

Date Started:	08/07/2019	Surface Elevation:	N/A	Well ID: MW-C-39, MW-C-156
Date Completed:	09/25/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	Dan O' Mara	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	Jario Pacheco	Borehole Diameter:	10-12 inches	
Logger:	Daniel Luneau	Water Level Start:	25.3 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	9/18/2019	
Total Depth:	161 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
1					(0.5 - 24.0') 2" PVC Sch 40 Casing (0.0 - 2.0') Concrete Pad		(0.0 - 2.0') 16.5 bags Note: 30 inch diameter sonotube incased concrete pad with 18 inch dia lockable vault, King Kon-Crete 4000 PSI
2							
3							
4							
5							
6							
7							
8					(0.9 - 16.0') Portland Cement 6% Bentonite	(0.9 - 16.0') 12.0" Borehole	(0.9 - 16.0') 69.4 gallons
9					(9.5 - 10.5') Centralizer		(0.9 - 16.0') 75 gallons (8%) Note: Type I, Type II, Type V with Hydrogel.
10							
11							
12							
13							
14							
15							
16							
17		Topock - Fluvial Deposits	GM				
18		Topock - Fluvial Deposits	ML		(16.0 - 22.0') Bentonite seal chips	(16.0 - 161.0') 10.0" Borehole	(16.0 - 22.0') 4.2 bags
19		Topock - Fluvial Deposits	ML				(16.0 - 22.0') 5 bags (19%) Note: Puregold Medium Chips
20							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measurement and groundwater samples collected during drilling of MW-Cd

Date Started: 08/07/2019	Surface Elevation: N/A	Well ID: MW-C-39, MW-C-156
Date Completed: 09/25/2019	Shallow Well Elevation: N/A	
Drilling Co.: Cascade	Deep Well Elevation: N/A	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): N/A	Project: Final GW Remedy Phase 1
Driller Name: Dan O' Mara	Easting (NAD83): N/A	Location: PG&E Topock, Needles, California
Drilling Asst: Jario Pacheco	Borehole Diameter: 10-12 inches	
Logger: Daniel Luneau	Water Level Start: 25.3 ft bgs	Project Number: RC000753.0051
Editor: Sean McGrane	Development End Date: 9/18/2019	
Total Depth: 161 ft bgs	Well Completion: <input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
21		Topock - Alluvium Deposits	ML		(0.5 - 24.0') 2" PVC Sch 40 Casing (16.0 - 22.0') Bentonite seal chips	(16.0 - 22.0') 4.2 bags	(16.0 - 22.0') 5 bags (19%) Note: Puregold Medium Chips
22		Topock - Alluvium Deposits	ML				
23		Topock - Alluvium Deposits	ML				
24		Topock - Alluvium Deposits	ML				
25		Topock - Alluvium Deposits	ML		(24.0 - 39.0') 2" Sch 40 PVC (20-slot) Screen		
26		Topock - Alluvium Deposits	ML				
27		Topock - Alluvium Deposits	ML				
28	MW-C-VAS-26-31 (380 ppb) 6/19/2019 10:35	Topock - Alluvium Deposits	ML				
29		Topock - Alluvium Deposits	ML				
30		Topock - Alluvium Deposits	ML				
31		Topock - Alluvium Deposits	ML		(22.0 - 43.3') Cemex #3 MESH (8x10)	(22.0 - 43.3') 20.5 bags	(22.0 - 43.3') 26 bags (27%) Note: Lapis Lustre Sand
32		Topock - Alluvium Deposits	ML				
33		Topock - Alluvium Deposits	ML				
34		Topock - Alluvium Deposits	ML				
35		Topock - Alluvium Deposits	ML				
36		Topock - Alluvium Deposits	ML				
37		Topock - Alluvium Deposits	SM				
38		Topock - Alluvium Deposits	SM				
39		Topock - Alluvium Deposits	SM		(39.0 - 39.2') Sum pand End Cap (39.5 - 40.5') Centralizer		
40		Topock - Alluvium Deposits	SM				Note: PVC plug installed to isolate filter pack sand in sump

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Date Started:	08/07/2019	Surface Elevation:	N/A	Well ID: MW-C-39, MW-C-156
Date Completed:	09/25/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	Dan O' Mara	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	Jario Pacheco	Borehole Diameter:	10-12 inches	
Logger:	Daniel Luneau	Water Level Start:	25.3 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	9/18/2019	
Total Depth:	161 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
41		Topock - Alluvium Deposits	SM				Note: Sump compromised and filled with filter pack sand
42						(22.0 - 43.3') 20.5 bags	
43	--No Sample-- (Interval did not produce) 6/19/2019 14:15	Topock - Alluvium Deposits	SM				
44							
45							
46							
47							
48	--No Sample-- (Interval did not produce) 6/20/2019 09:55						
49							
50							
51							
52					(43.3 - 134.0') Bentonite seal pellets	(43.3 - 134.0') 75.9 buckets	(43.3 - 134.0') 91 buckets (20%) Note: Pel-Plug (TR30) 3/8"
53	MW-C-VAS-51-56 (0.146 J ppb) 6/25/2019 12:00		NR				
54							
55							
56							
57							
58							
59							
60							

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WELL CONSTRUCTION DETAILS: PG&E TOPOCK C:\USERS\SMCGRANE\DOCUMENTS\PG&E TOPOCK\DATA\LOGS\GINT FILES\110719\TOPOCK DATA TEMPLATE FOR PLOG.GDT 11/07/19 08:28

Date Started:	08/07/2019	Surface Elevation:	N/A	Well ID: MW-C-39, MW-C-156
Date Completed:	09/25/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	Dan O' Mara	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	Jario Pacheco	Borehole Diameter:	10-12 inches	
Logger:	Daniel Luneau	Water Level Start:	25.3 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	9/18/2019	
Total Depth:	161 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
61					(0.6 - 136.0') 2" PVC Sch 80 Casing		
62							
63	--No Sample-- (Interval did not produce) 6/25/2019 13:15				(43.3 - 134.0') Bentonite seal pellets		(43.3 - 134.0') 91 buckets (20%) Note: Pel-Plug (TR30) 3/8"
64							
65							
66							
67							
68	MW-C-VAS-66-71 (<0.033 U ppb) 6/26/2019 10:44						
69							
70			NR		(69.5 - 70.5') Centralizer	(16.0 - 161.0') 10.0" Borehole	(43.3 - 134.0') 75.9 buckets
71							
72							
73							
74							
75							
76							
77							
78							
79							
80							

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Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	Dan O' Mara	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	Jario Pacheco	Borehole Diameter:	10-12 inches	
Logger:	Daniel Luneau	Water Level Start:	25.3 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	9/18/2019	
Total Depth:	161 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
81	MW-C-VAS-81-86 (<0.17 U ppb) 6/27/2019 10:58				(0.6 - 136.0') 2" PVC Sch 80 Casing		
82							
83							
84							
85							
86							
87							
88							
89							
90			NR		(16.0 - 161.0') 10.0" Borehole	(43.3 - 134.0') 75.9 buckets	
91							
92							
93							
94							
95							
96							
97							
98							
99							
100							

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Date Completed: 09/25/2019	Shallow Well Elevation: N/A	
Drilling Co.: Cascade	Deep Well Elevation: N/A	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): N/A	Project: Final GW Remedy Phase 1
Driller Name: Dan O' Mara	Easting (NAD83): N/A	Location: PG&E Topock, Needles, California
Drilling Asst: Jario Pacheco	Borehole Diameter: 10-12 inches	
Logger: Daniel Luneau	Water Level Start: 25.3 ft bgs	Project Number: RC000753.0051
Editor: Sean McGrane	Development End Date: 9/18/2019	
Total Depth: 161 ft bgs	Well Completion: <input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
101					(0.6 - 136.0') 2" PVC Sch 80 Casing		
102							
103							
104							
105							
106							
107							
108							
109							
110			NR		(109.5 - 110.5') Centralizer	(16.0 - 161.0') 10.0" Borehole	(43.3 - 134.0') 75.9 buckets
111							
112							
113							
114							
115							
116							
117							
118	MW-C-VAS-117-122 (<0.17 U ppb) 6/28/2019 14:59						
119							
120							

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Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	Dan O' Mara	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	Jario Pacheco	Borehole Diameter:	10-12 inches	
Logger:	Daniel Luneau	Water Level Start:	25.3 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	9/18/2019	
Total Depth:	161 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
121	MW-C-VAS-117-122 (<0.17 U ppb) 6/28/2019 14:59				(0.6 - 136.0') 2" PVC Sch 80 Casing		
122							
123							
124							
125							
126							
127						(43.3 - 134.0') 75.9 buckets	
128							
129							
130					(16.0 - 161.0') 10.0" Borehole		
131							
132							
133							
134							
135							
136							
137		Topock - Alluvium Deposits	ML		(134.0 - 161.0') Cemex #3 MESH (8x10)	(134.0 - 161.0') 28.3 bags	(134.0 - 161.0') 36 bags (27%) Note: Lapis Lustre Sand, used >20% of the calculated volume due to potential voids that formed during drilling.
138							
139		Topock - Alluvium Deposits	SM				
140							

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Date Started:	08/07/2019	Surface Elevation:	N/A	Well ID: MW-C-39, MW-C-156
Date Completed:	09/25/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	Dan O' Mara	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	Jario Pacheco	Borehole Diameter:	10-12 inches	
Logger:	Daniel Luneau	Water Level Start:	25.3 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	9/18/2019	
Total Depth:	161 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
141							
142		Topock - Alluvium Deposits	SM				
143							
144		Topock - Alluvium Deposits	ML				
145							
146							
147		Topock - Alluvium Deposits	ML				
148							
149	MW-C-VAS-147-152 (<0.17 U ppb) 6/29/2019 13:58						
150					(134.0 - 161.0') Cemex #3 MESH (8x10)	(16.0 - 161.0') 10.0" Borehole	(134.0 - 161.0') 28.3 bags
151							(134.0 - 161.0') 36 bags (27%) Note: Lapis Lustre Sand, used >20% of the calculated volume due to potential voids that formed during drilling.
152							
153							
154		Topock - Alluvium Deposits	SP-SM				
155							
156							
157					(156.5 - 157.5') Centralizer	(156.0 - 156.3') Sump and End Cap	Note: PVC plug installed to isolate filter pack sand in sump
158							Note: Sump compromised and filled with filter pack sand
159							
160							


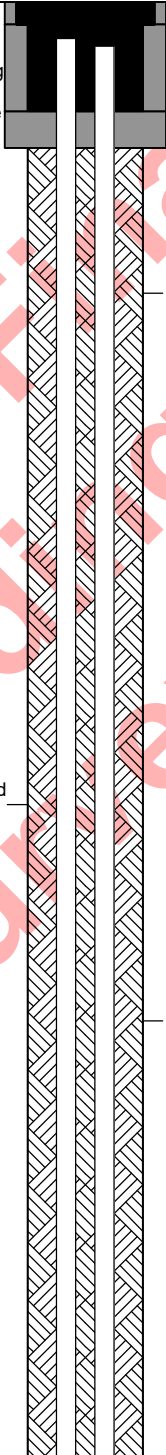
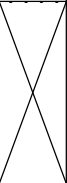

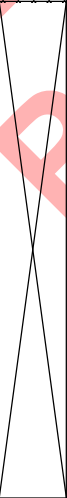
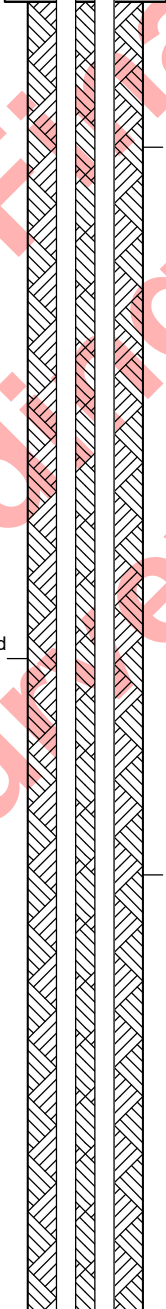


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Date Completed: 09/25/2019	Shallow Well Elevation: N/A	
Drilling Co.: Cascade	Deep Well Elevation: N/A	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): N/A	Project: Final GW Remedy Phase 1
Driller Name: Dan O' Mara	Easting (NAD83): N/A	Location: PG&E Topock, Needles, California
Drilling Asst: Jario Pacheco	Borehole Diameter: 10-12 inches	
Logger: Daniel Luneau	Water Level Start: 25.3 ft bgs	Project Number: RC000753.0051
Editor: Sean McGrane	Development End Date: 9/18/2019	
Total Depth: 161 ft bgs	Well Completion: <input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction			Calculated Material Volumes	Material Volumes Installed
161		Topock - Alluvium Deposits	SP-SM		(134.0 - 161.0') Cemex #3 MESH (8x10)		(16.0 - 161.0') 10.0" Borehole	(134.0 - 161.0') 28.3 bags	
162	<div>End of Boring at 161.0 'bgs.</div> <div>Draft Final Pending Final Survey 11/7/19</div>								
163									
164									
165									
166									
167									
168									
169									
170									
171									
172									
173									
174									
175									
176									
177									
178									
179									
180									

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Date Started: 07/17/2019	Surface Elevation: N/A	Well ID: MW-C-181, MW-C-218
Date Completed: 09/25/2019	Shallow Well Elevation: N/A	
Drilling Co.: Cascade	Deep Well Elevation: N/A	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): N/A	Project: Final GW Remedy Phase 1
Driller Name: Dan O'Mara	Easting (NAD83): N/A	Location: PG&E Topock, Needles, California
Drilling Asst: Jario Pacheco	Borehole Diameter: 10-12 inches	
Logger: Dave Cornell	Water Level Start: 28.11 ft bgs	Project Number: RC000753.0051
Editor: Grant Willford	Development End Date: 8/22/2019	
Total Depth: 221.5 ft bgs	Well Completion: <input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed			
1		Topock - Fill	SW		(0.5 - 171.0') 2" PVC Sch 80 Casing		(0.6 - 198.0') 2" PVC Sch 80 Casing	(0.0 - 2.0') 14.5 bags Note: 30 Inch diameter sonotube incased concrete pad with 18" dia lockable vault, King Kon-Crete 4000 PSI.		
2					(0.0 - 1.5') Concrete Pad					
3								Note: Removed ~18 inches of grout to install pad.		
4			NR				(0.0 - 8.0') 12.0" Borehole			
5										
6										
7		Topock - Fill	SW							
8										
9										
10										
11			NR		(2.0 - 25.7') Portland Cement 6% Bentonite			(2.0 - 25.7') 110 gallons (7%) Note: Type I, II and V and Benseal		
12										
13										
14										(8.0 - 221.5') 10.0" Borehole
15										
16										
17		Topock - Fluvial Deposits	SW							
18										
19		Topock - Fluvial Deposits	SM							
20										

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Date Completed:	09/25/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	Dan O'Mara	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	Jario Pacheco	Borehole Diameter:	10-12 inches	
Logger:	Dave Cornell	Water Level Start:	28.11 ft bgs	Project Number: RC000753.0051
Editor:	Grant Willford	Development End Date:	8/22/2019	
Total Depth:	221.5 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
21		Topock - Fluvial Deposits	GP		(0.5 - 171.0') 2" PVC Sch 80 Casing		
22					(21.5 - 22.5') Centralizer		
23			NR		(2.0 - 25.7') Portland Cement 6% Bentonite	(2.0 - 25.7') 102.4 gallons	(2.0 - 25.7') 110 gallons (7%) Note: Type I, II and V and Benseal
24							
25							
26							
27							
28	MW-C-VAS-26-31 (380 ppb) 6/19/2019 10:35						
29							
30							
31		Topock - Alluvium Deposits	SM		(8.0 - 221.5') 10.0" Borehole		
32							
33					(25.7 - 168.9') Bentonite seal chips	(25.7 - 168.9') 99.8 bags	(25.7 - 168.9') 103 bags (3%) Note: Puregold Medium Chips
34							
35							
36							
37		Topock - Alluvium Deposits	ML				
38							
39		Topock - Alluvium Deposits	SM				
40							

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Drilling Method:	Sonic Drilling	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	Dan O'Mara	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	Jario Pacheco	Borehole Diameter:	10-12 inches	
Logger:	Dave Cornell	Water Level Start:	28.11 ft bgs	Project Number: RC000753.0051
Editor:	Grant Willford	Development End Date:	8/22/2019	
Total Depth:	221.5 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
41					(0.5 - 171.0') 2" PVC Sch 80 Casing		
42							
43	--No Sample-- (Interval did not produce) 6/19/2019 14:15	Topock - Alluvium Deposits	SM				
44							
45							
46		Topock - Alluvium Deposits	SM				
47		Topock - Alluvium Deposits	GW-GM				
48	--No Sample-- (Interval did not produce) 6/20/2019 09:55	Topock - Alluvium Deposits	SM				
49		Topock - Alluvium Deposits	GM				
50		Topock - Alluvium Deposits	GM		(25.7 - 168.9') Bentonite seal chips	(8.0 - 221.5') 10.0" Borehole	(25.7 - 168.9') 99.8 bags
51							(25.7 - 168.9') 103 bags (3%) Note: Puregold Medium Chips
52							
53	MW-C-VAS-51-56 (0.146 J ppb) 6/25/2019 12:00	Topock - Alluvium Deposits	SM				
54							
55		Topock - Alluvium Deposits	SW				
56		Topock - Alluvium Deposits	SW-SM				
57		Topock - Alluvium Deposits	ML				
58		Topock - Alluvium Deposits	ML				
59		Topock - Alluvium Deposits	ML				
60							




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Date Started: 07/17/2019	Surface Elevation: N/A	Well ID: MW-C-181, MW-C-218
Date Completed: 09/25/2019	Shallow Well Elevation: N/A	
Drilling Co.: Cascade	Deep Well Elevation: N/A	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): N/A	Project: Final GW Remedy Phase 1
Driller Name: Dan O'Mara	Easting (NAD83): N/A	Location: PG&E Topock, Needles, California
Drilling Asst: Jario Pacheco	Borehole Diameter: 10-12 inches	
Logger: Dave Cornell	Water Level Start: 28.11 ft bgs	Project Number: RC000753.0051
Editor: Grant Willford	Development End Date: 8/22/2019	
Total Depth: 221.5 ft bgs	Well Completion: <input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
61			ML		(0.5 - 171.0') 2" PVC Sch 80 Casing		
62		Topock - Alluvium Deposits	GM		(61.5 - 62.5') Centralizer		
63	--No Sample-- (Interval did not produce) 6/25/2019 13:15						
64		Topock - Alluvium Deposits	GW-GM				
65							
66							
67							
68	MW-C-VAS-66-71 (<0.033 U ppb) 6/26/2019 10:44	Topock - Alluvium Deposits	SW-SM				
69							
70					(25.7 - 168.9') Bentonite seal chips	(8.0 - 221.5') 10.0" Borehole	(25.7 - 168.9') 99.8 bags
71							(25.7 - 168.9') 103 bags (3%) Note: Puregold Medium Chips
72							
73							
74							
75		Topock - Alluvium Deposits	ML				
76							
77							
78							
79							
80							

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Date Started:	07/17/2019	Surface Elevation:	N/A	Well ID: MW-C-181, MW-C-218
Date Completed:	09/25/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	Dan O'Mara	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	Jario Pacheco	Borehole Diameter:	10-12 inches	
Logger:	Dave Cornell	Water Level Start:	28.11 ft bgs	Project Number: RC000753.0051
Editor:	Grant Willford	Development End Date:	8/22/2019	
Total Depth:	221.5 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
81	MW-C-VAS-81-86 (<0.17 U ppb) 6/27/2019 10:58	Topock - Alluvium Deposits	ML		(0.5 - 171.0') 2" PVC Sch 80 Casing	(0.6 - 198.0') 2" PVC Sch 80 Casing	
82							
83		Topock - Alluvium Deposits	SW-SM				
84							
85		Topock - Alluvium Deposits	GM				
86							
87							
88							
89							
90					(25.7 - 168.9') Bentonite seal chips	(8.0 - 221.5') 10.0" Borehole	(25.7 - 168.9') 99.8 bags
91							(25.7 - 168.9') 103 bags (3%) Note: Puregold Medium Chips
92							
93							
94							
95							
96							
97							
98							
99							
100							

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Date Started: 07/17/2019	Surface Elevation: N/A	Well ID: MW-C-181, MW-C-218
Date Completed: 09/25/2019	Shallow Well Elevation: N/A	
Drilling Co.: Cascade	Deep Well Elevation: N/A	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): N/A	Project: Final GW Remedy Phase 1
Driller Name: Dan O'Mara	Easting (NAD83): N/A	Location: PG&E Topock, Needles, California
Drilling Asst: Jario Pacheco	Borehole Diameter: 10-12 inches	
Logger: Dave Cornell	Water Level Start: 28.11 ft bgs	Project Number: RC000753.0051
Editor: Grant Willford	Development End Date: 8/22/2019	
Total Depth: 221.5 ft bgs	Well Completion: <input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
101		Topock - Alluvium Deposits	GM		(0.5 - 171.0') 2" PVC Sch 80 Casing		
102		Topock - Alluvium Deposits	MH		(101.5 - 102.5') Centralizer		
103		Topock - Alluvium Deposits	ML				
104		Topock - Alluvium Deposits	ML				
105		Topock - Alluvium Deposits	MH				
106		Topock - Alluvium Deposits	MH				
107							
108							
109							
110					(25.7 - 168.9') Bentonite seal chips	(8.0 - 221.5') 10.0" Borehole	(25.7 - 168.9') 99.8 bags
111		Topock - Alluvium Deposits	ML				(25.7 - 168.9') 103 bags (3%) Note: Puregold Medium Chips
112							
113							
114							
115							
116							
117							
118	MW-C-VAS-117-122 (<0.17 U ppb) 6/28/2019 14:59		NR				
119							
120							

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Date Started:	07/17/2019	Surface Elevation:	N/A	Well ID: MW-C-181, MW-C-218
Date Completed:	09/25/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	Dan O'Mara	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	Jario Pacheco	Borehole Diameter:	10-12 inches	
Logger:	Dave Cornell	Water Level Start:	28.11 ft bgs	Project Number: RC000753.0051
Editor:	Grant Willford	Development End Date:	8/22/2019	
Total Depth:	221.5 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
121	MW-C-VAS-117-122 (<0.17 U ppb) 6/28/2019 14:59	Topock - Alluvium Deposits	ML		(0.5 - 171.0') 2" PVC Sch 80 Casing		
122							
123		Topock - Alluvium Deposits	SW-SM				
124							
125							
126		Topock - Alluvium Deposits	ML				
127							
128							
129							
130					(25.7 - 168.9') Bentonite seal chips	(8.0 - 221.5') 10.0" Borehole	(25.7 - 168.9') 99.8 bags
131							(25.7 - 168.9') 103 bags (3%) Note: Puregold Medium Chips
132		Topock - Alluvium Deposits	MH				
133							
134		Topock - Alluvium Deposits	SM				
135							
136							
137		Topock - Alluvium Deposits	MH				
138							
139							
140							

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Date Started: 07/17/2019	Surface Elevation: N/A	Well ID: MW-C-181, MW-C-218
Date Completed: 09/25/2019	Shallow Well Elevation: N/A	
Drilling Co.: Cascade	Deep Well Elevation: N/A	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): N/A	Project: Final GW Remedy Phase 1
Driller Name: Dan O'Mara	Easting (NAD83): N/A	Location: PG&E Topock, Needles, California
Drilling Asst: Jario Pacheco	Borehole Diameter: 10-12 inches	
Logger: Dave Cornell	Water Level Start: 28.11 ft bgs	Project Number: RC000753.0051
Editor: Grant Willford	Development End Date: 8/22/2019	
Total Depth: 221.5 ft bgs	Well Completion: <input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
141			MH		(0.5 - 171.0') 2" PVC Sch 80 Casing		
142		Topock - Alluvium Deposits	MH		(141.5 - 142.5') Centralizer		
143							
144		Topock - Alluvium Deposits	ML				
145		Topock - Alluvium Deposits	MH				
146		Topock - Alluvium Deposits	GW-GM				
147		Topock - Alluvium Deposits	GM				
148							
149	MW-C-VAS-147-152 (<0.17 U ppb) 6/29/2019 13:58	Topock - Alluvium Deposits	ML				
150		Topock - Alluvium Deposits	SW-SM		(25.7 - 168.9') Bentonite seal chips	(8.0 - 221.5') 10.0" Borehole	(25.7 - 168.9') 99.8 bags
151							(25.7 - 168.9') 103 bags (3%) Note: Puregold Medium Chips
152		Topock - Alluvium Deposits	SW-SM				
153							
154		Topock - Alluvium Deposits	GM				
155							
156		Topock - Alluvium Deposits	GW-GM				
157							
158		Topock - Alluvium Deposits	SW-SM				
159							
160							

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Date Started:	07/17/2019	Surface Elevation:	N/A	Well ID: MW-C-181, MW-C-218
Date Completed:	09/25/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	Dan O'Mara	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	Jario Pacheco	Borehole Diameter:	10-12 inches	
Logger:	Dave Cornell	Water Level Start:	28.11 ft bgs	Project Number: RC000753.0051
Editor:	Grant Willford	Development End Date:	8/22/2019	
Total Depth:	221.5 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
161		Topock - Alluvium Deposits	SM		(0.5 - 171.0') 2" PVC Sch 80 Casing		
162							
163		Topock - Alluvium Deposits	GM				
164							
165					(25.7 - 168.9') Bentonite seal chips	(25.7 - 168.9') 99.8 bags	(25.7 - 168.9') 103 bags (3%) Note: Puregold Medium Chips
166		Topock - Alluvium Deposits	GW-GM				
167	MW-C-VAS-165-170 (<0.17 U ppb) 6/30/2019 11:04						
168		Topock - Alluvium Deposits	SM				
169							
170		Topock - Alluvium Deposits	SM				
171							
172					(171.0 - 181.0') 2" Sch 80 PVC (20-slot) Screen		
173		Topock - Alluvium Deposits	ML				
174							
175					(168.9 - 183.1') Cemex #3 MESH (8x10)	(168.9 - 183.1') 15.3 bags	(168.9 - 183.1') 19 bags (24%) Note: Lapis Lustre Sand, used >20% of the calculated volume due to potential voids that formed during drilling.
176		Topock - Alluvium Deposits	GM				
177		Topock - Alluvium Deposits	GW				
178	MW-C-VAS-176-181 (410 ppb) 7/1/2019 16:02	Topock - Alluvium Deposits	ML				
179		Topock - Alluvium Deposits	ML				
180		Topock - Alluvium	ML				

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Date Started: 07/17/2019	Surface Elevation: N/A	Well ID: MW-C-181, MW-C-218
Date Completed: 09/25/2019	Shallow Well Elevation: N/A	
Drilling Co.: Cascade	Deep Well Elevation: N/A	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): N/A	Project: Final GW Remedy Phase 1
Driller Name: Dan O'Mara	Easting (NAD83): N/A	Location: PG&E Topock, Needles, California
Drilling Asst: Jario Pacheco	Borehole Diameter: 10-12 inches	
Logger: Dave Cornell	Water Level Start: 28.11 ft bgs	Project Number: RC000753.0051
Editor: Grant Willford	Development End Date: 8/22/2019	
Total Depth: 221.5 ft bgs	Well Completion: <input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
181		Deposits Topock - Alluvium Deposits	ML		(171.0 - 181.0') 2" Sch 80 PVC (20-slot) Screen (168.9 - 183.1') Cemex #3 MESH (8x10) (181.5 - 182.5') Centralizer	(0.6 - 198.0') 2" PVC Sch 80 Casing	
182		Topock - Alluvium Deposits	ML				(168.9 - 183.1') 15.3 bags Note: Lapis Lustre Sand, used >20% of the calculated volume due to potential voids that formed during drilling.
183		Topock - Alluvium Deposits	ML				
184		Topock - Alluvium Deposits	ML		(181.0 - 183.3') Sump and End Cap		
185		Topock - Alluvium Deposits	ML				
186		Topock - Alluvium Deposits	ML				
187		Topock - Alluvium Deposits	SW-SM				
188	MW-C-VAS-185-191 (<0.17 U ppb) 7/1/2019 12:00	Topock - Alluvium Deposits	SM		(183.1 - 195.9') Bentonite seal pellets	(8.0 - 221.5') 10.0" Borehole	(183.1 - 195.9') 12.2 buckets (183.1 - 195.9') 13 buckets (7%) Note: Pel-Plug (TR30) 3/8"
189		Topock - Alluvium Deposits	SM				
190		Topock - Alluvium Deposits	SM				
191		Topock - Alluvium Deposits	ML				
192		Topock - Alluvium Deposits	GW-GM				
193		Topock - Alluvium Deposits	ML				
194		Topock - Alluvium Deposits	SM				
195		Topock - Alluvium Deposits	SM				
196		Topock - Alluvium Deposits	ML				
197		Topock - Alluvium Deposits	ML				
198		Topock - Alluvium Deposits	SM		(195.9 - 221.5') Cemex #3 MESH (8x10)	(198.0 - 218.0') 2" PVC Sch 80 Screen	(195.9 - 221.5') 27.8 bags (195.9 - 221.5') 31 bags (12%) Note: Lapis Lustre Sand
199		Topock - Alluvium Deposits	SM				
200		Topock - Alluvium Deposits	SM				

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Date Started:	07/17/2019	Surface Elevation:	N/A	Well ID: MW-C-181, MW-C-218
Date Completed:	09/25/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	Dan O'Mara	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	Jario Pacheco	Borehole Diameter:	10-12 inches	
Logger:	Dave Cornell	Water Level Start:	28.11 ft bgs	Project Number: RC000753.0051
Editor:	Grant Willford	Development End Date:	8/22/2019	
Total Depth:	221.5 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction		Calculated Material Volumes	Material Volumes Installed
201	MW-C-VAS-200-205 (<0.17 U ppb) 7/2/2019 15:24	Topock - Alluvium Deposits	ML			(198.0 - 218.0') 2" PVC Sch 80 Screen		
202								
203								
204								
205								
206		Topock - Alluvium Deposits	SM		(195.9 - 221.5') Cemex #3 MESH (8x10)	(8.0 - 221.5') 10.0" Borehole	(195.9 - 221.5') 27.8 bags	(195.9 - 221.5') 31 bags (12%) Note: Lapis Lustre Sand
207								
208								
209		Topock - Alluvium Deposits	SW-SM					
210								
211								
212		Topock - Alluvium Deposits	ML					
213								
214								
215		Topock - Weathered Bedrock - conglomerate	MH					
216								
217	MW-C-VAS-216-221 (<0.17 U ppb) 7/3/2019 11:09	Topock - Weathered Bedrock - conglomerate	SM		(218.5 - 219.5') Centralizer			
218								
219		Topock - Competent Bedrock - conglomerate						
220								

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Date Started:	07/17/2019	Surface Elevation:	N/A	Well ID: MW-C-181, MW-C-218
Date Completed:	09/25/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	Dan O'Mara	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	Jario Pacheco	Borehole Diameter:	10-12 inches	
Logger:	Dave Cornell	Water Level Start:	28.11 ft bgs	Project Number: RC000753.0051
Editor:	Grant Willford	Development End Date:	8/22/2019	
Total Depth:	221.5 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction		Calculated Material Volumes	Material Volumes Installed
221		Topock - Competent Bedrock - conglomerate			(195.9 - 221.5') Cemex #3 MESH (8x10)	(218.0 - 220.3') Sump and End Cap	(195.9 - 221.5') 27.8 bags	(195.9 - 221.5') 31 bags (12%) Note: Lapis Lustre Sand
222					End of Boring at 221.5 'bgs.			
223								
224								
225								
226								
227								
228								
229								
230								
231								
232								
233								
234								
235								
236								
237								
238								
239								
240								






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Date Started:	06/16/2019	Surface Elevation:	N/A	Boring No.: <u>MW-Cd</u>
Date Completed:	07/14/2019	Northing (NAD83):	N/A	
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	221.5 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Terrasonic track mount	Borehole Diameter:	10-12 inches	Location: PG&E Topock, Needles, California
Driller Name:	Dan O'Mara	Depth to First Water:	28.11 ft bgs	
Drilling Asst:	Jario Pacheco	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger:	CS / AM / DC	Sampling Interval:	Continuous	
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid				
1	36	No Sieve Samples Collected		Topock - Fill	SW		(0.0 - 3.5') Topock - Fill; Well graded sand (SW); dark yellowish brown (10YR 4/6); fine grained to medium grained, angular to subround; trace granules to medium pebbles, subangular to round; trace silt; dry	(0.0 - 21.0') Drill rod broke down hole core barrel had to be fished out.	(0.0 - 26.0') No water used				
2													
3													
4	NR				(3.5 - 6.0') No recovery (NR); interpertaion of where recovery was lost changed from draft logs based on drilling notes of core falling out of core barrel and review of core photo logs	(3.5') Loose sediments falling out of core barrel leading to no recovery.							
5													
6													
7	38.4					Topock - Fill	SW			(6.0 - 9.2') Topock - Fill; Well graded sand (SW); dark yellowish brown (10YR 4/6) trace black (10YR 2/1); fine grained to medium grained, subangular to subround; trace granules to small pebbles, subangular to subround; trace silt; moist	(6.0') Loose loose sediments falling out of core barrel leading to no recovery.		
8													
9													
10													
11	60				NR		(9.2 - 16.0') No recovery (NR); interpertaion of where recovery was lost changed from draft logs based on drilling notes of core falling out of core barrel and review of core photo logs	(16.0') Loose sediments falling out of core barrel leading to no recovery, with slough at top of core.					
12													
13													
14													
15													
16													
17				Topock - Fluvial Deposits	SW		(16.0 - 18.2') Topock - Fluvial Deposits; Well graded sand with gravel (SW); dark yellowish brown (10YR 4/6) trace black (10YR 2/1); fine grained to medium grained, subangular to subround; little granules to medium pebbles, subangular to round; trace silt; dry						
18													
19							Topock - Fluvial Deposits		SM		(18.2 - 20.0') Topock - Fluvial Deposits; Silty sand with gravel (SM); dark brown (10YR 3/3); very fine grained to very coarse grained, angular to subangular; some granules to very large pebbles, angular to subangular; little silt; trace small cobbles, subangular; dry		
20													

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Date Started:	06/16/2019	Surface Elevation:	N/A	Boring No.: <u>MW-Cd</u>	
Date Completed:	07/14/2019	Northing (NAD83):	N/A		
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	221.5 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Terrasonic track mount	Borehole Diameter:	10-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Dan O'Mara	Depth to First Water:	28.11 ft bgs		
Drilling Asst:	Jario Pacheco	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	CS / AM / DC	Sampling Interval:	Continuous		
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
21	60			Topock - Fluvial Deposits	GP		(20.0 - 21.0') Topock - Fluvial Deposits; Poorly graded gravel (GP); pulverized boulder		(0.0 - 26.0') No water used
22				NR	NR		(21.0 - 26.0') No recovery (NR); interperatation of where recovery was lost changed from draft logs based on drilling notes of core falling out of core barrel and review of core photo logs		
23									
24								(24.0 - 26.0') Rough drilling.	
25	120	No Sieve Samples Collected	MW-C-VAS-26-31 (380 ppb) 6/19/2019 10:35	Topock - Alluvium Deposits	SM		(26.0 - 36.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); dark brown (10YR 3/3) little strong brown (7.5YR 4/6); very fine grained to very coarse grained, angular to subangular; some granules to very large pebbles, angular to subangular; some silt; wet; mottled (27'); slight decrease in silt, no mottling	(26.0') Approximate depth to water.	(26.0 - 36.0') 15 gallons of water used; 0 gallons of water recovered; 15 gallons of water lost
26									
27									
28									
29									
30									
31									
32									
33							(32.5'); little silt; weak cementation; increase in granules to very large pebbles, decrease in silt		
34									
35									
36									
37	120			Topock - Alluvium Deposits	ML		(36.0 - 38.0') Topock - Alluvium Deposits; Sandy silt with gravel (ML); brown (10YR 4/3); no plasticity, no dilatency; some granules to very large pebbles, subangular to subround; some fine to coarse grained sand, subangular to subround; trace small cobbles, angular to subround; coarser clasts composed of metadiorite; wet; soft	(36.0 - 46.0') Rough drilling.	(36.0 - 150.0') No water used
38				Topock - Alluvium Deposits	SM		(38.0 - 45.8') Topock - Alluvium Deposits; Silty sand with gravel (SM); dark yellowish brown (10YR 4/4); very fine grained to very coarse grained, subangular to subround; little granules to very large pebbles, angular to subround; little silt; trace small cobbles, subangular; coarser clasts composed of metadiorite; moist to dry; moderate cementation		
39									
40									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measurement collected during the first VAS interval

Date Started:	06/16/2019	Surface Elevation:	N/A	Boring No.: <u>MW-Cd</u>	
Date Completed:	07/14/2019	Northing (NAD83):	N/A		
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	221.5 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Terrasonic track mount	Borehole Diameter:	10-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Dan O'Mara	Depth to First Water:	28.11 ft bgs		
Drilling Asst:	Jario Pacheco	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	CS / AM / DC	Sampling Interval:	Continuous		
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
41	120						(41') brown (7.5YR 4/4) some light reddish brown(2.5YR 7/3); some silt; mottled; moderate cementation; decrease in granules to very large pebbles	(36.0 - 46.0') Rough drilling.	(36.0 - 150.0') No water used
42								(41.0') Installed sample screen to get below cemented layer.	
43			--No Sample-- (Interval did not produce) 6/19/2019 14:15	Topock - Alluvium Deposits	SM				
44							(44') little granules to small pebbles, subangular to subround; little silt; weak cementation; decrease in pebble grain size, increase in very fine to very coarse sand		
45									
46				Topock - Alluvium Deposits	SM		(45.8 - 47.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); strong brown (7.5YR 4/6); very fine grained to very coarse grained, subangular to subround; some granules to large pebbles, subangular to subround; some silt; wet to moist		
47				Topock - Alluvium Deposits	GW-GM		(47.0 - 48.0') Topock - Alluvium Deposits; Well graded gravel with silt and sand (GW-GM); brown (7.5YR 4/4); granules to very large pebbles, subangular to subround; some fine to very coarse grained sand, subangular to subround; little silt; coarser clasts composed of metadiorite; wet		
48	60		--No Sample-- (Interval did not produce) 6/20/2019 09:55	Topock - Alluvium Deposits	SM		(48.0 - 49.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); strong brown (7.5YR 4/6); very fine grained to coarse grained, subangular to subround; some granules to large pebbles, subangular to subround; some silt; coarser clasts composed of metadiorite; wet to moist; trace silt nodules		
49				Topock - Alluvium Deposits	GM		(49.5 - 51.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); brown (7.5YR 4/4); granules to small pebbles, subangular to subround; little fine to very coarse grained sand, subangular to subround; little silt; coarser clasts composed of metadiorite; wet	(50.0 - 51.0') Rough drilling.	
50									
51									
52				Topock - Alluvium Deposits	SM		(51.0 - 54.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 4/3) trace dark reddish brown (2.5YR 3/4); very fine grained to very coarse grained, angular to subround; some granules to very large pebbles, angular to subangular; little silt; trace small cobbles, subangular; coarser clasts composed of metadiorite; wet; mottled; interbedded silt lenses		
53	60		MW-C-VAS-51-56 (0.146 J ppb) 6/25/2019 12:00						
54				Topock - Alluvium Deposits	SW		(54.5 - 55.5') Topock - Alluvium Deposits; Well graded sand with gravel (SW); brown (10YR 4/3); very fine grained to very coarse grained, angular to subround; some granules to very large pebbles, angular to subangular; trace small cobbles, subround; trace silt; trace mica; wet; trace silt nodules, coarser clasts consist of conglomerate and metadiorite		
55				Topock - Alluvium Deposits	SW-SM				
56				Topock - Alluvium Deposits	ML		(55.5 - 56.0') Topock - Alluvium Deposits; Well graded sand with silt and gravel (SW-SM); brown (10YR 4/3); very fine grained to very coarse grained, angular to subround; little granules to very large pebbles, angular to subround; little silt; coarser clasts composed of metadiorite; wet		
57									
58	120			Topock - Alluvium Deposits	ML		(56.0 - 57.5') Topock - Alluvium Deposits; Sandy silt with gravel (ML); brown (10YR 5/3); angular to subangular; low plasticity; some small to medium pebbles, angular to subangular; some medium to very coarse grained sand, subangular to subround; moist; medium stiff		
59				Topock - Alluvium Deposits	ML		(57.5 - 59.0') Topock - Alluvium Deposits; Sandy silt with gravel (ML); brown (10YR 4/3); low plasticity; some granules to very large pebbles, angular to subround; some medium to very coarse		
60									




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Date Started:	06/16/2019	Surface Elevation:	N/A	Boring No.: <u>MW-Cd</u>	
Date Completed:	07/14/2019	Northing (NAD83):	N/A		
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	221.5 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Terrasonic track mount	Borehole Diameter:	10-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Dan O'Mara	Depth to First Water:	28.11 ft bgs		
Drilling Asst:	Jario Pacheco	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	CS / AM / DC	Sampling Interval:	Continuous		
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
61	120				ML		grained sand, subangular to subround; trace small cobbles, angular to subangular; moist; medium stiff		(36.0 - 150.0') No water used
62				Topock - Alluvium Deposits	GM		(59.0 - 60.8') Topock - Alluvium Deposits; Gravelly silt with sand (ML); (10Y 4/3); low plasticity; and granules to very large pebbles, angular to subround; some small cobbles, angular to subangular; little medium to very coarse grained sand, subangular to subround; moist	(61.0 - 66.0') Rough drilling.	
63			--No Sample-- (Interval did not produce) 6/25/2019 13:15				(60.8 - 63.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); brown (10YR 4/3); granules to large cobbles, angular to subround; and silt; little fine to very coarse grained sand, subangular to subround; moist; moderate cementation		
64				Topock - Alluvium Deposits	GW-GM		(63.0 - 65.9') Topock - Alluvium Deposits; Well graded gravel with silt and sand (GW-GM); brown (10YR 4/3); granules to small cobbles, subangular to round; some fine to very coarse grained sand, subangular to subround; little silt; moist		
65									
66									
67									
68	60		MW-C-VAS-66-71 (<0.033 U ppb) 6/26/2019 10:44	Topock - Alluvium Deposits	SW-SM		(65.9 - 71.0') Topock - Alluvium Deposits; Well graded sand with silt and gravel (SW-SM); brown (10YR 4/3); fine grained to very coarse grained, angular to subround; some granules to large pebbles, angular to subround; little silt; moist; weak cementation	(66.0 - 71.0') Soft drilling.	
69									
70		No Sieve Samples Collected							
71									
72									
73									
74									
75	162			Topock - Alluvium Deposits	ML		(71.0 - 84.6') Topock - Alluvium Deposits; Gravelly silt with sand (ML); brown (10YR 4/3); some granules to very large pebbles, angular to subangular; little fine to very coarse grained sand, angular to subround; moist to dry; coarser clast composed of weathered metadiorite	(71.0 - 86.0') Rough drilling.	
76									
77									
78									
79									
80									

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Date Started:	06/16/2019	Surface Elevation:	N/A	Boring No.: MW-Cd	
Date Completed:	07/14/2019	Northing (NAD83):	N/A		
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	221.5 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Terrasonic track mount	Borehole Diameter:	10-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Dan O'Mara	Depth to First Water:	28.11 ft bgs		
Drilling Asst:	Jario Pacheco	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	CS / AM / DC	Sampling Interval:	Continuous		
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
81	162		MW-C-VAS-81-86 (<0.17 U ppb) 6/27/2019 10:58	Topock - Alluvium Deposits	ML			(71.0 - 86.0') Rough drilling.	(36.0 - 150.0') No water used
82									
83									
84									
85				Topock - Alluvium Deposits	SW-SM		(84.6 - 86.0') Topock - Alluvium Deposits; Well graded sand with silt and gravel (SW-SM); reddish brown (5YR 5/3); medium grained to very coarse grained, subangular to subround; some small to medium pebbles, angular to subangular; little silt; moist		
86	207.6	No Sieve Samples Collected		Topock - Alluvium Deposits	GM		(86.0 - 101.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); brown (10YR 4/3); granules to very large pebbles, angular to subround; some medium to very coarse grained sand, angular to subround; some silt; little coarser clasts composed of metadiorite; moist to dry; moderate cementation	(86.0 - 106.0') Rough drilling.	
87									
88									
89									
90									
91									
92									
93									
94									
95									
96									
97									
98									
99									
100									

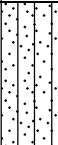

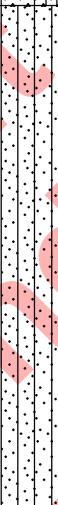


Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measurement collected during the first VAS interval

Date Started:	06/16/2019	Surface Elevation:	N/A	Boring No.: <u>MW-Cd</u>
Date Completed:	07/14/2019	Northing (NAD83):	N/A	
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	221.5 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Terrasonic track mount	Borehole Diameter:	10-12 inches	Location: PG&E Topock, Needles, California
Driller Name:	Dan O'Mara	Depth to First Water:	28.11 ft bgs	
Drilling Asst:	Jario Pacheco	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger:	CS / AM / DC	Sampling Interval:	Continuous	
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
101	207.6			Topock - Alluvium Deposits	GM		(101.0 - 103.0') Topock - Alluvium Deposits; Gravelly elastic silt with sand (MH); brown (10YR 4/3); medium plasticity; some granules to very large pebbles, angular to subround; little coarse to very coarse grained sand; little clay; little coarser clasts composed of metadiorite; dry; medium stiff; moderate cementation	(86.0 - 106.0') Rough drilling.	(36.0 - 150.0') No water used
102				Topock - Alluvium Deposits	MH		(103.0 - 104.0') Topock - Alluvium Deposits; Gravelly silt with sand (ML); brown (10YR 4/3); low plasticity; some small to very large pebbles, angular to subround; some medium to very coarse grained sand, subangular to subround; trace small cobbles, subangular to subround; moist; medium stiff; moderate cementation	(106.0 - 116.0') Rough drilling.	
103				Topock - Alluvium Deposits	ML		(104.0 - 104.5') Topock - Alluvium Deposits; Gravelly silt with sand (ML); brown (10YR 4/3); low plasticity; some granules to very large pebbles, angular to subround; little medium to very coarse grained sand, subangular to subround; trace small cobbles, angular to subangular; dry; medium stiff; moderate cementation		
104				Topock - Alluvium Deposits	ML		(104.5 - 106.0') Topock - Alluvium Deposits; Gravelly elastic silt with sand (MH); dark grayish brown / dark yellowish brown (10YR 4/2); medium plasticity; some granules to large pebbles, angular to subangular; some clay; little medium to very coarse grained sand, subangular to subround; moist		
105	192	No Sieve Samples Collected		Topock - Alluvium Deposits	MH		(106.0 - 116.0') Topock - Alluvium Deposits; Silty sand with gravel (ML); brown (7.5YR 4/3); low plasticity; some granules to large pebbles, angular to subround; some medium to very coarse grained sand, angular to subround; moist; soft; moderate cementation	(116.0 - 126.0') Rough drilling. Core fell out during drill run when core barrel got stuck.	
106				Topock - Alluvium Deposits	ML		(116.0 - 120.0') No recovery (NR)		
107									
108									
109									
110									
111									
112									
113									
114									
115									
116									
117									
118									
119									
120									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measurement collected during the first VAS interval

Date Started:	06/16/2019	Surface Elevation:	N/A	Boring No.: <u>MW-Cd</u>	
Date Completed:	07/14/2019	Northing (NAD83):	N/A		
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	221.5 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Terrasonic track mount	Borehole Diameter:	10-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Dan O'Mara	Depth to First Water:	28.11 ft bgs		
Drilling Asst:	Jario Pacheco	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	CS / AM / DC	Sampling Interval:	Continuous		
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid		
121	192		MW-C-VAS-117-122 (<0.17 U ppb) 6/28/2019 14:59	Topock - Alluvium Deposits	ML		(120.0 - 122.0') Topock - Alluvium Deposits; Sandy silt with gravel (ML); brown (7.5YR 4/3); low plasticity; some granules to very large pebbles, subangular to subround; some medium to very coarse grained sand, subangular to subround; wet; soft; moderate cementation	(116.0 - 126.0') Rough drilling. Core fell out during drill run when core barrel got stuck.	(36.0 - 150.0') No water used		
122				Topock - Alluvium Deposits	SW-SM		(122.0 - 125.1') Topock - Alluvium Deposits; Well graded sand with silt and gravel (SW-SM); brown (10YR 4/3); very fine grained to very coarse grained, subangular to subround; some granules to medium pebbles, angular to subround; little silt; wet; weak cementation				
123											
124											
125											
126	120	No Sieve Samples Collected		Topock - Alluvium Deposits	ML		(125.1 - 132.0') Topock - Alluvium Deposits; Sandy silt with gravel (ML); dark yellowish brown (10YR 4/4); low plasticity; some medium to very coarse grained sand, subangular to subround; little granules to very large pebbles, angular to subround; trace small cobbles, subround; moist to wet; very soft; moderate cementation	(126.0 - 136.0') Soft drilling.			
127											
128											
129											
130											
131	117.6			Topock - Alluvium Deposits	MH		(132.0 - 133.0') Topock - Alluvium Deposits; Sandy elastic silt with gravel (MH); brown (7.5YR 4/3); medium plasticity; some medium to very coarse grained sand, subangular to subround; some clay; little granules to very large pebbles, angular to subround; trace small cobbles, subround; wet; soft; moderate cementation	(136.0 - 146.0') Rough drilling.			
133							Topock - Alluvium Deposits		SM		(133.0 - 136.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 5/4); very fine grained to very coarse grained, angular to subround; some granules to medium pebbles, angular to subround; some silt; moist; weak cementation
134											
135											
136							117.6				Topock - Alluvium Deposits
137											
138											
139											
140											

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measurement collected during the first VAS interval

Date Started:	06/16/2019	Surface Elevation:	N/A	Boring No.: <u>MW-Cd</u>	
Date Completed:	07/14/2019	Northing (NAD83):	N/A		
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	221.5 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Terrasonic track mount	Borehole Diameter:	10-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Dan O'Mara	Depth to First Water:	28.11 ft bgs		
Drilling Asst:	Jario Pacheco	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	CS / AM / DC	Sampling Interval:	Continuous		
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
141	117.6			Topock - Alluvium Deposits	MH		(140.5 - 143.5') Topock - Alluvium Deposits; Gravelly elastic silt (MH); brown (7.5YR 4/3); medium plasticity; some granules to medium pebbles, angular to subangular; little clay; trace medium to very coarse grained sand, angular to subround; wet to moist; soft; weak cementation	(136.0 - 146.0') Rough drilling.	(36.0 - 150.0') No water used
142					MH				
143									
144									
145	120	No Sieve Samples Collected	MW-C-VAS-147-152 (<0.17 U ppb) 6/29/2019 13:58	Topock - Alluvium Deposits	ML		(143.5 - 143.8') Topock - Alluvium Deposits; Silt (ML); brown (10YR 4/3); no plasticity; trace granules to small pebbles, subangular to subround; trace very fine to medium grained sand, subangular to subround; moist; soft; weak cementation		
146				Topock - Alluvium Deposits	MH		(143.8 - 145.0') Topock - Alluvium Deposits; Elastic silt (MH); brown (10YR 4/3); medium plasticity; little clay; trace granules to small pebbles, subangular to subround; trace fine to medium grained sand, subangular to subround; dry; soft; weak cementation		
147				Topock - Alluvium Deposits	GW-GM		(145.0 - 145.8') Topock - Alluvium Deposits; Well graded gravel with silt and sand (GW-GM); reddish brown (5YR 4/3); granules to very large pebbles, angular to subround; some medium to very coarse grained sand, subangular to subround; dry; soft; weak cementation		
148				Topock - Alluvium Deposits	GM		(145.8 - 148.5') Topock - Alluvium Deposits; Silty gravel (GM); reddish brown (5YR 4/3); granules to large pebbles, angular to subround; some silt; little medium to very coarse grained sand, subangular to subround; moist; weak cementation		
149				Topock - Alluvium Deposits	ML		(148.5 - 149.6') Topock - Alluvium Deposits; Silt with sand (ML); brown (10YR 4/3); low plasticity; little medium to very coarse grained sand, angular to subround; trace granules to medium pebbles, angular to subangular; wet; very soft; weak cementation		
150				Topock - Alluvium Deposits	SW-SM		(149.6 - 151.3') Topock - Alluvium Deposits; Well graded sand with silt and gravel (SW-SM); reddish brown (5YR 4/3); medium grained to very coarse grained, angular to subround; some granules to very large pebbles, angular to subround; little silt; wet to moist; weak cementation		
151				Topock - Alluvium Deposits	SW-SM		(151.3 - 153.5') Topock - Alluvium Deposits; Well graded sand with silt and gravel (SW-SM); reddish brown (5YR 4/3); medium grained to very coarse grained, angular to subround; and granules to very large pebbles, angular to subround; little silt; wet to moist; weak cementation		
152				Topock - Alluvium Deposits	GM		(153.5 - 155.3') Topock - Alluvium Deposits; Gravelly silt with sand (GM); reddish brown (5YR 4/3); granules to very large pebbles; some medium to very coarse grained sand, subangular to subround; little silt; moist; weak cementation		
153				Topock - Alluvium Deposits	GW-GM		(155.3 - 157.1') Topock - Alluvium Deposits; Well graded gravel with silt and sand (GW-GM); reddish brown (5YR 4/3); granules to small cobbles, angular to subround; and fine to very coarse grained sand, subangular to subround; little silt; moist; weak cementation		
154				180			Topock - Alluvium Deposits		
155	SW-SM								
156	SW-SM								
157	SW-SM								
158									
159									
160									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measurement collected during the first VAS interval

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measurement collected during the first VAS interval

Date Started:	06/16/2019	Surface Elevation:	N/A	Boring No.: MW-Cd
Date Completed:	07/14/2019	Northing (NAD83):	N/A	
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	221.5 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Terrasonic track mount	Borehole Diameter:	10-12 inches	Location: PG&E Topock, Needles, California
Driller Name:	Dan O'Mara	Depth to First Water:	28.11 ft bgs	
Drilling Asst:	Jario Pacheco	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger:	CS / AM / DC	Sampling Interval:	Continuous	
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
181	180			Deposits Topock - Alluvium Deposits	ML		(178.5 - 179.0') Topock - Alluvium Deposits; Gravelly silt (ML); brown (7.5YR 4/3); low plasticity; little granules to medium pebbles, subangular to subround; trace fine to very coarse grained sand, subangular to subround; dry, soft; weak cementation	(171.0 - 186.0') Rough drilling.	(150.0 - 221.0') 700 gallons of water used; 550 gallons of water recovered; 150 gallons of water lost
182				Topock - Alluvium Deposits	ML		(179.0 - 180.0') Topock - Alluvium Deposits; Gravelly silt with sand (ML); reddish brown (5YR 4/3); low plasticity; some granules to very large pebbles, angular to subround; little medium to very coarse grained sand, subangular to subround; trace small cobbles, subround; trace clay; moist; soft; weak cementation		
183				Topock - Alluvium Deposits	ML		(180.0 - 181.0') Topock - Alluvium Deposits; Sandy silt with gravel (ML); brown (7.5YR 4/3); low plasticity; little granules to medium pebbles, angular to subround; little fine to very coarse grained sand, subangular to subround; trace clay; moist; soft; weak cementation		
184				Topock - Alluvium Deposits	ML		(181.0 - 184.5') Topock - Alluvium Deposits; Gravelly silt (ML); brown (7.5YR 4/3); low plasticity; little granules to large pebbles, angular to subangular; little medium to very coarse grained sand, angular to subangular; trace clay; moist; soft; weak cementation		
185				Topock - Alluvium Deposits	ML		(184.5 - 186.0') Topock - Alluvium Deposits; Sandy silt (ML); brown (7.5YR 4/3); low plasticity; little granules to very large pebbles, angular to subangular; little very fine to very coarse grained sand, angular to subround; trace clay; moist; soft; weak cementation		
186				Topock - Alluvium Deposits	SW-SM		(186.0 - 188.0') Topock - Alluvium Deposits; Well graded sand with silt and gravel (SW-SM); reddish brown (5YR 4/3); fine grained to very coarse grained, subangular to subround; some granules to large pebbles, angular to subround; moist; weak cementation		
187				Topock - Alluvium Deposits	SM		(188.0 - 191.7') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (5YR 4/3); fine grained to very coarse grained, subangular to subround; some silt; little granules to large pebbles, subangular to subround; moist; weak cementation		
188			MW-C-VAS-185-191 (<0.17 U ppb) 7/1/2019 12:00	Topock - Alluvium Deposits	SM				
189				Topock - Alluvium Deposits	ML		(191.7 - 192.4') Topock - Alluvium Deposits; Gravelly silt with sand (ML); reddish brown (5YR 4/3); low plasticity; some granules to very large pebbles, subangular to subround; little fine to very coarse grained sand, subangular to subround; moist; moderate cementation	(191.0 - 196.0') Soft drilling.	
190				Topock - Alluvium Deposits	GW-GM		(192.4 - 193.0') Topock - Alluvium Deposits; Well graded gravel with silt and sand (GW-GM); gray (10YR 6/1); granules to boulders, angular to subangular; little very fine to medium grained sand, subangular to subround; little silt; moist; weak cementation		
191				Topock - Alluvium Deposits	SM		(193.0 - 193.5') Topock - Alluvium Deposits; Gravelly silt (ML); reddish brown (5YR 4/3); low plasticity; some granules to very large pebbles, angular to subangular; little fine to very coarse grained sand, subangular to subround; moist; medium stiff; weak cementation		
192				Topock - Alluvium Deposits	ML		(193.5 - 195.4') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (5YR 4/3); medium grained to very coarse grained, subangular to subround; some silt; little granules to very large pebbles, angular to subround; moist; weak cementation		
193				Topock - Alluvium Deposits	SM		(195.4 - 197.5') Topock - Alluvium Deposits; Sandy silt (ML); reddish brown (5YR 4/3); low plasticity; some fine to coarse grained sand, subangular to subround; little granules to medium pebbles, subangular to subround; moist; soft; weak cementation		
194				Topock - Alluvium Deposits	SM		(197.5 - 200.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (5YR 4/3); medium grained to very coarse grained, subangular to subround; some granules to large pebbles, subangular to subround; little silt; moist; weak cementation		
195				Topock - Alluvium Deposits	SM				
196				Topock - Alluvium Deposits	SM				
197				Topock - Alluvium Deposits	SM				
198				Topock - Alluvium Deposits	SM				
199				Topock - Alluvium Deposits	SM				
200				Topock - Alluvium Deposits	SM				

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SOIL BORING LOG, PG&E TOPOCK C:\USERS\SSMCGRANE\DOCUMENTS\PG&E TOPOCK\DRIFT BORING LOGS\GINT FILES\1.06.19\TOPOCK DATA TEMPLATE FOR PLOG.GPJ TOPOCK DATA TEMPLATE FOR PLOG.GPJ 11/06/19 15:05

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measurement collected during the first VAS interval

Date Started:	06/16/2019	Surface Elevation:	N/A	Boring No.: MW-Cd	
Date Completed:	07/14/2019	Northing (NAD83):	N/A		
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	221.5 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Terrasonic track mount	Borehole Diameter:	10-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Dan O'Mara	Depth to First Water:	28.11 ft bgs		
Drilling Asst:	Jario Pacheco	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	CS / AM / DC	Sampling Interval:	Continuous		
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
221	60	No Sieve Samples Collected		Topock - Competent Bedrock - conglomerate					
222							End of Boring at 221.5 'bgs.		
223									
224									
225									
226									
227									
228									
229									
230									
231									
232									
233									
234									
235									
236									
237									
238									
239									
240									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measurement collected during the first VAS interval

SOIL BORING LOG_PG&E_TOPOCK_C:\USERS\MCGRANE\DOCUMENTS\PG&E_TOPOCK\PROJECTS\LOGS\GINT FILES\1.06.19\TOPOCK DATABASE FOR PLOG.GPJ TOPOCK DATA TEMPLATE FOR PLOG.GDT 11/06/19 15:05

Date Started:	<u>07/25/2019</u>	Surface Elevation:	<u>N/A</u>	Boring No.: <u>MW-Cs</u>
Date Completed:	<u>08/07/2019</u>	Northing (NAD83):	<u>N/A</u>	
Drilling Co.:	<u>Cascade</u>	Easting (NAD83):	<u>N/A</u>	Client: <u>PG&E</u>
Drilling Method:	<u>Sonic Drilling</u>	Total Depth:	<u>161 ft bgs</u>	Project: <u>Final GW Remedy Phase 1</u>
Drill Rig Type:	<u>Terrasonic Track Mount</u>	Borehole Diameter:	<u>10-12 inches</u>	Location: <u>PG&E Topock, Needles, California</u>
Driller Name:	<u>Dan O' Mara</u>	Depth to First Water:	<u>25.3 ft bgs</u>	
Drilling Asst:	<u>Jario Pacheco</u>	Sampling Method:	<u>4 inch x 10 ft. Core Barrel</u>	Project Number: <u>RC000753.0051</u>
Logger:	<u>Daniel Luneau</u>	Sampling Interval:	<u>Screen Intervals</u>	
Editor:	<u>Sean McGrane</u>	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

[illegible]

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measurement and groundwater samples collected during drilling of MW-Cd

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measurement and groundwater samples collected during drilling of MW-Cd

Date Started:	<u>07/25/2019</u>	Surface Elevation:	<u>N/A</u>	Boring No.: <u>MW-Cs</u>
Date Completed:	<u>08/07/2019</u>	Northing (NAD83):	<u>N/A</u>	
Drilling Co.:	<u>Cascade</u>	Easting (NAD83):	<u>N/A</u>	Client: <u>PG&E</u>
Drilling Method:	<u>Sonic Drilling</u>	Total Depth:	<u>161 ft bgs</u>	Project: <u>Final GW Remedy Phase 1</u>
Drill Rig Type:	<u>Terrasonic Track Mount</u>	Borehole Diameter:	<u>10-12 inches</u>	Location: <u>PG&E Topock, Needles, California</u>
Driller Name:	<u>Dan O' Mara</u>	Depth to First Water:	<u>25.3 ft bgs</u>	
Drilling Asst:	<u>Jario Pacheco</u>	Sampling Method:	<u>4 inch x 10 ft. Core Barrel</u>	Project Number: <u>RC000753.0051</u>
Logger:	<u>Daniel Luneau</u>	Sampling Interval:	<u>Screen Intervals</u>	
Editor:	<u>Sean McGrane</u>	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

SOIL BORING LOG PG&E TOPOCK1061910 TOPOCK DATABASE FOR PI OG GP1 TOPOCK DATA TEMPLATE FOR PI OG GDT 11/06/19 16:40

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measurement and groundwater samples collected during drilling of MW-Cd

Date Started:	07/25/2019	Surface Elevation:	N/A	Boring No.: MW-Cs	
Date Completed:	08/07/2019	Northing (NAD83):	N/A		
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	161 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Terrasonic Track Mount	Borehole Diameter:	10-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Dan O' Mara	Depth to First Water:	25.3 ft bgs		
Drilling Asst:	Jario Pacheco	Sampling Method:	4 inch x 10 ft. Core Barrel	Project Number:	RC000753.0051
Logger:	Daniel Luneau	Sampling Interval:	Screen Intervals		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
61								(36.0 - 66.0') Normal drilling.	(0.0 - 146.0') No water used
62									
63			--No Sample-- (Interval did not produce) 6/25/2019 13:15						
64									
65									
66								(66.0 - 126.0') Normal Drilling.	
67									
68			MW-C-VAS-66-71 (<0.033 U ppb) 6/26/2019 10:44						
69									
70	0	No Sieve Samples Collected			NR				
71									
72									
73									
74									
75									
76									
77									
78									
79									
80									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measurement and groundwater samples collected during drilling of MW-Cd

Date Started:	07/25/2019	Surface Elevation:	N/A	Boring No.: MW-Cs	
Date Completed:	08/07/2019	Northing (NAD83):	N/A		
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	161 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Terrasonic Track Mount	Borehole Diameter:	10-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Dan O' Mara	Depth to First Water:	25.3 ft bgs		
Drilling Asst:	Jario Pacheco	Sampling Method:	4 inch x 10 ft. Core Barrel	Project Number:	RC000753.0051
Logger:	Daniel Luneau	Sampling Interval:	Screen Intervals		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
81								(66.0 - 126.0') Normal Drilling.	(0.0 - 146.0') No water used
82									
83			MW-C-VAS-81-86 (<0.17 U ppb) 6/27/2019 10:58						
84									
85									
86									
87									
88									
89									
90	0	No Sieve Samples Collected			NR				
91									
92									
93									
94									
95									
96									
97									
98									
99									
100									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measurement and groundwater samples collected during drilling of MW-Cd

SOIL BORING LOG PG&E TOPOCK C:\USERS\MCGRANE\DOCUMENTS\PG&E TOPOCK\DRIFT BORING LOGS\GINT FILES\1.06.19\TOPOCK DATABASE FOR PLOG.GPJ TOPOCK DATA TEMPLATE FOR PLOG.GDT 11/06/19 16:40

Date Started:	07/25/2019	Surface Elevation:	N/A	Boring No.: MW-Cs	
Date Completed:	08/07/2019	Northing (NAD83):	N/A		
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	161 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Terrasonic Track Mount	Borehole Diameter:	10-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Dan O' Mara	Depth to First Water:	25.3 ft bgs		
Drilling Asst:	Jario Pacheco	Sampling Method:	4 inch x 10 ft. Core Barrel	Project Number:	RC000753.0051
Logger:	Daniel Luneau	Sampling Interval:	Screen Intervals		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
101								(66.0 - 126.0') Normal Drilling.	(0.0 - 146.0') No water used
102									
103									
104									
105									
106									
107									
108									
109									
110	0	No Sieve Samples Collected			NR				
111									
112									
113									
114									
115									
116									
117									
118			MW-C-VAS-117-122 (<0.17 U ppb) 6/28/2019 14:59						
119									
120									

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Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measurement and groundwater samples collected during drilling of MW-Cd

Date Started:	<u>07/25/2019</u>	Surface Elevation:	<u>N/A</u>	Boring No.: <u>MW-Cs</u>
Date Completed:	<u>08/07/2019</u>	Northing (NAD83):	<u>N/A</u>	
Drilling Co.:	<u>Cascade</u>	Easting (NAD83):	<u>N/A</u>	Client: <u>PG&E</u>
Drilling Method:	<u>Sonic Drilling</u>	Total Depth:	<u>161 ft bgs</u>	Project: <u>Final GW Remedy Phase 1</u>
Drill Rig Type:	<u>Terrasonic Track Mount</u>	Borehole Diameter:	<u>10-12 inches</u>	Location: <u>PG&E Topock, Needles, California</u>
Driller Name:	<u>Dan O' Mara</u>	Depth to First Water:	<u>25.3 ft bgs</u>	
Drilling Asst:	<u>Jario Pacheco</u>	Sampling Method:	<u>4 inch x 10 ft. Core Barrel</u>	Project Number: <u>RC000753.0051</u>
Logger:	<u>Daniel Luneau</u>	Sampling Interval:	<u>Screen Intervals</u>	
Editor:	<u>Sean McGrane</u>	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

SOIL BORING LOG PG&E TOPOCK1061910 TOPOCK DATABASE FOR PI OG GP1 TOPOCK DATA TEMPLATE FOR PI OG GDT 11/06/19 16:40

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measurement and groundwater samples collected during drilling of MW-Cd

Boring Log

Sheet: 9 of 9

Date Started:	07/25/2019	Surface Elevation:	N/A	Boring No.: MW-Cs	
Date Completed:	08/07/2019	Northing (NAD83):	N/A		
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	161 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Terrasonic Track Mount	Borehole Diameter:	10-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Dan O' Mara	Depth to First Water:	25.3 ft bgs		
Drilling Asst:	Jario Pacheco	Sampling Method:	4 inch x 10 ft. Core Barrel	Project Number:	RC000753.0051
Logger:	Daniel Luneau	Sampling Interval:	Screen Intervals		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
161	189.6	No Sieve Samples Collected		Topock - Alluvium Deposits	SP-SM		End of Boring at 161.0 'bgs.		
162									
163									
164									
165									
166									
167									
168									
169									
170									
171									
172									
173									
174									
175									
176									
177									
178									
179									
180									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measurement and groundwater samples collected during drilling of MW-Cd

SOIL BORING LOG_PG&E_TOPOCK C:\USERS\SMCGRANE\DOCUMENTS\PG&E_TOPOCK\PROJECTS\TOPOCK\TOPOCK DRAFT BORING LOGS\GINT FILES\1.06.19\TOPOCK DATABASE FOR PLOG.GPJ TOPOCK DATA TEMPLATE FOR PLOG.GDT 11/06/19 16:40

Draft Final
Pending Final
Survey 11/6/19

Date Started:	09/20/2019	Surface Elevation:	N/A	Boring No.: MW-S
Date Completed:	09/24/2019	Northing (NAD83):	N/A	
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	117.1 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	10-12 inches	Location: PG&E Topock, Needles, California
Driller Name:	Steve Vasquez	Depth to First Water:	89.14 ft bgs	Project Number: RC000753.0051
Drilling Asst:	L. Amaya / O. Floures	Sampling Method:	Split spoon, Cal Mod	Hammer Type: Auto Hammer
Logger:	Sean McGrane	Sampling Interval:	Continuous	Hammer Weight: 140 lbs
Editor:	Chris Bonessi	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Hammer Drop: 30 inches

Depth (ft)	Blow Counts [N Value]	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
1					Topock - Fluvial Deposits	SM		(0.0 - 3.0') Topock - Fluvial Deposits; Silty sand with gravel (SM); brown (7.5YR 4/3); very fine grained to very coarse grained, angular to subround; some granules to very large pebbles, angular to subangular; little silt; trace small cobbles, angular to subangular; trace clay; trace mica; well graded; dry; no odor; no staining; 25,55,20 logged from hand auger cuttings, moisture from water added for hand augering	(0.0 - 3.0') Hand augered for utility clearance, refusal at 3.0 ft.	
2										
3			MW-S-SG-0.0-5.0 9/20/2019 10:40		Topock - Fluvial Deposits	SW		(3.0 - 4.3') Topock - Fluvial Deposits; Well graded sand with gravel (SW); brown (7.5YR 5/3); very fine grained to very coarse grained, angular to subround; some granules to very large pebbles, angular to subround; trace large cobbles, subangular; trace silt; trace clay; trace mica; well graded; wet; no odor; no staining; 25,70,5, moisture due to water added for hand augering	(4.0 - 5.0') Hard drilling	
4		24			Topock - Fluvial Deposits	SW				
5	25-25/3 (null/0.25')	6	MW-S-SP-5.0-5.6 9/20/2019 11:10		Topock - Fluvial Deposits	SW		(4.3 - 5.0') Topock - Fluvial Deposits; Well graded sand with gravel (SW); reddish brown(2.5YR 5/3); very fine grained to granules, angular to subangular; and small to very large pebbles, angular to subangular; trace small cobbles, subangular; trace silt; trace clay; coarser clasts composed of metadiorite; well graded; dry; no odor; no staining; 45,50,5		(5.0') 2 gallons of water used; 2 gallons of water recovered; 0 gallons of water lost
6					Topock - Fluvial Deposits	NR				
7		6			Topock - Fluvial Deposits	SW		(5.0 - 5.6') Topock - Fluvial Deposits; Well graded sand with gravel (SW); weak red (2.5YR 5/2); very fine grained to granules, angular to subround; little small to very large pebbles, angular to subangular; trace silt; trace clay; well graded; dry; very loose; no odor; no staining; 15,80,5		2 gallons used; 2 gallons recovered; 0 gallons lost
8	12-28-30 (58)	12	MW-S-CM-7.0-7.5 9/20/2019 11:38		Topock - Fluvial Deposits	SW				
9			MW-S-CM-7.5-8.0 9/20/2019 11:34			NR		(5.6 - 6.5') No recovery (NR); very loose; split spoon refusal	(8.5 - 12.0') Rough drilling	
10								(6.5 - 7.0') Topock - Fluvial Deposits; Well graded sand with gravel (SW); (GLE1 5/4); very fine grained to granules, angular to subangular; and small to very large pebbles, angular to subangular; trace small cobbles, subangular; trace silt; coarser clasts composed of metadiorite; dry; no odor; no staining; 45,50,5		
11		42			Topock - Alluvium Deposits	SW		(7.0 - 8.0') Topock - Fluvial Deposits; Well graded sand with gravel (SW); weak red (2.5YR 5/2); very fine grained to granules, angular to subround; little small to very large pebbles, angular to subangular; trace silt; trace clay; well graded; dry to moist; very dense; no odor; no staining; 20,75,5		
12								(8.0 - 8.5') No recovery (NR); missing from sampler		
13	34-35-30 (65)	14.4	MW-S-SP-12.0-13.2 9/20/2019 13:59		Topock - Alluvium Deposits	SW		(8.5 - 12.0') Topock - Alluvium Deposits; Well graded sand with gravel (SW); brown (10YR 4/3) and reddish gray(2.5YR 5/1); very fine grained to granules, angular to subangular; and small to very large pebbles, angular to subangular; trace boulders, subround; trace silt; coarser clasts composed of metadiorite; dry; no odor; lensed; no staining; 45,50,5		(12.0') 2 gallons of water used; 2 gallons of water recovered; 0 gallons of water lost
14					Topock - Alluvium Deposits	NR			(13.5 - 17.0') Rough drilling	
15					Topock - Alluvium Deposits	SW-SM		(12.0 - 13.2') Topock - Alluvium Deposits; Well graded sand with gravel (SW); grayish brown (10YR 5/2); very fine grained to granules, angular to subround; little small to large pebbles, angular to subangular; trace silt; trace clay; trace mica; well graded; dry; very dense; no odor; 20,75,5		
16		42						(13.2 - 13.5') Topock - Alluvium Deposits; No recovery (NR); slough from casing advancement		
17					Topock - Alluvium Deposits	SM		(13.5 - 16.3') Topock - Alluvium Deposits; Well graded sand with silt and gravel (SW-SM); dark reddish gray(2.5YR 4/1) and weak red (2.5YR 5/2); very fine grained to granules, angular to round; and small to very large pebbles, angular to subround; little silt; trace small cobbles, subangular to subround; trace clay; coarser clasts composed of metadiorite; 40,50,10, cobbles composed of gabbro	(17.0 - 18.5') Poor recovery sample maybe slough	2 gallons used; 2 gallons recovered; 0 gallons lost
18	50/4 (null/0.35')	4.8	MW-S-CM-17.0-17.4 9/20/2019 14:31		Topock - Alluvium Deposits	NR		(16.3 - 17.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); weak red (2.5YR 5/2); very fine grained to granules, angular to subround; some silt; little small to very large pebbles, angular to subangular; trace small cobbles, angular; trace clay; coarser clasts composed of metadiorite; well graded; dry; no odor; no staining; 20,55,25, some silt content maybe rock flour from pulverized cobbles and boulders	(18.5 - 22.0') Rough drilling	
19					Topock - Alluvium Deposits	SW				
20		42						(17.0 - 17.2') Topock - Alluvium Deposits; Silty sand with gravel		

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Date Started:	09/20/2019	Surface Elevation:	N/A	Boring No.: MW-S
Date Completed:	09/24/2019	Northing (NAD83):	N/A	
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	117.1 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	10-12 inches	Location: PG&E Topock, Needles, California
Driller Name:	Steve Vasquez	Depth to First Water:	89.14 ft bgs	Project Number: RC000753.0051
Drilling Asst:	L. Amaya / O. Floures	Sampling Method:	Split spoon, Cal Mod	Hammer Type: Auto Hammer
Logger:	Sean McGrane	Sampling Interval:	Continuous	Hammer Weight: 140 lbs
Editor:	Chris Bonessi	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Hammer Drop: 30 inches

Depth (ft)	Blow Counts [N Value]	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
21		42			Topock - Alluvium Deposits	SW		(SM); dark gray / olive gray(5Y 4/1); very fine grained to granules, angular to subround; little small to medium pebbles, angular to subangular; little silt; trace clay; trace mica; well graded; dry; very dense; no odor; no staining; 20,65,15	(18.5 - 22.0') Rough drilling	
22	50/6	6	MW-S-SP-22.0-22.5 9/20/2019 14:59		Topock - Alluvium Deposits	SW-SM		(17.2 - 18.5') Topock - Alluvium Deposits; No recovery (NR); top 0.3 ft of spoon was slough.		
23					Topock - Alluvium Deposits	SM		(18.5 - 21.0') Topock - Alluvium Deposits; Well graded sand with gravel (SW); weak red (2.5YR 5/2); very fine grained to granules, subangular to subround; some small to very large pebbles, angular to subangular; trace small cobbles, subangular; trace silt; coarser clasts composed of metadiorite; dry; no odor; lensed; no staining; 30,65,5	(22.0 - 23.5') Poor recovery	
24						NR		(19.5'); and small to very large pebbles, angular to subangular; 40, 55, 5, decrease in sand	(23.5 - 27.0') Rough drilling	
25		42			Topock - Alluvium Deposits	GM		(21.0 - 22.0') Topock - Alluvium Deposits; Well graded sand with silt and gravel (SW-SM); olive gray (5Y 4/2); very fine grained to granules, angular to subround; some small to very large pebbles, angular to subangular; little silt; trace small cobbles, subangular; trace boulders, subangular; coarser clasts composed of metadiorite; dry; no odor; no staining; 35,65,10, some silt rock flour from pulverized cobbles and boulders		
26								(22.0 - 22.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); gray (2.5Y 5/1); very fine grained to granules, angular to subround; little small to large pebbles, angular to subangular; little silt; trace clay; trace mica; well graded; moist to dry; very dense; no odor; no staining; 15, 70, 15, seams of silt	(27.0 - 28.5') Poor recovery sample may have slough in it	(27.0') 2 gallons of water used; 2 gallons of water recovered; 0 gallons of water lost
27	50/4 (null/0.35')	4.8	MW-S-CM-27.0-27.4 9/20/2019 15:35		Topock - Alluvium Deposits	SM		(22.5 - 23.5') No recovery (NR); split spoon refusal		
28					Topock - Alluvium Deposits	NR		(23.5 - 26.3') Topock - Alluvium Deposits; Silty gravel with sand (GM); grayish brown (2.5Y 5/2); granules to very large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subround; some silt; trace small cobbles, angular to subangular; coarser clasts composed of metadiorite; trace coarser clast composed of conglomerate; well graded; dry; no odor; no staining; 35,25,30	(28.5 - 32.0') Rough drilling	
29								(26.3 - 27.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); grayish brown (2.5Y 5/2); very fine grained to granules, angular to round; some small to very large pebbles, angular to subangular; little silt; coarser clasts composed of metadiorite; well graded; dry; no odor; no staining; 30,55,15		
30		42			Topock - Alluvium Deposits	SM		(27.0 - 27.4') Topock - Alluvium Deposits; Silty sand with gravel (SM); grayish brown (2.5Y 5/2); very fine grained to granules, angular to subround; little small to large pebbles, angular to subangular; little silt; trace clay; dry to moist; very dense; no odor; no staining; 20,60,20	(32.0 - 33.5') Poor recovery top 0.2 ft slough	(32.0') 2 gallons of water used; 2 gallons of water recovered; 0 gallons of water lost
31	50/5 (null/0.40')	4.8	MW-S-SP-32.0-32.4 9/20/2019 16:17		Topock - Alluvium Deposits	SM		(27.4 - 28.5') No recovery (NR); Cal Mod refusal		
32						NR		(28.5 - 32.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (10YR 5/3); very fine grained to granules, angular to subround; some silt; coarser clasts composed of metadiorite; well graded; dry; no odor; 25,40,35	(33.5 - 37.0') Normal Drilling	
33					Topock - Alluvium Deposits	SM		(31'); little silt; trace small cobbles, angular; 30,55,15, increase in sand and pebbles		
34		42						(32.0 - 32.4') Topock - Alluvium Deposits; Silty sand with gravel (SM); grayish brown (2.5Y 5/2); very fine grained to granules, angular to subround; little small to large pebbles, angular to subangular; little silt; trace clay; well graded; dry to moist; very dense; no odor; no staining; 20,65,15		
35					Topock - Alluvium Deposits	SW		(32.4 - 33.5') No recovery (NR); split spoon refusal		
36								(33.5 - 35.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 5/3); very fine grained to granules, angular to subround; some small to very large pebbles, angular to subangular; little silt; trace small cobbles, subangular; trace coarser clast composed of conglomerate; coarser clasts composed of metadiorite; well graded; dry; no odor; no staining; 35,45,20	(37.0 - 38.5') Cal Mod refusal after 5 inches, approximately 1 to 2 inches of slough in sample	(37.0') 2 gallons of water used; 2 gallons of water recovered; 0 gallons of water lost
37	50/5 (null/0.40')	8.4	MW-S-CM-37.0-37.5 9/21/2019 09:12		Topock - Alluvium Deposits	SM		(35.5 - 36.5') Topock - Alluvium Deposits; Well graded sand with gravel (SW); grayish brown (10YR 5/2); very fine grained to granules, angular to subround; little small to very large pebbles, angular to subangular; trace silt; coarser clasts composed of	(38.5 - 46.5') Rough drilling	
38					Topock - Alluvium Deposits	NR				
39		102			Topock - Alluvium Deposits	ML				
40					Topock - Alluvium Deposits					

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Date Started:	09/20/2019	Surface Elevation:	N/A	Boring No.: <u>MW-S</u>	
Date Completed:	09/24/2019	Northing (NAD83):	N/A		
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	117.1 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	10-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Steve Vasquez	Depth to First Water:	89.14 ft bgs	Project Number:	RC000753.0051
Drilling Asst:	L. Amaya / O. Floures	Sampling Method:	Split spoon, Cal Mod	Hammer Type:	Auto Hammer
Logger:	Sean McGrane	Sampling Interval:	Continuous	Hammer Weight:	140 lbs
Editor:	Chris Bonessi	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Hammer Drop:	30 inches

Depth (ft)	Blow Counts [N Value]	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid	
41		102			Topock - Alluvium Deposits	ML		metadiorite; dry; no odor; no staining; 20,75,5	(38.5 - 46.5') Rough drilling		
42								(36.5 - 37.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 5/3); very fine grained to very coarse grained, angular to round; some small to very large pebbles, angular to subangular; some silt; trace small cobbles, angular to subangular; trace coarser clast composed of conglomerate; coarser clasts composed of metadiorite; well graded; dry; no odor; no staining; 30,45,25			
43								(37.0 - 37.4') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (10YR 5/3); very fine grained to granules, angular to subround; some small to very large pebbles, angular to subangular; little silt; coarser clasts composed of metadiorite; well graded; moist; very dense; no odor; no staining; 25,55,20			
44								(37.4 - 38.5') Topock - Alluvium Deposits; No recovery (NR); Cal Mod refusal			
45					Topock - Alluvium Deposits	SM		(38.5 - 44.5') Topock - Alluvium Deposits; Sandy silt with gravel (ML); dark grayish brown / dark yellowish brown(10YR 4/2); low plasticity; some granules to very large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subround; trace small cobbles, angular; coarser clasts composed of metadiorite; dry; no odor; no staining; 30,30,40 (44') brown (7.5YR 5/3)	(46.5 - 47.0') Very hard drilling	(47.0') 2 gallons of water used; 2 gallons of water recovered; 0 gallons of water lost	
46								(44.5 - 47.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); gray (2.5Y 5/1); very fine grained to granules, angular to subround; some small to very large pebbles, angular to subangular; little silt; coarser clasts composed of metadiorite; trace coarser clast composed of conglomerate; well graded; dry; no odor; no staining; 30,55,15 (46.5') grayish brown (10YR 5/2)			
47	50/4 (null/0.35')	4.8	MW-S-SP-47.0-47.4 9/21/2019 09:57		Topock - Alluvium Deposits	SM		(47.0 - 47.4') Topock - Alluvium Deposits; Silty sand with gravel (SM); grayish brown (10YR 5/2); very fine grained to granules, angular to subround; some small to large pebbles, angular to subangular; some silt; trace clay; well graded; moist to dry; very dense; no odor; no staining; 25,45,30, silt nodules	(47.0 - 48.5') Split spoon refusal, 2 inches of slough in spoon not sampled.		
48					Topock - Alluvium Deposits	NR		(47.4 - 48.5') No recovery (NR); split spoon refusal	(48.5 - 57.0') Hard drilling, core moist to dry and hot		
49		102			Topock - Alluvium Deposits	SM		(48.5 - 49.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); grayish brown (10YR 5/2); very fine grained to granules, angular to round; some small to very large pebbles, angular to subangular; little silt; trace clay; coarser clasts composed of metadiorite; well graded; dry; no odor; no staining; 30,50,20			
50								(49.5 - 53.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown / moderate brown(5YR 4/4); very fine grained to granules, angular to round; some small to very large pebbles, angular to subangular; little silt; trace clay; trace coarser clast composed of conglomerate; coarser clasts composed of metadiorite; well graded; dry; no odor; no staining; 35,45,20			
51								(53.0 - 57.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 5/3); very fine grained to granules, angular to subround; some small to very large pebbles, angular to subangular; some silt; trace small cobbles, angular; trace clay; trace coarser clast composed of conglomerate; coarser clasts composed of metadiorite; well graded; dry; no odor; no staining; 35,40,25			
52								(55.8') brown (7.5YR 4/3); little silt; 35,50,15, increase in sand, no cobbles			
53					Topock - Alluvium Deposits	SM		(57.0 - 57.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (10YR 5/3); very fine grained to granules, angular to subangular; little small to large pebbles, angular to subangular; little silt; well graded; dry; very dense; no odor; no staining; 15,65,20	(57.0 - 58.5') Poor recovery, top 2 to 3 inches of sample is slough	(57.0') 2 gallons of water used; 2 gallons of water recovered; 0 gallons of water lost	
54								(57.5 - 58.5') No recovery (NR); Cal Mod refusal			
55	50/5 (null/0.40')	6	MW-S-CM-57.0-57.5 9/21/2019 10:39		Topock - Alluvium Deposits	SM		(58.5 - 62.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 5/3) with brown (10YR 5/3); very fine grained to granules, angular to subround; some small to very large pebbles, angular to subangular; little silt; trace small cobbles,			
56											
57											
58											
59											
60											

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Date Started:	09/20/2019	Surface Elevation:	N/A	Boring No.: <u>MW-S</u>	
Date Completed:	09/24/2019	Northing (NAD83):	N/A		
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	117.1 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	10-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Steve Vasquez	Depth to First Water:	89.14 ft bgs	Project Number:	RC000753.0051
Drilling Asst:	L. Amaya / O. Floures	Sampling Method:	Split spoon, Cal Mod	Hammer Type:	Auto Hammer
Logger:	Sean McGrane	Sampling Interval:	Continuous	Hammer Weight:	140 lbs
Editor:	Chris Bonessi	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Hammer Drop:	30 inches

Depth (ft)	Blow Counts [N Value]	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
61					Topock - Alluvium Deposits	SM		subangular; trace clay; coarser clasts composed of metadiorite; well graded; dry; no odor; no staining; 35,45,20	(58.5 - 67.0') Hard drilling, hole stayed open running split spoon without casing to 67.	
62								(61') grayish brown (2.5Y 5/2); some silt; 30,45,25, decrease pebbles, no cobbles		
63					Topock - Alluvium Deposits	SW-SM		(62.0 - 64.5') Topock - Alluvium Deposits; Well graded sand with silt and gravel (SW-SM); brown (7.5YR 5/4); very fine grained to granules, angular to subround; some small to very large pebbles, angular to subangular; little silt; trace small cobbles, angular; trace clay; trace coarser clast composed of conglomerate; coarser clasts composed of metadiorite; well graded; dry; no odor; no staining; 35,55,10		
64										
65					Topock - Alluvium Deposits	SM		(64.5 - 67.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 5/3); very fine grained to granules, angular to subround; some small to very large pebbles, angular to subangular; little silt; trace small cobbles, angular; trace clay; coarser clasts composed of metadiorite; well graded; dry; no odor; no staining; 35,45,20		
66										
67					Topock - Alluvium Deposits	SM		(67.0 - 67.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); dark yellowish brown (10YR 4/4); very fine grained to granules, angular to subround; some small to very large pebbles, angular to subangular; some silt; well graded; dry; very dense; no odor; no staining; 25,45,30, potential slough	(67.0 - 68.5') Spilt spoon refusal, most of sample most likely slough.	(67.0') 2 gallons of water used; 2 gallons of water recovered; 0 gallons of water lost
68	50/6	6	MW-S-SP-67.0-67.5 9/21/2019 12:53		Topock - Alluvium Deposits	NR		(67.5 - 68.5') No recovery (NR); split spoon refusal		
69					Topock - Alluvium Deposits	GM		(68.5 - 69.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); grayish brown (2.5Y 5/2); granules to very large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subround; some silt; trace small to large cobbles, angular; trace clay; well graded; moist to dry; no odor; no staining; 40,35,25	(68.5 - 77.0') Formation tight, lost bottom 1.5 ft of core	
70					Topock - Alluvium Deposits	SM		(69.0 - 72.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); dark yellowish brown (10YR 4/4); very fine grained to granules, angular to subround; some small to very large pebbles, angular to subangular; some silt; trace clay; trace coarser clast composed of conglomerate; coarser clasts composed of metadiorite; well graded; dry to moist; no odor; no staining; 35,40,25		
71								(70.5'); little silt; 35,45,20, increase in sand		
72					Topock - Alluvium Deposits	SM		(72.0 - 74.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); yellowish brown / moderate yellowish brown (10YR 5/4); very fine grained to granules, angular to subround; and small to very large pebbles, angular to subround; little silt; trace clay; coarser clasts composed of metadiorite; well graded; moist to dry; no odor; no staining; 40,45,15, lithology has rock flour from pulverized pebbles		
73					Topock - Alluvium Deposits	SM		(74.0 - 75.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 5/4); very fine grained to granules, angular to subround; some small to very large pebbles, angular to subangular; little silt; trace small cobbles, angular; trace coarser clast composed of conglomerate; well graded; moist to dry; no odor; no staining; 35,45,20		
74								(75.5 - 77.0') No recovery (NR); see drilling notes		
75					Topock - Alluvium Deposits	NR		(77.0 - 77.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); dark yellowish brown (10YR 4/4); very fine grained to granules, angular to subround; some small to very large pebbles, angular to subangular; some silt; coarser clasts composed of metadiorite; trace mica; well graded; moist; very dense; no odor; no staining; 25,45,30	(77.0 - 78.5') Cal Mod refusal, top 0.3 ft of sample most likely slough	(77.0') 2 gallons of water used; 2 gallons of water recovered; 0 gallons of water lost
76								(77.5 - 78.5') No recovery (NR); Cal Mod refusal		
77	50/3 (null/0.30')	6			Topock - Alluvium Deposits	SM		(78.5 - 83.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 5/4); very fine grained to granules, angular to subround; little silt; trace clay; well graded; moist to dry; no odor;	(78.5 - 87.0') Normal drilling	
78										
79					Topock - Alluvium Deposits	SM				
80										

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Date Started:	09/20/2019	Surface Elevation:	N/A	Boring No.: <u>MW-S</u>	
Date Completed:	09/24/2019	Northing (NAD83):	N/A		
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	117.1 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	10-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Steve Vasquez	Depth to First Water:	89.14 ft bgs	Project Number:	RC000753.0051
Drilling Asst:	L. Amaya / O. Floures	Sampling Method:	Split spoon, Cal Mod	Hammer Type:	Auto Hammer
Logger:	Sean McGrane	Sampling Interval:	Continuous	Hammer Weight:	140 lbs
Editor:	Chris Bonessi	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Hammer Drop:	30 inches

Depth (ft)	Blow Counts [N Value]	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
81					Topock - Alluvium Deposits	SM		no staining; 35	(78.5 - 87.0') Normal drilling	
82										
83		102								
84					Topock - Alluvium Deposits	ML		(83.5 - 87.0') Topock - Alluvium Deposits; Sandy silt with gravel (ML); brown (10YR 5/3); some very fine to very coarse grained sand, angular to subround; little granules to very large pebbles, angular to subangular; little clay; moist to dry; no odor; no staining; 20,35,45		
85										
86										
87					Topock - Alluvium Deposits	SM		(87.0 - 87.4') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 5/4); very fine grained to granules, angular to subround; some small to large pebbles, angular to subangular; little silt; trace clay; coarser clasts composed of metadiorite; well graded; moist; very dense; no odor; no staining; 25,60,15	(87.0 - 88.5') Spilt spoon refusal	
88	50/5 (null/0.40')	4.8	MW-S-SP-87.0-87.4 9/21/2019 15:17			NR		(87.4 - 88.5') No recovery (NR)		
89					Topock - Alluvium Deposits	SM		(88.5 - 92.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 5/3); very fine grained to granules, angular to subround; some small to very large pebbles, angular to subround; some silt; little clay; trace small cobbles, angular to subround; coarser clasts composed of metadiorite; well graded; moist; no odor; no staining; 25,40,35 (89.7'); dry (90'); moist	(88.5 - 97.0') Normal drilling (89.0') Approximate depth to water table	
90										
91										
92					Topock - Alluvium Deposits	ML		(92.0 - 94.5') Topock - Alluvium Deposits; Sandy silt with gravel (ML); brown (7.5YR 5/2); low plasticity; some granules to very large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subround; little clay; trace small cobbles, angular to subangular; coarser clasts composed of metadiorite; moist to wet; 25,35,40		
93		102								
94										
95					Topock - Alluvium Deposits	SM		(94.5 - 97.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 5/3); very fine grained to granules, angular to subround; some small to very large pebbles, angular to subangular; little silt; trace clay; coarser clasts composed of metadiorite; well graded; wet; no odor; no staining; 25,50,25 (96'); little clay; 25,40,35, decrease in sand		
96										
97										
98	25-50/2 (null/0.17')	12	MW-S-CM-97.0-97.5 9/22/2019 11:29		Topock - Alluvium Deposits	ML		(97.0 - 98.0') Topock - Alluvium Deposits; Sandy silt with gravel (ML); brown (10YR 4/3); low plasticity; some granules to very large pebbles, angular to subround; some very fine to very coarse grained sand, angular to subround; moist to wet; soft; no odor; 25,30,45	(97.0 - 98.5') Top 4 to 6 inches of sample most likely slough	
99			MW-S-CM-97.5-98.0 9/22/2019 11:27			NR		(98.0 - 98.5') No recovery (NR)		
100		102			Topock - Alluvium Deposits	SM		(98.5 - 101.8') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (10YR 5/3); very fine grained to granules, angular to subround; some small to very large pebbles, angular to subangular; little silt; little clay; coarser clasts composed of	(98.5 - 107.0') Tight formation	

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Date Started:	09/20/2019	Surface Elevation:	N/A	Boring No.: MW-S
Date Completed:	09/24/2019	Northing (NAD83):	N/A	
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	117.1 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	10-12 inches	Location: PG&E Topock, Needles, California
Driller Name:	Steve Vasquez	Depth to First Water:	89.14 ft bgs	Project Number: RC000753.0051
Drilling Asst:	L. Amaya / O. Floures	Sampling Method:	Split spoon, Cal Mod	Hammer Type: Auto Hammer
Logger:	Sean McGrane	Sampling Interval:	Continuous	Hammer Weight: 140 lbs
Editor:	Chris Bonessi	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Hammer Drop: 30 inches

Depth (ft)	Blow Counts [N Value]	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
101.0					Topock - Alluvium Deposits	SM		metadiorite; well graded; wet; no odor; 30,40,35	(98.5 - 107.0') Tight formation	
102.0		102						(101.8 - 110.0') Topock - Weathered Bedrock - conglomerate; Sandy silt with gravel (ML); reddish brown (5YR 5/4); low plasticity; some very fine to very coarse grained sand, angular to subangular; little granules to very large pebbles, angular to subangular; little clay; coarser clasts composed of metadiorite; moist to wet; no odor; no staining; 20,35,45		
103.0										
104.0										
105.0										
106.0					Topock - Weathered Bedrock - conglomerate	ML				
107.0										
108.0									(107.0 - 115.0') Very hard drilling, could not advance past 115 ft. sediments compacted in bag.	
109.0										
110.0					MW-S-VAS-107-112 (6.8 ppb) 9/24/2019 11:14			(110.0 - 115.0') Topock - Competent Bedrock - conglomerate; reddish brown / moderate brown(5YR 4/4); moist to dry; friable, pulverized,		
111.0		90								
112.0					Topock - Competent Bedrock - conglomerate					(112.0 - 117.1') 50 gallons of water used; 50 gallons of water recovered; 0 gallons of water lost
113.0										
114.0										
115.0					no sample 9/23/2019 10:43					
116.0		6				NR		(115.0 - 117.1') No recovery (NR); lost core downhole what was recovered was highly disturbed and not log able	(115.0 - 117.1') Lost core down hole what was retrieved was highly disturbed.	
117.0										
End of Boring at 117.1' bgs.										
118.0										
119.0										
120.0										

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Date Started:	08/13/2019	Surface Elevation:	N/A	Well ID: MW-X-45, MW-X-120
Date Completed:	09/24/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	Steve Vasquez	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	O. Flores / L. Amaya	Borehole Diameter:	10-12 inches	
Logger:	Anthony Mack	Water Level Start:	9.6 ft bgs	Project Number: RC000753.0051
Editor:	Grant Wilford	Development End Date:	N/A	
Total Depth:	127 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
0					(+0.5 - 3.0') Concrete Pad		(+0.5 - 3.0') 24 bags
1					(0.0 - 24.2') 2" PVC Sch 40 Casing		Note: 30-inch Diameter Concrete Pad with 18-inch Diameter Lockable Vault, Quickcrete Concrete Mix with Buff dye
2							
3							
4							
5							
6							
7							
8							
9			NR				
10					(9.5 - 10.5') Centralizer		
11					(3.0 - 17.1') Portland Cement 6% Bentonite	(3.0 - 17.1') 60.7 gallons	(3.0 - 17.1') 100 gallons (65%) Note: Type I, II and V and Benseal, used >20% of the calculated volume due to potential voids forming during drilling
12							
13							
14	MW-X-VAS-12-17 (<0.033 U ppb) 6/25/2019 15:10						
15							
16							
17							
18			NR		(17.1 - 22.0') Bentonite seal chips	(17.1 - 22.0') 3.41 bags	(17.1 - 22.0') 4 bags (17%) Note: Puregold Medium Chips
19							

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Date Started:	08/13/2019	Surface Elevation:	N/A	Well ID: MW-X-45, MW-X-120
Date Completed:	09/24/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	Steve Vasquez	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	O. Flores / L. Amaya	Borehole Diameter:	10-12 inches	
Logger:	Anthony Mack	Water Level Start:	9.6 ft bgs	Project Number: RC000753.0051
Editor:	Grant Wilford	Development End Date:	N/A	
Total Depth:	127 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
20					(0.0 - 24.2') 2" PVC Sch 40 Casing		
21					(17.1 - 22.0') Bentonite seal chips	(17.1 - 22.0') 3.41 bags	(17.1 - 22.0') 4 bags (17%) Note: Puregold Medium Chips
22							
23			NR				
24					(24.2 - 44.2') 2" Sch 40 PVC (20-slot) Screen		
25							
26							
27							
28							
29							
30					(17.0 - 127.0') 10.0" Borehole		
31					(22.0 - 48.5') Cemex #3 MESH (8x10)	(22.0 - 48.5') 26.5 bags	(22.0 - 48.5') 31 bags (17%) Note: Lapis Lustre Sand
32		Topock - Fill	SP				
33	MW-X-VAS-32-37 (<0.033 U ppb) 6/26/2019 11:45						
34							
35							
36							
37		Topock - Fluvial Deposits	SW				
38							
39							

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Date Started:	08/13/2019	Surface Elevation:	N/A	Well ID: MW-X-45, MW-X-120
Date Completed:	09/24/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	Steve Vasquez	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	O. Flores / L. Amaya	Borehole Diameter:	10-12 inches	
Logger:	Anthony Mack	Water Level Start:	9.6 ft bgs	Project Number: RC000753.0051
Editor:	Grant Wilford	Development End Date:	N/A	
Total Depth:	127 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
40					(24.2 - 44.2') 2" Sch 40 PVC (20-slot) Screen		
41							
42							
43		Topock - Fluvial Deposits	SW				
44					(22.0 - 48.5') Cemex #3 MESH (8x10)	(22.0 - 48.5') 26.5 bags	(22.0 - 48.5') 31 bags (17%) Note: Lapis Lustre Sand
45					(44.2 - 46.5') Sump and End Cap		
46					(45.5 - 46.5') Centralizer		
47		Topock - Fluvial Deposits	GW				
48							
49							
50					(17.0 - 127.0') 10.0" Borehole		
51							
52							
53			NR				
54					(48.5 - 96.4') Bentonite seal chips	(48.5 - 96.4') 34.8 bags	(48.5 - 96.4') 37 bags (6%) Note: Puregold Medium Chips
55							
56							
57							
58							
59							

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Date Started:	08/13/2019	Surface Elevation:	N/A	Well ID: MW-X-45, MW-X-120
Date Completed:	09/24/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	Steve Vasquez	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	O. Flores / L. Amaya	Borehole Diameter:	10-12 inches	
Logger:	Anthony Mack	Water Level Start:	9.6 ft bgs	Project Number: RC000753.0051
Editor:	Grant Wilford	Development End Date:	N/A	
Total Depth:	127 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
60					(0.1 - 99.8') 2" PVC Sch 40 Casing		
61							
62							
63							
64							
65							
66							
67							
68							
69							
70			NR		(48.5 - 96.4') Bentonite seal chips	(17.0 - 127.0') 10.0" Borehole	(48.5 - 96.4') 34.8 bags
71							(48.5 - 96.4') 37 bags (6%) Note: Puregold Medium Chips
72							
73	MW-X-VAS-71-76 (<0.033 U ppb) 6/27/2019 08:52						
74							
75							
76							
77							
78							
79							

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Date Started:	08/13/2019	Surface Elevation:	N/A	Well ID: MW-X-45, MW-X-120
Date Completed:	09/24/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	Steve Vasquez	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	O. Flores / L. Amaya	Borehole Diameter:	10-12 inches	
Logger:	Anthony Mack	Water Level Start:	9.6 ft bgs	Project Number: RC000753.0051
Editor:	Grant Wilford	Development End Date:	N/A	
Total Depth:	127 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
80					(0.1 - 99.8') 2" PVC Sch 40 Casing		
81							
82							
83							
84							
85					(84.5 - 85.5') Centralizer		
86							
87							
88		NR			(48.5 - 96.4') Bentonite seal chips	(48.5 - 96.4') 34.8 bags	(48.5 - 96.4') 37 bags (6%) Note: Puregold Medium Chips
89							
90					(17.0 - 127.0') 10.0" Borehole		
91							
92							
93							
94							
95							
96							
97							
98		Topock - Fluvial Deposits	SW		(96.4 - 124.0') Cemex #3 MESH (8x10)	(96.4 - 124.0') 29 bags	(96.4 - 124.0') 35 bags (21%) Note: Lapis Lustre Sand, used >20% of the calculated volume due to potential voids forming during flushing of the casing
99							

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Date Started:	08/13/2019	Surface Elevation:	N/A	Well ID: MW-X-45, MW-X-120
Date Completed:	09/24/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	Steve Vasquez	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	O. Flores / L. Amaya	Borehole Diameter:	10-12 inches	
Logger:	Anthony Mack	Water Level Start:	9.6 ft bgs	Project Number: RC000753.0051
Editor:	Grant Wilford	Development End Date:	N/A	
Total Depth:	127 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
100							
101							
102							
103		Topock - Fluvial Deposits	SW				
104							
105							
106							
107		Topock - Fluvial Deposits	GW				
108							
109	MW-X-VAS-107-112 (<0.033 U ppb) 6/27/2019 15:04	Topock - Fluvial Deposits	SM		(96.4 - 124.0') Cemex #3 MESH (8x10)	(96.4 - 124.0') 29 bags	(96.4 - 124.0') 35 bags (21%) Note: Lapis Lustre Sand, used >20% of the calculated volume due to potential voids forming during flushing of the casing
110							
111							
112							
113		Topock - Fluvial Deposits	GW				
114	MW-X-VAS-112-117 (<0.033 U ppb) 6/28/2019 09:56						
115							
116		Topock - Alluvium Deposits	GW-GM				
117							
118		Topock - Alluvium Deposits	SM				
119							

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Date Started: 08/13/2019	Surface Elevation: N/A	Well ID: MW-X-45, MW-X-120
Date Completed: 09/24/2019	Shallow Well Elevation: N/A	
Drilling Co.: Cascade	Deep Well Elevation: N/A	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): N/A	Project: Final GW Remedy Phase 1
Driller Name: Steve Vasquez	Easting (NAD83): N/A	Location: PG&E Topock, Needles, California
Drilling Asst: O. Flores / L. Amaya	Borehole Diameter: 10-12 inches	
Logger: Anthony Mack	Water Level Start: 9.6 ft bgs	Project Number: RC000753.0051
Editor: Grant Wilford	Development End Date: N/A	
Total Depth: 127 ft bgs	Well Completion: <input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction		Calculated Material Volumes	Material Volumes Installed
120		Topock - Alluvium Deposits	SM			(120.5 - 121.5') Centralizer (96.4 - 124.0') Cemex #3 MESH (8x10) (119.8 - 122.1') Sump and End Cap (17.0 - 127.0') 10.0" Borehole	(96.4 - 124.0') 29 bags	(96.4 - 124.0') 35 bags (21%) Note: Lapis Lustre Sand, used >20% of the calculated volume due to potential voids forming during flushing of the casing
121								
122								
123								
124			NR			(124.0 - 125.0') Bentonite seal chips (125.0 - 127.0') Slough	(124.0 - 125.0') 0.8 bags	(124.0 - 125.0') 1 bags (25%) Note: Puregold Medium Chips, used >20% of the calculated volume due to potential voids forming during flushing of the casing
125								
126								
127						End of Boring at 127.0' bgs.		Note: Formation material that settled from the water column in the casing
128								
129								
130								
131								
132								
133								
134								
135								
136								
137								
138								
139								

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Date Started:	07/31/2019	Surface Elevation:	N/A	Well ID: MW-X-170, MW-X-320
Date Completed:	09/23/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	E. Ramos / S. Vasquez	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	O. Flores / L. Amaya	Borehole Diameter:	6-12 inches	
Logger:	GJ / SM / CS / DC / AM	Water Level Start:	9.6 ft bgs	Project Number: RC000753.0051
Editor:	Grant Willford	Development End Date:	N/A	
Total Depth:	417 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
0							
1					(+0.5 - 3.0') Concrete Pad		(-0.5 - 3.0') 22 bags Note: 30-inch Diameter Concrete Pad with 18-inch Diameter Lockable Vault, Quickcrete Concrete Mix with Buff dye
2					(0.5 - 150.8') 2" PVC Sch 80 Casing		
3					(2.2 - 5.0') Bentonite seal chips	(2.2 - 5.0') 2.92	(2.2 - 5.0') 7 (140%) Note: Puregold Medium Chips, installed due to void and heat of hydration concerns, installed >20% of calculated volume to fill void
4							
5							
6		Topock - Fill	SP				
7							
8							
9							
10					(0.0 - 42.0') 12.0" Borehole		
11					(5.0 - 16.9') Portland Cement 6% Bentonite	(5.0 - 16.9') 66 gallons	(5.0 - 16.9') 100 gallons (52%) Note: Type I, II and V and Benseal, used >20% of the calculated volume due to potential voids forming during flushing of the 10-inch casing
12							
13							
14	MW-X-VAS-12-17 (<0.033 U ppb) 6/25/2019 15:10						
15			NR				
16							
17							
18					(16.9 - 118.2') Bentonite seal chips	(16.9 - 118.2') 78.93 bags	(16.9 - 118.2') 77 bags (-2%) Note: Puregold Medium Chips
19		Topock - Fill	SW				

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Date Started:	07/31/2019	Surface Elevation:	N/A	Well ID: MW-X-170, MW-X-320
Date Completed:	09/23/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	E. Ramos / S. Vasquez	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	O. Flores / L. Amaya	Borehole Diameter:	6-12 inches	
Logger:	GJ / SM / CS / DC / AM	Water Level Start:	9.6 ft bgs	Project Number: RC000753.0051
Editor:	Grant Willford	Development End Date:	N/A	
Total Depth:	417 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
20					(19.5 - 20.5') Centralizer		
21					(0.5 - 150.8') 2" PVC Sch 80 Casing		
22							
23							
24							
25							
26							
27							
28		Topock - Fill	SW				
29							
30					(16.9 - 118.2') Bentonite seal chips	(16.9 - 118.2') 78.93 bags	(16.9 - 118.2') 77 bags (-2%) Note: Puregold Medium Chips
31							
32							
33	MW-X-VAS-32-37 (<0.033 U ppb) 6/26/2019 11:45						
34							
35							
36							
37		Topock - Fluvial Deposits	SW				
38							
39							

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Date Started: 07/31/2019	Surface Elevation: N/A	Well ID: MW-X-170, MW-X-320
Date Completed: 09/23/2019	Shallow Well Elevation: N/A	
Drilling Co.: Cascade	Deep Well Elevation: N/A	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): N/A	Project: Final GW Remedy Phase 1
Driller Name: E. Ramos / S. Vasquez	Easting (NAD83): N/A	Location: PG&E Topock, Needles, California
Drilling Asst: O. Flores / L. Amaya	Borehole Diameter: 6-12 inches	
Logger: GJ / SM / CS / DC / AM	Water Level Start: 9.6 ft bgs	Project Number: RC000753.0051
Editor: Grant Willford	Development End Date: N/A	
Total Depth: 417 ft bgs	Well Completion: <input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
40			SW		(0.5 - 150.8') 2" PVC Sch 80 Casing		
41						(0.6 - 300.8') 2" PVC Sch 80 Casing	
42						(0.0 - 42.0') 12.0" Borehole	
43							
44			NR				
45							
46							
47							
48		Topock - Fluvial Deposits	SW				
49		Topock - Fluvial Deposits	GW		(16.9 - 118.2') Bentonite seal chips	(16.9 - 118.2') 78.93 bags	(16.9 - 118.2') 77 bags (-2%) Note: Puregold Medium Chips
50							
51		Topock - Fluvial Deposits	SW			(42.0 - 324.0') 10.0" Borehole	
52							
53							
54							
55		Topock - Fluvial Deposits	SP				
56							
57							
58		Topock - Fluvial Deposits	SW				
59							

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Date Started:	07/31/2019	Surface Elevation:	N/A	Well ID: MW-X-170, MW-X-320
Date Completed:	09/23/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	E. Ramos / S. Vasquez	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	O. Flores / L. Amaya	Borehole Diameter:	6-12 inches	
Logger:	GJ / SM / CS / DC / AM	Water Level Start:	9.6 ft bgs	Project Number: RC000753.0051
Editor:	Grant Willford	Development End Date:	N/A	
Total Depth:	417 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
60					(0.5 - 150.8') 2" PVC Sch 80 Casing		
61		Topock - Fluvial Deposits	SW				
62							
63		Topock - Fluvial Deposits	SP				
64							
65							
66							
67							
68							
69		Topock - Fluvial Deposits	SW		(16.9 - 118.2') Bentonite seal chips		
70					(69.5 - 70.5') Centralizer	(42.0 - 324.0') 10.0" Borehole	(16.9 - 118.2') 78.93 bags
71							(16.9 - 118.2') 77 bags (-2%) Note: Puregold Medium Chips
72							
73	MW-X-VAS-71-76 (<0.033 U ppb) 6/27/2019 08:52						
74							
75							
76		Topock - Fluvial Deposits	SP				
77							
78		Topock - Fluvial Deposits	SW				
79							

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Date Started: 07/31/2019	Surface Elevation: N/A	Well ID: MW-X-170, MW-X-320
Date Completed: 09/23/2019	Shallow Well Elevation: N/A	
Drilling Co.: Cascade	Deep Well Elevation: N/A	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): N/A	Project: Final GW Remedy Phase 1
Driller Name: E. Ramos / S. Vasquez	Easting (NAD83): N/A	Location: PG&E Topock, Needles, California
Drilling Asst: O. Flores / L. Amaya	Borehole Diameter: 6-12 inches	
Logger: GJ / SM / CS / DC / AM	Water Level Start: 9.6 ft bgs	Project Number: RC000753.0051
Editor: Grant Willford	Development End Date: N/A	
Total Depth: 417 ft bgs	Well Completion: <input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
80					(0.5 - 150.8') 2" PVC Sch 80 Casing		
81		Topock - Fluvial Deposits	SW				
82							
83							
84		Topock - Fluvial Deposits	SW				
85							
86							
87							
88		Topock - Fluvial Deposits	SW-SM				
89							
90					(16.9 - 118.2') Bentonite seal chips	(42.0 - 324.0') 10.0" Borehole	(16.9 - 118.2') 78.93 bags
91							(16.9 - 118.2') 77 bags (-2%) Note: Puregold Medium Chips
92							
93		Topock - Fluvial Deposits	GW-GM				
94		Topock - Fluvial Deposits	SP				
95		Topock - Fluvial Deposits	SW				
96							
97			NR				
98		Topock - Fluvial Deposits	SW				
99							

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Date Started:	07/31/2019	Surface Elevation:	N/A	Well ID: MW-X-170, MW-X-320
Date Completed:	09/23/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	E. Ramos / S. Vasquez	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	O. Flores / L. Amaya	Borehole Diameter:	6-12 inches	
Logger:	GJ / SM / CS / DC / AM	Water Level Start:	9.6 ft bgs	Project Number: RC000753.0051
Editor:	Grant Willford	Development End Date:	N/A	
Total Depth:	417 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
100					(0.5 - 150.8') 2" PVC Sch 80 Casing		
101							
102		Topock - Fluvial Deposits	SW				
103							
104		Topock - Fluvial Deposits	SW				
105							
106		Topock - Fluvial Deposits	SW				
107							
108		Topock - Fluvial Deposits	GW				
109	MW-X-VAS-107-112 (<0.033 U ppb) 6/27/2019 15:04				(16.9 - 118.2') Bentonite seal chips	(16.9 - 118.2') 78.93 bags	(16.9 - 118.2') 77 bags (-2%) Note: Puregold Medium Chips
110		Topock - Fluvial Deposits	SM				
111							
112							
113		Topock - Fluvial Deposits	GW				
114	MW-X-VAS-112-117 (<0.033 U ppb) 6/28/2019 09:56				(42.0 - 324.0') 10.0" Borehole		
115		Topock - Fluvial Deposits	SM				
116							
117							
118		Topock - Alluvium Deposits	SM				
119					(118.2 - 146.8') Bentonite seal pellets	(118.2 - 146.8') 22.9 buckets	(118.2 - 146.8') 25 buckets (9%) Note: Pel-Plug (TR30) 3/8"

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	07/31/2019	Surface Elevation:	N/A	Well ID: MW-X-170, MW-X-320
Date Completed:	09/23/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	E. Ramos / S. Vasquez	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	O. Flores / L. Amaya	Borehole Diameter:	6-12 inches	
Logger:	GJ / SM / CS / DC / AM	Water Level Start:	9.6 ft bgs	Project Number: RC000753.0051
Editor:	Grant Willford	Development End Date:	N/A	
Total Depth:	417 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
120					(119.5 - 120.5') Centralizer (0.5 - 150.8') 2" PVC Sch 80 Casing		
121							
122							
123							
124							
125							
126							
127							
128							
129		Topock - Alluvium Deposits	SM		(118.2 - 146.8') Bentonite seal pellets	(42.0 - 324.0') 10.0" Borehole	(118.2 - 146.8') 22.9 buckets
130							(118.2 - 146.8') 25 buckets (9%) Note: Pel-Plug (TR30) 3/8"
131							
132							
133							
134							
135							
136							
137							
138							
139							

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Date Started:	07/31/2019	Surface Elevation:	N/A	Well ID: MW-X-170, MW-X-320
Date Completed:	09/23/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	E. Ramos / S. Vasquez	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	O. Flores / L. Amaya	Borehole Diameter:	6-12 inches	
Logger:	GJ / SM / CS / DC / AM	Water Level Start:	9.6 ft bgs	Project Number: RC000753.0051
Editor:	Grant Willford	Development End Date:	N/A	
Total Depth:	417 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
140					(0.5 - 150.8') 2" PVC Sch 80 Casing		
141							
142							
143					(118.2 - 146.8') Bentonite seal pellets	(118.2 - 146.8') 22.9 buckets	(118.2 - 146.8') 25 buckets (9%) Note: Pel-Plug (TR30) 3/8"
144							
145							
146							
147							
148		Topock - Alluvium Deposits	SM				
149							
150							
151					(150.8 - 170.8') 2" Sch 80 PVC (20-slot) Screen		
152					(146.8 - 174.0') Cemex #3 MESH (8x10)	(146.8 - 174.0') 26.6 bags	(146.8 - 174.0') 34 bags (28%) Note: Lapis Lustre Sand
153	MW-X-VAS-152-157 (<0.17 U ppb) 6/29/2019 09:19						
154							
155							
156							
157							
158			NR				
159							

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Date Started:	07/31/2019	Surface Elevation:	N/A	Well ID: MW-X-170, MW-X-320
Date Completed:	09/23/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	E. Ramos / S. Vasquez	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	O. Flores / L. Amaya	Borehole Diameter:	6-12 inches	
Logger:	GJ / SM / CS / DC / AM	Water Level Start:	9.6 ft bgs	Project Number: RC000753.0051
Editor:	Grant Willford	Development End Date:	N/A	
Total Depth:	417 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
160			NR		(150.8 - 170.8') 2" Sch 80 PVC (20-slot) Screen		
161							
162							
163							
164		Topock - Alluvium Deposits	CL				
165							
166							
167					(146.8 - 174.0') Cemex #3 MESH (8x10)	(146.8 - 174.0') 26.6 bags	(146.8 - 174.0') 34 bags (28%) Note: Lapis Lustre Sand
168							
169							
170		Topock - Alluvium Deposits	CL		(42.0 - 324.0') 10.0" Borehole		
171							
172					(170.5 - 172.0') Centralizer		
173					(170.8 - 173.2') Sump and End Cap		
174							
175		Topock - Alluvium Deposits	SM				
176							
177		Topock - Alluvium Deposits	GP		(174.0 - 297.4') Bentonite seal pellets	(174.0 - 297.4') 103.3 buckets	(174.0 - 297.4') 119 buckets (15%) Note: Pel-Plug (TR30) 3/8"
178							
179			NR				




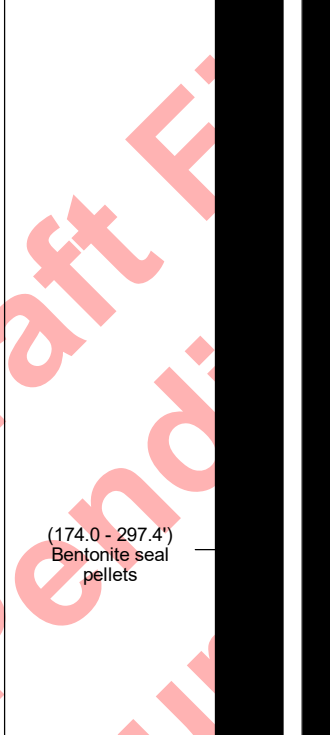
Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	07/31/2019	Surface Elevation:	N/A	Well ID: MW-X-170, MW-X-320
Date Completed:	09/23/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	E. Ramos / S. Vasquez	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	O. Flores / L. Amaya	Borehole Diameter:	6-12 inches	
Logger:	GJ / SM / CS / DC / AM	Water Level Start:	9.6 ft bgs	Project Number: RC000753.0051
Editor:	Grant Willford	Development End Date:	N/A	
Total Depth:	417 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
180			NR		(0.6 - 300.8') 2" PVC Sch 80 Casing		
181							
182							
183							
184	MW-X-VAS-182-187 (<0.17 U ppb) 6/29/2019 15:28	Topock - Alluvium Deposits	SM				
185							
186							
187		Topock - Alluvium Deposits	SC				
188		Topock - Alluvium Deposits	ML				
189		Topock - Alluvium Deposits	SM		(174.0 - 297.4') Bentonite seal pellets		
190		Topock - Alluvium Deposits	CL		(42.0 - 324.0') 10.0" Borehole	(174.0 - 297.4') 103.3 buckets	(174.0 - 297.4') 119 buckets (15%) Note: Pel-Plug (TR30) 3/8"
191		Topock - Alluvium Deposits	MH				
192							
193		Topock - Alluvium Deposits	ML				
194							
195		Topock - Alluvium Deposits	ML				
196							
197		Topock - Alluvium Deposits	ML				
198							
199		Topock - Alluvium Deposits	CL				

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Date Started:	07/31/2019	Surface Elevation:	N/A	Well ID: MW-X-170, MW-X-320
Date Completed:	09/23/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	E. Ramos / S. Vasquez	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	O. Flores / L. Amaya	Borehole Diameter:	6-12 inches	
Logger:	GJ / SM / CS / DC / AM	Water Level Start:	9.6 ft bgs	Project Number: RC000753.0051
Editor:	Grant Willford	Development End Date:	N/A	
Total Depth:	417 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction		Calculated Material Volumes	Material Volumes Installed
200		Topock - Alluvium Deposits	CL			(0.6 - 300.8') 2" PVC Sch 80 Casing		
201								
202		Topock - Alluvium Deposits	SM			(174.0 - 297.4') 103.3 buckets	(174.0 - 297.4') 119 buckets (15%) Note: Pel-Plug (TR30) 3/8"	
203								
204								
205								
206								
207								
208								
209	MW-X-VAS-207-212 (<0.17 U ppb) 6/30/2019 13:28							
210								
211								
212								
213								
214								
215								
216								
217								
218								
219								

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WELL CONSTRUCTION DETAILS_PG&E TOPOCK TOPOCK BORING LOGS\GINT FILES\110319\TOPOCK DATA TEMPLATE FOR PLOG.GDT 11/03/19 12:59

Date Started:	07/31/2019	Surface Elevation:	N/A	Well ID: MW-X-170, MW-X-320
Date Completed:	09/23/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	E. Ramos / S. Vasquez	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	O. Flores / L. Amaya	Borehole Diameter:	6-12 inches	
Logger:	GJ / SM / CS / DC / AM	Water Level Start:	9.6 ft bgs	Project Number: RC000753.0051
Editor:	Grant Willford	Development End Date:	N/A	
Total Depth:	417 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
220					(0.6 - 300.8') 2" PVC Sch 80 Casing		
221							
222							
223		Topock - Alluvium Deposits	SM				
224							
225							
226							
227							
228					(174.0 - 297.4') Bentonite seal pellets		
229							
230					(229.5 - 230.5') Centralizer		
231							
232							
233		Topock - Alluvium Deposits	SM				
234							
235							
236							
237							
238							
239							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	07/31/2019	Surface Elevation:	N/A	Well ID: MW-X-170, MW-X-320
Date Completed:	09/23/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	E. Ramos / S. Vasquez	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	O. Flores / L. Amaya	Borehole Diameter:	6-12 inches	
Logger:	GJ / SM / CS / DC / AM	Water Level Start:	9.6 ft bgs	Project Number: RC000753.0051
Editor:	Grant Willford	Development End Date:	N/A	
Total Depth:	417 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
240			SM		(0.6 - 300.8') 2" PVC Sch 80 Casing		
241							
242							
243		Topock - Alluvium Deposits	SM				
244							
245							
246							
247	MW-X-VAS-245-255 (<0.033 U ppb) 7/1/2019 13:35						
248							
249							
250		Topock - Alluvium Deposits	SM		(174.0 - 297.4') Bentonite seal pellets	(42.0 - 324.0') 10.0" Borehole	(174.0 - 297.4') 103.3 buckets
251							(174.0 - 297.4') 119 buckets (15%) Note: Pel-Plug (TR30) 3/8"
252							
253							
254							
255							
256		Topock - Alluvium Deposits	SM				
257							
258							
259							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	07/31/2019	Surface Elevation:	N/A	Well ID: MW-X-170, MW-X-320
Date Completed:	09/23/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	E. Ramos / S. Vasquez	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	O. Flores / L. Amaya	Borehole Diameter:	6-12 inches	
Logger:	GJ / SM / CS / DC / AM	Water Level Start:	9.6 ft bgs	Project Number: RC000753.0051
Editor:	Grant Willford	Development End Date:	N/A	
Total Depth:	417 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
260					(0.6 - 300.8') 2" PVC Sch 80 Casing		
261							
262							
263							
264		Topock - Alluvium Deposits	SM				
265							
266							
267					(174.0 - 297.4') Bentonite seal pellets		
268							
269							
270					(269.5 - 270.5') Centralizer		
271							
272							
273							
274		Topock - Alluvium Deposits	SM				
275							
276							
277							
278							
279							

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Date Started:	07/31/2019	Surface Elevation:	N/A	Well ID: MW-X-170, MW-X-320
Date Completed:	09/23/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	E. Ramos / S. Vasquez	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	O. Flores / L. Amaya	Borehole Diameter:	6-12 inches	
Logger:	GJ / SM / CS / DC / AM	Water Level Start:	9.6 ft bgs	Project Number: RC000753.0051
Editor:	Grant Willford	Development End Date:	N/A	
Total Depth:	417 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
280					(0.6 - 300.8') 2" PVC Sch 80 Casing		
281							
282							
283							
284							
285							
286							
287							
288							
289					(174.0 - 297.4') Bentonite seal pellets	(174.0 - 297.4') 103.3 buckets	(174.0 - 297.4') 119 buckets (15%) Note: Pel-Plug (TR30) 3/8"
290		Topock - Alluvium Deposits	SM		(42.0 - 324.0') 10.0" Borehole		
291							
292							
293							
294	MW-X-VAS-292-297 (<0.17 U ppb) 7/2/2019 14:45						
295							
296							
297							
298					(297.4 - 324.0') Cemex #3 MESH (8x10)	(297.4 - 324.0') 28 bags	(297.4 - 324.0') 33 bags (18%) Note: Lapis Lustre Sand
299							

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Date Started:	07/31/2019	Surface Elevation:	N/A	Well ID: MW-X-170, MW-X-320
Date Completed:	09/23/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	E. Ramos / S. Vasquez	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	O. Flores / L. Amaya	Borehole Diameter:	6-12 inches	
Logger:	GJ / SM / CS / DC / AM	Water Level Start:	9.6 ft bgs	Project Number: RC000753.0051
Editor:	Grant Willford	Development End Date:	N/A	
Total Depth:	417 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
300					(0.6 - 300.8') 2" PVC Sch 80 Casing		
301					(300.8 - 320.8') 2" PVC Sch 80 Screen		
302							
303							
304							
305							
306							
307							
308							
309		Topock - Alluvium Deposits	SM		(297.4 - 324.0') Cemex #3 MESH (8x10)	(297.4 - 324.0') 28 bags	(297.4 - 324.0') 33 bags (18%) Note: Lapis Lustre Sand
310					(42.0 - 324.0') 10.0" Borehole		
311							
312							
313							
314							
315							
316							
317							
318							
319							


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Date Started: 07/31/2019	Surface Elevation: N/A	Well ID: MW-X-170, MW-X-320
Date Completed: 09/23/2019	Shallow Well Elevation: N/A	
Drilling Co.: Cascade	Deep Well Elevation: N/A	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): N/A	Project: Final GW Remedy Phase 1
Driller Name: E. Ramos / S. Vasquez	Easting (NAD83): N/A	Location: PG&E Topock, Needles, California
Drilling Asst: O. Flores / L. Amaya	Borehole Diameter: 6-12 inches	
Logger: GJ / SM / CS / DC / AM	Water Level Start: 9.6 ft bgs	Project Number: RC000753.0051
Editor: Grant Willford	Development End Date: N/A	
Total Depth: 417 ft bgs	Well Completion: <input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
320					(300.8 - 320.8') 2" PVC Sch 80 Screen		
321					(320.5 - 321.5') Centralizer		
322					(297.4 - 324.0') Cemex #3 MESH (8x10)	(42.0 - 324.0') 10.0" Borehole	(297.4 - 324.0') 28 bags
323		Topock - Alluvium Deposits	SM		(320.8 - 323.2') Sump and End Cap		(297.4 - 324.0') 33 bags (18%) Note: Lapis Lustre Sand
324							
325							
326							
327		Topock - Alluvium Deposits	MH				
328							
329		Topock - Alluvium Deposits	SM				
330							
331		Topock - Alluvium Deposits	MH				
332					(324.0 - 417.0') Bentonite seal chips	(324.0 - 414.0') 6.0" Borehole	(324.0 - 417.0') 24.9 bags
333							(324.0 - 417.0') 34 bags (37%) Note: Puregold Medium Chips, used >20% of the calculated volume due to potential voids that formed during drilling
334							
335		Topock - Alluvium Deposits	MH				
336							
337							
338	MW-X-VAS-337-342 (<0.17 U ppb) 7/11/2019 11:30	Topock - Alluvium Deposits	ML				
339		Topock - Alluvium Deposits	ML				

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Date Started:	07/31/2019	Surface Elevation:	N/A	Well ID: MW-X-170, MW-X-320
Date Completed:	09/23/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	E. Ramos / S. Vasquez	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	O. Flores / L. Amaya	Borehole Diameter:	6-12 inches	
Logger:	GJ / SM / CS / DC / AM	Water Level Start:	9.6 ft bgs	Project Number: RC000753.0051
Editor:	Grant Willford	Development End Date:	N/A	
Total Depth:	417 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
340	MW-X-VAS-337-342 (<0.17 U ppb) 7/11/2019 11:30	Topock - Alluvium Deposits	ML				(324.0 - 417.0') 34 bags (37%) Note: Puregold Medium Chips, used >20% of the calculated volume due to potential voids that formed during drilling
341		Topock - Alluvium Deposits	GM				
342							
343		Topock - Alluvium Deposits	SM				
344							
345							
346		Topock - Alluvium Deposits	ML				
347							
348		Topock - Alluvium Deposits	MH				
349							
350		Topock - Alluvium Deposits	ML		(324.0 - 417.0') Bentonite seal chips	(324.0 - 417.0') 24.9 bags	
351							
352							
353		Topock - Alluvium Deposits	SW-SM				
354							
355							
356		Topock - Weathered Bedrock - conglomerate	MH				
357							
358		Topock - Weathered Bedrock - conglomerate	ML				
359			ML				

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Date Started:	07/31/2019	Surface Elevation:	N/A	Well ID: MW-X-170, MW-X-320
Date Completed:	09/23/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	E. Ramos / S. Vasquez	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	O. Flores / L. Amaya	Borehole Diameter:	6-12 inches	
Logger:	GJ / SM / CS / DC / AM	Water Level Start:	9.6 ft bgs	Project Number: RC000753.0051
Editor:	Grant Willford	Development End Date:	N/A	
Total Depth:	417 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
360							
361							
362							
363							
364							
365							
366							
367		Topock - Weathered Bedrock - conglomerate	ML				
368							
369					(324.0 - 417.0') Bentonite seal chips	(324.0 - 417.0') 24.9 bags	(324.0 - 417.0') 34 bags (37%) Note: Puregold Medium Chips, used >20% of the calculated volume due to potential voids that formed during drilling
370							
371							
372							
373							
374							
375		Topock - Weathered Bedrock - conglomerate	SM				
376							
377		Topock - Weathered Bedrock - conglomerate	GW-GM				
378		Topock - Weathered Bedrock - conglomerate					
379		Topock - Weathered Bedrock - conglomerate	GM				

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Date Started:	07/31/2019	Surface Elevation:	N/A	Well ID: MW-X-170, MW-X-320
Date Completed:	09/23/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	E. Ramos / S. Vasquez	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	O. Flores / L. Amaya	Borehole Diameter:	6-12 inches	
Logger:	GJ / SM / CS / DC / AM	Water Level Start:	9.6 ft bgs	Project Number: RC000753.0051
Editor:	Grant Willford	Development End Date:	N/A	
Total Depth:	417 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
380		Topock - Weathered Bedrock - conglomerate	GM				
381							
382							
383							
384	MW-X-VAS-382-387 (<0.17 U ppb) 7/13/2019 14:43	Topock - Weathered Bedrock - conglomerate	CL				
385							
386							
387							
388							
389							
390					(324.0 - 417.0') Bentonite seal chips	(324.0 - 417.0') 24.9 bags	(324.0 - 417.0') 34 bags (37%) Note: Puregold Medium Chips, used >20% of the calculated volume due to potential voids that formed during drilling
391							
392							
393							
394		Topock - Weathered Bedrock - conglomerate	CL				
395							
396							
397							
398							
399							

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Date Started:	07/31/2019	Surface Elevation:	N/A	Well ID: MW-X-170, MW-X-320
Date Completed:	09/23/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	E. Ramos / S. Vasquez	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	O. Flores / L. Amaya	Borehole Diameter:	6-12 inches	
Logger:	GJ / SM / CS / DC / AM	Water Level Start:	9.6 ft bgs	Project Number: RC000753.0051
Editor:	Grant Willford	Development End Date:	N/A	
Total Depth:	417 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
400		Topock - Weathered Bedrock - conglomerate	CL				
401		Topock - Weathered Bedrock - conglomerate	GC				
402		Topock - Weathered Bedrock - conglomerate	ML				
403		Topock - Weathered Bedrock - conglomerate	GC				
404		Topock - Weathered Bedrock - conglomerate	SM				
405		Topock - Weathered Bedrock - conglomerate	CL				
406		Topock - Weathered Bedrock - conglomerate	SM				
407		Topock - Weathered Bedrock - conglomerate	GC				
408		Topock - Weathered Bedrock - conglomerate	SM				
409		Topock - Weathered Bedrock - conglomerate	GC				
410		Topock - Weathered Bedrock - conglomerate	SM				
411		Topock - Weathered Bedrock - conglomerate	GM				
412		Topock - Weathered Bedrock - conglomerate					
413		Topock - Weathered Bedrock - conglomerate					
414	MW-X-VAS-412-417 (<0.17 U ppb) 7/15/2019 12:43	Topock - Weathered Bedrock - conglomerate					
415		Topock - Weathered Bedrock - conglomerate					
416		Topock - Weathered Bedrock - conglomerate					
417		Topock - Weathered Bedrock - conglomerate					
418							
419							

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Date Started: 06/20/2019	Surface Elevation: N/A	Boring No.: MW-Xd
Date Completed: 07/30/2019	Northing (NAD83): N/A	
Drilling Co.: Cascade	Easting (NAD83): N/A	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 417 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type: Prosonic Truck Mount	Borehole Diameter: 6-12 inches	Location: PG&E Topock, Needles, California
Driller Name: E. Ramos / S. Vasquez	Depth to First Water: 9.6 ft bgs	
Drilling Asst: O. Flores / L. Amaya	Sampling Method: 4 Inch X 10 ft Core Barrel	Project Number: RC000753.0051
Logger: GJ / SM / CS / DC / AM	Sampling Interval: Continuous	
Editor: Grant Willford	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
1							(0.0 - 12.0') Topock - Fill; Poorly graded sand (SP); brown (10YR 5/3); fine grained to medium grained, angular to subround; trace mica; trace wood; dry; no odor	(0.0 - 7.0') Formation was collapsing at the surface during the installation of the 12-inch conductor casing. Used bentonite to stop the collapse at the surface. Bentonite was mixed into the core during installation of the 12-inch casing to 7 ft bgs.	(0.0 - 177.0') 5100 gallons of water used; 1600 gallons of water recovered; 3500 gallons of water lost
2									
3									
4	96								
5									
6				Topock - Fill	SP				
7									
8									
9							(8'); trace clay; trace organics; no wood particles. 3.0" lense of fat clay @ 8.0' bgs (5Y 4/1)	(8.0 - 17.0') Soft drilling, low recovery due to soft dredge sands	
10		No Sieve Samples Collected					(10'); moist; no clay	compacting or falling out of core barrel.	
11							(11'); wet	(11.0') Approximate Depth to Water.	
12							(12.0 - 19.0') No recovery (NR)		
13	48								
14			MW-X-VAS-12-17 (<0.033 U ppb) 6/25/2019 15:10						
15									
16					NR				
17									
18	24								
19									
20	96			Topock - Fill	SW		(19.0 - 36.5') Topock - Fill; Well graded sand (SW); yellowish brown / moderate yellowish brown (10YR 5/4); fine grained to coarse grained, subangular to subround; little mica; trace	(17.0 - 19.0') No recovery, due to casing and core barrel dropping 2 ft. during clean out to 17 ft. bgs. Heaving sands formation collapse observed on	

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Date Started:	06/20/2019	Surface Elevation:	N/A	Boring No.: MW-Xd	
Date Completed:	07/30/2019	Northing (NAD83):	N/A		
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	417 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	E. Ramos / S. Vasquez	Depth to First Water:	9.6 ft bgs		
Drilling Asst:	O. Flores / L. Amaya	Sampling Method:	4 Inch X 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	GJ / SM / CS / DC / AM	Sampling Interval:	Continuous		
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
21	96						organics; wet; no odor; increase organics at 36.2-36.5' bgs	6/26/19. (19.0 - 27.0') Soft drilling.	(0.0 - 177.0') 5100 gallons of water used; 1600 gallons of water recovered; 3500 gallons of water lost
22									
23									
24									
25									
26	120	No Sieve Samples Collected		Topock - Fill	SW			(27.0 - 36.5') Soft drilling.	
27									
28									
29									
30									
31									
32									
33									
34									
35									
36	36		MW-X-VAS-32-37 (<0.033 U ppb) 6/26/2019 11:45	Topock - Fluvial Deposits	SW		(36.5 - 40.0') Topock - Fluvial Deposits; Well graded sand (SW); grayish brown (10YR 5/2); fine grained to very coarse grained, subangular to round; little granules to very large pebbles, round; trace round; little mica; coarser clast consists of quartz and basalt; wet; organic odor (37'); no granules and pebbles	(38.0') Drilling reaming with the 10-inch casing, the 12-inch conductor casing began to	
37									
38									
39									
40							(38.5'); trace granules to very large pebbles, subround to round		

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Date Started:	06/20/2019	Surface Elevation:	N/A	Boring No.: <u>MW-Xd</u>	
Date Completed:	07/30/2019	Northing (NAD83):	N/A		
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	417 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	E. Ramos / S. Vasquez	Depth to First Water:	9.6 ft bgs		
Drilling Asst:	O. Flores / L. Amaya	Sampling Method:	4 Inch X 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	GJ / SM / CS / DC / AM	Sampling Interval:	Continuous		
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
41	36				NR		(40.0 - 47.0') No recovery (NR)	slip below ground surface. The 12-inch was advanced to 38 ft bgs to stabilize the borehole. (42.0') Final depth of conductor casing after installing deeper to fix mud tub seal.	(0.0 - 177.0') 5100 gallons of water used; 1600 gallons of water recovered; 3500 gallons of water lost
42									
43									
44									
45									
46									
47									
48				Topock - Fluvial Deposits	SW		(47.0 - 48.2') Topock - Fluvial Deposits; Well graded sand (SW); grayish brown (10YR 5/2); fine grained to very coarse grained, subangular to round; trace granules to large pebbles, round; trace mica; coarser clast composed of quartz; wet		
49				Topock - Fluvial Deposits	GW		(48.2 - 50.5') Topock - Fluvial Deposits; Well graded gravel with sand (GW); grayish brown (10YR 5/2); granules to small cobbles, subangular to round; some fine to coarse grained sand, subangular to round; trace mica; coarser clast composed of granite and basalt; wet		
50									
51									
52	120			Topock - Fluvial Deposits	SW		(50.5 - 53.8') Topock - Fluvial Deposits; Well graded sand with gravel (SW); grayish brown (10YR 5/2); fine grained to very coarse grained, subangular to subround; little granules to very large pebbles, subangular to subround; trace round; trace mica; coarser clasts composed of granite and basalt; wet		
53									
54									
55				Topock - Fluvial Deposits	SP		(53.8 - 57.0') Topock - Fluvial Deposits; Poorly graded sand (SP); brown (10YR 5/3); very fine grained to fine grained, subround to round; trace granules to very large pebbles, subround to round; wet		
56									
57									
58	120			Topock - Fluvial Deposits	SW		(57.0 - 62.2') Topock - Fluvial Deposits; Well graded sand (SW); brown (10YR 5/3); very fine grained to coarse grained, round; trace mica; wet		
59									
60									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	<u>06/20/2019</u>	Surface Elevation:	<u>N/A</u>	Boring No.: <u>MW-Xd</u>
Date Completed:	<u>07/30/2019</u>	Northing (NAD83):	<u>N/A</u>	
Drilling Co.:	<u>Cascade</u>	Easting (NAD83):	<u>N/A</u>	Client: <u>PG&E</u>
Drilling Method:	<u>Sonic Drilling</u>	Total Depth:	<u>417 ft bgs</u>	Project: <u>Final GW Remedy Phase 1</u>
Drill Rig Type:	<u>Prosonic Truck Mount</u>	Borehole Diameter:	<u>6-12 inches</u>	Location: <u>PG&E Topock, Needles, California</u>
Driller Name:	<u>E. Ramos / S. Vasquez</u>	Depth to First Water:	<u>9.6 ft bgs</u>	
Drilling Asst:	<u>O. Flores / L. Amaya</u>	Sampling Method:	<u>4 Inch X 10 ft Core Barrel</u>	Project Number: <u>RC000753.0051</u>
Logger:	<u>GJ / SM / CS / DC / AM</u>	Sampling Interval:	<u>Continuous</u>	
Editor:	<u>Grant Willford</u>	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

C:\USERS\SSMCGRANF\DOCUMENTS\PG&E TOPOCKIDRAFT BORING LOGS\GINT FILE ES110319\TOPOCK DATA TEMPLATE FOR PI OG.GDT 11/03/19 11:53

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	06/20/2019	Surface Elevation:	N/A	Boring No.: <u>MW-Xd</u>	
Date Completed:	07/30/2019	Northing (NAD83):	N/A		
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	417 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	E. Ramos / S. Vasquez	Depth to First Water:	9.6 ft bgs		
Drilling Asst:	O. Flores / L. Amaya	Sampling Method:	4 Inch X 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	GJ / SM / CS / DC / AM	Sampling Interval:	Continuous		
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
81	120			Topock - Fluvial Deposits	SW				(0.0 - 177.0') 5100 gallons of water used; 1600 gallons of water recovered; 3500 gallons of water lost
82									
83									
84				Topock - Fluvial Deposits	SW		(83.5 - 87.0') Topock - Fluvial Deposits; Well graded sand with gravel (SW); brown (10YR 5/3); very fine grained to very coarse grained; little granules to very large pebbles, subangular to round; trace subround to round; trace mica; coarse clasts composed of granite, basalt, and quartz; wet; granules and pebbles increase with depth		
85									
86									
87									
88	108	No Sieve Samples Collected		Topock - Fluvial Deposits	SW-SM		(87.0 - 93.0') Topock - Fluvial Deposits; Well graded sand with silt (SW-SM); brown (10YR 5/3); very fine grained to very coarse grained, subangular to round; little granules to large pebbles, subround to round; little silt; trace mica; coarser clasts composed of metadiorite; wet		
89									
90									
91									
92									
93									
94				Topock - Fluvial Deposits	GW-GM		(93.0 - 94.0') Topock - Fluvial Deposits; Well graded gravel with silt and sand (GW-GM); brown (10YR 5/3); granules to small cobbles, subangular to round; and very fine to very coarse grained sand, subangular to subround; little silt; trace mica; coarser clasts composed of metadiorite; wet		
95				Topock - Fluvial Deposits	SP		(94.0 - 95.0') Topock - Fluvial Deposits; Poorly graded sand (SP); strong brown (7.5YR 4/6); very fine grained to fine grained, subround to round; trace silt; trace mica; wet		
96				Topock - Fluvial Deposits	SW		(95.0 - 96.0') Topock - Fluvial Deposits; Well graded sand with gravel (SW); brown (10YR 5/3); very fine grained to medium grained, subangular to round; some granules to very large pebbles, subround to round; trace subround to round; trace silt; trace mica; coarser clasts composed of metadiorite; wet; fractured cobble/boulder fragments within formation		
97					NR		(96.0 - 97.0') No recovery (NR)		
98	96			Topock - Fluvial Deposits	SW		(97.0 - 104.0') Topock - Fluvial Deposits; Well graded sand (SW); brown (10YR 5/3); very fine grained to very coarse grained, subangular to subround; trace granules to small pebbles, subround to round; trace mica; wet		
99									
100									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	06/20/2019	Surface Elevation:	N/A	Boring No.: MW-Xd
Date Completed:	07/30/2019	Northing (NAD83):	N/A	
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	417 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	6-12 inches	Location: PG&E Topock, Needles, California
Driller Name:	E. Ramos / S. Vasquez	Depth to First Water:	9.6 ft bgs	
Drilling Asst:	O. Flores / L. Amaya	Sampling Method:	4 Inch X 10 ft Core Barrel	Project Number: RC000753.0051
Logger:	GJ / SM / CS / DC / AM	Sampling Interval:	Continuous	
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
101	96	No Sieve Samples Collected		Topock - Fluvial Deposits	SW		(104.0 - 105.0') Topock - Fluvial Deposits; Well graded sand with gravel (SW); dark grayish brown / dark yellowish brown(10YR 4/2); very fine grained to very coarse grained, subround to round; and granules to very large pebbles, subangular to round; trace subround to round; trace silt; trace mica; coarser clasts composed of metadiorite; wet; fractured cobbles/ boulder fragments within formation	(102.0 - 105.0') Tight formation.	(0.0 - 177.0') 5100 gallons of water used; 1600 gallons of water recovered; 3500 gallons of water lost
102									
103									
104									
105	Topock - Fluvial Deposits		SW		(105.0 - 107.0') Topock - Fluvial Deposits; Well graded sand (SW); brown (10YR 5/3); very fine grained to very coarse grained, subangular to subround; little granules to small pebbles, subround to round; trace silt; trace mica; wet	(107.0 - 108.0') Topock - Fluvial Deposits; Well graded gravel with sand (GW); brown (10YR 4/3); granules to very large pebbles, subround to round; some very fine to very coarse grained sand, subangular to round; trace silt; trace mica; coarse clasts composed of metadiorite, granite, basalt, quartz; wet	(108.0 - 112.0') Topock - Fluvial Deposits; Silty sand with gravel (SM); dark grayish brown / dark yellowish brown(10YR 4/2); very fine grained to coarse grained, subangular to round; some granules to very large pebbles, subround to round; some silt; little subround to round; trace mica; trace organics; wet; organic odor; coarser clasts composed of metadiorite and granite, pulverized cobble/boulder fragments observed (109') brown (10YR 5/3); little silt; no organics; increase in very fine to very coarse grained sand		
106	Topock - Fluvial Deposits		SW						
107	84		Topock - Fluvial Deposits					GW	
108			MW-X-VAS- 107-112 (<0.033 U ppb) 6/27/2019 15:04					Topock - Fluvial Deposits	SM
109				MW-X-VAS- 112-117 (<0.033 U ppb) 6/28/2019 09:56	Topock - Fluvial Deposits	GW			
110					Topock - Fluvial Deposits	SM			
111	60				Topock - Fluvial Deposits	SM	(114.0 - 116.0') Topock - Fluvial Deposits; Silty sand with gravel (SM); brown (10YR 4/3); very fine grained to very coarse grained, subangular to round; some granules to very large pebbles, subangular to round; little silt; trace subround to round; trace mica; trace organics; wet; organic odor; coarser clasts composed of metadiorite		
112			Topock - Fluvial Deposits					SM	(116.0 - 157.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 4/4) trace red / moderate reddish brown(10R 4/6); very fine grained to very coarse grained, angular to subround; some granules to very large pebbles, angular to subangular; little silt; trace subangular; trace mica; coarser clasts composed of metadiorite; wet; mottled (117') reddish brown / moderate brown(5YR 4/4) little red / moderate reddish brown(10R 4/6); some silt; decrease in granules to very large pebbles, no cobbles (118'); little silt; increase in very fine to very coarse sand, weathered granules to very large pebbles
113		120		Topock - Alluvium Deposits	SM				
114									
115									
116									
117	120			Topock - Alluvium Deposits	SM		(117.0 - 119.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 4/4) trace red / moderate reddish brown(10R 4/6); very fine grained to very coarse grained, angular to subround; some granules to very large pebbles, angular to subangular; little silt; trace subangular; trace mica; coarser clasts composed of metadiorite; wet; mottled (118') reddish brown / moderate brown(5YR 4/4) little red / moderate reddish brown(10R 4/6); some silt; decrease in granules to very large pebbles, no cobbles (119'); little silt; increase in very fine to very coarse sand, weathered granules to very large pebbles	(112.0 - 117.0') Rough drilling, collect groundwater sample across fluvial / alluvium contact.	
118									
119									
120									

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Date Started:	06/20/2019	Surface Elevation:	N/A	Boring No.: MW-Xd	
Date Completed:	07/30/2019	Northing (NAD83):	N/A		
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	417 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	E. Ramos / S. Vasquez	Depth to First Water:	9.6 ft bgs		
Drilling Asst:	O. Flores / L. Amaya	Sampling Method:	4 Inch X 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	GJ / SM / CS / DC / AM	Sampling Interval:	Continuous		
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
121	120	No Sieve Samples Collected		Topock - Alluvium Deposits	SM		(128'); some silt; little granules to very large pebbles, angular to subangular; decrease in very fine to very coarse sand		(0.0 - 177.0') 5100 gallons of water used; 1600 gallons of water recovered; 3500 gallons of water lost
122									
123									
124									
125									
126	120	No Sieve Samples Collected		Topock - Alluvium Deposits	SM		(134'); little silt; increase in very fine to very coarse, increase in granules to very large pebbles		
127									
128									
129									
130									
131	120	No Sieve Samples Collected		Topock - Alluvium Deposits	SM		(138'); some granules to very large pebbles, angular to subangular; slight decrease in silt	(137.0') During reaming with the 10-inch casing, drilling became difficult due to increased friction. Reinstalled 6-casing and started flushing	
132									
133									
134									
135									
136	120	No Sieve Samples Collected		Topock - Alluvium Deposits	SM				
137									
138									
139									
140									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started: 06/20/2019	Surface Elevation: N/A	Boring No.: MW-Xd
Date Completed: 07/30/2019	Northing (NAD83): N/A	
Drilling Co.: Cascade	Easting (NAD83): N/A	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 417 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type: Prosonic Truck Mount	Borehole Diameter: 6-12 inches	Location: PG&E Topock, Needles, California
Driller Name: E. Ramos / S. Vasquez	Depth to First Water: 9.6 ft bgs	
Drilling Asst: O. Flores / L. Amaya	Sampling Method: 4 Inch X 10 ft Core Barrel	Project Number: RC000753.0051
Logger: GJ / SM / CS / DC / AM	Sampling Interval: Continuous	
Editor: Grant Willford	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
141	120			Topock - Alluvium Deposits	SM	(148'); and silt; moist to wet; decrease in very fine to very coarse sand		10-inch over the 6-inch.	(0.0 - 177.0') 5100 gallons of water used; 1600 gallons of water recovered; 3500 gallons of water lost
142									
143									
144									
145									
146	120	No Sieve Samples Collected			SM	(148'); and silt; moist to wet; decrease in very fine to very coarse sand			
147									
148									
149									
150									
151									
152									
153									
154									
155									
156	72		MW-X-VAS-152-157 (<0.17 U ppb) 6/29/2019 09:19		NR	(155'); some granules to very large pebbles, angular to subangular; little silt; wet; increase in very fine to very coarse sand		(151.0 - 157.0') Heaving sands came into casing during clean out to set the sample screen from 152 to 157 ft. bgs. Sampler screen was clogged with sand and had to be reinstalled.	
157									
158									
159									
160									
						(157.0 - 161.0') No recovery (NR)		(157.0 - 167.0') Loose sands fell out of core barrel into hopper when bagging core, 165 to 167 drilling got hard.	

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Date Started:	<u>06/20/2019</u>	Surface Elevation:	<u>N/A</u>	Boring No.: <u>MW-Xd</u>	
Date Completed:	<u>07/30/2019</u>	Northing (NAD83):	<u>N/A</u>		
Drilling Co.:	<u>Cascade</u>	Easting (NAD83):	<u>N/A</u>	Client:	<u>PG&E</u>
Drilling Method:	<u>Sonic Drilling</u>	Total Depth:	<u>417 ft bgs</u>	Project:	<u>Final GW Remedy Phase 1</u>
Drill Rig Type:	<u>Prosonic Truck Mount</u>	Borehole Diameter:	<u>6-12 inches</u>	Location:	<u>PG&E Topock, Needles, California</u>
Driller Name:	<u>E. Ramos / S. Vasquez</u>	Depth to First Water:	<u>9.6 ft bgs</u>		
Drilling Asst:	<u>O. Flores / L. Amaya</u>	Sampling Method:	<u>4 Inch X 10 ft Core Barrel</u>	Project Number:	<u>RC000753.0051</u>
Logger:	<u>GJ / SM / CS / DC / AM</u>	Sampling Interval:	<u>Continuous</u>		
Editor:	<u>Grant Willford</u>	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

		NR			(157.0 - 161.0') Topock - Alluvium Deposits; Sandy lean clay with gravel (CL); brown (7.5YR 4/4); medium plasticity; some very fine to very coarse grained sand, angular to subangular; little granules to very large pebbles, angular to subangular; little silt; coarser clasts composed of metadiorite; moist; hard; blocky; some meta-diorite clasts are weathered	(157.0 - 161.0') Loose sand fell out of barrel in hopper wh bagging co 165 to 16 drilling got h
	Topock - Alluvium Deposits	CL			(167.0 - 174.5') Topock - Alluvium Deposits; Sandy lean clay with gravel (CL); reddish brown / moderate brown (5YR 4/4); medium plasticity; some very fine to very coarse grained sand, angular to subangular; little granules to very large pebbles, angular to subangular; little silt; coarser clasts composed of metadiorite; moist; some meta-diorite clasts are weathered	(167.0 - 174.5') Smooth drill
	Topock - Alluvium Deposits	CL			(173.5') moist to wet	

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	06/20/2019	Surface Elevation:	N/A	Boring No.: <u>MW-Xd</u>	
Date Completed:	07/30/2019	Northing (NAD83):	N/A		
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	417 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	E. Ramos / S. Vasquez	Depth to First Water:	9.6 ft bgs		
Drilling Asst:	O. Flores / L. Amaya	Sampling Method:	4 Inch X 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	GJ / SM / CS / DC / AM	Sampling Interval:	Continuous		
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
181	84		MW-X-VAS-182-187 (<0.17 U ppb) 6/29/2019 15:28	Topock - Alluvium Deposits	NR		(180.5 - 187.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown / moderate brown(5YR 4/4); very fine grained to very coarse grained, angular to subround; little granules to medium pebbles, subangular to subround; little silt; trace subangular; trace clay; trace large to very large pebbles subangular; wet	(177.0 - 187.0') Normal drilling.	(177.0 - 327.0') 5395 gallons of water used; 4465 gallons of water recovered; 930 gallons of water lost
182									
183									
184									
185									
186	120	No Sieve Samples Collected		Topock - Alluvium Deposits	SM		(183.5'); little granules to very large pebbles, angular to subangular; little clay (184.5'); little granules to large pebbles, angular to subangular; trace clay	(187.0 - 197.0') Normal drilling.	
187									
188					SC		(187.0 - 188.0') Topock - Alluvium Deposits; Clayey sand with gravel (SC); reddish brown (2.5YR 4/4); very fine grained to very coarse grained, angular to subround; some clay; little granules to large pebbles, angular to subangular; little silt; coarser clasts composed of metadiorite; iron oxide staining on metadiorite pebbles; wet		
189					ML		(188.0 - 189.5') Topock - Alluvium Deposits; Sandy silt with gravel (ML); red (2.5YR 4/6); medium plasticity; some very fine to very coarse grained sand, angular to subround; little granules to large pebbles, angular to subangular; little clay; coarser clasts composed of metadiorite; moist to wet; very stiff		
190					SM		(189.5 - 190.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (2.5YR 4/4) to dark reddish brown (2.5YR 3/4); very fine grained to very coarse grained, angular to subround; some silt; little granules to very large pebbles, angular to subround; little clay; coarser clasts composed of metadiorite; moist to wet		
191					CL		(190.0 - 191.5') Topock - Alluvium Deposits; Sandy lean clay with gravel (CL); reddish brown (2.5YR 4/4); medium plasticity; some very fine to very coarse grained sand, angular to subround; little granules to small pebbles, angular to subround; little silt; moist; very stiff		
192					MH		(191.5 - 192.5') Topock - Alluvium Deposits; Sandy elastic silt with gravel (MH); reddish brown (2.5YR 4/4); high plasticity; some very fine to very coarse grained sand, angular to subround; little granules to medium pebbles, angular to subround; little clay; coarser clasts composed of metadiorite; moist; very stiff		
193					ML		(192.5 - 197.0') Topock - Alluvium Deposits; Sandy silt with gravel (ML); light red(2.5YR 7/6); medium plasticity; some very fine to very coarse grained sand, angular to subround; little granules to medium pebbles, angular to subangular; little clay; coarser clasts composed of metadiorite; moist; green staining		
194									
195									
196	120			Topock - Alluvium Deposits	ML		(197.0 - 199.0') Topock - Alluvium Deposits; Sandy silt with gravel (ML); reddish brown (2.5YR 4/4); low plasticity; some very fine to medium grained sand, angular to subround; little granules to medium pebbles, angular to subangular; little clay; trace coarse to very coarse grained sand angular to subangular; moist; very stiff		
197									
198									
199									
200					CL		(199.0 - 202.0') Topock - Alluvium Deposits; Sandy lean clay with gravel (CL); reddish brown (2.5YR 4/4); medium plasticity; some very fine to very coarse grained sand, angular to subround; little		

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Date Started:	06/20/2019	Surface Elevation:	N/A	Boring No.: MW-Xd
Date Completed:	07/30/2019	Northing (NAD83):	N/A	
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	417 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	6-12 inches	Location: PG&E Topock, Needles, California
Driller Name:	E. Ramos / S. Vasquez	Depth to First Water:	9.6 ft bgs	
Drilling Asst:	O. Flores / L. Amaya	Sampling Method:	4 Inch X 10 ft Core Barrel	Project Number: RC000753.0051
Logger:	GJ / SM / CS / DC / AM	Sampling Interval:	Continuous	
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
201				Topock - Alluvium Deposits	CL		granules to large pebbles, angular to subround; little silt; coarser clasts composed of metadiorite; moist; very stiff		(177.0 - 327.0') 5395 gallons of water used; 4465 gallons of water recovered; 930 gallons of water lost
202							(202.0 - 227.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); red (2.5YR 4/6); very fine grained to very coarse grained, angular to subround; some silt; little granules to large pebbles, angular to subround; little clay; coarser clasts composed of metadiorite; moist		
203							(204'); little silt; trace clay; moist to wet		
204	120						(204.5'); some silt; trace very large pebbles, subangular; trace subangular; moist to wet		
205							(206.3'); little silt; no cobbles, increase in sand		
206							(207'); wet		
207							(209'); some silt; moist to wet; no clay, weathered granules to very large pebbles	(207.0 - 217.0') Normal drilling, approximately 6 inches of sample fell out of core barrel at ~208.5 during bagging, material was the same as in the core. Groundwater sample interval 207 to 212 ft. bgs screened across sandy zone 207 to 209 ft bgs.	
208							(210.5'); little clay; moist to wet; decrease in silt, decrease in sand		
209			MW-X-VAS-207-212 (<0.17 U ppb) 6/30/2019 13:28	Topock - Alluvium Deposits	SM				
210		No Sieve Samples Collected							
211									
212	108								
213									
214									
215									
216									
217									
218									
219	114								
220									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	06/20/2019	Surface Elevation:	N/A	Boring No.: MW-Xd	
Date Completed:	07/30/2019	Northing (NAD83):	N/A		
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	417 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	E. Ramos / S. Vasquez	Depth to First Water:	9.6 ft bgs		
Drilling Asst:	O. Flores / L. Amaya	Sampling Method:	4 Inch X 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	GJ / SM / CS / DC / AM	Sampling Interval:	Continuous		
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
221	114	No Sieve Samples Collected		Topock - Alluvium Deposits	SM		(227.0 - 240.0') Topock - Alluvium Deposits; Silty sand (SM); reddish brown (2.5YR 4/4); very fine grained to very coarse grained, angular to subround; some silt; little granules to large pebbles, angular to subangular; trace clay; coarser clasts composed of metadiorite; moist; iron oxide staining; weathered granules to very large pebbles	(227.0 - 232.0') Normal drilling	(177.0 - 327.0') 5395 gallons of water used; 4465 gallons of water recovered; 930 gallons of water lost
222									
223									
224									
225									
226	111.6			Topock - Alluvium Deposits	SM	(230'); increase in silt, decrease in very fine to very coarse sand	(232.0 - 237.0') Hard drilling.		
227									
228									
229									
230									
231	114	(235'); moist to wet	(237.0 - 245.0') Normal drilling, poor						
232									
233									
234									
235									
236		(237'); and silt; little clay; decrease in very fine to very coarse sand							
237									
238									
239									
240									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	06/20/2019	Surface Elevation:	N/A	Boring No.: MW-Xd
Date Completed:	07/30/2019	Northing (NAD83):	N/A	
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	417 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	6-12 inches	Location: PG&E Topock, Needles, California
Driller Name:	E. Ramos / S. Vasquez	Depth to First Water:	9.6 ft bgs	
Drilling Asst:	O. Flores / L. Amaya	Sampling Method:	4 Inch X 10 ft Core Barrel	Project Number: RC000753.0051
Logger:	GJ / SM / CS / DC / AM	Sampling Interval:	Continuous	
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid	
241	114	No Sieve Samples Collected		Topock - Alluvium Deposits	SM		(240.0 - 247.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (2.5YR 4/4); very fine grained to very coarse grained, angular to subround; some silt; little granules to very large pebbles, angular to subangular; trace clay; coarser clasts composed of metadiorite; moist; weathered granules to very large pebbles, dry 243.5'-244' bgs	(237.0 - 245.0') Normal drilling, poor	(177.0 - 327.0') 5395 gallons of water used; 4465 gallons of water recovered; 930 gallons of water lost	
242										
243										
244										
245										
246			(245.0 - 247.0') Hard drilling.							
247										
248	120		MW-X-VAS- 245-255 (<0.033 U ppb) 7/1/2019 13:35		Topock - Alluvium Deposits	SM		(247.0 - 254.0') Topock - Alluvium Deposits; Silty sand (SM); reddish brown (2.5YR 4/4); very fine grained to very coarse grained, angular to subround; some silt; little granules to very large pebbles, angular to subangular; little clay; trace mica; coarser clasts composed of metadiorite; moist; weathered granules to very large pebble		(247.0 - 257.0') Normal drilling.
249										
250										
251										
252										
253										
254										
255										
256	120			Topock - Alluvium Deposits	SM		(254.0 - 259.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (2.5YR 4/4) little (7.5R 4/6); very fine grained to very coarse grained, angular to subround; some silt; little granules to very large pebbles, angular to subangular; trace clay; moist; mottled; iron oxide staining; wet at 256' bgs, weathered granules to very large pebbles			
257										
258										
259										
260					SM		(259.5 - 269.0') Topock - Alluvium Deposits; Silty sand (SM);			

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Date Started:	06/20/2019	Surface Elevation:	N/A	Boring No.: MW-Xd
Date Completed:	07/30/2019	Northing (NAD83):	N/A	
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	417 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	6-12 inches	Location: PG&E Topock, Needles, California
Driller Name:	E. Ramos / S. Vasquez	Depth to First Water:	9.6 ft bgs	
Drilling Asst:	O. Flores / L. Amaya	Sampling Method:	4 Inch X 10 ft Core Barrel	Project Number: RC000753.0051
Logger:	GJ / SM / CS / DC / AM	Sampling Interval:	Continuous	
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
261	120			Topock - Alluvium Deposits	SM		reddish brown (2.5YR 4/4) little (7.5R 4/6); very fine grained to very coarse grained, angular to subround; medium plasticity, no dilatency; some silt; little granules to very large pebbles, angular to subangular; little clay; coarser clasts composed of metadiorite; moist; mottled; weathered gravel granules to very large pebbles	(257.0 - 267.0') Normal drilling, water was observed to contain more bubbles during drilling. Possibly due to increased specific conductivity or salinity.	(177.0 - 327.0') 5395 gallons of water used; 4465 gallons of water recovered; 930 gallons of water lost
262									
263									
264									
265									
266	120	No Sieve Samples Collected		Topock - Alluvium Deposits	SM		(269.0 - 327.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (2.5YR 4/4) some (7.5R 4/6); very fine grained to very coarse grained, angular to subround; some granules to very large pebbles, angular to subangular; some silt; little clay; trace angular; coarser clasts composed of metadiorite; moist; mottled; weathered granules to small cobbles	(267.0 - 277.0') Normal drilling, during reaming with 10-inch removed 6-inch casing and attempted to dry drill due to reduce water use.	
267									
268									
269									
270									
271	120			Topock - Alluvium Deposits	SM		(275'); little granules to very large pebbles, angular to subround; trace angular to subangular; increase in silt, increase in very fine to very coarse sand, dry from 283-285' bgs		
272									
273									
274									
275									
276	120								
277									
278									
279									
280									

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Date Started:	<u>06/20/2019</u>	Surface Elevation:	<u>N/A</u>	Boring No.: <u>MW-Xd</u>
Date Completed:	<u>07/30/2019</u>	Northing (NAD83):	<u>N/A</u>	
Drilling Co.:	<u>Cascade</u>	Easting (NAD83):	<u>N/A</u>	Client: <u>PG&E</u>
Drilling Method:	<u>Sonic Drilling</u>	Total Depth:	<u>417 ft bgs</u>	Project: <u>Final GW Remedy Phase 1</u>
Drill Rig Type:	<u>Prosonic Truck Mount</u>	Borehole Diameter:	<u>6-12 inches</u>	Location: <u>PG&E Topock, Needles, California</u>
Driller Name:	<u>E. Ramos / S. Vasquez</u>	Depth to First Water:	<u>9.6 ft bgs</u>	
Drilling Asst:	<u>O. Flores / L. Amaya</u>	Sampling Method:	<u>4 Inch X 10 ft Core Barrel</u>	Project Number: <u>RC000753.0051</u>
Logger:	<u>GJ / SM / CS / DC / AM</u>	Sampling Interval:	<u>Continuous</u>	
Editor:	<u>Grant Willford</u>	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid				
281	120	No Sieve Samples Collected		Topock - Alluvium Deposits	SM		(287') red / moderate reddish brown(10R 4/6) and reddish brown (2.5YR 4/4); trace clay; dry to moist; decrease in silt, increase in very fine to very coarse sand	(281.0 - 287.0') Rough drilling.	(177.0 - 327.0') 5395 gallons of water used; 4465 gallons of water recovered; 930 gallons of water lost				
282													
283													
284													
285													
286													
287	120											(291'); decrease in silt, increase in very fine to very coarse sand	(287.0 - 297.0') Rough drilling.
288													
289													
290													
291													
292													
293	120		MW-X-VAS- 292-297 (<0.17 U ppb) 7/2/2019 14:45				(293'); moist to wet						
294													
295													
296													
297													
298													
299	120							(297.0 - 307.0') Rough drilling.					
300													
							(299.5') reddish brown (2.5YR 4/4) some red / moderate reddish						

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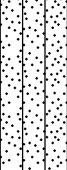






Date Started:	06/20/2019	Surface Elevation:	N/A	Boring No.: MW-Xd	
Date Completed:	07/30/2019	Northing (NAD83):	N/A		
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	417 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	E. Ramos / S. Vasquez	Depth to First Water:	9.6 ft bgs		
Drilling Asst:	O. Flores / L. Amaya	Sampling Method:	4 Inch X 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	GJ / SM / CS / DC / AM	Sampling Interval:	Continuous		
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
301	120						brown(10R 4/6); some granules to very large pebbles, angular to subangular; decrease in very fine to very coarse sand	(297.0 - 307.0') Rough drilling.	(177.0 - 327.0') 5395 gallons of water used; 4465 gallons of water recovered; 930 gallons of water lost
302									
303							(303'); little granules to very large pebbles, angular to subangular; little silt; increase in very fine to very coarse sand		
304									
305									
306	120								
307									
308							(307'); some granules to very large pebbles, angular to subangular; trace angular to subangular; dry to moist; decrease in very fine to very coarse sand	(307.0 - 317.0') Rough drilling.	
309									
310									
311	120								
312									
313							(312') dark reddish brown (2.5YR 3/4) trace red / moderate reddish brown(10R 4/6); some silt; moist to wet; increase in very fine to very coarse sand		
314									
315									
316	120								
317									
318									
319									
320								(317.0 - 323.0') Normal drilling.	

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SOIL BORING LOG PG&E TOPOCK C:\USERS\MCGRANED\DOCUMENTS\PG&E TOPOCK\DRIFT BORING LOGS\GINT FILES\1.03.19\TOPOCK DATABASE FOR PLOG.GPJ TOPOCK DATA TEMPLATE FOR PLOG.GPJ 11/03/19 11:53

Date Started:	06/20/2019	Surface Elevation:	N/A	Boring No.: <u>MW-Xd</u>	
Date Completed:	07/30/2019	Northing (NAD83):	N/A		
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	417 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	E. Ramos / S. Vasquez	Depth to First Water:	9.6 ft bgs		
Drilling Asst:	O. Flores / L. Amaya	Sampling Method:	4 Inch X 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	GJ / SM / CS / DC / AM	Sampling Interval:	Continuous		
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
321	120			Topock - Alluvium Deposits	SM		(321'); little silt; dry to moist; iron oxide staining; increase in very fine to very coarse sand	(317.0 - 323.0') Normal drilling.	(177.0 - 327.0') 5395 gallons of water used; 4465 gallons of water recovered; 930 gallons of water lost
322									
323									
324								(323.0 - 326.0') Rough drilling.	
325									
326	1200	No Sieve Samples Collected		Topock - Alluvium Deposits	MH		(327.0 - 328.2') Topock - Alluvium Deposits; Gravelly elastic silt with sand (MH); reddish brown (2.5YR 4/4); medium plasticity; some granules to very large pebbles, angular to subround; little very fine to very coarse grained sand, subangular to subround; little clay; some coarser clasts composed of metadiorite; moist; medium stiff; moderate cementation	(327.0 - 327.0') Normal drilling.	(327.0 - 412.0') No used
327									
328				Topock - Alluvium Deposits	SM		(328.2 - 329.9') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (2.5YR 4/4); very fine grained to small cobbles, subangular to subround; low plasticity; some silt; little granules to large pebbles, angular to subround; little clay; moist; weak cementation		
329									
330				Topock - Alluvium Deposits	MH		(329.9 - 334.0') Topock - Alluvium Deposits; Gravelly elastic silt with sand (MH); reddish brown (2.5YR 4/4); medium plasticity; some granules to large pebbles, angular to subangular; little very fine to very coarse grained sand, subangular to subround; little clay; moist; medium stiff; weak cementation		
331							(331'); trace clay; increase in granules and pebbles, decrease in silt and clay		
332									
333									
334				Topock - Alluvium Deposits	MH		(334.0 - 337.5') Topock - Alluvium Deposits; Sandy elastic silt with gravel (MH); reddish brown (2.5YR 4/4); medium plasticity; some fine to very coarse grained sand, subangular to subround; little granules to very large pebbles, angular to subangular; trace clay; moist; medium stiff; weak cementation		
335									
336									
337	96		MW-X-VAS-337-342 (<0.17 U ppb) 7/11/2019 11:30	Topock - Alluvium Deposits	ML		(337.5 - 338.0') Topock - Alluvium Deposits; Gravelly silt with sand (ML); reddish brown (2.5YR 4/4); low plasticity; some granules to very large pebbles, angular to subangular; little very fine to very coarse grained sand, subangular to subround; trace clay; moist; medium stiff; weak cementation	(337.0 - 345.0') Normal drilling, drilled 8 ft due to slough.	
338				Topock - Alluvium Deposits	ML		(338.0 - 341.0') Topock - Alluvium Deposits; Gravelly silt with sand (ML); reddish brown (2.5YR 4/4); medium plasticity; some granules to very large pebbles, angular to subangular; little very		
339									
340									

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Date Started:	<u>06/20/2019</u>	Surface Elevation:	<u>N/A</u>	Boring No.: <u>MW-Xd</u>	
Date Completed:	<u>07/30/2019</u>	Northing (NAD83):	<u>N/A</u>		
Drilling Co.:	<u>Cascade</u>	Easting (NAD83):	<u>N/A</u>	Client:	<u>PG&E</u>
Drilling Method:	<u>Sonic Drilling</u>	Total Depth:	<u>417 ft bgs</u>	Project:	<u>Final GW Remedy Phase 1</u>
Drill Rig Type:	<u>Prosonic Truck Mount</u>	Borehole Diameter:	<u>6-12 inches</u>	Location:	<u>PG&E Topock, Needles, California</u>
Driller Name:	<u>E. Ramos / S. Vasquez</u>	Depth to First Water:	<u>9.6 ft bgs</u>		
Drilling Asst:	<u>O. Flores / L. Amaya</u>	Sampling Method:	<u>4 Inch X 10 ft Core Barrel</u>	Project Number:	<u>RC000753.0051</u>
Logger:	<u>GJ / SM / CS / DC / AM</u>	Sampling Interval:	<u>Continuous</u>		
Editor:	<u>Grant Willford</u>	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
341	96	No Sieve Samples Collected	MW-X-VAS- 337-342 (<0.17 U ppb) 7/11/2019 11:30	Topock - Alluvium Deposits	ML		fine to very coarse grained sand, subangular to subround; little clay; moist; stiff; moderate cementation (339'); wet to moist; weak cementation; decrease in granules and pebbles, increase in silt	(337.0 - 345.0') Normal drilling, drilled 8 ft due to slough.	(327.0 - 412.0') No used
342				Topock - Alluvium Deposits	GM		(341.0 - 342.5') Topock - Alluvium Deposits; Silty gravel with sand (GM); reddish brown (2.5YR 4/4); granules to very large pebbles, angular to subround; some fine to very coarse grained sand, subangular to subround; little silt; trace clay; moist		
343				Topock - Alluvium Deposits	SM		(342.5 - 345.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (2.5YR 4/4); medium grained to very coarse grained, angular to subround; some granules to very large pebbles, angular to subround; little silt; trace clay; moist; weak cementation		
344									
345									
346	144			Topock - Alluvium Deposits	ML		(345.0 - 348.0') Topock - Alluvium Deposits; Gravelly silt with sand (ML); reddish brown (2.5YR 4/4); low plasticity; some small to large pebbles, angular to subround; little fine to coarse grained sand, subangular to subround; moist to dry; soft; weak cementation	(345.0 - 352.0') Normal drilling.	
347							(347'); moist to dry; soft; weak cementation; increase in granules and pebbles, increase in sand, decrease in silt		
348					Topock - Alluvium Deposits	MH			(348.0 - 348.3') Topock - Alluvium Deposits; Gravelly elastic silt with sand (MH); light brown (7.5YR 6/4); medium plasticity; some clay; little granules to medium pebbles, angular to subround; trace very fine to fine grained sand, subangular to round; dry; soft; weak cementation
349					Topock - Alluvium Deposits	ML			(348.3 - 352.0') Topock - Alluvium Deposits; Gravelly silt with sand (ML); reddish brown (2.5YR 4/4); low plasticity; some small to large pebbles, angular to subround; little fine to coarse grained sand, subangular to subround; moist to dry; soft; weak cementation
350									
351	352			Topock - Alluvium Deposits	SW-SM		(352.0 - 355.0') Topock - Alluvium Deposits; Well graded sand with silt and gravel (SW-SM); reddish brown (2.5YR 4/4); very fine grained to medium grained, subangular to subround; little granules to very large pebbles, angular to subround; little silt; little clay; trace small cobbles, subangular; moist; weak cementation	(352.0 - 357.0') Rough drilling.	
353									
354									
355									
356		Topock - Weathered Bedrock - conglomerate	MH						(355.0 - 357.0') Topock - Weathered Bedrock - conglomerate; Gravelly elastic silt with sand (MH); reddish brown (2.5YR 4/4); medium plasticity; some granules to very large pebbles, angular to subround; little very fine to fine grained sand, subangular to subround; little clay; little coarser clasts composed of metadiorite; dry to moist; stiff; moderate cementation
357	Topock - Weathered Bedrock - conglomerate	ML		(357.0 - 359.0') Topock - Weathered Bedrock - conglomerate; Sandy silt with gravel (ML); reddish brown (2.5YR 4/4); low plasticity; some very fine to medium grained sand, subangular to subround; little granules to very large pebbles, angular to subround; little clay; moist; medium stiff; weak cementation	(357.0 - 362.0') Rough drilling, slough in 4-inch rathole advance 6-inch for clean out.				
358									
359				Topock - Weathered Bedrock -		ML		(359.0 - 374.0') Topock - Weathered Bedrock - conglomerate; Sandy silt with gravel (ML); reddish brown (2.5YR 4/4); low plasticity; some very fine to very coarse grained sand, subangular	
360	60								




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Date Started:	06/20/2019	Surface Elevation:	N/A	Boring No.: MW-Xd	
Date Completed:	07/30/2019	Northing (NAD83):	N/A		
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	417 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	E. Ramos / S. Vasquez	Depth to First Water:	9.6 ft bgs		
Drilling Asst:	O. Flores / L. Amaya	Sampling Method:	4 Inch X 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	GJ / SM / CS / DC / AM	Sampling Interval:	Continuous		
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
361	60			conglomerate			to subround; little granules to very large pebbles, angular to subround; little clay; trace coarser clasts composed of metadiorite; dry to moist; soft	(357.0 - 362.0') Rough drilling, slough in 4-inch rathole advance 6-inch for clean out.	(327.0 - 412.0') No used
362							(361'); moist to wet		
363							(361.5'); moist to wet; soft; weak cementation; increase in sand and decrease in silt		
364									
365									
366									
367	120			Topock - Weathered Bedrock - conglomerate	ML		(363'); dry to moist	(362.0 - 367.0') Soft drilling, slough in 4-inch rathole advance 6-inch for clean out.	
368								(367.0 - 372.0') Soft Drilling.	
369							(369'); dry to moist; soft; weak cementation; increase in sand and decrease in silt		
370		No Sieve Samples Collected							
371									
372									
373								(372.0 - 377.0') Normal drilling.	
374									
375	60			Topock - Weathered Bedrock - conglomerate	SM		(374.0 - 377.0') Topock - Weathered Bedrock - conglomerate; Silty sand with gravel (SM); reddish brown (2.5YR 4/4); fine grained to very coarse grained, subangular to subround; some granules to very large pebbles, angular to subround; trace clay; moist; medium dense; moderate cementation		
376									
377				Topock - Weathered Bedrock - conglomerate	GW-GM		(377.0 - 377.5') Topock - Weathered Bedrock - conglomerate; Well graded gravel with silt and sand (GW-GM); reddish brown (2.5YR 4/4); granules to boulders, subangular to subround; little very fine to very coarse grained sand, subangular to subround; little silt; dry to moist; weak cementation	(377.0 - 382.0') Normal drilling.	
378	60			Topock - Weathered Bedrock - conglomerate	GM		(377.5 - 382.0') Topock - Weathered Bedrock - conglomerate; Silty gravel with sand (GM); reddish brown (2.5YR 4/4); granules to very large pebbles, angular to subround; little very fine to very coarse grained sand, subangular to subround; little silt; trace clay; trace coarser clasts composed of metadiorite; dry to moist;		
379									
380									











Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	06/20/2019	Surface Elevation:	N/A	Boring No.: MW-Xd
Date Completed:	07/30/2019	Northing (NAD83):	N/A	
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	417 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	6-12 inches	Location: PG&E Topock, Needles, California
Driller Name:	E. Ramos / S. Vasquez	Depth to First Water:	9.6 ft bgs	
Drilling Asst:	O. Flores / L. Amaya	Sampling Method:	4 Inch X 10 ft Core Barrel	Project Number: RC000753.0051
Logger:	GJ / SM / CS / DC / AM	Sampling Interval:	Continuous	
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
381	60			Topock - Weathered Bedrock - conglomerate	GM		moderate cementation	(377.0 - 382.0') Normal drilling.	(327.0 - 412.0') No used
382									
383									
384									
385									
386									
387	132			Topock - Weathered Bedrock - conglomerate	CL		(382.0 - 390.0') Topock - Weathered Bedrock - conglomerate; Gravelly lean clay with sand (CL); reddish brown (2.5YR 4/4); medium plasticity; some granules to very large pebbles, angular to subround; little fine to coarse grained sand, subangular to subround; little silt; moist to wet; soft; weak cementation	(382.0 - 390.0') Normal drilling.	
388									
389									
390									
391									
392									
393									
394									
395									
396									
397	162			Topock - Weathered Bedrock - conglomerate	CL		(386') moist to wet; soft; weak cementation; decrease in granules and pebbles and sand, increase in silt and clay		
398									
399									
400									

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Date Started:	06/20/2019	Surface Elevation:	N/A	Boring No.: <u>MW-Xd</u>	
Date Completed:	07/30/2019	Northing (NAD83):	N/A		
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	417 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	E. Ramos / S. Vasquez	Depth to First Water:	9.6 ft bgs		
Drilling Asst:	O. Flores / L. Amaya	Sampling Method:	4 Inch X 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	GJ / SM / CS / DC / AM	Sampling Interval:	Continuous		
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
401	162	No Sieve Samples Collected		Topock - Weathered Bedrock - conglomerate	CL		(400.0 - 401.0') Topock - Weathered Bedrock - conglomerate; Gravelly lean clay with sand (CL); reddish brown (2.5YR 4/4); medium plasticity; some silt; little granules to large pebbles, angular to subround; little fine to very coarse grained sand, subangular to subround; trace small cobbles, subangular; moist; soft to medium stiff; weak cementation	(393.0 - 403.0') Normal drilling.	(327.0 - 412.0') No used
402				Topock - Weathered Bedrock - conglomerate	GC		(401.0 - 402.2') Topock - Weathered Bedrock - conglomerate; Clayey gravel with sand (GC); reddish brown (2.5YR 4/4); granules to very large pebbles, angular to subround; little fine to very coarse grained sand, subangular to subround; little silt; little clay; little coarser clasts composed of metadiorite; moist; weak cementation	(403.0 - 407.0') Soft drilling.	
403				Topock - Weathered Bedrock - conglomerate	ML		(402.2 - 403.6') Topock - Weathered Bedrock - conglomerate; Gravelly silt with sand (ML); reddish brown (2.5YR 4/4); low plasticity; some granules to very large pebbles, angular to subround; little medium to very coarse grained sand, subangular to subround; little clay; moist; soft; weak cementation		
404				Topock - Weathered Bedrock - conglomerate	GC		(403.6 - 404.0') Topock - Weathered Bedrock - conglomerate; Clayey gravel with sand (GC); reddish brown (2.5YR 4/4); granules to small cobbles, angular to subround; little medium to very coarse grained sand, subangular to subround; little silt; little clay; little coarser clasts composed of metadiorite; moist; weak cementation		
405				Topock - Weathered Bedrock - conglomerate	SM		(404.0 - 406.1') Topock - Weathered Bedrock - conglomerate; Silty sand with gravel (SM); reddish brown (2.5YR 4/4); fine grained to very coarse grained, subangular to subround; some granules to very large pebbles, angular to subround; little silt; little clay; little coarser clasts composed of metadiorite; moist; weak cementation	(407.0 - 417.0') Soft drilling.	
406				Topock - Weathered Bedrock - conglomerate	SM		(406.1 - 407.0') Topock - Weathered Bedrock - conglomerate; Sandy lean clay with gravel (CL); reddish brown (2.5YR 4/4); medium plasticity; some silt; little granules to large pebbles, subangular to subround; little fine to very coarse grained sand, subangular to subround; moist; soft; weak cementation		
407	120		MW-X-VAS-412-417 (<0.17 U ppb) 7/15/2019 12:43	Topock - Weathered Bedrock - conglomerate	GC		(407.0 - 408.0') Topock - Weathered Bedrock - conglomerate; Silty sand with gravel (SM); reddish brown (2.5YR 4/4); fine grained to very coarse grained, subangular to subround; low plasticity; some granules to very large pebbles, angular to subround; little silt; little clay; moist; weak cementation	(412.0 - 417.0') Groundwater sample turbidity could not get below 10 NTU with the use of three filters. Well screen fell to 413.9' - 418.9' prior to collecting sample. Used water to flush the casing of fines prior to the installation of the bentonite seal.	(375 gallons of water used; 0 gallons of water recovered; 375 gallons of water lost)
408				Topock - Weathered Bedrock - conglomerate	SM		(408.0 - 411.0') Topock - Weathered Bedrock - conglomerate; Clayey gravel with sand (GC); reddish brown (2.5YR 4/4); granules to small cobbles, angular to subround; some fine to very coarse grained sand, subangular to subround; little silt; little clay; moist; weak cementation		
409				Topock - Weathered Bedrock - conglomerate	SM		(411.0 - 414.8') Topock - Weathered Bedrock - conglomerate; Silty sand with gravel (SM); reddish brown (2.5YR 4/4); fine grained to very coarse grained, subangular to subround; low plasticity; some granules to very large pebbles, angular to subround; some silt; little clay; moist; weak cementation		
410				Topock - Weathered Bedrock - conglomerate	GM		(414.8 - 417.0') Topock - Weathered Bedrock - conglomerate; Silty gravel with sand (GM); reddish brown (2.5YR 4/4); granules to very large pebbles, angular to subround; some fine to very coarse grained sand, subangular to subround; little silt; little clay; some coarser clasts composed of metadiorite; moist; moderate cementation		
411				Topock - Weathered Bedrock - conglomerate				End of Boring at 417.0' bgs.	
412				Topock - Weathered Bedrock - conglomerate					
413									
414									
415									
416									
417									
418									
419									
420									

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Date Started:	08/09/2019	Surface Elevation:	N/A	Boring No.: MW-Xs	
Date Completed:	08/12/2019	Northing (NAD83):	N/A		
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	127 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	10-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Steve Vasquez	Depth to First Water:	9.6 ft bgs		
Drilling Asst:	O. Flores / L. Amaya	Sampling Method:	4 inch x 10 ft. Core Barrel	Project Number:	RC000753.0051
Logger:	Anthony Mack	Sampling Interval:	Screen Intervals		
Editor:	Grant Wilford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
1							(0.0 - 17.0') No recovery (NR); did not collect or log core, see MW-Xd for lithology	(0.0 - 17.0') Soft drilling.	(0.0 - 40.0') No used
2									
3									
4									
5									
6									
7									
8									
9	0				NR				
10		No Sieve Samples Collected							
11									
12									
13									
14									
15			MW-X-VAS-12-17 (<0.033 U ppb) 6/25/2019 15:10						
16									
17							(17.0 - 27.0') No recovery (NR)	(17.0 - 27.0') Loose fine grained sands did not stay in core barrel.	
18	0				NR				
19									
20									

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Date Started: 08/09/2019	Surface Elevation: N/A	Boring No.: MW-Xs
Date Completed: 08/12/2019	Northing (NAD83): N/A	
Drilling Co.: Cascade	Easting (NAD83): N/A	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 127 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type: Prosonic Truck Mount	Borehole Diameter: 10-12 inches	Location: PG&E Topock, Needles, California
Driller Name: Steve Vasquez	Depth to First Water: 9.6 ft bgs	
Drilling Asst: O. Flores / L. Amaya	Sampling Method: 4 inch x 10 ft. Core Barrel	Project Number: RC000753.0051
Logger: Anthony Mack	Sampling Interval: Screen Intervals	
Editor: Grant Wilford	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	



Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
21	0				NR			(17.0 - 27.0') Loose fine grained sands did not stay in core barrel.	(0.0 - 40.0') No used
22									
23									
24									
25									
26	120	No Sieve Samples Collected		Topock - Fill	SP		(27.0 - 36.0') Topock - Fill; Poorly graded sand (SP); dark yellowish brown (10YR 4/4); very fine grained to medium grained, subangular to round; trace silt; wet	(27.0 - 40.0') Soft drilling.	
27									
28									
29									
30									
31									
32									
33									
34									
35									
36									
37									
38									
39									
40	120			Topock - Fluvial Deposits	SW		(36.0 - 46.5') Topock - Fluvial Deposits; Well graded sand with gravel (SW); grayish brown (10YR 5/2); fine grained to very coarse grained, subangular to subround; little granules to small pebbles, subangular to subround; trace silt; wet		

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Boring Log

Sheet: 3 of 7

Date Started:	08/09/2019	Surface Elevation:	N/A	Boring No.: MW-Xs	
Date Completed:	08/12/2019	Northing (NAD83):	N/A		
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	127 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	10-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Steve Vasquez	Depth to First Water:	9.6 ft bgs		
Drilling Asst:	O. Flores / L. Amaya	Sampling Method:	4 inch x 10 ft. Core Barrel	Project Number:	RC000753.0051
Logger:	Anthony Mack	Sampling Interval:	Screen Intervals		
Editor:	Grant Wilford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
41	120			Topock - Fluvial Deposits	SW		(44.5'); little granules to large pebbles; increase in pebble size	(40.0') Retracked 10-inch casing and started flushing casing to get past due to rough drilling at 119 to 124 ft. bgs. and too much torque on the drill head.	(40.0 - 127.0') 4960.4 gallons of water used; 2031.68 gallons of water recovered; 2928.72 gallons of water lost
42									
43									
44									
45									
46	0	No Sieve Samples Collected		Topock - Fluvial Deposits	GW		(46.5 - 47.0') Topock - Fluvial Deposits; Well graded gravel with sand (GW); dark grayish brown / dark yellowish brown(10YR 4/2); angular to subangular; some fine to coarse grained sand, subangular to subround; trace silt		
47							(47.0 - 97.0') No recovery (NR); did not collect or log core, see MW-Xd for lithology		
48									
49									
50									
51									
52									
53									
54									
55									
56									
57									
58									
59									
60									

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Date Started:	08/09/2019	Surface Elevation:	N/A	Boring No.: MW-Xs	
Date Completed:	08/12/2019	Northing (NAD83):	N/A		
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	127 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	10-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Steve Vasquez	Depth to First Water:	9.6 ft bgs		
Drilling Asst:	O. Flores / L. Amaya	Sampling Method:	4 inch x 10 ft. Core Barrel	Project Number:	RC000753.0051
Logger:	Anthony Mack	Sampling Interval:	Screen Intervals		
Editor:	Grant Wilford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
61									(40.0 - 127.0') 4960.4 gallons of water used; 2031.68 gallons of water recovered; 2928.72 gallons of water lost
62									
63									
64									
65									
66									
67									
68									
69									
70	0	No Sieve Samples Collected			NR				
71									
72									
73			MW-X-VAS-71-76 (<0.033 U ppb) 6/27/2019 08:52						
74									
75									
76									
77									
78									
79									
80									

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Date Started:	08/09/2019	Surface Elevation:	N/A	Boring No.: MW-Xs	
Date Completed:	08/12/2019	Northing (NAD83):	N/A		
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	127 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	10-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Steve Vasquez	Depth to First Water:	9.6 ft bgs		
Drilling Asst:	O. Flores / L. Amaya	Sampling Method:	4 inch x 10 ft. Core Barrel	Project Number:	RC000753.0051
Logger:	Anthony Mack	Sampling Interval:	Screen Intervals		
Editor:	Grant Wilford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
81									(40.0 - 127.0') 4960.4 gallons of water used; 2031.68 gallons of water recovered; 2928.72 gallons of water lost
82									
83									
84									
85									
86									
87									
88									
89	0				NR				
90		No Sieve Samples Collected							
91									
92									
93									
94									
95									
96									
97									
98									
99	120			Topock - Fluvial Deposits	SW		(97.0 - 107.0') Topock - Fluvial Deposits; Well graded sand (SW); brown (10YR 4/3); fine grained to very coarse grained, subangular to subround; trace granules, subangular to subround; wet	(95.0') Rough drilling starts.	
100									



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Date Started:	08/09/2019	Surface Elevation:	N/A	Boring No.: <u>MW-Xs</u>	
Date Completed:	08/12/2019	Northing (NAD83):	N/A		
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	127 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	10-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Steve Vasquez	Depth to First Water:	9.6 ft bgs		
Drilling Asst:	O. Flores / L. Amaya	Sampling Method:	4 inch x 10 ft. Core Barrel	Project Number:	RC000753.0051
Logger:	Anthony Mack	Sampling Interval:	Screen Intervals		
Editor:	Grant Wilford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
101	120			Topock - Fluvial Deposits	SW				
102									
103									
104									
105									
106									
107									
108				Topock - Fluvial Deposits	GW		(107.0 - 108.0') Topock - Fluvial Deposits; Well graded gravel with sand (GW); brown (10YR 4/3); granules to very large pebbles, angular to subround; some very fine to medium grained sand, subangular to subround; trace silt		
109									
110				Topock - Fluvial Deposits	SM		(108.0 - 112.0') Topock - Fluvial Deposits; Silty sand with gravel (SM); dark grayish brown / dark yellowish brown (10YR 4/2); very fine grained to medium grained, subangular to subround; some granules to large pebbles, angular to subround; some silt; trace angular to subround; wet		
111									
112									
113									
114				Topock - Fluvial Deposits	GW		(112.0 - 116.0') Topock - Fluvial Deposits; Well graded gravel with sand (GW); dark grayish brown / dark yellowish brown (10YR 4/2); granules to large cobbles, subangular to round; some fine to very coarse grained sand, subangular to subround; trace small cobbles; wet		
115									
116									
117				Topock - Alluvium Deposits	GW-GM		(116.0 - 117.0') Topock - Alluvium Deposits; Well graded gravel with silt and sand (GW-GM); brown (7.5YR 4/4) trace weak red / pale reddish brown (10R 5/4); granules to small cobbles, angular to round; some very fine to medium grained sand, subangular to round; little silt; wet		
118									
119				Topock - Alluvium Deposits	SM		(117.0 - 124.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (5YR 4/3) trace red (10R 5/6); very fine grained to medium grained, subangular to subround; some granules to large pebbles, angular to subround; some silt; trace angular to subround; wet		
120							(118'); increase in granules and pebbles		

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Date Started:	08/09/2019	Surface Elevation:	N/A	Boring No.: MW-Xs
Date Completed:	08/12/2019	Northing (NAD83):	N/A	
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	127 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	10-12 inches	Location: PG&E Topock, Needles, California
Driller Name:	Steve Vasquez	Depth to First Water:	9.6 ft bgs	
Drilling Asst:	O. Flores / L. Amaya	Sampling Method:	4 inch x 10 ft. Core Barrel	Project Number: RC000753.0051
Logger:	Anthony Mack	Sampling Interval:	Screen Intervals	
Editor:	Grant Wilford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
121	84			Topock - Alluvium Deposits	SM			(119.0 - 124.0') Rough drilling due to large cobbles and boulders in the formation, increased torque caused spindle bolts to shear. Start flushing casing with water	(40.0 - 127.0') 4960.4 gallons of water used; 2031.68 gallons of water recovered; 2928.72 gallons of water lost
122									
123									
124									
125	0				NR		(124.0 - 127.0') No recovery (NR); Did not collect or log core, see MW-Xd for lithology	(124.0 - 127.0') Drilled an extra 3 ft to get through boulders and cobbles.	
126									
127									
128									
End of Boring at 127.0' bgs.									
128									
129									
130									
131									
132									
133									
134									
135									
136									
137									
138									
139									
140									

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Date Started:	08/20/2019	Surface Elevation:	N/A	Well ID: MW-Y'-102/122
Date Completed:	09/25/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	J. Khem / S. Vasquez	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	L. Amaya / O. Flourez	Borehole Diameter:	6-12 inches	
Logger:	Grant Willford	Water Level Start:	4.6 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	N/A	
Total Depth:	137 ft bgs	Well Completion:	<input type="checkbox"/> Flush <input checked="" type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
0					(+2.5 - 82.0') 2" PVC Sch 80 Casing (+3.0 - 2.0') 12-inch lockable monument		Note: Painted Desert Sand
1					(+0.5 - 3.4') 24-inch diameter concrete well pad		(-0.5 - 3.4') 15 bags (%) Note: King Kon-Crete 4000 PSI
2							
3							
4							
5							
6							
7							
8					(2.0 - 13.0') Grout	(2.0 - 13.0') 72.1 gallons	(2.0 - 13.0') 90 gallons (25%) Note: Type I, II and V and Benseal
9		Topock - Fill	SP		(0.0 - 48.0') 12.0" Borehole		
10							
11							
12							
13							
14	MW-Y'-VAS-12-17 (<0.033 U ppb) 8/20/2019 13:58				(13.0 - 79.9') Bentonite seal chips	(13.0 - 79.9') 58.3 bags	(13.0 - 79.9') 60 bags (3%) Note: Puregold Medium Chips
15							
16							
17							

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Date Started: 08/20/2019	Surface Elevation: N/A	Well ID: MW-Y'-102/122
Date Completed: 09/25/2019	Shallow Well Elevation: N/A	
Drilling Co.: Cascade	Deep Well Elevation: N/A	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): N/A	Project: Final GW Remedy Phase 1
Driller Name: J. Khem / S. Vasquez	Easting (NAD83): N/A	Location: PG&E Topock, Needles, California
Drilling Asst: L. Amaya / O. Flourez	Borehole Diameter: 6-12 inches	
Logger: Grant Willford	Water Level Start: 4.6 ft bgs	Project Number: RC000753.0051
Editor: Sean McGrane	Development End Date: N/A	
Total Depth: 137 ft bgs	Well Completion: <input type="checkbox"/> Flush <input checked="" type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
18		Topock - Fill	SP		(+2.5 - 82.0') 2" PVC Sch 80 Casing		
19							
20					(19.5 - 20.5') Centralizer		
21							
22		Topock - Alluvium Deposits	SP-SM				
23							
24							
25							
26							
27					(13.0 - 79.9') Bentonite seal chips	(0.0 - 48.0') 12.0" Borehole	(13.0 - 79.9') 58.3 bags
28							(13.0 - 79.9') 60 bags (3%) Note: Puregold Medium Chips
29							
30							
31							
32			NR				
33							
34							
35							
36							
37							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	08/20/2019	Surface Elevation:	N/A	Well ID: MW-Y'-102/122
Date Completed:	09/25/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	J. Khem / S. Vasquez	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	L. Amaya / O. Flourez	Borehole Diameter:	6-12 inches	
Logger:	Grant Willford	Water Level Start:	4.6 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	N/A	
Total Depth:	137 ft bgs	Well Completion:	<input type="checkbox"/> Flush <input checked="" type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
38					(+2.5 - 82.0') 2" PVC Sch 80 Casing		
39							
40							
41							
42			NR				
43							
44							
45							
46							
47					(13.0 - 79.9') Bentonite seal chips	(13.0 - 79.9') 58.3 bags	(13.0 - 79.9') 60 bags (3%) Note: Puregold Medium Chips
48							
49							
50							
51							
52	MW-Y'-VAS-52-57 (<0.033 U ppb) 8/21/2019 11:41	Topock - Fluvial Deposits	SP		(48.0 - 126.0') 10.0" Borehole		
53							
54							
55							
56							
57							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	08/20/2019	Surface Elevation:	N/A	Well ID: MW-Y'-102/122
Date Completed:	09/25/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	J. Khem / S. Vasquez	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	L. Amaya / O. Flourez	Borehole Diameter:	6-12 inches	
Logger:	Grant Willford	Water Level Start:	4.6 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	N/A	
Total Depth:	137 ft bgs	Well Completion:	<input type="checkbox"/> Flush <input checked="" type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
58		Topock - Fluvial Deposits	SP		(+2.5 - 82.0') 2" PVC Sch 80 Casing		
59							
60					(59.5 - 60.5') Centralizer		
61							
62		Topock - Fluvial Deposits	SP-SM				
63							
64							
65							
66							
67					(13.0 - 79.9') Bentonite seal chips	(48.0 - 126.0') 10.0" Borehole	(13.0 - 79.9') 58.3 bags
68							(13.0 - 79.9') 60 bags (3%) Note: Puregold Medium Chips
69		Topock - Fluvial Deposits	SW-SM				
70							
71							
72							
73							
74			NR				
75							
76							
77							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	08/20/2019	Surface Elevation:	N/A	Well ID: MW-Y'-102/122
Date Completed:	09/25/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	J. Khem / S. Vasquez	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	L. Amaya / O. Flourez	Borehole Diameter:	6-12 inches	
Logger:	Grant Willford	Water Level Start:	4.6 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	N/A	
Total Depth:	137 ft bgs	Well Completion:	<input type="checkbox"/> Flush <input checked="" type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
78		Topock - Fluvial Deposits	SP-SM		(+2.5 - 82.0') 2" PVC Sch 80 Casing		
79					(13.0 - 79.9') Bentonite seal chips	(13.0 - 79.9') 58.3 bags	(13.0 - 79.9') 60 bags (3%) Note: Puregold Medium Chips
80							
81							
82		Topock - Fluvial Deposits	SW-SM		(82.0 - 102.0') 2" Sch 80 PVC (20-slot) Screen		
83							
84							
85							
86							
87					(48.0 - 126.0') 10.0" Borehole		
88							
89					(79.9 - 105.0') Cemex #3 MESH (8x10)	(79.9 - 105.0') 25.5 bags	(79.9 - 105.0') 30 bags (18%) Note: Lapis Lustre Sand
90							
91							
92		Topock - Fluvial Deposits	SM				
93							
94	MW-Y-VAS-92-97 (0.31 ppb) 8/22/2019 11:43						
95							
96							
97							

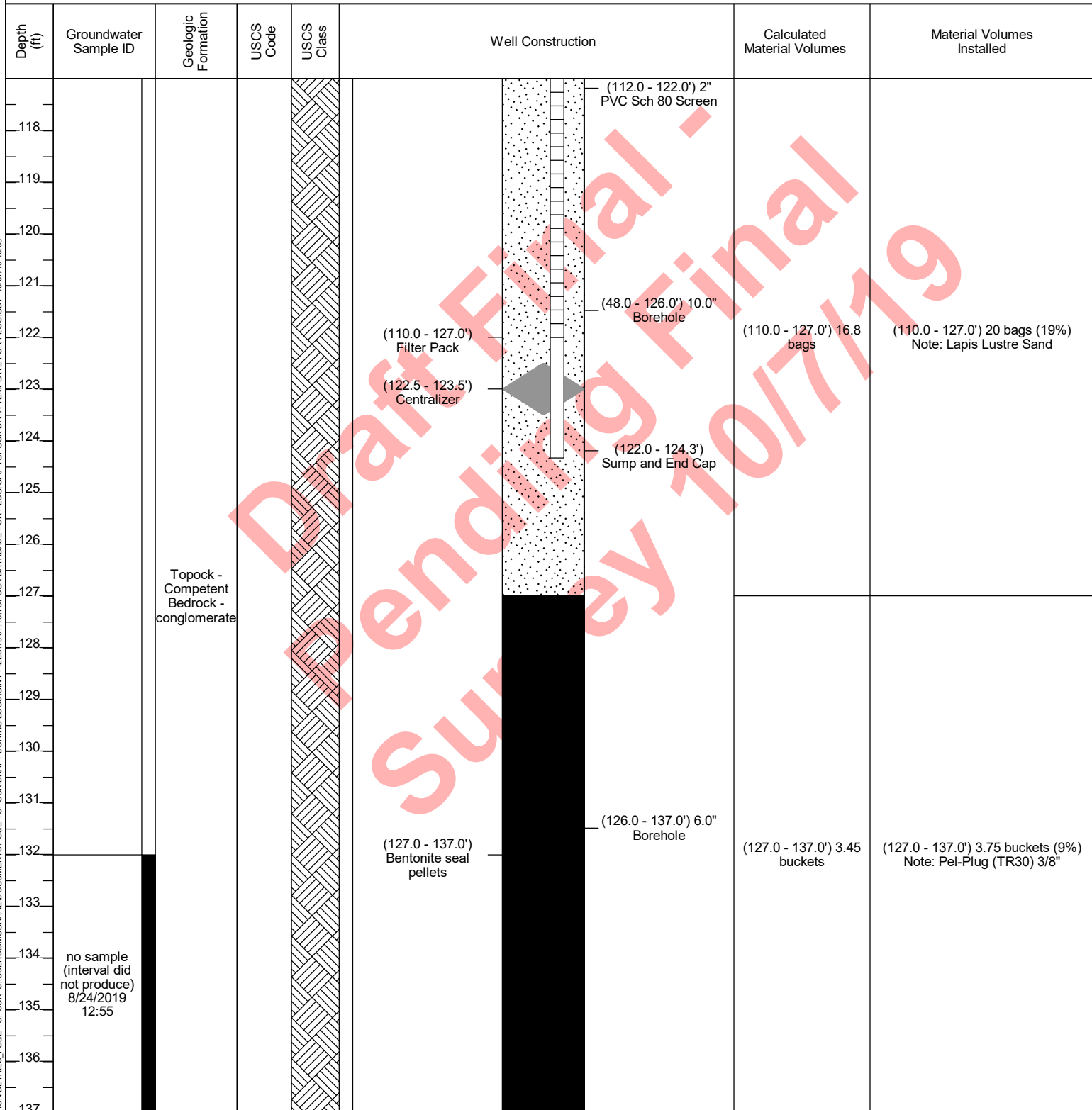
Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	08/20/2019	Surface Elevation:	N/A	Well ID: MW-Y'-102/122
Date Completed:	09/25/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	J. Khem / S. Vasquez	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	L. Amaya / O. Flourez	Borehole Diameter:	6-12 inches	
Logger:	Grant Willford	Water Level Start:	4.6 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	N/A	
Total Depth:	137 ft bgs	Well Completion:	<input type="checkbox"/> Flush <input checked="" type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
98					(82.0 - 102.0') 2" Sch 80 PVC (20-slot) Screen		
99							
100	MW-Y'-VAS-98-103 (<0.033 U ppb) 8/23/2019 21:24	Topock - Fluvial Deposits	SM				
101					(79.9 - 105.0') Cemex #3 MESH (8x10)	(79.9 - 105.0') 25.5 bags	(79.9 - 105.0') 30 bags (18%) Note: Lapis Lustre Sand
102							
103					(102.5 - 103.5') Centralizer		
104					(102.0 - 104.3') Sump and End Cap		
105							
106							
107					(105.0 - 110.0') Bentonite seal pellets		
108							
109		Topock - Competent Bedrock - conglomerate			(48.0 - 126.0') 10.0" Borehole	(105.0 - 110.0') 4.8 buckets	(105.0 - 110.0') 4 buckets (-17%) Note: Pel-Plug (TR30) 3/8"
110							
111							
112					(112.0 - 122.0') 2" PVC Sch 80 Screen		
113							
114	MW-Y'-VAS-112-117 (<0.033 U ppb) 8/23/2019 15:11				(110.0 - 127.0') Filter Pack	(110.0 - 127.0') 16.8 bags	(110.0 - 127.0') 20 bags (19%) Note: Lapis Lustre Sand
115							
116							
117							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	08/20/2019	Surface Elevation:	N/A	Well ID: MW-Y'-102/122
Date Completed:	09/25/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	J. Khem / S. Vasquez	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	L. Amaya / O. Flourez	Borehole Diameter:	6-12 inches	
Logger:	Grant Willford	Water Level Start:	4.6 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	N/A	
Total Depth:	137 ft bgs	Well Completion:	<input type="checkbox"/> Flush <input checked="" type="checkbox"/> Stick-up	



Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	08/20/2019	Surface Elevation:	N/A	Boring No.: <u>MW-Y'd</u>	
Date Completed:	09/25/2019	Northing (NAD83):	N/A		
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	137 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Pro-Sonic Truck Mounted	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	J. Khem / S. Vasquez	Depth to First Water:	4.6 ft bgs		
Drilling Asst:	L. Amaya / O. Flourez	Sampling Method:	4 inch x 10 ft. Core Barrel	Project Number:	RC000753.0051
Logger:	Grant Willford	Sampling Interval:	Continuous		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
1	60						(0.0 - 18.0') Topock - Fill; Poorly graded sand (SP); pale yellow (2.5Y 7/3); very fine grained to fine grained, subangular to subround; trace silt; some organics; dry; homogeneous	(0.0 - 3.0') Area around borehole subsided overnight after advancing the 10-inch casing.	(0.0 - 97.0') 4437 gallons of water used; 0 gallons of water recovered; 4437 gallons of water lost
2									
3									
4									
5									
6									
7	120			Topock - Fill	SP		(7'); moist; no organics	(7.0 - 17.0') Heaving sands.	
8									
9									
10									
11									
12									
13									
14									
15									
16									
17	102						(10'); wet	(12.0 - 17.0') Sample interval was chosen based on moisture content of soils. Static water during sampling was higher possible from drill water used for heaving sands or possible confining unit.	
18									
19									
20									
18				Topock - Alluvium Deposits	SP-SM		(18.0 - 26.0') Topock - Alluvium Deposits; Poorly graded sand with silt (SP-SM); grayish brown (10YR 5/2) with pale yellow (2.5Y 7/3); very fine grained to fine grained, subangular to round; little silt; trace clay; some organics; moist to wet; some organics at 18-19 ft bgs and 20-20.5 ft. bgs (19'); no organics	(17.0 - 37.0') Soft drilling. Very loose material being pushed out by core barrel causing poor recovery. Heaving sands encountered.	
19									
20									



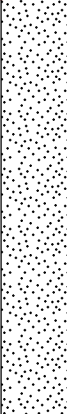
Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	08/20/2019	Surface Elevation:	N/A	Boring No.: MW-Y'd	
Date Completed:	09/25/2019	Northing (NAD83):	N/A		
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	137 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Pro-Sonic Truck Mounted	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	J. Khem / S. Vasquez	Depth to First Water:	4.6 ft bgs		
Drilling Asst:	L. Amaya / O. Flourez	Sampling Method:	4 inch x 10 ft. Core Barrel	Project Number:	RC000753.0051
Logger:	Grant Willford	Sampling Interval:	Continuous		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
21							(20'); some organics	(17.0 - 37.0') Soft drilling. Very loose material being pushed out by core barrel causing poor recovery. Heaving sands encountered.	(0.0 - 97.0') 4437 gallons of water used; 0 gallons of water recovered; 4437 gallons of water lost
22							(20.5'); no organics		
23				Topock - Alluvium Deposits	SP-SM				
24									
25									
26									
27							(26.0 - 37.0') No recovery (NR)		
28									
29	102								
30									
31									
32					NR			(30.0') Due to borehole conditions 10" casing was retreated from 75 ft bgs to 30 ft bgs and re-advanced to 70 ft bgs on 8.26.19.	
33									
34									
35									
36									
37							(37.0 - 47.0') No recovery (NR)		
38	6								
39					NR				
40									

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Date Started:	08/20/2019	Surface Elevation:	N/A	Boring No.: MW-Y'd
Date Completed:	09/25/2019	Northing (NAD83):	N/A	
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	137 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Pro-Sonic Truck Mounted	Borehole Diameter:	6-12 inches	Location: PG&E Topock, Needles, California
Driller Name:	J. Khem / S. Vasquez	Depth to First Water:	4.6 ft bgs	
Drilling Asst:	L. Amaya / O. Flourez	Sampling Method:	4 inch x 10 ft. Core Barrel	Project Number: RC000753.0051
Logger:	Grant Willford	Sampling Interval:	Continuous	
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
41	6				NR			(37.0 - 47.0') Soft drilling. Very loose material being pushed out by core barrel causing poor recovery. Core barrel pushed down 10 ft bgs with very little to no resistance, approximately 0.5 ft of soil in core barrel. Heaving sands encountered.	(0.0 - 97.0') 4437 gallons of water used; 0 gallons of water recovered; 4437 gallons of water lost
42									
43									
44									
45									
46	120				SP			(47.0 - 60.0') Topock - Fluvial Deposits; Poorly graded sand (SP); very pale brown (10YR 7/3); very fine grained to fine grained, subangular to round; trace silt; moist to wet	(47.0 - 57.0') Soft drilling. Heaving sands encountered.
47									
48									
49									
50									
51									
52									
53									
54									
55									
56	120				SP			(55'); to 57 ft. bgs, core is saturated	(57.0 - 67.0') Soft drilling. Heaving sands encountered.
57									
58									
59									
60									

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Date Started:	08/20/2019	Surface Elevation:	N/A	Boring No.: MW-Y'd	
Date Completed:	09/25/2019	Northing (NAD83):	N/A		
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	137 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Pro-Sonic Truck Mounted	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	J. Khem / S. Vasquez	Depth to First Water:	4.6 ft bgs		
Drilling Asst:	L. Amaya / O. Flourez	Sampling Method:	4 inch x 10 ft. Core Barrel	Project Number:	RC000753.0051
Logger:	Grant Willford	Sampling Interval:	Continuous		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
61	120			Topock - Fluvial Deposits	SP-SM		(60.0 - 68.0') Topock - Fluvial Deposits; Poorly graded sand with silt (SP-SM); very pale brown (10YR 7/3); very fine grained to very fine grained, subangular to round; little medium grained grained sand, subangular to round; little silt; wet	(57.0 - 67.0') Soft drilling. Heaving sands encountered.	(0.0 - 97.0') 4437 gallons of water used; 0 gallons of water recovered; 4437 gallons of water lost
62									
63									
64									
65									
66	54			Topock - Fluvial Deposits	SW-SM		(68.0 - 71.5') Topock - Fluvial Deposits; Well graded sand with silt and gravel (SW-SM); very pale brown (10YR 7/3); very fine grained to very coarse grained, subangular to round; little granules to large pebbles, subround to round; little silt; wet	(67.0 - 77.0') Soft drilling. Very loose material being pushed out by core barrel causing poor recovery. Heaving sands encountered.	
67									
68									
69									
70									
71									
72									
73									
74									
75									
76	120			Topock - Fluvial Deposits	SP-SM		(77.0 - 80.0') Topock - Fluvial Deposits; Poorly graded sand with silt (SP-SM); very pale brown (10YR 7/3); very fine grained to medium grained, subangular to round; little granules to medium pebbles, subangular to round; little silt; wet		
77									
78									
79									
80									

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Date Started:	08/20/2019	Surface Elevation:	N/A	Boring No.: <u>MW-Y'd</u>
Date Completed:	09/25/2019	Northing (NAD83):	N/A	
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	137 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Pro-Sonic Truck Mounted	Borehole Diameter:	6-12 inches	Location: PG&E Topock, Needles, California
Driller Name:	J. Khem / S. Vasquez	Depth to First Water:	4.6 ft bgs	
Drilling Asst:	L. Amaya / O. Flourez	Sampling Method:	4 inch x 10 ft. Core Barrel	Project Number: RC000753.0051
Logger:	Grant Willford	Sampling Interval:	Continuous	
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
81	120			Topock - Fluvial Deposits	SW-SM		(80.0 - 87.5') Topock - Fluvial Deposits; Well graded sand with silt and gravel (SW-SM); very fine grained to very coarse grained, subangular to round; some granules to very large pebbles, subround to round; little silt; trace small cobbles, subround; wet	(77.0 - 87.0') Soft drilling. Very loose material being pushed out by core barrel causing poor recovery. Heaving sands encountered. Spindle bolts broke while advancing 6-inch casing.	(0.0 - 97.0') 4437 gallons of water used; 0 gallons of water recovered; 4437 gallons of water lost
82									
83									
84									
85									
86	120			Topock - Fluvial Deposits	SM		(87.5 - 97.0') Topock - Fluvial Deposits; Silty sand with gravel (SM); pale brown (10YR 6/3); very fine grained to coarse grained, subangular to round; little granules to medium pebbles, subangular to round; little silt; trace small cobbles, round; trace clay; wet; fat clay lense at 88.0-88.2 ft bgs	(87.0 - 97.0') Soft drilling. Heaving sands encountered.	
87									
88									
89									
90									
91									
92									
93									
94									
95									
96	72			Topock - Fluvial Deposits	SM		(97.0 - 101.6') Topock - Fluvial Deposits; Silty sand with gravel (SM); pale brown (10YR 6/3) some gray (10YR 6/1); very fine grained to coarse grained, subangular to round; little granules to large pebbles, subangular to round; little silt; trace clay; wet to moist		
97									
98									
99									
100									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	08/20/2019	Surface Elevation:	N/A	Boring No.: MW-Y'd	
Date Completed:	09/25/2019	Northing (NAD83):	N/A		
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	137 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Pro-Sonic Truck Mounted	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	J. Khem / S. Vasquez	Depth to First Water:	4.6 ft bgs		
Drilling Asst:	L. Amaya / O. Flourez	Sampling Method:	4 inch x 10 ft. Core Barrel	Project Number:	RC000753.0051
Logger:	Grant Willford	Sampling Interval:	Continuous		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
101	72		MW-Y'-VAS-98-103 (<0.033 U ppb) 8/23/2019 21:24	Topock - Fluvial Deposits	SM			(100.0 - 103.0') Rough drilling.	
102							(101.6 - 137.0') Topock - Competent Bedrock - conglomerate; red (2.5YR 4/8); dry; strong cementation; heavily fractured-pulverized rock, friable		
103								(103.0 - 107.0') Very rough drilling.	
104									
105	48								
106									
107									
108								(107.0 - 117.0') Very rough drilling.	(107.0 - 117.0') 100 gallons of water used; 0 gallons of water recovered; 100 gallons of water lost
109									
110									
111				Topock - Competent Bedrock - conglomerate					
112	120								
113									
114			MW-Y'-VAS-112-117 (<0.033 U ppb) 8/23/2019 15:11						
115									
116									
117									
118	120							(117.0 - 127.0') Very rough drilling.	(117.0 - 127.0') 60 gallons of water used; 0 gallons of water recovered; 60 gallons of water lost
119									
120									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started: 08/20/2019	Surface Elevation: N/A	Boring No.: MW-Y'd
Date Completed: 09/25/2019	Northing (NAD83): N/A	
Drilling Co.: Cascade	Easting (NAD83): N/A	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 137 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type: Pro-Sonic Truck Mounted	Borehole Diameter: 6-12 inches	Location: PG&E Topock, Needles, California
Driller Name: J. Khem / S. Vasquez	Depth to First Water: 4.6 ft bgs	
Drilling Asst: L. Amaya / O. Flourez	Sampling Method: 4 inch x 10 ft. Core Barrel	Project Number: RC000753.0051
Logger: Grant Willford	Sampling Interval: Continuous	
Editor: Sean McGrane	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
121	120			Topock - Competent Bedrock - conglomerate				(117.0 - 127.0') Very rough drilling.	(117.0 - 127.0') 60 gallons of water used; 0 gallons of water recovered; 60 gallons of water lost
122									
123									
124									
125									
126	60							(127.0 - 132.0') Very rough drilling.	(127.0 - 137.0') 60 gallons of water used; 0 gallons of water recovered; 60 gallons of water lost
127									
128									
129									
130									
131	60							(132.0 - 137.0') Very rough drilling.	(127.1') 675 gallons of water used; 675 gallons of water recovered; 0 gallons of water lost
132									
133									
134									
135									
136			no sample (interval did not produce) 8/24/2019 12:55						
137									
End of Boring at 137.0' bgs.									
138									
139									
140									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	09/19/2019	Surface Elevation:	472.7 ft amsl	Boring No.: MW-75i	
Date Completed:	09/25/2019	Northing (NAD83):	2103736.2		
Drilling Co.:	Cascade	Easting (NAD83):	7615559.7	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	271 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Boart Longyear Track	Borehole Diameter:	12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Eddie Ramos	Depth to First Water:	21 ft bgs		
Drilling Asst:	F. Sandoval/J. Candelaria	Sampling Method:	4 inch x 10 ft. Core Barrel	Project Number:	RC000753.0051
Logger:	Grant Willford	Sampling Interval:	177-271		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
1							(0.0 - 177.0') No recovery (NR); No logging was performed from 0 to 177 ft bgs. See MW-75-d log for lithology.		(0.0 - 266.0') No water used
2									
3									
4	0								
5									
6									
7									
8									
9							(8.0 - 117.0') Drilled with 8 inch core barrel and 10 inch casing.		
10									
11									
12									
13	0								
14									
15									
16									
17									
18									
19									
20									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval at MW-75d, groundwater samples collected during drilling of MW-75d

Date Started:	09/19/2019	Surface Elevation:	472.7 ft amsl	Boring No.: MW-75i	
Date Completed:	09/25/2019	Northing (NAD83):	2103736.2		
Drilling Co.:	Cascade	Easting (NAD83):	7615559.7	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	271 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Boart Longyear Track	Borehole Diameter:	12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Eddie Ramos	Depth to First Water:	21 ft bgs		
Drilling Asst:	F. Sandoval/J. Candelaria	Sampling Method:	4 inch x 10 ft. Core Barrel	Project Number:	RC000753.0051
Logger:	Grant Willford	Sampling Interval:	177-271		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
21									
22									
23									
24									
25									
26									
27									
28									
29									
30									
31									
32	0								
33									
34									
35									
36									
37									
38	0								
39									
40									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval at MW-75d, groundwater samples collected during drilling of MW-75d

SOIL BORING LOG PG&E TOPOCK C:\USERS\SMCGRANE\DOCUMENTS\PG&E TOPOCK\DRAFT BORING LOGS\GINT FILES\01.13.20\TOPOCK DATABASE FOR PLOG.GPJ TOPOCK DATA TEMPLATE FOR PLOG.GDT 01/13/20 17:21

Date Started:	<u>09/19/2019</u>	Surface Elevation:	<u>472.7 ft amsl</u>	Boring No.: <u>MW-75i</u>
Date Completed:	<u>09/25/2019</u>	Northing (NAD83):	<u>2103736.2</u>	
Drilling Co.:	<u>Cascade</u>	Easting (NAD83):	<u>7615559.7</u>	Client: <u>PG&E</u>
Drilling Method:	<u>Sonic Drilling</u>	Total Depth:	<u>271 ft bgs</u>	Project: <u>Final GW Remedy Phase 1</u>
Drill Rig Type:	<u>Boart Longyear Track</u>	Borehole Diameter:	<u>12 inches</u>	Location: <u>PG&E Topock, Needles, California</u>
Driller Name:	<u>Eddie Ramos</u>	Depth to First Water:	<u>21 ft bgs</u>	
Drilling Asst:	<u>F. Sandoval/J. Candelaria</u>	Sampling Method:	<u>4 inch x 10 ft. Core Barrel</u>	Project Number: <u>RC000753.0051</u>
Logger:	<u>Grant Willford</u>	Sampling Interval:	<u>177-271</u>	
Editor:	<u>Sean McGrane</u>	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
41	0	Sieve Samples Not Collected			NR				
42									
43									
44									
45									
46									
47									
48									
49			MW-B-VAS-47-52 (<0.17 U ppb) 1/9/2019 10:15						
50									
51	0								
52									
53									
54									
55									
56									
57	0								
58									
59									
60									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval at MW-75d, groundwater samples collected during drilling of MW-75d

Date Started:	09/19/2019	Surface Elevation:	472.7 ft amsl	Boring No.: MW-75i	
Date Completed:	09/25/2019	Northing (NAD83):	2103736.2		
Drilling Co.:	Cascade	Easting (NAD83):	7615559.7	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	271 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Boart Longyear Track	Borehole Diameter:	12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Eddie Ramos	Depth to First Water:	21 ft bgs		
Drilling Asst:	F. Sandoval/J. Candelaria	Sampling Method:	4 inch x 10 ft. Core Barrel	Project Number:	RC000753.0051
Logger:	Grant Willford	Sampling Interval:	177-271		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
61									
62									
63									
64	0								
65									
66									
67									
68									
69									
70		Sieve Samples Not Collected	MW-B-VAS-67-72 (<0.17 U ppb) 1/9/2019 14:55		NR				
71									
72	0								
73									
74									
75									
76									
77									
78									
79									
80									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval at MW-75d, groundwater samples collected during drilling of MW-75d

Date Started:	09/19/2019	Surface Elevation:	472.7 ft amsl	Boring No.: MW-75i	
Date Completed:	09/25/2019	Northing (NAD83):	2103736.2		
Drilling Co.:	Cascade	Easting (NAD83):	7615559.7	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	271 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Boart Longyear Track	Borehole Diameter:	12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Eddie Ramos	Depth to First Water:	21 ft bgs		
Drilling Asst:	F. Sandoval/J. Candelaria	Sampling Method:	4 inch x 10 ft. Core Barrel	Project Number:	RC000753.0051
Logger:	Grant Willford	Sampling Interval:	177-271		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
81									
82									
83									
84									
85									
86									
87									
88									
89									
90		Sieve Samples Not Collected			NR				
91									
92	0								
93									
94									
95									
96									
97									
98									
99									
100									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval at MW-75d, groundwater samples collected during drilling of MW-75d

Date Started:	09/19/2019	Surface Elevation:	472.7 ft amsl	Boring No.: <u>MW-75i</u>
Date Completed:	09/25/2019	Northing (NAD83):	2103736.2	
Drilling Co.:	Cascade	Easting (NAD83):	7615559.7	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	271 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Boart Longyear Track	Borehole Diameter:	12 inches	Location: PG&E Topock, Needles, California
Driller Name:	Eddie Ramos	Depth to First Water:	21 ft bgs	
Drilling Asst:	F. Sandoval/J. Candelaria	Sampling Method:	4 inch x 10 ft. Core Barrel	Project Number: RC000753.0051
Logger:	Grant Willford	Sampling Interval:	177-271	
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
101									
102									
103									
104			MW-B-VAS-102-107 (<0.17 U ppb) 1/10/2019 13:00						
105									
106									
107									
108									
109									
110		Sieve Samples Not Collected			NR				
111									
112	0								
113									
114									
115									
116									
117									
118	0							(117.0 - 271.0') Switched to 6 inch tooling to pilot the hole before reaming with 10 inch.	
119									
120									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval at MW-75d, groundwater samples collected during drilling of MW-75d

Date Started:	09/19/2019	Surface Elevation:	472.7 ft amsl	Boring No.: MW-75i	
Date Completed:	09/25/2019	Northing (NAD83):	2103736.2		
Drilling Co.:	Cascade	Easting (NAD83):	7615559.7	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	271 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Boart Longyear Track	Borehole Diameter:	12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Eddie Ramos	Depth to First Water:	21 ft bgs		
Drilling Asst:	F. Sandoval/J. Candelaria	Sampling Method:	4 inch x 10 ft. Core Barrel	Project Number:	RC000753.0051
Logger:	Grant Willford	Sampling Interval:	177-271		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
121									
122									
123	0								
124									
125									
126									
127									
128									
129									
130		Sieve Samples Not Collected			NR				
131									
132	0								
133									
134									
135									
136									
137									
138	0								
139									
140									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval at MW-75d, groundwater samples collected during drilling of MW-75d

SOIL BORING LOG PG&E TOPOCK C:\USERS\MCGRANE\DOCUMENTS\PG&E TOPOCK\DRIFT BORING LOGS\GINT FILES\01.13.20\TOPOCK DATABASE FOR PLOG.GPJ TOPOCK DATA TEMPLATE FOR PLOG.GDT 01/13/20 17:21

Date Started:	<u>09/19/2019</u>	Surface Elevation:	<u>472.7 ft amsl</u>	Boring No.: <u>MW-75i</u>
Date Completed:	<u>09/25/2019</u>	Northing (NAD83):	<u>2103736.2</u>	
Drilling Co.:	<u>Cascade</u>	Easting (NAD83):	<u>7615559.7</u>	Client: <u>PG&E</u>
Drilling Method:	<u>Sonic Drilling</u>	Total Depth:	<u>271 ft bgs</u>	Project: <u>Final GW Remedy Phase 1</u>
Drill Rig Type:	<u>Boart Longyear Track</u>	Borehole Diameter:	<u>12 inches</u>	Location: <u>PG&E Topock, Needles, California</u>
Driller Name:	<u>Eddie Ramos</u>	Depth to First Water:	<u>21 ft bgs</u>	
Drilling Asst:	<u>F. Sandoval/J. Candelaria</u>	Sampling Method:	<u>4 inch x 10 ft. Core Barrel</u>	Project Number: <u>RC000753.0051</u>
Logger:	<u>Grant Willford</u>	Sampling Interval:	<u>177-271</u>	
Editor:	<u>Sean McGrane</u>	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
141	0		MW-B-VAS-142-147 (<0.17 U ppb) 1/15/2019 14:25						
142									
143									
144									
145									
146	Sieve Samples Not Collected				NR				
147									
148									
149									
150									
151									
152									
153									
154									
155									
156	0								
157									
158									
159									
160									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval at MW-75d, groundwater samples collected during drilling of MW-75d

Date Started:	<u>09/19/2019</u>	Surface Elevation:	<u>472.7 ft amsl</u>	Boring No.: <u>MW-75i</u>
Date Completed:	<u>09/25/2019</u>	Northing (NAD83):	<u>2103736.2</u>	
Drilling Co.:	<u>Cascade</u>	Easting (NAD83):	<u>7615559.7</u>	Client: <u>PG&E</u>
Drilling Method:	<u>Sonic Drilling</u>	Total Depth:	<u>271 ft bgs</u>	Project: <u>Final GW Remedy Phase 1</u>
Drill Rig Type:	<u>Boart Longyear Track</u>	Borehole Diameter:	<u>12 inches</u>	Location: <u>PG&E Topock, Needles, California</u>
Driller Name:	<u>Eddie Ramos</u>	Depth to First Water:	<u>21 ft bgs</u>	
Drilling Asst:	<u>F. Sandoval/J. Candelaria</u>	Sampling Method:	<u>4 inch x 10 ft. Core Barrel</u>	Project Number: <u>RC000753.0051</u>
Logger:	<u>Grant Willford</u>	Sampling Interval:	<u>177-271</u>	
Editor:	<u>Sean McGrane</u>	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

NR

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval at MW-75d, groundwater samples collected during drilling of MW-75d

Date Started:	09/19/2019	Surface Elevation:	472.7 ft amsl	Boring No.: <u>MW-75i</u>	
Date Completed:	09/25/2019	Northing (NAD83):	2103736.2		
Drilling Co.:	Cascade	Easting (NAD83):	7615559.7	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	271 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Boart Longyear Track	Borehole Diameter:	12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Eddie Ramos	Depth to First Water:	21 ft bgs		
Drilling Asst:	F. Sandoval/J. Candelaria	Sampling Method:	4 inch x 10 ft. Core Barrel	Project Number:	RC000753.0051
Logger:	Grant Willford	Sampling Interval:	177-271		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
181									
182									
183	120			Topock - Alluvium Deposits	SM				
184			MW-B-VAS-182-187 (<0.17 U ppb) 2/13/2019 10:30						
185									
186									
187									
188				Topock - Alluvium Deposits	ML		(187.0 - 188.0') Topock - Alluvium Deposits; Sandy silt (ML); grayish brown (10YR 5/2); low plasticity; and very fine to medium grained sand, angular to subround; little granules to small pebbles, angular to subangular; little clay; moist; medium stiff; moderate cementation	(187.0 - 197.0') Slightly rough drilling.	
189							(188.0 - 197.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (5YR 5/4); very fine grained to coarse grained, angular to subround; little granules to large pebbles, angular to subangular; little silt; little clay; wet to moist; moderate cementation		
190		Sieve Samples Not Collected							
191									
192	120			Topock - Alluvium Deposits	SM				
193									
194							(194'); Weak cementation/looser material		
195									
196									
197									
198	120			Topock - Alluvium Deposits	SM		(197.0 - 205.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 5/4) some light greenish gray (GLE1 7/1); very fine grained to very coarse grained, angular to subround; little granules to very large pebbles, angular to subangular; little silt; little clay; trace small cobbles, angular; moist to dry; mottled; iron oxide staining	(197.0 - 207.0') Very rough drilling.	
199									
200									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval at MW-75d, groundwater samples collected during drilling of MW-75d

Date Started:	09/19/2019	Surface Elevation:	472.7 ft amsl	Boring No.: <u>MW-75i</u>	
Date Completed:	09/25/2019	Northing (NAD83):	2103736.2		
Drilling Co.:	Cascade	Easting (NAD83):	7615559.7	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	271 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Boart Longyear Track	Borehole Diameter:	12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Eddie Ramos	Depth to First Water:	21 ft bgs		
Drilling Asst:	F. Sandoval/J. Candelaria	Sampling Method:	4 inch x 10 ft. Core Barrel	Project Number:	RC000753.0051
Logger:	Grant Willford	Sampling Interval:	177-271		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
201	120			Topock - Alluvium Deposits	SM				
202									
203									
204									
205									
206	120			Topock - Alluvium Deposits	ML		(205.0 - 207.0') Topock - Alluvium Deposits; Sandy silt (ML); very pale brown / grayish orange (10YR 7/4); no plasticity; and very fine to medium grained sand, angular to subround; little clay; trace granules to medium pebbles, angular to subangular; dry; soft		
207									
208									
209									
210									
211	120	Sieve Samples Not Collected	MW-B-VAS-207-212 (<0.17 U ppb) 2/14/2019 10:55	Topock - Alluvium Deposits	SM		(207.0 - 219.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 5/4) little light greenish gray (GLE Y1 7/1); very fine grained to very coarse grained, angular to subround; little granules to large pebbles, angular to subround; little silt; little clay; moist to wet; weak cementation; some mottling	(207.0 - 217.0') Normal drilling.	
212									
213									
214									
215									
216	120			Topock - Alluvium Deposits	SM				
217									
218									
219									
220									
220				Topock - Alluvium Deposits	SM		(219.0 - 225.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 5/4); very fine grained to very coarse grained, angular to subround; some granules to very large pebbles, angular	(217.0 - 227.0') Soft drilling.	

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval at MW-75d, groundwater samples collected during drilling of MW-75d

Date Started:	09/19/2019	Surface Elevation:	472.7 ft amsl	Boring No.: MW-75i	
Date Completed:	09/25/2019	Northing (NAD83):	2103736.2		
Drilling Co.:	Cascade	Easting (NAD83):	7615559.7	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	271 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Boart Longyear Track	Borehole Diameter:	12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Eddie Ramos	Depth to First Water:	21 ft bgs		
Drilling Asst:	F. Sandoval/J. Candelaria	Sampling Method:	4 inch x 10 ft. Core Barrel	Project Number:	RC000753.0051
Logger:	Grant Willford	Sampling Interval:	177-271		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
221	120			Topock - Alluvium Deposits	SM		to subangular; little silt; trace small cobbles, angular to subangular; trace clay; wet; weak cementation; iron oxide staining; granules and pebbles mostly composed of metadiorite		
222									
223									
224									
225									
226	120			Topock - Alluvium Deposits	SM		(225.0 - 234.0') Topock - Alluvium Deposits; Silty sand (SM); brown (7.5YR 4/4); very fine grained to very coarse grained, angular to subround; little granules to medium pebbles, angular to subangular; little silt; little clay; wet	(227.0 - 237.0') Soft drilling.	
227									
228									
229									
230									
231	120			Topock - Alluvium Deposits	SM			(237.0 - 247.0') Soft drilling.	
232									
233									
234									
235									
236	120			Topock - Alluvium Deposits	SM		(234.0 - 240.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (5YR 5/4); very fine grained to very coarse grained, angular to subround; little granules to large pebbles, angular to subangular; little silt; trace clay; wet		
237									
238									
239									
240									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval at MW-75d, groundwater samples collected during drilling of MW-75d

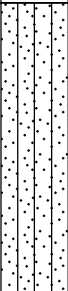
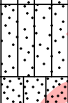

SOIL BORING LOG: PG&E TOPOCK C:\USERS\MCGRANE\DOCUMENTS\PG&E TOPOCK\DRIFT BORING LOGS\GINT FILES\01.13.20\TOPOCK DATABASE FOR PLOG.GPJ TOPOCK DATA TEMPLATE FOR PLOG.GDT 01/13/20 17:21

Date Started:	09/19/2019	Surface Elevation:	472.7 ft amsl	Boring No.: <u>MW-75i</u>	
Date Completed:	09/25/2019	Northing (NAD83):	2103736.2		
Drilling Co.:	Cascade	Easting (NAD83):	7615559.7	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	271 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Boart Longyear Track	Borehole Diameter:	12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Eddie Ramos	Depth to First Water:	21 ft bgs		
Drilling Asst:	F. Sandoval/J. Candelaria	Sampling Method:	4 inch x 10 ft. Core Barrel	Project Number:	RC000753.0051
Logger:	Grant Willford	Sampling Interval:	177-271		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
241	120			Topock - Alluvium Deposits	ML		(240.0 - 244.0') Topock - Alluvium Deposits; Sandy silt with gravel (ML); reddish brown (5YR 5/4); low plasticity; and very fine to very coarse grained sand, angular to subround; little granules to large pebbles, angular to subangular; trace clay; moist; stiff; moderate cementation		
242									
243									
244									
245									
246									
247	120	Sieve Samples Not Collected	MW-B-VAS-247-252 (<0.83 U ppb) 2/17/2019 11:25	Topock - Alluvium Deposits	ML		(247.0 - 253.0') Topock - Alluvium Deposits; Sandy silt with gravel (ML); reddish brown (5YR 5/4); low plasticity; some angular to subround; little granules to large pebbles, angular to subangular; trace clay; moist; very stiff; strong cementation	(247.0 - 257.0') Normal drilling.	
248									
249									
250									
251									
252									
253									
254									
255									
256									
257	168			Topock - Alluvium Deposits	SM		(253.0 - 257.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (5YR 5/4) little light greenish gray (GLEY1 7/1); very fine grained to very coarse grained, angular to subround; little granules to very large pebbles, angular to subround; little silt; little clay; trace small cobbles, angular; moist; moderate cementation; iron oxide staining; some red staining on gravel clasts	(252.0 - 257.0') Installed sampler screen to pump and test water quality for potential impacts from grout installed for the decommissioning of MW-75-267d.	
254									
255									
256									
257	168			Topock - Alluvium Deposits	ML		(257.0 - 267.0') Topock - Alluvium Deposits; Sandy silt with gravel (ML); reddish brown (5YR 5/4); low plasticity; some fine to very coarse grained sand, angular to subround; little granules to large pebbles, angular to subround; little clay; moist; stiff; moderate cementation	(257.0 - 267.0') Rough drilling.	
258									
259									
260									

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Date Started:	09/19/2019	Surface Elevation:	472.7 ft amsl	Boring No.: <u>MW-75i</u>	
Date Completed:	09/25/2019	Northing (NAD83):	2103736.2		
Drilling Co.:	Cascade	Easting (NAD83):	7615559.7	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	271 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Boart Longyear Track	Borehole Diameter:	12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Eddie Ramos	Depth to First Water:	21 ft bgs		
Drilling Asst:	F. Sandoval/J. Candelaria	Sampling Method:	4 inch x 10 ft. Core Barrel	Project Number:	RC000753.0051
Logger:	Grant Willford	Sampling Interval:	177-271		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
261	168	Sieve Samples Not Collected	MW-B-VAS-264-269 (<0.33 U ppb) 2/18/2019 14:00	Topock - Alluvium Deposits	ML		(265'); slightly moist (266'); dry	(267.0 - 271.0') Extremely rough/hard drilling conditions.	(266.0 - 271.0') Casing was flushed with water volumes not documented
262									
263									
264									
265									
266									
267				Topock - Alluvium Deposits	ML		(267.0 - 268.0') Topock - Alluvium Deposits; Sandy silt (ML); brown (7.5YR 4/4) little reddish brown (5YR 5/4); no plasticity; and very fine to coarse grained sand, angular to subround; little granules to medium pebbles, angular to subangular; little clay; dry; soft; weak cementation		
268									
269				Topock - Alluvium Deposits	SM		(268.0 - 271.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); yellowish red / light brown (5YR 5/6) some red / moderate reddish brown (10R 4/6); angular to subround; little small to large pebbles, angular to subangular; little silt; little clay; dry; strong cementation; iron oxide staining; some red staining on gravel clasts		
270									
271									
End of Boring at 271.0' bgs.									
272									
273									
274									
275									
276									
277									
278									
279									
280									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval at MW-75d, groundwater samples collected during drilling of MW-75d

Date Started:	09/19/2019	Surface Elevation:	472.7 ft amsl	Boring No.: MW-75i	
Date Completed:	09/25/2019	Northing (NAD83):	2103736.2		
Drilling Co.:	Cascade	Easting (NAD83):	7615559.7	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	271 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Boart Longyear Track	Borehole Diameter:	12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Eddie Ramos	Depth to First Water:	21 ft bgs		
Drilling Asst:	F. Sandoval/J. Candelaria	Sampling Method:	4 inch x 10 ft. Core Barrel	Project Number:	RC000753.0051
Logger:	Grant Willford	Sampling Interval:	177-271		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
281									
282									
283									
284									
285									
286									
287									
288									
289									
290									
291									
292									
293									
294									
295									
296									
297									
298									
299									
300									

MW-B-VAS-
287-292
(<0.17 U
ppb)
2/20/2019
12:15

Final 1/13/20

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval at MW-75d, groundwater samples collected during drilling of MW-75d

Date Started: 09/25/2019	Surface Elevation: 472.7 ft amsl	Well ID: MW-75-202, MW-75-267r
Date Completed: 01/11/2020	Shallow Well Elevation: N/A	
Drilling Co.: Cascade	Deep Well Elevation: N/A	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): 2103736.2	Project: Final GW Remedy Phase 1
Driller Name: Eddie Ramos	Easting (NAD83): 7615559.7	Location: PG&E Topock, Needles, California
Drilling Asst: F. Sandoval/J. Candelaria	Borehole Diameter: 12 inches	
Logger: Grant Willford	Water Level Start: 21 ft bgs	Project Number: RC000753.0051
Editor: Sean McGrane	Development End Date: 10/18/2019	
Total Depth: 271 ft bgs	Well Completion: <input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
0					(+0.1 - 181.7') 2" PVC Sch 80 Casing		(-0.6 - 2.25') 17 bags Note: 30" dia concrete pad with 18" dia lockable vault, King Kon-Crete 4000 PSI
1					(+0.6 - 2.25') Concrete Pad		
2							
3							
4							
5							
6							
7							
8					(1.5 - 14.0') Portland Cement 6% Bentonite	(1.5 - 14.0') 60.4 gallons	(1.5 - 14.0') 180 gallons (198%) Note: Type I, II and V and Benseal, used >20 % of the calculated volume due to potential voids forming during drilling, grout installed in lifts due to grout migrating into the formation
9			NR				
10							
11							
12							
13							
14							
15							
16							
17					(14.0 - 100.0') Bentonite seal pellets	(14.0 - 100.0') 59.9 bags	(14.0 - 100.0') 81 bags (35%) Note: Puregold Medium Chips, used >20 % of the calculated volume voids forming during drilling void at approximately 17 ft. bgs
18							
19							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery. groundwater samples collected during drilling of MW-75d

Date Started:	09/25/2019	Surface Elevation:	472.7 ft amsl	Well ID: MW-75-202, MW-75-267r
Date Completed:	01/11/2020	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	2103736.2	Project: Final GW Remedy Phase 1
Driller Name:	Eddie Ramos	Easting (NAD83):	7615559.7	Location: PG&E Topock, Needles, California
Drilling Asst:	F. Sandoval/J. Candelaria	Borehole Diameter:	12 inches	
Logger:	Grant Willford	Water Level Start:	21 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	10/18/2019	
Total Depth:	271 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
20					(+0.1 - 181.7') 2" PVC Sch 80 Casing		
21							
22							
23							
24							
25							
26							
27							
28							
29	MW-B-VAS-27-32 (7.7 J ppb) 1/6/2019 12:50		NR		(14.0 - 100.0') Bentonite seal pellets	(8.0 - 271.0') 10.0" Borehole	(14.0 - 100.0') 59.9 bags
30							(14.0 - 100.0') 81 bags (35%) Note: Puregold Medium Chips, used >20 % of the calculated volume voids forming during drilling void at approximately 17 ft. bgs
31							
32							
33							
34							
35							
36							
37							
38							
39							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery. groundwater samples collected during drilling of MW-75d

Date Started:	09/25/2019	Surface Elevation:	472.7 ft amsl	Well ID: MW-75-202, MW-75-267r
Date Completed:	01/11/2020	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	2103736.2	Project: Final GW Remedy Phase 1
Driller Name:	Eddie Ramos	Easting (NAD83):	7615559.7	Location: PG&E Topock, Needles, California
Drilling Asst:	F. Sandoval/J. Candelaria	Borehole Diameter:	12 inches	
Logger:	Grant Willford	Water Level Start:	21 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	10/18/2019	
Total Depth:	271 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
40					(+0.1 - 181.7') 2" PVC Sch 80 Casing		
41							
42							
43							
44							
45							
46							
47							
48					(47.5 - 48.5') Centralizer		
49	MW-B-VAS-47-52 (<0.17 U ppb) 1/9/2019 10:15		NR		(14.0 - 100.0') Bentonite seal pellets		
50							
51							
52							
53							
54							
55							
56							
57							
58							
59							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery. groundwater samples collected during drilling of MW-75d

Date Started:	09/25/2019	Surface Elevation:	472.7 ft amsl	Well ID: MW-75-202, MW-75-267r
Date Completed:	01/11/2020	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	2103736.2	Project: Final GW Remedy Phase 1
Driller Name:	Eddie Ramos	Easting (NAD83):	7615559.7	Location: PG&E Topock, Needles, California
Drilling Asst:	F. Sandoval/J. Candelaria	Borehole Diameter:	12 inches	
Logger:	Grant Willford	Water Level Start:	21 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	10/18/2019	
Total Depth:	271 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
60					(+0.1 - 181.7') 2" PVC Sch 80 Casing		
61							
62							
63							
64							
65							
66							
67							
68							
69	MW-B-VAS-67-72 (<0.17 U ppb) 1/9/2019 14:55		NR		(14.0 - 100.0') Bentonite seal pellets	(8.0 - 271.0') 10.0" Borehole	(14.0 - 100.0') 59.9 bags
70							(14.0 - 100.0') 81 bags (35%) Note: Puregold Medium Chips, used >20 % of the calculated volume voids forming during drilling void at approximately 17 ft. bgs
71							
72							
73							
74							
75							
76							
77							
78							
79							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery. groundwater samples collected during drilling of MW-75d

Date Started:	09/25/2019	Surface Elevation:	472.7 ft amsl	Well ID: MW-75-202, MW-75-267r
Date Completed:	01/11/2020	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	2103736.2	Project: Final GW Remedy Phase 1
Driller Name:	Eddie Ramos	Easting (NAD83):	7615559.7	Location: PG&E Topock, Needles, California
Drilling Asst:	F. Sandoval/J. Candelaria	Borehole Diameter:	12 inches	
Logger:	Grant Willford	Water Level Start:	21 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	10/18/2019	
Total Depth:	271 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
80					(+0.1 - 181.7') 2" PVC Sch 80 Casing	(0.0 - 247.0') 2" PVC Sch 80 Casing	
81							
82							
83							
84							
85							
86							
87							
88					(87.5 - 88.5') Centralizer		
89			NR		(14.0 - 100.0') Bentonite seal pellets	(8.0 - 271.0') 10.0" Borehole	(14.0 - 100.0') 59.9 bags
90							(14.0 - 100.0') 81 bags (35%) Note: Puregold Medium Chips, used >20 % of the calculated volume voids forming during drilling void at approximately 17 ft. bgs
91							
92							
93							
94							
95							
96							
97							
98							
99							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery. groundwater samples collected during drilling of MW-75d

WELL CONSTRUCTION DETAILS_PG&E TOPOCK TOPOCK DRAFT BORING LOGS\GINT FILES\01.13.20\TOPOCK DATABASE FOR PLOG.GPJ TOPOCK DATA TEMPLATE FOR PLOG.GPJ 01/13/20 17:33

Well Construction Log

Sheet: 6 of 15

Date Started:	09/25/2019	Surface Elevation:	472.7 ft amsl	Well ID: MW-75-202, MW-75-267r
Date Completed:	01/11/2020	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	2103736.2	Project: Final GW Remedy Phase 1
Driller Name:	Eddie Ramos	Easting (NAD83):	7615559.7	Location: PG&E Topock, Needles, California
Drilling Asst:	F. Sandoval/J. Candelaria	Borehole Diameter:	12 inches	
Logger:	Grant Willford	Water Level Start:	21 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	10/18/2019	
Total Depth:	271 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
100					(+0.1 - 181.7') 2" PVC Sch 80 Casing	(0.0 - 247.0') 2" PVC Sch 80 Casing	(14.0 - 100.0') 59.9 bags
101							
102							
103							
104	MW-B-VAS-102-107 (<0.17 U ppb) 1/10/2019 13:00						
105							
106							
107							
108							
109							
110			NR		(100.0 - 175.0') Bentonite seal pellets	(8.0 - 271.0') 10.0" Borehole	(100.0 - 175.0') 60.2 buckets
111							(100.0 - 175.0') 73 buckets (21%) Note: Pel-Plug (TR30) 3/8", used >20% of the calculated volume due to potential voids forming during drilling
112							
113							
114							
115							
116							
117							
118							
119							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery. groundwater samples collected during drilling of MW-75d

WELL CONSTRUCTION DETAILS_PG&E TOPOCK TOPOCK DRAFT BORING LOGS\GINT FILES\01.13.20\TOPOCK DATABASE FOR PLOG.GPJ TOPOCK DATA TEMPLATE FOR PLOG.GDT 01/13/20 17:33

Date Started:	09/25/2019	Surface Elevation:	472.7 ft amsl	Well ID: MW-75-202, MW-75-267r
Date Completed:	01/11/2020	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	2103736.2	Project: Final GW Remedy Phase 1
Driller Name:	Eddie Ramos	Easting (NAD83):	7615559.7	Location: PG&E Topock, Needles, California
Drilling Asst:	F. Sandoval/J. Candelaria	Borehole Diameter:	12 inches	
Logger:	Grant Willford	Water Level Start:	21 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	10/18/2019	
Total Depth:	271 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
120					(+0.1 - 181.7') 2" PVC Sch 80 Casing	(0.0 - 247.0') 2" PVC Sch 80 Casing	
121							
122							
123							
124							
125							
126							
127							
128					(127.5 - 128.5') Centralizer		
129			NR		(100.0 - 175.0') Bentonite seal pellets	(8.0 - 271.0') 10.0" Borehole	(100.0 - 175.0') 60.2 buckets
130							(100.0 - 175.0') 73 buckets (21%) Note: Pel-Plug (TR30) 3/8", used >20% of the calculated volume due to potential voids forming during drilling
131							
132							
133							
134							
135							
136							
137							
138							
139							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery. groundwater samples collected during drilling of MW-75d

Date Started:	09/25/2019	Surface Elevation:	472.7 ft amsl	Well ID: MW-75-202, MW-75-267r
Date Completed:	01/11/2020	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	2103736.2	Project: Final GW Remedy Phase 1
Driller Name:	Eddie Ramos	Easting (NAD83):	7615559.7	Location: PG&E Topock, Needles, California
Drilling Asst:	F. Sandoval/J. Candelaria	Borehole Diameter:	12 inches	
Logger:	Grant Willford	Water Level Start:	21 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	10/18/2019	
Total Depth:	271 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
140					(+0.1 - 181.7') 2" PVC Sch 80 Casing	(0.0 - 247.0') 2" PVC Sch 80 Casing	
141							
142							
143							
144	MW-B-VAS-142-147 (<0.17 U ppb) 1/15/2019 14:25						
145							
146							
147							
148							
149							
150			NR		(100.0 - 175.0') Bentonite seal pellets	(8.0 - 271.0') 10.0" Borehole	(100.0 - 175.0') 60.2 buckets
151							(100.0 - 175.0') 73 buckets (21%) Note: Pel-Plug (TR30) 3/8", used >20% of the calculated volume due to potential voids forming during drilling
152							
153							
154							
155							
156							
157							
158							
159							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery. groundwater samples collected during drilling of MW-75d

Date Started:	09/25/2019	Surface Elevation:	472.7 ft amsl	Well ID: MW-75-202, MW-75-267r
Date Completed:	01/11/2020	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	2103736.2	Project: Final GW Remedy Phase 1
Driller Name:	Eddie Ramos	Easting (NAD83):	7615559.7	Location: PG&E Topock, Needles, California
Drilling Asst:	F. Sandoval/J. Candelaria	Borehole Diameter:	12 inches	
Logger:	Grant Willford	Water Level Start:	21 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	10/18/2019	
Total Depth:	271 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
160					(+0.1 - 181.7') 2" PVC Sch 80 Casing		
161							
162							
163							
164							
165							
166							
167					(100.0 - 175.0') Bentonite seal pellets	(100.0 - 175.0') 60.2 buckets	(100.0 - 175.0') 73 buckets (21%) Note: Pel-Plug (TR30) 3/8", used >20% of the calculated volume due to potential voids forming during drilling
168					(167.5 - 168.5') Centralizer		
169							
170					(8.0 - 271.0') 10.0" Borehole		
171							
172							
173							
174							
175							
176							
177					(175.0 - 180.0') Transition Sand (#00)	(175.0 - 180.0') 5 bags	(175.0 - 180.0') 7 bags (40%) Note: Lapis Lustre Sand, used >20% of the calculated volume due to potential voids forming during drilling
178		Topock - Alluvium Deposits	SM				
179							

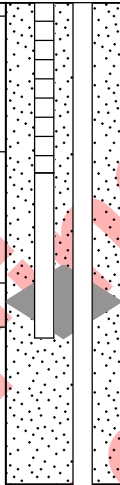
Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery. groundwater samples collected during drilling of MW-75d

Date Started:	09/25/2019	Surface Elevation:	472.7 ft amsl	Well ID: MW-75-202, MW-75-267r
Date Completed:	01/11/2020	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	2103736.2	Project: Final GW Remedy Phase 1
Driller Name:	Eddie Ramos	Easting (NAD83):	7615559.7	Location: PG&E Topock, Needles, California
Drilling Asst:	F. Sandoval/J. Candelaria	Borehole Diameter:	12 inches	
Logger:	Grant Willford	Water Level Start:	21 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	10/18/2019	
Total Depth:	271 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
180					(+0.1 - 181.7') 2" PVC Sch 80 Casing	(0.0 - 247.0') 2" PVC Sch 80 Casing	(175.0 - 180.0') 5 bags
181							
182					(181.7 - 201.7') 2" Sch 80 PVC (20-slot) Screen		
183							
184	MW-B-VAS-182-187 (<0.17 U ppb) 2/13/2019 10:30	Topock - Alluvium Deposits	SM				
185							
186							
187		Topock - Alluvium Deposits	ML				
188							
189							
190					(180.0 - 206.0') Cemex #3 MESH (8x10)	(8.0 - 271.0') 10.0" Borehole	(180.0 - 206.0') 30.5 bags
191							(180.0 - 206.0') 30 bags (-2%) Note: Lapis Lustre Sand
192							
193		Topock - Alluvium Deposits	SM				
194							
195							
196							
197							
198		Topock - Alluvium Deposits	SM				
199							

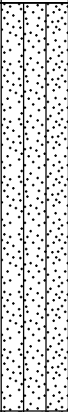

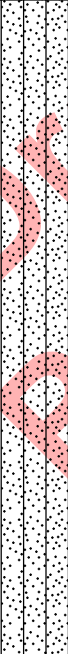

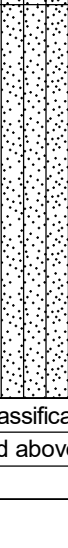
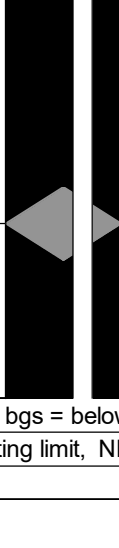
Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery. groundwater samples collected during drilling of MW-75d

Date Started: 09/25/2019	Surface Elevation: 472.7 ft amsl	Well ID: MW-75-202, MW-75-267r
Date Completed: 01/11/2020	Shallow Well Elevation: N/A	
Drilling Co.: Cascade	Deep Well Elevation: N/A	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): 2103736.2	Project: Final GW Remedy Phase 1
Driller Name: Eddie Ramos	Easting (NAD83): 7615559.7	Location: PG&E Topock, Needles, California
Drilling Asst: F. Sandoval/J. Candelaria	Borehole Diameter: 12 inches	
Logger: Grant Willford	Water Level Start: 21 ft bgs	Project Number: RC000753.0051
Editor: Sean McGrane	Development End Date: 10/18/2019	
Total Depth: 271 ft bgs	Well Completion: <input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction		Calculated Material Volumes	Material Volumes Installed
200		Topock - Alluvium Deposits	SM		(181.7 - 201.7') 2" Sch 80 PVC (20-slot) Screen		(0.0 - 247.0') 2" PVC Sch 80 Casing	(180.0 - 206.0') 30 bags (-2%) Note: Lapis Lustre Sand
201					(180.0 - 206.0') Cemex #3 MESH (8x10)		(180.0 - 206.0') 30.5 bags	
202					(203.0 - 204.0') Centralizer			
203					(201.7 - 204.0') Sump and End Cap			
204								
205		Topock - Alluvium Deposits	ML					
206								
207	MW-B-VAS- 207-212 (<0.17 U ppb) 2/14/2019 10:55							
208								
209								
210								
211								
212		Topock - Alluvium Deposits	SM					(206.0 - 240.0') 34 buckets (19%) Note: Pel-Plug (TR30) 3/8"
213					(206.0 - 240.0') Bentonite seal pellets	(206.0 - 240.0') 28.5 buckets		
214								
215								
216								
217								
218								
219								
			SM					

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery. groundwater samples collected during drilling of MW-75d

Date Started:	09/25/2019	Surface Elevation:	472.7 ft amsl	Well ID: MW-75-202, MW-75-267r
Date Completed:	01/11/2020	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	2103736.2	Project: Final GW Remedy Phase 1
Driller Name:	Eddie Ramos	Easting (NAD83):	7615559.7	Location: PG&E Topock, Needles, California
Drilling Asst:	F. Sandoval/J. Candelaria	Borehole Diameter:	12 inches	
Logger:	Grant Willford	Water Level Start:	21 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	10/18/2019	
Total Depth:	271 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction		Calculated Material Volumes	Material Volumes Installed	
220		Topock - Alluvium Deposits	SM			(0.0 - 247.0') 2" PVC Sch 80 Casing		(206.0 - 240.0') 34 buckets (19%) Note: Pel-Plug (TR30) 3/8"	
221									
222									
223									
224									
225		Topock - Alluvium Deposits	SM			(206.0 - 240.0') Bentonite seal pellets			(8.0 - 271.0') 10.0" Borehole
226									
227									
228									
229									
230		Topock - Alluvium Deposits	SM			(236.5 - 237.5') Centralizer			
231									
232									
233									
234									
235	Topock - Alluvium Deposits	SM			(236.5 - 237.5') Centralizer				
236									
237									
238									
239									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery. groundwater samples collected during drilling of MW-75d

WELL CONSTRUCTION DETAILS_PG&E TOPOCK C:\USERS\SMCGRANE\DOCUMENTS\PG&E TOPOCK\DRIFT BORING LOGS\GINT FILES\011320\TOPOCK DATA TEMPLATE FOR PLOG.GDT 01/13/20 17:33

Date Started:	09/25/2019	Surface Elevation:	472.7 ft amsl	Well ID: MW-75-202, MW-75-267r
Date Completed:	01/11/2020	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	2103736.2	Project: Final GW Remedy Phase 1
Driller Name:	Eddie Ramos	Easting (NAD83):	7615559.7	Location: PG&E Topock, Needles, California
Drilling Asst:	F. Sandoval/J. Candelaria	Borehole Diameter:	12 inches	
Logger:	Grant Willford	Water Level Start:	21 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	10/18/2019	
Total Depth:	271 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction		Calculated Material Volumes	Material Volumes Installed	
240	MW-B-VAS-247-252 (<0.83 U ppb) 2/17/2019 11:25		SM			(0.0 - 247.0') 2" PVC Sch 80 Casing	(206.0 - 240.0') 28.5 buckets	(206.0 - 240.0') 34 buckets (19%) Note: Pel-Plug (TR30) 3/8"	
241		Topock - Alluvium Deposits	ML		(240.0 - 245.0') Transition Sand (#00)		(240.0 - 245.0') 5.2 bags	(240.0 - 245.0') 5 bags (-4%) Note: Lapis Lustre Sand	
242									
243									
244									
245		Topock - Alluvium Deposits	SM						
246									
247		Topock - Alluvium Deposits	ML			(247.0 - 267.0') 2" Sch 80 PVC (20-slot) Screen			
248									
249									
250									
251	Topock - Alluvium Deposits	SM			(8.0 - 271.0') 10.0" Borehole				
252									
253									
254									
255	Topock - Alluvium Deposits	ML			(245.0 - 271.0') Cemex #3 MESH (8x10)		(245.0 - 271.0') 27.3 bags	(245.0 - 271.0') 33 bags (21%) Note: Lapis Lustre Sand, used $>20\%$ of the calculated volume due to potential voids forming during drilling	
256									
257									
258									
259									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery. groundwater samples collected during drilling of MW-75d

Date Started:	09/25/2019	Surface Elevation:	472.7 ft amsl	Well ID: MW-75-202, MW-75-267r
Date Completed:	01/11/2020	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	2103736.2	Project: Final GW Remedy Phase 1
Driller Name:	Eddie Ramos	Easting (NAD83):	7615559.7	Location: PG&E Topock, Needles, California
Drilling Asst:	F. Sandoval/J. Candelaria	Borehole Diameter:	12 inches	
Logger:	Grant Willford	Water Level Start:	21 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	10/18/2019	
Total Depth:	271 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
260	MW-B-VAS-264-269 (<0.33 U ppb) 2/18/2019 14:00	Topock - Alluvium Deposits	ML		(247.0 - 267.0') 2" Sch 80 PVC (20-slot) Screen		
261							
262		Topock - Alluvium Deposits	ML		(245.0 - 271.0') Cemex #3 MESH (8x10)	(8.0 - 271.0') 10.0" Borehole	(245.0 - 271.0') 27.3 bags
263							
264		Topock - Alluvium Deposits	ML		(267.5 - 268.5') Centralizer		(245.0 - 271.0') 33 bags (21%) Note: Lapis Lustre Sand, used >20% of the calculated volume due to potential voids forming during drilling
265		Topock - Alluvium Deposits	SM		(267.0 - 269.3') Sump and End Cap		
266							
267							
268							
269							
270							
271					End of Boring at 271.0' bgs.		
272							
273							
274							
275							
276							
277							
278							
279							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery. groundwater samples collected during drilling of MW-75d

Well Construction Log

Sheet: 15 of 15

Date Started:	09/25/2019	Surface Elevation:	472.7 ft amsl	Well ID: MW-75-202, MW-75-267r
Date Completed:	01/11/2020	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	2103736.2	Project: Final GW Remedy Phase 1
Driller Name:	Eddie Ramos	Easting (NAD83):	7615559.7	Location: PG&E Topock, Needles, California
Drilling Asst:	F. Sandoval/J. Candelaria	Borehole Diameter:	12 inches	
Logger:	Grant Willford	Water Level Start:	21 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	10/18/2019	
Total Depth:	271 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
280							
281							
282							
283							
284							
285							
286							
287							
288							
289	MW-B-VAS-287-292 (<0.17 U ppb) 2/20/2019 12:15						
290							
291							
292							
293							
294							
295							
296							
297							
298							
299							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery. groundwater samples collected during drilling of MW-75d

Boring Log

Sheet: 1 of 6

Date Started:	10/19/2019	Surface Elevation:	546.4 ft amsl	Boring No.: MW-88	
Date Completed:	10/29/2019	Northing (NAD83):	2100541.3		
Drilling Co.:	Cascade	Easting (NAD83):	7614692.8	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	116 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	4-10 inches	Location:	PG&E Topock, Needles, California
Driller Name:	JC / ER / SV	Depth to First Water:	89.56 ft bgs		
Drilling Asst:	LA / OF / PM	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	J. Latham / C. Bonessi	Sampling Interval:	Screen Interval		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
1							(0.0 - 87.0') No recovery (NR); Core was not collected or logged, see MW-88d geotech log for lithologic descriptions		
2									
3	0							(2.5') When 6" casing was at 27" it was determined that the 10" conductor casing was only driven to 2.5'. All 6" casing was pulled to allow the 10" conductor casing to be reset to 8' bgs.	
4									
5									
6									
7									
8									
9									
10									
11									
12	0							(8.0 - 27.0') Rough drilling.	
13									
14									
15									
16									
17									
18	0								
19									
20									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, NR = no recovery, blue water table symbol represents depth to water measured during purging to confirm water quality parameters were not affected by grout for the decommissioning of MW-88d, ground water quality data collected from MW-88d

Date Started:	10/19/2019	Surface Elevation:	546.4 ft amsl	Boring No.: MW-88	
Date Completed:	10/29/2019	Northing (NAD83):	2100541.3		
Drilling Co.:	Cascade	Easting (NAD83):	7614692.8	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	116 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	4-10 inches	Location:	PG&E Topock, Needles, California
Driller Name:	JC / ER / SV	Depth to First Water:	89.56 ft bgs		
Drilling Asst:	LA / OF / PM	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	J. Latham / C. Bonessi	Sampling Interval:	Screen Interval		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
21									
22									
23									
24	0								
25									
26									
27								(26.0') Lost core barrel down hole	
28									
29									
30					NR				
31									
32	0							(30.0 - 37.0') Rough drilling and borehole keeps collapsing requiring multiple clean out runs.	(30.0 - 37.0') 4 gallons of water used; 0 gallons of water recovered; 4 gallons of water lost
33									
34									
35									
36									
37									
38	0								
39									
40									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, NR = no recovery, blue water table symbol represents depth to water measured during purging to confirm water quality parameters were not affected by grout for the decommissioning of MW-88d, ground water quality data collected from MW-88d

Boring Log

Sheet: 3 of 6

Date Started:	10/19/2019	Surface Elevation:	546.4 ft amsl	Boring No.: MW-88	
Date Completed:	10/29/2019	Northing (NAD83):	2100541.3		
Drilling Co.:	Cascade	Easting (NAD83):	7614692.8	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	116 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	4-10 inches	Location:	PG&E Topock, Needles, California
Driller Name:	JC / ER / SV	Depth to First Water:	89.56 ft bgs		
Drilling Asst:	LA / OF / PM	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	J. Latham / C. Bonessi	Sampling Interval:	Screen Interval		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
41									
42									
43									
44	0								
45									
46									
47									
48									
49									
50									
51									
52	0							(50.0 - 57.0') Rough drilling.	
53									
54									
55									
56									
57									
58	0								
59									
60									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, NR = no recovery, blue water table symbol represents depth to water measured during purging to confirm water quality parameters were not affected by grout for the decommissioning of MW-88d, ground water quality data collected from MW-88d

SOIL BORING LOG PG&E TOPOCK C:\USERS\MCGRANE\DOCUMENTS\PG&E TOPOCK\DRAFT BORING LOGS\GINT FILES\01.03.20\TOPOCK DATABASE FOR PLOG.GPJ TOPOCK DATA TEMPLATE FOR PLOG.GDT 01/03/20 14:03

Boring Log

Sheet: 4 of 6

Date Started:	10/19/2019	Surface Elevation:	546.4 ft amsl	Boring No.: <u>MW-88</u>	
Date Completed:	10/29/2019	Northing (NAD83):	2100541.3		
Drilling Co.:	Cascade	Easting (NAD83):	7614692.8	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	116 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	4-10 inches	Location:	PG&E Topock, Needles, California
Driller Name:	JC / ER / SV	Depth to First Water:	89.56 ft bgs		
Drilling Asst:	LA / OF / PM	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	J. Latham / C. Bonessi	Sampling Interval:	Screen Interval		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
61									
62									
63									
64	0							(63.0 - 67.0') Rough drilling.	
65									
66									
67									
68									
69									
70									
71									
72	0								
73								(72.0') Lost core barrel down hole, first attempt to retrieve failed, retrieve on second attempt.	
74									
75									
76									
77									
78									
79	0								
80									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, NR = no recovery, blue water table symbol represents depth to water measured during purging to confirm water quality parameters were not affected by grout for the decommissioning of MW-88d, ground water quality data collected from MW-88d

SOIL BORING LOG PG&E TOPOCK C:\USERS\MCGRANE\DOCUMENTS\PG&E TOPOCK\DRAFT BORING LOGS\GINT FILES\01.03.20\TOPOCK DATABASE FOR PLOG.GPJ TOPOCK DATA TEMPLATE FOR PLOG.GDT 01/03/20 14:03

Date Started:	10/19/2019	Surface Elevation:	546.4 ft amsl	Boring No.: <u>MW-88</u>	
Date Completed:	10/29/2019	Northing (NAD83):	2100541.3		
Drilling Co.:	Cascade	Easting (NAD83):	7614692.8	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	116 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	4-10 inches	Location:	PG&E Topock, Needles, California
Driller Name:	JC / ER / SV	Depth to First Water:	89.56 ft bgs		
Drilling Asst:	LA / OF / PM	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	J. Latham / C. Bonessi	Sampling Interval:	Screen Interval		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

SOIL BORING LOG PG&E TOPOCK DATABASE FOR PI OG GP1 TOPOCK DATA TEMPLATE FOR PI OG GDT 01/03/20 14:03

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, NR = no recovery, blue water table symbol represents depth to water measured during purging to confirm water quality parameters were not affected by grout for the decommissioning of MW-88d, ground water quality data collected from MW-88d

Date Started:	10/19/2019	Surface Elevation:	546.4 ft amsl	Boring No.: <u>MW-88</u>	
Date Completed:	10/29/2019	Northing (NAD83):	2100541.3		
Drilling Co.:	Cascade	Easting (NAD83):	7614692.8	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	116 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	4-10 inches	Location:	PG&E Topock, Needles, California
Driller Name:	JC / ER / SV	Depth to First Water:	89.56 ft bgs		
Drilling Asst:	LA / OF / PM	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	J. Latham / C. Bonessi	Sampling Interval:	Screen Interval		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
101	120			Topock - Alluvium Deposits	ML				
102				Topock - Weathered Bedrock - conglomerate	ML		(101.0 - 104.0') Topock - Weathered Bedrock - conglomerate; Sandy silt with gravel (ML); reddish brown (5YR 5/4); low plasticity; some very fine to very coarse grained sand, angular to subround; little granules to very large pebbles, angular to subangular; little clay; coarser clasts composed of metadiorite; moist; medium stiff; strong HCL reaction		
103									
104									
105	108			Topock - Weathered Bedrock - conglomerate	ML		(104.0 - 106.0') Topock - Weathered Bedrock - conglomerate; Sandy silt with gravel (ML); brown (7.5YR 5/3); low plasticity; some very fine to very coarse grained sand, angular to subround; little granules to very large pebbles, angular to subangular; trace small cobbles, angular to subround; trace clay; wet; very soft to medium stiff; material highly disturbed by reworking over material	(104.0 - 106.0') Recovery was highly disturbed, likely slough.	
106				Topock - Weathered Bedrock - conglomerate	ML		(106.0 - 107.0') Topock - Weathered Bedrock - conglomerate; Sandy silt with gravel (ML); reddish brown (5YR 5/4); low plasticity; some very fine to very coarse grained sand, angular to subround; little granules to very large pebbles, angular to subangular; little clay; coarser clasts composed of metadiorite; dry; stiff	(107.0 - 116.0') Very hard drilling.	
107							(107.0 - 116.0') Topock - Competent Bedrock - conglomerate; (7.5R 5/1); dry; friable, pulverized		
108							(108') brown (7.5YR 5/3)		
109	108		MW-S-VAS-107-112 (6.8 ppb) 9/24/2019 11:14				(110') gray (7.5YR 5/1)		
110				Topock - Competent Bedrock - conglomerate				(110.0') Core barrel locked up, run casing over core barrel to free up.	
111									
112							(113') brown (7.5YR 5/3)		
113			no sample 9/23/2019 10:43						
114									
115									
116									
End of Boring at 116.0' bgs.									
117									
118									
119									
120									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, NR = no recovery, blue water table symbol represents depth to water measured during purging to confirm water quality parameters were not affected by grout for the decommissioning of MW-88d, ground water quality data collected from MW-88d

Date Started:	10/29/2019	Surface Elevation:	546.4 ft amsl	Well ID: MW-88-107
Date Completed:	10/30/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	546.9 ft amsl	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	2100541.3	Project: Final GW Remedy Phase 1
Driller Name:	JC / ER / SV	Easting (NAD83):	7614692.8	Location: PG&E Topock, Needles, California
Drilling Asst:	LA / OF / PM	Borehole Diameter:	4-10 inches	
Logger:	J. Latham / C. Bonessi	Water Level Start:	90.1 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	11/13/2019	
Total Depth:	116 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
1					(0.0 - 87.0') 2" PVC Sch 80 Casing		
2					(0.0 - 3.0') Backfill		Note: Native material to be removed during installation of surface completion
3							
4							
5							
6					(0.0 - 12.0') 10.0" Borehole		
7							
8							
9							
10			NR				
11					(3.0 - 75.0') Portland Cement 6% Bentonite	(3.0 - 75.0') 129.2 bags	(3.0 - 75.0') 165 bags (28%) Note: Type I II and V with Hydrogel, actual volume of grout installed was >20% of the calculated volume due to potential lateral migration of the grout into the formation or void spaces created during drilling
12							
13							
14							
15							
16					(12.0 - 116.0') 6.0" Borehole		
17							
18							
19							
20							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, NR = no recovery, ground water quality data collected from MW-88d

Date Started:	10/29/2019	Surface Elevation:	546.4 ft amsl	Well ID: MW-88-107
Date Completed:	10/30/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	546.9 ft amsl	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	2100541.3	Project: Final GW Remedy Phase 1
Driller Name:	JC / ER / SV	Easting (NAD83):	7614692.8	Location: PG&E Topock, Needles, California
Drilling Asst:	LA / OF / PM	Borehole Diameter:	4-10 inches	
Logger:	J. Latham / C. Bonessi	Water Level Start:	90.1 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	11/13/2019	
Total Depth:	116 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
21					(0.0 - 87.0') 2" PVC Sch 80 Casing		
22							
23							
24							
25							
26							
27							
28							
29					(28.0 - 29.0') Centralizer		
30			NR		(3.0 - 75.0') Portland Cement 6% Bentonite	(3.0 - 75.0') 129.2 bags	(3.0 - 75.0') 165 bags (28%) Note: Type I II and V with Hydrogel, actual volume of grout installed was >20% of the calculated volume due to potential lateral migration of the grout into the formation or void spaces created during drilling
31							
32							
33							
34							
35							
36							
37							
38							
39							
40							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, NR = no recovery, ground water quality data collected from MW-88d

Date Started:	10/29/2019	Surface Elevation:	546.4 ft amsl	Well ID: MW-88-107
Date Completed:	10/30/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	546.9 ft amsl	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	2100541.3	Project: Final GW Remedy Phase 1
Driller Name:	JC / ER / SV	Easting (NAD83):	7614692.8	Location: PG&E Topock, Needles, California
Drilling Asst:	LA / OF / PM	Borehole Diameter:	4-10 inches	
Logger:	J. Latham / C. Bonessi	Water Level Start:	90.1 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	11/13/2019	
Total Depth:	116 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
41					(0.0 - 87.0') 2" PVC Sch 80 Casing		
42							
43							
44							
45							
46							
47							
48							
49							
50			NR		(3.0 - 75.0') Portland Cement 6% Bentonite	(12.0 - 116.0') 6.0" Borehole	(3.0 - 75.0') 129.2 bags
51							(3.0 - 75.0') 165 bags (28%) Note: Type I II and V with Hydrogel, actual volume of grout installed was >20% of the calculated volume due to potential lateral migration of the grout into the formation or void spaces created during drilling
52							
53							
54							
55							
56							
57							
58							
59							
60							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, NR = no recovery, ground water quality data collected from MW-88d

Date Started:	10/29/2019	Surface Elevation:	546.4 ft amsl	Well ID: MW-88-107
Date Completed:	10/30/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	546.9 ft amsl	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	2100541.3	Project: Final GW Remedy Phase 1
Driller Name:	JC / ER / SV	Easting (NAD83):	7614692.8	Location: PG&E Topock, Needles, California
Drilling Asst:	LA / OF / PM	Borehole Diameter:	4-10 inches	
Logger:	J. Latham / C. Bonessi	Water Level Start:	90.1 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	11/13/2019	
Total Depth:	116 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
61					(0.0 - 87.0') 2" PVC Sch 80 Casing		
62							
63							
64							
65							
66							
67							
68					(3.0 - 75.0') Portland Cement 6% Bentonite	(3.0 - 75.0') 129.2 bags	(3.0 - 75.0') 165 bags (28%) Note: Type I II and V with Hydrogel, actual volume of grout installed was >20% of the calculated volume due to potential lateral migration of the grout into the formation or void spaces created during drilling
69					(68.0 - 69.0') Centralizer		
70			NR		(12.0 - 116.0') 6.0" Borehole		
71							
72							
73							
74							
75							
76							
77							
78					(75.0 - 85.0') Cemex #60 Mesh (40A-70)	(75.0 - 85.0') 3.5 bags	(75.0 - 85.0') 3.5 bags (0%) Note: Lapis Lustre Sand
79							
80							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, NR = no recovery, ground water quality data collected from MW-88d

Date Started:	10/29/2019	Surface Elevation:	546.4 ft amsl	Well ID: MW-88-107
Date Completed:	10/30/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	546.9 ft amsl	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	2100541.3	Project: Final GW Remedy Phase 1
Driller Name:	JC / ER / SV	Easting (NAD83):	7614692.8	Location: PG&E Topock, Needles, California
Drilling Asst:	LA / OF / PM	Borehole Diameter:	4-10 inches	
Logger:	J. Latham / C. Bonessi	Water Level Start:	90.1 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	11/13/2019	
Total Depth:	116 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
81					(0.0 - 87.0') 2" PVC Sch 80 Casing		
82							
83			NR		(75.0 - 85.0') Cemex #60 Mesh (40A-70)	(75.0 - 85.0') 3.5 bags	(75.0 - 85.0') 3.5 bags (0%) Note: Lapis Lustre Sand
84							
85							
86							
87					(87.0 - 107.0') 2" 20-Slot Sch 80 PVC (0.20 slot) Screen		
88							
89							
90							
91		Topock - Alluvium Deposits	SM		(12.0 - 116.0') 6.0" Borehole		
92							
93	MW-S-VAS-92-97 (26 ppb) 9/22/2019 10:14				(85.0 - 111.0') Cemex #3 MESH (8x10)	(85.0 - 111.0') 9.2 bags	(85.0 - 111.0') 10 bags (9%) Note: Lapis Lustre Sand
94							
95							
96							
97		Topock - Alluvium Deposits	ML				
98							
99							
100							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, NR = no recovery, ground water quality data collected from MW-88d

Date Started:	10/29/2019	Surface Elevation:	546.4 ft amsl	Well ID: MW-88-107
Date Completed:	10/30/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	546.9 ft amsl	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	2100541.3	Project: Final GW Remedy Phase 1
Driller Name:	JC / ER / SV	Easting (NAD83):	7614692.8	Location: PG&E Topock, Needles, California
Drilling Asst:	LA / OF / PM	Borehole Diameter:	4-10 inches	
Logger:	J. Latham / C. Bonessi	Water Level Start:	90.1 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	11/13/2019	
Total Depth:	116 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
101		Topock - Alluvium Deposits	ML		(87.0 - 107.0') 2" 20-Slot Sch 80 PVC (0.20 slot) Screen		
102		Topock - Weathered Bedrock - conglomerate	ML				
103							
104		Topock - Weathered Bedrock - conglomerate	ML				
105							
106		Topock - Weathered Bedrock - conglomerate	ML		(85.0 - 111.0') Cemex #3 MESH (8x10)	(85.0 - 111.0') 9.2 bags	(85.0 - 111.0') 10 bags (9%) Note: Lapis Lustre Sand
107		Topock - Weathered Bedrock - conglomerate	ML				
108					(107.5 - 108.5') Centralizer		
109	MW-S-VAS-107-112 (6.8 ppb) 9/24/2019 11:14				(107.0 - 109.3') Sump and End Cap		
110							
111		Topock - Competent Bedrock - conglomerate					
112							
113							
114	no sample 9/23/2019 10:43				(111.0 - 116.0') Bentonite seal chips	(111.0 - 116.0') 0.8 bags	(111.0 - 116.0') 1 bags (25%) Note: Puregold Medium Chips
115							
116							
117					End of Boring at 116.0' bgs.		
118							
119							
120							

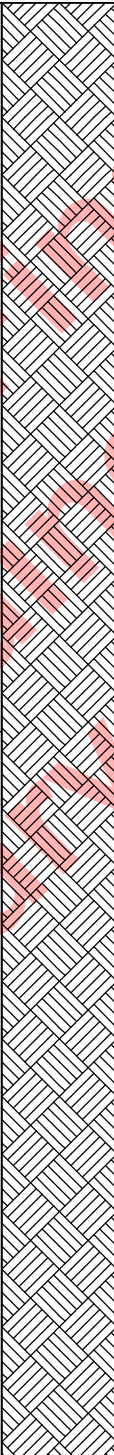
Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, NR = no recovery, ground water quality data collected from MW-88d

Date Started:	10/03/2019	Surface Elevation:	545.6 ft amsl	Well ID: MW-88-107d
Date Completed:	10/04/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	2100555.9	Project: Final GW Remedy Phase 1
Driller Name:	John Colon	Easting (NAD83):	7614695.2	Location: PG&E Topock, Needles, California
Drilling Asst:	L. Amaya / O. Floures	Borehole Diameter:	4-12 inches	
Logger:	Chris Bonessi	Water Level Start:	89.14 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	N/A	
Total Depth:	117.1 ft bgs	Well Completion:	<input type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
1		Topock - Fluvial Deposits	SM				Note: Backfilled with native material
2							
3		Topock - Fluvial Deposits	SW				
4		Topock - Fluvial Deposits	SW		(0.0 - 8.0') 12.0" Borehole		
5		Topock - Fluvial Deposits	SW				
6		Topock - Fluvial Deposits	SW				
7		Topock - Fluvial Deposits	NR				
8		Topock - Fluvial Deposits	SW				
9		Topock - Fluvial Deposits	NR				
10		Topock - Alluvium Deposits	SW		(2.0 - 82.0') Grout		
11						(2.0 - 82.0') 238 gallons	(2.0 - 82.0') 335 gallons (41%) Note: Type I, II and V and Benseal, used >20% of the calculated volume due to grout migration potentially in to the damaged well and the formation
12		Topock - Alluvium Deposits	SW				
13		Topock - Alluvium Deposits	NR				
14		Topock - Alluvium Deposits	NR				
15		Topock - Alluvium Deposits	SW-SM		(8.0 - 82.0') 8.0" Borehole		
16							
17		Topock - Alluvium Deposits	SM				
18		Topock - Alluvium Deposits	NR				
19		Topock - Alluvium Deposits	SW				
20							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval, penetration rates where not documented during overdrill

Date Started:	10/03/2019	Surface Elevation:	545.6 ft amsl	Well ID: MW-88-107d
Date Completed:	10/04/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	2100555.9	Project: Final GW Remedy Phase 1
Driller Name:	John Colon	Easting (NAD83):	7614695.2	Location: PG&E Topock, Needles, California
Drilling Asst:	L. Amaya / O. Floures	Borehole Diameter:	4-12 inches	
Logger:	Chris Bonessi	Water Level Start:	89.14 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	N/A	
Total Depth:	117.1 ft bgs	Well Completion:	<input type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
21		Topock - Alluvium Deposits	SW		 <p>(2.0 - 82.0') Grout</p> <p>(8.0 - 82.0') 8.0" Borehole</p>	(2.0 - 82.0') 238 gallons	<p>(2.0 - 82.0') 335 gallons (41%)</p> <p>Note: Type I, II and V and Benseal, used >20% of the calculated volume due to grout migration potentially in to the damaged well and the formation</p>
22		Topock - Alluvium Deposits	SW-SM				
23		Topock - Alluvium Deposits	SM				
24			NR				
25		Topock - Alluvium Deposits	GM				
26							
27		Topock - Alluvium Deposits	SM				
28		Topock - Alluvium Deposits	SM				
29			NR				
30		Topock - Alluvium Deposits	SM				
31							
32		Topock - Alluvium Deposits	SM				
33			NR				
34		Topock - Alluvium Deposits	SM				
35							
36		Topock - Alluvium Deposits	SW				
37		Topock - Alluvium Deposits	SM				
38		Topock - Alluvium Deposits	SM				
39		Topock - Alluvium Deposits	NR				
40		Topock - Alluvium Deposits	ML				

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval, penetration rates where not documented during overdrill

Date Started:	10/03/2019	Surface Elevation:	545.6 ft amsl	Well ID: MW-88-107d
Date Completed:	10/04/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	2100555.9	Project: Final GW Remedy Phase 1
Driller Name:	John Colon	Easting (NAD83):	7614695.2	Location: PG&E Topock, Needles, California
Drilling Asst:	L. Amaya / O. Floures	Borehole Diameter:	4-12 inches	
Logger:	Chris Bonessi	Water Level Start:	89.14 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	N/A	
Total Depth:	117.1 ft bgs	Well Completion:	<input type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
41		Topock - Alluvium Deposits	ML				
42		Topock - Alluvium Deposits	ML				
43		Topock - Alluvium Deposits	ML				
44		Topock - Alluvium Deposits	ML				
45		Topock - Alluvium Deposits	SM				
46		Topock - Alluvium Deposits	SM				
47		Topock - Alluvium Deposits	SM				
48		Topock - Alluvium Deposits	NR				
49		Topock - Alluvium Deposits	SM				
50		Topock - Alluvium Deposits	SM		(2.0 - 82.0') Grout	(2.0 - 82.0') 238 gallons	(2.0 - 82.0') 335 gallons (41%) Note: Type I, II and V and Benseal, used >20% of the calculated volume due to grout migration potentially in to the damaged well and the formation
51		Topock - Alluvium Deposits	SM				
52		Topock - Alluvium Deposits	SM				
53		Topock - Alluvium Deposits	SM				
54		Topock - Alluvium Deposits	SM				
55		Topock - Alluvium Deposits	SM				
56		Topock - Alluvium Deposits	SM				
57		Topock - Alluvium Deposits	SM				
58		Topock - Alluvium Deposits	NR				
59		Topock - Alluvium Deposits	SM				
60		Topock - Alluvium Deposits	SM				

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval, penetration rates where not documented during overdrill

Date Started:	10/03/2019	Surface Elevation:	545.6 ft amsl	Well ID: MW-88-107d
Date Completed:	10/04/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	2100555.9	Project: Final GW Remedy Phase 1
Driller Name:	John Colon	Easting (NAD83):	7614695.2	Location: PG&E Topock, Needles, California
Drilling Asst:	L. Amaya / O. Floures	Borehole Diameter:	4-12 inches	
Logger:	Chris Bonessi	Water Level Start:	89.14 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	N/A	
Total Depth:	117.1 ft bgs	Well Completion:	<input type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
61		Topock - Alluvium Deposits	SM				
62							
63		Topock - Alluvium Deposits	SW-SM				
64							
65		Topock - Alluvium Deposits	SM				
66							
67		Topock - Alluvium Deposits	SM				
68			NR				
69		Topock - Alluvium Deposits	GM				
70		Topock - Alluvium Deposits	SM		(2.0 - 82.0') Grout	(2.0 - 82.0') 238 gallons	(2.0 - 82.0') 335 gallons (41%) Note: Type I, II and V and Benseal, used >20% of the calculated volume due to grout migration potentially in to the damaged well and the formation
71							
72		Topock - Alluvium Deposits	SM				
73							
74		Topock - Alluvium Deposits	SM				
75							
76			NR				
77		Topock - Alluvium Deposits	SM				
78			NR				
79		Topock - Alluvium Deposits	SM				
80							

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Date Started:	10/03/2019	Surface Elevation:	545.6 ft amsl	Well ID: MW-88-107d
Date Completed:	10/04/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	2100555.9	Project: Final GW Remedy Phase 1
Driller Name:	John Colon	Easting (NAD83):	7614695.2	Location: PG&E Topock, Needles, California
Drilling Asst:	L. Amaya / O. Floures	Borehole Diameter:	4-12 inches	
Logger:	Chris Bonessi	Water Level Start:	89.14 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	N/A	
Total Depth:	117.1 ft bgs	Well Completion:	<input type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
81	MW-S-VAS-92-97 (26 ppb) 9/22/2019 10:14	Topock - Alluvium Deposits	SM		(2.0 - 82.0') Grout	(2.0 - 82.0') 238 gallons	(2.0 - 82.0') 335 gallons (41%) Note: Type I, II and V and Benseal, used >20% of the calculated volume due to grout migration potentially in to the damaged well and the formation
82							
83							
84		Topock - Alluvium Deposits	ML		(82.0 - 87.0') Bentonite seal chips	(82.0 - 87.0') 0.6 bags	(82.0 - 87.0') 1 bags (67%) Note: Puregold Medium Chips used to abandon 4 inch core barrel rathole
85							
86		Topock - Alluvium Deposits	SM		(87.0 - 102.7') 2" Sch 80 PVC (20-slot) Screen		
87			NR				
88							
89		Topock - Alluvium Deposits	SM				
90							
91							
92							
93		Topock - Alluvium Deposits	ML		(87.0 - 111.0') Cemex #3 MESH (8x10)	(87.0 - 111.0') 9.4 bags	(87.0 - 111.0') 11.5 bags (22%) Note: Lapis Lustre Sand, used >20% due to potential voids forming during drilling. Grout was bailed out of the screen interval after the well casing had shifted resulting in the loss of the well.
94							
95		Topock - Alluvium Deposits	SM				
96							
97							
98		Topock - Alluvium Deposits	ML				
99			NR				
100		Topock - Alluvium Deposits	SM				

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Date Started:	10/03/2019	Surface Elevation:	545.6 ft amsl	Well ID: MW-88-107d
Date Completed:	10/04/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	2100555.9	Project: Final GW Remedy Phase 1
Driller Name:	John Colon	Easting (NAD83):	7614695.2	Location: PG&E Topock, Needles, California
Drilling Asst:	L. Amaya / O. Floures	Borehole Diameter:	4-12 inches	
Logger:	Chris Bonessi	Water Level Start:	89.14 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	N/A	
Total Depth:	117.1 ft bgs	Well Completion:	<input type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
101		Topock - Alluvium Deposits	SM		(87.0 - 102.7') 2" Sch 80 PVC (20-slot) Screen		
102					(102.7 - 102.7') Sump and End Cap		
103							
104							
105		Topock - Weathered Bedrock - conglomerate	ML		(101.5 - 109.0') Grout tagged on 9/26/19 (87.0 - 111.0') Cemex #3 MESH (8x10)	(101.5 - 109.0') 0.78 gallons (87.0 - 111.0') 9.4 bags	(101.5 - 109.0') 0.78 gallons (0%) Note: Type I, II and V and Benseal, that settled after the grout migrated into the well screen. (87.0 - 111.0') 11.5 bags (22%) Note: Lapis Lustre Sand, used >20% due to potential voids forming during drilling. Grout was bailed out of the screen interval after the well casing had shifted resulting in the loss of the well.
106							
107							
108							
109	MW-S-VAS-107-112 (6.8 ppb) 9/24/2019 11:14						
110							
111							
112		Topock - Competent Bedrock - conglomerate					
113							
114	no sample (interval did not produce) 9/23/2019 10:43				(111.0 - 117.1') Bentonite seal chips	(111.0 - 117.1') 1.66 bags	(111.0 - 117.1') 2 bags (20%) Note: Puregold Medium Chips
115							
116			NR				
117							
118					End of Boring at 117.1' bgs.		
119							
120							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval, penetration rates where not documented during overdrill

Date Started:	09/25/2019	Surface Elevation:	545.6 ft amsl	Boring No.: MW-88d	
Date Completed:	09/25/2019	Northing (NAD83):	2100555.9		
Drilling Co.:	Cascade	Easting (NAD83):	7614695.2	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	117.1 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	10-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Steve Vasquez	Depth to First Water:	89.14 ft bgs	Project Number:	RC000753.0051
Drilling Asst:	L. Amaya / O. Floures	Sampling Method:	Split spoon, Cal Mod	Hammer Type:	Auto Hammer
Logger:	Sean McGrane	Sampling Interval:	Continuous	Hammer Weight:	140 lbs
Editor:	Chris Bonessi	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Hammer Drop:	30 inches

Depth (ft)	Blow Counts [N Value]	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
1					Topock - Fluvial Deposits	SM		(0.0 - 3.0') Topock - Fluvial Deposits; Silty sand with gravel (SM); brown (7.5YR 4/3); very fine grained to very coarse grained, angular to subround; some granules to very large pebbles, angular to subangular; little silt; trace small cobbles, angular to subangular; trace clay; trace mica; well graded; dry; 25,55,20 logged from hand auger cuttings, moisture from water added for hand augering	(0.0 - 3.0') Hand augered for utility clearance, refusal at 3.0 ft.	
2										
3			MW-S-SG-0.0-5.0 9/20/2019 10:40		Topock - Fluvial Deposits	SW		(3.0 - 4.3') Topock - Fluvial Deposits; Well graded sand with gravel (SW); brown (7.5YR 5/3); very fine grained to very coarse grained, angular to subround; some granules to very large pebbles, angular to subround; trace large cobbles, subangular; trace silt; trace clay; trace mica; well graded; wet; 25,70,5, moisture due to water added for hand augering	(4.0 - 5.0') Hard drilling	
4		24			Topock - Fluvial Deposits	SW				
5	25-25/3 (null/0.25')	6	MW-S-SP-5.0-5.6 9/20/2019 11:10		Topock - Fluvial Deposits	SW		(4.3 - 5.0') Topock - Fluvial Deposits; Well graded sand with gravel (SW); reddish brown (2.5YR 5/3); very fine grained to granules, angular to subangular; and small to very large pebbles, angular to subangular; trace small cobbles, subangular; trace silt; trace clay; coarser clasts composed of metadiorite; well graded; dry; 45,50,5		(5.0') 2 gallons of water used; gallons of water recovered; gallons of water lost
6					Topock - Fluvial Deposits	NR				
7		6			Topock - Fluvial Deposits	SW		(5.0 - 5.6') Topock - Fluvial Deposits; Well graded sand with gravel (SW); weak red (2.5YR 5/2); very fine grained to granules, angular to subround; little small to very large pebbles, angular to subangular; trace silt; trace clay; well graded; dry; very loose; 15,80,5		(7.0') 2 gallons of water used; gallons of water recovered; gallons of water lost
8	12-28-30 (58)	12	MW-S-CM-7.0-7.5 9/20/2019 11:38		Topock - Fluvial Deposits	SW				
9			MW-S-CM-7.5-8.0 9/20/2019 11:34			NR		(5.6 - 6.5') No recovery (NR); very loose; split spoon refusal	(8.5 - 12.0') Rough drilling	
10								(6.5 - 7.0') Topock - Fluvial Deposits; Well graded sand with gravel (SW); (GLE Y1 5/4); very fine grained to granules, angular to subangular; and small to very large pebbles, angular to subangular; trace small cobbles, subangular; trace silt; coarser clasts composed of metadiorite; dry; 45,50,5		
11		42			Topock - Alluvium Deposits	SW		(7.0 - 8.0') Topock - Fluvial Deposits; Well graded sand with gravel (SW); weak red (2.5YR 5/2); very fine grained to granules, angular to subround; little small to very large pebbles, angular to subangular; trace silt; trace clay; well graded; dry to moist; very dense; 20,75,5		
12								(8.0 - 8.5') No recovery (NR); missing from sampler		
13	34-35-30 (65)	14.4	MW-S-SP-12.0-13.2 9/20/2019 13:59		Topock - Alluvium Deposits	SW		(8.5 - 12.0') Topock - Alluvium Deposits; Well graded sand with gravel (SW); brown (10YR 4/3) and reddish gray (2.5YR 5/1); very fine grained to granules, angular to subangular; and small to very large pebbles, angular to subangular; trace boulders, subround; trace silt; coarser clasts composed of metadiorite; dry; lensed; 45,50,5		(12.0') 2 gallons of water used; gallons of water recovered; gallons of water lost
14					Topock - Alluvium Deposits	NR		(12.0 - 13.2') Topock - Alluvium Deposits; Well graded sand with gravel (SW); grayish brown (10YR 5/2); very fine grained to granules, angular to subround; little small to large pebbles, angular to subangular; trace silt; trace clay; trace mica; well graded; dry; very dense; 20,75,5	(13.5 - 17.0') Rough drilling	
15		42			Topock - Alluvium Deposits	SW-SM		(13.2 - 13.5') Topock - Alluvium Deposits; No recovery (NR); slough from casing advancement		
16								(13.5 - 16.3') Topock - Alluvium Deposits; Well graded sand with silt and gravel (SW-SM); dark reddish gray (2.5YR 4/1) and weak red (2.5YR 5/2); very fine grained to granules, angular to round; and small to very large pebbles, angular to subround; little silt; trace small cobbles, subangular to subround; trace clay; coarser clasts composed of metadiorite; 40,50,10, cobbles composed of gabbro		
17	50/4 (null/0.35')	4.8	MW-S-CM-17.0-17.4 9/20/2019 14:31		Topock - Alluvium Deposits	SM			(17.0 - 18.5') Poor recovery sample maybe slough	(17.0') 2 gallons of water used; gallons of water recovered; gallons of water lost
18					Topock - Alluvium Deposits	NR		(16.3 - 17.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); weak red (2.5YR 5/2); very fine grained to granules, angular to subround; some silt; little small to very large pebbles, angular to subangular; trace small cobbles, angular; trace clay; coarser clasts composed of metadiorite; well graded; dry; 20,55,25, some silt content maybe rock flour from pulverized cobbles and boulders		
19		42			Topock - Alluvium Deposits	SW		(17.0 - 17.2') Topock - Alluvium Deposits; Silty sand with gravel (SM); dark gray / olive gray (5Y 4/1); very fine grained to granules, angular to subround; little small to medium pebbles, angular to	(18.5 - 22.0') Rough drilling	
20										

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Date Started:	09/25/2019	Surface Elevation:	545.6 ft amsl	Boring No.: MW-88d
Date Completed:	09/25/2019	Northing (NAD83):	2100555.9	
Drilling Co.:	Cascade	Easting (NAD83):	7614695.2	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	117.1 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	10-12 inches	Location: PG&E Topock, Needles, California
Driller Name:	Steve Vasquez	Depth to First Water:	89.14 ft bgs	Project Number: RC000753.0051
Drilling Asst:	L. Amaya / O. Floures	Sampling Method:	Split spoon, Cal Mod	Hammer Type: Auto Hammer
Logger:	Sean McGrane	Sampling Interval:	Continuous	Hammer Weight: 140 lbs
Editor:	Chris Bonessi	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Hammer Drop: 30 inches

Depth (ft)	Blow Counts [N Value]	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
21		42			Topock - Alluvium Deposits	SW		subangular; little silt; trace clay; trace mica; well graded; dry; very dense; 20,65,15		
22	50/6	6	MW-S-SP-22.0-22.5 9/20/2019 14:59		Topock - Alluvium Deposits	SW-SM		(17.2 - 18.5') Topock - Alluvium Deposits; No recovery (NR); top 0.3 ft of spoon was slough.	(22.0 - 23.5') Poor recovery	(22.0') 2 gallons of water used; gallons of water recovered; gallons of water lost
23					Topock - Alluvium Deposits	SM		(18.5 - 21.0') Topock - Alluvium Deposits; Well graded sand with gravel (SW); weak red (2.5YR 5/2); very fine grained to granules, subangular to subround; some small to very large pebbles, angular to subangular; trace small cobbles, subangular; trace silt; coarser clasts composed of metadiorite; dry; lensed; 30,65,5 (19.5'); and small to very large pebbles, angular to subangular; 40, 55, 5, decrease in sand		
24						NR				
25		42			Topock - Alluvium Deposits	GM		(21.0 - 22.0') Topock - Alluvium Deposits; Well graded sand with silt and gravel (SW-SM); olive gray (5Y 4/2); very fine grained to granules, angular to subround; some small to very large pebbles, angular to subangular; little silt; trace small cobbles, subangular; trace boulders, subangular; coarser clasts composed of metadiorite; dry; 35,65,10, some silt rock flour from pulverized cobbles and boulders	(23.5 - 27.0') Rough drilling	
26								(22.0 - 22.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); gray (2.5Y 5/1); very fine grained to granules, angular to subround; little small to large pebbles, angular to subangular; little silt; trace clay; trace mica; well graded; moist to dry; very dense; 15, 70, 15, seams of silt		
27	50/4 (null/0.35')	4.8	MW-S-CM-27.0-27.4 9/20/2019 15:35		Topock - Alluvium Deposits	SM		(22.5 - 23.5') No recovery (NR); split spoon refusal		
28					Topock - Alluvium Deposits	SM		(23.5 - 26.3') Topock - Alluvium Deposits; Silty gravel with sand (GM); grayish brown (2.5Y 5/2); granules to very large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subround; some silt; trace small cobbles, angular to subangular; coarser clasts composed of metadiorite; trace coarser clast composed of conglomerate; well graded; dry; 35,25,30	(27.0 - 28.5') Poor recovery sample may have slough in it	(27.0') 2 gallons of water used; gallons of water recovered; gallons of water lost
29						NR				
30		42			Topock - Alluvium Deposits	SM		(26.3 - 27.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); grayish brown (2.5Y 5/2); very fine grained to granules, angular to round; some small to very large pebbles, angular to subangular; little silt; coarser clasts composed of metadiorite; well graded; dry; 30,55,15	(28.5 - 32.0') Rough drilling	
31								(27.0 - 27.4') Topock - Alluvium Deposits; Silty sand with gravel (SM); grayish brown (2.5Y 5/2); very fine grained to granules, angular to subround; little small to large pebbles, angular to subangular; little silt; trace clay; dry to moist; very dense; 20,60,20		
32	50/5 (null/0.40')	4.8	MW-S-SP-32.0-32.4 9/20/2019 16:17		Topock - Alluvium Deposits	SM		(27.4 - 28.5') No recovery (NR); Cal Mod refusal	(32.0 - 33.5') Poor recovery top 0.2 ft slough	(32.0') 2 gallons of water used; gallons of water recovered; gallons of water lost
33						NR		(28.5 - 32.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (10YR 5/3); very fine grained to granules, angular to subround; some small to very large pebbles, angular to subangular; some silt; coarser clasts composed of metadiorite; well graded; dry; 25,40,35		
34								(31') little silt; trace small cobbles, angular; 30,55,15, increase in sand and pebbles	(33.5 - 37.0') Normal Drilling	
35		42			Topock - Alluvium Deposits	SM		(32.0 - 32.4') Topock - Alluvium Deposits; Silty sand with gravel (SM); grayish brown (2.5Y 5/2); very fine grained to granules, angular to subround; little small to large pebbles, angular to subangular; little silt; trace clay; well graded; dry to moist; very dense; 20,65,15		
36					Topock - Alluvium Deposits	SW		(32.4 - 33.5') No recovery (NR); split spoon refusal		
37	50/5 (null/0.40')	8.4	MW-S-CM-37.0-37.5 9/21/2019 09:12		Topock - Alluvium Deposits	SM		(33.5 - 35.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 5/3); very fine grained to granules, angular to subround; some small to very large pebbles, angular to subangular; little silt; trace small cobbles, subangular; trace coarser clast composed of conglomerate; coarser clasts composed of metadiorite; well graded; dry; 35,45,20	(37.0 - 38.5') Cal Mod refusal after 5 inches, approximately 1 to 2 inches of slough in sample	(37.0') 2 gallons of water used; gallons of water recovered; gallons of water lost
38					Topock - Alluvium Deposits	NR		(35.5 - 36.5') Topock - Alluvium Deposits; Well graded sand with gravel (SW); grayish brown (10YR 5/2); very fine grained to granules, angular to subround; little small to very large pebbles, angular to subangular; trace silt; coarser clasts composed of metadiorite; dry; 20,75,5		
39		102			Topock - Alluvium Deposits	ML		(36.5 - 37.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 5/3); very fine grained to very coarse grained, angular to round; some small to very large pebbles, angular to	(38.5 - 46.5') Rough drilling	
40										

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Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	09/25/2019	Surface Elevation:	545.6 ft amsl	Boring No.: <u>MW-88d</u>	
Date Completed:	09/25/2019	Northing (NAD83):	2100555.9		
Drilling Co.:	Cascade	Easting (NAD83):	7614695.2	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	117.1 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	10-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Steve Vasquez	Depth to First Water:	89.14 ft bgs	Project Number:	RC000753.0051
Drilling Asst:	L. Amaya / O. Floures	Sampling Method:	Split spoon, Cal Mod	Hammer Type:	Auto Hammer
Logger:	Sean McGrane	Sampling Interval:	Continuous	Hammer Weight:	140 lbs
Editor:	Chris Bonessi	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Hammer Drop:	30 inches

Depth (ft)	Blow Counts [N Value]	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
61					Topock - Alluvium Deposits	SM		well graded; dry; 35,45,20	without casing to 67.	
62								(61') grayish brown (2.5Y 5/2); some silt; 30,45,25, decrease pebbles, no cobbles		
63		102			Topock - Alluvium Deposits	SW-SM		(62.0 - 64.5') Topock - Alluvium Deposits; Well graded sand with silt and gravel (SW-SM); brown (7.5YR 5/4); very fine grained to granules, angular to subround; some small to very large pebbles, angular to subangular; little silt; trace small cobbles, angular; trace clay; trace coarser clast composed of conglomerate; coarser clasts composed of metadiorite; well graded; dry; 35,55,10		
64										
65					Topock - Alluvium Deposits	SM		(64.5 - 67.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 5/3); very fine grained to granules, angular to subround; some small to very large pebbles, angular to subangular; little silt; trace small cobbles, angular; trace clay; coarser clasts composed of metadiorite; well graded; dry; 35,45,20		
66										
67	50/6	6	MW-S-SP-67.0-67.5 9/21/2019 12:53		Topock - Alluvium Deposits	SM		(67.0 - 67.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); dark yellowish brown (10YR 4/4); very fine grained to granules, angular to subround; some small to very large pebbles, angular to subangular; some silt; well graded; dry; very dense; 25,45,30, potential slough	(67.0 - 68.5') Split spoon refusal, most of sample most likely slough.	(67.0') 2 gallons of water used; gallons of water recovered; gallons of water lost
68					Topock - Alluvium Deposits	NR		(67.5 - 68.5') No recovery (NR); split spoon refusal		
69					Topock - Alluvium Deposits	GM		(68.5 - 69.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); grayish brown (2.5Y 5/2); granules to very large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subround; some silt; trace small to large cobbles, angular; trace clay; well graded; moist to dry; 40,35,25	(68.5 - 77.0') Formation tight, lost bottom 1.5 ft of core	
70					Topock - Alluvium Deposits	SM		(69.0 - 72.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); dark yellowish brown (10YR 4/4); very fine grained to granules, angular to subround; some small to very large pebbles, angular to subangular; some silt; trace clay; trace coarser clast composed of conglomerate; coarser clasts composed of metadiorite; well graded; dry to moist; 35,40,25		
71								(70.5') little silt; 35,45,20, increase in sand		
72					Topock - Alluvium Deposits	SM		(72.0 - 74.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); yellowish brown / moderate yellowish brown (10YR 5/4); very fine grained to granules, angular to subround; and small to very large pebbles, angular to subround; little silt; trace clay; coarser clasts composed of metadiorite; well graded; moist to dry; 40,45,15, lithology has rock flour from pulverized pebbles		
73		84								
74					Topock - Alluvium Deposits	SM		(74.0 - 75.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 5/4); very fine grained to granules, angular to subround; some small to very large pebbles, angular to subangular; little silt; trace clay; trace coarser clast composed of conglomerate; well graded; moist to dry; 35,45,20		
75										
76						NR		(75.5 - 77.0') No recovery (NR); see drilling notes		
77	50/3 (null/0.30')	6			Topock - Alluvium Deposits	SM		(77.0 - 77.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); dark yellowish brown (10YR 4/4); very fine grained to granules, angular to subround; some small to very large pebbles, angular to subangular; some silt; coarser clasts composed of metadiorite; trace mica; well graded; moist; very dense; 25,45,30	(77.0 - 78.5') Cal Mod refusal, top 0.3 ft of sample most likely slough	(77.0') 2 gallons of water used; gallons of water recovered; gallons of water lost
78						NR		(77.5 - 78.5') No recovery (NR); Cal Mod refusal		
79		102			Topock - Alluvium Deposits	SM		(78.5 - 83.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 5/4); very fine grained to granules, angular to subround; little silt; trace clay; well graded; moist to dry; 35	(78.5 - 87.0') Normal drilling	(78.0 - 112.0') No water used
80										

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Date Started:	09/25/2019	Surface Elevation:	545.6 ft amsl	Boring No.: <u>MW-88d</u>	
Date Completed:	09/25/2019	Northing (NAD83):	2100555.9		
Drilling Co.:	Cascade	Easting (NAD83):	7614695.2	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	117.1 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	10-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Steve Vasquez	Depth to First Water:	89.14 ft bgs	Project Number:	RC000753.0051
Drilling Asst:	L. Amaya / O. Floures	Sampling Method:	Split spoon, Cal Mod	Hammer Type:	Auto Hammer
Logger:	Sean McGrane	Sampling Interval:	Continuous	Hammer Weight:	140 lbs
Editor:	Chris Bonessi	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Hammer Drop:	30 inches

Depth (ft)	Blow Counts [N Value]	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
81					Topock - Alluvium Deposits	SM				
82										
83		102								
84					Topock - Alluvium Deposits	ML		(83.5 - 87.0') Topock - Alluvium Deposits; Sandy silt with gravel (ML); brown (10YR 5/3); some very fine to very coarse grained sand, angular to subround; little granules to very large pebbles, angular to subangular; little clay; moist to dry; 20,35,45		
85										
86										
87					Topock - Alluvium Deposits	SM		(87.0 - 87.4') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 5/4); very fine grained to granules, angular to subround; some small to large pebbles, angular to subangular; little silt; trace clay; coarser clasts composed of metadiorite; well graded; moist; very dense; 25,60,15	(87.0 - 88.5') Spilt spoon refusal	
88	50/5 (null/0.40')	4.8	MW-S-SP-87.0-87.4 9/21/2019 15:17		Topock - Alluvium Deposits	NR		(87.4 - 88.5') No recovery (NR)		
89								(88.5 - 92.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 5/3); very fine grained to granules, angular to subround; some small to very large pebbles, angular to subround; some silt; little clay; trace small cobbles, angular to subround; coarser clasts composed of metadiorite; well graded; moist; 25,40,35 (89.7'); dry (90'); moist	(88.5 - 97.0') Normal drilling (89.0') Approximate depth to water table	
90					Topock - Alluvium Deposits	SM				
91										
92										
93		102			Topock - Alluvium Deposits	ML		(92.0 - 94.5') Topock - Alluvium Deposits; Sandy silt with gravel (ML); brown (7.5YR 5/2); low plasticity; some granules to very large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subround; little clay; trace small cobbles, angular to subangular; coarser clasts composed of metadiorite; moist to wet; 25,35,40		
94										
95					Topock - Alluvium Deposits	SM		(94.5 - 97.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 5/3); very fine grained to granules, angular to subround; some small to very large pebbles, angular to subangular; little silt; trace clay; coarser clasts composed of metadiorite; well graded; wet; 25,50,25 (96'); little clay; 25,40,35, decrease in sand		
96										
97										
98	25-50/2 (null/0.17')	12	MW-S-CM-97.0-97.5 9/22/2019 11:29		Topock - Alluvium Deposits	ML		(97.0 - 98.0') Topock - Alluvium Deposits; Sandy silt with gravel (ML); brown (10YR 4/3); low plasticity; some granules to very large pebbles, angular to subround; some very fine to very coarse grained sand, angular to subround; moist to wet; soft; 25,30,45	(97.0 - 98.5') Top 4 to 6 inches of sample most likely slough	
99			MW-S-CM-97.5-98.0 9/22/2019 11:27		Topock - Alluvium Deposits	NR		(98.0 - 98.5') No recovery (NR)		
100		102			Topock - Alluvium Deposits	SM		(98.5 - 101.8') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (10YR 5/3); very fine grained to granules, angular to subround; some small to very large pebbles, angular to subangular; little silt; little clay; coarser clasts composed of metadiorite; well graded; wet; 30,40,35	(98.5 - 107.0') Tight formation	














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Date Started:	09/25/2019	Surface Elevation:	545.6 ft amsl	Boring No.: <u>MW-88d</u>	
Date Completed:	09/25/2019	Northing (NAD83):	2100555.9		
Drilling Co.:	Cascade	Easting (NAD83):	7614695.2	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	117.1 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	10-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Steve Vasquez	Depth to First Water:	89.14 ft bgs	Project Number:	RC000753.0051
Drilling Asst:	L. Amaya / O. Floures	Sampling Method:	Split spoon, Cal Mod	Hammer Type:	Auto Hammer
Logger:	Sean McGrane	Sampling Interval:	Continuous	Hammer Weight:	140 lbs
Editor:	Chris Bonessi	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Hammer Drop:	30 inches

Depth (ft)	Blow Counts [N Value]	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
101					Topock - Alluvium Deposits	SM				
102		102						(101.8 - 110.0') Topock - Weathered Bedrock - conglomerate; Sandy silt with gravel (ML); reddish brown (5YR 5/4); low plasticity; some very fine to very coarse grained sand, angular to subangular; little granules to very large pebbles, angular to subangular; little clay; coarser clasts composed of metadiorite; moist to wet; 20,35,45		
103										
104										
105										
106					Topock - Weathered Bedrock - conglomerate	ML				
107										
108									(107.0 - 115.0') Very hard drilling, could not advance past 115 ft. sediments compacted in bag.	
109										
110										
111		90						(110.0 - 115.0') Topock - Competent Bedrock - conglomerate; reddish brown / moderate brown (5YR 4/4); moist to dry; friable, pulverized,		
112					Topock - Competent Bedrock - conglomerate					
113										(112.0 - 117.1') 50 gallons of water used; gallons of water recovered; gallons of water lost
114										
115										
116		6				NR		(115.0 - 117.1') No recovery (NR); lost core downhole what was recovered was highly disturbed and not log able	(115.0 - 117.1') Lost core down hole what was retrieved was highly disturbed.	
117										
End of Boring at 117.1' bgs.										
118										
119										
120										

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Date Started:	10/01/2019	Surface Elevation:	545.6 ft amsl	Boring No.: MW-88d
Date Completed:	10/03/2019	Northing (NAD83):	2100555.9	
Drilling Co.:	Cascade	Easting (NAD83):	7614695.2	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	117.1 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Conductor Casing Diameter:	12 inches	Location: PG&E Topock, Needles, California
Driller Name:	John Colon	Drill Casing Diameter:	6 inches	
Drilling Asst:	L. Amaya / O. Floures	Drill Bit:	Cutting Shoe	Project Number: RC000753.0051
Tool-Pusher:	Arnold Lamon	Depth to First Water:	89.14 ft bgs	
Rig Geologist:	Chris Bonessi	Converted to Well:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	

Depth (ft)	Drilling Run and Average Penetration Rate	USCS Code	USCS Class	Casing Diameter	Description (See Pilot boring log for full geologic descriptions)	Drilling Notes	Drilling Fluid		
1	(0.0 - 8.0) mins/ft	SM		(0.0 - 8.0') 12.0" Steel Casing	(0.0 - 3.0') Topock - Fluvial Deposits; Silty sand with gravel (SM); brown (7.5YR 4/3)	(0.0 - 59.0') The 8-inch casing was advanced over the damaged well. As the casing was advanced, well construction materials were cored/driven into the casing. Grout and approximately 40 ft of PVC well casing was removed with the 7-inch core barrel.	(0.0 - 57.0') 1650 gallons of water used; 1650 gallons of water recovered; 0 gallons of water lost		
2									
3									
4					SW				(3.0 - 4.3') Topock - Fluvial Deposits; Well graded sand with gravel (SW); brown (7.5YR 5/3)
5					SW				(4.3 - 5.0') Topock - Fluvial Deposits; Well graded sand with gravel (SW); reddish brown (2.5YR 5/3)
6					NR				(5.0 - 5.6') Topock - Fluvial Deposits; Well graded sand with gravel (SW); weak red (2.5YR 5/2)
7					SW				(5.6 - 6.5') No recovery (NR) (6.5 - 7.0') Topock - Fluvial Deposits; Well graded sand with gravel (SW); (GLE1 5/4)
8	(8.0 - 82.0) mins/ft	SW		(8.0 - 82.0') 8.0" Steel Casing	(7.0 - 8.0') Topock - Fluvial Deposits; Well graded sand with gravel (SW); weak red (2.5YR 5/2)				
9					NR				(8.0 - 8.5') No recovery (NR) (8.5 - 12.0') Topock - Alluvium Deposits; Well graded sand with gravel (SW); brown (10YR 4/3)
10									
11									
12									
13					SW				(12.0 - 13.2') Topock - Alluvium Deposits; Well graded sand with gravel (SW); grayish brown (10YR 5/2)
14					NR				(13.2 - 13.5') Topock - Alluvium Deposits; No recovery (NR) (13.5 - 16.3') Topock - Alluvium Deposits; Well graded sand with silt and gravel (SW-SM); dark reddish gray (2.5YR 4/1)
15					SW-SM				
16									
17					SM				(16.3 - 17.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); weak red (2.5YR 5/2)
18					NR				(17.0 - 17.2') Topock - Alluvium Deposits; Silty sand with gravel (SM); dark gray / olive gray (5Y 4/1)
19					SW				(17.2 - 18.5') Topock - Alluvium Deposits; No recovery (NR) (18.5 - 21.0') Topock - Alluvium Deposits; Well graded sand with gravel (SW); weak red (2.5YR 5/2)
20									

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Date Started:	10/01/2019	Surface Elevation:	545.6 ft amsl	Boring No.: MW-88d
Date Completed:	10/03/2019	Northing (NAD83):	2100555.9	
Drilling Co.:	Cascade	Easting (NAD83):	7614695.2	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	117.1 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Conductor Casing Diameter:	12 inches	Location: PG&E Topock, Needles, California
Driller Name:	John Colon	Drill Casing Diameter:	6 inches	
Drilling Asst:	L. Amaya / O. Floures	Drill Bit:	Cutting Shoe	Project Number: RC000753.0051
Tool-Pusher:	Arnold Lamon	Depth to First Water:	89.14 ft bgs	
Rig Geologist:	Chris Bonessi	Converted to Well:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	

Depth (ft)	Drilling Run and Average Penetration Rate	USCS Code	USCS Class	Casing Diameter	Description (See Pilot boring log for full geologic descriptions)	Drilling Notes	Drilling Fluid
21		SW					
22		SW-SM			(21.0 - 22.0') Topock - Alluvium Deposits; Well graded sand with silt and gravel (SW-SM); olive gray (5Y 4/2)		
23		SM			(22.0 - 22.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); gray (2.5Y 5/1)		
24		NR			(22.5 - 23.5') No recovery (NR)		
25		GM			(23.5 - 26.3') Topock - Alluvium Deposits; Silty gravel with sand (GM); grayish brown (2.5Y 5/2)		
26							
27		SM			(26.3 - 27.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); grayish brown (2.5Y 5/2)		
28		SM			(27.0 - 27.4') Topock - Alluvium Deposits; Silty sand with gravel (SM); grayish brown (2.5Y 5/2)		
29		NR			(27.4 - 28.5') No recovery (NR)		
30	(8.0 - 82.0) mins/ft	SM		(8.0 - 82.0') 8.0" Steel Casing	(28.5 - 32.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (10YR 5/3)		
31							
32		SM			(32.0 - 32.4') Topock - Alluvium Deposits; Silty sand with gravel (SM); grayish brown (2.5Y 5/2)		
33		NR			(32.4 - 33.5') No recovery (NR)		
34		SM			(33.5 - 35.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 5/3)		
35							
36		SW			(35.5 - 36.5') Topock - Alluvium Deposits; Well graded sand with gravel (SW); grayish brown (10YR 5/2)		
37		SM			(36.5 - 37.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 5/3)		
38		NR			(37.0 - 37.4') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (10YR 5/3)		
39		ML			(37.4 - 38.5') Topock - Alluvium Deposits; No recovery (NR)		
40					(38.5 - 44.5') Topock - Alluvium Deposits; Sandy silt with gravel (ML); dark grayish brown / dark		

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Date Started:	10/01/2019	Surface Elevation:	545.6 ft amsl	Boring No.: MW-88d
Date Completed:	10/03/2019	Northing (NAD83):	2100555.9	
Drilling Co.:	Cascade	Easting (NAD83):	7614695.2	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	117.1 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Conductor Casing Diameter:	12 inches	Location: PG&E Topock, Needles, California
Driller Name:	John Colon	Drill Casing Diameter:	6 inches	
Drilling Asst:	L. Amaya / O. Floures	Drill Bit:	Cutting Shoe	Project Number: RC000753.0051
Tool-Pusher:	Arnold Lamon	Depth to First Water:	89.14 ft bgs	
Rig Geologist:	Chris Bonessi	Converted to Well:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	

Depth (ft)	Drilling Run and Average Penetration Rate	USCS Code	USCS Class	Casing Diameter	Description (See Pilot boring log for full geologic descriptions)	Drilling Notes	Drilling Fluid
41					yellowish brown (10YR 4/2)		
42		ML					
43							
44							
45		SM			(44.5 - 47.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); gray (2.5Y 5/1)		
46							
47		SM			(47.0 - 47.4') Topock - Alluvium Deposits; Silty sand with gravel (SM); grayish brown (10YR 5/2)		
48		NR			(47.4 - 48.5') No recovery (NR)		
49		SM			(48.5 - 49.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); grayish brown (10YR 5/2)		
50	(8.0 - 82.0) mins/ft			(8.0 - 82.0') 8.0" Steel Casing	(49.5 - 53.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown / moderate brown (5YR 4/4)		
51		SM					
52							
53							
54		SM			(53.0 - 57.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 5/3)		
55							
56							
57		SM			(57.0 - 57.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (10YR 5/3)		
58		NR			(57.5 - 58.5') No recovery (NR)		
59							
60		SM			(58.5 - 62.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 5/3)	(59.0 - 77.0') During advancement of the 7-inch core barrel, the core barrel kept hanging up. During the last attempt to advance the core barrel there was loud and violent	

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Date Started:	10/01/2019	Surface Elevation:	545.6 ft amsl	Boring No.: MW-88d
Date Completed:	10/03/2019	Northing (NAD83):	2100555.9	
Drilling Co.:	Cascade	Easting (NAD83):	7614695.2	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	117.1 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Conductor Casing Diameter:	12 inches	Location: PG&E Topock, Needles, California
Driller Name:	John Colon	Drill Casing Diameter:	6 inches	
Drilling Asst:	L. Amaya / O. Floures	Drill Bit:	Cutting Shoe	Project Number: RC000753.0051
Tool-Pusher:	Arnold Lamon	Depth to First Water:	89.14 ft bgs	
Rig Geologist:	Chris Bonessi	Converted to Well:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	

Depth (ft)	Drilling Run and Average Penetration Rate	USCS Code	USCS Class	Casing Diameter	Description (See Pilot boring log for full geologic descriptions)	Drilling Notes	Drilling Fluid
61		SM				chattering of the rig. During retrieve of the core barrel it was determined that approximately 19 feet of core barrel broke off down hole. Crew was able to retrieve the core barrel.	
62							
63		SW-SM			(62.0 - 64.5') Topock - Alluvium Deposits; Well graded sand with silt and gravel (SW-SM); brown (7.5YR 5/4)		
64							
65					(64.5 - 67.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 5/3)		
66		SM					
67		SM			(67.0 - 67.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); dark yellowish brown (10YR 4/4)		
68		NR			(67.5 - 68.5') No recovery (NR)		
69		GM			(68.5 - 69.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); grayish brown (2.5Y 5/2)		
70	(8.0 - 82.0) mins/ft			(8.0 - 82.0') 8.0" Steel Casing	(69.0 - 72.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); dark yellowish brown (10YR 4/4)		
71		SM					
72					(72.0 - 74.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); yellowish brown / moderate yellowish brown (10YR 5/4)		
73		SM					
74					(74.0 - 75.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 5/4)		
75		SM					
76		NR			(75.5 - 77.0') No recovery (NR)		
77		SM			(77.0 - 77.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); dark yellowish brown (10YR 4/4)	(77.0 - 82.0') Advanced 8-inch casing, inspected material from clean out run 77 to 82 feet bgs for well construction materials. Materials observed appeared to be native material, reddish brown fine to coarse grained sand and gravel, subangular to angular indicating that the borehole had walked off the hole. Pulled 8-inch casing and attempted to get back on borehole with 4-inch core barrel and 6-inch casing. At approximately 82 ft. hit resistance pulled core barrel and observed some filter pack with mostly native material. Clean out run from 82 to 87 ft bgs appeared to be undisturbed native material, reddish brown, stiff fine to	
78		NR			(77.5 - 78.5') No recovery (NR)		
79		SM			(78.5 - 83.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 5/4)		
80							

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Remarks: NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval, penetration rates where not documented during overdrill

Date Started:	10/01/2019	Surface Elevation:	545.6 ft amsl	Boring No.: MW-88d	
Date Completed:	10/03/2019	Northing (NAD83):	2100555.9		
Drilling Co.:	Cascade	Easting (NAD83):	7614695.2	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	117.1 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Conductor Casing Diameter:	12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	John Colon	Drill Casing Diameter:	6 inches		
Drilling Asst:	L. Amaya / O. Floures	Drill Bit:	Cutting Shoe	Project Number:	RC000753.0051
Tool-Pusher:	Arnold Lamon	Depth to First Water:	89.14 ft bgs		
Rig Geologist:	Chris Bonessi	Converted to Well:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		

Depth (ft)	Drilling Run and Average Penetration Rate	USCS Code	USCS Class	Casing Diameter	Description (See Pilot boring log for full geologic descriptions)	Drilling Notes	Drilling Fluid
81	(8.0 - 82.0) mins/ft	SM		(8.0 - 82.0') 8.0" Steel Casing		coarse sand, some silt. Determined that the borehole needed to be abandoned and will offset to drill new hole. After abandoning 82 to 87 ft bgs with bentonite, clean out run removed 7 ft of pvc casing.	
82							
83	(82.0 - 87.0) mins/ft	ML		(82.0 - 87.0') 4.0" Core Barrel			
84					(83.5 - 87.0') Topock - Alluvium Deposits; Sandy silt with gravel (ML); brown (10YR 5/3)		
85							
86							
87		SM			(87.0 - 87.4') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 5/4)		
88		NR			(87.4 - 88.5') No recovery (NR)		
89					(88.5 - 92.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 5/3)		
90		SM					
91							
92					(92.0 - 94.5') Topock - Alluvium Deposits; Sandy silt with gravel (ML); brown (7.5YR 5/2)		
93		ML					
94							
95					(94.5 - 97.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 5/3)		
96		SM					
97							
98		ML			(97.0 - 98.0') Topock - Alluvium Deposits; Sandy silt with gravel (ML); brown (10YR 4/3)		
99		NR			(98.0 - 98.5') No recovery (NR)		
100		SM			(98.5 - 101.8') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (10YR 5/3)		

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater

Remarks: NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval, penetration rates where not documented during overdrill

Date Started:	10/01/2019	Surface Elevation:	545.6 ft amsl	Boring No.: MW-88d
Date Completed:	10/03/2019	Northing (NAD83):	2100555.9	
Drilling Co.:	Cascade	Easting (NAD83):	7614695.2	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	117.1 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Conductor Casing Diameter:	12 inches	Location: PG&E Topock, Needles, California
Driller Name:	John Colon	Drill Casing Diameter:	6 inches	
Drilling Asst:	L. Amaya / O. Floures	Drill Bit:	Cutting Shoe	Project Number: RC000753.0051
Tool-Pusher:	Arnold Lamon	Depth to First Water:	89.14 ft bgs	
Rig Geologist:	Chris Bonessi	Converted to Well:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	

Depth (ft)	Drilling Run and Average Penetration Rate	USCS Code	USCS Class	Casing Diameter	Description (See Pilot boring log for full geologic descriptions)	Drilling Notes	Drilling Fluid
101		SM					
102					(101.8 - 110.0') Topock - Weathered Bedrock - conglomerate; Sandy silt with gravel (ML); reddish brown (5YR 5/4)		
103							
104							
105							
106		ML					
107							
108							
109							
110					(110.0 - 115.0') Topock - Competent Bedrock - conglomerate; reddish brown / moderate brown (5YR 4/4)		
111							
112							
113							
114							
115					(115.0 - 117.1') No recovery (NR)		
116		NR					
117							
End of Boring at 117.1 'bgs.							
118							
119							
120							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater

Remarks: NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval, penetration rates where not documented during overdrill

Date Started:	08/13/2019	Surface Elevation:	465.5 ft amsl	Well ID: MW-91-45, MW-91-120
Date Completed:	09/24/2019	Shallow Well Elevation:	465.5 ft amsl	
Drilling Co.:	Cascade	Deep Well Elevation:	465.4 ft amsl	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	2103782.1	Project: Final GW Remedy Phase 1
Driller Name:	Steve Vasquez	Easting (NAD83):	7616745.1	Location: PG&E Topock, Needles, California
Drilling Asst:	O. Flores / L. Amaya	Borehole Diameter:	10-12 inches	
Logger:	Anthony Mack	Water Level Start:	11.8 ft bgs	Project Number: RC000753.0051
Editor:	Grant Wilford	Development End Date:	11/20/2019	
Total Depth:	127 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
0					(0.0 - 24.2') 2" PVC Sch 40 Casing (+0.5 - 1.0') Concrete Pad		(+0.5 - 1.0') 24 bags Note: 30-inch Diameter Concrete Pad with 18-inch Diameter Lockable Vault, Quickcrete Concrete Mix with Buff dye
1							
2							
3							
4							
5							
6							
7							
8							
9							
10			NR		(3.0 - 17.1') Portland Cement 6% Bentonite (9.5 - 10.5') Centralizer		
11							
12							
13							
14	MW-X-VAS-12-17 (<0.033 U ppb) 6/25/2019 15:10						
15							
16							
17							
18			NR		(17.1 - 22.0') Bentonite seal chips	(17.1 - 22.0') 3.41 bags	(17.1 - 22.0') 4 bags (17%) Note: Puregold Medium Chips
19							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, groundwater data was collected from MW-91d

Date Started:	08/13/2019	Surface Elevation:	465.5 ft amsl	Well ID: MW-91-45, MW-91-120
Date Completed:	09/24/2019	Shallow Well Elevation:	465.5 ft amsl	
Drilling Co.:	Cascade	Deep Well Elevation:	465.4 ft amsl	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	2103782.1	Project: Final GW Remedy Phase 1
Driller Name:	Steve Vasquez	Easting (NAD83):	7616745.1	Location: PG&E Topock, Needles, California
Drilling Asst:	O. Flores / L. Amaya	Borehole Diameter:	10-12 inches	
Logger:	Anthony Mack	Water Level Start:	11.8 ft bgs	Project Number: RC000753.0051
Editor:	Grant Wilford	Development End Date:	11/20/2019	
Total Depth:	127 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
20					(0.0 - 24.2') 2" PVC Sch 40 Casing		
21					(17.1 - 22.0') Bentonite seal chips	(17.1 - 22.0') 3.41 bags	(17.1 - 22.0') 4 bags (17%) Note: Puregold Medium Chips
22							
23			NR				
24					(24.2 - 44.2') 2" Sch 40 PVC (20-slot) Screen		
25							
26							
27							
28							
29							
30					(17.0 - 127.0') 10.0" Borehole		
31					(22.0 - 48.5') Cemex #3 MESH (8x10)	(22.0 - 48.5') 26.5 bags	(22.0 - 48.5') 31 bags (17%) Note: Lapis Lustre Sand
32		Topock - Fill	SP				
33							
34	MW-X-VAS-32-37 (<0.033 U ppb) 6/26/2019 11:45						
35							
36							
37		Topock - Fluvial Deposits	SW				
38							
39							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, groundwater data was collected from MW-91d

Date Started:	08/13/2019	Surface Elevation:	465.5 ft amsl	Well ID: MW-91-45, MW-91-120
Date Completed:	09/24/2019	Shallow Well Elevation:	465.5 ft amsl	
Drilling Co.:	Cascade	Deep Well Elevation:	465.4 ft amsl	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	2103782.1	Project: Final GW Remedy Phase 1
Driller Name:	Steve Vasquez	Easting (NAD83):	7616745.1	Location: PG&E Topock, Needles, California
Drilling Asst:	O. Flores / L. Amaya	Borehole Diameter:	10-12 inches	
Logger:	Anthony Mack	Water Level Start:	11.8 ft bgs	Project Number: RC000753.0051
Editor:	Grant Wilford	Development End Date:	11/20/2019	
Total Depth:	127 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
40					(24.2 - 44.2') 2" Sch 40 PVC (20-slot) Screen		
41							
42							
43		Topock - Fluvial Deposits	SW				
44					(22.0 - 48.5') Cemex #3 MESH (8x10)	(22.0 - 48.5') 26.5 bags	(22.0 - 48.5') 31 bags (17%) Note: Lapis Lustre Sand
45					(44.2 - 46.5') Sump and End Cap		
46					(45.5 - 46.5') Centralizer		
47		Topock - Fluvial Deposits	GW				
48							
49							
50							
51							
52							
53			NR				
54					(48.5 - 96.4') Bentonite seal chips	(48.5 - 96.4') 34.8 bags	(48.5 - 96.4') 37 bags (6%) Note: Puregold Medium Chips
55							
56							
57							
58							
59							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, groundwater data was collected from MW-91d

Date Started:	08/13/2019	Surface Elevation:	465.5 ft amsl	Well ID: MW-91-45, MW-91-120
Date Completed:	09/24/2019	Shallow Well Elevation:	465.5 ft amsl	
Drilling Co.:	Cascade	Deep Well Elevation:	465.4 ft amsl	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	2103782.1	Project: Final GW Remedy Phase 1
Driller Name:	Steve Vasquez	Easting (NAD83):	7616745.1	Location: PG&E Topock, Needles, California
Drilling Asst:	O. Flores / L. Amaya	Borehole Diameter:	10-12 inches	
Logger:	Anthony Mack	Water Level Start:	11.8 ft bgs	Project Number: RC000753.0051
Editor:	Grant Wilford	Development End Date:	11/20/2019	
Total Depth:	127 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
60					(0.1 - 99.8') 2" PVC Sch 40 Casing		
61							
62							
63							
64							
65							
66							
67							
68							
69							
70			NR		(48.5 - 96.4') Bentonite seal chips	(17.0 - 127.0') 10.0" Borehole	(48.5 - 96.4') 34.8 bags
71							(48.5 - 96.4') 37 bags (6%) Note: Puregold Medium Chips
72							
73	MW-X-VAS-71-76 (<0.033 U ppb) 6/27/2019 08:52						
74							
75							
76							
77							
78							
79							

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Date Started:	08/13/2019	Surface Elevation:	465.5 ft amsl	Well ID: MW-91-45, MW-91-120
Date Completed:	09/24/2019	Shallow Well Elevation:	465.5 ft amsl	
Drilling Co.:	Cascade	Deep Well Elevation:	465.4 ft amsl	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	2103782.1	Project: Final GW Remedy Phase 1
Driller Name:	Steve Vasquez	Easting (NAD83):	7616745.1	Location: PG&E Topock, Needles, California
Drilling Asst:	O. Flores / L. Amaya	Borehole Diameter:	10-12 inches	
Logger:	Anthony Mack	Water Level Start:	11.8 ft bgs	Project Number: RC000753.0051
Editor:	Grant Wilford	Development End Date:	11/20/2019	
Total Depth:	127 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
80					(0.1 - 99.8') 2" PVC Sch 40 Casing		
81							
82							
83							
84							
85					(84.5 - 85.5') Centralizer		
86							
87							
88			NR		(48.5 - 96.4') Bentonite seal chips	(48.5 - 96.4') 34.8 bags	(48.5 - 96.4') 37 bags (6%) Note: Puregold Medium Chips
89							
90					(17.0 - 127.0') 10.0" Borehole		
91							
92							
93							
94							
95							
96							
97							
98		Topock - Fluvial Deposits	SW		(96.4 - 124.0') Cemex #3 MESH (8x10)	(96.4 - 124.0') 29 bags	(96.4 - 124.0') 35 bags (21%) Note: Lapis Lustre Sand, used >20% of the calculated volume due to potential voids forming during flushing of the casing
99							


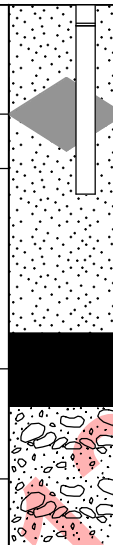

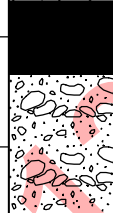
Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, groundwater data was collected from MW-91d

Date Started:	08/13/2019	Surface Elevation:	465.5 ft amsl	Well ID: MW-91-45, MW-91-120
Date Completed:	09/24/2019	Shallow Well Elevation:	465.5 ft amsl	
Drilling Co.:	Cascade	Deep Well Elevation:	465.4 ft amsl	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	2103782.1	Project: Final GW Remedy Phase 1
Driller Name:	Steve Vasquez	Easting (NAD83):	7616745.1	Location: PG&E Topock, Needles, California
Drilling Asst:	O. Flores / L. Amaya	Borehole Diameter:	10-12 inches	
Logger:	Anthony Mack	Water Level Start:	11.8 ft bgs	Project Number: RC000753.0051
Editor:	Grant Wilford	Development End Date:	11/20/2019	
Total Depth:	127 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
100							
101							
102							
103		Topock - Fluvial Deposits	SW				
104							
105							
106							
107		Topock - Fluvial Deposits	GW				
108							
109	MW-X-VAS-107-112 (<0.033 U ppb) 6/27/2019 15:04	Topock - Fluvial Deposits	SM		(96.4 - 124.0') Cemex #3 MESH (8x10)		
110							
111							
112							
113							
114	MW-X-VAS-112-117 (<0.033 U ppb) 6/28/2019 09:56	Topock - Fluvial Deposits	GW				
115							
116							
117		Topock - Alluvium Deposits	GW-GM				
118							
119		Topock - Alluvium Deposits	SM				

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Date Started:	08/13/2019	Surface Elevation:	465.5 ft amsl	Well ID: MW-91-45, MW-91-120
Date Completed:	09/24/2019	Shallow Well Elevation:	465.5 ft amsl	
Drilling Co.:	Cascade	Deep Well Elevation:	465.4 ft amsl	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	2103782.1	Project: Final GW Remedy Phase 1
Driller Name:	Steve Vasquez	Easting (NAD83):	7616745.1	Location: PG&E Topock, Needles, California
Drilling Asst:	O. Flores / L. Amaya	Borehole Diameter:	10-12 inches	
Logger:	Anthony Mack	Water Level Start:	11.8 ft bgs	Project Number: RC000753.0051
Editor:	Grant Wilford	Development End Date:	11/20/2019	
Total Depth:	127 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction			Calculated Material Volumes	Material Volumes Installed
120		Topock - Alluvium Deposits	SM			(120.5 - 121.5') Centralizer (96.4 - 124.0') Cemex #3 MESH (8x10)	(119.8 - 122.1') Sump and End Cap (17.0 - 127.0') 10.0" Borehole	(96.4 - 124.0') 29 bags	(96.4 - 124.0') 35 bags (21%) Note: Lapis Lustre Sand, used >20% of the calculated volume due to potential voids forming during flushing of the casing
121									
122									
123									
124			NR			(124.0 - 125.0') Bentonite seal chips (125.0 - 127.0') Slough		(124.0 - 125.0') 0.8 bags	(124.0 - 125.0') 1 bags (25%) Note: Puregold Medium Chips, used >20% of the calculated volume due to potential voids forming during flushing of the casing
125									
126									
127									
End of Boring at 127.0' bgs.									
128									
129									
130									
131									
132									
133									
134									
135									
136									
137									
138									
139									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, groundwater data was collected from MW-91d

Date Started: 07/31/2019	Surface Elevation: 465.4 ft amsl	Well ID: MW-91-170, MW-91-320
Date Completed: 09/23/2019	Shallow Well Elevation: 465.4 ft amsl	
Drilling Co.: Cascade	Deep Well Elevation: 465.3 ft amsl	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): 2103798.1	Project: Final GW Remedy Phase 1
Driller Name: E. Ramos / S. Vasquez	Easting (NAD83): 7616739.7	Location: PG&E Topock, Needles, California
Drilling Asst: O. Flores / L. Amaya	Borehole Diameter: 6-12 inches	
Logger: GJ / SM / CS / DC / AM	Water Level Start: 10.5 ft bgs	Project Number: RC000753.0051
Editor: Grant Willford	Development End Date: 11/23/2019	
Total Depth: 417 ft bgs	Well Completion: <input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
0					(0.0 - 150.8') 2" PVC Sch 80 Casing		(+0.5 - 1.0') 22 bags Note: 30-inch Diameter Concrete Pad with 18-inch Diameter Lockable Vault, Quickcrete Concrete Mix with Buff dye
1					(+0.5 - 1.0') Concrete Pad		
2							
3					(2.2 - 5.0') Bentonite seal chips	(2.2 - 5.0') 2.92	(2.2 - 5.0') 7 (140%) Note: Puregold Medium Chips, installed due to void and heat of hydration concerns, installed >20% of calculated volume to fill void
4							
5							
6		Topock - Fill	SP				
7							
8							
9							
10					(0.0 - 42.0') 12.0" Borehole		
11					(5.0 - 16.9') Portland Cement 6% Bentonite	(5.0 - 16.9') 66 gallons	(5.0 - 16.9') 100 gallons (52%) Note: Type I, II and V and Benseal, used >20% of the calculated volume due to potential voids forming during flushing of the 10-inch casing
12							
13							
14	MW-X-VAS-12-17 (<0.033 U ppb) 6/25/2019 15:10						
15			NR				
16							
17							
18					(16.9 - 118.2') Bentonite seal chips	(16.9 - 118.2') 78.93 bags	(16.9 - 118.2') 77 bags (-2%) Note: Puregold Medium Chips
19		Topock - Fill	SW				

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery

Date Started:	07/31/2019	Surface Elevation:	465.4 ft amsl	Well ID: MW-91-170, MW-91-320
Date Completed:	09/23/2019	Shallow Well Elevation:	465.4 ft amsl	
Drilling Co.:	Cascade	Deep Well Elevation:	465.3 ft amsl	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	2103798.1	Project: Final GW Remedy Phase 1
Driller Name:	E. Ramos / S. Vasquez	Easting (NAD83):	7616739.7	Location: PG&E Topock, Needles, California
Drilling Asst:	O. Flores / L. Amaya	Borehole Diameter:	6-12 inches	
Logger:	GJ / SM / CS / DC / AM	Water Level Start:	10.5 ft bgs	Project Number: RC000753.0051
Editor:	Grant Willford	Development End Date:	11/23/2019	
Total Depth:	417 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
20					(19.5 - 20.5') Centralizer		
21					(0.0 - 150.8') 2" PVC Sch 80 Casing		
22							
23							
24							
25							
26							
27							
28		Topock - Fill	SW				
29							
30					(16.9 - 118.2') Bentonite seal chips	(0.0 - 42.0') 12.0" Borehole	(16.9 - 118.2') 78.93 bags
31							(16.9 - 118.2') 77 bags (-2%) Note: Puregold Medium Chips
32							
33	MW-X-VAS-32-37 (<0.033 U ppb) 6/26/2019 11:45						
34							
35							
36							
37		Topock - Fluvial Deposits	SW				
38							
39							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery

Date Started: 07/31/2019	Surface Elevation: 465.4 ft amsl	Well ID: MW-91-170, MW-91-320
Date Completed: 09/23/2019	Shallow Well Elevation: 465.4 ft amsl	
Drilling Co.: Cascade	Deep Well Elevation: 465.3 ft amsl	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): 2103798.1	Project: Final GW Remedy Phase 1
Driller Name: E. Ramos / S. Vasquez	Easting (NAD83): 7616739.7	Location: PG&E Topock, Needles, California
Drilling Asst: O. Flores / L. Amaya	Borehole Diameter: 6-12 inches	
Logger: GJ / SM / CS / DC / AM	Water Level Start: 10.5 ft bgs	Project Number: RC000753.0051
Editor: Grant Willford	Development End Date: 11/23/2019	
Total Depth: 417 ft bgs	Well Completion: <input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
40			SW		(0.0 - 150.8') 2" PVC Sch 80 Casing		
41						(0.1 - 300.8') 2" PVC Sch 80 Casing	
42						(0.0 - 42.0') 12.0" Borehole	
43							
44			NR				
45							
46							
47							
48		Topock - Fluvial Deposits	SW				
49		Topock - Fluvial Deposits	GW		(16.9 - 118.2') Bentonite seal chips	(16.9 - 118.2') 78.93 bags	(16.9 - 118.2') 77 bags (-2%) Note: Puregold Medium Chips
50							
51		Topock - Fluvial Deposits	SW			(42.0 - 324.0') 10.0" Borehole	
52							
53							
54							
55		Topock - Fluvial Deposits	SP				
56							
57							
58		Topock - Fluvial Deposits	SW				
59							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery

Date Started:	07/31/2019	Surface Elevation:	465.4 ft amsl	Well ID: MW-91-170, MW-91-320
Date Completed:	09/23/2019	Shallow Well Elevation:	465.4 ft amsl	
Drilling Co.:	Cascade	Deep Well Elevation:	465.3 ft amsl	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	2103798.1	Project: Final GW Remedy Phase 1
Driller Name:	E. Ramos / S. Vasquez	Easting (NAD83):	7616739.7	Location: PG&E Topock, Needles, California
Drilling Asst:	O. Flores / L. Amaya	Borehole Diameter:	6-12 inches	
Logger:	GJ / SM / CS / DC / AM	Water Level Start:	10.5 ft bgs	Project Number: RC000753.0051
Editor:	Grant Willford	Development End Date:	11/23/2019	
Total Depth:	417 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
60					(0.0 - 150.8') 2" PVC Sch 80 Casing		
61		Topock - Fluvial Deposits	SW				
62							
63		Topock - Fluvial Deposits	SP				
64							
65							
66							
67							
68							
69		Topock - Fluvial Deposits	SW		(16.9 - 118.2') Bentonite seal chips		
70					(69.5 - 70.5') Centralizer	(42.0 - 324.0') 10.0" Borehole	(16.9 - 118.2') 78.93 bags
71							(16.9 - 118.2') 77 bags (-2%) Note: Puregold Medium Chips
72							
73	MW-X-VAS-71-76 (<0.033 U ppb) 6/27/2019 08:52						
74							
75							
76		Topock - Fluvial Deposits	SP				
77							
78		Topock - Fluvial Deposits	SW				
79							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery

Date Started:	07/31/2019	Surface Elevation:	465.4 ft amsl	Well ID: MW-91-170, MW-91-320
Date Completed:	09/23/2019	Shallow Well Elevation:	465.4 ft amsl	
Drilling Co.:	Cascade	Deep Well Elevation:	465.3 ft amsl	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	2103798.1	Project: Final GW Remedy Phase 1
Driller Name:	E. Ramos / S. Vasquez	Easting (NAD83):	7616739.7	Location: PG&E Topock, Needles, California
Drilling Asst:	O. Flores / L. Amaya	Borehole Diameter:	6-12 inches	
Logger:	GJ / SM / CS / DC / AM	Water Level Start:	10.5 ft bgs	Project Number: RC000753.0051
Editor:	Grant Willford	Development End Date:	11/23/2019	
Total Depth:	417 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
80					(0.0 - 150.8') 2" PVC Sch 80 Casing		
81		Topock - Fluvial Deposits	SW				
82							
83							
84		Topock - Fluvial Deposits	SW				
85							
86							
87							
88		Topock - Fluvial Deposits	SW-SM				
89							
90					(16.9 - 118.2') Bentonite seal chips	(42.0 - 324.0') 10.0" Borehole	(16.9 - 118.2') 78.93 bags
91							
92							
93		Topock - Fluvial Deposits	GW-GM				
94		Topock - Fluvial Deposits	SP				
95		Topock - Fluvial Deposits	SW				
96							
97			NR				
98		Topock - Fluvial Deposits	SW				
99							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery

Date Started:	07/31/2019	Surface Elevation:	465.4 ft amsl	Well ID: MW-91-170, MW-91-320
Date Completed:	09/23/2019	Shallow Well Elevation:	465.4 ft amsl	
Drilling Co.:	Cascade	Deep Well Elevation:	465.3 ft amsl	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	2103798.1	Project: Final GW Remedy Phase 1
Driller Name:	E. Ramos / S. Vasquez	Easting (NAD83):	7616739.7	Location: PG&E Topock, Needles, California
Drilling Asst:	O. Flores / L. Amaya	Borehole Diameter:	6-12 inches	
Logger:	GJ / SM / CS / DC / AM	Water Level Start:	10.5 ft bgs	Project Number: RC000753.0051
Editor:	Grant Willford	Development End Date:	11/23/2019	
Total Depth:	417 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
100					(0.0 - 150.8') 2" PVC Sch 80 Casing		
101							
102		Topock - Fluvial Deposits	SW				
103							
104		Topock - Fluvial Deposits	SW				
105							
106		Topock - Fluvial Deposits	SW				
107							
108		Topock - Fluvial Deposits	GW				
109	MW-X-VAS-107-112 (<0.033 U ppb) 6/27/2019 15:04	Topock - Fluvial Deposits	SM		(16.9 - 118.2') Bentonite seal chips	(16.9 - 118.2') 78.93 bags	(16.9 - 118.2') 77 bags (-2%) Note: Puregold Medium Chips
110							
111							
112							
113		Topock - Fluvial Deposits	GW				
114	MW-X-VAS-112-117 (<0.033 U ppb) 6/28/2019 09:56	Topock - Fluvial Deposits	SM		(42.0 - 324.0') 10.0" Borehole		
115							
116							
117							
118		Topock - Alluvium Deposits	SM				
119					(118.2 - 146.8') Bentonite seal pellets	(118.2 - 146.8') 22.9 buckets	(118.2 - 146.8') 25 buckets (9%) Note: Pel-Plug (TR30) 3/8"

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery

Date Started: 07/31/2019	Surface Elevation: 465.4 ft amsl	Well ID: MW-91-170, MW-91-320
Date Completed: 09/23/2019	Shallow Well Elevation: 465.4 ft amsl	
Drilling Co.: Cascade	Deep Well Elevation: 465.3 ft amsl	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): 2103798.1	Project: Final GW Remedy Phase 1
Driller Name: E. Ramos / S. Vasquez	Easting (NAD83): 7616739.7	Location: PG&E Topock, Needles, California
Drilling Asst: O. Flores / L. Amaya	Borehole Diameter: 6-12 inches	
Logger: GJ / SM / CS / DC / AM	Water Level Start: 10.5 ft bgs	Project Number: RC000753.0051
Editor: Grant Willford	Development End Date: 11/23/2019	
Total Depth: 417 ft bgs	Well Completion: <input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
120					(119.5 - 120.5') Centralizer		
121					(0.0 - 150.8') 2" PVC Sch 80 Casing		
122							
123							
124							
125							
126							
127							
128							
129		Topock - Alluvium Deposits	SM		(118.2 - 146.8') Bentonite seal pellets	(42.0 - 324.0') 10.0" Borehole	(118.2 - 146.8') 22.9 buckets
130							(118.2 - 146.8') 25 buckets (9%) Note: Pel-Plug (TR30) 3/8"
131							
132							
133							
134							
135							
136							
137							
138							
139							

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Date Started:	07/31/2019	Surface Elevation:	465.4 ft amsl	Well ID: MW-91-170, MW-91-320
Date Completed:	09/23/2019	Shallow Well Elevation:	465.4 ft amsl	
Drilling Co.:	Cascade	Deep Well Elevation:	465.3 ft amsl	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	2103798.1	Project: Final GW Remedy Phase 1
Driller Name:	E. Ramos / S. Vasquez	Easting (NAD83):	7616739.7	Location: PG&E Topock, Needles, California
Drilling Asst:	O. Flores / L. Amaya	Borehole Diameter:	6-12 inches	
Logger:	GJ / SM / CS / DC / AM	Water Level Start:	10.5 ft bgs	Project Number: RC000753.0051
Editor:	Grant Willford	Development End Date:	11/23/2019	
Total Depth:	417 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
140					(0.0 - 150.8') 2" PVC Sch 80 Casing		
141							
142							
143					(118.2 - 146.8') Bentonite seal pellets	(118.2 - 146.8') 22.9 buckets	(118.2 - 146.8') 25 buckets (9%) Note: Pel-Plug (TR30) 3/8"
144							
145							
146							
147							
148		Topock - Alluvium Deposits	SM				
149							
150							
151					(150.8 - 170.8') 2" Sch 80 PVC (20-slot) Screen		
152							
153					(146.8 - 174.0') Cemex #3 MESH (8x10)	(146.8 - 174.0') 26.6 bags	(146.8 - 174.0') 34 bags (28%) Note: Lapis Lustre Sand
154	MW-X-VAS-152-157 (<0.17 U ppb) 6/29/2019 09:19						
155							
156							
157							
158			NR				
159							











Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery

Date Started:	07/31/2019	Surface Elevation:	465.4 ft amsl	Well ID: MW-91-170, MW-91-320
Date Completed:	09/23/2019	Shallow Well Elevation:	465.4 ft amsl	
Drilling Co.:	Cascade	Deep Well Elevation:	465.3 ft amsl	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	2103798.1	Project: Final GW Remedy Phase 1
Driller Name:	E. Ramos / S. Vasquez	Easting (NAD83):	7616739.7	Location: PG&E Topock, Needles, California
Drilling Asst:	O. Flores / L. Amaya	Borehole Diameter:	6-12 inches	
Logger:	GJ / SM / CS / DC / AM	Water Level Start:	10.5 ft bgs	Project Number: RC000753.0051
Editor:	Grant Willford	Development End Date:	11/23/2019	
Total Depth:	417 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
160			NR		(150.8 - 170.8') 2" Sch 80 PVC (20-slot) Screen		
161							
162							
163							
164		Topock - Alluvium Deposits	CL				
165							
166							
167					(146.8 - 174.0') Cemex #3 MESH (8x10)	(146.8 - 174.0') 26.6 bags	(146.8 - 174.0') 34 bags (28%) Note: Lapis Lustre Sand
168							
169							
170		Topock - Alluvium Deposits	CL				
171							
172					(170.5 - 172.0') Centralizer		
173					(170.8 - 173.2') Sump and End Cap		
174							
175		Topock - Alluvium Deposits	SM				
176							
177		Topock - Alluvium Deposits	GP		(174.0 - 297.4') Bentonite seal pellets	(174.0 - 297.4') 103.3 buckets	(174.0 - 297.4') 119 buckets (15%) Note: Pel-Plug (TR30) 3/8"
178			NR				
179							





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Date Started:	07/31/2019	Surface Elevation:	465.4 ft amsl	Well ID: MW-91-170, MW-91-320
Date Completed:	09/23/2019	Shallow Well Elevation:	465.4 ft amsl	
Drilling Co.:	Cascade	Deep Well Elevation:	465.3 ft amsl	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	2103798.1	Project: Final GW Remedy Phase 1
Driller Name:	E. Ramos / S. Vasquez	Easting (NAD83):	7616739.7	Location: PG&E Topock, Needles, California
Drilling Asst:	O. Flores / L. Amaya	Borehole Diameter:	6-12 inches	
Logger:	GJ / SM / CS / DC / AM	Water Level Start:	10.5 ft bgs	Project Number: RC000753.0051
Editor:	Grant Willford	Development End Date:	11/23/2019	
Total Depth:	417 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
180			NR		(0.1 - 300.8') 2" PVC Sch 80 Casing		
181							
182							
183							
184	MW-X-VAS-182-187 (<0.17 U ppb) 6/29/2019 15:28	Topock - Alluvium Deposits	SM				
185							
186							
187		Topock - Alluvium Deposits	SC				
188		Topock - Alluvium Deposits	ML				
189		Topock - Alluvium Deposits	SM				
190		Topock - Alluvium Deposits	CL				
191		Topock - Alluvium Deposits	MH				
192		Topock - Alluvium Deposits					
193							
194		Topock - Alluvium Deposits	ML				
195							
196							
197							
198		Topock - Alluvium Deposits	ML				
199			CL				

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Date Started:	07/31/2019	Surface Elevation:	465.4 ft amsl	Well ID: MW-91-170, MW-91-320
Date Completed:	09/23/2019	Shallow Well Elevation:	465.4 ft amsl	
Drilling Co.:	Cascade	Deep Well Elevation:	465.3 ft amsl	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	2103798.1	Project: Final GW Remedy Phase 1
Driller Name:	E. Ramos / S. Vasquez	Easting (NAD83):	7616739.7	Location: PG&E Topock, Needles, California
Drilling Asst:	O. Flores / L. Amaya	Borehole Diameter:	6-12 inches	
Logger:	GJ / SM / CS / DC / AM	Water Level Start:	10.5 ft bgs	Project Number: RC000753.0051
Editor:	Grant Willford	Development End Date:	11/23/2019	
Total Depth:	417 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction		Calculated Material Volumes	Material Volumes Installed	
200		Topock - Alluvium Deposits	CL				(0.1 - 300.8') 2" PVC Sch 80 Casing		
201									
202		Topock - Alluvium Deposits	SM				(174.0 - 297.4') 10.0" Borehole	(174.0 - 297.4') 103.3 buckets	(174.0 - 297.4') 119 buckets (15%) Note: Pel-Plug (TR30) 3/8"
203									
204									
205									
206									
207									
208									
209	MW-X-VAS-207-212 (<0.17 U ppb) 6/30/2019 13:28								
210									
211									
212									
213									
214									
215									
216									
217									
218									
219									

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Date Started:	07/31/2019	Surface Elevation:	465.4 ft amsl	Well ID: MW-91-170, MW-91-320
Date Completed:	09/23/2019	Shallow Well Elevation:	465.4 ft amsl	
Drilling Co.:	Cascade	Deep Well Elevation:	465.3 ft amsl	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	2103798.1	Project: Final GW Remedy Phase 1
Driller Name:	E. Ramos / S. Vasquez	Easting (NAD83):	7616739.7	Location: PG&E Topock, Needles, California
Drilling Asst:	O. Flores / L. Amaya	Borehole Diameter:	6-12 inches	
Logger:	GJ / SM / CS / DC / AM	Water Level Start:	10.5 ft bgs	Project Number: RC000753.0051
Editor:	Grant Willford	Development End Date:	11/23/2019	
Total Depth:	417 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
220					(0.1 - 300.8') 2" PVC Sch 80 Casing		
221							
222							
223		Topock - Alluvium Deposits	SM				
224							
225							
226							
227							
228					(174.0 - 297.4') Bentonite seal pellets		
229							
230					(229.5 - 230.5') Centralizer		
231							
232							
233		Topock - Alluvium Deposits	SM				
234							
235							
236							
237							
238							
239							
					(42.0 - 324.0') 10.0" Borehole	(174.0 - 297.4') 103.3 buckets	(174.0 - 297.4') 119 buckets (15%) Note: Pel-Plug (TR30) 3/8"

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery

Date Started:	07/31/2019	Surface Elevation:	465.4 ft amsl	Well ID: MW-91-170, MW-91-320
Date Completed:	09/23/2019	Shallow Well Elevation:	465.4 ft amsl	
Drilling Co.:	Cascade	Deep Well Elevation:	465.3 ft amsl	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	2103798.1	Project: Final GW Remedy Phase 1
Driller Name:	E. Ramos / S. Vasquez	Easting (NAD83):	7616739.7	Location: PG&E Topock, Needles, California
Drilling Asst:	O. Flores / L. Amaya	Borehole Diameter:	6-12 inches	
Logger:	GJ / SM / CS / DC / AM	Water Level Start:	10.5 ft bgs	Project Number: RC000753.0051
Editor:	Grant Willford	Development End Date:	11/23/2019	
Total Depth:	417 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
240			SM		(0.1 - 300.8') 2" PVC Sch 80 Casing		
241							
242							
243		Topock - Alluvium Deposits	SM				
244							
245							
246							
247	MW-X-VAS-245-255 (<0.033 U ppb) 7/1/2019 13:35						
248							
249							
250		Topock - Alluvium Deposits	SM		(174.0 - 297.4') Bentonite seal pellets	(42.0 - 324.0') 10.0" Borehole	(174.0 - 297.4') 103.3 buckets
251							(174.0 - 297.4') 119 buckets (15%) Note: Pel-Plug (TR30) 3/8"
252							
253							
254							
255							
256		Topock - Alluvium Deposits	SM				
257							
258							
259							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery

Date Started:	07/31/2019	Surface Elevation:	465.4 ft amsl	Well ID: MW-91-170, MW-91-320
Date Completed:	09/23/2019	Shallow Well Elevation:	465.4 ft amsl	
Drilling Co.:	Cascade	Deep Well Elevation:	465.3 ft amsl	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	2103798.1	Project: Final GW Remedy Phase 1
Driller Name:	E. Ramos / S. Vasquez	Easting (NAD83):	7616739.7	Location: PG&E Topock, Needles, California
Drilling Asst:	O. Flores / L. Amaya	Borehole Diameter:	6-12 inches	
Logger:	GJ / SM / CS / DC / AM	Water Level Start:	10.5 ft bgs	Project Number: RC000753.0051
Editor:	Grant Willford	Development End Date:	11/23/2019	
Total Depth:	417 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
260					(0.1 - 300.8') 2" PVC Sch 80 Casing		
261							
262							
263							
264		Topock - Alluvium Deposits	SM				
265							
266							
267							
268					(174.0 - 297.4') Bentonite seal pellets		
269							
270					(269.5 - 270.5') Centralizer		
271							
272							
273							
274		Topock - Alluvium Deposits	SM				
275							
276							
277							
278							
279							
					(42.0 - 324.0') 10.0" Borehole	(174.0 - 297.4') 103.3 buckets	(174.0 - 297.4') 119 buckets (15%) Note: Pel-Plug (TR30) 3/8"

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery

Date Started:	07/31/2019	Surface Elevation:	465.4 ft amsl	Well ID: MW-91-170, MW-91-320
Date Completed:	09/23/2019	Shallow Well Elevation:	465.4 ft amsl	
Drilling Co.:	Cascade	Deep Well Elevation:	465.3 ft amsl	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	2103798.1	Project: Final GW Remedy Phase 1
Driller Name:	E. Ramos / S. Vasquez	Easting (NAD83):	7616739.7	Location: PG&E Topock, Needles, California
Drilling Asst:	O. Flores / L. Amaya	Borehole Diameter:	6-12 inches	
Logger:	GJ / SM / CS / DC / AM	Water Level Start:	10.5 ft bgs	Project Number: RC000753.0051
Editor:	Grant Willford	Development End Date:	11/23/2019	
Total Depth:	417 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
280					(0.1 - 300.8') 2" PVC Sch 80 Casing		
281							
282							
283							
284							
285							
286							
287							
288							
289					(174.0 - 297.4') Bentonite seal pellets	(174.0 - 297.4') 103.3 buckets	(174.0 - 297.4') 119 buckets (15%) Note: Pel-Plug (TR30) 3/8"
290		Topock - Alluvium Deposits	SM		(42.0 - 324.0') 10.0" Borehole		
291							
292							
293							
294	MW-X-VAS-292-297 (<0.17 U ppb) 7/2/2019 14:45						
295							
296							
297							
298					(297.4 - 324.0') Cemex #3 MESH (8x10)	(297.4 - 324.0') 28 bags	(297.4 - 324.0') 33 bags (18%) Note: Lapis Lustre Sand
299							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery

Date Started:	07/31/2019	Surface Elevation:	465.4 ft amsl	Well ID: MW-91-170, MW-91-320
Date Completed:	09/23/2019	Shallow Well Elevation:	465.4 ft amsl	
Drilling Co.:	Cascade	Deep Well Elevation:	465.3 ft amsl	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	2103798.1	Project: Final GW Remedy Phase 1
Driller Name:	E. Ramos / S. Vasquez	Easting (NAD83):	7616739.7	Location: PG&E Topock, Needles, California
Drilling Asst:	O. Flores / L. Amaya	Borehole Diameter:	6-12 inches	
Logger:	GJ / SM / CS / DC / AM	Water Level Start:	10.5 ft bgs	Project Number: RC000753.0051
Editor:	Grant Willford	Development End Date:	11/23/2019	
Total Depth:	417 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
300					(0.1 - 300.8') 2" PVC Sch 80 Casing		
301					(300.8 - 320.8') 2" Sch 80 PVC (20-slot) Screen		
302							
303							
304							
305							
306							
307							
308							
309		Topock - Alluvium Deposits	SM		(297.4 - 324.0') Cemex #3 MESH (8x10)	(297.4 - 324.0') 28 bags	(297.4 - 324.0') 33 bags (18%) Note: Lapis Lustre Sand
310					(42.0 - 324.0') 10.0" Borehole		
311							
312							
313							
314							
315							
316							
317							
318							
319							


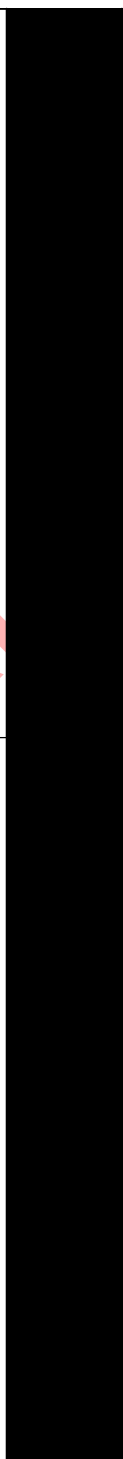






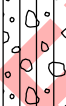

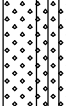

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Date Started:	07/31/2019	Surface Elevation:	465.4 ft amsl	Well ID: MW-91-170, MW-91-320
Date Completed:	09/23/2019	Shallow Well Elevation:	465.4 ft amsl	
Drilling Co.:	Cascade	Deep Well Elevation:	465.3 ft amsl	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	2103798.1	Project: Final GW Remedy Phase 1
Driller Name:	E. Ramos / S. Vasquez	Easting (NAD83):	7616739.7	Location: PG&E Topock, Needles, California
Drilling Asst:	O. Flores / L. Amaya	Borehole Diameter:	6-12 inches	
Logger:	GJ / SM / CS / DC / AM	Water Level Start:	10.5 ft bgs	Project Number: RC000753.0051
Editor:	Grant Willford	Development End Date:	11/23/2019	
Total Depth:	417 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
320							
321							
322							
323		Topock - Alluvium Deposits	SM		(300.8 - 320.8') 2" Sch 80 PVC (20-slot) Screen (320.5 - 321.5') Centralizer (297.4 - 324.0') Cemex #3 MESH (8x10) (42.0 - 324.0') 10.0" Borehole (320.8 - 323.2') Sump and End Cap	(297.4 - 324.0') 28 bags	(297.4 - 324.0') 33 bags (18%) Note: Lapis Lustre Sand
324							
325							
326							
327							
328		Topock - Alluvium Deposits	MH				
329		Topock - Alluvium Deposits	SM				
330							
331							
332		Topock - Alluvium Deposits	MH		(324.0 - 417.0') Bentonite seal chips	(324.0 - 414.0') 6.0" Borehole	(324.0 - 417.0') 24.9 bags (324.0 - 417.0') 34 bags (37%) Note: Puregold Medium Chips, used >20% of the calculated volume due to potential voids that formed during drilling
333							
334							
335							
336		Topock - Alluvium Deposits	MH				
337							
338	MW-X-VAS-337-342 (<0.17 U ppb) 7/11/2019 11:30	Topock - Alluvium Deposits	ML				
339		Topock - Alluvium Deposits	ML				

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Date Started:	07/31/2019	Surface Elevation:	465.4 ft amsl	Well ID: MW-91-170, MW-91-320
Date Completed:	09/23/2019	Shallow Well Elevation:	465.4 ft amsl	
Drilling Co.:	Cascade	Deep Well Elevation:	465.3 ft amsl	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	2103798.1	Project: Final GW Remedy Phase 1
Driller Name:	E. Ramos / S. Vasquez	Easting (NAD83):	7616739.7	Location: PG&E Topock, Needles, California
Drilling Asst:	O. Flores / L. Amaya	Borehole Diameter:	6-12 inches	
Logger:	GJ / SM / CS / DC / AM	Water Level Start:	10.5 ft bgs	Project Number: RC000753.0051
Editor:	Grant Willford	Development End Date:	11/23/2019	
Total Depth:	417 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
340	MW-X-VAS-337-342 (<0.17 U ppb) 7/11/2019 11:30	Topock - Alluvium Deposits	ML				
341		Topock - Alluvium Deposits	GM				
342		Topock - Alluvium Deposits	SM				
343		Topock - Alluvium Deposits	ML				
344		Topock - Alluvium Deposits	ML				
345		Topock - Alluvium Deposits	MH				
346		Topock - Alluvium Deposits	ML				
347		Topock - Alluvium Deposits	SW-SM				
348		Topock - Weathered Bedrock - conglomerate	MH				
349		Topock - Weathered Bedrock - conglomerate	ML				
350			ML				
351							
352							
353							
354							
355							
356							
357							
358							
359							

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Date Started:	07/31/2019	Surface Elevation:	465.4 ft amsl	Well ID: MW-91-170, MW-91-320
Date Completed:	09/23/2019	Shallow Well Elevation:	465.4 ft amsl	
Drilling Co.:	Cascade	Deep Well Elevation:	465.3 ft amsl	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	2103798.1	Project: Final GW Remedy Phase 1
Driller Name:	E. Ramos / S. Vasquez	Easting (NAD83):	7616739.7	Location: PG&E Topock, Needles, California
Drilling Asst:	O. Flores / L. Amaya	Borehole Diameter:	6-12 inches	
Logger:	GJ / SM / CS / DC / AM	Water Level Start:	10.5 ft bgs	Project Number: RC000753.0051
Editor:	Grant Willford	Development End Date:	11/23/2019	
Total Depth:	417 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
360							
361							
362							
363							
364							
365							
366							
367		Topock - Weathered Bedrock - conglomerate	ML				
368							
369							
370					(324.0 - 417.0') Bentonite seal chips	(324.0 - 414.0') 6.0" Borehole	(324.0 - 417.0') 24.9 bags
371							
372							
373							
374							
375		Topock - Weathered Bedrock - conglomerate	SM				
376							
377		Topock - Weathered Bedrock - conglomerate	GW-GM				
378		Topock - Weathered Bedrock - conglomerate					
379		Topock - Weathered Bedrock - conglomerate	GM				

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Date Started:	07/31/2019	Surface Elevation:	465.4 ft amsl	Well ID: MW-91-170, MW-91-320
Date Completed:	09/23/2019	Shallow Well Elevation:	465.4 ft amsl	
Drilling Co.:	Cascade	Deep Well Elevation:	465.3 ft amsl	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	2103798.1	Project: Final GW Remedy Phase 1
Driller Name:	E. Ramos / S. Vasquez	Easting (NAD83):	7616739.7	Location: PG&E Topock, Needles, California
Drilling Asst:	O. Flores / L. Amaya	Borehole Diameter:	6-12 inches	
Logger:	GJ / SM / CS / DC / AM	Water Level Start:	10.5 ft bgs	Project Number: RC000753.0051
Editor:	Grant Willford	Development End Date:	11/23/2019	
Total Depth:	417 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
380		Topock - Weathered Bedrock - conglomerate	GM				
381							
382							
383							
384	MW-X-VAS-382-387 (<0.17 U ppb) 7/13/2019 14:43	Topock - Weathered Bedrock - conglomerate	CL				
385							
386							
387							
388							
389							
390					(324.0 - 417.0') Bentonite seal chips	(324.0 - 417.0') 24.9 bags	(324.0 - 417.0') 34 bags (37%) Note: Puregold Medium Chips, used >20% of the calculated volume due to potential voids that formed during drilling
391							
392							
393							
394							
395		Topock - Weathered Bedrock - conglomerate	CL				
396							
397							
398							
399							

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Date Started:	07/31/2019	Surface Elevation:	465.4 ft amsl	Well ID: MW-91-170, MW-91-320
Date Completed:	09/23/2019	Shallow Well Elevation:	465.4 ft amsl	
Drilling Co.:	Cascade	Deep Well Elevation:	465.3 ft amsl	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	2103798.1	Project: Final GW Remedy Phase 1
Driller Name:	E. Ramos / S. Vasquez	Easting (NAD83):	7616739.7	Location: PG&E Topock, Needles, California
Drilling Asst:	O. Flores / L. Amaya	Borehole Diameter:	6-12 inches	
Logger:	GJ / SM / CS / DC / AM	Water Level Start:	10.5 ft bgs	Project Number: RC000753.0051
Editor:	Grant Willford	Development End Date:	11/23/2019	
Total Depth:	417 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
400		Topock - Weathered Bedrock - conglomerate	CL				
401		Topock - Weathered Bedrock - conglomerate	CL				
402		Topock - Weathered Bedrock - conglomerate	GC				
403		Topock - Weathered Bedrock - conglomerate	ML				
404		Topock - Weathered Bedrock - conglomerate	GC				
405		Topock - Weathered Bedrock - conglomerate	SM				
406		Topock - Weathered Bedrock - conglomerate	CL				
407		Topock - Weathered Bedrock - conglomerate	SM		(324.0 - 414.0') 6.0" Borehole		
408		Topock - Weathered Bedrock - conglomerate	SM		(324.0 - 417.0') Bentonite seal chips	(324.0 - 417.0') 24.9 bags	(324.0 - 417.0') 34 bags (37%) Note: Puregold Medium Chips, used >20% of the calculated volume due to potential voids that formed during drilling
409		Topock - Weathered Bedrock - conglomerate	GC				
410		Topock - Weathered Bedrock - conglomerate	GC				
411		Topock - Weathered Bedrock - conglomerate	GC				
412		Topock - Weathered Bedrock - conglomerate	SM				
413		Topock - Weathered Bedrock - conglomerate	SM				
414	MW-X-VAS-412-417 (<0.17 U ppb) 7/15/2019 12:43	Topock - Weathered Bedrock - conglomerate	SM				
415		Topock - Weathered Bedrock - conglomerate	GM		(414.0 - 417.0') 4.0" Borehole		
416		Topock - Weathered Bedrock - conglomerate	GM				
417		Topock - Weathered Bedrock - conglomerate	GM				
418					End of Boring at 417.0' bgs.		
419							

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Date Started:	06/20/2019	Surface Elevation:	465.4 ft amsl	Boring No.: <u>MW-91d</u>	
Date Completed:	07/31/2019	Northing (NAD83):	2103798.1		
Drilling Co.:	Cascade	Easting (NAD83):	7616739.7	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	417 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	E. Ramos / S. Vasquez	Depth to First Water:	9.6 ft bgs		
Drilling Asst:	O. Flores / L. Amaya	Sampling Method:	4 Inch X 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	GJ / SM / CS / DC / AM	Sampling Interval:	Continuous		
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
1							(0.0 - 12.0') Topock - Fill; Poorly graded sand (SP); brown (10YR 5/3); fine grained to medium grained, angular to subround; trace mica; trace wood; dry; no odor	(0.0 - 7.0') Formation was collapsing at the surface during the installation of the 12-inch conductor casing. Used bentonite to stop the collapse at the surface. Bentonite was mixed into the core during installation of the 12-inch casing to 7 ft bgs.	(0.0 - 177.0') 5100 gallons of water used; 1600 gallons of water recovered; 3500 gallons of water lost
2									
3									
4	96								
5									
6				Topock - Fill	SP				
7									
8							(8'); trace clay; trace organics; no wood particles. 3.0" lense of fat clay @ 8.0' bgs (5Y 4/1)	(8.0 - 17.0') Soft drilling, low recovery due to soft dredge sands	
9								compacting or falling out of core barrel.	
10		No Sieve Samples Collected					(10'); moist; no clay		
11							(11'); wet	(11.0') Approximate Depth to Water.	
12							(12.0 - 19.0') No recovery (NR)		
13	48								
14		MW-X-VAS-12-17 (<0.033 U ppb) 6/25/2019 15:10							
15									
16						NR			
17									
18	24								
19									
20	96			Topock - Fill	SW		(19.0 - 36.5') Topock - Fill; Well graded sand (SW); yellowish brown / moderate yellowish brown (10YR 5/4); fine grained to coarse grained, subangular to subround; little mica; trace	(17.0 - 19.0') No recovery, due to casing and core barrel dropping 2 ft. during clean out to 17 ft. bgs. Heaving sands formation collapse observed on	

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Boring Log

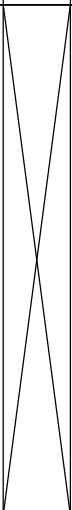



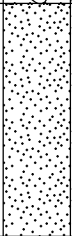

Sheet: 2 of 21

Date Started:	06/20/2019	Surface Elevation:	465.4 ft amsl	Boring No.: <u>MW-91d</u>	
Date Completed:	07/31/2019	Northing (NAD83):	2103798.1		
Drilling Co.:	Cascade	Easting (NAD83):	7616739.7	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	417 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	E. Ramos / S. Vasquez	Depth to First Water:	9.6 ft bgs		
Drilling Asst:	O. Flores / L. Amaya	Sampling Method:	4 Inch X 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	GJ / SM / CS / DC / AM	Sampling Interval:	Continuous		
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
21	96						organics; wet; no odor	6/26/19. (19.0 - 27.0') Soft drilling.	
22									
23									
24									
25									
26	120	No Sieve Samples Collected		Topock - Fill	SW				
27									
28								(27.0 - 36.5') Soft drilling.	
29									
30									
31									
32									
33								(32.0 - 37.0') Heaving sands.	
34									
35									
36	36		MW-X-VAS-32-37 (<0.033 U ppb) 6/26/2019 11:45				(36.2'); increase organics		
37							(36.5 - 40.0') Topock - Fluvial Deposits; Well graded sand (SW); grayish brown (10YR 5/2); fine grained to very coarse grained, subangular to round; little granules to very large pebbles, round; trace round; little mica; coarser clast consists of quartz and basalt; wet; organic odor		
38							(37'); no granules and pebbles		
39							(38.5'); trace granules to very large pebbles, subround to round		
40								(38.0') Druring reaming with the 10-inch casing, the 12-inch conductor casing began to	

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Date Started:	06/20/2019	Surface Elevation:	465.4 ft amsl	Boring No.: <u>MW-91d</u>	
Date Completed:	07/31/2019	Northing (NAD83):	2103798.1		
Drilling Co.:	Cascade	Easting (NAD83):	7616739.7	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	417 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	E. Ramos / S. Vasquez	Depth to First Water:	9.6 ft bgs		
Drilling Asst:	O. Flores / L. Amaya	Sampling Method:	4 Inch X 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	GJ / SM / CS / DC / AM	Sampling Interval:	Continuous		
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
41	36	No Sieve Samples Collected			NR		(40.0 - 47.0') No recovery (NR)	slip below ground surface. The 12-inch was advanced to 38 ft bgs to stabilize the borehole.	
42									
43									
44									
45									
46									
47									
48	Topock - Fluvial Deposits			SW		(47.0 - 48.2') Topock - Fluvial Deposits; Well graded sand (SW); grayish brown (10YR 5/2); fine grained to very coarse grained, subangular to round; trace granules to large pebbles, round; trace mica; coarser clast composed of quartz; wet	(42.0') Final depth of conductor casing after installing deeper to fix mud tub seal.		
49	Topock - Fluvial Deposits			GW		(48.2 - 50.5') Topock - Fluvial Deposits; Well graded gravel with sand (GW); grayish brown (10YR 5/2); granules to small cobbles, subangular to round; some fine to coarse grained sand, subangular to round; trace mica; coarser clast composed of granite and basalt; wet			
50									
51									
52									
53	Topock - Fluvial Deposits	SW		(50.5 - 53.8') Topock - Fluvial Deposits; Well graded sand with gravel (SW); grayish brown (10YR 5/2); fine grained to very coarse grained, subangular to subround; little granules to very large pebbles, subangular to subround; trace round; trace mica; coarser clasts composed of granite and basalt; wet					
54									
55	Topock - Fluvial Deposits	SP		(53.8 - 57.0') Topock - Fluvial Deposits; Poorly graded sand (SP); brown (10YR 5/3); very fine grained to fine grained, subround to round; trace granules to very large pebbles, subround to round; wet					
56									
57									
58	120				SW		(57.0 - 62.2') Topock - Fluvial Deposits; Well graded sand (SW); brown (10YR 5/3); very fine grained to coarse grained, round; trace mica; wet		
59									
60									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	06/20/2019	Surface Elevation:	465.4 ft amsl	Boring No.: <u>MW-91d</u>	
Date Completed:	07/31/2019	Northing (NAD83):	2103798.1		
Drilling Co.:	Cascade	Easting (NAD83):	7616739.7	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	417 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	E. Ramos / S. Vasquez	Depth to First Water:	9.6 ft bgs		
Drilling Asst:	O. Flores / L. Amaya	Sampling Method:	4 Inch X 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	GJ / SM / CS / DC / AM	Sampling Interval:	Continuous		
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
61	120			Topock - Fluvial Deposits	SW				
62				Topock - Fluvial Deposits	SP		(62.2 - 63.5') Topock - Fluvial Deposits; Poorly graded sand (SP); brown (10YR 5/3); very fine grained to fine grained, round; trace mica; wet		
63							(63.5 - 75.5') Topock - Fluvial Deposits; Well graded sand with gravel (SW); brown (10YR 5/3); very fine grained to very coarse grained, subangular to round; little granules to very large pebbles, subangular to round; trace subangular to subround; trace mica; coarser clast composed of basalt, granite, and metadiorite; wet		
64	120	No Sieve Samples Collected							
65									
66									
67									
68									
69									
70				Topock - Fluvial Deposits	SW				
71									
72	120		MW-X-VAS-71-76 (<0.033 U ppb) 6/27/2019 08:52					(71.0 - 77.0') A foot of heaving sands in the casing resulted in the groundwater sample interval to be adjusted from 72 to 77 ft. bgs to 71 to 76 ft. bgs.	
73									
74									
75									
76	120			Topock - Fluvial Deposits	SP		(75.5 - 77.0') Topock - Fluvial Deposits; Poorly graded sand (SP); brown (7.5YR 5/3); very fine grained to fine grained, subangular to round; trace mica; wet		
77									
78				Topock - Fluvial Deposits	SW		(77.0 - 83.5') Topock - Fluvial Deposits; Well graded sand (SW); brown (10YR 5/3); very fine grained to very coarse grained, subangular to subround; trace mica; wet		
79									
80									

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Date Started:	06/20/2019	Surface Elevation:	465.4 ft amsl	Boring No.: <u>MW-91d</u>	
Date Completed:	07/31/2019	Northing (NAD83):	2103798.1		
Drilling Co.:	Cascade	Easting (NAD83):	7616739.7	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	417 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	E. Ramos / S. Vasquez	Depth to First Water:	9.6 ft bgs		
Drilling Asst:	O. Flores / L. Amaya	Sampling Method:	4 Inch X 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	GJ / SM / CS / DC / AM	Sampling Interval:	Continuous		
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid		
81	120	No Sieve Samples Collected		Topock - Fluvial Deposits	SW						
82											
83											
84				Topock - Fluvial Deposits	SW		(83.5 - 87.0') Topock - Fluvial Deposits; Well graded sand with gravel (SW); brown (10YR 5/3); very fine grained to very coarse grained; little granules to very large pebbles, subangular to round; trace subround to round; trace mica; coarse clasts composed of granite, basalt, and quartz; wet; granules and pebbles increase with depth				
85											
86											
87						Topock - Fluvial Deposits	SW-SM		(87.0 - 93.0') Topock - Fluvial Deposits; Well graded sand with silt (SW-SM); brown (10YR 5/3); very fine grained to very coarse grained, subangular to round; little granules to large pebbles, subround to round; little silt; trace mica; coarser clasts composed of metadiorite; wet		
88											
89											
90											
91											
92	108								Topock - Fluvial Deposits	GW-GM	
93				Topock - Fluvial Deposits	SP		(94.0 - 95.0') Topock - Fluvial Deposits; Poorly graded sand (SP); strong brown (7.5YR 4/6); very fine grained to fine grained, subround to round; trace silt; trace mica; wet				
94				Topock - Fluvial Deposits	SW		(95.0 - 96.0') Topock - Fluvial Deposits; Well graded sand with gravel (SW); brown (10YR 5/3); very fine grained to medium grained, subangular to round; some granules to very large pebbles, subround to round; trace subround to round; trace silt; trace mica; coarser clasts composed of metadiorite; wet; fractured				
95					NR		cobble/boulder fragments within formation				
96				Topock - Fluvial Deposits	SW		(96.0 - 97.0') No recovery (NR)				
97							(97.0 - 104.0') Topock - Fluvial Deposits; Well graded sand (SW); brown (10YR 5/3); very fine grained to very coarse grained, subangular to subround; trace granules to small pebbles, subround to round; trace mica; wet				
98											
99	96										
100											

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Date Started:	06/20/2019	Surface Elevation:	465.4 ft amsl	Boring No.: <u>MW-91d</u>	
Date Completed:	07/31/2019	Northing (NAD83):	2103798.1		
Drilling Co.:	Cascade	Easting (NAD83):	7616739.7	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	417 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	E. Ramos / S. Vasquez	Depth to First Water:	9.6 ft bgs		
Drilling Asst:	O. Flores / L. Amaya	Sampling Method:	4 Inch X 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	GJ / SM / CS / DC / AM	Sampling Interval:	Continuous		
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid					
101	96			Topock - Fluvial Deposits	SW			(102.0 - 105.0') Tight formation.						
102														
103														
104														
105	84	No Sieve Samples Collected	MW-X-VAS-107-112 (<0.033 U ppb) 6/27/2019 15:04	Topock - Fluvial Deposits	SW		(104.0 - 105.0') Topock - Fluvial Deposits; Well graded sand with gravel (SW); dark grayish brown / dark yellowish brown (10YR 4/2); very fine grained to very coarse grained, subround to round; and granules to very large pebbles, subangular to round; trace subround to round; trace silt; trace mica; coarser clasts composed of metadiorite; wet; fractured cobbles/ boulder fragments within formation							
106				Topock - Fluvial Deposits	SW		(105.0 - 107.0') Topock - Fluvial Deposits; Well graded sand (SW); brown (10YR 5/3); very fine grained to very coarse grained, subangular to subround; little granules to small pebbles, subround to round; trace silt; trace mica; wet							
107				Topock - Fluvial Deposits	GW		(107.0 - 108.0') Topock - Fluvial Deposits; Well graded gravel with sand (GW); brown (10YR 4/3); granules to very large pebbles, subround to round; some very fine to very coarse grained sand, subangular to round; trace silt; trace mica; coarse clasts composed of metadiorite, granite, basalt, quartz; wet							
108							Topock - Fluvial Deposits			SM		(108.0 - 112.0') Topock - Fluvial Deposits; Silty sand with gravel (SM); dark grayish brown / dark yellowish brown (10YR 4/2); very fine grained to coarse grained, subangular to round; some granules to very large pebbles, subround to round; some silt; little subround to round; trace mica; trace organics; wet; organic odor; coarser clasts composed of metadiorite and granite, pulverized cobble/boulder fragments observed		
109												(109') brown (10YR 5/3); little silt; no organics; increase sand		
110				60		MW-X-VAS-112-117 (<0.033 U ppb) 6/28/2019 09:56	Topock - Fluvial Deposits			GW		(112.0 - 114.0') Topock - Fluvial Deposits; Well graded gravel with sand (GW); dark gray (10YR 4/1); very fine grained to small cobbles, subangular to round; little very fine to very coarse grained sand, subangular to round; trace silt; trace clay; trace organics; coarser clasts composed of metadiorite; wet; organic odor	(112.0 - 117.0') Rough drilling, collect groundwater sample across fluvial / alluvium contact.	
111												Topock - Fluvial Deposits		
112							Topock - Alluvium Deposits			SM				
113	(117') reddish brown / moderate brown (5YR 4/4) little red / moderate reddish brown (10R 4/6); some silt; decrease in granules and pebbles, no cobbles													
114	(118') little silt; increase in sand, weathered granules and pebbles													
115	120													
116														
117														
118														
119														
120														

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Date Started:	06/20/2019	Surface Elevation:	465.4 ft amsl	Boring No.: <u>MW-91d</u>	
Date Completed:	07/31/2019	Northing (NAD83):	2103798.1		
Drilling Co.:	Cascade	Easting (NAD83):	7616739.7	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	417 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	E. Ramos / S. Vasquez	Depth to First Water:	9.6 ft bgs		
Drilling Asst:	O. Flores / L. Amaya	Sampling Method:	4 Inch X 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	GJ / SM / CS / DC / AM	Sampling Interval:	Continuous		
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
121									
122									
123									
124	120								
125									
126									
127									
128							(128'); some silt; little granules to very large pebbles, angular to subangular; decrease in sand		
129									
130		No Sieve Samples Collected		Topock - Alluvium Deposits	SM				
131									
132	120								
133									
134							(134'); little silt; increase sand, increase in granules and pebbles		
135									
136									
137									
138							(138'); some granules to very large pebbles, angular to subangular; slight decrease in silt	(137.0') During reaming with the 10-inch casing, drilling became difficult due to increased friction. Reinstalled 6-casing and started flushing.	
139	120								
140									

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Date Started:	06/20/2019	Surface Elevation:	465.4 ft amsl	Boring No.: <u>MW-91d</u>	
Date Completed:	07/31/2019	Northing (NAD83):	2103798.1		
Drilling Co.:	Cascade	Easting (NAD83):	7616739.7	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	417 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	E. Ramos / S. Vasquez	Depth to First Water:	9.6 ft bgs		
Drilling Asst:	O. Flores / L. Amaya	Sampling Method:	4 Inch X 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	GJ / SM / CS / DC / AM	Sampling Interval:	Continuous		
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
141								10-inch over the 6-inch.	
142									
143									
144	120								
145									
146									
147									
148				Topock - Alluvium Deposits	SM		(148'); and silt; moist to wet; decrease in sand		
149									
150		No Sieve Samples Collected							
151									
152	120							(151.0 - 157.0') Heaving sands came into casing during clean out to set the sample screen from 152 to 157 ft. bgs. Sampler screen was clogged with sand and had to be reinstalled.	
153									
154		MW-X-VAS-152-157 (<0.17 U ppb) 6/29/2019 09:19							
155							(155'); some granules to very large pebbles, angular to subangular; little silt; wet; increase in sand		
156									
157							(157.0 - 161.0') No recovery (NR)		
158	72				NR			(157.0 - 167.0') Loose sands fell out of core barrel into hopper when bagging core, 165 to 167 drilling got hard.	
159									
160									

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Date Started:	06/20/2019	Surface Elevation:	465.4 ft amsl	Boring No.: <u>MW-91d</u>	
Date Completed:	07/31/2019	Northing (NAD83):	2103798.1		
Drilling Co.:	Cascade	Easting (NAD83):	7616739.7	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	417 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	E. Ramos / S. Vasquez	Depth to First Water:	9.6 ft bgs		
Drilling Asst:	O. Flores / L. Amaya	Sampling Method:	4 Inch X 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	GJ / SM / CS / DC / AM	Sampling Interval:	Continuous		
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
161	72				NR				
162							(161.0 - 167.0') Topock - Alluvium Deposits; Sandy lean clay with gravel (CL); brown (7.5YR 4/4); medium plasticity; some very fine to very coarse grained sand, angular to subangular; little granules to very large pebbles, angular to subangular; little silt; coarser clasts composed of metadiorite; moist; hard; blocky; some meta-diorite clasts are weathered		
163									
164				Topock - Alluvium Deposits	CL				
165	120	No Sieve Samples Collected							
166									
167									
168							(167.0 - 174.5') Topock - Alluvium Deposits; Sandy lean clay with gravel (CL); reddish brown / moderate brown (5YR 4/4); medium plasticity; some very fine to very coarse grained sand, angular to subangular; little granules to very large pebbles, angular to subangular; little silt; coarser clasts composed of metadiorite; moist; some meta-diorite clasts are weathered	(167.0 - 177.0') Smooth drilling.	
169									
170				Topock - Alluvium Deposits	CL				
171									
172									
173	84						(173.5'); moist to wet		
174									
175				Topock - Alluvium Deposits	SM		(174.5 - 177.0') Topock - Alluvium Deposits; Silty sand (SM); reddish brown / moderate brown (5YR 4/4); very fine grained to very coarse grained, angular to subround; some silt; little granules to medium pebbles, angular to subangular; little clay; trace large to very large pebbles, angular to subangular; wet		
176									
177				Topock - Alluvium Deposits	GP		(177.0 - 177.5') Topock - Alluvium Deposits; Poorly graded gravel (GP); boulders; wet	(177.0 - 187.0') Normal drilling.	(177.0 - 327.0') 5395 gallons of water used; 4465 gallons of water recovered; 930 gallons of water lost
178							(177.5 - 180.5') No recovery (NR)		
179									
180					NR				

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Date Started:	06/20/2019	Surface Elevation:	465.4 ft amsl	Boring No.: <u>MW-91d</u>	
Date Completed:	07/31/2019	Northing (NAD83):	2103798.1		
Drilling Co.:	Cascade	Easting (NAD83):	7616739.7	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	417 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	E. Ramos / S. Vasquez	Depth to First Water:	9.6 ft bgs		
Drilling Asst:	O. Flores / L. Amaya	Sampling Method:	4 Inch X 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	GJ / SM / CS / DC / AM	Sampling Interval:	Continuous		
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid		
181	84		MW-X-VAS-182-187 (<0.17 U ppb) 6/29/2019 15:28	Topock - Alluvium Deposits	NR		(180.5 - 187.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown / moderate brown (5YR 4/4); very fine grained to very coarse grained, angular to subround; little granules to medium pebbles, subangular to subround; little silt; trace subangular; trace clay; trace large to very large pebbles subangular; wet				
182											
183											
184					SM	(183.5'); little granules to very large pebbles, angular to subangular; little clay					
185						(184.5'); little granules to large pebbles, angular to subangular; trace clay					
186	120	No Sieve Samples Collected		Topock - Alluvium Deposits				(187.0 - 197.0') Normal drilling.			
187											
188					SC	(187.0 - 188.0') Topock - Alluvium Deposits; Clayey sand with gravel (SC); reddish brown (2.5YR 4/4); very fine grained to very coarse grained, angular to subround; some clay; little granules to large pebbles, angular to subangular; little silt; coarser clasts composed of metadiorite; iron oxide staining on metadiorite pebbles; wet					
189					ML	(188.0 - 189.5') Topock - Alluvium Deposits; Sandy silt with gravel (ML); red (2.5YR 4/6); medium plasticity; some very fine to very coarse grained sand, angular to subround; little granules to large pebbles, angular to subangular; little clay; coarser clasts composed of metadiorite; moist to wet; very stiff					
190					SM	(189.5 - 190.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (2.5YR 4/4) to dark reddish brown (2.5YR 3/4); very fine grained to very coarse grained, angular to subround; some silt; little granules to very large pebbles, angular to subround; little clay; coarser clasts composed of metadiorite; moist to wet					
191					CL	(190.0 - 191.5') Topock - Alluvium Deposits; Sandy lean clay with gravel (CL); reddish brown (2.5YR 4/4); medium plasticity; some very fine to very coarse grained sand, angular to subround; little granules to small pebbles, angular to subround; little silt; moist; very stiff					
192					MH	(191.5 - 192.5') Topock - Alluvium Deposits; Sandy elastic silt with gravel (MH); reddish brown (2.5YR 4/4); high plasticity; some very fine to very coarse grained sand, angular to subround; little granules to medium pebbles, angular to subround; little clay; coarser clasts composed of metadiorite; moist; green staining					
193					ML	(192.5 - 197.0') Topock - Alluvium Deposits; Sandy silt with gravel (ML); light red (2.5YR 7/6); medium plasticity; some very fine to very coarse grained sand, angular to subround; little granules to medium pebbles, angular to subangular; little clay; coarser clasts composed of metadiorite; moist; green staining					
194											
195											
196					ML	(197.0 - 199.0') Topock - Alluvium Deposits; Sandy silt with gravel (ML); reddish brown (2.5YR 4/4); low plasticity; some very fine to medium grained sand, angular to subround; little granules to medium pebbles, angular to subangular; little clay; trace coarse to very coarse grained sand angular to subangular; moist; very stiff					
197											
198	120			Topock - Alluvium Deposits	ML						
199				Topock - Alluvium Deposits	CL		(199.0 - 202.0') Topock - Alluvium Deposits; Sandy lean clay with gravel (CL); reddish brown (2.5YR 4/4); medium plasticity; some very fine to very coarse grained sand, angular to subround; little				
200				Topock - Alluvium Deposits	CL						

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Date Started:	06/20/2019	Surface Elevation:	465.4 ft amsl	Boring No.: MW-91d
Date Completed:	07/31/2019	Northing (NAD83):	2103798.1	
Drilling Co.:	Cascade	Easting (NAD83):	7616739.7	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	417 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	6-12 inches	Location: PG&E Topock, Needles, California
Driller Name:	E. Ramos / S. Vasquez	Depth to First Water:	9.6 ft bgs	
Drilling Asst:	O. Flores / L. Amaya	Sampling Method:	4 Inch X 10 ft Core Barrel	Project Number: RC000753.0051
Logger:	GJ / SM / CS / DC / AM	Sampling Interval:	Continuous	
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
201				Topock - Alluvium Deposits	CL		granules to large pebbles, angular to subround; little silt; coarser clasts composed of metadiorite; moist; very stiff		
202							(202.0 - 227.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); red (2.5YR 4/6); very fine grained to very coarse grained, angular to subround; some silt; little granules to large pebbles, angular to subround; little clay; coarser clasts composed of metadiorite; moist		
203	120						(204'); little silt; trace clay; moist to wet		
204							(204.5'); some silt; trace very large pebbles, subangular; trace subangular; moist to wet		
205							(206.3'); little silt; no cobbles, increase in sand		
206							(207'); wet		
207							(209'); some silt; moist to wet; no clay, weathered granules and pebbles	(207.0 - 217.0') Normal drilling, approximately 6 inches of sample fell out of core barrel at ~208.5 during bagging, material was the same as in the core. Groundwater sample interval 207 to 212 ft. bgs screened across sandy zone 207 to 209 ft bgs.	
208							(210.5'); little clay; moist to wet; decrease in silt, decrease in sand		
209			MW-X-VAS-207-212 (<0.17 U ppb) 6/30/2019 13:28	Topock - Alluvium Deposits	SM				
210		No Sieve Samples Collected							
211									
212	108								
213									
214									
215									
216									
217									
218									
219	114								
220									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	06/20/2019	Surface Elevation:	465.4 ft amsl	Boring No.: MW-91d
Date Completed:	07/31/2019	Northing (NAD83):	2103798.1	
Drilling Co.:	Cascade	Easting (NAD83):	7616739.7	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	417 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	6-12 inches	Location: PG&E Topock, Needles, California
Driller Name:	E. Ramos / S. Vasquez	Depth to First Water:	9.6 ft bgs	
Drilling Asst:	O. Flores / L. Amaya	Sampling Method:	4 Inch X 10 ft Core Barrel	Project Number: RC000753.0051
Logger:	GJ / SM / CS / DC / AM	Sampling Interval:	Continuous	
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
221	114			Topock - Alluvium Deposits	SM				
222									
223									
224									
225									
226	111.6	No Sieve Samples Collected		Topock - Alluvium Deposits	SM		(227.0 - 240.0') Topock - Alluvium Deposits; Silty sand (SM); reddish brown (2.5YR 4/4); very fine grained to very coarse grained, angular to subround; some silt; little granules to large pebbles, angular to subangular; trace clay; coarser clasts composed of metadiorite; moist; iron oxide staining; weathered granules and pebbles	(227.0 - 232.0') Normal drilling.	
227									
228									
229									
230									
231									
232									
233									
234									
235									
236	114			Topock - Alluvium Deposits	SM		(230'); increase in silt, decrease in sand	(232.0 - 237.0') Hard drilling.	
237									
238									
239									
240							(235'); moist to wet		
							(237'); and silt; little clay; decrease in sand	(237.0 - 245.0') Normal drilling.	

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Date Started:	06/20/2019	Surface Elevation:	465.4 ft amsl	Boring No.: <u>MW-91d</u>	
Date Completed:	07/31/2019	Northing (NAD83):	2103798.1		
Drilling Co.:	Cascade	Easting (NAD83):	7616739.7	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	417 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	E. Ramos / S. Vasquez	Depth to First Water:	9.6 ft bgs		
Drilling Asst:	O. Flores / L. Amaya	Sampling Method:	4 Inch X 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	GJ / SM / CS / DC / AM	Sampling Interval:	Continuous		
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
241	114	No Sieve Samples Collected		Topock - Alluvium Deposits	SM		(240.0 - 247.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (2.5YR 4/4); very fine grained to very coarse grained, angular to subround; some silt; little granules to very large pebbles, angular to subangular; trace clay; coarser clasts composed of metadiorite; moist; weathered granules and pebbles		
242									
243									
244									
245									
246	MW-X-VAS- 245-255 (0.033 U ppb) 7/1/2019 13:35			Topock - Alluvium Deposits	SM		(243.5 - 244.0'); dry	(245.0 - 247.0') Hard drilling.	
247									
248									
249									
250									
251			Topock - Alluvium Deposits	SM		(247.0 - 254.0') Topock - Alluvium Deposits; Silty sand (SM); reddish brown (2.5YR 4/4); very fine grained to very coarse grained, angular to subround; some silt; little granules to very large pebbles, angular to subangular; little clay; trace mica; coarser clasts composed of metadiorite; moist; weathered granules and pebbles	(247.0 - 257.0') Normal drilling.		
252									
253									
254									
255									
256			Topock - Alluvium Deposits	SM		(254.0 - 259.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (2.5YR 4/4) little (7.5R 4/6); very fine grained to very coarse grained, angular to subround; some silt; little granules to very large pebbles, angular to subangular; trace clay; moist; mottled; iron oxide staining; weathered granules and pebbles			
257									
258									
259									
260									
					SM		(259.5 - 269.0') Topock - Alluvium Deposits; Silty sand (SM);	(257.0 - 267.0') Normal drilling, water was observed to contain more bubbles during drilling. Possibly due to increased specific conductivity or	

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Date Started:	06/20/2019	Surface Elevation:	465.4 ft amsl	Boring No.: MW-91d
Date Completed:	07/31/2019	Northing (NAD83):	2103798.1	
Drilling Co.:	Cascade	Easting (NAD83):	7616739.7	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	417 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	6-12 inches	Location: PG&E Topock, Needles, California
Driller Name:	E. Ramos / S. Vasquez	Depth to First Water:	9.6 ft bgs	
Drilling Asst:	O. Flores / L. Amaya	Sampling Method:	4 Inch X 10 ft Core Barrel	Project Number: RC000753.0051
Logger:	GJ / SM / CS / DC / AM	Sampling Interval:	Continuous	
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
261	120			Topock - Alluvium Deposits	SM		reddish brown (2.5YR 4/4) little (7.5R 4/6); very fine grained to very coarse grained, angular to subround; medium plasticity, no dilatency; some silt; little granules to very large pebbles, angular to subangular; little clay; coarser clasts composed of metadiorite; moist; mottled; weathered granules and pebbles	salinity.	
262									
263									
264									
265									
266	120	No Sieve Samples Collected		Topock - Alluvium Deposits	SM		(269.0 - 327.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (2.5YR 4/4) some (7.5R 4/6); very fine grained to very coarse grained, angular to subround; some granules to very large pebbles, angular to subangular; some silt; little clay; trace angular; coarser clasts composed of metadiorite; moist; mottled; weathered granules to small cobbles	(267.0 - 277.0') Normal drilling, during reaming with 10-inch removed 6-inch casing and attempted to dry drill due to reduce water use.	
267									
268									
269									
270									
271	120			Topock - Alluvium Deposits	SM		(275'); little granules to very large pebbles, angular to subround; trace angular to subangular; increase in silt, increase in sand		
272									
273									
274									
275									
276	120								
277									
278									
279									
280									





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Date Started:	06/20/2019	Surface Elevation:	465.4 ft amsl	Boring No.: MW-91d	
Date Completed:	07/31/2019	Northing (NAD83):	2103798.1		
Drilling Co.:	Cascade	Easting (NAD83):	7616739.7	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	417 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	E. Ramos / S. Vasquez	Depth to First Water:	9.6 ft bgs		
Drilling Asst:	O. Flores / L. Amaya	Sampling Method:	4 Inch X 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	GJ / SM / CS / DC / AM	Sampling Interval:	Continuous		
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid					
281	120	No Sieve Samples Collected		Topock - Alluvium Deposits	SM			(281.0 - 287.0') Rough drilling.						
282														
283							(283.0 - 285.0'); dry							
284														
285	120												(287.0 - 297.0') Rough drilling.	
286														
287							(287') red / moderate reddish brown (10R 4/6) and reddish brown (2.5YR 4/4); trace clay; dry to moist; decrease in silt, increase in sand							
288														
289	120													
290														
291							(291'); decrease in silt, increase in sand							
292														
293	120						(293'); moist to wet							
294														
295														
296														
297	120							(297.0 - 307.0') Rough drilling.						
298														
299														
300							(299.5') reddish brown (2.5YR 4/4) some red / moderate reddish							

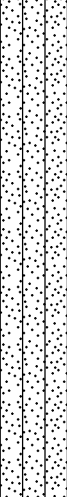


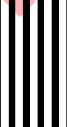
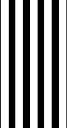
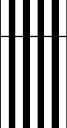
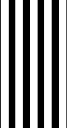
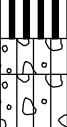
Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	06/20/2019	Surface Elevation:	465.4 ft amsl	Boring No.: MW-91d	
Date Completed:	07/31/2019	Northing (NAD83):	2103798.1		
Drilling Co.:	Cascade	Easting (NAD83):	7616739.7	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	417 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	E. Ramos / S. Vasquez	Depth to First Water:	9.6 ft bgs		
Drilling Asst:	O. Flores / L. Amaya	Sampling Method:	4 Inch X 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	GJ / SM / CS / DC / AM	Sampling Interval:	Continuous		
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
301	120	No Sieve Samples Collected		Topock - Alluvium Deposits	SM		brown (10R 4/6); some granules to very large pebbles, angular to subangular; decrease sand		
302									
303							(303'); little granules to very large pebbles, angular to subangular; little silt; increase sand		
304									
305									
306	120	No Sieve Samples Collected		Topock - Alluvium Deposits	SM			(307.0 - 317.0') Rough drilling.	
307							(307'); some granules to very large pebbles, angular to subangular; trace angular to subangular; dry to moist; decrease sand		
308									
309									
310									
311	120	No Sieve Samples Collected		Topock - Alluvium Deposits	SM			(317.0 - 323.0') Normal drilling.	
312							(312') dark reddish brown (2.5YR 3/4) trace red / moderate reddish brown (10R 4/6); some silt; moist to wet; increase sand		
313									
314									
315									
316	120	No Sieve Samples Collected		Topock - Alluvium Deposits	SM			(317.0 - 323.0') Normal drilling.	
317									
318									
319									
320									











Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	06/20/2019	Surface Elevation:	465.4 ft amsl	Boring No.: <u>MW-91d</u>	
Date Completed:	07/31/2019	Northing (NAD83):	2103798.1		
Drilling Co.:	Cascade	Easting (NAD83):	7616739.7	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	417 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	E. Ramos / S. Vasquez	Depth to First Water:	9.6 ft bgs		
Drilling Asst:	O. Flores / L. Amaya	Sampling Method:	4 Inch X 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	GJ / SM / CS / DC / AM	Sampling Interval:	Continuous		
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
321	120			Topock - Alluvium Deposits	SM		(321'); little silt; dry to moist; iron oxide staining; increase sand		
322									
323								(323.0 - 326.0') Rough drilling.	
324									
325									
326	1200	No Sieve Samples Collected		Topock - Alluvium Deposits	MH		(327.0 - 328.2') Topock - Alluvium Deposits; Gravelly elastic silt with sand (MH); reddish brown (2.5YR 4/4); medium plasticity; some granules to very large pebbles, angular to subround; little very fine to very coarse grained sand, subangular to subround; little clay; some coarser clasts composed of metadiorite; moist; medium stiff; moderate cementation	(326.0 - 327.0') Normal drilling.	
327									
328				Topock - Alluvium Deposits	SM		(328.2 - 329.9') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (2.5YR 4/4); very fine grained to small cobbles, subangular to subround; low plasticity; some silt; little granules to large pebbles, angular to subround; little clay; moist; weak cementation	(327.0 - 337.0') Normal Drilling.	(327.0 - 412.0') No water used
329				Topock - Alluvium Deposits	MH		(329.9 - 334.0') Topock - Alluvium Deposits; Gravelly elastic silt with sand (MH); reddish brown (2.5YR 4/4); medium plasticity; some granules to large pebbles, angular to subangular; little very fine to very coarse grained sand, subangular to subround; little clay; moist; medium stiff; weak cementation		
330							(331'); trace clay; increase in granules and pebbles, decrease in silt and clay		
331									
332				Topock - Alluvium Deposits	MH		(334.0 - 337.5') Topock - Alluvium Deposits; Sandy elastic silt with gravel (MH); reddish brown (2.5YR 4/4); medium plasticity; some fine to very coarse grained sand, subangular to subround; little granules to very large pebbles, angular to subangular; trace clay; moist; medium stiff; weak cementation		
333									
334									
335				Topock - Alluvium Deposits	ML		(337.5 - 338.0') Topock - Alluvium Deposits; Gravelly silt with sand (ML); reddish brown (2.5YR 4/4); low plasticity; some granules to very large pebbles, angular to subangular; little very fine to very coarse grained sand, subangular to subround; trace clay; moist; medium stiff; weak cementation	(337.0 - 345.0') Normal drilling, drilled 8 ft due to slough.	
336							(338.0 - 341.0') Topock - Alluvium Deposits; Gravelly silt with sand (ML); reddish brown (2.5YR 4/4); medium plasticity; some granules to very large pebbles, angular to subangular; little very		
337	96	MW-X-VAS-337-342 (<0.17 U ppb) 7/11/2019 11:30		Topock - Alluvium Deposits	ML				
338				Topock - Alluvium Deposits	ML				
339									
340									

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Date Started:	06/20/2019	Surface Elevation:	465.4 ft amsl	Boring No.: <u>MW-91d</u>	
Date Completed:	07/31/2019	Northing (NAD83):	2103798.1		
Drilling Co.:	Cascade	Easting (NAD83):	7616739.7	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	417 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	E. Ramos / S. Vasquez	Depth to First Water:	9.6 ft bgs		
Drilling Asst:	O. Flores / L. Amaya	Sampling Method:	4 Inch X 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	GJ / SM / CS / DC / AM	Sampling Interval:	Continuous		
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
341	96		MW-X-VAS-337-342 (<0.17 U ppb) 7/11/2019 11:30	Topock - Alluvium Deposits	ML		fine to very coarse grained sand, subangular to subround; little clay; moist; stiff; moderate cementation (339'); wet to moist; weak cementation; decrease in granules and pebbles, increase in silt		
342				Topock - Alluvium Deposits	GM		(341.0 - 342.5') Topock - Alluvium Deposits; Silty gravel with sand (GM); reddish brown (2.5YR 4/4); granules to very large pebbles, angular to subround; some fine to very coarse grained sand, subangular to subround; little silt; trace clay; moist		
343				Topock - Alluvium Deposits	SM		(342.5 - 345.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (2.5YR 4/4); medium grained to very coarse grained, angular to subround; some granules to very large pebbles, angular to subround; little silt; trace clay; moist; weak cementation		
344									
345	144	No Sieve Samples Collected		Topock - Alluvium Deposits	ML		(345.0 - 348.0') Topock - Alluvium Deposits; Gravelly silt with sand (ML); reddish brown (2.5YR 4/4); low plasticity; some small to large pebbles, angular to subround; little fine to coarse grained sand, subangular to subround; moist to dry; soft; weak cementation	(345.0 - 352.0') Normal drilling.	
346							(347'); moist to dry; soft; weak cementation; increase in granules and pebbles, increase in sand, decrease in silt		
347				Topock - Alluvium Deposits	MH		(348.0 - 348.3') Topock - Alluvium Deposits; Gravelly elastic silt with sand (MH); light brown (7.5YR 6/4); medium plasticity; some clay; little granules to medium pebbles, angular to subround; trace very fine to fine grained sand, subangular to round; dry; soft; weak cementation		
348				Topock - Alluvium Deposits	ML		(348.3 - 352.0') Topock - Alluvium Deposits; Gravelly silt with sand (ML); reddish brown (2.5YR 4/4); low plasticity; some small to large pebbles, angular to subround; little fine to coarse grained sand, subangular to subround; moist to dry; soft; weak cementation		
349									
350				Topock - Alluvium Deposits	SW-SM		(352.0 - 355.0') Topock - Alluvium Deposits; Well graded sand with silt and gravel (SW-SM); reddish brown (2.5YR 4/4); very fine grained to medium grained, subangular to subround; little granules to very large pebbles, angular to subround; little silt; little clay; trace small cobbles, subangular; moist; weak cementation	(352.0 - 357.0') Rough drilling.	
351									
352	60			Topock - Weathered Bedrock - conglomerate	MH		(355.0 - 357.0') Topock - Weathered Bedrock - conglomerate; Gravelly elastic silt with sand (MH); reddish brown (2.5YR 4/4); medium plasticity; some granules to very large pebbles, angular to subround; little very fine to fine grained sand, subangular to subround; little clay; little coarser clasts composed of metadiorite; dry to moist; stiff; moderate cementation		
353				Topock - Weathered Bedrock - conglomerate	ML		(357.0 - 359.0') Topock - Weathered Bedrock - conglomerate; Sandy silt with gravel (ML); reddish brown (2.5YR 4/4); low plasticity; some very fine to medium grained sand, subangular to subround; little granules to very large pebbles, angular to subround; little clay; moist; medium stiff; weak cementation	(357.0 - 362.0') Rough drilling, slough in 4-inch rathole advance 6-inch for clean out.	
354									
355				Topock - Weathered Bedrock -	ML		(359.0 - 374.0') Topock - Weathered Bedrock - conglomerate; Sandy silt with gravel (ML); reddish brown (2.5YR 4/4); low plasticity; some very fine to very coarse grained sand, subangular		
356									
357									
358									
359									
360									




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Date Started:	06/20/2019	Surface Elevation:	465.4 ft amsl	Boring No.: <u>MW-91d</u>	
Date Completed:	07/31/2019	Northing (NAD83):	2103798.1		
Drilling Co.:	Cascade	Easting (NAD83):	7616739.7	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	417 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	E. Ramos / S. Vasquez	Depth to First Water:	9.6 ft bgs		
Drilling Asst:	O. Flores / L. Amaya	Sampling Method:	4 Inch X 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	GJ / SM / CS / DC / AM	Sampling Interval:	Continuous		
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
361	60			conglomerate			to subround; little granules to very large pebbles, angular to subround; little clay; trace coarser clasts composed of metadiorite; dry to moist; soft		
362							(361'); moist to wet		
363							(361.5'); moist to wet; soft; weak cementation; increase in sand, decrease in silt	(362.0 - 367.0') Soft drilling, slough in 4-inch rathole advance 6-inch for clean out.	
364							(363'); dry to moist		
365									
366									
367	120			Topock - Weathered Bedrock - conglomerate	ML				(367.0 - 372.0') Soft Drilling.
368							(369'); dry to moist; soft; weak cementation; increase in sand, decrease in silt		
369									
370		No Sieve Samples Collected							
371									
372									
373									
374									
375	60			Topock - Weathered Bedrock - conglomerate	SM		(374.0 - 377.0') Topock - Weathered Bedrock - conglomerate; Silty sand with gravel (SM); reddish brown (2.5YR 4/4); fine grained to very coarse grained, subangular to subround; some granules to very large pebbles, angular to subround; trace clay; moist; medium dense; moderate cementation		
376									
377				Topock - Weathered Bedrock - conglomerate	GW-GM		(377.0 - 377.5') Topock - Weathered Bedrock - conglomerate; Well graded gravel with silt and sand (GW-GM); reddish brown (2.5YR 4/4); granules to boulders, subangular to subround; little very fine to very coarse grained sand, subangular to subround; little silt; dry to moist; weak cementation	(377.0 - 382.0') Normal drilling.	
378				Topock - Weathered Bedrock - conglomerate					
379	60			Topock - Weathered Bedrock - conglomerate	GM		(377.5 - 382.0') Topock - Weathered Bedrock - conglomerate; Silty gravel with sand (GM); reddish brown (2.5YR 4/4); granules to very large pebbles, angular to subround; little very fine to very coarse grained sand, subangular to subround; little silt; trace clay; trace coarser clasts composed of metadiorite; dry to moist;		
380									


















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Date Started:	06/20/2019	Surface Elevation:	465.4 ft amsl	Boring No.: <u>MW-91d</u>	
Date Completed:	07/31/2019	Northing (NAD83):	2103798.1		
Drilling Co.:	Cascade	Easting (NAD83):	7616739.7	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	417 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	E. Ramos / S. Vasquez	Depth to First Water:	9.6 ft bgs		
Drilling Asst:	O. Flores / L. Amaya	Sampling Method:	4 Inch X 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	GJ / SM / CS / DC / AM	Sampling Interval:	Continuous		
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
381	60			Topock - Weathered Bedrock - conglomerate	GM		moderate cementation		
382									
383									
384									
385									
386									
387	132			Topock - Weathered Bedrock - conglomerate	CL		(382.0 - 390.0') Topock - Weathered Bedrock - conglomerate; Gravelly lean clay with sand (CL); reddish brown (2.5YR 4/4); medium plasticity; some granules to very large pebbles, angular to subround; little fine to coarse grained sand, subangular to subround; little silt; moist to wet; soft; weak cementation	(382.0 - 390.0') Normal drilling.	
388									
389									
390									
391									
392									
393									
394									
395									
396									
397	162			Topock - Weathered Bedrock - conglomerate	CL		(390.0 - 400.0') Topock - Weathered Bedrock - conglomerate; Gravelly lean clay with sand (CL); reddish brown (2.5YR 4/4); medium plasticity; some silt; little granules to large pebbles, angular to subround; little fine to very coarse grained sand, subangular to subround; moist; soft; weak cementation	(390.0 - 393.0') Rough drilling.	
398									
399									
400									

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Date Started:	06/20/2019	Surface Elevation:	465.4 ft amsl	Boring No.: <u>MW-91d</u>	
Date Completed:	07/31/2019	Northing (NAD83):	2103798.1		
Drilling Co.:	Cascade	Easting (NAD83):	7616739.7	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	417 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	E. Ramos / S. Vasquez	Depth to First Water:	9.6 ft bgs		
Drilling Asst:	O. Flores / L. Amaya	Sampling Method:	4 Inch X 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	GJ / SM / CS / DC / AM	Sampling Interval:	Continuous		
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
401	162			Topock - Weathered Bedrock - conglomerate	CL		(400.0 - 401.0') Topock - Weathered Bedrock - conglomerate; Gravelly lean clay with sand (CL); reddish brown (2.5YR 4/4); medium plasticity; some silt; little granules to large pebbles, angular to subround; little fine to very coarse grained sand, subangular to subround; trace small cobbles, subangular; moist; soft to medium stiff; weak cementation	(403.0 - 407.0') Soft drilling.	
402				Topock - Weathered Bedrock - conglomerate	GC		(401.0 - 402.2') Topock - Weathered Bedrock - conglomerate; Clayey gravel with sand (GC); reddish brown (2.5YR 4/4); granules to very large pebbles, angular to subround; little fine to very coarse grained sand, subangular to subround; little silt; little clay; little coarser clasts composed of metadiorite; moist; weak cementation		
403				Topock - Weathered Bedrock - conglomerate	ML		(402.2 - 403.6') Topock - Weathered Bedrock - conglomerate; Gravelly silt with sand (ML); reddish brown (2.5YR 4/4); low plasticity; some granules to very large pebbles, angular to subround; little medium to very coarse grained sand, subangular to subround; little clay; moist; soft; weak cementation		
404				Topock - Weathered Bedrock - conglomerate	GC		(403.6 - 404.0') Topock - Weathered Bedrock - conglomerate; Clayey gravel with sand (GC); reddish brown (2.5YR 4/4); granules to small cobbles, angular to subround; little medium to very coarse grained sand, subangular to subround; little silt; little clay; little coarser clasts composed of metadiorite; moist; weak cementation		
405				Topock - Weathered Bedrock - conglomerate	SM		(404.0 - 406.1') Topock - Weathered Bedrock - conglomerate; Silty sand with gravel (SM); reddish brown (2.5YR 4/4); fine grained to very coarse grained, subangular to subround; some granules to very large pebbles, angular to subround; little silt; little clay; little coarser clasts composed of metadiorite; moist; weak cementation		
406				Topock - Weathered Bedrock - conglomerate	SM		(406.1 - 407.0') Topock - Weathered Bedrock - conglomerate; Sandy lean clay with gravel (CL); reddish brown (2.5YR 4/4); medium plasticity; some silt; little granules to large pebbles, subangular to subround; little fine to very coarse grained sand, subangular to subround; moist; soft; weak cementation		
407	120			Topock - Weathered Bedrock - conglomerate	CL		(407.0 - 408.0') Topock - Weathered Bedrock - conglomerate; Silty sand with gravel (SM); reddish brown (2.5YR 4/4); fine grained to very coarse grained, subangular to subround; low plasticity; some granules to very large pebbles, angular to subround; little silt; little clay; moist; weak cementation	(412.0 - 417.0') Groundwater sample turbidity could not get below 10 NTU with the use of three filters. Well screen fell to 413.9' - 418.9' prior to collecting sample. Used water to flush the casing of fines prior to the installation of the bentonite seal.	(412.0 - 417.0') 375 gallons of water used; 0 gallons of water recovered; 375 gallons of water lost
408				Topock - Weathered Bedrock - conglomerate	SM		(408.0 - 411.0') Topock - Weathered Bedrock - conglomerate; Clayey gravel with sand (GC); reddish brown (2.5YR 4/4); granules to small cobbles, angular to subround; some fine to very coarse grained sand, subangular to subround; little silt; little clay; moist; weak cementation		
409				Topock - Weathered Bedrock - conglomerate	GC		(411.0 - 414.8') Topock - Weathered Bedrock - conglomerate; Silty sand with gravel (SM); reddish brown (2.5YR 4/4); fine grained to very coarse grained, subangular to subround; low plasticity; some granules to very large pebbles, angular to subround; some silt; little clay; moist; weak cementation		
410				Topock - Weathered Bedrock - conglomerate	GC		(413.3') moist; weak cementation; increase in granules and pebbles and sand, decrease in silt and clay		
411				Topock - Weathered Bedrock - conglomerate	GM		(414.8 - 417.0') Topock - Weathered Bedrock - conglomerate; Silty gravel with sand (GM); reddish brown (2.5YR 4/4); granules to very large pebbles, angular to subround; some fine to very coarse grained sand, subangular to subround; little silt; little clay; some coarser clasts composed of metadiorite; moist; moderate cementation		
412				Topock - Weathered Bedrock - conglomerate	GM				
413				Topock - Weathered Bedrock - conglomerate	SM				
414				Topock - Weathered Bedrock - conglomerate	SM				
415				Topock - Weathered Bedrock - conglomerate	SM				
416				Topock - Weathered Bedrock - conglomerate	GM				
417				Topock - Weathered Bedrock - conglomerate	GM				
418							End of Boring at 417.0' bgs.		
419									
420									

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Date Started:	08/09/2019	Surface Elevation:	465.5 ft amsl	Boring No.: MW-91s	
Date Completed:	08/12/2019	Northing (NAD83):	2103782.1		
Drilling Co.:	Cascade	Easting (NAD83):	7616745.1	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	127 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	10-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Steve Vasquez	Depth to First Water:	9.6 ft bgs		
Drilling Asst:	O. Flores / L. Amaya	Sampling Method:	4 inch x 10 ft. Core Barrel	Project Number:	RC000753.0051
Logger:	Anthony Mack	Sampling Interval:	Screen Intervals		
Editor:	Grant Wilford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
1							(0.0 - 17.0') No recovery (NR); did not collect or log core, see MW-91d for lithology	(0.0 - 17.0') Soft drilling.	(0.0 - 40.0') No water used
2									
3									
4									
5									
6									
7									
8									
9	0				NR				
10		No Sieve Samples Collected							
11									
12									
13									
14			MW-X-VAS-12-17 (<0.033 U ppb) 6/25/2019 15:10						
15									
16									
17							(17.0 - 27.0') No recovery (NR)	(17.0 - 27.0') Loose fine grained sands did not stay in core barrel.	
18	0				NR				
19									
20									




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Date Started:	08/09/2019	Surface Elevation:	465.5 ft amsl	Boring No.: <u>MW-91s</u>	
Date Completed:	08/12/2019	Northing (NAD83):	2103782.1		
Drilling Co.:	Cascade	Easting (NAD83):	7616745.1	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	127 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	10-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Steve Vasquez	Depth to First Water:	9.6 ft bgs		
Drilling Asst:	O. Flores / L. Amaya	Sampling Method:	4 inch x 10 ft. Core Barrel	Project Number:	RC000753.0051
Logger:	Anthony Mack	Sampling Interval:	Screen Intervals		
Editor:	Grant Wilford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
21	0				NR				
22									
23									
24									
25									
26	120	No Sieve Samples Collected		Topock - Fill	SP		(27.0 - 36.0') Topock - Fill; Poorly graded sand (SP); dark yellowish brown (10YR 4/4); very fine grained to medium grained, subangular to round; trace silt; wet	(27.0 - 40.0') Soft drilling.	
27									
28									
29									
30									
31									
32									
33									
34									
35									
36									
37									
38									
39									
40									
				Topock - Fluvial Deposits	SW		(36.0 - 46.5') Topock - Fluvial Deposits; Well graded sand with gravel (SW); grayish brown (10YR 5/2); fine grained to very coarse grained, subangular to subround; little granules to small pebbles, subangular to subround; trace silt; wet		

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Date Started:	08/09/2019	Surface Elevation:	465.5 ft amsl	Boring No.: <u>MW-91s</u>	
Date Completed:	08/12/2019	Northing (NAD83):	2103782.1		
Drilling Co.:	Cascade	Easting (NAD83):	7616745.1	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	127 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	10-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Steve Vasquez	Depth to First Water:	9.6 ft bgs		
Drilling Asst:	O. Flores / L. Amaya	Sampling Method:	4 inch x 10 ft. Core Barrel	Project Number:	RC000753.0051
Logger:	Anthony Mack	Sampling Interval:	Screen Intervals		
Editor:	Grant Wilford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid		
41	120			Topock - Fluvial Deposits	SW		(44.5'); little granules to large pebbles; increase in pebble size	(40.0') Retracked 10-inch casing and started flushing casing to get past due to rough drilling at 119 to 124 ft. bgs. and too much torque on the drill head.	(40.0 - 127.0') 4960.4 gallons of water used; 2031.68 gallons of water recovered; 2928.72 gallons of water lost		
42											
43											
44											
45											
46	0	No Sieve Samples Collected		Topock - Fluvial Deposits	GW		(46.5 - 47.0') Topock - Fluvial Deposits; Well graded gravel with sand (GW); dark grayish brown / dark yellowish brown (10YR 4/2); angular to subangular; some fine to coarse grained sand, subangular to subround; trace silt				
47											
48				NR			(47.0 - 97.0') No recovery (NR); did not collect or log core, see MW-91d for lithology				
49											
50											
51											
52											
53											
54											
55											
56											
57											
58											
59											
60											

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Boring Log

Sheet: 4 of 7

Date Started:	08/09/2019	Surface Elevation:	465.5 ft amsl	Boring No.: MW-91s	
Date Completed:	08/12/2019	Northing (NAD83):	2103782.1		
Drilling Co.:	Cascade	Easting (NAD83):	7616745.1	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	127 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	10-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Steve Vasquez	Depth to First Water:	9.6 ft bgs		
Drilling Asst:	O. Flores / L. Amaya	Sampling Method:	4 inch x 10 ft. Core Barrel	Project Number:	RC000753.0051
Logger:	Anthony Mack	Sampling Interval:	Screen Intervals		
Editor:	Grant Wilford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
61									
62									
63									
64									
65									
66									
67									
68									
69									
70	0	No Sieve Samples Collected			NR				
71									
72									
73			MW-X-VAS-71-76 (<0.033 U ppb) 6/27/2019 08:52						
74									
75									
76									
77									
78									
79									
80									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval at MW-91d, groundwater data was collected from MW-91d

Date Started:	08/09/2019	Surface Elevation:	465.5 ft amsl	Boring No.: MW-91s	
Date Completed:	08/12/2019	Northing (NAD83):	2103782.1		
Drilling Co.:	Cascade	Easting (NAD83):	7616745.1	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	127 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	10-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Steve Vasquez	Depth to First Water:	9.6 ft bgs		
Drilling Asst:	O. Flores / L. Amaya	Sampling Method:	4 inch x 10 ft. Core Barrel	Project Number:	RC000753.0051
Logger:	Anthony Mack	Sampling Interval:	Screen Intervals		
Editor:	Grant Wilford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
81									
82									
83									
84									
85									
86									
87									
88									
89	0				NR				
90		No Sieve Samples Collected							
91									
92									
93									
94									
95									
96									
97								(95.0') Rough drilling starts.	
98									
99	120			Topock - Fluvial Deposits	SW		(97.0 - 107.0') Topock - Fluvial Deposits; Well graded sand (SW); brown (10YR 4/3); fine grained to very coarse grained, subangular to subround; trace granules, subangular to subround; wet		
100									

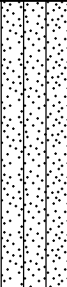

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Date Started:	08/09/2019	Surface Elevation:	465.5 ft amsl	Boring No.: <u>MW-91s</u>	
Date Completed:	08/12/2019	Northing (NAD83):	2103782.1		
Drilling Co.:	Cascade	Easting (NAD83):	7616745.1	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	127 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	10-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Steve Vasquez	Depth to First Water:	9.6 ft bgs		
Drilling Asst:	O. Flores / L. Amaya	Sampling Method:	4 inch x 10 ft. Core Barrel	Project Number:	RC000753.0051
Logger:	Anthony Mack	Sampling Interval:	Screen Intervals		
Editor:	Grant Wilford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
101	120	No Sieve Samples Collected		Topock - Fluvial Deposits	SW				
102									
103									
104									
105									
106									
107									
108	MW-X-VAS-107-112 (<0.033 U ppb) 6/27/2019 15:04		Topock - Fluvial Deposits	GW		(107.0 - 108.0') Topock - Fluvial Deposits; Well graded gravel with sand (GW); brown (10YR 4/3); granules to very large pebbles, angular to subround; some very fine to medium grained sand, subangular to subround; trace silt			
109			Topock - Fluvial Deposits	SM		(108.0 - 112.0') Topock - Fluvial Deposits; Silty sand with gravel (SM); dark grayish brown / dark yellowish brown (10YR 4/2); very fine grained to medium grained, subangular to subround; some granules to large pebbles, angular to subround; some silt; trace angular to subround; wet			
110									
111									
112	MW-X-VAS-112-117 (<0.033 U ppb) 6/28/2019 09:56	Topock - Fluvial Deposits	GW		(112.0 - 116.0') Topock - Fluvial Deposits; Well graded gravel with sand (GW); dark grayish brown / dark yellowish brown (10YR 4/2); granules to large cobbles, subangular to round; some fine to very coarse grained sand, subangular to subround; trace small cobbles; wet				
113									
114									
115									
116		Topock - Alluvium Deposits	GW-GM		(116.0 - 117.0') Topock - Alluvium Deposits; Well graded gravel with silt and sand (GW-GM); brown (7.5YR 4/4) trace weak red / pale reddish brown (10R 5/4); granules to small cobbles, angular to round; some very fine to medium grained sand, subangular to round; little silt; wet				
117	84			Topock - Alluvium Deposits	SM		(117.0 - 124.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (5YR 4/3) trace red (10R 5/6); very fine grained to medium grained, subangular to subround; some granules to large pebbles, angular to subround; some silt; trace angular to subround; wet (118'); increase in granules and pebbles	(119.0 - 124.0') Rough drilling due to large	
118									
119									
120									

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Date Started:	08/09/2019	Surface Elevation:	465.5 ft amsl	Boring No.: MW-91s
Date Completed:	08/12/2019	Northing (NAD83):	2103782.1	
Drilling Co.:	Cascade	Easting (NAD83):	7616745.1	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	127 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	10-12 inches	Location: PG&E Topock, Needles, California
Driller Name:	Steve Vasquez	Depth to First Water:	9.6 ft bgs	
Drilling Asst:	O. Flores / L. Amaya	Sampling Method:	4 inch x 10 ft. Core Barrel	Project Number: RC000753.0051
Logger:	Anthony Mack	Sampling Interval:	Screen Intervals	
Editor:	Grant Wilford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
121	84			Topock - Alluvium Deposits	SM			cobbles and boulders in the formation, increased torque caused spindle bolts to shear. Start flusing casing with water	
122									
123									
124									
125	0				NR		(124.0 - 127.0') No recovery (NR); Did not collect or log core, see MW-91d for lithology	(124.0 - 127.0') Drilled an extra 3 ft to get through boulders and cobbles.	
126									
127									
End of Boring at 127.0' bgs.									
128	<div>Final 1213119</div>								
129									
130									
131									
132									
133									
134									
135									
136									
137									
138									
139									
140									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval at MW-91d, groundwater data was collected from MW-91d

Date Started:	09/10/2019	Surface Elevation:	460.4 ft amsl	Well ID: MW-92-37, MW-92-72
Date Completed:	09/24/2019	Shallow Well Elevation:	462.0 ft amsl	
Drilling Co.:	Cascade	Deep Well Elevation:	462.0 ft amsl	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	2102811.6	Project: Final GW Remedy Phase 1
Driller Name:	Steve Vasquez	Easting (NAD83):	7617576.7	Location: PG&E Topock, Needles, California
Drilling Asst:	L. Amaya / O. Flores	Borehole Diameter:	10-12 inches	
Logger:	David Cornell	Water Level Start:	5.22 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	10/22/2019	
Total Depth:	77 ft bgs	Well Completion:	<input type="checkbox"/> Flush <input checked="" type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
0					(+2.2 - 3.0') Monument painted desert sand (+0.6 - 3.0') Concrete Pad (+1.5 - 17.0') 2" PVC Sch 40 Casing		Note: 12x12-inch Lockable Steel Monument (+0.6 - 3.0') 17 bags Note: 24-inch Diameter Concrete Pad, King Kon-Crete 4000 PSI, Mixed with Buff dye
1							
2							
3							
4							
5							
6							
7					(1.5 - 13.0') Portland Cement 6% Bentonite	(1.5 - 13.0') 63.3 gallons	(1.5 - 13.0') 85 gallons (34%) Note: Type I, II and V and Benseal, used >20% of the calculated volume due to potential migration into the formation
8							
9			NR				
10					(9.5 - 10.5') Centralizer		
11							
12							
13							
14	MW-Y'-VAS-12-17 (<0.033 U ppb) 8/20/2019 13:58				(13.0 - 15.0') Bentonite seal chips	(13.0 - 15.0') 2.1 bags	(13.0 - 15.0') 2.5 bags (19%) Note: Puregold Medium Chips
15					(15.0 - 41.0') Cemex #3 MESH (8x10)		
16						(15.0 - 41.0') 26.5 bags	(15.0 - 41.0') 30 bags (13%) Note: Lapis Lustre Sand
17		Topock - Fluvial Deposits	SP		(17.0 - 77.0') 10.0" Borehole		

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, groundwater data was collected from MW-91d

Date Started:	09/10/2019	Surface Elevation:	460.4 ft amsl	Well ID: MW-92-37, MW-92-72
Date Completed:	09/24/2019	Shallow Well Elevation:	462.0 ft amsl	
Drilling Co.:	Cascade	Deep Well Elevation:	462.0 ft amsl	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	2102811.6	Project: Final GW Remedy Phase 1
Driller Name:	Steve Vasquez	Easting (NAD83):	7617576.7	Location: PG&E Topock, Needles, California
Drilling Asst:	L. Amaya / O. Flores	Borehole Diameter:	10-12 inches	
Logger:	David Cornell	Water Level Start:	5.22 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	10/22/2019	
Total Depth:	77 ft bgs	Well Completion:	<input type="checkbox"/> Flush <input checked="" type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
18					(17.0 - 37.0') 2" Sch 40 PVC (20-slot) Screen		
19							
20							
21		Topock - Fluvial Deposits	SP				
22							
23							
24							
25							
26		Topock - Fluvial Deposits	SP				
27							
28					(17.0 - 77.0') 10.0" Borehole	(15.0 - 41.0') 26.5 bags	(15.0 - 41.0') 30 bags (13%) Note: Lapis Lustre Sand
29							
30							
31							
32							
33			NR				
34							
35							
36							
37			NR				

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, groundwater data was collected from MW-91d

Date Started:	09/10/2019	Surface Elevation:	460.4 ft amsl	Well ID: MW-92-37, MW-92-72
Date Completed:	09/24/2019	Shallow Well Elevation:	462.0 ft amsl	
Drilling Co.:	Cascade	Deep Well Elevation:	462.0 ft amsl	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	2102811.6	Project: Final GW Remedy Phase 1
Driller Name:	Steve Vasquez	Easting (NAD83):	7617576.7	Location: PG&E Topock, Needles, California
Drilling Asst:	L. Amaya / O. Flores	Borehole Diameter:	10-12 inches	
Logger:	David Cornell	Water Level Start:	5.22 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	10/22/2019	
Total Depth:	77 ft bgs	Well Completion:	<input type="checkbox"/> Flush <input checked="" type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
38					(37.5 - 38.5') Centralizer		
39					(37.0 - 39.4') Sump and End Cap	(15.0 - 41.0') 26.5 bags	(15.0 - 41.0') 30 bags (13%) Note: Lapis Lustre Sand
40							
41							
42			NR				
43							
44							
45					(41.0 - 49.8') Bentonite seal chips	(41.0 - 49.8') 6.4 bags	(41.0 - 49.8') 7 bags (9%) Note: Puregold Medium Chips
46							
47							
48		Topock - Fluvial Deposits	SP		(17.0 - 77.0') 10.0" Borehole		
49							
50		Topock - Fluvial Deposits	SP-SM				
51							
52					(52.0 - 72.0') 2" Sch 40 PVC (20-slot) Screen		
53		Topock - Fluvial Deposits	SP				
54	MW-Y'-VAS-52-57 (<0.033 U ppb) 8/21/2019 11:41				(49.8 - 76.5') Cemex #3 MESH (8x10)	(49.8 - 76.5') 28.1 bags	(49.8 - 76.5') 33 bags (17%) Note: Lapis Lustre Sand
55							
56			NR				
57		Topock - Fluvial Deposits	SP				

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, groundwater data was collected from MW-91d

Well Construction Log

Sheet: 4 of 4

Date Started: 09/10/2019	Surface Elevation: 460.4 ft amsl	Well ID: MW-92-37, MW-92-72
Date Completed: 09/24/2019	Shallow Well Elevation: 462.0 ft amsl	
Drilling Co.: Cascade	Deep Well Elevation: 462.0 ft amsl	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): 2102811.6	Project: Final GW Remedy Phase 1
Driller Name: Steve Vasquez	Easting (NAD83): 7617576.7	Location: PG&E Topock, Needles, California
Drilling Asst: L. Amaya / O. Flores	Borehole Diameter: 10-12 inches	
Logger: David Cornell	Water Level Start: 5.22 ft bgs	Project Number: RC000753.0051
Editor: Sean McGrane	Development End Date: 10/22/2019	
Total Depth: 77 ft bgs	Well Completion: <input type="checkbox"/> Flush <input checked="" type="checkbox"/> Stick-up	

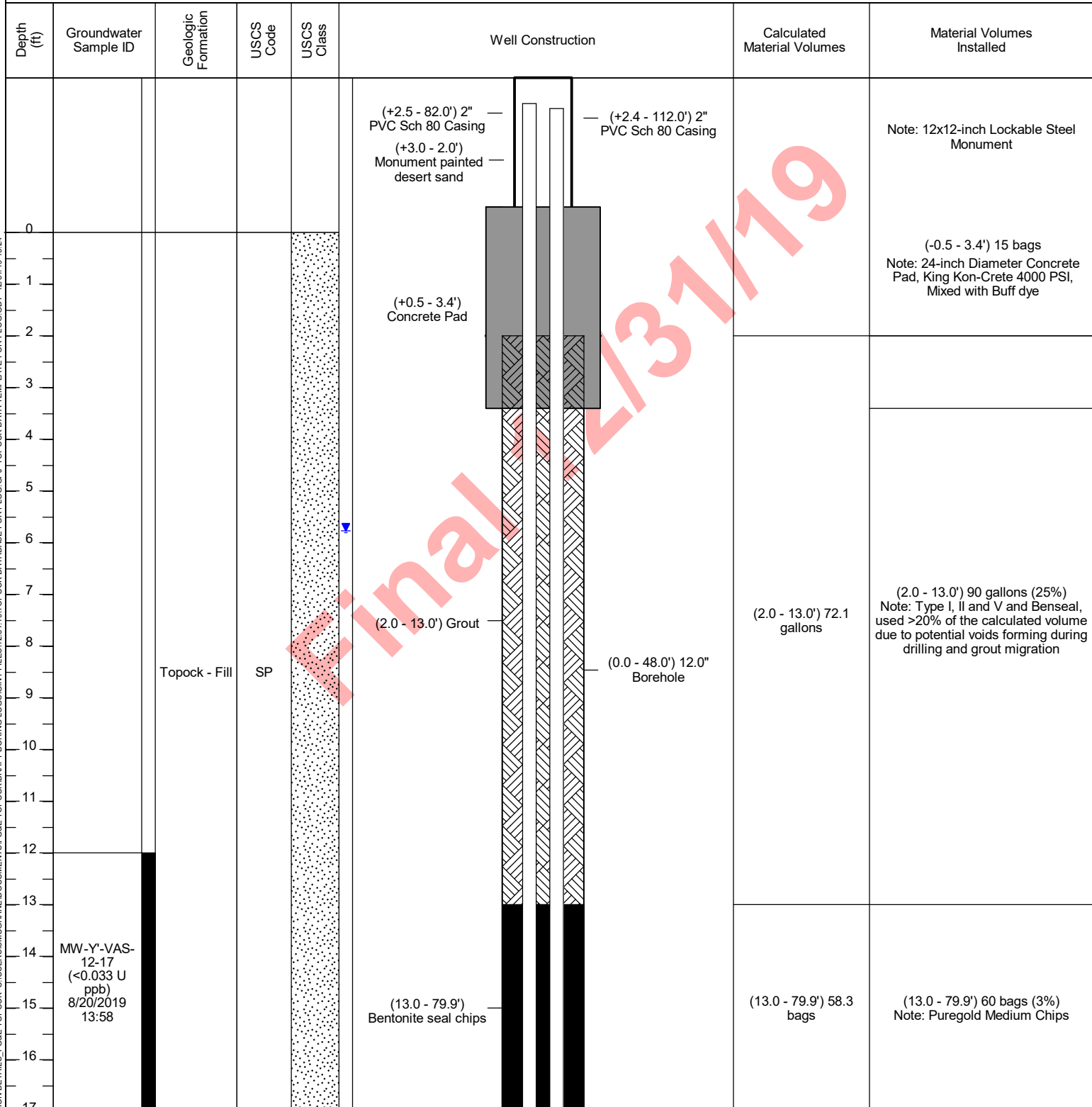
Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
58					(52.0 - 72.0') 2" Sch 40 PVC (20-slot) Screen		
59		Topock - Fluvial Deposits	SP				
60							
61							
62		Topock - Fluvial Deposits	SP				
63							
64							
65			NR				
66							
67		Topock - Fluvial Deposits	SP		(49.8 - 76.5') Cemex #3 MESH (8x10)	(49.8 - 76.5') 28.1 bags	(49.8 - 76.5') 33 bags (17%) Note: Lapis Lustre Sand
68					(17.0 - 77.0') 10.0" Borehole		
69							
70		Topock - Fluvial Deposits	SP-SM				
71							
72							
73					(72.5 - 73.5') Centralizer		
74							
75		Topock - Fluvial Deposits	SP		(72.0 - 74.4') Sump and End Cap		
76							
77			NR		(76.5 - 77.0') Formation Collapse		
					End of Boring at 77.0' bgs.		

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, groundwater data was collected from MW-91d

Well Construction Log

Sheet: 1 of 7

Date Started: 09/06/2019	Surface Elevation: 460.0 ft amsl	Well ID: MW-92-102, MW-92-122
Date Completed: 09/25/2019	Shallow Well Elevation: 462.4 ft amsl	
Drilling Co.: Cascade	Deep Well Elevation: 462.3 ft amsl	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): 2102813.6	Project: Final GW Remedy Phase 1
Driller Name: J. Khem / S. Vasquez	Easting (NAD83): 7617583.9	Location: PG&E Topock, Needles, California
Drilling Asst: L. Amaya / O. Flores	Borehole Diameter: 6-12 inches	
Logger: G. Willford / D. Cornell	Water Level Start: 5.77 ft bgs	Project Number: RC000753.0051
Editor: Sean McGrane	Development End Date: 10/31/2019	
Total Depth: 137 ft bgs	Well Completion: <input type="checkbox"/> Flush <input checked="" type="checkbox"/> Stick-up	



Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery

Date Started:	09/06/2019	Surface Elevation:	460.0 ft amsl	Well ID: MW-92-102, MW-92-122
Date Completed:	09/25/2019	Shallow Well Elevation:	462.4 ft amsl	
Drilling Co.:	Cascade	Deep Well Elevation:	462.3 ft amsl	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	2102813.6	Project: Final GW Remedy Phase 1
Driller Name:	J. Khem / S. Vasquez	Easting (NAD83):	7617583.9	Location: PG&E Topock, Needles, California
Drilling Asst:	L. Amaya / O. Flores	Borehole Diameter:	6-12 inches	
Logger:	G. Willford / D. Cornell	Water Level Start:	5.77 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	10/31/2019	
Total Depth:	137 ft bgs	Well Completion:	<input type="checkbox"/> Flush <input checked="" type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
18		Topock - Fill	SP		(+2.5 - 82.0') 2" PVC Sch 80 Casing		
19							
20					(19.5 - 20.5') Centralizer		
21							
22		Topock - Fluvial Deposits	SP-SM				
23							
24							
25							
26							
27					(13.0 - 79.9') Bentonite seal chips	(0.0 - 48.0') 12.0" Borehole	(13.0 - 79.9') 58.3 bags
28							(13.0 - 79.9') 60 bags (3%) Note: Puregold Medium Chips
29							
30							
31							
32			NR				
33							
34							
35							
36							
37							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery

Date Started:	09/06/2019	Surface Elevation:	460.0 ft amsl	Well ID: MW-92-102, MW-92-122
Date Completed:	09/25/2019	Shallow Well Elevation:	462.4 ft amsl	
Drilling Co.:	Cascade	Deep Well Elevation:	462.3 ft amsl	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	2102813.6	Project: Final GW Remedy Phase 1
Driller Name:	J. Khem / S. Vasquez	Easting (NAD83):	7617583.9	Location: PG&E Topock, Needles, California
Drilling Asst:	L. Amaya / O. Flores	Borehole Diameter:	6-12 inches	
Logger:	G. Willford / D. Cornell	Water Level Start:	5.77 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	10/31/2019	
Total Depth:	137 ft bgs	Well Completion:	<input type="checkbox"/> Flush <input checked="" type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
38					(+2.5 - 82.0') 2" PVC Sch 80 Casing		
39							
40							
41							
42			NR				
43							
44							
45							
46							
47					(13.0 - 79.9') Bentonite seal chips	(13.0 - 79.9') 58.3 bags	(13.0 - 79.9') 60 bags (3%) Note: Puregold Medium Chips
48							
49							
50							
51							
52		Topock - Fluvial Deposits	SP				
53							
54	MW-Y'-VAS-52-57 (<0.033 U ppb) 8/21/2019 11:41						
55							
56							
57							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery

Date Started:	09/06/2019	Surface Elevation:	460.0 ft amsl	Well ID: MW-92-102, MW-92-122
Date Completed:	09/25/2019	Shallow Well Elevation:	462.4 ft amsl	
Drilling Co.:	Cascade	Deep Well Elevation:	462.3 ft amsl	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	2102813.6	Project: Final GW Remedy Phase 1
Driller Name:	J. Khem / S. Vasquez	Easting (NAD83):	7617583.9	Location: PG&E Topock, Needles, California
Drilling Asst:	L. Amaya / O. Flores	Borehole Diameter:	6-12 inches	
Logger:	G. Willford / D. Cornell	Water Level Start:	5.77 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	10/31/2019	
Total Depth:	137 ft bgs	Well Completion:	<input type="checkbox"/> Flush <input checked="" type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
58		Topock - Fluvial Deposits	SP		(+2.5 - 82.0') 2" PVC Sch 80 Casing		
59							
60					(59.5 - 60.5') Centralizer		
61							
62							
63		Topock - Fluvial Deposits	SP-SM				
64							
65							
66							
67					(13.0 - 79.9') Bentonite seal chips	(48.0 - 126.0') 10.0" Borehole	(13.0 - 79.9') 58.3 bags
68							
69		Topock - Fluvial Deposits	SW-SM				
70							
71							
72							
73							
74			NR				
75							
76							
77							


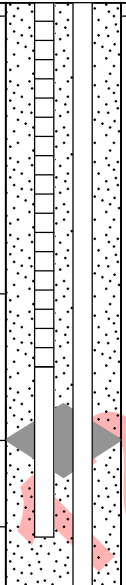

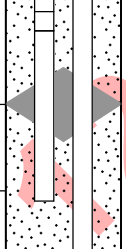
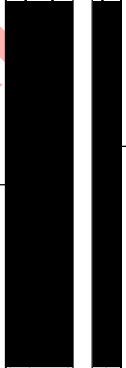
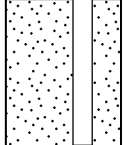
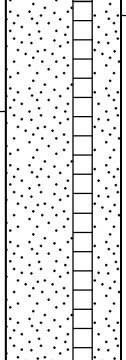
Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery

Date Started:	09/06/2019	Surface Elevation:	460.0 ft amsl	Well ID: MW-92-102, MW-92-122
Date Completed:	09/25/2019	Shallow Well Elevation:	462.4 ft amsl	
Drilling Co.:	Cascade	Deep Well Elevation:	462.3 ft amsl	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	2102813.6	Project: Final GW Remedy Phase 1
Driller Name:	J. Khem / S. Vasquez	Easting (NAD83):	7617583.9	Location: PG&E Topock, Needles, California
Drilling Asst:	L. Amaya / O. Flores	Borehole Diameter:	6-12 inches	
Logger:	G. Willford / D. Cornell	Water Level Start:	5.77 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	10/31/2019	
Total Depth:	137 ft bgs	Well Completion:	<input type="checkbox"/> Flush <input checked="" type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
78		Topock - Fluvial Deposits	SP-SM		(+2.5 - 82.0') 2" PVC Sch 80 Casing		
79					(13.0 - 79.9') Bentonite seal chips	(13.0 - 79.9') 58.3 bags	(13.0 - 79.9') 60 bags (3%) Note: Puregold Medium Chips
80							
81							
82		Topock - Fluvial Deposits	SW-SM		(82.0 - 102.0') 2" Sch 80 PVC (20-slot) Screen		
83							
84							
85							
86							
87							
88							
89					(79.9 - 105.0') Cemex #3 MESH (8x10)	(79.9 - 105.0') 25.5 bags	(79.9 - 105.0') 30 bags (18%) Note: Lapis Lustre Sand
90							
91							
92		Topock - Fluvial Deposits	SM				
93							
94	MW-Y-VAS-92-97 (0.31 ppb) 8/22/2019 11:43						
95							
96							
97							

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Date Started:	09/06/2019	Surface Elevation:	460.0 ft amsl	Well ID: MW-92-102, MW-92-122
Date Completed:	09/25/2019	Shallow Well Elevation:	462.4 ft amsl	
Drilling Co.:	Cascade	Deep Well Elevation:	462.3 ft amsl	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	2102813.6	Project: Final GW Remedy Phase 1
Driller Name:	J. Khem / S. Vasquez	Easting (NAD83):	7617583.9	Location: PG&E Topock, Needles, California
Drilling Asst:	L. Amaya / O. Flores	Borehole Diameter:	6-12 inches	
Logger:	G. Willford / D. Cornell	Water Level Start:	5.77 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	10/31/2019	
Total Depth:	137 ft bgs	Well Completion:	<input type="checkbox"/> Flush <input checked="" type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction			Calculated Material Volumes	Material Volumes Installed
98	MW-Y'-VAS-98-103 (<0.033 U ppb) 8/23/2019 21:24	Topock - Fluvial Deposits	SM		(82.0 - 102.0') 2" Sch 80 PVC (20-slot) Screen		(+2.4 - 112.0') 2" PVC Sch 80 Casing	(79.9 - 105.0') 25.5 bags	(79.9 - 105.0') 30 bags (18%) Note: Lapis Lustre Sand
99									
100									
101									
102		Topock - Competent Bedrock - conglomerate			(102.5 - 103.5') Centralizer				
103									
104									
105									
106									
107									
108									
109									
110							(48.0 - 126.0') 10.0" Borehole	(105.0 - 110.0') 4.8 buckets	(105.0 - 110.0') 4 buckets (-17%) Note: Pel-Plug (TR30) 3/8"
111									
112									
113									
114	MW-Y'-VAS-112-117 (<0.033 U ppb) 8/23/2019 15:11				(110.0 - 127.0') Cemex #3 MESH (8x10)		(112.0 - 122.0') 2" Sch 80 PVC (20-slot) Screen	(110.0 - 127.0') 16.8 bags	(110.0 - 127.0') 20 bags (19%) Note: Lapis Lustre Sand
115									
116									
117									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery

Date Started:	09/06/2019	Surface Elevation:	460.0 ft amsl	Well ID: MW-92-102, MW-92-122
Date Completed:	09/25/2019	Shallow Well Elevation:	462.4 ft amsl	
Drilling Co.:	Cascade	Deep Well Elevation:	462.3 ft amsl	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	2102813.6	Project: Final GW Remedy Phase 1
Driller Name:	J. Khem / S. Vasquez	Easting (NAD83):	7617583.9	Location: PG&E Topock, Needles, California
Drilling Asst:	L. Amaya / O. Flores	Borehole Diameter:	6-12 inches	
Logger:	G. Willford / D. Cornell	Water Level Start:	5.77 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	10/31/2019	
Total Depth:	137 ft bgs	Well Completion:	<input type="checkbox"/> Flush <input checked="" type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
118					(112.0 - 122.0') 2" Sch 80 PVC (20-slot) Screen		
119							
120							
121							
122					(110.0 - 127.0') Cemex #3 MESH (8x10)	(110.0 - 127.0') 16.8 bags	(110.0 - 127.0') 20 bags (19%) Note: Lapis Lustre Sand
123					(122.5 - 123.5') Centralizer		
124							
125					(122.0 - 124.3') Sump and End Cap		
126							
127		Topock - Competent Bedrock - conglomerate					
128							
129							
130							
131							
132					(127.0 - 137.0') Bentonite seal pellets	(127.0 - 137.0') 3.45 buckets	(127.0 - 137.0') 3.75 buckets (9%) Note: Pel-Plug (TR30) 3/8"
133							
134	no sample (interval did not produce) 8/24/2019 12:55						
135							
136							
137					End of Boring at 137.0' bgs.		

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery

Date Started:	08/20/2019	Surface Elevation:	460.0 ft amsl	Boring No.: <u>MW-92d</u>	
Date Completed:	09/05/2019	Northing (NAD83):	2102813.6		
Drilling Co.:	Cascade	Easting (NAD83):	7617583.9	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	137 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Pro-Sonic Truck Mounted	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	J. Khem / S. Vasquez	Depth to First Water:	4.6 ft bgs		
Drilling Asst:	L. Amaya / O. Flores	Sampling Method:	4 inch x 10 ft. Core Barrel	Project Number:	RC000753.0051
Logger:	G. Willford / D. Cornell	Sampling Interval:	Continuous		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
1	60	No Sieve Samples Collected		Topock - Fill	SP		(0.0 - 18.0') Topock - Fill; Poorly graded sand (SP); pale yellow (2.5Y 7/3); very fine grained to fine grained, subangular to subround; trace silt; some organics; dry; homogeneous	(0.0 - 3.0') Area around borehole subsided overnight after advancing the 10-inch casing.	(0.0 - 97.0') 4437 gallons of water used; 0 gallons of water recovered; 4437 gallons of water lost
2									
3									
4									
5									
6									
7	120	No Sieve Samples Collected		Topock - Fill	SP		(7'); moist; no organics	(7.0 - 17.0') Heaving sands.	
8									
9									
10							(10'); wet		
11									
12									
13									
14									
15									
16									
17	102	No Sieve Samples Collected	MW-Y'-VAS-12-17 (<0.033 U ppb) 8/20/2019 13:58	Topock - Fluvial Deposits	SP-SM		(18.0 - 26.0') Topock - Fluvial Deposits; Poorly graded sand with silt (SP-SM); grayish brown (10YR 5/2) with pale yellow (2.5Y 7/3); very fine grained to fine grained, subangular to round; little silt; trace clay; some organics; moist to wet (19'); no organics	(12.0 - 17.0') Sample interval was chosen based on moisture content of soils. Static water during sampling was higher possible from drill water used for heaving sands or possible confining unit.	(17.0 - 37.0') Soft drilling. Very loose material being pushed out by core barrel causing poor recovery. Heaving sands encountered.
18									
19									
20									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	08/20/2019	Surface Elevation:	460.0 ft amsl	Boring No.: MW-92d	
Date Completed:	09/05/2019	Northing (NAD83):	2102813.6		
Drilling Co.:	Cascade	Easting (NAD83):	7617583.9	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	137 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Pro-Sonic Truck Mounted	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	J. Khem / S. Vasquez	Depth to First Water:	4.6 ft bgs		
Drilling Asst:	L. Amaya / O. Flores	Sampling Method:	4 inch x 10 ft. Core Barrel	Project Number:	RC000753.0051
Logger:	G. Willford / D. Cornell	Sampling Interval:	Continuous		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
21							(20'); some organics		
22							(20.5'); no organics		
23				Topock - Fluvial Deposits	SP-SM				
24									
25									
26									
27							(26.0 - 37.0') No recovery (NR)		
28									
29	102								
30		No Sieve Samples Collected							
31									
32					NR			(30.0') Due to borehole conditions 10" casing was retreated from 75 ft bgs to 30 ft bgs and re-advanced to 70 ft bgs on 8.26.19.	
33									
34									
35									
36									
37									
38							(37.0 - 47.0') No recovery (NR)		
39	6				NR			(37.0 - 47.0') Soft drilling. Very loose material being pushed out by core barrel causing poor recovery. Core barrel pushed down 10 ft bgs with very little to	
40									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	08/20/2019	Surface Elevation:	460.0 ft amsl	Boring No.: <u>MW-92d</u>	
Date Completed:	09/05/2019	Northing (NAD83):	2102813.6		
Drilling Co.:	Cascade	Easting (NAD83):	7617583.9	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	137 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Pro-Sonic Truck Mounted	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	J. Khem / S. Vasquez	Depth to First Water:	4.6 ft bgs		
Drilling Asst:	L. Amaya / O. Flores	Sampling Method:	4 inch x 10 ft. Core Barrel	Project Number:	RC000753.0051
Logger:	G. Willford / D. Cornell	Sampling Interval:	Continuous		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
41	6				NR			no resistance, approximately 0.5 ft of soil in core barrel. Heaving sands encountered.	
42									
43									
44									
45									
46	120	No Sieve Samples Collected			SP		(47.0 - 60.0') Topock - Fluvial Deposits; Poorly graded sand (SP); very pale brown (10YR 7/3); very fine grained to fine grained, subangular to round; trace silt; moist to wet	(47.0 - 57.0') Soft drilling. Heaving sands encountered.	
47									
48									
49									
50									
51									
52									
53									
54									
55									
56	120						(55'); saturated		
57									
58									
59									
60									
							(57'); moist to wet	(57.0 - 67.0') Soft drilling. Heaving sands encountered.	

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	08/20/2019	Surface Elevation:	460.0 ft amsl	Boring No.: <u>MW-92d</u>	
Date Completed:	09/05/2019	Northing (NAD83):	2102813.6		
Drilling Co.:	Cascade	Easting (NAD83):	7617583.9	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	137 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Pro-Sonic Truck Mounted	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	J. Khem / S. Vasquez	Depth to First Water:	4.6 ft bgs		
Drilling Asst:	L. Amaya / O. Flores	Sampling Method:	4 inch x 10 ft. Core Barrel	Project Number:	RC000753.0051
Logger:	G. Willford / D. Cornell	Sampling Interval:	Continuous		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
61	120			Topock - Fluvial Deposits	SP-SM		(60.0 - 68.0') Topock - Fluvial Deposits; Poorly graded sand with silt (SP-SM); very pale brown (10YR 7/3); very fine grained to very fine grained, subangular to round; little medium grained sand, subangular to round; little silt; wet		
62									
63									
64									
65	54	No Sieve Samples Collected		Topock - Fluvial Deposits	SW-SM		(68.0 - 71.5') Topock - Fluvial Deposits; Well graded sand with silt and gravel (SW-SM); very pale brown (10YR 7/3); very fine grained to very coarse grained, subangular to round; little granules to large pebbles, subround to round; little silt; wet		
66									
67									
68									
69									
70									
71									
72	120			Topock - Fluvial Deposits	SP-SM		(71.5 - 77.0') No recovery (NR)	(67.0 - 77.0') Soft drilling. Very loose material being pushed out by core barrel causing poor recovery. Heaving sands encountered.	
73									
74									
75									
76									
77									
78	120			Topock - Fluvial Deposits	SP-SM		(77.0 - 80.0') Topock - Fluvial Deposits; Poorly graded sand with silt (SP-SM); very pale brown (10YR 7/3); very fine grained to medium grained, subangular to round; little granules to medium pebbles, subangular to round; little silt; wet	(77.0 - 87.0') Soft drilling. Very loose material being pushed out by core barrel causing poor recovery. Heaving sands encountered. Spindle bolts	
79									
80									

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Date Started:	08/20/2019	Surface Elevation:	460.0 ft amsl	Boring No.: <u>MW-92d</u>
Date Completed:	09/05/2019	Northing (NAD83):	2102813.6	
Drilling Co.:	Cascade	Easting (NAD83):	7617583.9	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	137 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Pro-Sonic Truck Mounted	Borehole Diameter:	6-12 inches	Location: PG&E Topock, Needles, California
Driller Name:	J. Khem / S. Vasquez	Depth to First Water:	4.6 ft bgs	
Drilling Asst:	L. Amaya / O. Flores	Sampling Method:	4 inch x 10 ft. Core Barrel	Project Number: RC000753.0051
Logger:	G. Willford / D. Cornell	Sampling Interval:	Continuous	
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
81	120			Topock - Fluvial Deposits	SW-SM		(80.0 - 87.5') Topock - Fluvial Deposits; Well graded sand with silt and gravel (SW-SM); very fine grained to very coarse grained, subangular to round; some granules to very large pebbles, subround to round; little silt; trace small cobbles, subround; wet	broke while advancing 6-inch casing.	
82									
83									
84									
85									
86	120	No Sieve Samples Collected		Topock - Fluvial Deposits	SM		(87.5 - 97.0') Topock - Fluvial Deposits; Silty sand with gravel (SM); pale brown (10YR 6/3); very fine grained to coarse grained, subangular to round; little granules to medium pebbles, subangular to round; little silt; trace small cobbles, round; trace clay; wet (88.0 - 88.2'); fat clay lense	(87.0 - 97.0') Soft drilling. Heaving sands encountered.	
87									
88									
89									
90									
91									
92									
93									
94									
95									
96	72		MW-Y-VAS-92-97 (0.31 ppb) 8/22/2019 11:43	Topock - Fluvial Deposits	SM		(97.0 - 101.6') Topock - Fluvial Deposits; Silty sand with gravel (SM); pale brown (10YR 6/3) some gray (10YR 6/1); very fine grained to coarse grained, subangular to round; little granules to large pebbles, subangular to round; little silt; trace clay; wet to moist		(97.0 - 107.0') No water used
97									
98									
99									
100									

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Date Started:	<u>08/20/2019</u>	Surface Elevation:	<u>460.0 ft amsl</u>	Boring No.: <u>MW-92d</u>
Date Completed:	<u>09/05/2019</u>	Northing (NAD83):	<u>2102813.6</u>	
Drilling Co.:	<u>Cascade</u>	Easting (NAD83):	<u>7617583.9</u>	Client: <u>PG&E</u>
Drilling Method:	<u>Sonic Drilling</u>	Total Depth:	<u>137 ft bgs</u>	Project: <u>Final GW Remedy Phase 1</u>
Drill Rig Type:	<u>Pro-Sonic Truck Mounted</u>	Borehole Diameter:	<u>6-12 inches</u>	Location: <u>PG&E Topock, Needles, California</u>
Driller Name:	<u>J. Khem / S. Vasquez</u>	Depth to First Water:	<u>4.6 ft bgs</u>	
Drilling Asst:	<u>L. Amaya / O. Flores</u>	Sampling Method:	<u>4 inch x 10 ft. Core Barrel</u>	Project Number: <u>RC000753.0051</u>
Logger:	<u>G. Willford / D. Cornell</u>	Sampling Interval:	<u>Continuous</u>	
Editor:	<u>Sean McGrane</u>	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

SOIL BORING LOG PG&E TOPOCK C:\USERS\SMCGRANE\DOCUMENTS\PG&E TOPOCK\DATABASE FOR PLOG.GPJ TOPOCK DATA TEMPLATE FOR PLOG.GDT 12/31/19 14:27

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	08/20/2019	Surface Elevation:	460.0 ft amsl	Boring No.: <u>MW-92d</u>	
Date Completed:	09/05/2019	Northing (NAD83):	2102813.6		
Drilling Co.:	Cascade	Easting (NAD83):	7617583.9	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	137 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Pro-Sonic Truck Mounted	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	J. Khem / S. Vasquez	Depth to First Water:	4.6 ft bgs		
Drilling Asst:	L. Amaya / O. Flores	Sampling Method:	4 inch x 10 ft. Core Barrel	Project Number:	RC000753.0051
Logger:	G. Willford / D. Cornell	Sampling Interval:	Continuous		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
121									
122									
123									
124	120								
125									
126									
127									
128								(127.0 - 132.0') Very rough drilling.	(127.0 - 137.0') 735 gallons of water used; 675 gallons of water recovered; 60 gallons of water lost
129	60	No Sieve Samples Collected		Topock - Competent Bedrock - conglomerate					
130									
131									
132									
133								(132.0 - 137.0') Very rough drilling.	
134									
135	60		no sample (interval did not produce) 8/24/2019 12:55						
136									
137									
End of Boring at 137.0' bgs.									
138									
139									
140									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	<u>09/09/2019</u>	Surface Elevation:	<u>460.4 ft amsl</u>	Boring No.: <u>MW-92s</u>
Date Completed:	<u>09/10/2019</u>	Northing (NAD83):	<u>2102811.6</u>	
Drilling Co.:	<u>Cascade</u>	Easting (NAD83):	<u>7617576.7</u>	Client: <u>PG&E</u>
Drilling Method:	<u>Sonic Drilling</u>	Total Depth:	<u>77 ft bgs</u>	Project: <u>Final GW Remedy Phase 1</u>
Drill Rig Type:	<u>Prosonic Truck Mounted</u>	Borehole Diameter:	<u>10-12 inches</u>	Location: <u>PG&E Topock, Needles, California</u>
Driller Name:	<u>Steve Vasquez</u>	Depth to First Water:	<u>4.6 ft bgs</u>	
Drilling Asst:	<u>L. Amaya / O. Flores</u>	Sampling Method:	<u>4 inch x 10 ft. Core Barrel</u>	Project Number: <u>RC000753.0051</u>
Logger:	<u>David Cornell</u>	Sampling Interval:	<u>Screen Intervals</u>	
Editor:	<u>Sean McGrane</u>	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

[illegible]

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion U = not detected above the laboratory reporting limit, NR = no recovery, groundwater data was collected from MW-91d

Date Started:	09/09/2019	Surface Elevation:	460.4 ft amsl	Boring No.: MW-92s	
Date Completed:	09/10/2019	Northing (NAD83):	2102811.6		
Drilling Co.:	Cascade	Easting (NAD83):	7617576.7	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	77 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mounted	Borehole Diameter:	10-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Steve Vasquez	Depth to First Water:	4.6 ft bgs		
Drilling Asst:	L. Amaya / O. Flores	Sampling Method:	4 inch x 10 ft. Core Barrel	Project Number:	RC000753.0051
Logger:	David Cornell	Sampling Interval:	Screen Intervals		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
21									
22									
23				Topock - Fluvial Deposits	SP		(23') dark gray (10YR 4/1)		
24									
25									
26				Topock - Fluvial Deposits	SP		(25.0 - 29.0') Topock - Fluvial Deposits; Poorly graded sand (SP); dark grayish brown / dark yellowish brown (10YR 4/2); very fine grained to medium grained, subangular to subround; trace silt; trace clay; wet		
27									
28									
29	144						(29.0 - 37.0') No recovery (NR)	(29.0') No recovery due to loss of fine grained sands out of core barrel or pushed out into the formation.	
30		No Sieve Samples Collected							
31									
32									
33					NR				
34									
35									
36									
37							(37.0 - 47.0') No recovery (NR); Core not collected or logged, see MW-92d boring log for lithologic descriptions	(37.0 - 47.0') Heaving sands.	
38					NR				
39									
40									


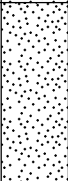

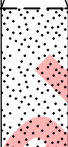
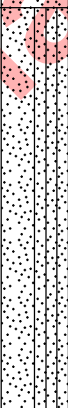


Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, groundwater data was collected from MW-91d

Date Started:	09/09/2019	Surface Elevation:	460.4 ft amsl	Boring No.: MW-92s	
Date Completed:	09/10/2019	Northing (NAD83):	2102811.6		
Drilling Co.:	Cascade	Easting (NAD83):	7617576.7	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	77 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mounted	Borehole Diameter:	10-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Steve Vasquez	Depth to First Water:	4.6 ft bgs		
Drilling Asst:	L. Amaya / O. Flores	Sampling Method:	4 inch x 10 ft. Core Barrel	Project Number:	RC000753.0051
Logger:	David Cornell	Sampling Interval:	Screen Intervals		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
41									
42									
43									
44					NR				
45									
46									
47									
48				Topock - Fluvial Deposits	SP		(47.0 - 49.0') Topock - Fluvial Deposits; (SP); grayish brown (10YR 5/2); very fine grained to medium grained, subangular to subround; trace coarse grained sand; trace silt; trace clay; wet	(47.0 - 57.0') Heaving sands. Full recovery not obtained likely due to compaction.	(47.0 - 77.0') 430 gallons of water used; 400 gallons of water recovered; 30 gallons of water lost
49				Topock - Fluvial Deposits	SP-SM		(49.0 - 51.0') Topock - Fluvial Deposits; (SP-SM); grayish brown (10YR 5/2); very fine grained to medium grained, subangular to subround; little silt; trace clay; wet		
50									
51									
52	108			Topock - Fluvial Deposits	SP		(51.0 - 56.0') Topock - Fluvial Deposits; (SP); grayish brown (10YR 5/2); very fine grained to medium grained, subangular to subround; trace coarse grained sand; trace silt; trace clay; wet		
53									
54									
55									
56									
57					NR		(56.0 - 57.0') No recovery (NR)		
58				Topock - Fluvial Deposits	SP		(57.0 - 62.0') Topock - Fluvial Deposits; (SP); grayish brown (10YR 5/2); very fine grained to medium grained, subangular to subround; trace coarse grained sand; trace silt; trace clay; wet	(57.0 - 67.0') Heaving sands. Full recovery not obtained likely due to compaction and possibly falling out of barrel.	
59	90								
60									

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Date Started:	09/09/2019	Surface Elevation:	460.4 ft amsl	Boring No.: <u>MW-92s</u>	
Date Completed:	09/10/2019	Northing (NAD83):	2102811.6		
Drilling Co.:	Cascade	Easting (NAD83):	7617576.7	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	77 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mounted	Borehole Diameter:	10-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Steve Vasquez	Depth to First Water:	4.6 ft bgs		
Drilling Asst:	L. Amaya / O. Flores	Sampling Method:	4 inch x 10 ft. Core Barrel	Project Number:	RC000753.0051
Logger:	David Cornell	Sampling Interval:	Screen Intervals		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
61	90	No Sieve Samples Collected		Topock - Fluvial Deposits	SP				
62				Topock - Fluvial Deposits	SP		(62.0 - 64.5') Topock - Fluvial Deposits; (SP); brown (10YR 5/3); very fine grained to medium grained, subangular to subround; trace coarse grained sand; trace silt; trace clay; wet		
63									
64									
65				NR		(64.5 - 67.0') No recovery (NR)			
66									
67									
68	108			Topock - Fluvial Deposits	SP		(67.0 - 69.0') Topock - Fluvial Deposits; (SP); brown (10YR 4/3); very fine grained to medium grained, subangular to subround; trace coarse grained sand; trace silt; trace clay; wet	(67.0 - 77.0') Heaving sands. Full recovery not obtained likely due to compaction.	
69		Topock - Fluvial Deposits	SP-SM		(69.0 - 74.5') Topock - Fluvial Deposits; (SP-SM); brown (10YR 4/3); very fine grained to medium grained, subangular to subround; trace granules to small pebbles, angular to subangular; trace coarse grained sand; trace silt; trace clay; wet				
70									
71									
72		Topock - Fluvial Deposits	SP		(74.5 - 76.0') Topock - Fluvial Deposits; Poorly graded sand with gravel (SP); brown (10YR 5/3); very fine grained to very coarse grained, subangular to subround; some small to large pebbles, subround to round; trace silt; trace clay				
73									
74									
75		NR		(76.0 - 77.0') No recovery (NR)					
76									
77	End of Boring at 77.0' bgs.								
78									
79									
80									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, groundwater data was collected from MW-91d

Date Started: 11/14/2019	Surface Elevation: N/A	Well ID: MW-94-30, MW-94-100
Date Completed: 11/16/2019	Shallow Well Elevation: N/A	
Drilling Co.: Cascade	Deep Well Elevation: N/A	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): N/A	Project: Final GW Remedy Phase 1
Driller Name: Jose Hernandez	Easting (NAD83): N/A	Location: PG&E Topock, Needles, California
Drilling Asst: L. Amaya / P. Almanza	Borehole Diameter: 10-12 inches	
Logger: Chris Bonessi	Water Level Start: 10.55 ft bgs	Project Number: RC000753.0051
Editor: Sean McGrane	Development End Date: 12/7/2019	
Total Depth: 105 ft bgs	Well Completion: <input type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
1					(0.0 - 10.0') 2" PVC Sch 80 Casing		
2							
3			NR		(2.5 - 3.5') Centralizer (1.5 - 5.0') Grout	(1.5 - 5.0') 16.6 gallons	(1.5 - 5.0') 15.5 gallons (-7%) Note: Type I, II and V and Benseal
4							
5							
6							
7					(5.0 - 8.0') Cemex #60 MESH	(5.0 - 8.0') 4 bags	(5.0 - 8.0') 19 bags (375%) Note: Lapis Lustre Sand, used >20% of calculated volume due to potential voids forming during drilling
8		Topock - Fluvial Deposits	SW				
9		Topock - Fluvial Deposits	SW				
10	Groundwater VAS collection was not included in the drilling scope 11/1/2019 20:16	Topock - Fluvial Deposits	SM		(10.0 - 30.0') 2" 0.020" Slot Sch 80 PVC Screen		
11							
12							
13							
14					(8.0 - 34.0') Cemex #3 MESH (8x10)	(8.0 - 34.0') 26.2 bags	(8.0 - 34.0') 32 bags (22%) Note: Lapis Lustre Sand, used >20% of calculated volume due to potential voids forming during drilling
15							
16		Topock - Fluvial Deposits	SW				
17							
18							
19							
20							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, NR = no recovery

Date Started:	11/14/2019	Surface Elevation:	N/A	Well ID: MW-94-30, MW-94-100
Date Completed:	11/16/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	Jose Hernandez	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	L. Amaya / P. Almanza	Borehole Diameter:	10-12 inches	
Logger:	Chris Bonessi	Water Level Start:	10.55 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	12/7/2019	
Total Depth:	105 ft bgs	Well Completion:	<input type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
21					(10.0 - 30.0') 2" 0.020"-Slot Sch 80 PVC Screen		
22							
23							
24							
25		Topock - Fluvial Deposits	SW				
26							
27					(8.0 - 34.0') Cemex #3 MESH (8x10)	(8.0 - 34.0') 26.2 bags	(8.0 - 34.0') 32 bags (22%) Note: Lapis Lustre Sand, used >20% of calculated volume due to potential voids forming during drilling
28							
29							
30	Groundwater VAS collection was not included in the drilling scope 11/1/2019 20:16				(7.0 - 105.0') 10.0" Borehole		
31					(30.5 - 31.5') Centralizer		
32					(30.0 - 32.3') Sump and End Cap		
33		Topock - Fluvial Deposits	SM				
34							
35							
36							
37					(34.0 - 63.0') Bentonite seal pellets	(34.0 - 63.0') 24.3 buckets	(34.0 - 63.0') 32 buckets (32%) Note: Pel-Plug (TR30) 3/8", used >20% of calculated volume due to potential voids forming during drilling
38							
39			NR				
40							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, NR = no recovery

Date Started:	11/14/2019	Surface Elevation:	N/A	Well ID: MW-94-30, MW-94-100
Date Completed:	11/16/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	Jose Hernandez	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	L. Amaya / P. Almanza	Borehole Diameter:	10-12 inches	
Logger:	Chris Bonessi	Water Level Start:	10.55 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	12/7/2019	
Total Depth:	105 ft bgs	Well Completion:	<input type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
41					(0.0 - 70.0') 2" PVC Sch 80 Casing		
42							
43							
44							
45							
46							
47							
48							
49							
50	Groundwater VAS collection was not included in the drilling scope 11/1/2019 20:16		NR		(34.0 - 63.0') Bentonite seal pellets	(7.0 - 105.0') 10.0" Borehole	(34.0 - 63.0') 24.3 buckets
51							(34.0 - 63.0') 32 buckets (32%) Note: Pel-Plug (TR30) 3/8", used >20% of calculated volume due to potential voids forming during drilling
52							
53							
54							
55							
56							
57							
58							
59							
60							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, NR = no recovery

Date Started:	11/14/2019	Surface Elevation:	N/A	Well ID: MW-94-30, MW-94-100
Date Completed:	11/16/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	Jose Hernandez	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	L. Amaya / P. Almanza	Borehole Diameter:	10-12 inches	
Logger:	Chris Bonessi	Water Level Start:	10.55 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	12/7/2019	
Total Depth:	105 ft bgs	Well Completion:	<input type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
61					(0.0 - 70.0') 2" PVC Sch 80 Casing		
62					(34.0 - 63.0') Bentonite seal pellets	(34.0 - 63.0') 24.3 buckets	(34.0 - 63.0') 32 buckets (32%) Note: Pel-Plug (TR30) 3/8", used >20% of calculated volume due to potential voids forming during drilling
63					(62.5 - 63.5') Centralizer		
64			NR				
65					(63.0 - 68.0') Cemex #60 MESH	(63.0 - 68.0') 5.2 bags	(63.0 - 68.0') 9 bags (73%) Note: Lapis Lustre Sand, used >20% of calculated volume due to potential voids forming during drilling
66							
67							
68							
69	Groundwater VAS collection was not included in the drilling scope 11/1/2019 20:16	Topock - Alluvium Deposits	SM		(7.0 - 105.0') 10.0" Borehole		
70					(70.0 - 100.0') 2" 0.020"-Slot Sch 80 PVC Screen		
71							
72							
73		Topock - Alluvium Deposits	SM		(68.0 - 105.0') Cemex #3 MESH (8x10)	(68.0 - 105.0') 38.9 bags	(68.0 - 105.0') 53 bags (36%) Note: Lapis Lustre Sand, used >20% of calculated volume due to potential voids forming during drilling
74							
75							
76							
77		Topock - Alluvium Deposits	SW-SM				
78							
79							
80		Topock - Alluvium Deposits	SM				

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Date Started:	11/14/2019	Surface Elevation:	N/A	Well ID: MW-94-30, MW-94-100
Date Completed:	11/16/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	Jose Hernandez	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	L. Amaya / P. Almanza	Borehole Diameter:	10-12 inches	
Logger:	Chris Bonessi	Water Level Start:	10.55 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	12/7/2019	
Total Depth:	105 ft bgs	Well Completion:	<input type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction		Calculated Material Volumes	Material Volumes Installed		
81	Groundwater VAS collection was not included in the drilling scope 11/1/2019 20:16	Topock - Alluvium Deposits	SM				(70.0 - 100.0') 2" 0.020"-Slot Sch 80 PVC Screen			
82										
83		Topock - Alluvium Deposits	SW-SM							
84										
85		Topock - Alluvium Deposits	SM				(68.0 - 105.0') Cemex #3 MESH (8x10)	(7.0 - 105.0') 10.0" Borehole	(68.0 - 105.0') 38.9 bags	(68.0 - 105.0') 53 bags (36%) Note: Lapis Lustre Sand, used >20% of calculated volume due to potential voids forming during drilling
86										
87		Topock - Alluvium Deposits	SW-SM							
88										
89		Topock - Alluvium Deposits	SM							
90										
91	Topock - Alluvium Deposits	SW-SM								
92										
93	Topock - Alluvium Deposits	SM								
94										
95	Topock - Alluvium Deposits	SW-SM								
96										
97	Topock - Alluvium Deposits	SM								
98										
99	Topock - Alluvium Deposits	SW-SM								
100										

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, NR = no recovery

Date Started:	11/14/2019	Surface Elevation:	N/A	Well ID: MW-94-30, MW-94-100
Date Completed:	11/16/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	Jose Hernandez	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	L. Amaya / P. Almanza	Borehole Diameter:	10-12 inches	
Logger:	Chris Bonessi	Water Level Start:	10.55 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	12/7/2019	
Total Depth:	105 ft bgs	Well Completion:	<input type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
101	Groundwater VAS collection was not included in the drilling scope 11/1/2019 20:16	Topock - Alluvium Deposits	SW-SM		(100.5 - 101.5') Centralizer		
102		Topock - Alluvium Deposits	SM		(68.0 - 105.0') Cemex #3 MESH (8x10)	(68.0 - 105.0') 38.9 bags	(68.0 - 105.0') 53 bags (36%) Note: Lapis Lustre Sand, used >20% of calculated volume due to potential voids forming during drilling
103					(7.0 - 105.0') 10.0" Borehole		
104					(100.0 - 102.3') Sump and End Cap		
105					End of Boring at 105.0' bgs.		
106							
107							
108							
109							
110							
111							
112							
113							
114							
115							
116							
117							
118							
119							
120							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, NR = no recovery

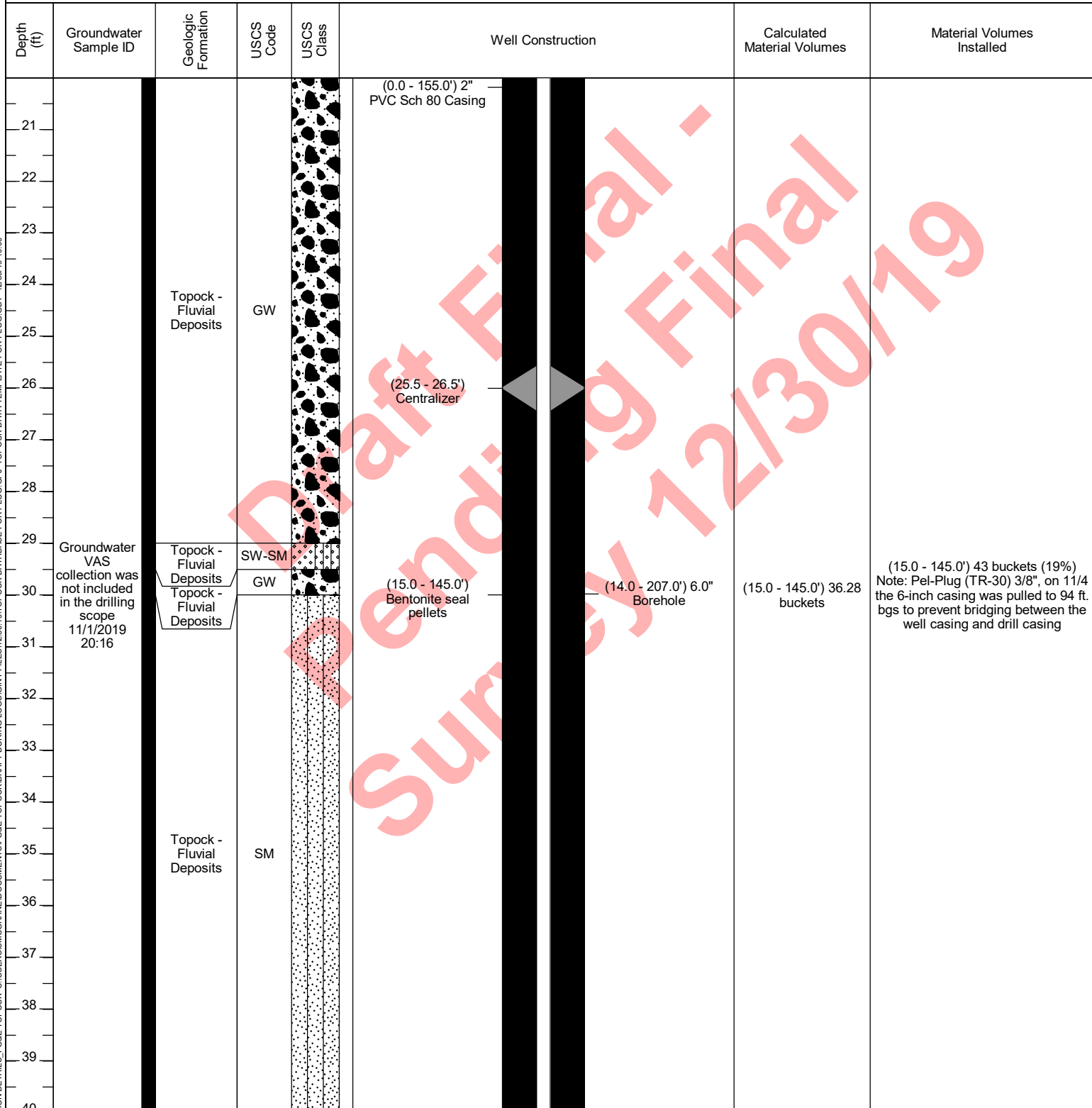
WELL CONSTRUCTION DETAILS_PG&E TOPOCK C:\USERS\SMC\GRANDOCUMENTS\PG&E TOPOCK\DRIFT BORING LOGS\GINT FILES\123019\TOPOCK DATABASE FOR PLOG.GPJ TOPOCK DATA TEMPLATE FOR PLOG.GPJ 12/30/19 23:47

Date Started:	11/03/2019	Surface Elevation:	N/A	Well ID: MW-94-175
Date Completed:	11/05/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	S. Vasquez / E. Ramos	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	L. Amaya / P. Almanza	Borehole Diameter:	6-10 inches	
Logger:	JL / SM/ GJ / RC	Water Level Start:	9.73 ft bgs	Project Number: RC000753.0051
Editor:	Kendra Keon	Development End Date:	12/3/2019	
Total Depth:	207 ft bgs	Well Completion:	<input type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
1					(0.0 - 155.0') 2" PVC Sch 80 Casing		
2							
3		Topock - Fluvial Deposits	SW				
4							
5							
6							
7		Topock - Fluvial Deposits	SW-SC		(0.0 - 14.0') 10.0" Borehole		
8							
9		Topock - Fluvial Deposits	SC		(2.0 - 15.0') Portland Cement 6% Bentonite	(2.0 - 15.0') 30 gallons	(2.0 - 15.0') 77.5 gallons (158%) Note: Type I, II and V and Hydrogel, used >20% of calculated volume due voids in formation.
10	Groundwater VAS collection was not included in the drilling scope 11/1/2019 20:16	Topock - Fluvial Deposits	SM				
11		Topock - Fluvial Deposits	SW				
12							
13							
14							
15			NR				
16							
17							
18		Topock - Fluvial Deposits	GW		(15.0 - 145.0') Bentonite seal pellets	(15.0 - 145.0') 36.28 buckets	(15.0 - 145.0') 43 buckets (19%) Note: Pel-Plug (TR-30) 3/8", on 11/4 the 6-inch casing was pulled to 94 ft. bgs to prevent bridging between the well casing and drill casing
19							
20							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, NR = no recovery

Date Started:	11/03/2019	Surface Elevation:	N/A	Well ID: MW-94-175
Date Completed:	11/05/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	S. Vasquez / E. Ramos	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	L. Amaya / P. Almanza	Borehole Diameter:	6-10 inches	
Logger:	JL / SM/ GJ / RC	Water Level Start:	9.73 ft bgs	Project Number: RC000753.0051
Editor:	Kendra Keon	Development End Date:	12/3/2019	
Total Depth:	207 ft bgs	Well Completion:	<input type="checkbox"/> Flush <input type="checkbox"/> Stick-up	



Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, NR = no recovery

Date Started:	11/03/2019	Surface Elevation:	N/A	Well ID: MW-94-175
Date Completed:	11/05/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	S. Vasquez / E. Ramos	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	L. Amaya / P. Almanza	Borehole Diameter:	6-10 inches	
Logger:	JL / SM/ GJ / RC	Water Level Start:	9.73 ft bgs	Project Number: RC000753.0051
Editor:	Kendra Keon	Development End Date:	12/3/2019	
Total Depth:	207 ft bgs	Well Completion:	<input type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
41					(0.0 - 155.0') 2" PVC Sch 80 Casing		
42							
43		Topock - Fluvial Deposits	SM				
44							
45							
46							
47		Topock - Fluvial Deposits	SP				
48							
49							
50	Groundwater VAS collection was not included in the drilling scope 11/1/2019 20:16	Topock - Fluvial Deposits	SM		(15.0 - 145.0') Bentonite seal pellets		
51		Topock - Fluvial Deposits	ML		(14.0 - 207.0') 6.0" Borehole	(15.0 - 145.0') 36.28 buckets	(15.0 - 145.0') 43 buckets (19%) Note: Pel-Plug (TR-30) 3/8", on 11/4 the 6-inch casing was pulled to 94 ft. bgs to prevent bridging between the well casing and drill casing
52		Topock - Fluvial Deposits	SW				
53							
54		Topock - Fluvial Deposits	SP-SM				
55							
56		Topock - Fluvial Deposits	SM				
57		Topock - Fluvial Deposits	MH				
58		Topock - Fluvial Deposits	SC				
59							
60		Topock - Fluvial	SW-SC				

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, NR = no recovery

Date Started:	11/03/2019	Surface Elevation:	N/A	Well ID: MW-94-175
Date Completed:	11/05/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	S. Vasquez / E. Ramos	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	L. Amaya / P. Almanza	Borehole Diameter:	6-10 inches	
Logger:	JL / SM/ GJ / RC	Water Level Start:	9.73 ft bgs	Project Number: RC000753.0051
Editor:	Kendra Keon	Development End Date:	12/3/2019	
Total Depth:	207 ft bgs	Well Completion:	<input type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
61		Deposits Topock - Fluvial Deposits	SW-SC		(0.0 - 155.0') 2" PVC Sch 80 Casing		
62		Topock - Fluvial Deposits	MH				
63		Topock - Fluvial Deposits	SC				
64		Topock - Older Alluvium Deposits	SM				
65							
66			NR				
67							
68							
69							
70	Groundwater VAS collection was not included in the drilling scope 11/1/2019 20:16				(15.0 - 145.0') Bentonite seal pellets		
71							
72							
73		Topock - Older Alluvium Deposits	SM				
74							
75							
76					(75.5 - 76.5') Centralizer		
77							
78							
79							
80							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, NR = no recovery

Date Started: 11/03/2019	Surface Elevation: N/A	Well ID: MW-94-175
Date Completed: 11/05/2019	Shallow Well Elevation: N/A	
Drilling Co.: Cascade	Deep Well Elevation: N/A	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): N/A	Project: Final GW Remedy Phase 1
Driller Name: S. Vasquez / E. Ramos	Easting (NAD83): N/A	Location: PG&E Topock, Needles, California
Drilling Asst: L. Amaya / P. Almanza	Borehole Diameter: 6-10 inches	
Logger: JL / SM/ GJ / RC	Water Level Start: 9.73 ft bgs	Project Number: RC000753.0051
Editor: Kendra Keon	Development End Date: 12/3/2019	
Total Depth: 207 ft bgs	Well Completion: <input type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
81		Topock - Older Alluvium Deposits	SM		(0.0 - 155.0') 2" PVC Sch 80 Casing		
82							
83							
84							
85							
86							
87							
88		Topock - Older Alluvium Deposits	SW-SM				
89							
90	Groundwater VAS collection was not included in the drilling scope 11/1/2019 20:16				(15.0 - 145.0') Bentonite seal pellets		
91							
92							
93							
94							
95							
96							
97		Topock - Older Alluvium Deposits	SM				
98							
99							
100							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, NR = no recovery

Date Started:	11/03/2019	Surface Elevation:	N/A	Well ID: MW-94-175
Date Completed:	11/05/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	S. Vasquez / E. Ramos	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	L. Amaya / P. Almanza	Borehole Diameter:	6-10 inches	
Logger:	JL / SM/ GJ / RC	Water Level Start:	9.73 ft bgs	Project Number: RC000753.0051
Editor:	Kendra Keon	Development End Date:	12/3/2019	
Total Depth:	207 ft bgs	Well Completion:	<input type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
101					(0.0 - 155.0') 2" PVC Sch 80 Casing		
102							
103							
104							
105							
106							
107							
108							
109							
110	Groundwater VAS collection was not included in the drilling scope 11/1/2019 20:16	Topock - Older Alluvium Deposits	SM		(15.0 - 145.0') Bentonite seal pellets	(15.0 - 145.0') 36.28 buckets	(15.0 - 145.0') 43 buckets (19%) Note: Pel-Plug (TR-30) 3/8", on 11/4 the 6-inch casing was pulled to 94 ft. bgs to prevent bridging between the well casing and drill casing
111					(14.0 - 207.0') 6.0" Borehole		
112							
113							
114							
115							
116							
117							
118							
119							
120							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, NR = no recovery

Date Started:	11/03/2019	Surface Elevation:	N/A	Well ID: MW-94-175
Date Completed:	11/05/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	S. Vasquez / E. Ramos	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	L. Amaya / P. Almanza	Borehole Diameter:	6-10 inches	
Logger:	JL / SM/ GJ / RC	Water Level Start:	9.73 ft bgs	Project Number: RC000753.0051
Editor:	Kendra Keon	Development End Date:	12/3/2019	
Total Depth:	207 ft bgs	Well Completion:	<input type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
121					(0.0 - 155.0') 2" PVC Sch 80 Casing		
122							
123							
124		Topock - Older Alluvium Deposits	SM				
125							
126					(125.5 - 126.5') Centralizer		
127							
128							
129		Topock - Older Alluvium Deposits	ML				
130	Groundwater VAS collection was not included in the drilling scope 11/1/2019 20:16				(15.0 - 145.0') Bentonite seal pellets		
131							
132							
133							
134							
135		Topock - Older Alluvium Deposits	SM		(14.0 - 207.0') 6.0" Borehole	(15.0 - 145.0') 36.28 buckets	(15.0 - 145.0') 43 buckets (19%) Note: Pel-Plug (TR-30) 3/8", on 11/4 the 6-inch casing was pulled to 94 ft. bgs to prevent bridging between the well casing and drill casing
136							
137							
138							
139							
140							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, NR = no recovery

Date Started:	11/03/2019	Surface Elevation:	N/A	Well ID: MW-94-175
Date Completed:	11/05/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	S. Vasquez / E. Ramos	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	L. Amaya / P. Almanza	Borehole Diameter:	6-10 inches	
Logger:	JL / SM/ GJ / RC	Water Level Start:	9.73 ft bgs	Project Number: RC000753.0051
Editor:	Kendra Keon	Development End Date:	12/3/2019	
Total Depth:	207 ft bgs	Well Completion:	<input type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
141					(0.0 - 155.0') 2" PVC Sch 80 Casing		
142					(15.0 - 145.0') Bentonite seal pellets	(15.0 - 145.0') 36.28 buckets	(15.0 - 145.0') 43 buckets (19%) Note: Pel-Plug (TR-30) 3/8", on 11/4 the 6-inch casing was pulled to 94 ft. bgs to prevent bridging between the well casing and drill casing
143							
144							
145					(145.0 - 150.0') Cemex #0/30 (MESH)	(145.0 - 150.0') 1.7 bags	(145.0 - 150.0') 2 bags (18%) Note: Lapis Lustre Sand
146							
147							
148							
149	Groundwater VAS collection was not included in the drilling scope 11/1/2019 20:16	Topock - Older Alluvium Deposits	SM		(14.0 - 207.0') 6.0" Borehole		
150							
151							
152							
153							
154					(150.0 - 179.0') Cemex #3 MESH (8x10)		
155					(155.0 - 175.0') 2" 20-Slot Sch 80 PVC Screen	(150.0 - 179.0') 10.3 bags	(150.0 - 179.0') 12 bags (17%) Note: Lapis Lustre Sand
156							
157							
158							
159							
160							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, NR = no recovery

Date Started:	11/03/2019	Surface Elevation:	N/A	Well ID: MW-94-175
Date Completed:	11/05/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	S. Vasquez / E. Ramos	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	L. Amaya / P. Almanza	Borehole Diameter:	6-10 inches	
Logger:	JL / SM/ GJ / RC	Water Level Start:	9.73 ft bgs	Project Number: RC000753.0051
Editor:	Kendra Keon	Development End Date:	12/3/2019	
Total Depth:	207 ft bgs	Well Completion:	<input type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
161					(155.0 - 175.0') 2" 20-Slot Sch 80 PVC Screen		
162							
163							
164							
165							
166							
167							
168							
169	Groundwater VAS collection was not included in the drilling scope 11/1/2019 20:16	Topock - Older Alluvium Deposits	SM		(150.0 - 179.0') Cemex #3 MESH (8x10)	(150.0 - 179.0') 10.3 bags	(150.0 - 179.0') 12 bags (17%) Note: Lapis Lustre Sand
170					(14.0 - 207.0') 6.0" Borehole		
171							
172							
173							
174							
175							
176					(175.5 - 176.5') Centralizer		
177					(175.0 - 177.3') Sump and End Cap		
178							
179							
180					(179.0 - 207.0') Bentonite seal pellets	(179.0 - 207.0') 8.7 buckets	(179.0 - 207.0') 10 buckets (15%) Note: Pel-Plug (TR30) 3/8"


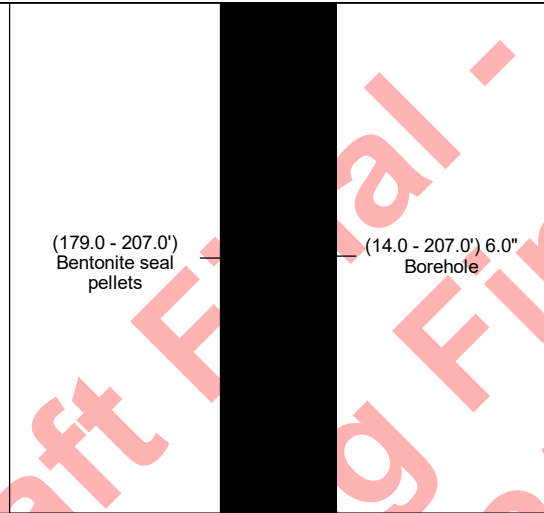
Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, NR = no recovery

Date Started:	11/03/2019	Surface Elevation:	N/A	Well ID: MW-94-175
Date Completed:	11/05/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	S. Vasquez / E. Ramos	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	L. Amaya / P. Almanza	Borehole Diameter:	6-10 inches	
Logger:	JL / SM/ GJ / RC	Water Level Start:	9.73 ft bgs	Project Number: RC000753.0051
Editor:	Kendra Keon	Development End Date:	12/3/2019	
Total Depth:	207 ft bgs	Well Completion:	<input type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
181		Topock - Older Alluvium Deposits	SM				
182			SW-SM				
183		Topock - Older Alluvium Deposits	SM				
184							
185							
186							
187							
188							
189	Groundwater VAS collection was not included in the drilling scope 11/1/2019 20:16						
190					(179.0 - 207.0') Bentonite seal pellets	(14.0 - 207.0') 6.0" Borehole	(179.0 - 207.0') 8.7 buckets
191							(179.0 - 207.0') 10 buckets (15%) Note: Pel-Plug (TR30) 3/8"
192							
193		Topock - Weathered Bedrock - conglomerate	SC				
194							
195							
196							
197							
198							
199							
200							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, NR = no recovery

Date Started:	11/03/2019	Surface Elevation:	N/A	Well ID: MW-94-175
Date Completed:	11/05/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	S. Vasquez / E. Ramos	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	L. Amaya / P. Almanza	Borehole Diameter:	6-10 inches	
Logger:	JL / SM/ GJ / RC	Water Level Start:	9.73 ft bgs	Project Number: RC000753.0051
Editor:	Kendra Keon	Development End Date:	12/3/2019	
Total Depth:	207 ft bgs	Well Completion:	<input type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction		Calculated Material Volumes	Material Volumes Installed
201	Groundwater VAS collection was not included in the drilling scope 11/1/2019 20:16	Topock - Weathered Bedrock - conglomerate	SC			(179.0 - 207.0') 6.0" Borehole	(179.0 - 207.0') 8.7 buckets	(179.0 - 207.0') 10 buckets (15%) Note: Pel-Plug (TR30) 3/8"
202								
203								
204								
205								
206								
207								
208	End of Boring at 207.0' bgs.							
209								
210								
211								
212								
213								
214								
215								
216								
217								
218								
219								
220								

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, NR = no recovery

Date Started:	10/31/2019	Surface Elevation:	N/A	Boring No.: MW-94d
Date Completed:	11/02/2019	Northing (NAD83):	N/A	
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	207 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	6-10 inches	Location: PG&E Topock, Needles, California
Driller Name:	S. Vasquez / E. Ramos	Depth to First Water:	10.55 ft bgs	
Drilling Asst:	L. Amaya / P. Almanza	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger:	JL / SM / GJ / RC	Sampling Interval:	Continuous	
Editor:	Kendra Keon	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
1	84			Topock - Fluvial Deposits	SW		(0.0 - 7.0') Topock - Fluvial Deposits; Well graded sand with gravel (SW); brown (7.5YR 4/4); very fine grained to very coarse grained, angular to round; some granules to very large pebbles, subangular to round; little small cobbles, angular to subangular; trace silt; dry; coarser clast composed of mixed lithology	(0.0 - 7.0') Soft drilling.	(0.0 - 12.0') No water used
2									
3									
4									
5									
6									
7									
8	72	Sieve samples not collected	Groundwater VAS collection was not included in the drilling scope 11/1/2019 20:16	Topock - Fluvial Deposits	SW-SC		(7.0 - 8.0') Topock - Fluvial Deposits; Well graded sand with clay and gravel (SW-SC); brown (7.5YR 5/4); very fine grained to very coarse grained, angular to round; little granules to very large pebbles, angular to subround; little clay; trace silt; trace mica; moist; coarser clast mixed lithology	(7.0 - 17.0') Soft drilling, loss of recovery due to sands falling out of core barrel, 9.5 to 13 disturbed.	
9				Topock - Fluvial Deposits	SC		(8.0 - 9.5') Topock - Fluvial Deposits; Clayey sand with gravel (SC); yellowish brown (10YR 5/6); very fine grained to very coarse grained, angular to round; little granules to large pebbles, subangular to subround; little small cobbles, subround; little clay; trace silt; mica; moist; coarser clast mixed lithology		
10				Topock - Fluvial Deposits	SM		(9.5 - 10.0') Topock - Fluvial Deposits; Silty sand (SM); brown (7.5YR 5/3); very fine grained to very coarse grained, angular to round; little silt; trace granules to very large pebbles, angular to subround; trace small cobbles, subround; moist; coarser clast composed of mixed lithology		
11				Topock - Fluvial Deposits	SW		(10.0 - 13.0') Topock - Fluvial Deposits; Well graded sand (SW); yellowish brown / moderate yellowish brown (10YR 5/4); very fine grained to very coarse grained, angular to round; little granules to medium pebbles, subangular to subround; trace silt; trace clay; little mica; wet; sands composed of mostly quartz, coarser clast mixed lithology	(12.0 - 17.0') Set temp well to determine static depth to water. Water had to be used to set temp well due to heaving sands on 10/31/19. Water level collected on 11/1/19 after letting water levels equilibrate.	(12.0 - 17.0') 100 gallons of water used; 0 gallons of water recovered; 100 gallons of water lost
12									
13									
14				NR	NR		(13.0 - 17.0') No recovery (NR); lost core downhole could not retrieve		
15									
16									
17	120			Topock - Fluvial Deposits	GW		(17.0 - 29.0') Topock - Fluvial Deposits; Well graded gravel with sand (GW); yellowish brown / moderate yellowish brown (10YR 5/4); granules to small cobbles, subangular to round; some fine to very coarse grained sand, angular to subround; trace silt; trace mica; wet; coarser clast composed of basalt, granite, metadiorite, quartz	(17.0 - 57.0') Normal drilling.	(17.0 - 207.0') No water used
18									
19									
20									

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Date Started:	10/31/2019	Surface Elevation:	N/A	Boring No.: MW-94d
Date Completed:	11/02/2019	Northing (NAD83):	N/A	
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	207 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	6-10 inches	Location: PG&E Topock, Needles, California
Driller Name:	S. Vasquez / E. Ramos	Depth to First Water:	10.55 ft bgs	
Drilling Asst:	L. Amaya / P. Almanza	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger:	JL / SM / GJ / RC	Sampling Interval:	Continuous	
Editor:	Kendra Keon	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
21									
22									
23									
24	120			Topock - Fluvial Deposits	GW				
25									
26									
27							(27'); formation becomes coarser		
28									
29				Topock - Fluvial Deposits	SW-SM		(29.0 - 29.5') Topock - Fluvial Deposits; Well graded sand with silt (SW-SM); yellowish brown / moderate yellowish brown (10YR 5/4); very fine grained to very coarse grained, angular to subround; little silt; trace granules to small pebbles, subround to round; trace small cobbles, subround; trace mica; coarser clasts composed of metadiorite; wet		
30				Topock - Fluvial Deposits	GW				
31									
32	120						(29.5 - 30.0') Topock - Fluvial Deposits; Well graded gravel with sand (GW); yellowish brown / moderate yellowish brown (10YR 5/4); granules to small cobbles, subangular to round; some fine to very coarse grained sand, angular to subround; trace silt; trace mica; wet; coarser clast composed of basalt, granite, metadiorite, quartz		
33							(30.0 - 46.5') Topock - Fluvial Deposits; Silty sand (SM); brown (10YR 5/3); very fine grained to fine grained, subangular to round; some silt; wet; trace medium to coarse grained sand (32.5') very fine grained to medium grained; little silt; laminated; increase grain size sand, interbedded sandy silt lenses 2-4 inches		
34				Topock - Fluvial Deposits	SM				
35									
36									
37							(37') very fine grained to fine grained; increase silt, decrease in sand		
38									
39	120								
40							(39.2'); some silt; decrease in sand		

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Date Started:	10/31/2019	Surface Elevation:	N/A	Boring No.: MW-94d
Date Completed:	11/02/2019	Northing (NAD83):	N/A	
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	207 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	6-10 inches	Location: PG&E Topock, Needles, California
Driller Name:	S. Vasquez / E. Ramos	Depth to First Water:	10.55 ft bgs	
Drilling Asst:	L. Amaya / P. Almanza	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger:	JL / SM / GJ / RC	Sampling Interval:	Continuous	
Editor:	Kendra Keon	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
41	120			Topock - Fluvial Deposits	SM		(41') very fine grained; and silt; decrease in sand		
42							(42.5') very fine grained to fine grained; some silt; increase in sand		
43							(43.5') very fine grained; and silt; decrease in sand		
44							(44.5') very fine grained to fine grained; some silt; increase in sand		
45									
46									
47				Topock - Fluvial Deposits	SP		(46.5 - 49.5') Topock - Fluvial Deposits; Poorly graded sand (SP); brown (10YR 5/3); very fine grained to fine grained, subangular to round; trace silt; little mica; wet; trace medium sand		
48									
49									
50				Topock - Fluvial Deposits	SM		(49.5 - 50.5') Topock - Fluvial Deposits; Silty sand (SM); brown (10YR 5/3); very fine grained to fine grained, subangular to round; some silt; trace clay; little mica; wet		
51				Topock - Fluvial Deposits	ML		(50.5 - 51.0') Topock - Fluvial Deposits; Sandy silt (ML); brown (7.5YR 4/4); no plasticity; some very fine grained sand, subround; little clay; trace mica; moist to wet; medium stiff		
52	120			Topock - Fluvial Deposits	SW		(51.0 - 53.0') Topock - Fluvial Deposits; Well graded sand with gravel (SW); brown (10YR 5/3); very fine grained to very coarse grained, subangular to subround; some granules to very large pebbles, subround to round; trace silt; trace mica; coarser clasts composed of metadiorite; wet		
53							(52') increase in granules and pebbles, decrease in sand		
54				Topock - Fluvial Deposits	SP-SM		(53.0 - 56.0') Topock - Fluvial Deposits; Poorly graded sand with silt (SP-SM); brown (10YR 5/3); very fine grained to medium grained, subangular to subround; little silt; little mica; wet; iron oxide staining		
55									
56				Topock - Fluvial Deposits	SM		(56.0 - 57.0') Topock - Fluvial Deposits; Silty sand (SM); brown (10YR 5/3); very fine grained to fine grained, subround; and silt; little clay; trace mica; wet; iron oxide staining		
57				Topock - Fluvial Deposits	MH		(57.0 - 57.5') Topock - Fluvial Deposits; Elastic silt with sand (MH); brown (7.5YR 5/3); high plasticity; little very fine to fine grained sand, subround to round; little clay; trace mica; moist; stiff		
58				Topock - Fluvial Deposits	SC		(57.5 - 59.3') Topock - Fluvial Deposits; Clayey sand with gravel (SC); brown (10YR 4/3); very fine grained to very coarse grained, angular to round; some granules to very large pebbles, subangular to subround; little clay; trace small cobbles, subround; trace silt; trace mica; coarser clasts composed of metadiorite; wet		
59	102								
60				Topock - Fluvial	SW-SC		(59.3 - 61.0') Topock - Fluvial Deposits; Well graded sand with clay and gravel (SW-SC); pale brown (10YR 6/3); very fine grained		

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Date Started:	10/31/2019	Surface Elevation:	N/A	Boring No.: MW-94d
Date Completed:	11/02/2019	Northing (NAD83):	N/A	
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	207 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	6-10 inches	Location: PG&E Topock, Needles, California
Driller Name:	S. Vasquez / E. Ramos	Depth to First Water:	10.55 ft bgs	
Drilling Asst:	L. Amaya / P. Almanza	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger:	JL / SM / GJ / RC	Sampling Interval:	Continuous	
Editor:	Kendra Keon	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
61	102			Deposits Topock - Fluvial Deposits	SW-SC		to very coarse grained, angular to subround; little granules to very large pebbles, angular to subround; little clay; trace small cobbles, subangular; trace silt; wet; sand composed of mostly quartz, coarser clast mixed lithology		
62				Topock - Fluvial Deposits	MH		(61.0 - 62.5') Topock - Fluvial Deposits; Elastic silt (MH); brown (7.5YR 5/4); high plasticity; and clay; trace very fine to fine grained sand, subround to round; very stiff		
63				Topock - Fluvial Deposits	SC		(62.5 - 63.5') Topock - Fluvial Deposits; Clayey sand with gravel (SC); dark yellowish brown (10YR 4/4); very fine grained to very coarse grained, subangular to subround; some clay; little granules to very large pebbles, angular to subround; trace small cobbles, subangular to subround; trace silt; coarser clast composed of mixed lithology		
64				Topock - Older Alluvium Deposits	SM		(63.5 - 65.5') Topock - Older Alluvium Deposits; Silty sand with gravel (SM); reddish brown / moderate brown (5YR 4/4); very fine grained to very coarse grained, angular to subround; some silt; little granules to large pebbles, angular to subround; trace clay; coarser clasts composed of metadiorite; wet		
65					NR		(65.5 - 67.0') No recovery (NR); sediments fell out of bottom of core barrel		
66									
67									
68							(67.0 - 82.4') Topock - Older Alluvium Deposits; Silty sand with gravel (SM); reddish brown / moderate brown (5YR 4/4); very fine grained to very coarse grained, angular to subround; some silt; little granules to very large pebbles, angular to subround; trace small cobbles, angular to subangular; trace clay; trace mica; coarser clasts composed of metadiorite; wet	(67.0 - 77.0') Soft drilling.	
69									
70									
71									
72	120								
73				Topock - Older Alluvium Deposits	SM		(72.5'); some granules to very large pebbles, angular to subangular; little silt; little clay		
74							(74'); increase in sand, no clay		
75									
76									
77									
78							(77'); decrease in sand, increase in granule and pebbles, silt nodules	(77.0 - 87.0') Soft drilling.	
79	120								
80									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, NR = no recovery, blue water table symbol represents depth to water collected from temp well during drilling

Date Started:	10/31/2019	Surface Elevation:	N/A	Boring No.: MW-94d
Date Completed:	11/02/2019	Northing (NAD83):	N/A	
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	207 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	6-10 inches	Location: PG&E Topock, Needles, California
Driller Name:	S. Vasquez / E. Ramos	Depth to First Water:	10.55 ft bgs	
Drilling Asst:	L. Amaya / P. Almanza	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger:	JL / SM / GJ / RC	Sampling Interval:	Continuous	
Editor:	Kendra Keon	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
81				Topock - Older Alluvium Deposits	SM				
82									
83	120						(82.4 - 93.3') Topock - Older Alluvium Deposits; Well graded sand with silt and gravel (SW-SM); reddish brown / moderate brown (5YR 4/4); very fine grained to very coarse grained, angular to subround; some granules to very large pebbles, angular to subround; little silt; little mica; coarser clasts composed of metadiorite; wet; silt nodules		
84									
85									
86									
87									
88				Topock - Older Alluvium Deposits	SW-SM			(87.0 - 97.0') Soft drilling.	
89									
90									
91									
92	120								
93									
94							(93.3 - 129.0') Topock - Older Alluvium Deposits; Silty sand with gravel (SM); reddish brown / moderate brown (5YR 4/4); very fine grained to very coarse grained, angular to subround; some granules to very large pebbles, angular to subangular; little silt; trace mica; coarser clasts composed of metadiorite; wet		
95									
96									
97				Topock - Older Alluvium Deposits	SM		(96'); decrease in silt, increase in sand		
98								(97.0 - 107.0') Soft drilling, change in rig geologist.	
99	120						(98.5'); some silt; decrease in sand		
100									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, NR = no recovery, blue water table symbol represents depth to water collected from temp well during drilling

Date Started: 10/31/2019	Surface Elevation: N/A	Boring No.: MW-94d
Date Completed: 11/02/2019	Northing (NAD83): N/A	
Drilling Co.: Cascade	Easting (NAD83): N/A	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 207 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type: Prosonic Truck Mount	Borehole Diameter: 6-10 inches	Location: PG&E Topock, Needles, California
Driller Name: S. Vasquez / E. Ramos	Depth to First Water: 10.55 ft bgs	Project Number: RC000753.0051
Drilling Asst: L. Amaya / P. Almanza	Sampling Method: 4 inch x 10 ft Core Barrel	
Logger: JL / SM/ GJ / RC	Sampling Interval: Continuous	
Editor: Kendra Keon	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
101	120	Sieve samples not collected	Groundwater VAS collection was not included in the drilling scope 11/1/2019 20:16	Topock - Older Alluvium Deposits	SM	(103'); little silt; increase in sand			
102									
103									
104									
105	120	Sieve samples not collected	Groundwater VAS collection was not included in the drilling scope 11/1/2019 20:16	Topock - Older Alluvium Deposits	SM	(107'); some silt; little granules to very large pebbles, angular to subround; trace small cobbles, subangular; decrease in sand		(107.0 - 117.0') Soft drilling.	
106									
107									
108									
109	120	Sieve samples not collected	Groundwater VAS collection was not included in the drilling scope 11/1/2019 20:16	Topock - Older Alluvium Deposits	SM	(114.5'); some granules to very large pebbles, angular to subangular; trace small cobbles, subangular; iron oxide staining; increase in sand, decrease in silt, trace weathered metadiorite			
110									
111									
112									
113	120	Sieve samples not collected	Groundwater VAS collection was not included in the drilling scope 11/1/2019 20:16	Topock - Older Alluvium Deposits	SM	(119'); decrease in sand, increase in silt		(117.0 - 127.0') Soft drilling.	
114									
115									
116									
117	120	Sieve samples not collected	Groundwater VAS collection was not included in the drilling scope 11/1/2019 20:16	Topock - Older Alluvium Deposits	SM	(119'); decrease in sand, increase in silt			
118									
119									
120									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, NR = no recovery, blue water table symbol represents depth to water collected from temp well during drilling

SOIL BORING LOG PG&E TOPOCK C:\USERS\MCGRANED\DOCUMENTS\PG&E TOPOCK\DRIFT BORING LOGS\GINT FILES\12.30.19\TOPOCK DATABASE FOR PLOG.GPJ TOPOCK DATA TEMPLATE FOR PLOG.GDT 12/30/19 18:38

Date Started:	10/31/2019	Surface Elevation:	N/A	Boring No.: MW-94d
Date Completed:	11/02/2019	Northing (NAD83):	N/A	
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	207 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	6-10 inches	Location: PG&E Topock, Needles, California
Driller Name:	S. Vasquez / E. Ramos	Depth to First Water:	10.55 ft bgs	
Drilling Asst:	L. Amaya / P. Almanza	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger:	JL / SM / GJ / RC	Sampling Interval:	Continuous	
Editor:	Kendra Keon	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
121									
122							(122'); decrease in sand, increase in silt		
123									
124	120			Topock - Older Alluvium Deposits	SM		(124.3'); increase in sand, decrease in silt		
125									
126									
127							(127'); decrease in sand, increase in silt	(127.0 - 137.0') Soft drilling.	
128									
129				Topock - Older Alluvium Deposits	ML		(129.0 - 130.0') Topock - Older Alluvium Deposits; Sandy silt with gravel (ML); reddish brown / moderate brown (5YR 4/4); no plasticity; some granules to large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subround; trace mica; coarser clasts composed of metadiorite; wet; soft		
130		Sieve samples not collected	Groundwater VAS collection was not included in the drilling scope 11/1/2019 20:16				(130.0 - 180.5') Topock - Older Alluvium Deposits; Silty sand with gravel (SM); reddish brown (2.5YR 4/4); very fine grained to very coarse grained, angular to subround; some granules to very large pebbles, angular to subangular; some silt; little mica; coarser clasts composed of metadiorite; wet		
131									
132	120			Topock - Older Alluvium Deposits	SM		(134.5'); little granules to very large pebbles, angular to subangular; increase in silt		
133									
134									
135									
136									
137							(137'); increase in sand, decrease in silt	(137.0 - 147.0') Soft drilling.	
138									
139	120								
140							(139.5'); increase in silt, decrease in sand		

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, NR = no recovery, blue water table symbol represents depth to water collected from temp well during drilling

Date Started:	10/31/2019	Surface Elevation:	N/A	Boring No.: MW-94d
Date Completed:	11/02/2019	Northing (NAD83):	N/A	
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	207 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	6-10 inches	Location: PG&E Topock, Needles, California
Driller Name:	S. Vasquez / E. Ramos	Depth to First Water:	10.55 ft bgs	
Drilling Asst:	L. Amaya / P. Almanza	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger:	JL / SM/ GJ / RC	Sampling Interval:	Continuous	
Editor:	Kendra Keon	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
141									
142									
143									
144	120						(144'); some granules to very large pebbles, angular to subangular; trace small cobbles, subangular; decrease in silt		
145									
146									
147									
148								(147.0 - 157.0') Soft drilling.	
149							(149'); little silt		
150									
151									
152	120						(152'); increase in sand, decrease in granules and pebbles, no cobbles		
153									
154									
155									
156									
157							(156.5') reddish brown (2.5YR 4/4); little granules to very large pebbles, angular to subangular; trace clay; decrease in sand		
158								(157.0 - 167.0') Soft drilling, change in rig geologist.	
159	120								
160							(159.2'); some granules to very large pebbles, angular to subangular; decrease in sand, decrease in silt		

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, NR = no recovery, blue water table symbol represents depth to water collected from temp well during drilling

Date Started:	10/31/2019	Surface Elevation:	N/A	Boring No.: MW-94d
Date Completed:	11/02/2019	Northing (NAD83):	N/A	
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	207 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	6-10 inches	Location: PG&E Topock, Needles, California
Driller Name:	S. Vasquez / E. Ramos	Depth to First Water:	10.55 ft bgs	
Drilling Asst:	L. Amaya / P. Almanza	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger:	JL / SM / GJ / RC	Sampling Interval:	Continuous	
Editor:	Kendra Keon	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
161									
162							(162'); increase in sand, decrease in granules and pebbles, increase in silt, no clay		
163	120								
164							(164'); little clay; moist to wet; increase in granules and pebbles, decrease in sand		
165									
166									
167									
168							(168'); wet; decrease in sand, increase in granules and pebbles	(167.0 - 177.0') Soft drilling.	
169									
170									
171									
172	120						(172'); trace clay; increase in silt, increase in sand, decrease in granules and pebbles		
173									
174							(174'); little clay; decrease in silt, decrease in granules and pebbles		
175									
176									
177							(177'); trace clay; increase in sand		
178							(178'); increase in silt, no clay	(177.0 - 197.0') Soft drilling, additional recovery do to stretching of finer grained lithology.	
179	252						(179'); trace clay; decrease in silt		
180									

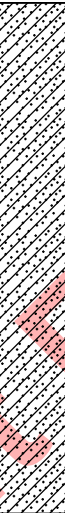
Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, NR = no recovery, blue water table symbol represents depth to water collected from temp well during drilling

Date Started:	10/31/2019	Surface Elevation:	N/A	Boring No.: MW-94d
Date Completed:	11/02/2019	Northing (NAD83):	N/A	
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	207 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	6-10 inches	Location: PG&E Topock, Needles, California
Driller Name:	S. Vasquez / E. Ramos	Depth to First Water:	10.55 ft bgs	
Drilling Asst:	L. Amaya / P. Almanza	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger:	JL / SM / GJ / RC	Sampling Interval:	Continuous	
Editor:	Kendra Keon	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
181				Topock - Older Alluvium Deposits	SM		(180.5 - 181.0') Topock - Older Alluvium Deposits; Well graded sand with silt and gravel (SW-SM); reddish brown (2.5YR 4/4); very fine grained to very coarse grained, angular to subround; some granules to very large pebbles, angular to subangular; little silt; trace clay; trace mica; coarser clasts composed of metadiorite; wet		
182					SW-SM				
183				Topock - Older Alluvium Deposits	SM		(181.0 - 186.5') Topock - Older Alluvium Deposits; Silty sand with gravel (SM); reddish brown (2.5YR 4/4); very fine grained to very coarse grained, angular to subround; some granules to very large pebbles, angular to subangular; little silt; trace clay; little mica; coarser clasts composed of metadiorite; wet		
184									
185							(184.0 - 186.5'); some silt; little clay; decrease in sand, increase in silt, increase in clay		
186									
187							(186.5 - 207.0') Topock - Weathered Bedrock - conglomerate; Clayey sand with gravel (SC); red (2.5YR 4/6); very fine grained to very coarse grained, angular to subround; some granules to very large pebbles, angular to subangular; little silt; little clay; trace mica; coarser clasts composed of metadiorite; moist to wet; weathered pebble gravel present		
188									
189	252		Groundwater VAS collection was not included in the drilling scope 11/1/2019 20:16						
190		Sieve samples not collected							
191									
192							(192'); trace silt; increase granules and pebbles, increase in sand, decrease silt		
193				Topock - Weathered Bedrock - conglomerate	SC				
194									
195									
196									
197									
198	120						(197.5'); little silt; decrease in sand, increase in silt	(197.0 - 207.0') Soft drilling, change in rig geologist.	
199							(199'); trace silt; increase in sand, decrease in silt		
200									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, NR = no recovery, blue water table symbol represents depth to water collected from temp well during drilling

Date Started:	10/31/2019	Surface Elevation:	N/A	Boring No.: <u>MW-94d</u>
Date Completed:	11/02/2019	Northing (NAD83):	N/A	
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	207 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	6-10 inches	Location: PG&E Topock, Needles, California
Driller Name:	S. Vasquez / E. Ramos	Depth to First Water:	10.55 ft bgs	
Drilling Asst:	L. Amaya / P. Almanza	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger:	JL / SM/ GJ / RC	Sampling Interval:	Continuous	
Editor:	Kendra Keon	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
201	120	Sieve samples not collected	Groundwater VAS collection was not included in the drilling scope 11/1/2019 20:16	Topock - Weathered Bedrock - conglomerate	SC		(205'); little silt; decrease in sand, increase in silt		
202									
203									
204									
205									
206									
207	End of Boring at 207.0 'bgs.								
208	<div>Draft - Final - Pending Final Survey 12/30/19</div>								
209									
210									
211									
212									
213									
214									
215									
216									
217									
218									
219									
220									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, NR = no recovery, blue water table symbol represents depth to water collected from temp well during drilling

Date Started:	11/12/2019	Surface Elevation:	N/A	Boring No.: MW-94s
Date Completed:	11/14/2019	Northing (NAD83):	N/A	
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	105 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	10-12 inches	Location: PG&E Topock, Needles, California
Driller Name:	Jose Hernandez	Depth to First Water:	10.55 ft bgs	
Drilling Asst:	L. Amaya / P. Almanza	Sampling Method:	8 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger:	Chris Bonessi	Sampling Interval:	Screen Intervals	
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
1	0				NR		(0.0 - 7.0') No recovery (NR); Core not collected or logged, see MW-94d boring log for lithologic description.	(0.0 - 7.0') Hard drilling.	(0.0 - 17.0') No water used
2									
3									
4									
5									
6									
7									
8		Sieve samples not collected	Groundwater VAS collection was not included in the drilling scope 11/1/2019 20:16	Topock - Fluvial Deposits	SW		(7.0 - 8.0') Topock - Fluvial Deposits; Well graded sand with gravel (SW); yellowish brown / moderate yellowish brown (10YR 5/4); very fine grained to very coarse grained, angular to round; little granules to very large pebbles, angular to subround; little silt; trace clay; trace mica; dry; coarser clast mixed lithology	(7.0 - 17.0') Soft drilling.	
9				Topock - Fluvial Deposits	SW		(8.0 - 10.0') Topock - Fluvial Deposits; Well graded sand with gravel (SW); dark yellowish brown (10YR 4/4); very fine grained to very coarse grained, angular to round; some granules to very large pebbles, subangular to subround; trace silt; trace clay; little mica; moist; coarser clast mixed lithology		
10				Topock - Fluvial Deposits	SM		(10.0 - 12.0') Topock - Fluvial Deposits; Silty sand (SM); brown (10YR 4/3); very fine grained to very coarse grained, angular to round; little granules to very large pebbles, angular to subround; little silt; trace clay; wet; coarser clast composed of mixed lithology		
11	120						(12.0 - 30.0') Topock - Fluvial Deposits; Well graded sand with gravel (SW); dark yellowish brown (10YR 4/4); medium grained to very coarse grained, angular to round; some granules to very large pebbles, subangular to subround; little small to large cobbles, subround to round; little very fine to medium grained sand, subangular to subround; trace silt; trace mica; wet; coarser clast mixed lithology		
12									
13	60								
14									
15									
16	120			Topock - Fluvial Deposits	SW		(15.0 - 17.0'); increase in cobbles		(17.0 - 27.0') 10 gallons of water used; 0 gallons of water recovered; 10 gallons of water lost
17									
18									
19									
20									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, NR = no recovery, blue water table symbol represents depth to water collected during drilling at MW-94d

Date Started:	11/12/2019	Surface Elevation:	N/A	Boring No.: MW-94s
Date Completed:	11/14/2019	Northing (NAD83):	N/A	
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	105 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	10-12 inches	Location: PG&E Topock, Needles, California
Driller Name:	Jose Hernandez	Depth to First Water:	10.55 ft bgs	
Drilling Asst:	L. Amaya / P. Almanza	Sampling Method:	8 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger:	Chris Bonessi	Sampling Interval:	Screen Intervals	
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
21							(20') coarse grained to very coarse grained; trace silt; decrease in sand, increase in granules and pebbles		
22									
23									
24	120								
25				Topock - Fluvial Deposits	SW		(25') and granules to very large pebbles, subangular to round; decrease in sand		
26									
27							(27') some granules to very large pebbles, subangular to round; increase in sand		
28									(27.0 - 47.0') No water used
29									
30									
31									
32	120								
33									
34				Topock - Fluvial Deposits	SM		(30.0 - 37.0') Topock - Fluvial Deposits; Silty sand (SM); yellowish brown / moderate yellowish brown (10YR 5/4); very fine grained to fine grained, subangular to subround; wet; lensed		
35							(31') brown (10YR 5/3); very fine grained to medium grained, angular to subround; trace mica		
36							(35') yellowish brown / moderate yellowish brown (10YR 5/4); very fine grained to fine grained, subangular to subround; lensed; increase silt, silt in seams, decrease in sand		
37									
38							(37.0 - 67.0') No recovery (NR); Core not collected or logged, see MW-94d boring log for lithologic description.		
39	0								
40									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, NR = no recovery, blue water table symbol represents depth to water collected during drilling at MW-94d

Date Started:	11/12/2019	Surface Elevation:	N/A	Boring No.: MW-94s
Date Completed:	11/14/2019	Northing (NAD83):	N/A	
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	105 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	10-12 inches	Location: PG&E Topock, Needles, California
Driller Name:	Jose Hernandez	Depth to First Water:	10.55 ft bgs	
Drilling Asst:	L. Amaya / P. Almanza	Sampling Method:	8 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger:	Chris Bonessi	Sampling Interval:	Screen Intervals	
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
41									
42									
43									
44	0								
45									
46									
47									
48									
49									
50									
51									
52	0								
53									
54									
55									
56									
57									
58									
59	0								
60									

Groundwater VAS collection was not included in the drilling scope 11/1/2019 20:16

NR

Sieve samples not collected

(47.0 - 57.0') 5 gallons of water used; 0 gallons of water recovered; 5 gallons of water lost

(57.0 - 77.0') No water used

(58.0 - 60.0') Encountered large boulder stopped drilling and clean out.

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, NR = no recovery, blue water table symbol represents depth to water collected during drilling at MW-94d

Date Started:	11/12/2019	Surface Elevation:	N/A	Boring No.: MW-94s
Date Completed:	11/14/2019	Northing (NAD83):	N/A	
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	105 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	10-12 inches	Location: PG&E Topock, Needles, California
Driller Name:	Jose Hernandez	Depth to First Water:	10.55 ft bgs	
Drilling Asst:	L. Amaya / P. Almanza	Sampling Method:	8 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger:	Chris Bonessi	Sampling Interval:	Screen Intervals	
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
61	0				NR				
62									
63									
64									
65	120	Sieve samples not collected	Groundwater VAS collection was not included in the drilling scope 11/1/2019 20:16	Topock - Alluvium Deposits	SM		(67.0 - 72.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (2.5YR 4/4); very fine grained to very coarse grained, angular to subround; some granules to very large pebbles, angular to subangular; little silt; trace small cobbles, angular to subangular; trace clay; trace mica; coarser clasts composed of metadiorite; wet		
66									
67									
68									
69									
70									
71									
72									
73									
74									
75									
76									
77									
78									
79									
80									
	84			Topock - Alluvium Deposits	SM		(79.0 - 84.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (2.5YR 4/4); very fine grained to medium grained, angular to subround; some silt; little granules to very		
							(74.5 - 79.0') Topock - Alluvium Deposits; Well graded sand with gravel (SW-SM); reddish brown (2.5YR 4/4); very fine grained to medium grained, angular to subround; some granules to very large pebbles, angular to subangular; little coarse to very coarse grained sand, angular to subangular; trace small cobbles, angular to subangular; trace clay; trace mica; coarser clasts composed of metadiorite; wet		
							(72.0 - 74.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (2.5YR 4/4); very fine grained to medium grained, angular to subround; little granules to very large pebbles, angular to subangular; little coarse to very coarse grained sand, angular to subangular; trace small cobbles, angular to subangular; trace clay; trace mica; coarser clasts composed of metadiorite; wet		
							(67.0 - 72.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (2.5YR 4/4); very fine grained to very coarse grained, angular to subround; some granules to very large pebbles, angular to subangular; little silt; trace small cobbles, angular to subangular; trace clay; trace mica; coarser clasts composed of metadiorite; wet		
									(77.0 - 87.0') 10 gallons of water used; 0 gallons of water recovered; 10 gallons of water lost

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, NR = no recovery, blue water table symbol represents depth to water collected during drilling at MW-94d

Date Started:	11/12/2019	Surface Elevation:	N/A	Boring No.: MW-94s
Date Completed:	11/14/2019	Northing (NAD83):	N/A	
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	105 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	10-12 inches	Location: PG&E Topock, Needles, California
Driller Name:	Jose Hernandez	Depth to First Water:	10.55 ft bgs	
Drilling Asst:	L. Amaya / P. Almanza	Sampling Method:	8 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger:	Chris Bonessi	Sampling Interval:	Screen Intervals	
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
81	84			Topock - Alluvium Deposits	SM		large pebbles, angular to subangular; trace clay; coarser clasts composed of metadiorite; wet		
82									
83									
84									
85	36			Topock - Alluvium Deposits	SW-SM		(84.0 - 89.0') Topock - Alluvium Deposits; Well graded sand with gravel (SW-SM); reddish brown (2.5YR 4/4); very fine grained to very coarse grained, angular to subround; some granules to very large pebbles, angular to subangular; little silt; trace small cobbles, angular to subangular; trace clay; trace mica; coarser clasts composed of metadiorite; wet; likely disturbed due to short run, silt and clay percentage likely biased low	(84.0 - 87.0') Heaving sands.	
86									
87									
88									
89	120	Sieve samples not collected	Groundwater VAS collection was not included in the drilling scope 11/1/2019 20:16	Topock - Alluvium Deposits	SM		(89.0 - 93.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (2.5YR 4/4); very fine grained to very coarse grained, angular to subround; some granules to very large pebbles, angular to subangular; little silt; trace small cobbles, angular to subangular; trace clay; trace mica; coarser clasts composed of metadiorite; wet		(87.0 - 97.0') 5 gallons of water used; 0 gallons of water recovered; 5 gallons of water lost
90									
91									
92									
93				Topock - Alluvium Deposits	SW-SM		(93.0 - 95.0') Topock - Alluvium Deposits; Silty sand with gravel (SW-SM); reddish brown (2.5YR 4/4); very fine grained to very coarse grained, angular to subround; and granules to very large pebbles, angular to subround; little silt; trace small cobbles, angular to subangular; trace mica; wet		
94									
95									
96									
97				Topock - Alluvium Deposits	SM		(95.0 - 100.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (2.5YR 4/4); very fine grained to very coarse grained, angular to subround; some granules to very large pebbles, angular to subangular; little silt; trace small cobbles, angular to subangular; trace clay; trace mica; coarser clasts composed of metadiorite; wet		
98									
99									
100							(97'); little silt; decrease in sand		
	36							(98.0') Encountered rock stopped run short.	

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, NR = no recovery, blue water table symbol represents depth to water collected during drilling at MW-94d

Date Started:	11/12/2019	Surface Elevation:	N/A	Boring No.: MW-94s
Date Completed:	11/14/2019	Northing (NAD83):	N/A	
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	105 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	10-12 inches	Location: PG&E Topock, Needles, California
Driller Name:	Jose Hernandez	Depth to First Water:	10.55 ft bgs	
Drilling Asst:	L. Amaya / P. Almanza	Sampling Method:	8 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger:	Chris Bonessi	Sampling Interval:	Screen Intervals	
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
101	60	Sieve samples not collected	Groundwater VAS collection was not included in the drilling scope 11/1/2019 20:16	Topock - Alluvium Deposits	SW-SM		(100.0 - 103.0') Topock - Alluvium Deposits; Well graded sand with silt and gravel (SW-SM); reddish brown (2.5YR 4/4); very fine grained to very coarse grained, angular to subround; some granules to very large pebbles, angular to subangular; little silt; trace small cobbles, angular to subangular; trace mica; coarser clasts composed of metadiorite; wet; likely disturbed due to short run, silt percentage likely biased low	(105.0') Water used to was flush out casing.	(105.0') 500 gallons of water used; 0 gallons of water recovered; 500 gallons of water lost
102									
103									
104				Topock - Alluvium Deposits	SM		(103.0 - 105.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (2.5YR 4/4); very fine grained to very coarse grained, round; some granules to very large pebbles, angular to subangular; some silt; trace small cobbles, angular to subangular; trace clay; trace mica; coarser clasts composed of metadiorite; wet		
105				End of Boring at 105.0 'bgs.					
106									
107									
108									
109									
110									
111									
112									
113									
114									
115									
116									
117									
118									
119									
120									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, NR = no recovery, blue water table symbol represents depth to water collected during drilling at MW-94d

Date Started:	06/28/2019	Surface Elevation:	480.9 ft amsl	Boring No.: <u>RB-2 Pilot</u>	
Date Completed:	07/29/2019	Northing (NAD83):	2103398.9		
Drilling Co.:	Cascade	Easting (NAD83):	7616014.8	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	307 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Boart Longyear Track Mount	Borehole Diameter:	4-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Tyler Alymer	Depth to First Water:	23.77 ft bgs		
Drilling Asst:	J. Condelaria, G. Angiano	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	Joe Latham	Sampling Interval:	Continuous		
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
1				Topock - Fill	SP		(0.0 - 3.0') Topock - Fill; Poorly graded sand (SP); brown (10YR 4/3); fine grained to medium grained, subround; dry	(0.0 - 7.0') Soft drilling	2 gallons used; 0 gallons recovered; 2 gallons lost
2									
3							(3.0 - 7.0') No recovery (NR)	(3.0 - 7.0') Lost recovery due to soft dredge sands	
4	36				NR				
5									
6									
7							(7.0 - 11.0') Topock - Fill; Poorly graded sand (SP); brown (7.5YR 4/3); fine grained to medium grained, subangular to subround; dry	(7.0 - 17.0') Heaving sands. No recovery 11 to 17 ft bgs due to loose dredge sands	1 gallons used; 0 gallons recovered; 1 gallons lost
8				Topock - Fill	SP				
9									
10									
11							(11.0 - 17.0') No recovery (NR)		
12	48				NR				
13									
14									
15									
16									
17							(17.0 - 18.5') Topock - Fill; Poorly graded sand (SP); brown (10YR 4/3); fine grained to medium grained, subangular to subround; dry		
18				Topock - Fill	SP				
19	36			Topock - Fluvial Deposits	SP		(18.5 - 20.0') Topock - Fluvial Deposits; Poorly graded sand (SP); light yellowish brown (10YR 6/4); very fine grained to fine grained, round; trace silt; dry		
20									







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Date Started:	06/28/2019	Surface Elevation:	480.9 ft amsl	Boring No.: <u>RB-2 Pilot</u>	
Date Completed:	07/29/2019	Northing (NAD83):	2103398.9		
Drilling Co.:	Cascade	Easting (NAD83):	7616014.8	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	307 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Boart Longyear Track Mount	Borehole Diameter:	4-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Tyler Alymer	Depth to First Water:	23.77 ft bgs		
Drilling Asst:	J. Condelaria, G. Angiano	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	Joe Latham	Sampling Interval:	Continuous		
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
21	36				NR		(20.0 - 27.0') No recovery (NR)	(17.0 - 27.0') Heaving sands, no recovery 20 to 27 ft bgs due to loose dredge sands, during backfilling the sand dropped ~12 ft. indicating void at ~15 to 25 ft bgs	
22									
23									
24									
25									
26	48	RB-2-SS-27-31 7/15/2019 09:31		Topock - Fluvial Deposits	SP		(27.0 - 31.5') Topock - Fluvial Deposits; Poorly graded sand (SP); light yellowish brown (10YR 6/4); very fine grained to fine grained, subangular to round; trace silt; moist	(27.0 - 37.0') Heaving sands. No recovery 31.5 to 37 ft bgs due to loose dredge sands	2 gallons used; 0 gallons recovered; 2 gallons lost
27									
28									
29									
30									
31									
32							(31.5 - 37.0') No recovery (NR)		
33									
34									
35									
36	60	RB-2-SS-37-42 7/15/2019 09:46	RB-2-VAS-36.5-41.5 (<0.033 U ppb) 6/29/2019 11:43	Topock - Fluvial Deposits	SP-SM		(37.0 - 38.0') Topock - Fluvial Deposits; Poorly graded sand with silt (SP-SM); brown (10YR 5/3); fine grained, subangular to round; little silt; moist		(37.0 - 307.0') No used
37				Topock - Fluvial Deposits	SM		(38.0 - 39.0') Topock - Fluvial Deposits; Silty sand (SM); brown (10YR 5/3); very fine grained to fine grained, round; little silt; moist		
38				Topock - Fluvial Deposits	GW-GM		(39.0 - 42.0') Topock - Fluvial Deposits; Well graded gravel with silt and sand (GW-GM); grayish brown (10YR 5/2); granules to very large pebbles, subangular to subround; some very fine		
39									
40									






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Date Started:	06/28/2019	Surface Elevation:	480.9 ft amsl	Boring No.: <u>RB-2 Pilot</u>	
Date Completed:	07/29/2019	Northing (NAD83):	2103398.9		
Drilling Co.:	Cascade	Easting (NAD83):	7616014.8	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	307 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Boart Longyear Track Mount	Borehole Diameter:	4-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Tyler Alymer	Depth to First Water:	23.77 ft bgs		
Drilling Asst:	J. Condelaria, G. Angiano	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	Joe Latham	Sampling Interval:	Continuous		
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
41	60	RB-2-SS-37-42 7/15/2019 09:46		Topock - Fluvial Deposits	GW-GM		grained to very coarse grained sand; little small cobbles; little silt; trace caliche; trace coarser clast consists of metidiorite and quartz; wet	(41.5') Bottom of sampler set at 41.5 instead of 42 ft bgs because of formation collapse	(37.0 - 307.0') No used
42									
43				Topock - Fluvial Deposits	SM		(42.0 - 45.0') Topock - Fluvial Deposits; Silty sand (SM); dark yellowish brown (10YR 4/4); very fine grained, round; little silt; trace clay; wet		
44		RB-2-SS-42-47 7/15/2019 10:06							
45				Topock - Fluvial Deposits	GW-GM		(45.0 - 48.0') Topock - Fluvial Deposits; Well graded gravel with silt and sand (GW-GM); dark gray (10YR 4/1); granules to very large pebbles, round; little very fine grained to very coarse grained sand; little silt; trace small cobbles; trace clay; little caliche; little coarser clast consists of metidiorite and quartz; wet		
46									
47									
48		RB-2-SS-47-50 7/15/2019 10:00							
49	180			Topock - Alluvium Deposits	GM		(48.0 - 54.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); reddish brown (5YR 5/4); small pebbles to very large pebbles, angular to subangular; some very fine grained to very coarse grained sand; little silt; trace clay; some coarser clasts composed of metadiorite; wet		
50									
51									
52		RB-2-SS-50-55 7/15/2019 10:10							
53				Topock - Alluvium Deposits	GM		(54.0 - 55.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); reddish brown (5YR 5/4); small pebbles to very large pebbles, angular to subangular; some very fine grained to very coarse grained sand; some clay; little silt; some coarser clasts composed of metadiorite; moist		
54									
55									
56				Topock - Alluvium Deposits	SM		(55.0 - 59.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (5YR 5/4); fine grained to medium grained, subangular; some granules to medium pebbles; little silt; trace clay; little coarser clasts composed of metadiorite; little coarser clast composed of quartz; moist		
57		RB-2-SS-55-60 7/15/2019 10:15							
58	120								
59				Topock - Alluvium Deposits	SC		(59.0 - 60.0') Topock - Alluvium Deposits; Clayey sand with gravel (SC); reddish brown (5YR 5/4); fine grained to coarse grained, angular to subangular; little granules to large pebbles, angular to		
60									

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Date Started:	06/28/2019	Surface Elevation:	480.9 ft amsl	Boring No.: <u>RB-2 Pilot</u>	
Date Completed:	07/29/2019	Northing (NAD83):	2103398.9		
Drilling Co.:	Cascade	Easting (NAD83):	7616014.8	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	307 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Boart Longyear Track Mount	Borehole Diameter:	4-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Tyler Alymer	Depth to First Water:	23.77 ft bgs		
Drilling Asst:	J. Condelaria, G. Angiano	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	Joe Latham	Sampling Interval:	Continuous		
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
61	120	RB-2-SS-60-65 7/15/2019 10:20		Topock - Alluvium Deposits	GM		subangular; little clay; trace silt; little coarser clasts composed of metadiorite; little granite; moist		(37.0 - 307.0') No used
62							(60.0 - 67.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); reddish brown (5YR 5/4); granules to large pebbles, angular to subangular; some very fine grained to very coarse grained sand; little silt; trace coarser clasts composed of metadiorite; moist		
63									
64									
65	120	RB-2-SS-65-70 7/15/2019 10:25		Topock - Alluvium Deposits	GW		(67.0 - 74.0') Topock - Alluvium Deposits; Well graded gravel (GW); reddish gray / pale brown(5YR 5/2); granules to small cobbles, angular to subangular; and medium to very coarse grained sand, angular to subangular; trace small cobbles; trace silt; some coarser clasts composed of metadiorite, quartz, granite, and basalt; wet		
66									
67									
68									
69	120	RB-2-SS-70-75 7/15/2019 11:38		Topock - Alluvium Deposits	GC		(74.0 - 75.0') Topock - Alluvium Deposits; Clayey gravel with sand (GC); dark reddish gray (5YR 4/2); granules to medium pebbles, subangular; some very fine grained to very coarse grained sand; little clay; trace silt; some coarser clasts composed of metadiorite; moist		
70									
71									
72									
73	120	RB-2-VAS-72-77 (<0.033 U ppb) 6/30/2019 14:10		Topock - Alluvium Deposits	SW		(75.0 - 77.0') Topock - Alluvium Deposits; Well graded sand with gravel (SW); reddish brown / moderate brown(5YR 4/4); medium grained to very coarse grained, angular to subround; some granules to medium pebbles, angular; trace silt; and coarser clasts composed of metadiorite; wet		
74									
75									
76									
77	120	RB-2-SS-75-80 7/15/2019 12:14		Topock - Alluvium Deposits	SW-SM		(77.0 - 81.5') Topock - Alluvium Deposits; Well graded sand with silt and gravel (SW-SM); reddish gray / pale brown(5YR 5/2); medium grained to coarse grained, angular to subround; some granules to large pebbles, angular to subangular; little silt; little coarser clasts composed of metadiorite; little granite; moist		
78									
79									
80									

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Date Started:	06/28/2019	Surface Elevation:	480.9 ft amsl	Boring No.: <u>RB-2 Pilot</u>	
Date Completed:	07/29/2019	Northing (NAD83):	2103398.9		
Drilling Co.:	Cascade	Easting (NAD83):	7616014.8	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	307 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Boart Longyear Track Mount	Borehole Diameter:	4-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Tyler Alymer	Depth to First Water:	23.77 ft bgs		
Drilling Asst:	J. Condelaria, G. Angiano	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	Joe Latham	Sampling Interval:	Continuous		
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
81				Topock - Alluvium Deposits	SW-SM				(37.0 - 307.0') No used
82		RB-2-SS-80-85 7/15/2019 12:21		Topock - Alluvium Deposits	ML		(81.5 - 86.5') Topock - Alluvium Deposits; Silt with gravel (ML); low plasticity; some granules to large pebbles, angular to subangular; little very fine grained to very coarse grained sand; little clay; little coarser clasts composed of metadiorite; wet		
83	120								
84									
85									
86									
87		RB-2-SS-85-90 7/15/2019 14:00		Topock - Alluvium Deposits	GC		(86.5 - 90.0') Topock - Alluvium Deposits; Clayey gravel (GC); yellowish red / light brown(5YR 5/6); granules to large pebbles, angular to subangular; some clay; little silt; trace fine to coarse grained sand, subangular to subround; some coarser clasts composed of metadiorite; wet		
88									
89									
90									
91				Topock - Alluvium Deposits	GC		(90.0 - 93.0') Topock - Alluvium Deposits; Clayey gravel (GC); brown (7.5YR 5/4); granules to very large pebbles, angular to subangular; some clay; trace very fine grained to very coarse grained sand; trace silt; some coarser clasts composed of metadiorite; trace granite; moist	(90.0 - 103.0') Rough drilling	
92	120	RB-2-SS-90-95 7/16/2019 08:04							
93									
94				Topock - Alluvium Deposits	GM		(93.0 - 96.5') Topock - Alluvium Deposits; Silty gravel (GM); strong brown (7.5YR 5/6); granules to very large pebbles, angular to subangular; little silt; trace very fine grained to very coarse grained sand; trace clay; and coarser clasts composed of metadiorite; dry		
95									
96									
97		RB-2-SS-95-100 7/16/2019 08:12		Topock - Alluvium Deposits	GM		(96.5 - 99.0') Topock - Alluvium Deposits; Silty gravel (GM); strong brown (7.5YR 5/6); granules to very large pebbles, angular to subangular; some silt; little clay; trace very fine grained to very coarse grained sand; some coarser clasts composed of metadiorite; moist		
98	120								
99									
100				Topock - Alluvium Deposits	GC		(99.0 - 104.0') Topock - Alluvium Deposits; Clayey gravel (GC); yellowish red / light brown(5YR 5/6); granules to very large pebbles, angular to subangular; some clay; little silt; trace very		





Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	06/28/2019	Surface Elevation:	480.9 ft amsl	Boring No.: <u>RB-2 Pilot</u>	
Date Completed:	07/29/2019	Northing (NAD83):	2103398.9		
Drilling Co.:	Cascade	Easting (NAD83):	7616014.8	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	307 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Boart Longyear Track Mount	Borehole Diameter:	4-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Tyler Alymer	Depth to First Water:	23.77 ft bgs		
Drilling Asst:	J. Condelaria, G. Angiano	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	Joe Latham	Sampling Interval:	Continuous		
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
101							fine grained to very coarse grained sand; some coarser clasts composed of metadiorite; moist	(90.0 - 103.0') Rough drilling	(37.0 - 307.0') No used
102									
103		RB-2-SS-100-105 7/16/2019 08:20		Topock - Alluvium Deposits	GC				
104	120								
105			RB-2-VAS-102-107 (<0.033 U ppb) 7/1/2019 15:21	Topock - Alluvium Deposits	GM		(104.0 - 107.0') Topock - Alluvium Deposits; Silty gravel (GM); yellowish red / light brown(5YR 5/6); granules to medium pebbles, angular to subangular; some silt; little clay; little coarser clasts composed of metadiorite; wet		
106									
107									
108		RB-2-SS-105-110 7/16/2019 08:33		Topock - Alluvium Deposits	GC		(107.0 - 109.0') Topock - Alluvium Deposits; Clayey gravel with sand (GC); yellowish red / light brown(5YR 5/6); granules to medium pebbles, angular to subangular; little very fine grained to very coarse grained sand; little silt; little clay; trace mica; little coarser clasts composed of metadiorite; moist		
109									
110				Topock - Alluvium Deposits	GM		(109.0 - 111.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); yellowish brown (10YR 5/6); granules to large pebbles, subangular; some silt; little very fine grained to very coarse grained sand; little clay; little coarser clasts composed of metadiorite; moist	(110.0 - 125.0') Rough drilling	
111									
112	120	RB-2-SS-110-115 7/16/2019 08:40		Topock - Alluvium Deposits	GM		(111.0 - 112.0') Topock - Alluvium Deposits; Silty gravel (GM); yellowish brown (10YR 5/6); granules to large pebbles, angular to subangular; little very fine grained to very coarse grained sand; little silt; little clay; little coarser clasts composed of metadiorite; moist		
113				Topock - Alluvium Deposits	GM		(112.0 - 114.0') Topock - Alluvium Deposits; Silty gravel (GM); strong brown (7.5YR 5/6); granules to large pebbles, angular to subangular; some silt; little very fine grained to very coarse grained sand; trace clay; trace caliche; some coarser clasts composed of metadiorite; moist		
114									
115							(114.0 - 121.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); yellowish brown (10YR 5/6); granules to small pebbles, subangular; some silt; little granules to small pebbles, subangular; trace clay; trace coarser clasts composed of metadiorite; moist		
116									
117				Topock - Alluvium Deposits	GM				
118	120	RB-2-SS-115-120 7/16/2019 08:51							
119									
120							(119.5'); less silt, more clay		

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Date Started:	06/28/2019	Surface Elevation:	480.9 ft amsl	Boring No.: <u>RB-2 Pilot</u>	
Date Completed:	07/29/2019	Northing (NAD83):	2103398.9		
Drilling Co.:	Cascade	Easting (NAD83):	7616014.8	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	307 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Boart Longyear Track Mount	Borehole Diameter:	4-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Tyler Alymer	Depth to First Water:	23.77 ft bgs		
Drilling Asst:	J. Condelaria, G. Angiano	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	Joe Latham	Sampling Interval:	Continuous		
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
121	120	RB-2-SS-120-125 7/16/2019 09:00		Topock - Alluvium Deposits	GM		(121.0 - 127.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); yellowish brown (10YR 5/6); granules to small pebbles, subangular; some silt; little granules to small pebbles, subangular; trace clay; trace coarser clasts composed of metadiorite; moist	(110.0 - 125.0') Rough drilling	(37.0 - 307.0') No used
122				Topock - Alluvium Deposits	GM				
123									
124									
125									
126	RB-2-SS-125-129 7/16/2019 09:09		Topock - Alluvium Deposits				ML		
127									
128									
129									
130				RB-2-SS-129-134 7/16/2019 09:22		Topock - Alluvium Deposits			GM
131									
132									
133									
134	RB-2-SS-134-139 7/16/2019 10:36		Topock - Alluvium Deposits				SM		
135									
136									
137									
138				120	RB-2-SS-139-144 7/16/2019				Topock - Alluvium Deposits
139									
140									






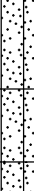

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Date Started:	06/28/2019	Surface Elevation:	480.9 ft amsl	Boring No.: <u>RB-2 Pilot</u>	
Date Completed:	07/29/2019	Northing (NAD83):	2103398.9		
Drilling Co.:	Cascade	Easting (NAD83):	7616014.8	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	307 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Boart Longyear Track Mount	Borehole Diameter:	4-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Tyler Alymer	Depth to First Water:	23.77 ft bgs		
Drilling Asst:	J. Condelaria, G. Angiano	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	Joe Latham	Sampling Interval:	Continuous		
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
141		10:45		Topock - Alluvium Deposits	SM				(37.0 - 307.0') No used
142		RB-2-SS-139-144 7/16/2019 10:45					(142.0 - 145.5') Topock - Alluvium Deposits; Silty gravel with sand (GM); strong brown (7.5YR 5/6); granules to very large pebbles, angular; little silt; trace small cobbles; some coarser clasts composed of metadiorite; moist		
143									
144	120		RB-2-VAS-142-147 (<0.17 U ppb) 7/9/2019 13:20	Topock - Alluvium Deposits	GM				
145									
146		RB-2-SS-144-149 7/16/2019 10:56		Topock - Alluvium Deposits	SM		(145.5 - 147.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); strong brown (7.5YR 5/6); very fine grained to very coarse grained, subangular to subround; some granules to large pebbles, angular to subangular; little coarser clasts composed of metadiorite; trace granite; moist		
147									
148				Topock - Alluvium Deposits	SM		(147.0 - 149.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown / moderate brown (5YR 4/4); very fine grained to coarse grained, subangular to subround; little granules to medium pebbles, angular; little silt; trace coarser clasts composed of metadiorite; little granite; wet		
149									
150		RB-2-SS-149-154 7/16/2019 11:06		Topock - Alluvium Deposits	SM		(149.0 - 153.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); yellowish brown (10YR 5/6); medium grained to very coarse grained, angular to subround; little granules to very large pebbles, subangular; little silt; trace coarser clasts composed of metadiorite; trace granite; wet		
151									
152	120								
153									
154		RB-2-SS-154-157 7/16/2019 11:14		Topock - Alluvium Deposits	GM		(153.0 - 156.5') Topock - Alluvium Deposits; Silty gravel with sand (GM); strong brown (7.5YR 5/6); granules to very large pebbles, angular to subangular; some medium to very coarse grained sand, subangular to subround; little silt; trace coarser clasts composed of metadiorite; wet		
155									
156									
157		RB-2-SS-157-162 7/16/2019 11:20		Topock - Alluvium Deposits	GM		(156.5 - 159.5') Topock - Alluvium Deposits; Silty gravel (GM); strong brown (7.5YR 5/6); granules to very large pebbles, angular to subangular; some silt; little very fine to very coarse grained sand, subangular to subround; trace clay; some coarser clasts composed of metadiorite; wet		
158	120								
159									
160				Topock - Alluvium	GC		(159.5 - 160.0') Topock - Alluvium Deposits; Clayey gravel (GC);		

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Date Started:	06/28/2019	Surface Elevation:	480.9 ft amsl	Boring No.: <u>RB-2 Pilot</u>	
Date Completed:	07/29/2019	Northing (NAD83):	2103398.9		
Drilling Co.:	Cascade	Easting (NAD83):	7616014.8	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	307 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Boart Longyear Track Mount	Borehole Diameter:	4-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Tyler Alymer	Depth to First Water:	23.77 ft bgs		
Drilling Asst:	J. Condelaria, G. Angiano	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	Joe Latham	Sampling Interval:	Continuous		
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid		
161	120	RB-2-SS-157-162 7/16/2019 11:20		Deposits	GM		yellowish brown (10YR 5/6); granules to very large pebbles, angular to subangular; some clay; little very fine to very coarse grained sand, subangular to subround; little silt; little coarser clasts composed of metadiorite; moist		(37.0 - 307.0') No used		
162		Topock - Alluvium Deposits		(160.0 - 163.0') Topock - Alluvium Deposits; Silty gravel (GM); strong brown (7.5YR 5/6); granules to very large pebbles, angular to subangular; some silt; little very fine to very coarse grained sand, subangular to subround; trace clay; some coarser clasts composed of metadiorite; wet							
163		RB-2-SS-162-165 7/16/2019 11:58		Topock - Alluvium Deposits	GM		(160.5'); 0.3' lense of grayish green color change				
164							(163.0 - 167.0') Topock - Alluvium Deposits; Silty gravel (GM); reddish yellow (7.5YR 6/8); granules to very large pebbles, angular to subangular; and silt; little very fine to very coarse grained sand, subangular to subround; trace clay; some coarser clasts composed of metadiorite; moist				
165											
166	120	RB-2-SS-165-170 7/16/2019 12:07	Topock - Alluvium Deposits	SM		(167.0 - 171.0') Topock - Alluvium Deposits; Silty sand (SM); reddish brown / moderate brown(5YR 4/4); very fine grained to fine grained, subangular to subround; and silt; little granules to medium pebbles, subangular; trace clay; little coarser clasts composed of metadiorite; wet	(167.0 - 177.0') Rough drilling				
167						(170'); moist; 0.2' lense of grayish green color change					
168						RB-2-SS-170-172 7/16/2019 12:18		Topock - Alluvium Deposits	SM		(171.0 - 172.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown / moderate brown(5YR 4/4); very fine grained to coarse grained, angular; little granules to medium pebbles, angular; little silt; little coarser clasts composed of metadiorite; wet
169		RB-2-SS-172-177 7/16/2019 12:29	Topock - Alluvium Deposits	SM							(172.5 - 177.0') Topock - Alluvium Deposits; Silty sand (SM); reddish brown / moderate brown(5YR 4/4); very fine grained to fine grained, subangular to subround; and silt; little granules to medium pebbles, subangular; trace clay; little coarser clasts composed of metadiorite; moist
170						(174'); saturated zone					
171	(175.5'); 0.2' lense of grayish green color change										
172	120	RB-2-SS-172-177 7/16/2019 12:29	RB-2-VAS-172-177 (<0.17 U ppb) 7/12/2019 14:55	Topock - Alluvium Deposits	SM		(177.0 - 178.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (5YR 5/4); very fine grained to coarse grained, angular; and silt; little granules to medium pebbles, angular to subangular; trace clay; little coarser clasts composed of metadiorite; wet				
173							Topock - Alluvium Deposits		SM		(178.0 - 179.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown / moderate brown(5YR 4/4); very fine grained to coarse grained, angular; little granules to medium pebbles, angular; little silt; little coarser clasts composed of metadiorite; wet
174							Topock - Alluvium Deposits				
175		120	RB-2-SS-177-180 7/17/2019 07:59		Topock - Alluvium Deposits	SM					
176									Topock - Alluvium Deposits		
177	Topock - Alluvium Deposits										
178	120	RB-2-SS-177-180 7/17/2019 07:59		Topock - Alluvium Deposits	SM						
179				Topock - Alluvium Deposits							
180				Topock - Alluvium Deposits							

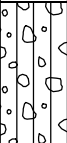







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Date Started:	06/28/2019	Surface Elevation:	480.9 ft amsl	Boring No.: <u>RB-2 Pilot</u>
Date Completed:	07/29/2019	Northing (NAD83):	2103398.9	
Drilling Co.:	Cascade	Easting (NAD83):	7616014.8	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	307 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Boart Longyear Track Mount	Borehole Diameter:	4-12 inches	Location: PG&E Topock, Needles, California
Driller Name:	Tyler Alymer	Depth to First Water:	23.77 ft bgs	
Drilling Asst:	J. Condelaria, G. Angiano	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger:	Joe Latham	Sampling Interval:	Continuous	
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
181		RB-2-SS-180-182 7/17/2019 08:08		Topock - Alluvium Deposits	SM		(179.0 - 181.0') Topock - Alluvium Deposits; Silty sand (SM); reddish brown / moderate brown(5YR 4/4); very fine grained to fine grained, subangular to subround; and silt; little granules to medium pebbles, subangular; trace clay; little coarser clasts composed of metadiorite; wet		(37.0 - 307.0') No used
182							(181.0 - 188.0') Topock - Alluvium Deposits; Well graded sand with gravel (SW); strong brown (7.5YR 5/6); very fine grained to very coarse grained, angular; some granules to large pebbles, angular; trace silt; some coarser clasts composed of metadiorite; wet		
183	120								
184		RB-2-SS-182-187 7/17/2019 08:17		Topock - Alluvium Deposits	SW				
185									
186									
187									
188		RB-2-SS-187-190 7/17/2019 08:25		Topock - Alluvium Deposits	GW-GM		(188.0 - 189.0') Topock - Alluvium Deposits; Well graded gravel with silt and sand (GW-GM); strong brown (7.5YR 5/6); granules to very large pebbles, angular; and very fine to very coarse grained sand, angular; trace clay; little coarser clasts composed of metadiorite; trace coarser clast composed of quartz; wet		
189				Topock - Alluvium Deposits	SM		(189.0 - 189.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); strong brown (7.5YR 5/6); very fine grained to very coarse grained, angular; some granules to large pebbles, angular; some silt; trace clay; little coarser clasts composed of metadiorite; trace coarser clast composed of quartz; wet		
190				Topock - Alluvium Deposits	GM		(189.5 - 192.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); strong brown (7.5YR 5/6); granules to very large pebbles, angular; some very fine to very coarse grained sand, angular; little silt; trace clay; little coarser clasts composed of metadiorite; trace coarser clast composed of quartz; wet		
191	120	RB-2-SS-190-195 7/17/2019 08:33					(192.0 - 197.0') Topock - Alluvium Deposits; Well graded sand with silt and gravel (SW-SM); strong brown (7.5YR 5/6); very fine grained to very coarse grained, angular; some granules to very large pebbles, angular; little silt; trace clay; little coarser clasts composed of metadiorite; trace coarser clast composed of quartz; wet; green staining		
192				Topock - Alluvium Deposits	SW-SM				
193									
194									
195		RB-2-SS-195-198 7/17/2019 08:40							
196									
197									
198	120	RB-2-SS-198-203 7/17/2019 09:03		Topock - Alluvium Deposits	SM		(197.0 - 199.5') Topock - Alluvium Deposits; Silty sand (SM); strong brown (7.5YR 5/6); very fine grained to medium grained, angular; and silt; little granules to small pebbles, angular; trace clay; trace coarser clasts composed of metadiorite; moist		
199									
200					ML		(199.5 - 202.0') Topock - Alluvium Deposits; Gravelly silt with sand		


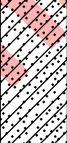

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Date Started:	06/28/2019	Surface Elevation:	480.9 ft amsl	Boring No.: <u>RB-2 Pilot</u>	
Date Completed:	07/29/2019	Northing (NAD83):	2103398.9		
Drilling Co.:	Cascade	Easting (NAD83):	7616014.8	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	307 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Boart Longyear Track Mount	Borehole Diameter:	4-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Tyler Alymer	Depth to First Water:	23.77 ft bgs		
Drilling Asst:	J. Condelaria, G. Angiano	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	Joe Latham	Sampling Interval:	Continuous		
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
201		RB-2-SS-198-203 7/17/2019 09:03		Topock - Alluvium Deposits	ML		(ML); strong brown (7.5YR 5/6); low plasticity; some granules to small pebbles, angular; little very fine to medium grained sand, angular; little clay; little coarser clasts composed of metadiorite; wet		(37.0 - 307.0') No used
202									
203	120			Topock - Alluvium Deposits	SM		(202.0 - 204.0') Topock - Alluvium Deposits; Silty sand (SM); strong brown (7.5YR 5/6); very fine grained to medium grained, angular; and silt; little small to very large pebbles, angular; trace clay; trace coarser clasts composed of metadiorite; wet (202.5'); green staining		
204			RB-2-VAS-202-207 (<0.17 U ppb) 7/14/2019 09:20	Topock - Alluvium Deposits	SM		(204.0 - 204.5') Topock - Alluvium Deposits; Silty sand (SM); strong brown (7.5YR 5/6); fine grained to coarse grained, angular; little granules to small pebbles, angular; little silt; trace clay; trace coarser clasts composed of metadiorite; wet		
205		RB-2-SS-203-207 7/17/2019 09:09		Topock - Alluvium Deposits	ML				
206				Topock - Alluvium Deposits	SM		(204.5 - 205.0') Topock - Alluvium Deposits; Gravelly silt with sand (ML); strong brown (7.5YR 5/6); low plasticity; some small to very large pebbles, angular; little very fine to medium grained sand, angular; little clay; little coarser clasts composed of metadiorite; wet		
207							(205.0 - 207.5') Topock - Alluvium Deposits; Silty sand (SM); strong brown (7.5YR 5/6); very fine grained to medium grained, angular; and silt; little small to very large pebbles, angular; trace clay; trace coarser clasts composed of metadiorite; moist		
208		RB-2-SS-207-209 7/17/2019 09:15					(207.5 - 217.0') Topock - Alluvium Deposits; Clayey sand with gravel (SC); brown (7.5YR 4/4); very fine grained to very coarse grained, angular to subround; some small to very large pebbles, angular; little clay; trace silt; little coarser clasts composed of metadiorite; moist	(207.0') Switched driller T. Alymer with D. OMara	
209									
210									
211		RB-2-SS-209-214 7/17/2019 09:22		Topock - Alluvium Deposits	SC				
212	120								
213									
214									
215		RB-2-SS-214-217 7/17/2019 09:28							
216									
217									
218									
219	180	RB-2-SS-217-222 7/17/2019 09:35		Topock - Alluvium Deposits	SC		(217.0 - 219.5') Topock - Alluvium Deposits; Clayey sand (SC); (7.5R 4/4); medium grained to very coarse grained, angular; some clay; trace granules, angular; trace silt; trace coarser clasts composed of metadiorite; wet		
220					GC		(219.5 - 222.0') Topock - Alluvium Deposits; Clayey gravel with		






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Date Started:	06/28/2019	Surface Elevation:	480.9 ft amsl	Boring No.: <u>RB-2 Pilot</u>	
Date Completed:	07/29/2019	Northing (NAD83):	2103398.9		
Drilling Co.:	Cascade	Easting (NAD83):	7616014.8	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	307 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Boart Longyear Track Mount	Borehole Diameter:	4-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Tyler Alymer	Depth to First Water:	23.77 ft bgs		
Drilling Asst:	J. Condelaria, G. Angiano	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	Joe Latham	Sampling Interval:	Continuous		
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
221	180	RB-2-SS-217-222 7/17/2019 09:35		Topock - Alluvium Deposits	GC		sand (GC); strong brown (7.5YR 5/6); granules to very large pebbles, angular; some fine to very coarse grained sand, angular to subround; little clay; some coarser clasts composed of metadiorite; trace granite; wet		(37.0 - 307.0') No used
222									
223									
224		RB-2-SS-222-227 7/17/2019 09:40					(222.0 - 237.0') Topock - Alluvium Deposits; Clayey sand with gravel (SC); brown (7.5YR 5/4); very fine grained to very coarse grained, angular to subround; some small to very large pebbles, angular; little clay; trace silt; little coarser clasts composed of metadiorite; moist		
225									
226	60								(227.0 - 244.0') Rough drilling
227									
228									
229		RB-2-SS-227-233 7/17/2019 09:45		Topock - Alluvium Deposits	SC				
230									
231	84								(237.0') Switched driller D. O'Mara with S. Vasquez
232									
233									
234		RB-2-SS-233-235 7/17/2019 09:50					(234'); greenish gray staining		
235									
236	84								(237.0') Switched driller D. O'Mara with S. Vasquez
237									
238		RB-2-SS-235-240 7/17/2019 10:30							
239									
240			RB-2-VAS-237-242 (<0.17 U ppb) 7/15/2019 13:48	Topock - Alluvium Deposits	GC		(237.0 - 241.0') Topock - Alluvium Deposits; Clayey gravel with sand (GC); reddish brown / moderate brown(5YR 4/4); granules to small pebbles, angular; some fine to coarse grained sand, subangular to subround; some clay; trace silt; little coarser clasts composed of metadiorite; moist		

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	06/28/2019	Surface Elevation:	480.9 ft amsl	Boring No.: <u>RB-2 Pilot</u>
Date Completed:	07/29/2019	Northing (NAD83):	2103398.9	
Drilling Co.:	Cascade	Easting (NAD83):	7616014.8	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	307 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Boart Longyear Track Mount	Borehole Diameter:	4-12 inches	Location: PG&E Topock, Needles, California
Driller Name:	Tyler Alymer	Depth to First Water:	23.77 ft bgs	
Drilling Asst:	J. Condelaria, G. Angiano	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger:	Joe Latham	Sampling Interval:	Continuous	
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
241	84	RB-2-SS-240-245 7/17/2019 10:35	RB-2-VAS-237-242 (<0.17 U ppb) 7/15/2019 13:48	Topock - Alluvium Deposits	GC		(241.0 - 244.0') Topock - Weathered Bedrock - conglomerate; Sandy lean clay with gravel (CL); reddish brown (5YR 5/4); low plasticity; some granules to very large pebbles, angular; little fine to coarse grained sand, subangular to subround; little silt; little coarser clasts composed of metadiorite; dry	(227.0 - 244.0') Rough drilling	(37.0 - 307.0') No used
242				Topock - Weathered Bedrock - conglomerate	CL				
243									
244	36	RB-2-SS-245-250 7/17/2019 10:40		Topock - Weathered Bedrock - conglomerate	SC		(244.0 - 247.0') Topock - Weathered Bedrock - conglomerate; Clayey sand with gravel (SC); yellowish red / light brown (5YR 5/6); very fine grained to medium grained, subangular to subround; some granules to large pebbles, angular to subangular; little clay; trace silt; little coarser clasts composed of metadiorite; moist		
245									
246									
247	84	RB-2-SS-250-255 7/17/2019 10:45		Topock - Weathered Bedrock - conglomerate	CL		(247.0 - 274.0') Topock - Weathered Bedrock - conglomerate; Gravelly lean clay with sand (CL); reddish brown (2.5YR 4/4); low plasticity; some granules to medium pebbles, angular to subangular; little very fine to fine grained sand, subangular to subround; trace silt; little coarser clasts composed of metadiorite; trace coarser clasts composed of granite; moist		
248									
249									
250	84	RB-2-SS-255-260 7/17/2019 10:50		Topock - Weathered Bedrock - conglomerate	CL		(252') dark reddish brown (2.5YR 3/4); decrease in moisture content, white mottling	(251.0 - 254.0') Rough drilling	
251									
252									
253	84						(254') reddish brown (2.5YR 4/4); increase in moisture content		
254									
255									
256	84						(257') dark reddish brown (2.5YR 3/4); decrease in moisture content		
257									
258									
259									
260									





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Date Started:	06/28/2019	Surface Elevation:	480.9 ft amsl	Boring No.: <u>RB-2 Pilot</u>
Date Completed:	07/29/2019	Northing (NAD83):	2103398.9	
Drilling Co.:	Cascade	Easting (NAD83):	7616014.8	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	307 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Boart Longyear Track Mount	Borehole Diameter:	4-12 inches	Location: PG&E Topock, Needles, California
Driller Name:	Tyler Alymer	Depth to First Water:	23.77 ft bgs	
Drilling Asst:	J. Condelaria, G. Angiano	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger:	Joe Latham	Sampling Interval:	Continuous	
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
261	84								(37.0 - 307.0') No used
262		RB-2-SS-250-265 7/17/2019 10:55							
263									
264	72						(264') reddish brown / moderate brown(5YR 4/4); decrease in moisture content		
265								(265.0 - 267.0') Rough drilling	
266									
267		RB-2-SS-265-270 7/17/2019 11:00		Topock - Weathered Bedrock - conglomerate	CL				
268									
269								(269.0 - 274.0') Rough drilling, drill rig ran out of fuel mid-drill run	
270									
271	84								
272		RB-2-SS-270-275 7/17/2019 11:00							
273									
274									
275							(274.0 - 277.0') Topock - Weathered Bedrock - conglomerate; Clayey sand with gravel (SC); brown (7.5YR 4/4); very fine grained to very coarse grained, subangular to subround; some medium to very large pebbles, angular; little clay; trace small cobbles; trace silt; little coarser clasts composed of metadiorite; wet		
276		RB-2-VAS-274-279 (<0.17 U ppb) 7/18/2019 09:17		Topock - Weathered Bedrock - conglomerate	SC				
277	108	RB-2-SS-275-280 7/17/2019 12:49					(277.0 - 279.0') Topock - Weathered Bedrock - conglomerate; Sandy lean clay with gravel (CL); reddish brown / moderate brown(5YR 4/4); low plasticity; some very fine to medium grained sand, subangular to subround; little granules to very large pebbles, subangular; trace silt; little coarser clasts composed of metadiorite; moist		
278				Topock - Weathered Bedrock - conglomerate	CL				
279									
280				Topock - Weathered Bedrock -	CL		(279.0 - 285.0') Topock - Weathered Bedrock - conglomerate; Gravely lean clay with sand (CL); reddish brown / moderate brown(5YR 4/4); low plasticity; some granules to very large		

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Date Started:	06/28/2019	Surface Elevation:	480.9 ft amsl	Boring No.: <u>RB-2 Pilot</u>	
Date Completed:	07/29/2019	Northing (NAD83):	2103398.9		
Drilling Co.:	Cascade	Easting (NAD83):	7616014.8	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	307 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Boart Longyear Track Mount	Borehole Diameter:	4-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Tyler Alymer	Depth to First Water:	23.77 ft bgs		
Drilling Asst:	J. Condelaria, G. Angiano	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	Joe Latham	Sampling Interval:	Continuous		
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		


Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
281	108	RB-2-SS-280-283 7/17/2019 12:56		conglomerate	CL		pebbles, angular to subangular; little very fine to medium grained sand, subangular to subround; trace small cobbles; trace silt; little coarser clasts composed of metadiorite; trace mica; moist; some white and dark brown mottling	(283.0 - 293.0') Rough drilling	(37.0 - 307.0') No used
282									
283									
284	120	RB-2-SS-283-288 7/18/2019 11:15		Topock - Weathered Bedrock - conglomerate	CL		(285.0 - 294.0') Topock - Weathered Bedrock - conglomerate; Gravelly lean clay with sand (CL); reddish brown / moderate brown(5YR 4/4); low plasticity; some granules to very large pebbles, angular to subround; some fine to medium grained sand, subangular to subround; trace silt; little coarser clasts composed of metadiorite; trace granite; moist	(293.0 - 307.0') 10' of slough in core barrel. From 303 to 307 very rough drilling. (294.0') Independant QC inspector on-site to confirm bedrock	
285									
286									
287									
288									
289		RB-2-VAS-287-292 (<0.17 U ppb) 7/26/2019 11:56	Topock - Weathered Bedrock - conglomerate	CL					
290									
291									
292									
293									
294	168			Topock - Competent Bedrock - conglomerate			(294.0 - 303.0') Topock - Competent Bedrock - conglomerate; reddish brown / moderate brown(5YR 4/4); little granules to medium pebbles, angular to subangular; little very fine to medium grained sand; trace silt; little coarser clasts composed of metadiorite; dry to moist; friable conglomerate, highly pulverized and fractured		
295									
296									
297									
298									
299									
300									

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Boring Log

Sheet: 16 of 16

Date Started:	06/28/2019	Surface Elevation:	480.9 ft amsl	Boring No.: RB-2 Pilot	
Date Completed:	07/29/2019	Northing (NAD83):	2103398.9		
Drilling Co.:	Cascade	Easting (NAD83):	7616014.8	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	307 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Boart Longyear Track Mount	Borehole Diameter:	4-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Tyler Alymer	Depth to First Water:	23.77 ft bgs		
Drilling Asst:	J. Condelaria, G. Angiano	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	Joe Latham	Sampling Interval:	Continuous		
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID		Groundwater Sample ID		Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
301	168					Topock - Competent Bedrock - conglomerate			(303.0 - 307.0'); dry; friable conglomerate, moderately pulverized and fractured	(293.0 - 307.0') 10' of slough in core barrel. From 303 to 307 very rough drilling.	(37.0 - 307.0') No used
302											
303											
304											
305											
306											
307											
End of Boring at 307.0' bgs.											
308											
309											
310											
311											
312											
313											
314											
315											
316											
317											
318											
319											
320											

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	09/24/2019	Surface Elevation:	N/A	Boring No.: RB-2
Date Completed:	10/05/2019	Northing (NAD83):	N/A	
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client: PG&E
Drilling Method:	Dual Rotary	Total Depth:	254.35 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Foremost DR-24HD	Conductor Casing Diameter:	18 inches	Location: PG&E Topock, Needles, California
Driller Name:	Jon Martinez	Drill Casing Diameter:	16 inches	
Drilling Asst:	A. & H. Amezguita	Drill Bit:	15.5 to 17.5 inch Tricone	Project Number: RC000753.0051
Tool-Pusher:	Arnold Lamon	Depth to First Water:	23.77 ft bgs	
Rig Geologist:	D. Cornell / E.Redner	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	







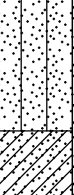
Depth (ft)	Drilling Run and Average Penetration Rate	USCS Code	USCS Class	Casing Diameter	Description (See Pilot boring log for full geologic descriptions)	Drilling Notes	Drilling Fluid
1		SP			(0.0 - 3.0') Topock - Fill; Poorly graded sand (SP); brown (10YR 4/3)		(0.0 - 19.8') 740 gallons of water used; 700 gallons of water recovered; 40 gallons of water lost
2							
3					(3.0 - 7.0') No recovery (NR)		
4		NR					
5							
6							
7					(7.0 - 11.0') Topock - Fill; Poorly graded sand (SP); brown (7.5YR 4/3)		
8		SP					
9							
10	(0.0 - 19.8) 2.18 mins/ft			(0.0 - 19.8') 18.0" Steel Casing		(10.0') trace amounts of Cemex #3 sand observed in return cuttings.	
11					(11.0 - 17.0') No recovery (NR)		
12		NR					
13							
14							
15							
16							
17					(17.0 - 18.5') Topock - Fill; Poorly graded sand (SP); brown (10YR 4/3)		
18		SP					
19					(18.5 - 20.0') Topock - Fluvial Deposits; Poorly graded sand (SP); light yellowish brown (10YR 6/4)		
20		SP					

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater

Remarks: NR = no recovery, depth to water collected during drilling of pilot; Gallons Gained/Lost: (+) = water gained from the formation, (-) = water lost to the formation

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater
Remarks: NR = no recovery, depth to water collected during drilling of pilot; Gallons Gained/Lost: (+) = water gained from the formation, (-) = water lost to the formation

Date Started:	09/24/2019	Surface Elevation:	N/A	Boring No.: RB-2
Date Completed:	10/05/2019	Northing (NAD83):	N/A	
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client: PG&E
Drilling Method:	Dual Rotary	Total Depth:	254.35 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Foremost DR-24HD	Conductor Casing Diameter:	18 inches	Location: PG&E Topock, Needles, California
Driller Name:	Jon Martinez	Drill Casing Diameter:	16 inches	
Drilling Asst:	A. & H. Amezcuita	Drill Bit:	15.5 to 17.5 inch Tricone	Project Number: RC000753.0051
Tool-Pusher:	Arnold Lamon	Depth to First Water:	23.77 ft bgs	
Rig Geologist:	D. Cornell / E. Redner	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Drilling Run and Average Penetration Rate	USCS Code	USCS Class	Casing Diameter	Description (See Pilot boring log for full geologic descriptions)	Drilling Notes	Drilling Fluid
41	(39.3 - 41.0) 21.83 mins/ft	GW-GM		Casing (39.3 - 41.0') 18.0" Steel Casing	brown (10YR 5/2)	(38.0 - 50.0') Rough drilling. (40.0') trace amounts of cemex #3 sand in return cuttings. (41.0') Sheared off bolts on the diverter plate, cut casing to trip out pipe to access diverter.	(39.3 - 58.1') 30153 gallons of water used; 7746 gallons of water recovered; 22407 gallons of water lost
42							
43		SM			(42.0 - 45.0') Topock - Fluvial Deposits; Silty sand (SM); dark yellowish brown (10YR 4/4)		
44							
45							
46		GW-GM			(45.0 - 48.0') Topock - Fluvial Deposits; Well graded gravel with silt and sand (GW-GM); dark gray (10YR 4/1)		
47							
48							
49					(48.0 - 54.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); reddish brown (5YR 5/4)		
50	(41.0 - 58.1) 7.37 mins/ft			(41.0 - 58.1') 18.0" Steel Casing		(50.0') trace to little amounts of cemex #3 sand in return cuttings.	
51		GM					
52							
53							
54		GM			(54.0 - 55.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); reddish brown (5YR 5/4)		
55							
56					(55.0 - 59.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (5YR 5/4)		
57		SM					
58							
59	(58.1 - 77.6) 4.80 mins/ft			(58.1 - 77.6') 18.0" Steel Casing		(58.1') Added additional bolts to the diverter.	(58.1 - 77.6') 4920 gallons of water used; 5527 gallons of water recovered; 607 gallons of water gained
60		SC			(59.0 - 60.0') Topock - Alluvium Deposits; Clayey sand with gravel (SC); reddish brown (5YR 5/4)		

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater

Remarks: NR = no recovery, depth to water collected during drilling of pilot; Gallons Gained/Lost: (+) = water gained from the formation, (-) = water lost to the formation

Date Started:	<u>09/24/2019</u>	Surface Elevation:	<u>N/A</u>	Boring No.: <u>RB-2</u>
Date Completed:	<u>10/05/2019</u>	Northing (NAD83):	<u>N/A</u>	
Drilling Co.:	<u>Cascade</u>	Easting (NAD83):	<u>N/A</u>	Client: <u>PG&E</u>
Drilling Method:	<u>Dual Rotary</u>	Total Depth:	<u>254.35 ft bgs</u>	Project: <u>Final GW Remedy Phase 1</u>
Drill Rig Type:	<u>Foremost DR-24HD</u>	Conductor Casing Diameter:	<u>18 inches</u>	Location: <u>PG&E Topock, Needles, California</u>
Driller Name:	<u>Jon Martinez</u>	Drill Casing Diameter:	<u>16 inches</u>	
Drilling Asst:	<u>A. & H. Amezguita</u>	Drill Bit:	<u>15.5 to 17.5 inch Tricone</u>	Project Number: <u>RC000753.0051</u>
Tool-Pusher:	<u>Arnold Lamon</u>	Depth to First Water:	<u>23.77 ft bgs</u>	
Rig Geologist:	<u>D. Cornell / E.Redner</u>	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

ERZ DRILLING LOG PG&E TOPOCK MCGRANF/DOCS/PG&E TOPOCK/DRAFT BORING LOGS/INT FILE ES11 04 19/TOPOCK DATABASE FOR PI OG GP1 TOPOCK DATA TEMPLATE FOR PI OG GDT 11/04/19 17:45

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater
Remarks: NR = no recovery, depth to water collected during drilling of pilot; Gallons Gained/Lost: (+) = water gained from the formation, (-) = water lost to the formation



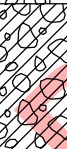


Date Started:	09/24/2019	Surface Elevation:	N/A	Boring No.: RB-2
Date Completed:	10/05/2019	Northing (NAD83):	N/A	
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client: PG&E
Drilling Method:	Dual Rotary	Total Depth:	254.35 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Foremost DR-24HD	Conductor Casing Diameter:	18 inches	Location: PG&E Topock, Needles, California
Driller Name:	Jon Martinez	Drill Casing Diameter:	16 inches	
Drilling Asst:	A. & H. Amezcuita	Drill Bit:	15.5 to 17.5 inch Tricone	Project Number: RC000753.0051
Tool-Pusher:	Arnold Lamon	Depth to First Water:	23.77 ft bgs	
Rig Geologist:	D. Cornell / E.Redner	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Drilling Run and Average Penetration Rate	USCS Code	USCS Class	Casing Diameter	Description (See Pilot boring log for full geologic descriptions)	Drilling Notes	Drilling Fluid
81	(77.6 - 82.0) 6.18 mins/ft	SW-SM		(77.6 - 82.0') 18.0" Steel Casing		(78.0 - 82.0') Rough drilling. (80.0') Observed trace amounts of Cemex #3 MESH (8x10) Lapis Luster Sand in drill cuttings.	(77.6 - 119.3') 14976 gallons of water used; 18999 gallons of water recovered; 4023 gallons of water gained
82					(81.5 - 86.5') Topock - Alluvium Deposits; Silt with gravel (ML)	(82.0') Rough drilling, loss of returns, hole plugs up, crew works to get it cleared out.	
83						(83.0 - 98.0') Rough drilling.	
84		ML					
85							
86							
87	(82.0 - 92.0) 3.01 mins/ft			(82.0 - 92.0') 18.0" Steel Casing	(86.5 - 90.0') Topock - Alluvium Deposits; Clayey gravel (GC); yellowish red / light brown(5YR 5/6)		
88		GC					
89							
90							
91					(90.0 - 93.0') Topock - Alluvium Deposits; Clayey gravel (GC); brown (7.5YR 5/4)	(90.0') Observed trace amounts of Cemex #3 MESH (8x10) Lapis Luster Sand in drill cuttings.	
92		GC					
93							
94	(92.0 - 97.0) 15.77 mins/ft			(92.0 - 97.0') 18.0" Steel Casing	(93.0 - 96.5') Topock - Alluvium Deposits; Silty gravel (GM); strong brown (7.5YR 5/6)	(94.0 - 95.0') Drill rods chattering.	
95		GM					
96							
97					(96.5 - 99.0') Topock - Alluvium Deposits; Silty gravel (GM); strong brown (7.5YR 5/6)	(97.0') Added small section of casing 1.95 ft.	
98		GM					
99	(97.0 - 119.3) 5.03 mins/ft			(97.0 - 119.3') 18.0" Steel Casing			
100		GC			(99.0 - 104.0') Topock - Alluvium Deposits; Clayey gravel (GC); yellowish red / light brown(5YR		

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater

Remarks: NR = no recovery, depth to water collected during drilling of pilot; Gallons Gained/Lost: (+) = water gained from the formation, (-) = water lost to the formation






Date Started:	09/24/2019	Surface Elevation:	N/A	Boring No.: RB-2
Date Completed:	10/05/2019	Northing (NAD83):	N/A	
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client: PG&E
Drilling Method:	Dual Rotary	Total Depth:	254.35 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Foremost DR-24HD	Conductor Casing Diameter:	18 inches	Location: PG&E Topock, Needles, California
Driller Name:	Jon Martinez	Drill Casing Diameter:	16 inches	
Drilling Asst:	A. & H. Amezcuita	Drill Bit:	15.5 to 17.5 inch Tricone	Project Number: RC000753.0051
Tool-Pusher:	Arnold Lamon	Depth to First Water:	23.77 ft bgs	
Rig Geologist:	D. Cornell / E.Redner	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Drilling Run and Average Penetration Rate	USCS Code	USCS Class	Casing Diameter	Description (See Pilot boring log for full geologic descriptions)	Drilling Notes	Drilling Fluid	
101	(97.0 - 119.3) 5.03 mins/ft	GC		18.0" Steel Casing	5/6)	(100.0') Observed trace amounts of Cemex #3 MESH (8x10) Lapis Luster Sand in drill cuttings	(77.6 - 119.3') 14976 gallons of water used; 18999 gallons of water recovered; 4023 gallons of water gained	
102								
103		GM			(104.0 - 107.0') Topock - Alluvium Deposits; Silty gravel (GM); yellowish red / light brown(5YR 5/6)	(104.0 - 119.0') Hard drilling.		
104								
105								
106		GC			(107.0 - 109.0') Topock - Alluvium Deposits; Clayey gravel with sand (GC); yellowish red / light brown(5YR 5/6)			
107								
108		GM			(109.0 - 111.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); yellowish brown (10YR 5/6)			
109								
110								
111	(119.3 - 130.0) 2.00 mins/ft	GM			(111.0 - 112.0') Topock - Alluvium Deposits; Silty gravel (GM); yellowish brown (10YR 5/6)		(119.0') Observed trace amounts of Cemex #3 MESH (8x10) Lapis Luster Sand in drill cuttings. (119.3') Conductor casing cannot be advanced deeper due	
112					(112.0 - 114.0') Topock - Alluvium Deposits; Silty gravel (GM); strong brown (7.5YR 5/6)			
113								
114					(114.0 - 121.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); yellowish brown (10YR 5/6)			
115								
116								
117								
118								
119								
120								

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater

Remarks: NR = no recovery, depth to water collected during drilling of pilot; Gallons Gained/Lost: (+) = water gained from the formation, (-) = water lost to the formation

Date Started:	09/24/2019	Surface Elevation:	N/A	Boring No.: RB-2
Date Completed:	10/05/2019	Northing (NAD83):	N/A	
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client: PG&E
Drilling Method:	Dual Rotary	Total Depth:	254.35 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Foremost DR-24HD	Conductor Casing Diameter:	18 inches	Location: PG&E Topock, Needles, California
Driller Name:	Jon Martinez	Drill Casing Diameter:	16 inches	
Drilling Asst:	A. & H. Amezcuita	Drill Bit:	15.5 to 17.5 inch Tricone	Project Number: RC000753.0051
Tool-Pusher:	Arnold Lamon	Depth to First Water:	23.77 ft bgs	
Rig Geologist:	D. Cornell / E.Redner	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Drilling Run and Average Penetration Rate	USCS Code	USCS Class	Casing Diameter	Description (See Pilot boring log for full geologic descriptions)	Drilling Notes	Drilling Fluid
121	(119.3 - 130.0) 2.00 mins/ft	GM		Steel Casing		to increased torque during run, formation is very tight.	(119.3 - 176.7') 13778 gallons of water used; 13310 gallons of water recovered; 468 gallons of water lost
122					(121.0 - 127.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); yellowish brown (10YR 5/6)		
123							
124		GM					
125	(130.0 - 137.1) 3.01 mins/ft			(119.3 - 130.0') 16.0" Steel Casing		(130.0') Observed trace amounts of Cemex #3 MESH (8x10) Lapis Luster Sand in drill cuttings.	
126							
127							
128		ML			(127.0 - 131.5') Topock - Alluvium Deposits; Gravelly silt with sand (ML); brown (7.5YR 5/4)		
129	(137.1 - 157.1) 1.49 mins/ft			(130.0 - 137.1') 16.0" Steel Casing			
130							
131							
132		GM			(131.5 - 137.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); yellowish brown (10YR 5/6)		
133	(137.0 - 142.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); dark yellowish brown (10YR 4/6)			(137.1 - 157.1') 16.0" Steel Casing			
134							
135							
136							
137	(137.0 - 142.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); dark yellowish brown (10YR 4/6)			(137.1 - 157.1') 16.0" Steel Casing			
138							
139							
140		SM					

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater

Remarks: NR = no recovery, depth to water collected during drilling of pilot; Gallons Gained/Lost: (+) = water gained from the formation, (-) = water lost to the formation



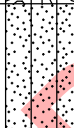

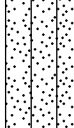


Date Started:	09/24/2019	Surface Elevation:	N/A	Boring No.: RB-2	
Date Completed:	10/05/2019	Northing (NAD83):	N/A		
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client:	PG&E
Drilling Method:	Dual Rotary	Total Depth:	254.35 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Foremost DR-24HD	Conductor Casing Diameter:	18 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Jon Martinez	Drill Casing Diameter:	16 inches		
Drilling Asst:	A. & H. Amezcuita	Drill Bit:	15.5 to 17.5 inch Tricone	Project Number:	RC000753.0051
Tool-Pusher:	Arnold Lamon	Depth to First Water:	23.77 ft bgs		
Rig Geologist:	D. Cornell / E.Redner	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Drilling Run and Average Penetration Rate	USCS Code	USCS Class	Casing Diameter	Description (See Pilot boring log for full geologic descriptions)	Drilling Notes	Drilling Fluid
141	(137.1 - 157.1) 1.49 mins/ft	SM		(137.1 - 157.1') 16.0" Steel Casing			(119.3 - 176.7') 13778 gallons of water used; 13310 gallons of water recovered; 468 gallons of water lost
142		GM			(142.0 - 145.5') Topock - Alluvium Deposits; Silty gravel with sand (GM); strong brown (7.5YR 5/6)		
143							
144							
145							
146		SM			(145.5 - 147.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); strong brown (7.5YR 5/6)		
147		SM			(147.0 - 149.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown / moderate brown(5YR 4/4)		
148							
149							
150		SM			(149.0 - 153.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); yellowish brown (10YR 5/6)		
151							
152							
153							
154	GM		(153.0 - 156.5') Topock - Alluvium Deposits; Silty gravel with sand (GM); strong brown (7.5YR 5/6)				
155							
156							
157	(157.1 - 176.7) 1.48 mins/ft	GM		(156.5 - 159.5') Topock - Alluvium Deposits; Silty gravel (GM); strong brown (7.5YR 5/6)			
158							
159							
160		GC		(159.5 - 160.0') Topock - Alluvium			

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Remarks: NR = no recovery, depth to water collected during drilling of pilot; Gallons Gained/Lost: (+) = water gained from the formation, (-) = water lost to the formation

Date Started:	09/24/2019	Surface Elevation:	N/A	Boring No.: RB-2	
Date Completed:	10/05/2019	Northing (NAD83):	N/A		
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client:	PG&E
Drilling Method:	Dual Rotary	Total Depth:	254.35 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Foremost DR-24HD	Conductor Casing Diameter:	18 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Jon Martinez	Drill Casing Diameter:	16 inches		
Drilling Asst:	A. & H. Amezcuita	Drill Bit:	15.5 to 17.5 inch Tricone	Project Number:	RC000753.0051
Tool-Pusher:	Arnold Lamon	Depth to First Water:	23.77 ft bgs		
Rig Geologist:	D. Cornell / E.Redner	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Drilling Run and Average Penetration Rate	USCS Code	USCS Class	Casing Diameter	Description (See Pilot boring log for full geologic descriptions)	Drilling Notes	Drilling Fluid
161	(157.1 - 176.7) 1.48 mins/ft	GM		(157.1 - 176.7') 16.0" Steel Casing	Deposits; Clayey gravel (GC); yellowish brown (10YR 5/6) (160.0 - 163.0') Topock - Alluvium Deposits; Silty gravel (GM); strong brown (7.5YR 5/6)		(119.3 - 176.7') 13778 gallons of water used; 13310 gallons of water recovered; 468 gallons of water lost
162							
163		GM			(163.0 - 167.0') Topock - Alluvium Deposits; Silty gravel (GM); reddish yellow (7.5YR 6/8)		
164							
165							
166							
167		SM			(167.0 - 171.0') Topock - Alluvium Deposits; Silty sand (SM); reddish brown / moderate brown(5YR 4/4)		
168							
169							
170		SM			(171.0 - 172.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown / moderate brown(5YR 4/4)		
171							
172							
173	SM		(172.5 - 177.0') Topock - Alluvium Deposits; Silty sand (SM); reddish brown / moderate brown(5YR 4/4)				
174							
175							
176							
177	(176.7 - 197.0) 1.09 mins/ft	SM		(177.0 - 178.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (5YR 5/4)		(176.7 - 254.0') 13257 gallons of water used; 13862 gallons of water recovered; 605 gallons of water gained	
178							
179		SM		(178.0 - 179.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown / moderate brown(5YR 4/4)			
180							
					(179.0 - 181.0') Topock - Alluvium Deposits; Silty sand (SM); reddish brown / moderate brown(5YR 4/4)		

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Remarks: NR = no recovery, depth to water collected during drilling of pilot; Gallons Gained/Lost: (+) = water gained from the formation, (-) = water lost to the formation

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater
Remarks: NR = no recovery, depth to water collected during drilling of pilot; Gallons Gained/Lost: (+) = water gained from the formation, (-) = water lost to the formation

Date Started:	09/24/2019	Surface Elevation:	N/A	Boring No.: RB-2	
Date Completed:	10/05/2019	Northing (NAD83):	N/A		
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client:	PG&E
Drilling Method:	Dual Rotary	Total Depth:	254.35 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Foremost DR-24HD	Conductor Casing Diameter:	18 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Jon Martinez	Drill Casing Diameter:	16 inches		
Drilling Asst:	A. & H. Amezcuita	Drill Bit:	15.5 to 17.5 inch Tricone	Project Number:	RC000753.0051
Tool-Pusher:	Arnold Lamon	Depth to First Water:	23.77 ft bgs		
Rig Geologist:	D. Cornell / E.Redner	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		


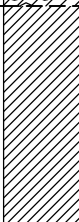
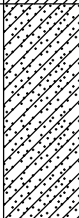

Depth (ft)	Drilling Run and Average Penetration Rate	USCS Code	USCS Class	Casing Diameter	Description (See Pilot boring log for full geologic descriptions)	Drilling Notes	Drilling Fluid
201	(197.0 - 216.7) 1.35 mins/ft	ML			Deposits; Gravelly silt with sand (ML); strong brown (7.5YR 5/6)	(200.0') Observed trace amounts of Cemex #3 MESH (8x10) Lapis Luster Sand in drill cuttings.	(176.7 - 254.0') 13257 gallons of water used; 13862 gallons of water recovered; 605 gallons of water gained
202		SM			(202.0 - 204.0') Topock - Alluvium Deposits; Silty sand (SM); strong brown (7.5YR 5/6)		
203					(204.0 - 204.5') Topock - Alluvium Deposits; Silty sand (SM); strong brown (7.5YR 5/6)		
204					(204.5 - 205.0') Topock - Alluvium Deposits; Gravelly silt with sand (ML); strong brown (7.5YR 5/6)		
205		ML			(205.0 - 207.5') Topock - Alluvium Deposits; Silty sand (SM); strong brown (7.5YR 5/6)		
206	(197.0 - 216.7) 1.35 mins/ft	SM			(207.5 - 217.0') Topock - Alluvium Deposits; Clayey sand with gravel (SC); brown (7.5YR 4/4)	(210.0') Observed trace amounts of Cemex #3 MESH (8x10) Lapis Luster Sand in drill cuttings.	
207		SC				(211.0 - 212.0') Rough drilling.	
208							
209							
210							
211	(216.7 - 236.9) 1.18 mins/ft	SC			(217.0 - 219.5') Topock - Alluvium Deposits; Clayey sand (SC); (7.5R 4/4)		
212							
213							
214							
215							
216	(216.7 - 236.9) 1.18 mins/ft	GC			(219.5 - 222.0') Topock - Alluvium		
217							
218							
219							
220							

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Remarks: NR = no recovery, depth to water collected during drilling of pilot; Gallons Gained/Lost: (+) = water gained from the formation, (-) = water lost to the formation

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater
Remarks: NR = no recovery, depth to water collected during drilling of pilot; Gallons Gained/Lost: (+) = water gained from the formation, (-) = water lost to the formation

Date Started:	09/24/2019	Surface Elevation:	N/A	Boring No.: RB-2
Date Completed:	10/05/2019	Northing (NAD83):	N/A	
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client: PG&E
Drilling Method:	Dual Rotary	Total Depth:	254.35 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Foremost DR-24HD	Conductor Casing Diameter:	18 inches	Location: PG&E Topock, Needles, California
Driller Name:	Jon Martinez	Drill Casing Diameter:	16 inches	
Drilling Asst:	A. & H. Amezguita	Drill Bit:	15.5 to 17.5 inch Tricone	Project Number: RC000753.0051
Tool-Pusher:	Arnold Lamon	Depth to First Water:	23.77 ft bgs	
Rig Geologist:	D. Cornell / E.Redner	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Drilling Run and Average Penetration Rate	USCS Code	USCS Class	Casing Diameter	Description (See Pilot boring log for full geologic descriptions)	Drilling Notes	Drilling Fluid
241	(236.9 - 254.4) 1.07 mins/ft	GC		(236.9 - 254.4') 16.0" Steel Casing		(240.0') Observed trace amounts of Cemex #3 MESH (8x10) Lapis Luster Sand in drill cuttings.	(176.7 - 254.0') 13257 gallons of water used; 13862 gallons of water recovered; 605 gallons of water gained
242		CL			(241.0 - 244.0') Topock - Weathered Bedrock - conglomerate; Sandy lean clay with gravel (CL); reddish brown (5YR 5/4)		
243							
244		SC			(244.0 - 247.0') Topock - Weathered Bedrock - conglomerate; Clayey sand with gravel (SC); yellowish red / light brown (5YR 5/6)		
245							
246							
247							
248					(247.0 - 254.3') Topock - Weathered Bedrock - conglomerate; Gravely lean clay with sand (CL); reddish brown (2.5YR 4/4)		
249							
250		CL				(250.0') Observed trace amounts of Cemex #1/20 MESH (20x40) Lapis Luster Sand in drill cuttings.	
251							
252							
253							
254							
255					End of Boring at 254.4' bgs.	(254.0') Observed trace amounts of Cemex #1/20 MESH (20x40) Lapis Luster Sand in drill cuttings.	
256							
257							
258							
259							
260							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater

Remarks: NR = no recovery, depth to water collected during drilling of pilot; Gallons Gained/Lost: (+) = water gained from the formation, (-) = water lost to the formation

Date Started:	10/07/2019	Surface Elevation:	N/A	Well ID: RB-2
Date Completed:	10/22/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Dual Rotary	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	Jon Martinez	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	A. & H. Amezguita	Borehole Diameter:	16-18 inches	
Logger:	Ellen Redner	Water Level Start:	23.77 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	N/A	
Total Depth:	254.35 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
1		Topock - Fill	SP		(0.0 - 38.0') 8" Suregrip 17 Casing		
2					(0.0 - 4.0') Cemex #0/30 Mesh (30x50)	(0.0 - 4.0') 11.3 bags	(0.0 - 4.0') 20 bags (77%) Note: Lapis Lustre Sand, used >20% of calculated volume due to subsidence around borehole
3							
4							
5			NR		(4.5 - 5.5') Centralizer		
6							
7							
8		Topock - Fill	SP				
9							
10					(0.0 - 19.8') 18.0" Borehole		
11							
12					(4.0 - 24.6') Portland Cement 3% Bentonite	(4.0 - 24.6') 218.4 gallons	(4.0 - 24.6') 253 gallons (16%) Note: Type I, II and V and Benseal
13							
14			NR				
15							
16							
17							
18		Topock - Fill	SP				
19		Topock - Fluvial Deposits	SP				
20							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, groundwater samples and depth to water collected during drilling of pilot

Date Started:	10/07/2019	Surface Elevation:	N/A	Well ID: RB-2
Date Completed:	10/22/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Dual Rotary	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	Jon Martinez	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	A. & H. Amezguita	Borehole Diameter:	16-18 inches	
Logger:	Ellen Redner	Water Level Start:	23.77 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	N/A	
Total Depth:	254.35 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
21					(0.0 - 38.0') 8" Suregrip 17 Casing		
22					(4.0 - 24.6') Portland Cement 3% Bentonite	(4.0 - 24.6') 218.4 gallons	(4.0 - 24.6') 253 gallons (16%) Note: Type I, II and V and Benseal
23			NR				
24					(24.6 - 27.0') Bentonite seal chips	(24.6 - 27.0') 4.7 bags	(24.6 - 27.0') 4 bags (-15%) Note: Puregold Medium Chips
25							
26							
27							
28		Topock - Fluvial Deposits	SP		(27.0 - 29.3') Cemex #60 Mesh (40x70)	(27.0 - 29.3') 6.4 bags	(27.0 - 29.3') 7 bags (9%) Note: Lapis Lustre Sand
29							
30					(19.8 - 39.3') 18.0" Borehole		
31							
32							
33							
34			NR		(29.3 - 106.0') Cemex #0/30 Mesh (30x50)	(29.3 - 106.0') 223.8 bags	(29.3 - 106.0') 196 bags (-12%) Note: Lapis Lustre Sand - Filter packed swabbed for 1 hours and 55 minutes during well construction
35					(35.5 - 36.5') Centralizer		
36							
37		Topock - Fluvial Deposits	SP-SM				
38	RB-2-VAS-36.5-41.5 (<0.033 U ppb) 6/29/2019 11:43	Topock - Fluvial Deposits	SM		(38.0 - 103.0') 8" 10-slot 316L SS Wire Wrap Screen		
39		Topock - Fluvial Deposits	GW-GM				
40					(39.3 - 41.0') 18.0" Borehole		

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Date Started:	10/07/2019	Surface Elevation:	N/A	Well ID: RB-2
Date Completed:	10/22/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Dual Rotary	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	Jon Martinez	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	A. & H. Amezcuita	Borehole Diameter:	16-18 inches	
Logger:	Ellen Redner	Water Level Start:	23.77 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	N/A	
Total Depth:	254.35 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
41		Topock - Fluvial Deposits	GW-GM		(38.0 - 103.0') 8" 10-slot 316L SS Wire Wrap Screen		
42							
43		Topock - Fluvial Deposits	SM				
44							
45							
46		Topock - Fluvial Deposits	GW-GM				
47							
48							
49							
50		Topock - Alluvium Deposits	GM		(29.3 - 106.0') Cemex #0/30 Mesh (30x50)	(29.3 - 106.0') 223.8 bags	(29.3 - 106.0') 196 bags (-12%) Note: Lapis Lustre Sand - Filter packed swabbed for 1 hours and 55 minutes during well construction
51							
52							
53							
54		Topock - Alluvium Deposits	GM				
55							
56		Topock - Alluvium Deposits	SM				
57							
58							
59		Topock - Alluvium Deposits	SC		(58.1 - 77.6') 18.0" Borehole		
60							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, groundwater samples and depth to water collected during drilling of pilot

Date Started: 10/07/2019	Surface Elevation: N/A	Well ID: RB-2
Date Completed: 10/22/2019	Shallow Well Elevation: N/A	
Drilling Co.: Cascade	Deep Well Elevation: N/A	Client: PG&E
Drilling Method: Dual Rotary	Northing (NAD83): N/A	Project: Final GW Remedy Phase 1
Driller Name: Jon Martinez	Easting (NAD83): N/A	Location: PG&E Topock, Needles, California
Drilling Asst: A. & H. Amezcuita	Borehole Diameter: 16-18 inches	
Logger: Ellen Redner	Water Level Start: 23.77 ft bgs	Project Number: RC000753.0051
Editor: Sean McGrane	Development End Date: N/A	
Total Depth: 254.35 ft bgs	Well Completion: <input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed	
61		Topock - Alluvium Deposits	GM		(38.0 - 103.0') 8" 10-slot 316L SS Wire Wrap Screen			
62								
63								
64								
65								
66		Topock - Alluvium Deposits	GW		(29.3 - 106.0') Cemex #0/30 Mesh (30x50)	(58.1 - 77.6') 18.0" Borehole	(29.3 - 106.0') 223.8 bags	(29.3 - 106.0') 196 bags (-12%) Note: Lapis Lustre Sand - Filter packed swabbed for 1 hours and 55 minutes during well construction
67								
68								
69								
70								
71	RB-2-VAS-72-77 (<0.033 U ppb) 6/30/2019 14:10	Topock - Alluvium Deposits	GC					
72								
73								
74								
75								
76		Topock - Alluvium Deposits	SW					
77								
78								
79								
80								
81		Topock - Alluvium Deposits	SW-SM			(77.6 - 82.0') 18.0" Borehole		
82								
83								
84								
85								






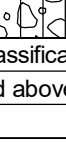
Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, groundwater samples and depth to water collected during drilling of pilot

Date Started:	10/07/2019	Surface Elevation:	N/A	Well ID: RB-2
Date Completed:	10/22/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Dual Rotary	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	Jon Martinez	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	A. & H. Amezcuita	Borehole Diameter:	16-18 inches	
Logger:	Ellen Redner	Water Level Start:	23.77 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	N/A	
Total Depth:	254.35 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
81		Topock - Alluvium Deposits	SW-SM		(38.0 - 103.0') 8" 10-slot 316L SS Wire Wrap Screen		
82							
83		Topock - Alluvium Deposits	ML				
84							
85							
86							
87		Topock - Alluvium Deposits	GC				
88							
89							
90		Topock - Alluvium Deposits	GC		(29.3 - 106.0') Cemex #0/30 Mesh (30x50)	(29.3 - 106.0') 223.8 bags	(29.3 - 106.0') 196 bags (-12%) Note: Lapis Lustre Sand - Filter packed swabbed for 1 hours and 55 minutes during well construction
91							
92		Topock - Alluvium Deposits	GC				
93							
94		Topock - Alluvium Deposits	GM				
95							
96							
97		Topock - Alluvium Deposits	GM				
98							
99		Topock - Alluvium Deposits	GC				
100							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, groundwater samples and depth to water collected during drilling of pilot

Date Started:	10/07/2019	Surface Elevation:	N/A	Well ID: RB-2
Date Completed:	10/22/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Dual Rotary	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	Jon Martinez	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	A. & H. Amezguita	Borehole Diameter:	16-18 inches	
Logger:	Ellen Redner	Water Level Start:	23.77 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	N/A	
Total Depth:	254.35 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
101	RB-2-VAS-102-107 (<0.033 U ppb) 7/1/2019 15:21	Topock - Alluvium Deposits	GC		(38.0 - 103.0') 8" 10-slot 316L SS Wire Wrap Screen	(29.3 - 106.0') 223.8 bags	(29.3 - 106.0') 196 bags (-12%) Note: Lapis Lustre Sand - Filter packed swabbed for 1 hours and 55 minutes during well construction
102					(29.3 - 106.0') Cemex #0/30 Mesh (30x50)		
103		Topock - Alluvium Deposits	GM		(103.0 - 133.0') 8" Suregrip 17 Casing	(106.0 - 106.7') 2.1 bags	(106.0 - 106.7') 2 bags (-5%) Note: Lapis Lustre Sand
104					(104.0 - 105.0') Centralizer		
105		Topock - Alluvium Deposits	GC		(106.0 - 106.7') Cemex #60 Mesh (40x70)	(106.7 - 117.0') 23.2 buckets	(106.7 - 117.0') 22.5 buckets (-3%) Note: Pel-Plug (TR30) 3/8"
106					(97.0 - 119.3') 18.0" Borehole		
107		Topock - Alluvium Deposits	GM		(106.7 - 117.0') Bentonite seal pellets		
108					(111.5 - 112.5') Centralizer		
109		Topock - Alluvium Deposits	GM		(117.0 - 118.0') Cemex #60 Mesh (40x70)	(118.0 - 254.4') 293.8 bags	(118.0 - 254.4') 334 bags (14%) Note: Lapis Lustre Sand - Filter packed swabbed for 2 hours and 55 minutes during well construction
110					(119.3 - 130.0') 16.0" Borehole		
111		Topock - Alluvium Deposits	GM				
112							
113							
114							

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Date Started:	10/07/2019	Surface Elevation:	N/A	Well ID: RB-2
Date Completed:	10/22/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Dual Rotary	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	Jon Martinez	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	A. & H. Amezguita	Borehole Diameter:	16-18 inches	
Logger:	Ellen Redner	Water Level Start:	23.77 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	N/A	
Total Depth:	254.35 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
121		Topock - Alluvium Deposits	GM		(103.0 - 133.0') 8" Suregrip 17 Casing		
122							
123		Topock - Alluvium Deposits	GM				
124							
125					(119.3 - 130.0') 16.0" Borehole		
126							
127		Topock - Alluvium Deposits	ML				
128							
129							
130					(118.0 - 254.4') Cemex #0/30 Mesh (30x50)	(118.0 - 254.4') 293.8 bags	(118.0 - 254.4') 334 bags (14%) Note: Lapis Lustre Sand - Filter packed swabbed for 2 hours and 55 minutes during well construction
131					(131.0 - 132.0') Centralizer		
132		Topock - Alluvium Deposits	GM				
133					(133.0 - 238.0') 8" Suregrip 17 Screen 16.0" Borehole		
134							
135							
136							
137		Topock - Alluvium Deposits	SM				
138					(137.1 - 157.1') 16.0" Borehole		
139							
140							

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Date Started:	10/07/2019	Surface Elevation:	N/A	Well ID: RB-2
Date Completed:	10/22/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Dual Rotary	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	Jon Martinez	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	A. & H. Amezguita	Borehole Diameter:	16-18 inches	
Logger:	Ellen Redner	Water Level Start:	23.77 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	N/A	
Total Depth:	254.35 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
141		Topock - Alluvium Deposits	SM				
142							
143							
144	RB-2-VAS-142-147 (<0.17 U ppb) 7/9/2019 13:20	Topock - Alluvium Deposits	GM				
145							
146		Topock - Alluvium Deposits	SM				
147							
148		Topock - Alluvium Deposits	SM				
149							
150					(118.0 - 254.4') Cemex #0/30 Mesh (30x50)	(118.0 - 254.4') 293.8 bags	(118.0 - 254.4') 334 bags (14%) Note: Lapis Lustre Sand - Filter packed swabbed for 2 hours and 55 minutes during well construction
151		Topock - Alluvium Deposits	SM				
152							
153							
154		Topock - Alluvium Deposits	GM				
155							
156							
157							
158		Topock - Alluvium Deposits	GM				
159					(157.1 - 176.7') 16.0" Borehole		
160		Topock - Alluvium	GC				

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Date Started:	10/07/2019	Surface Elevation:	N/A	Well ID: RB-2
Date Completed:	10/22/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Dual Rotary	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	Jon Martinez	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	A. & H. Amezguita	Borehole Diameter:	16-18 inches	
Logger:	Ellen Redner	Water Level Start:	23.77 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	N/A	
Total Depth:	254.35 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
161		Deposits			(133.0 - 238.0') 8" Suregrip 17 Screen		
162		Topock - Alluvium Deposits	GM				
163							
164		Topock - Alluvium Deposits	GM				
165							
166							
167		Topock - Alluvium Deposits	SM				
168							
169		Topock - Alluvium Deposits	SM		(157.1 - 176.7') 16.0" Borehole		
170					(118.0 - 254.4') Cemex #0/30 Mesh (30x50)	(118.0 - 254.4') 293.8 bags	(118.0 - 254.4') 334 bags (14%) Note: Lapis Lustre Sand - Filter packed swabbed for 2 hours and 55 minutes during well construction
171		Topock - Alluvium Deposits	SM				
172							
173		Topock - Alluvium Deposits	SM				
174	RB-2-VAS-172-177 (<0.17 U ppb) 7/12/2019 14:55						
175		Topock - Alluvium Deposits	SM				
176							
177		Topock - Alluvium Deposits	SM				
178		Topock - Alluvium Deposits	SM				
179		Topock - Alluvium Deposits	SM		(176.7 - 197.0') 16.0" Borehole		
180		Topock - Alluvium Deposits	SM				

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Date Started: 10/07/2019	Surface Elevation: N/A	Well ID: RB-2
Date Completed: 10/22/2019	Shallow Well Elevation: N/A	
Drilling Co.: Cascade	Deep Well Elevation: N/A	Client: PG&E
Drilling Method: Dual Rotary	Northing (NAD83): N/A	Project: Final GW Remedy Phase 1
Driller Name: Jon Martinez	Easting (NAD83): N/A	Location: PG&E Topock, Needles, California
Drilling Asst: A. & H. Amezcuita	Borehole Diameter: 16-18 inches	
Logger: Ellen Redner	Water Level Start: 23.77 ft bgs	Project Number: RC000753.0051
Editor: Sean McGrane	Development End Date: N/A	
Total Depth: 254.35 ft bgs	Well Completion: <input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
181		Topock - Alluvium Deposits	SM		(133.0 - 238.0') 8" Suregrip 17 Screen		
182		Topock - Alluvium Deposits	SW				
183							
184							
185							
186							
187							
188		Topock - Alluvium Deposits	GW-GM		(176.7 - 197.0') 16.0" Borehole		
189		Topock - Alluvium Deposits	SM				
190		Topock - Alluvium Deposits	GM		(118.0 - 254.4') Cemex #0/30 Mesh (30x50)	(118.0 - 254.4') 293.8 bags	(118.0 - 254.4') 334 bags (14%) Note: Lapis Lustre Sand - Filter packed swabbed for 2 hours and 55 minutes during well construction
191							
192		Topock - Alluvium Deposits	SW-SM				
193							
194							
195							
196							
197							
198		Topock - Alluvium Deposits	SM		(197.0 - 216.7') 16.0" Borehole		
199							
200			ML				

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Date Started:	10/07/2019	Surface Elevation:	N/A	Well ID: RB-2
Date Completed:	10/22/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Dual Rotary	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	Jon Martinez	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	A. & H. Amezguita	Borehole Diameter:	16-18 inches	
Logger:	Ellen Redner	Water Level Start:	23.77 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	N/A	
Total Depth:	254.35 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
201		Topock - Alluvium Deposits	ML		(133.0 - 238.0') 8" Suregrip 17 Screen		
202							
203		Topock - Alluvium Deposits	SM				
204	RB-2-VAS-202-207 (<0.17 U ppb) 7/14/2019 09:20	Topock - Alluvium Deposits	SM				
205		Topock - Alluvium Deposits	ML				
206		Topock - Alluvium Deposits	SM				
207							
208							
209							
210					(118.0 - 254.4') Cemex #0/30 Mesh (30x50)	(118.0 - 254.4') 293.8 bags	(118.0 - 254.4') 334 bags (14%) Note: Lapis Lustre Sand - Filter packed swabbed for 2 hours and 55 minutes during well construction
211							
212		Topock - Alluvium Deposits	SC				
213							
214							
215							
216							
217							
218		Topock - Alluvium Deposits	SC		(216.7 - 236.9') 16.0" Borehole		
219							
220			GC				


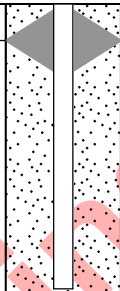



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Date Started:	10/07/2019	Surface Elevation:	N/A	Well ID: RB-2
Date Completed:	10/22/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Dual Rotary	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	Jon Martinez	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	A. & H. Amezguita	Borehole Diameter:	16-18 inches	
Logger:	Ellen Redner	Water Level Start:	23.77 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	N/A	
Total Depth:	254.35 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
221		Topock - Alluvium Deposits	GC		(133.0 - 238.0') 8" Suregrip 17 Screen		
222							
223							
224							
225							
226							
227							
228							
229		Topock - Alluvium Deposits	SC		(216.7 - 236.9') 16.0" Borehole		
230					(118.0 - 254.4') Cemex #0/30 Mesh (30x50)	(118.0 - 254.4') 293.8 bags	(118.0 - 254.4') 334 bags (14%) Note: Lapis Lustre Sand - Filter packed swabbed for 2 hours and 55 minutes during well construction
231							
232							
233							
234							
235							
236							
237							
238	RB-2-VAS-237-242 (<0.17 U ppb) 7/15/2019 13:48	Topock - Alluvium Deposits	GC		(236.9 - 254.4') 16.0" Borehole		
239							
240							

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Date Started:	10/07/2019	Surface Elevation:	N/A	Well ID: RB-2
Date Completed:	10/22/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Dual Rotary	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	Jon Martinez	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	A. & H. Amezguita	Borehole Diameter:	16-18 inches	
Logger:	Ellen Redner	Water Level Start:	23.77 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	N/A	
Total Depth:	254.35 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction		Calculated Material Volumes	Material Volumes Installed
241	RB-2-VAS-237-242 (<0.17 U ppb) 7/15/2019 13:48	Topock - Alluvium Deposits	GC		(240.0 - 241.0') Centralizer			
242		Topock - Weathered Bedrock - conglomerate	CL					
243								
244		Topock - Weathered Bedrock - conglomerate	SC			(238.0 - 243.9') Sump and End Cap		
245								
246	Topock - Weathered Bedrock - conglomerate	CL		(118.0 - 254.4') Cemex #0/30 Mesh (30x50)	(236.9 - 254.4') 16.0" Borehole	(118.0 - 254.4') 293.8 bags	(118.0 - 254.4') 334 bags (14%) Note: Lapis Lustre Sand - Filter packed swabbed for 2 hours and 55 minutes during well construction	
247								
248								
249								
250								
251								
252								
253								
254								
255	End of Boring at 254.4 'bgs.							
256								
257								
258								
259								
260								

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Date Started:	06/28/2019	Surface Elevation:	480.9 ft amsl	Boring No.: <u>RB-2 Pilot</u>	
Date Completed:	07/29/2019	Northing (NAD83):	2103398.9		
Drilling Co.:	Cascade	Easting (NAD83):	7616014.8	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	307 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Boart Longyear Track Mount	Borehole Diameter:	4-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Tyler Alymer	Depth to First Water:	23.77 ft bgs		
Drilling Asst:	J. Condelaria, G. Angiano	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	Joe Latham	Sampling Interval:	Continuous		
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
1				Topock - Fill	SP		(0.0 - 3.0') Topock - Fill; Poorly graded sand (SP); brown (10YR 4/3); fine grained to medium grained, subround; dry	(0.0 - 7.0') Soft drilling	2 gallons used; 0 gallons recovered; 2 gallons lost
2									
3									
4	36						(3.0 - 7.0') No recovery (NR)	(3.0 - 7.0') Lost recovery due to soft dredge sands	
5					NR				
6									
7									
8				Topock - Fill	SP		(7.0 - 11.0') Topock - Fill; Poorly graded sand (SP); brown (7.5YR 4/3); fine grained to medium grained, subangular to subround; dry	(7.0 - 17.0') Heaving sands. No recovery 11 to 17 ft bgs due to loose dredge sands	1 gallons used; 0 gallons recovered; 1 gallons lost
9									
10									
11									
12	48						(11.0 - 17.0') No recovery (NR)		
13									
14					NR				
15									
16									
17				Topock - Fill	SP		(17.0 - 18.5') Topock - Fill; Poorly graded sand (SP); brown (10YR 4/3); fine grained to medium grained, subangular to subround; dry		
18	36								
19				Topock - Fluvial Deposits	SP		(18.5 - 20.0') Topock - Fluvial Deposits; Poorly graded sand (SP); light yellowish brown (10YR 6/4); very fine grained to fine grained, round; trace silt; dry		
20									


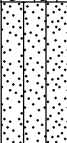




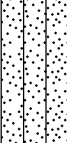
Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	06/28/2019	Surface Elevation:	480.9 ft amsl	Boring No.: <u>RB-2 Pilot</u>	
Date Completed:	07/29/2019	Northing (NAD83):	2103398.9		
Drilling Co.:	Cascade	Easting (NAD83):	7616014.8	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	307 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Boart Longyear Track Mount	Borehole Diameter:	4-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Tyler Alymer	Depth to First Water:	23.77 ft bgs		
Drilling Asst:	J. Condalaria, G. Angiano	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	Joe Latham	Sampling Interval:	Continuous		
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
21	36				NR		(20.0 - 27.0') No recovery (NR)	(17.0 - 27.0') Heaving sands, no recovery 20 to 27 ft bgs due to loose dredge sands, during backfilling the sand dropped ~12 ft. indicating void at ~15 to 25 ft bgs	
22									
23									
24									
25									
26	48	RB-2-SS-27-31 7/15/2019 09:31		Topock - Fluvial Deposits	SP		(27.0 - 31.5') Topock - Fluvial Deposits; Poorly graded sand (SP); light yellowish brown (10YR 6/4); very fine grained to fine grained, subangular to round; trace silt; moist	(27.0 - 37.0') Heaving sands. No recovery 31.5 to 37 ft bgs due to loose dredge sands	2 gallons used; 0 gallons recovered; 2 gallons lost
27									
28									
29									
30									
31									
32							(31.5 - 37.0') No recovery (NR)		
33									
34									
35									
36	60	RB-2-SS-37-42 7/15/2019 09:46	RB-2-VAS-36.5-41.5 (<0.033 U ppb) 6/29/2019 11:43	Topock - Fluvial Deposits	SP-SM		(37.0 - 38.0') Topock - Fluvial Deposits; Poorly graded sand with silt (SP-SM); brown (10YR 5/3); fine grained, subangular to round; little silt; moist		(37.0 - 307.0') No used
37				Topock - Fluvial Deposits	SM		(38.0 - 39.0') Topock - Fluvial Deposits; Silty sand (SM); brown (10YR 5/3); very fine grained to fine grained, round; little silt; moist		
38				Topock - Fluvial Deposits	GW-GM		(39.0 - 42.0') Topock - Fluvial Deposits; Well graded gravel with silt and sand (GW-GM); grayish brown (10YR 5/2); granules to very large pebbles, subangular to subround; some very fine		
39									
40									





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Date Started:	06/28/2019	Surface Elevation:	480.9 ft amsl	Boring No.: <u>RB-2 Pilot</u>	
Date Completed:	07/29/2019	Northing (NAD83):	2103398.9		
Drilling Co.:	Cascade	Easting (NAD83):	7616014.8	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	307 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Boart Longyear Track Mount	Borehole Diameter:	4-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Tyler Alymer	Depth to First Water:	23.77 ft bgs		
Drilling Asst:	J. Condelaria, G. Angiano	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	Joe Latham	Sampling Interval:	Continuous		
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
41	60	RB-2-SS-37-42 7/15/2019 09:46		Topock - Fluvial Deposits	GW-GM		grained to very coarse grained sand; little small cobbles; little silt; trace caliche; trace coarser clast consists of metidiorite and quartz; wet	(41.5') Bottom of sampler set at 41.5 instead of 42 ft bgs because of formation collapse	(37.0 - 307.0') No used
42									
43				Topock - Fluvial Deposits	SM		(42.0 - 45.0') Topock - Fluvial Deposits; Silty sand (SM); dark yellowish brown (10YR 4/4); very fine grained, round; little silt; trace clay; wet		
44		RB-2-SS-42-47 7/15/2019 10:06							
45									
46				Topock - Fluvial Deposits	GW-GM		(45.0 - 48.0') Topock - Fluvial Deposits; Well graded gravel with silt and sand (GW-GM); dark gray (10YR 4/1); granules to very large pebbles, round; little very fine grained to very coarse grained sand; little silt; trace small cobbles; trace clay; little caliche; little coarser clast consists of metidiorite and quartz; wet		
47									
48		RB-2-SS-47-50 7/15/2019 10:00							
49	180						(48.0 - 54.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); reddish brown (5YR 5/4); small pebbles to very large pebbles, angular to subangular; some very fine grained to very coarse grained sand; little silt; trace clay; some coarser clasts composed of metadiorite; wet		
50				Topock - Alluvium Deposits	GM				
51									
52		RB-2-SS-50-55 7/15/2019 10:10							
53									
54				Topock - Alluvium Deposits	GM		(54.0 - 55.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); reddish brown (5YR 5/4); small pebbles to very large pebbles, angular to subangular; some very fine grained to very coarse grained sand; some clay; little silt; some coarser clasts composed of metadiorite; moist		
55									
56				Topock - Alluvium Deposits	SM		(55.0 - 59.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (5YR 5/4); fine grained to medium grained, subangular; some granules to medium pebbles; little silt; trace clay; little coarser clasts composed of metadiorite; little coarser clast composed of quartz; moist		
57		RB-2-SS-55-60 7/15/2019 10:15							
58	120								
59									
60				Topock - Alluvium Deposits	SC		(59.0 - 60.0') Topock - Alluvium Deposits; Clayey sand with gravel (SC); reddish brown (5YR 5/4); fine grained to coarse grained, angular to subangular; little granules to large pebbles, angular to		

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Date Started:	06/28/2019	Surface Elevation:	480.9 ft amsl	Boring No.: <u>RB-2 Pilot</u>	
Date Completed:	07/29/2019	Northing (NAD83):	2103398.9		
Drilling Co.:	Cascade	Easting (NAD83):	7616014.8	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	307 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Boart Longyear Track Mount	Borehole Diameter:	4-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Tyler Alymer	Depth to First Water:	23.77 ft bgs		
Drilling Asst:	J. Condelaria, G. Angiano	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	Joe Latham	Sampling Interval:	Continuous		
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
61	120	RB-2-SS-60-65 7/15/2019 10:20		Topock - Alluvium Deposits	GM		subangular; little clay; trace silt; little coarser clasts composed of metadiorite; little granite; moist		(37.0 - 307.0') No used
62							(60.0 - 67.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); reddish brown (5YR 5/4); granules to large pebbles, angular to subangular; some very fine grained to very coarse grained sand; little silt; trace coarser clasts composed of metadiorite; moist		
63									
64									
65	120	RB-2-SS-65-70 7/15/2019 10:25		Topock - Alluvium Deposits	GW		(67.0 - 74.0') Topock - Alluvium Deposits; Well graded gravel (GW); reddish gray / pale brown(5YR 5/2); granules to small cobbles, angular to subangular; and medium to very coarse grained sand, angular to subangular; trace small cobbles; trace silt; some coarser clasts composed of metadiorite, quartz, granite, and basalt; wet		
66									
67									
68									
69									
70									
71									
72									
73		RB-2-SS-70-75 7/15/2019 11:38		Topock - Alluvium Deposits	GC		(74.0 - 75.0') Topock - Alluvium Deposits; Clayey gravel with sand (GC); dark reddish gray (5YR 4/2); granules to medium pebbles, subangular; some very fine grained to very coarse grained sand; little clay; trace silt; some coarser clasts composed of metadiorite; moist		
74									
75									
76									
77	120	RB-2-SS-75-80 7/15/2019 12:14		Topock - Alluvium Deposits	SW		(75.0 - 77.0') Topock - Alluvium Deposits; Well graded sand with gravel (SW); reddish brown / moderate brown(5YR 4/4); medium grained to very coarse grained, angular to subround; some granules to medium pebbles, angular; trace silt; and coarser clasts composed of metadiorite; wet		
78									
79									
80									
							(77.0 - 81.5') Topock - Alluvium Deposits; Well graded sand with silt and gravel (SW-SM); reddish gray / pale brown(5YR 5/2); medium grained to coarse grained, angular to subround; some granules to large pebbles, angular to subangular; little silt; little coarser clasts composed of metadiorite; little granite; moist		

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Date Started:	06/28/2019	Surface Elevation:	480.9 ft amsl	Boring No.: <u>RB-2 Pilot</u>	
Date Completed:	07/29/2019	Northing (NAD83):	2103398.9		
Drilling Co.:	Cascade	Easting (NAD83):	7616014.8	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	307 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Boart Longyear Track Mount	Borehole Diameter:	4-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Tyler Alymer	Depth to First Water:	23.77 ft bgs		
Drilling Asst:	J. Condelaria, G. Angiano	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	Joe Latham	Sampling Interval:	Continuous		
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
81				Topock - Alluvium Deposits	SW-SM				(37.0 - 307.0') No used
82		RB-2-SS-80-85 7/15/2019 12:21		Topock - Alluvium Deposits	ML		(81.5 - 86.5') Topock - Alluvium Deposits; Silt with gravel (ML); low plasticity; some granules to large pebbles, angular to subangular; little very fine grained to very coarse grained sand; little clay; little coarser clasts composed of metadiorite; wet		
83	120								
84									
85									
86									
87		RB-2-SS-85-90 7/15/2019 14:00		Topock - Alluvium Deposits	GC		(86.5 - 90.0') Topock - Alluvium Deposits; Clayey gravel (GC); yellowish red / light brown(5YR 5/6); granules to large pebbles, angular to subangular; some clay; little silt; trace fine to coarse grained sand, subangular to subround; some coarser clasts composed of metadiorite; wet		
88									
89									
90									
91				Topock - Alluvium Deposits	GC		(90.0 - 93.0') Topock - Alluvium Deposits; Clayey gravel (GC); brown (7.5YR 5/4); granules to very large pebbles, angular to subangular; some clay; trace very fine grained to very coarse grained sand; trace silt; some coarser clasts composed of metadiorite; trace granite; moist	(90.0 - 103.0') Rough drilling	
92	120	RB-2-SS-90-95 7/16/2019 08:04							
93									
94				Topock - Alluvium Deposits	GM		(93.0 - 96.5') Topock - Alluvium Deposits; Silty gravel (GM); strong brown (7.5YR 5/6); granules to very large pebbles, angular to subangular; little silt; trace very fine grained to very coarse grained sand; trace clay; and coarser clasts composed of metadiorite; dry		
95									
96									
97		RB-2-SS-95-100 7/16/2019 08:12		Topock - Alluvium Deposits	GM		(96.5 - 99.0') Topock - Alluvium Deposits; Silty gravel (GM); strong brown (7.5YR 5/6); granules to very large pebbles, angular to subangular; some silt; little clay; trace very fine grained to very coarse grained sand; some coarser clasts composed of metadiorite; moist		
98	120								
99									
100				Topock - Alluvium Deposits	GC		(99.0 - 104.0') Topock - Alluvium Deposits; Clayey gravel (GC); yellowish red / light brown(5YR 5/6); granules to very large pebbles, angular to subangular; some clay; little silt; trace very		

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Date Started:	06/28/2019	Surface Elevation:	480.9 ft amsl	Boring No.: <u>RB-2 Pilot</u>	
Date Completed:	07/29/2019	Northing (NAD83):	2103398.9		
Drilling Co.:	Cascade	Easting (NAD83):	7616014.8	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	307 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Boart Longyear Track Mount	Borehole Diameter:	4-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Tyler Alymer	Depth to First Water:	23.77 ft bgs		
Drilling Asst:	J. Condelaria, G. Angiano	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	Joe Latham	Sampling Interval:	Continuous		
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
101							fine grained to very coarse grained sand; some coarser clasts composed of metadiorite; moist	(90.0 - 103.0') Rough drilling	(37.0 - 307.0') No used
102									
103		RB-2-SS-100-105 7/16/2019 08:20		Topock - Alluvium Deposits	GC				
104	120								
105			RB-2-VAS-102-107 (<0.033 U ppb) 7/1/2019 15:21	Topock - Alluvium Deposits	GM		(104.0 - 107.0') Topock - Alluvium Deposits; Silty gravel (GM); yellowish red / light brown(5YR 5/6); granules to medium pebbles, angular to subangular; some silt; little clay; little coarser clasts composed of metadiorite; wet		
106									
107									
108		RB-2-SS-105-110 7/16/2019 08:33		Topock - Alluvium Deposits	GC		(107.0 - 109.0') Topock - Alluvium Deposits; Clayey gravel with sand (GC); yellowish red / light brown(5YR 5/6); granules to medium pebbles, angular to subangular; little very fine grained to very coarse grained sand; little silt; little clay; trace mica; little coarser clasts composed of metadiorite; moist		
109									
110				Topock - Alluvium Deposits	GM		(109.0 - 111.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); yellowish brown (10YR 5/6); granules to large pebbles, subangular; some silt; little very fine grained to very coarse grained sand; little clay; little coarser clasts composed of metadiorite; moist	(110.0 - 125.0') Rough drilling	
111									
112	120	RB-2-SS-110-115 7/16/2019 08:40		Topock - Alluvium Deposits	GM		(111.0 - 112.0') Topock - Alluvium Deposits; Silty gravel (GM); yellowish brown (10YR 5/6); granules to large pebbles, angular to subangular; little very fine grained to very coarse grained sand; little silt; little clay; little coarser clasts composed of metadiorite; moist		
113				Topock - Alluvium Deposits	GM		(112.0 - 114.0') Topock - Alluvium Deposits; Silty gravel (GM); strong brown (7.5YR 5/6); granules to large pebbles, angular to subangular; some silt; little very fine grained to very coarse grained sand; trace clay; trace caliche; some coarser clasts composed of metadiorite; moist		
114									
115							(114.0 - 121.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); yellowish brown (10YR 5/6); granules to small pebbles, subangular; some silt; little granules to small pebbles, subangular; trace clay; trace coarser clasts composed of metadiorite; moist		
116									
117				Topock - Alluvium Deposits	GM				
118	120	RB-2-SS-115-120 7/16/2019 08:51							
119									
120							(119.5'); less silt, more clay		

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Date Started:	06/28/2019	Surface Elevation:	480.9 ft amsl	Boring No.: <u>RB-2 Pilot</u>	
Date Completed:	07/29/2019	Northing (NAD83):	2103398.9		
Drilling Co.:	Cascade	Easting (NAD83):	7616014.8	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	307 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Boart Longyear Track Mount	Borehole Diameter:	4-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Tyler Alymer	Depth to First Water:	23.77 ft bgs		
Drilling Asst:	J. Condelaria, G. Angiano	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	Joe Latham	Sampling Interval:	Continuous		
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
121	120	RB-2-SS-120-125 7/16/2019 09:00		Topock - Alluvium Deposits	GM		(121.0 - 127.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); yellowish brown (10YR 5/6); granules to small pebbles, subangular; some silt; little granules to small pebbles, subangular; trace clay; trace coarser clasts composed of metadiorite; moist	(110.0 - 125.0') Rough drilling	(37.0 - 307.0') No used
122				Topock - Alluvium Deposits	GM				
123									
124									
125	RB-2-SS-125-129 7/16/2019 09:09	Topock - Alluvium Deposits	ML					(127.0 - 131.5') Topock - Alluvium Deposits; Gravelly silt with sand (ML); brown (7.5YR 5/4); low plasticity; some granules to small pebbles, angular to subangular; little very fine grained to very coarse grained sand; little clay; little coarser clasts composed of metadiorite; wet	
126									
127									
128									
129	120	RB-2-SS-129-134 7/16/2019 09:22		Topock - Alluvium Deposits	GM		(131.5 - 137.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); yellowish brown (10YR 5/6); granules to very large pebbles, subangular; some silt; little very fine grained to very coarse grained sand; trace clay; trace coarser clasts composed of metadiorite; moist		
130									
131									
132									
133	120	RB-2-SS-134-139 7/16/2019 10:36		Topock - Alluvium Deposits	SM		(137.0 - 142.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); dark yellowish brown (10YR 4/6); very fine grained to very coarse grained, angular to subround; some granules to large pebbles, angular; some silt; some coarser clasts composed of metadiorite; moist		
134									
135									
136									
137	120	RB-2-SS-139-144 7/16/2019		Topock - Alluvium Deposits					
138									
139									
140									









Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	06/28/2019	Surface Elevation:	480.9 ft amsl	Boring No.: <u>RB-2 Pilot</u>	
Date Completed:	07/29/2019	Northing (NAD83):	2103398.9		
Drilling Co.:	Cascade	Easting (NAD83):	7616014.8	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	307 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Boart Longyear Track Mount	Borehole Diameter:	4-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Tyler Alymer	Depth to First Water:	23.77 ft bgs		
Drilling Asst:	J. Condelaria, G. Angiano	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	Joe Latham	Sampling Interval:	Continuous		
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
141		10:45		Topock - Alluvium Deposits	SM				(37.0 - 307.0') No used
142		RB-2-SS-139-144 7/16/2019 10:45					(142.0 - 145.5') Topock - Alluvium Deposits; Silty gravel with sand (GM); strong brown (7.5YR 5/6); granules to very large pebbles, angular; little silt; trace small cobbles; some coarser clasts composed of metadiorite; moist		
143									
144	120		RB-2-VAS-142-147 (<0.17 U ppb) 7/9/2019 13:20	Topock - Alluvium Deposits	GM				
145									
146		RB-2-SS-144-149 7/16/2019 10:56		Topock - Alluvium Deposits	SM		(145.5 - 147.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); strong brown (7.5YR 5/6); very fine grained to very coarse grained, subangular to subround; some granules to large pebbles, angular to subangular; little coarser clasts composed of metadiorite; trace granite; moist		
147									
148				Topock - Alluvium Deposits	SM		(147.0 - 149.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown / moderate brown (5YR 4/4); very fine grained to coarse grained, subangular to subround; little granules to medium pebbles, angular; little silt; trace coarser clasts composed of metadiorite; little granite; wet		
149									
150		RB-2-SS-149-154 7/16/2019 11:06		Topock - Alluvium Deposits	SM		(149.0 - 153.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); yellowish brown (10YR 5/6); medium grained to very coarse grained, angular to subround; little granules to very large pebbles, subangular; little silt; trace coarser clasts composed of metadiorite; trace granite; wet		
151									
152	120								
153									
154		RB-2-SS-154-157 7/16/2019 11:14		Topock - Alluvium Deposits	GM		(153.0 - 156.5') Topock - Alluvium Deposits; Silty gravel with sand (GM); strong brown (7.5YR 5/6); granules to very large pebbles, angular to subangular; some medium to very coarse grained sand, subangular to subround; little silt; trace coarser clasts composed of metadiorite; wet		
155									
156									
157		RB-2-SS-157-162 7/16/2019 11:20		Topock - Alluvium Deposits	GM		(156.5 - 159.5') Topock - Alluvium Deposits; Silty gravel (GM); strong brown (7.5YR 5/6); granules to very large pebbles, angular to subangular; some silt; little very fine to very coarse grained sand, subangular to subround; trace clay; some coarser clasts composed of metadiorite; wet		
158	120								
159									
160				Topock - Alluvium	GC		(159.5 - 160.0') Topock - Alluvium Deposits; Clayey gravel (GC);		

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Date Started:	06/28/2019	Surface Elevation:	480.9 ft amsl	Boring No.: <u>RB-2 Pilot</u>	
Date Completed:	07/29/2019	Northing (NAD83):	2103398.9		
Drilling Co.:	Cascade	Easting (NAD83):	7616014.8	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	307 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Boart Longyear Track Mount	Borehole Diameter:	4-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Tyler Alymer	Depth to First Water:	23.77 ft bgs		
Drilling Asst:	J. Condelaria, G. Angiano	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	Joe Latham	Sampling Interval:	Continuous		
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
161	120	RB-2-SS-157-162 7/16/2019 11:20		Deposits	GM		yellowish brown (10YR 5/6); granules to very large pebbles, angular to subangular; some clay; little very fine to very coarse grained sand, subangular to subround; little silt; little coarser clasts composed of metadiorite; moist		(37.0 - 307.0') No used
162		Topock - Alluvium Deposits		(160.0 - 163.0') Topock - Alluvium Deposits; Silty gravel (GM); strong brown (7.5YR 5/6); granules to very large pebbles, angular to subangular; some silt; little very fine to very coarse grained sand, subangular to subround; trace clay; some coarser clasts composed of metadiorite; wet					
163		RB-2-SS-162-165 7/16/2019 11:58		Topock - Alluvium Deposits	GM		(163.0 - 167.0') Topock - Alluvium Deposits; Silty gravel (GM); reddish yellow (7.5YR 6/8); granules to very large pebbles, angular to subangular; and silt; little very fine to very coarse grained sand, subangular to subround; trace clay; some coarser clasts composed of metadiorite; moist		
164									
165									
166	120	RB-2-SS-165-170 7/16/2019 12:07	Topock - Alluvium Deposits	SM		(167.0 - 171.0') Topock - Alluvium Deposits; Silty sand (SM); reddish brown / moderate brown(5YR 4/4); very fine grained to fine grained, subangular to subround; and silt; little granules to medium pebbles, subangular; trace clay; little coarser clasts composed of metadiorite; wet	(167.0 - 177.0') Rough drilling		
167								(170'); moist; 0.2' lense of grayish green color change	
168									
169		RB-2-SS-170-172 7/16/2019 12:18	Topock - Alluvium Deposits	SM		(171.0 - 172.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown / moderate brown(5YR 4/4); very fine grained to coarse grained, angular; little granules to medium pebbles, angular; little silt; little coarser clasts composed of metadiorite; wet			
170									
171									
172	120	RB-2-SS-172-177 7/16/2019 12:29	RB-2-VAS-172-177 (<0.17 U ppb) 7/12/2019 14:55	Topock - Alluvium Deposits	SM		(172.5 - 177.0') Topock - Alluvium Deposits; Silty sand (SM); reddish brown / moderate brown(5YR 4/4); very fine grained to fine grained, subangular to subround; and silt; little granules to medium pebbles, subangular; trace clay; little coarser clasts composed of metadiorite; moist (174'); saturated zone (175.5'); 0.2' lense of grayish green color change		
173									
174									
175									
176									
177	120	RB-2-SS-177-180 7/17/2019 07:59		Topock - Alluvium Deposits	SM		(177.0 - 178.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (5YR 5/4); very fine grained to coarse grained, angular; and silt; little granules to medium pebbles, angular to subangular; trace clay; little coarser clasts composed of metadiorite; wet		
178				Topock - Alluvium Deposits	SM		(178.0 - 179.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown / moderate brown(5YR 4/4); very fine grained to coarse grained, angular; little granules to medium pebbles, angular; little silt; little coarser clasts composed of metadiorite; wet		
179				Topock - Alluvium Deposits	SM				





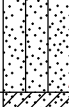
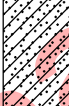
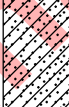

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Date Started:	06/28/2019	Surface Elevation:	480.9 ft amsl	Boring No.: RB-2 Pilot
Date Completed:	07/29/2019	Northing (NAD83):	2103398.9	
Drilling Co.:	Cascade	Easting (NAD83):	7616014.8	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	307 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Boart Longyear Track Mount	Borehole Diameter:	4-12 inches	Location: PG&E Topock, Needles, California
Driller Name:	Tyler Alymer	Depth to First Water:	23.77 ft bgs	
Drilling Asst:	J. Condelaria, G. Angiano	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger:	Joe Latham	Sampling Interval:	Continuous	
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
181		RB-2-SS-180-182 7/17/2019 08:08		Topock - Alluvium Deposits	SM		(179.0 - 181.0') Topock - Alluvium Deposits; Silty sand (SM); reddish brown / moderate brown(5YR 4/4); very fine grained to fine grained, subangular to subround; and silt; little granules to medium pebbles, subangular; trace clay; little coarser clasts composed of metadiorite; wet		(37.0 - 307.0') No used
182							(181.0 - 188.0') Topock - Alluvium Deposits; Well graded sand with gravel (SW); strong brown (7.5YR 5/6); very fine grained to very coarse grained, angular; some granules to large pebbles, angular; trace silt; some coarser clasts composed of metadiorite; wet		
183	120								
184		RB-2-SS-182-187 7/17/2019 08:17		Topock - Alluvium Deposits	SW				
185									
186									
187									
188		RB-2-SS-187-190 7/17/2019 08:25		Topock - Alluvium Deposits	GW-GM		(188.0 - 189.0') Topock - Alluvium Deposits; Well graded gravel with silt and sand (GW-GM); strong brown (7.5YR 5/6); granules to very large pebbles, angular; and very fine to very coarse grained sand, angular; trace clay; little coarser clasts composed of metadiorite; trace coarser clast composed of quartz; wet		
189				Topock - Alluvium Deposits	SM				
190				Topock - Alluvium Deposits	GM		(189.0 - 189.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); strong brown (7.5YR 5/6); very fine grained to very coarse grained, angular; some granules to large pebbles, angular; some silt; trace clay; little coarser clasts composed of metadiorite; trace coarser clast composed of quartz; wet		
191							(189.5 - 192.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); strong brown (7.5YR 5/6); granules to very large pebbles, angular; some very fine to very coarse grained sand, angular; little silt; trace clay; little coarser clasts composed of metadiorite; trace coarser clast composed of quartz; wet		
192	120	RB-2-SS-190-195 7/17/2019 08:33					(192.0 - 197.0') Topock - Alluvium Deposits; Well graded sand with silt and gravel (SW-SM); strong brown (7.5YR 5/6); very fine grained to very coarse grained, angular; some granules to very large pebbles, angular; little silt; trace clay; little coarser clasts composed of metadiorite; trace coarser clast composed of quartz; wet; green staining		
193				Topock - Alluvium Deposits	SW-SM				
194									
195									
196		RB-2-SS-195-198 7/17/2019 08:40							
197									
198	120	RB-2-SS-198-203 7/17/2019 09:03		Topock - Alluvium Deposits	SM		(197.0 - 199.5') Topock - Alluvium Deposits; Silty sand (SM); strong brown (7.5YR 5/6); very fine grained to medium grained, angular; and silt; little granules to small pebbles, angular; trace clay; trace coarser clasts composed of metadiorite; moist		
199									
200					ML		(199.5 - 202.0') Topock - Alluvium Deposits; Gravelly silt with sand		


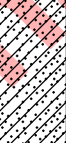

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Date Started:	06/28/2019	Surface Elevation:	480.9 ft amsl	Boring No.: <u>RB-2 Pilot</u>
Date Completed:	07/29/2019	Northing (NAD83):	2103398.9	
Drilling Co.:	Cascade	Easting (NAD83):	7616014.8	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	307 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Boart Longyear Track Mount	Borehole Diameter:	4-12 inches	Location: PG&E Topock, Needles, California
Driller Name:	Tyler Alymer	Depth to First Water:	23.77 ft bgs	
Drilling Asst:	J. Condelaria, G. Angiano	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger:	Joe Latham	Sampling Interval:	Continuous	
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
201	120	RB-2-SS-198-203 7/17/2019 09:03	RB-2-VAS-202-207 (<0.17 U ppb) 7/14/2019 09:20	Topock - Alluvium Deposits	ML		(ML); strong brown (7.5YR 5/6); low plasticity; some granules to small pebbles, angular; little very fine to medium grained sand, angular; little clay; little coarser clasts composed of metadiorite; wet	(207.0') Switched driller T. Alymer with D. OMara	(37.0 - 307.0') No used
202				Topock - Alluvium Deposits	SM		(202.0 - 204.0') Topock - Alluvium Deposits; Silty sand (SM); strong brown (7.5YR 5/6); very fine grained to medium grained, angular; and silt; little small to very large pebbles, angular; trace clay; trace coarser clasts composed of metadiorite; wet (202.5'); green staining		
203		RB-2-SS-203-207 7/17/2019 09:09		Topock - Alluvium Deposits	SM		(204.0 - 204.5') Topock - Alluvium Deposits; Silty sand (SM); strong brown (7.5YR 5/6); fine grained to coarse grained, angular; little granules to small pebbles, angular; little silt; trace clay; trace coarser clasts composed of metadiorite; wet		
204				Topock - Alluvium Deposits	ML		(204.5 - 205.0') Topock - Alluvium Deposits; Gravelly silt with sand (ML); strong brown (7.5YR 5/6); low plasticity; some small to very large pebbles, angular; little very fine to medium grained sand, angular; little clay; little coarser clasts composed of metadiorite; wet		
205				Topock - Alluvium Deposits	SM		(205.0 - 207.5') Topock - Alluvium Deposits; Silty sand (SM); strong brown (7.5YR 5/6); very fine grained to medium grained, angular; and silt; little small to very large pebbles, angular; trace clay; trace coarser clasts composed of metadiorite; moist		
206				Topock - Alluvium Deposits	SC		(207.5 - 217.0') Topock - Alluvium Deposits; Clayey sand with gravel (SC); brown (7.5YR 4/4); very fine grained to very coarse grained, angular to subround; some small to very large pebbles, angular; little clay; trace silt; little coarser clasts composed of metadiorite; moist		
207		120		RB-2-SS-207-209 7/17/2019 09:15	Topock - Alluvium Deposits	SC			
208									
209	RB-2-SS-209-214 7/17/2019 09:22								
210									
211									
212									
213	RB-2-SS-214-217 7/17/2019 09:28								
214									
215									
216									
217	180	RB-2-SS-217-222 7/17/2019 09:35	Topock - Alluvium Deposits	SC		(219.5 - 222.0') Topock - Alluvium Deposits; Clayey gravel with			
218									
219									
220									






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Date Started:	06/28/2019	Surface Elevation:	480.9 ft amsl	Boring No.: <u>RB-2 Pilot</u>
Date Completed:	07/29/2019	Northing (NAD83):	2103398.9	
Drilling Co.:	Cascade	Easting (NAD83):	7616014.8	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	307 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Boart Longyear Track Mount	Borehole Diameter:	4-12 inches	Location: PG&E Topock, Needles, California
Driller Name:	Tyler Alymer	Depth to First Water:	23.77 ft bgs	
Drilling Asst:	J. Condelaria, G. Angiano	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger:	Joe Latham	Sampling Interval:	Continuous	
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
221	180	RB-2-SS-217-222 7/17/2019 09:35		Topock - Alluvium Deposits	GC		sand (GC); strong brown (7.5YR 5/6); granules to very large pebbles, angular; some fine to very coarse grained sand, angular to subround; little clay; some coarser clasts composed of metadiorite; trace granite; wet		(37.0 - 307.0') No used
222									
223									
224									
225		RB-2-SS-222-227 7/17/2019 09:40					(222.0 - 237.0') Topock - Alluvium Deposits; Clayey sand with gravel (SC); brown (7.5YR 5/4); very fine grained to very coarse grained, angular to subround; some small to very large pebbles, angular; little clay; trace silt; little coarser clasts composed of metadiorite; moist		
226									
227	60								(227.0 - 244.0') Rough drilling
228									
229									
230		RB-2-SS-227-233 7/17/2019 09:45		Topock - Alluvium Deposits	SC				
231									
232									
233	60								(234') greenish gray staining
234		RB-2-SS-233-235 7/17/2019 09:50							
235									
236									
237	84								(237.0') Switched driller D. O'Mara with S. Vasquez
238		RB-2-SS-235-240 7/17/2019 10:30							
239									
240									
			RB-2-VAS-237-242 (<0.17 U ppb) 7/15/2019 13:48	Topock - Alluvium Deposits	GC		(237.0 - 241.0') Topock - Alluvium Deposits; Clayey gravel with sand (GC); reddish brown / moderate brown(5YR 4/4); granules to small pebbles, angular; some fine to coarse grained sand, subangular to subround; some clay; trace silt; little coarser clasts composed of metadiorite; moist		

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	06/28/2019	Surface Elevation:	480.9 ft amsl	Boring No.: <u>RB-2 Pilot</u>
Date Completed:	07/29/2019	Northing (NAD83):	2103398.9	
Drilling Co.:	Cascade	Easting (NAD83):	7616014.8	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	307 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Boart Longyear Track Mount	Borehole Diameter:	4-12 inches	Location: PG&E Topock, Needles, California
Driller Name:	Tyler Alymer	Depth to First Water:	23.77 ft bgs	
Drilling Asst:	J. Condelaria, G. Angiano	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger:	Joe Latham	Sampling Interval:	Continuous	
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
241	84	RB-2-SS-240-245 7/17/2019 10:35	RB-2-VAS-237-242 (<0.17 U ppb) 7/15/2019 13:48	Topock - Alluvium Deposits	GC		(241.0 - 244.0') Topock - Weathered Bedrock - conglomerate; Sandy lean clay with gravel (CL); reddish brown (5YR 5/4); low plasticity; some granules to very large pebbles, angular; little fine to coarse grained sand, subangular to subround; little silt; little coarser clasts composed of metadiorite; dry	(227.0 - 244.0') Rough drilling	(37.0 - 307.0') No used
242				Topock - Weathered Bedrock - conglomerate	CL				
243									
244	36	RB-2-SS-245-250 7/17/2019 10:40		Topock - Weathered Bedrock - conglomerate	SC		(244.0 - 247.0') Topock - Weathered Bedrock - conglomerate; Clayey sand with gravel (SC); yellowish red / light brown (5YR 5/6); very fine grained to medium grained, subangular to subround; some granules to large pebbles, angular to subangular; little clay; trace silt; little coarser clasts composed of metadiorite; moist		
245									
246									
247	84	RB-2-SS-250-255 7/17/2019 10:45		Topock - Weathered Bedrock - conglomerate	CL		(247.0 - 274.0') Topock - Weathered Bedrock - conglomerate; Gravelly lean clay with sand (CL); reddish brown (2.5YR 4/4); low plasticity; some granules to medium pebbles, angular to subangular; little very fine to fine grained sand, subangular to subround; trace silt; little coarser clasts composed of metadiorite; trace coarser clasts composed of granite; moist		
248									
249									
250	84	RB-2-SS-255-260 7/17/2019 10:50		Topock - Weathered Bedrock - conglomerate	CL		(252') dark reddish brown (2.5YR 3/4); decrease in moisture content, white mottling	(251.0 - 254.0') Rough drilling	
251									
252									
253	84						(254') reddish brown (2.5YR 4/4); increase in moisture content		
254									
255									
256	84						(257') dark reddish brown (2.5YR 3/4); decrease in moisture content		
257									
258									
259									
260									





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Date Started:	06/28/2019	Surface Elevation:	480.9 ft amsl	Boring No.: <u>RB-2 Pilot</u>	
Date Completed:	07/29/2019	Northing (NAD83):	2103398.9		
Drilling Co.:	Cascade	Easting (NAD83):	7616014.8	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	307 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Boart Longyear Track Mount	Borehole Diameter:	4-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Tyler Alymer	Depth to First Water:	23.77 ft bgs		
Drilling Asst:	J. Condelaria, G. Angiano	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	Joe Latham	Sampling Interval:	Continuous		
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
261	84								(37.0 - 307.0') No used
262		RB-2-SS-250-265 7/17/2019 10:55							
263									
264	72						(264') reddish brown / moderate brown(5YR 4/4); decrease in moisture content		
265								(265.0 - 267.0') Rough drilling	
266									
267		RB-2-SS-265-270 7/17/2019 11:00		Topock - Weathered Bedrock - conglomerate	CL				
268									
269								(269.0 - 274.0') Rough drilling, drill rig ran out of fuel mid-drill run	
270									
271	84								
272		RB-2-SS-270-275 7/17/2019 11:00							
273									
274									
275							(274.0 - 277.0') Topock - Weathered Bedrock - conglomerate; Clayey sand with gravel (SC); brown (7.5YR 4/4); very fine grained to very coarse grained, subangular to subround; some medium to very large pebbles, angular; little clay; trace small cobbles; trace silt; little coarser clasts composed of metadiorite; wet		
276		RB-2-VAS-274-279 (<0.17 U ppb) 7/18/2019 09:17		Topock - Weathered Bedrock - conglomerate	SC				
277	108	RB-2-SS-275-280 7/17/2019 12:49		Topock - Weathered Bedrock - conglomerate	CL		(277.0 - 279.0') Topock - Weathered Bedrock - conglomerate; Sandy lean clay with gravel (CL); reddish brown / moderate brown(5YR 4/4); low plasticity; some very fine to medium grained sand, subangular to subround; little granules to very large pebbles, subangular; trace silt; little coarser clasts composed of metadiorite; moist		
278									
279				Topock - Weathered Bedrock -	CL		(279.0 - 285.0') Topock - Weathered Bedrock - conglomerate; Gravely lean clay with sand (CL); reddish brown / moderate brown(5YR 4/4); low plasticity; some granules to very large		
280									


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Date Started:	06/28/2019	Surface Elevation:	480.9 ft amsl	Boring No.: <u>RB-2 Pilot</u>
Date Completed:	07/29/2019	Northing (NAD83):	2103398.9	
Drilling Co.:	Cascade	Easting (NAD83):	7616014.8	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	307 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Boart Longyear Track Mount	Borehole Diameter:	4-12 inches	Location: PG&E Topock, Needles, California
Driller Name:	Tyler Alymer	Depth to First Water:	23.77 ft bgs	
Drilling Asst:	J. Condelaria, G. Angiano	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger:	Joe Latham	Sampling Interval:	Continuous	
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid	
281	108	RB-2-SS-280-283 7/17/2019 12:56		conglomerate	CL		pebbles, angular to subangular; little very fine to medium grained sand, subangular to subround; trace small cobbles; trace silt; little coarser clasts composed of metadiorite; trace mica; moist; some white and dark brown mottling		(37.0 - 307.0') No used	
282										
283										
284	120	RB-2-SS-283-288 7/18/2019 11:15		Topock - Weathered Bedrock - conglomerate	CL		(285.0 - 294.0') Topock - Weathered Bedrock - conglomerate; Gravelly lean clay with sand (CL); reddish brown / moderate brown(5YR 4/4); low plasticity; some granules to very large pebbles, angular to subround; some fine to medium grained sand, subangular to subround; trace silt; little coarser clasts composed of metadiorite; trace granite; moist	(283.0 - 293.0') Rough drilling		
285										
286										
287										
288										
289		RB-2-VAS-287-292 (<0.17 U ppb) 7/26/2019 11:56	Topock - Weathered Bedrock - conglomerate	CL						
290										
291										
292										
293										
294	168			Topock - Competent Bedrock - conglomerate			(294.0 - 303.0') Topock - Competent Bedrock - conglomerate; reddish brown / moderate brown(5YR 4/4); little granules to medium pebbles, angular to subangular; little very fine to medium grained sand; trace silt; little coarser clasts composed of metadiorite; dry to moist; friable conglomerate, highly pulverized and fractured	(293.0 - 307.0') 10' of slough in core barrel. From 303 to 307 very rough drilling. (294.0') Independent QC inspector on-site to confirm bedrock		
295										
296										
297										
298										
299										
300										

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	06/28/2019	Surface Elevation:	480.9 ft amsl	Boring No.: RB-2 Pilot	
Date Completed:	07/29/2019	Northing (NAD83):	2103398.9		
Drilling Co.:	Cascade	Easting (NAD83):	7616014.8	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	307 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Boart Longyear Track Mount	Borehole Diameter:	4-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Tyler Alymer	Depth to First Water:	23.77 ft bgs		
Drilling Asst:	J. Condelaria, G. Angiano	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	Joe Latham	Sampling Interval:	Continuous		
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
301	168			Topock - Competent Bedrock - conglomerate			(303.0 - 307.0'); dry; friable conglomerate, moderately pulverized and fractured	(293.0 - 307.0') 10' of slough in core barrel. From 303 to 307 very rough drilling.	(37.0 - 307.0') No used
302									
303									
304									
305									
306									
307									
End of Boring at 307.0 'bgs.									
308									
309									
310									
311									
312									
313									
314									
315									
316									
317									
318									
319									
320									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	06/28/2019	Surface Elevation:	480.9 ft amsl	Well ID: RB-2 Pilot
Date Completed:	07/29/2019	Northing (NAD83):	2103398.9	
Drilling Co.:	Cascade	Easting (NAD83):	7616014.8	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	307 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Tyler Alymer	Borehole Diameter:	4-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	J. Condelaria, G. Angiano	Depth to First Water:	23.77 ft bgs	
Logger:	Joe Latham	Editor:	Grant Willford	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
1		Topock - Fill	SP		(0.0 - 0.5') Temporary Steel Plate with BMP		
2							
3					(0.5 - 5.0') Cemex #1/20 MESH (20x40)	(0.5 - 5.0') 7.9 bags	(0.5 - 5.0') 7 bags (-11%) Note: Lapis Lustre Sand
4							
5			NR		(0.0 - 8.5') 12.0" Borehole		
6							
7							
8		Topock - Fill	SP				
9							
10							
11							
12							
13					(5.0 - 243.5') Cemex #3 MESH (8x10)	(5.0 - 243.5') 97.7 bags	(5.0 - 243.5') 126 bags (29%) Note: Lapis Lustre Sand
14							
15			NR		(8.5 - 297.0') 6.0" Borehole		
16							
17							
18		Topock - Fill	SP				
19		Topock - Fluvial Deposits	SP				
20							








Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started:	06/28/2019	Surface Elevation:	480.9 ft amsl	Well ID: RB-2 Pilot
Date Completed:	07/29/2019	Northing (NAD83):	2103398.9	
Drilling Co.:	Cascade	Easting (NAD83):	7616014.8	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	307 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Tyler Alymer	Borehole Diameter:	4-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	J. Condalaria, G. Angiano	Depth to First Water:	23.77 ft bgs	
Logger:	Joe Latham	Editor:	Grant Willford	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
21							
22							
23							
24			NR				
25							
26							
27							
28							
29		Topock - Fluvial Deposits	SP				
30					(5.0 - 243.5') Cemex #3 MESH (8x10)	(8.5 - 297.0') 6.0" Borehole	(5.0 - 243.5') 97.7 bags
31							(5.0 - 243.5') 126 bags (29%) Note: Lapis Lustre Sand
32							
33							
34			NR				
35							
36							
37							
38	RB-2-VAS-36.5-41.5 (<0.033 U ppb) 6/29/2019 11:43	Topock - Fluvial Deposits	SP-SM				
39		Topock - Fluvial Deposits	SM				
40		Topock - Fluvial Deposits	GW-GM				


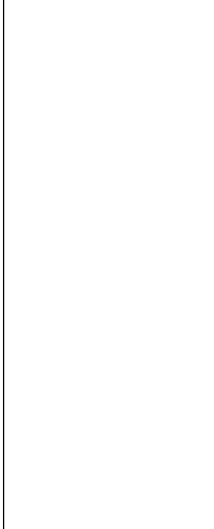
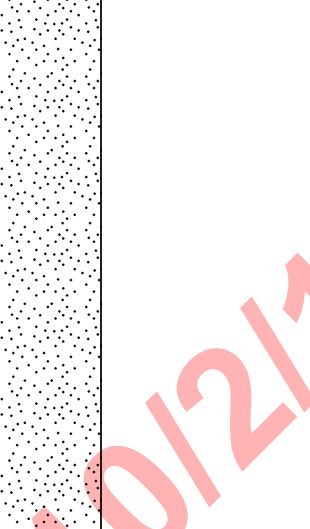

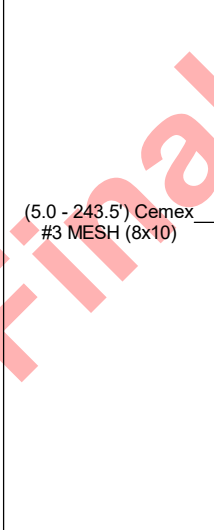
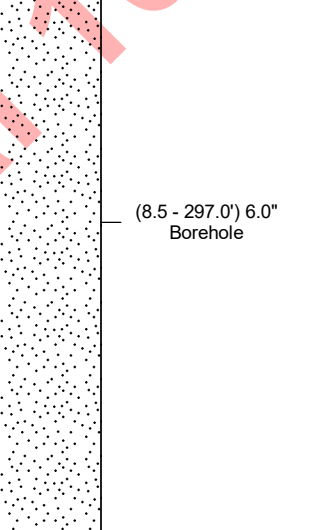









Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started:	06/28/2019	Surface Elevation:	480.9 ft amsl	Well ID: RB-2 Pilot
Date Completed:	07/29/2019	Northing (NAD83):	2103398.9	
Drilling Co.:	Cascade	Easting (NAD83):	7616014.8	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	307 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Tyler Alymer	Borehole Diameter:	4-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	J. Condalaria, G. Angiano	Depth to First Water:	23.77 ft bgs	
Logger:	Joe Latham	Editor:	Grant Willford	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction		Calculated Material Volumes	Material Volumes Installed
41		Topock - Fluvial Deposits	GW-GM					
42								
43		Topock - Fluvial Deposits	SM					
44								
45								
46		Topock - Fluvial Deposits	GW-GM					
47								
48								
49								
50					(5.0 - 243.5') Cemex #3 MESH (8x10)	(8.5 - 297.0') 6.0" Borehole	(5.0 - 243.5') 97.7 bags	(5.0 - 243.5') 126 bags (29%) Note: Lapis Lustre Sand
51		Topock - Alluvium Deposits	GM					
52								
53								
54								
55		Topock - Alluvium Deposits	GM					
56								
57		Topock - Alluvium Deposits	SM					
58								
59								
60		Topock - Alluvium Deposits	SC					

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started:	06/28/2019	Surface Elevation:	480.9 ft amsl	Well ID: RB-2 Pilot
Date Completed:	07/29/2019	Northing (NAD83):	2103398.9	
Drilling Co.:	Cascade	Easting (NAD83):	7616014.8	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	307 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Tyler Alymer	Borehole Diameter:	4-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	J. Condalaria, G. Angiano	Depth to First Water:	23.77 ft bgs	
Logger:	Joe Latham	Editor:	Grant Willford	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction		Calculated Material Volumes	Material Volumes Installed
61		Topock - Alluvium Deposits	GM					
62								
63								
64								
65		Topock - Alluvium Deposits	GW					
66								
67								
68								
69		Topock - Alluvium Deposits	GC					
70								
71								
72								
73	RB-2-VAS-72-77 (<0.033 U ppb) 6/30/2019 14:10	Topock - Alluvium Deposits	SW					
74								
75								
76								
77		Topock - Alluvium Deposits	SW-SM					
78								
79								
80								

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started:	06/28/2019	Surface Elevation:	480.9 ft amsl	Well ID: RB-2 Pilot
Date Completed:	07/29/2019	Northing (NAD83):	2103398.9	
Drilling Co.:	Cascade	Easting (NAD83):	7616014.8	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	307 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Tyler Alymer	Borehole Diameter:	4-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	J. Condelaria, G. Angiano	Depth to First Water:	23.77 ft bgs	
Logger:	Joe Latham	Editor:	Grant Willford	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction		Calculated Material Volumes	Material Volumes Installed
81		Topock - Alluvium Deposits	SW-SM					
82								
83								
84		Topock - Alluvium Deposits	ML					
85								
86								
87								
88		Topock - Alluvium Deposits	GC					
89								
90					(5.0 - 243.5') Cemex #3 MESH (8x10)	(8.5 - 297.0') 6.0" Borehole	(5.0 - 243.5') 97.7 bags	(5.0 - 243.5') 126 bags (29%) Note: Lapis Lustre Sand
91		Topock - Alluvium Deposits	GC					
92								
93								
94		Topock - Alluvium Deposits	GM					
95								
96								
97		Topock - Alluvium Deposits	GM					
98								
99		Topock - Alluvium Deposits	GC					
100								

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started:	06/28/2019	Surface Elevation:	480.9 ft amsl	Well ID: RB-2 Pilot
Date Completed:	07/29/2019	Northing (NAD83):	2103398.9	
Drilling Co.:	Cascade	Easting (NAD83):	7616014.8	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	307 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Tyler Alymer	Borehole Diameter:	4-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	J. Condelaria, G. Angiano	Depth to First Water:	23.77 ft bgs	
Logger:	Joe Latham	Editor:	Grant Willford	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction		Calculated Material Volumes	Material Volumes Installed
101	RB-2-VAS-102-107 (<0.033 U ppb) 7/1/2019 15:21	Topock - Alluvium Deposits	GC					
102		Topock - Alluvium Deposits	GM					
103		Topock - Alluvium Deposits	GC		(5.0 - 243.5') Cemex #3 MESH (8x10)	(8.5 - 297.0') 6.0" Borehole	(5.0 - 243.5') 97.7 bags	(5.0 - 243.5') 126 bags (29%) Note: Lapis Lustre Sand
104		Topock - Alluvium Deposits	GM					
105		Topock - Alluvium Deposits	GM					
106		Topock - Alluvium Deposits	GM					
107		Topock - Alluvium Deposits	GM					
108		Topock - Alluvium Deposits	GM					
109		Topock - Alluvium Deposits	GM					
110		Topock - Alluvium Deposits	GM					
111		Topock - Alluvium Deposits	GM					
112		Topock - Alluvium Deposits	GM					
113		Topock - Alluvium Deposits	GM					
114		Topock - Alluvium Deposits	GM					
115		Topock - Alluvium Deposits	GM					
116		Topock - Alluvium Deposits	GM					
117		Topock - Alluvium Deposits	GM					
118		Topock - Alluvium Deposits	GM					
119		Topock - Alluvium Deposits	GM					
120		Topock - Alluvium Deposits	GM					

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started:	06/28/2019	Surface Elevation:	480.9 ft amsl	Well ID: RB-2 Pilot
Date Completed:	07/29/2019	Northing (NAD83):	2103398.9	
Drilling Co.:	Cascade	Easting (NAD83):	7616014.8	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	307 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Tyler Alymer	Borehole Diameter:	4-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	J. Condelaria, G. Angiano	Depth to First Water:	23.77 ft bgs	
Logger:	Joe Latham	Editor:	Grant Willford	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction		Calculated Material Volumes	Material Volumes Installed
121		Topock - Alluvium Deposits	GM					
122								
123								
124		Topock - Alluvium Deposits	GM					
125								
126								
127								
128								
129		Topock - Alluvium Deposits	ML					
130					(5.0 - 243.5') Cemex #3 MESH (8x10)	(8.5 - 297.0') 6.0" Borehole	(5.0 - 243.5') 97.7 bags	(5.0 - 243.5') 126 bags (29%) Note: Lapis Lustre Sand
131								
132								
133								
134		Topock - Alluvium Deposits	GM					
135								
136								
137								
138								
139		Topock - Alluvium Deposits	SM					
140								


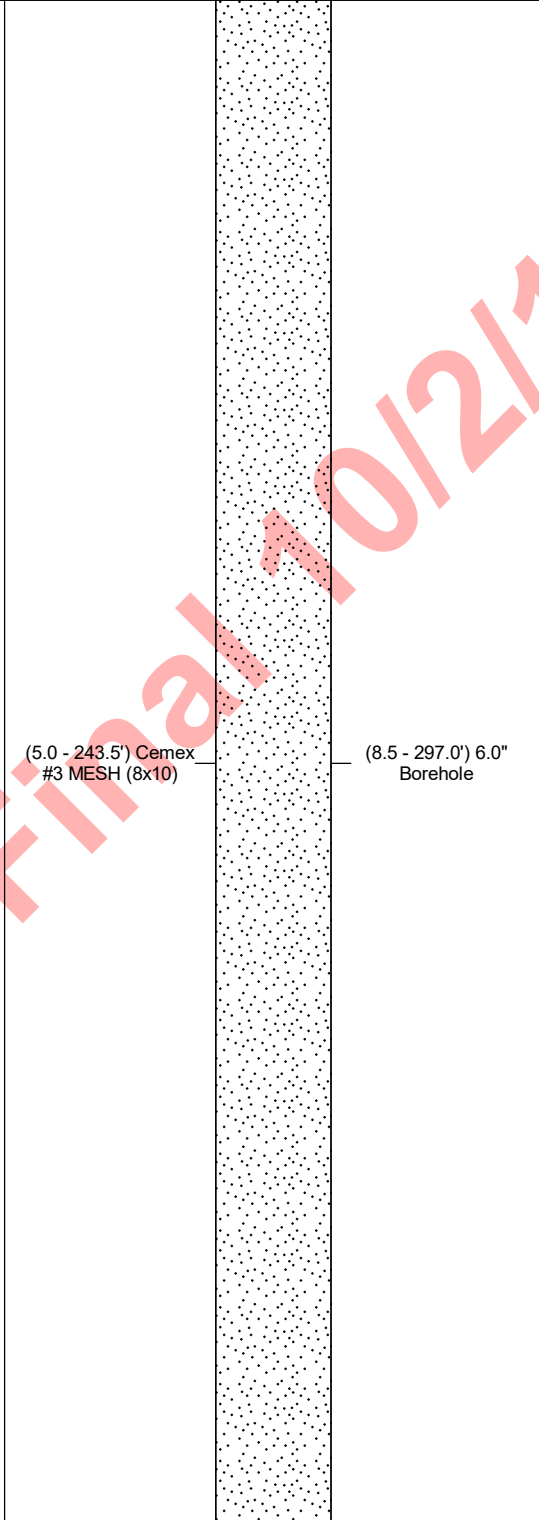






Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started:	06/28/2019	Surface Elevation:	480.9 ft amsl	Well ID: RB-2 Pilot
Date Completed:	07/29/2019	Northing (NAD83):	2103398.9	
Drilling Co.:	Cascade	Easting (NAD83):	7616014.8	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	307 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Tyler Alymer	Borehole Diameter:	4-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	J. Condelaria, G. Angiano	Depth to First Water:	23.77 ft bgs	
Logger:	Joe Latham	Editor:	Grant Willford	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction		Calculated Material Volumes	Material Volumes Installed
141	RB-2-VAS-142-147 (<0.17 U ppb) 7/9/2019 13:20	Topock - Alluvium Deposits	SM					
142								
143								
144		Topock - Alluvium Deposits	GM					
145								
146								
147		Topock - Alluvium Deposits	SM					
148								
149								
150		Topock - Alluvium Deposits	SM		(5.0 - 243.5') Cemex #3 MESH (8x10)	(8.5 - 297.0') 6.0" Borehole	(5.0 - 243.5') 97.7 bags	(5.0 - 243.5') 126 bags (29%) Note: Lapis Lustre Sand
151								
152								
153		Topock - Alluvium Deposits	GM					
154								
155								
156		Topock - Alluvium Deposits	GM					
157								
158								
159		Topock - Alluvium Deposits	GM					
160								
160		Topock - Alluvium	GC					

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started:	06/28/2019	Surface Elevation:	480.9 ft amsl	Well ID: RB-2 Pilot
Date Completed:	07/29/2019	Northing (NAD83):	2103398.9	
Drilling Co.:	Cascade	Easting (NAD83):	7616014.8	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	307 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Tyler Alymer	Borehole Diameter:	4-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	J. Condelaria, G. Angiano	Depth to First Water:	23.77 ft bgs	
Logger:	Joe Latham	Editor:	Grant Willford	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction		Calculated Material Volumes	Material Volumes Installed				
		Deposits										
161		Topock - Alluvium Deposits	GM									
162												
163		Topock - Alluvium Deposits	GM									
164												
165	RB-2-VAS-172-177 (<0.17 U ppb) 7/12/2019 14:55	Topock - Alluvium Deposits	SM									
166												
167		Topock - Alluvium Deposits	SM									
168												
169		Topock - Alluvium Deposits	SM									
170												
171		Topock - Alluvium Deposits	SM									
172												
173	RB-2-VAS-172-177 (<0.17 U ppb) 7/12/2019 14:55	Topock - Alluvium Deposits	SM									
174												
175		Topock - Alluvium Deposits	SM									
176												
177		Topock - Alluvium Deposits	SM									
178												
179		Topock - Alluvium Deposits	SM									
180												

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started:	06/28/2019	Surface Elevation:	480.9 ft amsl	Well ID: RB-2 Pilot
Date Completed:	07/29/2019	Northing (NAD83):	2103398.9	
Drilling Co.:	Cascade	Easting (NAD83):	7616014.8	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	307 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Tyler Alymer	Borehole Diameter:	4-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	J. Condelaria, G. Angiano	Depth to First Water:	23.77 ft bgs	
Logger:	Joe Latham	Editor:	Grant Willford	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
181		Topock - Alluvium Deposits	SM				
182							
183							
184		Topock - Alluvium Deposits	SW				
185							
186							
187							
188		Topock - Alluvium Deposits	GW-GM				
189		Topock - Alluvium Deposits	SM				
190					(5.0 - 243.5') Cemex #3 MESH (8x10)		
191		Topock - Alluvium Deposits	GM			(8.5 - 297.0') 6.0" Borehole	
192						(5.0 - 243.5') 97.7 bags	(5.0 - 243.5') 126 bags (29%) Note: Lapis Lustre Sand
193							
194		Topock - Alluvium Deposits	SW-SM				
195							
196							
197							
198		Topock - Alluvium Deposits	SM				
199							
200			ML				




Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started:	06/28/2019	Surface Elevation:	480.9 ft amsl	Well ID: RB-2 Pilot
Date Completed:	07/29/2019	Northing (NAD83):	2103398.9	
Drilling Co.:	Cascade	Easting (NAD83):	7616014.8	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	307 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Tyler Alymer	Borehole Diameter:	4-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	J. Condelaria, G. Angiano	Depth to First Water:	23.77 ft bgs	
Logger:	Joe Latham	Editor:	Grant Willford	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction		Calculated Material Volumes	Material Volumes Installed
201	RB-2-VAS-202-207 (<0.17 U ppb) 7/14/2019 09:20	Topock - Alluvium Deposits	ML					
202								
203		Topock - Alluvium Deposits	SM					
204		Topock - Alluvium Deposits	SM					
205		Topock - Alluvium Deposits	ML					
206		Topock - Alluvium Deposits	SM		(5.0 - 243.5') Cemex #3 MESH (8x10)	(8.5 - 297.0') 6.0" Borehole	(5.0 - 243.5') 97.7 bags	(5.0 - 243.5') 126 bags (29%) Note: Lapis Lustre Sand
207								
208								
209								
210								
211								
212		Topock - Alluvium Deposits	SC					
213								
214								
215								
216								
217								
218		Topock - Alluvium Deposits	SC					
219								
220			GC					





Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started:	06/28/2019	Surface Elevation:	480.9 ft amsl	Well ID: RB-2 Pilot
Date Completed:	07/29/2019	Northing (NAD83):	2103398.9	
Drilling Co.:	Cascade	Easting (NAD83):	7616014.8	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	307 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Tyler Alymer	Borehole Diameter:	4-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	J. Condalaria, G. Angiano	Depth to First Water:	23.77 ft bgs	
Logger:	Joe Latham	Editor:	Grant Willford	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction		Calculated Material Volumes	Material Volumes Installed
221		Topock - Alluvium Deposits	GC					
222								
223								
224								
225								
226								
227								
228								
229								
230		Topock - Alluvium Deposits	SC		(5.0 - 243.5') Cemex #3 MESH (8x10)	(8.5 - 297.0') 6.0" Borehole	(5.0 - 243.5') 97.7 bags	(5.0 - 243.5') 126 bags (29%) Note: Lapis Lustre Sand
231								
232								
233								
234								
235								
236								
237								
238	RB-2-VAS-237-242 (<0.17 U ppb) 7/15/2019 13:48	Topock - Alluvium Deposits	GC					
239								
240								

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started:	06/28/2019	Surface Elevation:	480.9 ft amsl	Well ID: RB-2 Pilot
Date Completed:	07/29/2019	Northing (NAD83):	2103398.9	
Drilling Co.:	Cascade	Easting (NAD83):	7616014.8	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	307 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Tyler Alymer	Borehole Diameter:	4-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	J. Condelaria, G. Angiano	Depth to First Water:	23.77 ft bgs	
Logger:	Joe Latham	Editor:	Grant Willford	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
241	RB-2-VAS-237-242 (<0.17 U ppb) 7/15/2019 13:48	Topock - Alluvium Deposits	GC		(5.0 - 243.5') Cemex #3 MESH (8x10)	(5.0 - 243.5') 97.7 bags	(5.0 - 243.5') 126 bags (29%) Note: Lapis Lustre Sand
242		Topock - Weathered Bedrock - conglomerate	CL				
243							
244		Topock - Weathered Bedrock - conglomerate	SC		(243.5 - 254.0') Cemex #1/20 MESH (20x40)	(243.5 - 254.0') 4.1 bags	(243.5 - 254.0') 8 bags (95%) Note: Lapis Lustre Sand
245							
246							
247							
248							
249							
250							
251							
252							
253							
254		Topock - Weathered Bedrock - conglomerate	CL				
255							
256							
257							
258							
259							
260							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started:	06/28/2019	Surface Elevation:	480.9 ft amsl	Well ID: RB-2 Pilot
Date Completed:	07/29/2019	Northing (NAD83):	2103398.9	
Drilling Co.:	Cascade	Easting (NAD83):	7616014.8	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	307 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Tyler Alymer	Borehole Diameter:	4-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	J. Condelaria, G. Angiano	Depth to First Water:	23.77 ft bgs	
Logger:	Joe Latham	Editor:	Grant Willford	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
261							
262							
263							
264							
265							
266							
267		Topock - Weathered Bedrock - conglomerate	CL				
268							
269							
270					(254.0 - 307.0') Bentonite seal chips	(8.5 - 297.0') 6.0" Borehole	(254.0 - 307.0') 12.9 bags
271							(254.0 - 307.0') 18.5 bags (43%) Note: Puregold Medium Chips
272							
273							
274							
275		Topock - Weathered Bedrock - conglomerate	SC				
276	RB-2-VAS-274-279 (<0.17 U ppb) 7/18/2019 09:17						
277		Topock - Weathered Bedrock - conglomerate	CL				
278							
279		Topock - Weathered Bedrock - conglomerate	CL				
280							



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Date Started:	06/28/2019	Surface Elevation:	480.9 ft amsl	Well ID: RB-2 Pilot
Date Completed:	07/29/2019	Northing (NAD83):	2103398.9	
Drilling Co.:	Cascade	Easting (NAD83):	7616014.8	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	307 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Tyler Alymer	Borehole Diameter:	4-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	J. Condelaria, G. Angiano	Depth to First Water:	23.77 ft bgs	
Logger:	Joe Latham	Editor:	Grant Willford	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
281							
282		Topock - Weathered Bedrock - conglomerate	CL				
283							
284							
285							
286							
287							
288							
289	RB-2-VAS-287-292 (<0.17 U ppb) 7/26/2019 11:56	Topock - Weathered Bedrock - conglomerate	CL		(8.5 - 297.0') 6.0" Borehole		
290					(254.0 - 307.0') Bentonite seal chips	(254.0 - 307.0') 12.9 bags	(254.0 - 307.0') 18.5 bags (43%) Note: Puregold Medium Chips
291							
292							
293							
294							
295							
296							
297		Topock - Competent Bedrock - conglomerate					
298							
299					(297.0 - 307.0') 4" Borehole		
300							

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Date Started:	06/28/2019	Surface Elevation:	480.9 ft amsl	Well ID: RB-2 Pilot
Date Completed:	07/29/2019	Northing (NAD83):	2103398.9	
Drilling Co.:	Cascade	Easting (NAD83):	7616014.8	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	307 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Tyler Alymer	Borehole Diameter:	4-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	J. Condellaria, G. Angiano	Depth to First Water:	23.77 ft bgs	
Logger:	Joe Latham	Editor:	Grant Willford	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction		Calculated Material Volumes	Material Volumes Installed
301		Topock - Competent Bedrock - conglomerate			(254.0 - 307.0') Bentonite seal chips		(254.0 - 307.0') 12.9 bags	(254.0 - 307.0') 18.5 bags (43%) Note: Puregold Medium Chips
302								
303								
304								
305								
306								
307								
308								
309								
310								
311								
312								
313								
314								
315								
316								
317								
318								
319								
320								

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Boring Log

Date Started:	06/28/2019	Surface Elevation:	N/A	Boring No.: RB-2 Pilot	
Date Completed:	07/29/2019	Northing (NAD83):	N/A		
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	307 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Borat Longyear Track Mount	Borehole Diameter:	4-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Tyler Alymer	Depth to First Water:	23.77 ft bgs		
Drilling Asst:	J. Condelaria, G. Angiano	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	Joe Latham	Sampling Interval:	Continuous		
Editor:	N/A	Converted to Well:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
1				Topock - Fill	SP		(0.0 - 3.0') Topock - Fill; Poorly graded sand (SP); brown (10YR 4/3); fine grained to medium grained, subround; dry; no odor; no staining	(0.0 - 7.0') Soft drilling	2 gallons used; 0 gallons recovered; 2 gallons lost
2									
3									
4	36						(3.0 - 7.0') No recovery (NR)	(3.0 - 7.0') Lost recovery due to soft dredge sands	
5					NR				
6									
7									
8				Topock - Fill	SP		(7.0 - 11.0') Topock - Fill; Poorly graded sand (SP); brown (7.5YR 4/3); fine grained to medium grained, subangular to subround; dry; no odor; no staining	(7.0 - 17.0') Heaving sands. No recovery 11 to 17 ft bgs due to loose dredge sands	1 gallons used; 0 gallons recovered; 1 gallons lost
9									
10									
11									
12	48						(11.0 - 17.0') No recovery (NR)		
13									
14					NR				
15									
16									
17									
18	36			Topock - Fill	SP		(17.0 - 18.5') Topock - Fill; Poorly graded sand (SP); brown (10YR 4/3); fine grained to medium grained, subangular to subround; dry; no odor; no staining	(17.0 - 27.0') Heaving sands. No recovery 20 to 27 ft bgs due to loose dredge sands	
19				Topock - Fluvial Deposits	SP		(18.5 - 20.0') Topock - Fluvial Deposits; Poorly graded sand (SP); light yellowish brown (10YR 6/4); very fine grained to fine grained, round; trace silt; dry; no odor; no staining		
20									








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Date Started:	06/28/2019	Surface Elevation:	N/A	Boring No.: RB-2 Pilot
Date Completed:	07/29/2019	Northing (NAD83):	N/A	
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	307 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Borat Longyear Track Mount	Borehole Diameter:	4-12 inches	Location: PG&E Topock, Needles, California
Driller Name:	Tyler Alymer	Depth to First Water:	23.77 ft bgs	
Drilling Asst:	J. Condelaria, G. Angiano	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger:	Joe Latham	Sampling Interval:	Continuous	
Editor:	N/A	Converted to Well:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
21	36				NR		(20.0 - 27.0') No recovery (NR)	(17.0 - 27.0') Heaving sands. No recovery 20 to 27 ft bgs due to loose dredge sands	
22									
23									
24									
25									
26	48	RB-2-SS-27-31 7/15/2019 09:31		Topock - Fluvial Deposits	SP		(27.0 - 31.5') Topock - Fluvial Deposits; Poorly graded sand (SP); light yellowish brown (10YR 6/4); very fine grained to fine grained, subangular to round; trace silt; moist; no odor; no staining	(27.0 - 37.0') Heaving sands. No recovery 31.5 to 37 ft bgs due to loose dredge sands	2 gallons used; 0 gallons recovered; 2 gallons lost
27									
28									
29									
30									
31									
32							(31.5 - 37.0') No recovery (NR)		
33									
34									
35									
36	60	RB-2-SS-37-42 7/15/2019 09:46	RB-2-VAS-36.5-41.5 (<0.033 U ppb) 6/29/2019 11:43	Topock - Fluvial Deposits	SP-SM		(37.0 - 38.0') Topock - Fluvial Deposits; Poorly graded sand with silt (SP-SM); brown (10YR 5/3); fine grained, subangular to round; little silt; moist; no odor; no staining		
37				Topock - Fluvial Deposits	SM		(38.0 - 39.0') Topock - Fluvial Deposits; Silty sand (SM); brown (10YR 5/3); very fine grained to fine grained, round; little silt; moist; no odor; no staining		
38				Topock - Fluvial Deposits	GW-GM		(39.0 - 42.0') Topock - Fluvial Deposits; Well graded gravel with silt and sand (GW-GM); grayish brown (10YR 5/2); granules to very large pebbles, subangular to subround; some very fine		
39									
40									

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Date Started:	06/28/2019	Surface Elevation:	N/A	Boring No.: RB-2 Pilot
Date Completed:	07/29/2019	Northing (NAD83):	N/A	
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	307 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Borat Longyear Track Mount	Borehole Diameter:	4-12 inches	Location: PG&E Topock, Needles, California
Driller Name:	Tyler Alymer	Depth to First Water:	23.77 ft bgs	
Drilling Asst:	J. Condelaria, G. Angiano	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger:	Joe Latham	Sampling Interval:	Continuous	
Editor:	N/A	Converted to Well:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
41	60	RB-2-SS-37-42 7/15/2019 09:46		Topock - Fluvial Deposits	GW-GM		grained to very coarse grained sand; little; little silt; trace caliche; trace coarser clast consists of metidirite and quartz; wet; no odor; no staining		
42									
43				Topock - Fluvial Deposits	SM		(42.0 - 45.0') Topock - Fluvial Deposits; Silty sand (SM); dark yellowish brown (10YR 4/4); very fine grained, round; little silt; trace clay; wet; no odor; no staining		
44									
45		RB-2-SS-42-47 7/15/2019 10:06							
46				Topock - Fluvial Deposits	GW-GM		(45.0 - 48.0') Topock - Fluvial Deposits; Well graded gravel with silt and sand (GW-GM); dark gray (10YR 4/1); granules to very large pebbles, round; little very fine grained to very coarse grained sand; little silt; trace; trace clay; little caliche; little coarser clast consists of metidirite and quartz; wet; no odor; no staining		
47									
48		RB-2-SS-47-50 7/15/2019 10:00							
49	180			Topock - Alluvium Deposits	GM		(48.0 - 54.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); reddish brown (5YR 5/4); small pebbles to very large pebbles, angular to subangular; some very fine grained to very coarse grained sand; little silt; trace clay; some coarser clasts composed of metadiorite; wet; no odor; no staining		
50									
51									
52		RB-2-SS-50-55 7/15/2019 10:10							
53				Topock - Alluvium Deposits	GM		(54.0 - 55.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); reddish brown (5YR 5/4); small pebbles to very large pebbles, angular to subangular; some very fine grained to very coarse grained sand; some clay; little silt; some coarser clasts composed of metadiorite; moist; no odor; no staining		
54									
55				Topock - Alluvium Deposits	SM		(55.0 - 59.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (5YR 5/4); fine grained to medium grained, subangular; some granules to medium pebbles; little silt; trace clay; little coarser clasts composed of metadiorite; little coarser clast composed of quartz; moist; no odor; no staining		
56									
57		RB-2-SS-55-60 7/15/2019 10:15							
58	120			Topock - Alluvium Deposits	SC		(59.0 - 60.0') Topock - Alluvium Deposits; Clayey sand with gravel (SC); reddish brown (5YR 5/4); fine grained to coarse grained, angular to subangular; little granules to large pebbles, angular to		
59									
60									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion

Date Started:	06/28/2019	Surface Elevation:	N/A	Boring No.: RB-2 Pilot
Date Completed:	07/29/2019	Northing (NAD83):	N/A	
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	307 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Borat Longyear Track Mount	Borehole Diameter:	4-12 inches	Location: PG&E Topock, Needles, California
Driller Name:	Tyler Alymer	Depth to First Water:	23.77 ft bgs	
Drilling Asst:	J. Condelaria, G. Angiano	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger:	Joe Latham	Sampling Interval:	Continuous	
Editor:	N/A	Converted to Well:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid	
61	120	RB-2-SS-60-65 7/15/2019 10:20		Topock - Alluvium Deposits	GM		subangular; little clay; trace silt; little coarser clasts composed of metadiorite; little granite; moist; no odor; no staining			
62							(60.0 - 67.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); reddish brown (5YR 5/4); granules to large pebbles, angular to subangular; some very fine grained to very coarse grained sand; little silt; trace coarser clasts composed of metadiorite; moist; no odor; no staining			
63										
64										
65										
66	120	RB-2-SS-65-70 7/15/2019 10:25		Topock - Alluvium Deposits	GW		(67.0 - 74.0') Topock - Alluvium Deposits; Well graded gravel (GW); reddish gray / pale brown(5YR 5/2); granules to small cobbles, angular to subangular; and medium to very coarse grained sand, angular to subangular; trace; trace silt; some coarser clasts composed of metadiorite, quartz, granite, and basalt; wet; no odor; no staining			
67										
68										
69										
70										
71		RB-2-SS-70-75 7/15/2019 11:38			Topock - Alluvium Deposits	GC		(74.0 - 75.0') Topock - Alluvium Deposits; Clayey gravel with sand (GC); dark reddish gray (5YR 4/2); granules to medium pebbles, subangular; some very fine grained to very coarse grained sand; little clay; trace silt; some coarser clasts composed of metadiorite; moist; no odor; no staining		
72										
73										
74										
75										
76	RB-2-SS-75-80 7/15/2019 12:14			Topock - Alluvium Deposits	SW		(75.0 - 77.0') Topock - Alluvium Deposits; Well graded sand with gravel (SW); reddish brown / moderate brown(5YR 4/4); medium grained to very coarse grained, angular to subround; some granules to medium pebbles, angular; trace silt; and coarser clasts composed of metadiorite; wet; no odor; no staining			
77										
78										
79										
80										









Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion

Date Started:	06/28/2019	Surface Elevation:	N/A	Boring No.: RB-2 Pilot
Date Completed:	07/29/2019	Northing (NAD83):	N/A	
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	307 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Borat Longyear Track Mount	Borehole Diameter:	4-12 inches	Location: PG&E Topock, Needles, California
Driller Name:	Tyler Alymer	Depth to First Water:	23.77 ft bgs	
Drilling Asst:	J. Condalaria, G. Angiano	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger:	Joe Latham	Sampling Interval:	Continuous	
Editor:	N/A	Converted to Well:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
81				Topock - Alluvium Deposits	SW-SM				
82		RB-2-SS-80-85					(81.5 - 86.5') Topock - Alluvium Deposits; Silt with gravel (ML); low plasticity; some granules to large pebbles, angular to subangular; little very fine grained to very coarse grained sand; little clay; little coarser clasts composed of metadiorite; wet; no odor; no staining		
83	120	7/15/2019 12:21		Topock - Alluvium Deposits	ML				
84									
85									
86									
87		RB-2-SS-85-90		Topock - Alluvium Deposits	GC		(86.5 - 90.0') Topock - Alluvium Deposits; Clayey gravel (GC); yellowish red / light brown(5YR 5/6); granules to large pebbles, angular to subangular; some clay; little silt; trace fine to coarse grained sand, subangular to subround; some coarser clasts composed of metadiorite; wet; no odor; no staining		
88		7/15/2019 14:00							
89									
90									
91				Topock - Alluvium Deposits	GC		(90.0 - 93.0') Topock - Alluvium Deposits; Clayey gravel (GC); brown (7.5YR 5/4); granules to very large pebbles, angular to subangular; some clay; trace very fine grained to very coarse grained sand; trace silt; some coarser clasts composed of metadiorite; trace granite; moist; no odor; no staining	(90.0 - 103.0') Rough drilling	
92	120	RB-2-SS-90-95							
93		7/16/2019 08:04		Topock - Alluvium Deposits	GM		(93.0 - 96.5') Topock - Alluvium Deposits; Silty gravel (GM); strong brown (7.5YR 5/6); granules to very large pebbles, angular to subangular; little silt; trace very fine grained to very coarse grained sand; trace clay; and coarser clasts composed of metadiorite; dry; no odor; no staining		
94									
95									
96									
97		RB-2-SS-95-100		Topock - Alluvium Deposits	GM		(96.5 - 99.0') Topock - Alluvium Deposits; Silty gravel (GM); strong brown (7.5YR 5/6); granules to very large pebbles, angular to subangular; some silt; little clay; trace very fine grained to very coarse grained sand; some coarser clasts composed of metadiorite; moist; no odor; no staining		
98	120	7/16/2019 08:12							
99									
100				Topock - Alluvium Deposits	GC		(99.0 - 104.0') Topock - Alluvium Deposits; Clayey gravel (GC); yellowish red / light brown(5YR 5/6); granules to very large pebbles, angular to subangular; some clay; little silt; trace very		




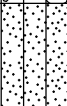
Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion

Date Started:	06/28/2019	Surface Elevation:	N/A	Boring No.: RB-2 Pilot
Date Completed:	07/29/2019	Northing (NAD83):	N/A	
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	307 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Borat Longyear Track Mount	Borehole Diameter:	4-12 inches	Location: PG&E Topock, Needles, California
Driller Name:	Tyler Alymer	Depth to First Water:	23.77 ft bgs	
Drilling Asst:	J. Condelaria, G. Angiano	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger:	Joe Latham	Sampling Interval:	Continuous	
Editor:	N/A	Converted to Well:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
101	120	RB-2-SS-100-105 7/16/2019 08:20		Topock - Alluvium Deposits	GC		fine grained to very coarse grained sand; some coarser clasts composed of metadiorite; moist; no odor; no staining	(90.0 - 103.0') Rough drilling	
102									
103									
104		RB-2-VAS-102-107 (<0.033 U ppb) 7/1/2019 15:21		Topock - Alluvium Deposits	GM		(104.0 - 107.0') Topock - Alluvium Deposits; Silty gravel (GM); yellowish red / light brown(5YR 5/6); granules to medium pebbles, angular to subangular; some silt; little clay; little coarser clasts composed of metadiorite; wet; no odor; no staining		
105									
106		RB-2-SS-105-110 7/16/2019 08:33		Topock - Alluvium Deposits	GC		(107.0 - 109.0') Topock - Alluvium Deposits; Clayey gravel with sand (GC); yellowish red / light brown(5YR 5/6); granules to medium pebbles, angular to subangular; little very fine grained to very coarse grained sand; little silt; little clay; little coarser clasts composed of metadiorite; moist; no odor; no staining	(110.0 - 125.0') Rough drilling	
107									
108				Topock - Alluvium Deposits	GM		(109.0 - 111.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); yellowish brown (10YR 5/6); granules to large pebbles, subangular; some silt; little very fine grained to very coarse grained sand; little clay; little coarser clasts composed of metadiorite; moist; no odor; no staining		
109									
110	120	RB-2-SS-110-115 7/16/2019 08:40		Topock - Alluvium Deposits	GM		(111.0 - 112.0') Topock - Alluvium Deposits; Silty gravel (GM); yellowish brown (10YR 5/6); granules to large pebbles, angular to subangular; little very fine grained to very coarse grained sand; little silt; little clay; little coarser clasts composed of metadiorite; moist; no odor; no staining		
111									
112					Topock - Alluvium Deposits	GM		(112.0 - 114.0') Topock - Alluvium Deposits; Silty gravel (GM); strong brown (7.5YR 5/6); granules to large pebbles, angular to subangular; some silt; little very fine grained to very coarse grained sand; trace clay; trace caliche; some coarser clasts composed of metadiorite; moist; no odor; no staining	
113									
114		RB-2-SS-115-120 7/16/2019 08:51		Topock - Alluvium Deposits	GM		(114.0 - 119.5') Topock - Alluvium Deposits; Silty gravel with sand (GM); yellowish brown (10YR 5/6); granules to small pebbles, subangular; some silt; little granules to small pebbles, subangular; trace clay; trace coarser clasts composed of metadiorite; moist; no odor; no staining		
115									
116									
117	120						(119.5'); less silt, more clay		
118									
119									
120									

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Date Started:	06/28/2019	Surface Elevation:	N/A	Boring No.: RB-2 Pilot	
Date Completed:	07/29/2019	Northing (NAD83):	N/A		
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	307 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Borat Longyear Track Mount	Borehole Diameter:	4-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Tyler Alymer	Depth to First Water:	23.77 ft bgs		
Drilling Asst:	J. Condelaria, G. Angiano	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	Joe Latham	Sampling Interval:	Continuous		
Editor:	N/A	Converted to Well:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
121	120	RB-2-SS-120-125 7/16/2019 09:00		Topock - Alluvium Deposits	GM		(121.0 - 127.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); yellowish brown (10YR 5/6); granules to small pebbles, subangular; some silt; little granules to small pebbles, subangular; trace clay; trace coarser clasts composed of metadiorite; moist; no odor; no staining	(110.0 - 125.0') Rough drilling	
122									
123									
124									
125	120	RB-2-SS-125-129 7/16/2019 09:09		Topock - Alluvium Deposits	ML		(127.0 - 131.5') Topock - Alluvium Deposits; Gravelly silt with sand (ML); brown (7.5YR 5/4); low plasticity; some granules to small pebbles, angular to subangular; little very fine grained to very coarse grained sand; little clay; little coarser clasts composed of metadiorite; wet; no odor; no staining		
126									
127									
128									
129	120	RB-2-SS-129-134 7/16/2019 09:22		Topock - Alluvium Deposits	GM		(131.5 - 137.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); yellowish brown (10YR 5/6); granules to very large pebbles, subangular; some silt; little very fine grained to very coarse grained sand; trace clay; trace coarser clasts composed of metadiorite; moist; no odor; no staining		
130									
131									
132									
133	120	RB-2-SS-134-139 7/16/2019 10:36		Topock - Alluvium Deposits	SM		(137.0 - 142.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); dark yellowish brown (10YR 4/6); very fine grained to very coarse grained, angular to subround; some granules to large pebbles, angular; some silt; some coarser clasts composed of metadiorite; moist; no odor; no staining		
134									
135									
136									
137	120	RB-2-SS-139-144 7/16/2019		Topock - Alluvium Deposits					
138									
139									
140									

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SOIL BORING LOG PG&E TOPOCK C:\USERS\MCGRANE\DOCUMENTS\PG&E TOPOCK\DATABASE FOR PLOG.GPJ TOPOCK DATA TEMPLATE FOR PLOG.GPJ 09/09/19 18:07

Date Started:	06/28/2019	Surface Elevation:	N/A	Boring No.: RB-2 Pilot
Date Completed:	07/29/2019	Northing (NAD83):	N/A	
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	307 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Borat Longyear Track Mount	Borehole Diameter:	4-12 inches	Location: PG&E Topock, Needles, California
Driller Name:	Tyler Alymer	Depth to First Water:	23.77 ft bgs	
Drilling Asst:	J. Condelaria, G. Angiano	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger:	Joe Latham	Sampling Interval:	Continuous	
Editor:	N/A	Converted to Well:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
141	120	10:45		Topock - Alluvium Deposits	SM				
142		RB-2-SS-139-144 7/16/2019 10:45					(142.0 - 145.5') Topock - Alluvium Deposits; Silty gravel with sand (GM); strong brown (7.5YR 5/6); granules to very large pebbles, angular; little silt; trace; some coarser clasts composed of metadiorite; moist; no odor; no staining		
143									
144	120		RB-2-VAS-142-147 (<0.17 U ppb) 7/9/2019 13:20	Topock - Alluvium Deposits	GM				
145									
146		RB-2-SS-144-149 7/16/2019 10:56		Topock - Alluvium Deposits	SM		(145.5 - 147.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); strong brown (7.5YR 5/6); very fine grained to very coarse grained, subangular to subround; some granules to large pebbles, angular to subangular; little coarser clasts composed of metadiorite; trace granite; moist; no odor; no staining		
147	120								
148				Topock - Alluvium Deposits	SM		(147.0 - 149.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown / moderate brown (5YR 4/4); very fine grained to coarse grained, subangular to subround; little granules to medium pebbles, angular; little silt; trace coarser clasts composed of metadiorite; little granite; wet; no odor; no staining		
149									
150	120	RB-2-SS-149-154 7/16/2019 11:06		Topock - Alluvium Deposits	SM		(149.0 - 153.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); yellowish brown (10YR 5/6); medium grained to very coarse grained, angular to subround; little granules to very large pebbles, subangular; little silt; trace coarser clasts composed of metadiorite; trace granite; wet; no odor; no staining		
151									
152									
153	120								
154		RB-2-SS-154-157 7/16/2019 11:14		Topock - Alluvium Deposits	GM		(153.0 - 156.5') Topock - Alluvium Deposits; Silty gravel with sand (GM); strong brown (7.5YR 5/6); granules to very large pebbles, angular to subangular; some medium to very coarse grained sand, subangular to subround; little silt; trace coarser clasts composed of metadiorite; wet; no odor; no staining		
155									
156	120								
157									
158		RB-2-SS-157-162 7/16/2019 11:20		Topock - Alluvium Deposits	GM		(156.5 - 159.5') Topock - Alluvium Deposits; Silty gravel (GM); strong brown (7.5YR 5/6); granules to very large pebbles, angular to subangular; some silt; little very fine to very coarse grained sand, subangular to subround; trace clay; some coarser clasts composed of metadiorite; wet; no odor; no staining		
159	120								
160				Topock - Alluvium	GC		(159.5 - 160.0') Topock - Alluvium Deposits; Clayey gravel (GC);		

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Date Started:	06/28/2019	Surface Elevation:	N/A	Boring No.: RB-2 Pilot
Date Completed:	07/29/2019	Northing (NAD83):	N/A	
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	307 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Borat Longyear Track Mount	Borehole Diameter:	4-12 inches	Location: PG&E Topock, Needles, California
Driller Name:	Tyler Alymer	Depth to First Water:	23.77 ft bgs	
Drilling Asst:	J. Condelaria, G. Angiano	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger:	Joe Latham	Sampling Interval:	Continuous	
Editor:	N/A	Converted to Well:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
161	120	RB-2-SS-157-162 7/16/2019 11:20		Deposits			yellowish brown (10YR 5/6); granules to very large pebbles, angular to subangular; some clay; little very fine to very coarse grained sand, subangular to subround; little silt; little coarser clasts composed of metadiorite; moist; no odor; no staining		
162				Topock - Alluvium Deposits	GM		(160.0 - 163.0') Topock - Alluvium Deposits; Silty gravel (GM); strong brown (7.5YR 5/6); granules to very large pebbles, angular to subangular; some silt; little very fine to very coarse grained sand, subangular to subround; trace clay; some coarser clasts composed of metadiorite; wet; no odor; no staining; 0.3' lense of grayish green color change from 160.5' to 160.8' bgs		
163		RB-2-SS-162-165 7/16/2019 11:58					(163.0 - 167.0') Topock - Alluvium Deposits; Silty gravel (GM); reddish yellow (7.5YR 6/8); granules to very large pebbles, angular to subangular; and silt; little very fine to very coarse grained sand, subangular to subround; trace clay; some coarser clasts composed of metadiorite; moist; no odor; no staining		
164				Topock - Alluvium Deposits	GM				
165	120								
166									
167		RB-2-SS-165-170 7/16/2019 12:07		Topock - Alluvium Deposits	SM		(167.0 - 171.0') Topock - Alluvium Deposits; Silty sand (SM); reddish brown / moderate brown(5YR 4/4); very fine grained to fine grained, subangular to subround; and silt; little granules to medium pebbles, subangular; trace clay; little coarser clasts composed of metadiorite; wet; no odor; no staining	(167.0 - 177.0') Rough drilling	
168							(170') moist; 0.2' lense of color change - grayish green from 170 to 170.2' bgs		
169									
170		RB-2-SS-170-172 7/16/2019 12:18		Topock - Alluvium Deposits	SM		(171.0 - 172.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown / moderate brown(5YR 4/4); very fine grained to coarse grained, angular; little granules to medium pebbles, angular; little silt; little coarser clasts composed of metadiorite; wet; no odor; no staining		
171	120								
172		RB-2-SS-172-177 7/16/2019 12:29	RB-2-VAS-172-177 (<0.17 U ppb) 7/12/2019 14:55	Topock - Alluvium Deposits	SM		(172.5 - 177.0') Topock - Alluvium Deposits; Silty sand (SM); reddish brown / moderate brown(5YR 4/4); very fine grained to fine grained, subangular to subround; and silt; little granules to medium pebbles, subangular; trace clay; little coarser clasts composed of metadiorite; moist; no odor; no staining; 0.2' lense of grayish green color change from 175.5 to 175.7' bgs		
173									
174									
175									
176									
177	120			Topock - Alluvium Deposits	SM		(177.0 - 178.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (5YR 5/4); very fine grained to coarse grained, angular; and silt; little granules to medium pebbles, angular to subangular; trace clay; little coarser clasts composed of metadiorite; wet; no odor; no staining		
178		RB-2-SS-177-180 7/17/2019 07:59		Topock - Alluvium Deposits	SM		(178.0 - 179.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown / moderate brown(5YR 4/4); very fine grained to coarse grained, angular; little granules to medium pebbles, angular; little silt; little coarser clasts composed of metadiorite; wet; no odor; no staining		
179				Topock - Alluvium Deposits	SM				
180									

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Date Started:	06/28/2019	Surface Elevation:	N/A	Boring No.: RB-2 Pilot
Date Completed:	07/29/2019	Northing (NAD83):	N/A	
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	307 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Borat Longyear Track Mount	Borehole Diameter:	4-12 inches	Location: PG&E Topock, Needles, California
Driller Name:	Tyler Alymer	Depth to First Water:	23.77 ft bgs	
Drilling Asst:	J. Condelaria, G. Angiano	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger:	Joe Latham	Sampling Interval:	Continuous	
Editor:	N/A	Converted to Well:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
181	120	RB-2-SS-180-182 7/17/2019 08:08		Topock - Alluvium Deposits	SM		(179.0 - 181.0') Topock - Alluvium Deposits; Silty sand (SM); reddish brown / moderate brown(5YR 4/4); very fine grained to fine grained, subangular to subround; and silt; little granules to medium pebbles, subangular; trace clay; little coarser clasts composed of metadiorite; wet; no odor; no staining		
182		RB-2-SS-182-187 7/17/2019 08:17		Topock - Alluvium Deposits	SW		(181.0 - 188.0') Topock - Alluvium Deposits; Well graded sand with gravel (SW); strong brown (7.5YR 5/6); very fine grained to very coarse grained, angular; some granules to large pebbles, angular; trace silt; some coarser clasts composed of metadiorite; wet; no odor; no staining		
183									
184									
185									
186	120	RB-2-SS-187-190 7/17/2019 08:25		Topock - Alluvium Deposits	GW-GM		(188.0 - 189.0') Topock - Alluvium Deposits; Well graded gravel with silt and sand (GW-GM); strong brown (7.5YR 5/6); granules to very large pebbles, angular; and very fine to very coarse grained sand, angular; trace clay; little coarser clasts composed of metadiorite; trace coarser clast composed of quartz; wet; no odor; no staining		
187				Topock - Alluvium Deposits	SM		(189.0 - 189.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); strong brown (7.5YR 5/6); very fine grained to very coarse grained, angular; some granules to large pebbles, angular; some silt; trace clay; little coarser clasts composed of metadiorite; trace coarser clast composed of quartz; wet; no odor; no staining		
188				Topock - Alluvium Deposits	GM		(189.5 - 192.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); strong brown (7.5YR 5/6); granules to very large pebbles, angular; some very fine to very coarse grained sand, angular; little silt; trace clay; little coarser clasts composed of metadiorite; trace coarser clast composed of quartz; wet; no odor; no staining		
189							(192.0 - 197.0') Topock - Alluvium Deposits; Well graded sand with silt and gravel (SW-SM); strong brown (7.5YR 5/6); very fine grained to very coarse grained, angular; some granules to very large pebbles, angular; little silt; trace clay; little coarser clasts composed of metadiorite; trace coarser clast composed of quartz; wet; no odor; green staining		
190	120	RB-2-SS-190-195 7/17/2019 08:33		Topock - Alluvium Deposits	SW-SM				
191									
192									
193									
194	120	RB-2-SS-195-198 7/17/2019 08:40		Topock - Alluvium Deposits	SM				
195									
196									
197									
198	120	RB-2-SS-198-203 7/17/2019 09:03		Topock - Alluvium Deposits	SM		(197.0 - 199.5') Topock - Alluvium Deposits; Silty sand (SM); strong brown (7.5YR 5/6); very fine grained to medium grained, angular; and silt; little granules to small pebbles, angular; trace clay; trace coarser clasts composed of metadiorite; moist; no odor; no staining		
199									
200									
					ML		(199.5 - 202.0') Topock - Alluvium Deposits; Gravelly silt with sand		


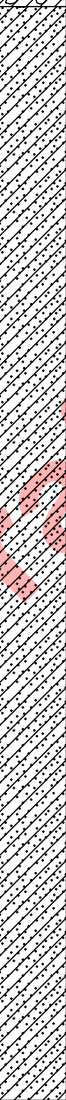
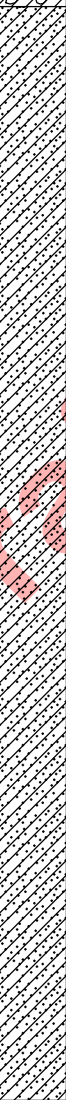


Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion

Date Started:	06/28/2019	Surface Elevation:	N/A	Boring No.: RB-2 Pilot
Date Completed:	07/29/2019	Northing (NAD83):	N/A	
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	307 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Borat Longyear Track Mount	Borehole Diameter:	4-12 inches	Location: PG&E Topock, Needles, California
Driller Name:	Tyler Alymer	Depth to First Water:	23.77 ft bgs	
Drilling Asst:	J. Condelaria, G. Angiano	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger:	Joe Latham	Sampling Interval:	Continuous	
Editor:	N/A	Converted to Well:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
201	120	RB-2-SS-198-203 7/17/2019 09:03	RB-2-VAS-202-207 (<0.17 U ppb) 7/14/2019 09:20	Topock - Alluvium Deposits	ML		(ML); strong brown (7.5YR 5/6); low plasticity; some granules to small pebbles, angular; little very fine to medium grained sand, angular; little clay; little coarser clasts composed of metadiorite; wet; no odor; no staining	(207.0') Switched driller T. Alymer with D. OMara	
202				Topock - Alluvium Deposits	SM		(202.0 - 204.0') Topock - Alluvium Deposits; Silty sand (SM); strong brown (7.5YR 5/6); very fine grained to medium grained, angular; and silt; little small to very large pebbles, angular; trace clay; trace coarser clasts composed of metadiorite; wet; no odor; no staining; green staining at 202.5' bgs		
203		RB-2-SS-203-207 7/17/2019 09:09		Topock - Alluvium Deposits	SM		(204.0 - 204.5') Topock - Alluvium Deposits; Silty sand (SM); strong brown (7.5YR 5/6); fine grained to coarse grained, angular; little granules to small pebbles, angular; little silt; trace clay; trace coarser clasts composed of metadiorite; wet; no odor; no staining		
204				Topock - Alluvium Deposits	ML				
205				Topock - Alluvium Deposits	SM		(204.5 - 205.0') Topock - Alluvium Deposits; Gravelly silt with sand (ML); strong brown (7.5YR 5/6); low plasticity; some small to very large pebbles, angular; little very fine to medium grained sand, angular; little clay; little coarser clasts composed of metadiorite; wet; no odor; no staining		
206				(205.0 - 207.5') Topock - Alluvium Deposits; Silty sand (SM); strong brown (7.5YR 5/6); very fine grained to medium grained, angular; and silt; little small to very large pebbles, angular; trace clay; trace coarser clasts composed of metadiorite; moist; no odor; no staining					
207	120	RB-2-SS-207-209 7/17/2019 09:15		Topock - Alluvium Deposits	SC		(207.5 - 217.0') Topock - Alluvium Deposits; Clayey sand with gravel (SC); brown (7.5YR 4/4); very fine grained to very coarse grained, angular to subround; some small to very large pebbles, angular; little clay; trace silt; little coarser clasts composed of metadiorite; moist; no odor; no staining		
208									
209									
210									
211									
212									
213									
214									
215									
216									
217									
218	180	RB-2-SS-217-222 7/17/2019 09:35					Topock - Alluvium Deposits		
219					GC		(219.5 - 222.0') Topock - Alluvium Deposits; Clayey gravel with		
220									





Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion

Date Started:	06/28/2019	Surface Elevation:	N/A	Boring No.: RB-2 Pilot
Date Completed:	07/29/2019	Northing (NAD83):	N/A	
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	307 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Borat Longyear Track Mount	Borehole Diameter:	4-12 inches	Location: PG&E Topock, Needles, California
Driller Name:	Tyler Alymer	Depth to First Water:	23.77 ft bgs	
Drilling Asst:	J. Condelaria, G. Angiano	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger:	Joe Latham	Sampling Interval:	Continuous	
Editor:	N/A	Converted to Well:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
221	180	RB-2-SS-217-222 7/17/2019 09:35		Topock - Alluvium Deposits	GC		sand (GC); strong brown (7.5YR 5/6); granules to very large pebbles, angular; some fine to very coarse grained sand, angular to subround; little clay; some coarser clasts composed of metadiorite; trace granite; wet; no odor; no staining		
222		RB-2-SS-222-227 7/17/2019 09:40		Topock - Alluvium Deposits	SC		(222.0 - 237.0') Topock - Alluvium Deposits; Clayey sand with gravel (SC); brown (7.5YR 5/4); very fine grained to very coarse grained, angular to subround; some small to very large pebbles, angular; little clay; trace silt; little coarser clasts composed of metadiorite; moist; no odor; no staining; greenish gray staining at 234' bgs	(227.0 - 244.0') Rough drilling	
223									
224									
225									
226									
227	60	RB-2-SS-227-233 7/17/2019 09:45		Topock - Alluvium Deposits	SC		(222.0 - 237.0') Topock - Alluvium Deposits; Clayey sand with gravel (SC); brown (7.5YR 5/4); very fine grained to very coarse grained, angular to subround; some small to very large pebbles, angular; little clay; trace silt; little coarser clasts composed of metadiorite; moist; no odor; no staining; greenish gray staining at 234' bgs	(227.0 - 244.0') Rough drilling	
228									
229									
230									
231									
232	84	RB-2-SS-233-235 7/17/2019 09:50		Topock - Alluvium Deposits	GC		(237.0 - 241.0') Topock - Alluvium Deposits; Clayey gravel with sand (GC); reddish brown / moderate brown(5YR 4/4); granules to small pebbles, angular; some fine to coarse grained sand, subangular to subround; some clay; trace silt; little coarser clasts composed of metadiorite; moist; no odor; no staining	(237.0') Switched driller D. OMara with S. Vasquez	
233									
234									
235									
236									
237	84	RB-2-SS-235-240 7/17/2019 10:30	RB-2-VAS-237-242 (<0.17 U ppb) 7/15/2019 13:38	Topock - Alluvium Deposits	GC		(237.0 - 241.0') Topock - Alluvium Deposits; Clayey gravel with sand (GC); reddish brown / moderate brown(5YR 4/4); granules to small pebbles, angular; some fine to coarse grained sand, subangular to subround; some clay; trace silt; little coarser clasts composed of metadiorite; moist; no odor; no staining	(237.0') Switched driller D. OMara with S. Vasquez	
238									
239									
240									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion

Date Started:	06/28/2019	Surface Elevation:	N/A	Boring No.: RB-2 Pilot
Date Completed:	07/29/2019	Northing (NAD83):	N/A	
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	307 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Borat Longyear Track Mount	Borehole Diameter:	4-12 inches	Location: PG&E Topock, Needles, California
Driller Name:	Tyler Alymer	Depth to First Water:	23.77 ft bgs	
Drilling Asst:	J. Condelaria, G. Angiano	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger:	Joe Latham	Sampling Interval:	Continuous	
Editor:	N/A	Converted to Well:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
241	84	RB-2-SS-240-245 7/17/2019 10:35	RB-2-VAS-237-242 (<0.17 U ppb) 7/15/2019 13:38	Topock - Alluvium Deposits	GC		(241.0 - 244.0') Topock - Weathered Bedrock - conglomerate; Sandy lean clay with gravel (CL); reddish brown (5YR 5/4); low plasticity; some granules to very large pebbles, angular; little fine to coarse grained sand, subangular to subround; little silt; little coarser clasts composed of metadiorite; dry; no odor; no staining	(227.0 - 244.0') Rough drilling	
242				Topock - Weathered Bedrock - conglomerate	CL				
243									
244	36			Topock - Weathered Bedrock - conglomerate	SC		(244.0 - 247.0') Topock - Weathered Bedrock - conglomerate; Clayey sand with gravel (SC); yellowish red / light brown(5YR 5/6); very fine grained to medium grained, subangular to subround; some granules to large pebbles, angular to subangular; little clay; trace silt; little coarser clasts composed of metadiorite; moist; no odor; no staining		
245									
246									
247	84	RB-2-SS-245-250 7/17/2019 10:40		Topock - Weathered Bedrock - conglomerate	CL		(247.0 - 252.0') Topock - Weathered Bedrock - conglomerate; Gravelly lean clay with sand (CL); reddish brown (2.5YR 4/4); low plasticity; some granules to medium pebbles, angular to subangular; little very fine to fine grained sand, subangular to subround; trace silt; little coarser clasts composed of metadiorite; trace coarser clasts composed of granite; moist; no odor; no staining		
248									
249									
250	84							(251.0 - 254.0') Rough drilling	
251									
252									
253	84	RB-2-SS-250-255 7/17/2019 10:45					(252.0 - 274.0') dark reddish brown (2.5YR 3/4); decrease in moisture content, white mottling		
254									
255									
256	84						(254') reddish brown (2.5YR 4/4); increase in moisture content		
257									
258									
259	84	RB-2-SS-255-260 7/17/2019 10:50					(257') dark reddish brown (2.5YR 3/4); decrease in moisture content		
260									





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Date Started:	06/28/2019	Surface Elevation:	N/A	Boring No.: RB-2 Pilot
Date Completed:	07/29/2019	Northing (NAD83):	N/A	
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	307 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Borat Longyear Track Mount	Borehole Diameter:	4-12 inches	Location: PG&E Topock, Needles, California
Driller Name:	Tyler Alymer	Depth to First Water:	23.77 ft bgs	
Drilling Asst:	J. Condelaria, G. Angiano	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger:	Joe Latham	Sampling Interval:	Continuous	
Editor:	N/A	Converted to Well:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
261	84								
262									
263		RB-2-SS-250-265 7/17/2019 10:55							
264	72						(264') reddish brown / moderate brown(5YR 4/4); decrease in moisture content		
265								(265.0 - 267.0') Rough drilling	
266									
267		RB-2-SS-265-270 7/17/2019 11:00							
268									
269								(269.0 - 274.0') Rough drilling	
270									
271	84								
272		RB-2-SS-270-275 7/17/2019 11:00							
273									
274									
275				Topock - Weathered Bedrock - conglomerate	SC		(274.0 - 277.0') Topock - Weathered Bedrock - conglomerate; Clayey sand with gravel (SC); brown (7.5YR 4/4); very fine grained to very coarse grained, subangular to subround; some medium to very large pebbles, angular; little clay; trace; trace silt; little coarser clasts composed of metadiorite; wet; no odor; no staining		
276		RB-2-VAS-274-279 (<0.17 U ppb) 7/18/2019 09:17							
277	108	RB-2-SS-275-280 7/17/2019 12:49		Topock - Weathered Bedrock - conglomerate	CL		(277.0 - 279.0') Topock - Weathered Bedrock - conglomerate; Sandy lean clay with gravel (CL); reddish brown / moderate brown(5YR 4/4); low plasticity; some very fine to medium grained sand, subangular to subround; little granules to very large pebbles, subangular; trace silt; little coarser clasts composed of metadiorite; moist; no odor; no staining		
278									
279				Topock - Weathered Bedrock -	CL		(279.0 - 285.0') Topock - Weathered Bedrock - conglomerate; Gravely lean clay with sand (CL); reddish brown / moderate brown(5YR 4/4); low plasticity; some granules to very large		
280									


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Date Started:	<u>06/28/2019</u>	Surface Elevation:	<u>N/A</u>	Boring No.: <u>RB-2 Pilot</u>
Date Completed:	<u>07/29/2019</u>	Northing (NAD83):	<u>N/A</u>	
Drilling Co.:	<u>Cascade</u>	Easting (NAD83):	<u>N/A</u>	Client: <u>PG&E</u>
Drilling Method:	<u>Sonic Drilling</u>	Total Depth:	<u>307 ft bgs</u>	Project: <u>Final GW Remedy Phase 1</u>
Drill Rig Type:	<u>Borat Longyear Track Mount</u>	Borehole Diameter:	<u>4-12 inches</u>	Location: <u>PG&E Topock, Needles, California</u>
Driller Name:	<u>Tyler Alymer</u>	Depth to First Water:	<u>23.77 ft bgs</u>	
Drilling Asst:	<u>J. Condelaria, G. Angiano</u>	Sampling Method:	<u>4 inch x 10 ft Core Barrel</u>	Project Number: <u>RC000753.0051</u>
Logger:	<u>Joe Latham</u>	Sampling Interval:	<u>Continuous</u>	
Editor:	<u>N/A</u>	Converted to Well:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
281	108	RB-2-SS-280-283 7/17/2019 12:56		conglomerate	CL		pebbles, angular to subangular; little very fine to medium grained sand, subangular to subround; trace; trace silt; little coarser clasts composed of metadiorite; trace mica; moist; no odor; no staining; some white and dark brown mottling		
282									
283									
284	120	RB-2-SS-283-288 7/18/2019 11:15		Topock - Weathered Bedrock - conglomerate	CL		(285.0 - 294.0') Topock - Weathered Bedrock - conglomerate; Gravelly lean clay with sand (CL); reddish brown / moderate brown(5YR 4/4); low plasticity; some granules to very large pebbles, angular to subround; some fine to medium grained sand, subangular to subround; trace silt; little coarser clasts composed of metadiorite; trace granite; moist; no odor; no staining	(283.0 - 293.0') Rough drilling	
285									
286									
287									
288									
289									
290	RB-2-SS-288-293 7/18/2019 11:20	RB-2-VAS-287-292 (<0.17 U ppb) 7/26/2019 11:56	Topock - Weathered Bedrock - conglomerate	CL					
291									
292									
293	168			Topock - Competent Bedrock - conglomerate			(294.0 - 303.0') Topock - Competent Bedrock - conglomerate; reddish brown / moderate brown(5YR 4/4); little granules to medium pebbles, angular to subangular; little very fine to medium grained sand; trace silt; little coarser clasts composed of metadiorite; dry to moist; no odor; no staining; friable conglomerate, highly pulverized and fractured	(293.0 - 307.0') 10' of slough in core barrel. From 303 to 307 very rough drilling.	
294									
295									
296									
297									
298									
299									
300									

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Date Started:	06/28/2019	Surface Elevation:	N/A	Boring No.: <u>RB-2 Pilot</u>	
Date Completed:	07/29/2019	Northing (NAD83):	N/A		
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	307 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Borat Longyear Track Mount	Borehole Diameter:	4-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Tyler Alymer	Depth to First Water:	23.77 ft bgs		
Drilling Asst:	J. Condelaria, G. Angiano	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	Joe Latham	Sampling Interval:	Continuous		
Editor:	N/A	Converted to Well:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
301	168			Topock - Competent Bedrock - conglomerate			(303.0 - 307.0'); dry; friable conglomerate, moderately pulverized and fractured	(293.0 - 307.0') 10' of slough in core barrel. From 303 to 307 very rough drilling.	
302									
303									
304									
305									
306									
307									
End of Boring at 307.0 'bgs.									
308									
309									
310									
311									
312									
313									
314									
315									
316									
317									
318									
319									
320									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion

Date Started:	06/28/2019	Surface Elevation:	N/A	Well ID: RB-2 Pilot
Date Completed:	07/29/2019	Northing (NAD83):	N/A	
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	307 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Tyler Alymer	Borehole Diameter:	4-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	J. Condelaria, G. Angiano	Depth to First Water:	23.77 ft bgs	
Logger:	Joe Latham	Editor:	N/A	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
1		Topock - Fill	SP		(0.0 - 5.0') Cemex #1/20 MESH (20x40)	(0.0 - 5.0') 7.9 bags	(0.0 - 5.0') 7 bags (-11%) Note: Lapis Lustre Sand
2							
3							
4					(0.0 - 8.5') 12.0" Borehole		
5			NR				
6							
7							
8		Topock - Fill	SP				
9							
10							
11							
12					(5.0 - 243.5') Cemex #3 MESH (8x10)	(5.0 - 243.5') 97.7 bags	(5.0 - 243.5') 126 bags (29%) Note: Lapis Lustre Sand
13							
14			NR		(8.5 - 297.0') 6.0" Borehole		
15							
16							
17							
18		Topock - Fill	SP				
19		Topock - Fluvial Deposits	SP				
20							

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Temporary Backfill Log











Sheet: 2 of 16

Date Started:	06/28/2019	Surface Elevation:	N/A	Well ID: RB-2 Pilot
Date Completed:	07/29/2019	Northing (NAD83):	N/A	
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	307 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Tyler Alymer	Borehole Diameter:	4-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	J. Condellaria, G. Angiano	Depth to First Water:	23.77 ft bgs	
Logger:	Joe Latham	Editor:	N/A	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
21							
22							
23							
24			NR				
25							
26							
27							
28							
29		Topock - Fluvial Deposits	SP				
30					(5.0 - 243.5') Cemex #3 MESH (8x10)	(8.5 - 297.0') 6.0" Borehole	(5.0 - 243.5') 97.7 bags
31							(5.0 - 243.5') 126 bags (29%) Note: Lapis Lustre Sand
32							
33							
34			NR				
35							
36							
37							
38	RB-2-VAS-36.5-41.5 (<0.033 U ppb) 6/29/2019 11:43	Topock - Fluvial Deposits	SP-SM				
39		Topock - Fluvial Deposits	SM				
40		Topock - Fluvial Deposits	GW-GM				


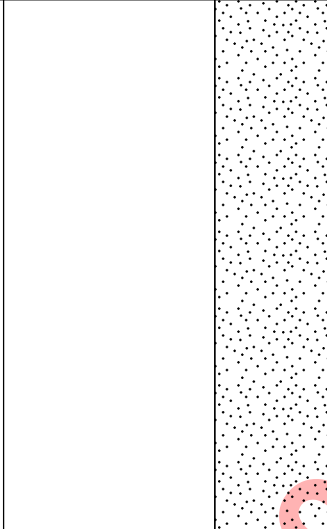


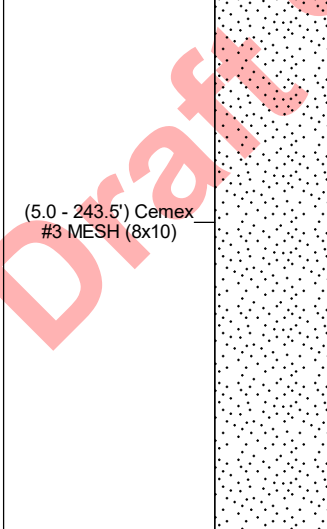
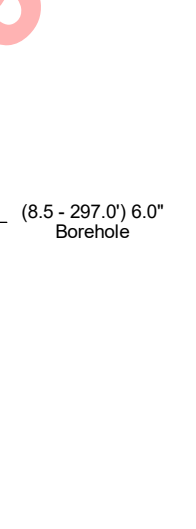







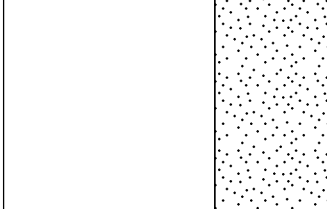

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started:	06/28/2019	Surface Elevation:	N/A	Well ID: RB-2 Pilot
Date Completed:	07/29/2019	Northing (NAD83):	N/A	
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	307 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Tyler Alymer	Borehole Diameter:	4-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	J. Condellaria, G. Angiano	Depth to First Water:	23.77 ft bgs	
Logger:	Joe Latham	Editor:	N/A	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction		Calculated Material Volumes	Material Volumes Installed
41		Topock - Fluvial Deposits	GW-GM					
42								
43		Topock - Fluvial Deposits	SM					
44								
45		Topock - Fluvial Deposits	GW-GM					
46								
47		Topock - Fluvial Deposits	GW-GM					
48								
49		Topock - Alluvium Deposits	GM					
50								
51		Topock - Alluvium Deposits	GM					
52								
53		Topock - Alluvium Deposits	SM					
54								
55		Topock - Alluvium Deposits	GM					
56								
57		Topock - Alluvium Deposits	SM					
58								
59		Topock - Alluvium Deposits	SC					
60								

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started:	06/28/2019	Surface Elevation:	N/A	Well ID: RB-2 Pilot
Date Completed:	07/29/2019	Northing (NAD83):	N/A	
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	307 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Tyler Alymer	Borehole Diameter:	4-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	J. Condelaria, G. Angiano	Depth to First Water:	23.77 ft bgs	
Logger:	Joe Latham	Editor:	N/A	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction		Calculated Material Volumes	Material Volumes Installed
61		Topock - Alluvium Deposits	GM					
62								
63								
64								
65								
66		Topock - Alluvium Deposits	GW					
67								
68								
69								
70								
71		Topock - Alluvium Deposits	GC					
72								
73								
74	RB-2-VAS-72-77 (<0.033 U ppb) 6/30/2019 14:10	Topock - Alluvium Deposits	SW					
75		Topock - Alluvium Deposits						
76		Topock - Alluvium Deposits	SW-SM					
77								
78								
79								
80								

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Date Started:	06/28/2019	Surface Elevation:	N/A	Well ID: RB-2 Pilot
Date Completed:	07/29/2019	Northing (NAD83):	N/A	
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	307 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Tyler Alymer	Borehole Diameter:	4-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	J. Condelaria, G. Angiano	Depth to First Water:	23.77 ft bgs	
Logger:	Joe Latham	Editor:	N/A	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
81		Topock - Alluvium Deposits	SW-SM				
82							
83							
84		Topock - Alluvium Deposits	ML				
85							
86							
87							
88		Topock - Alluvium Deposits	GC				
89							
90					(5.0 - 243.5') Cemex #3 MESH (8x10)		
91		Topock - Alluvium Deposits	GC				
92							
93							
94		Topock - Alluvium Deposits	GM				
95							
96							
97		Topock - Alluvium Deposits	GM				
98							
99		Topock - Alluvium Deposits	GC				
100							


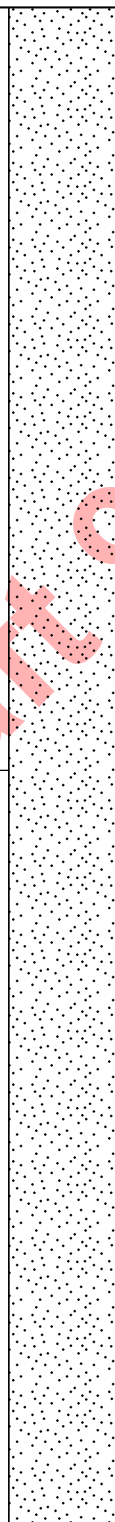
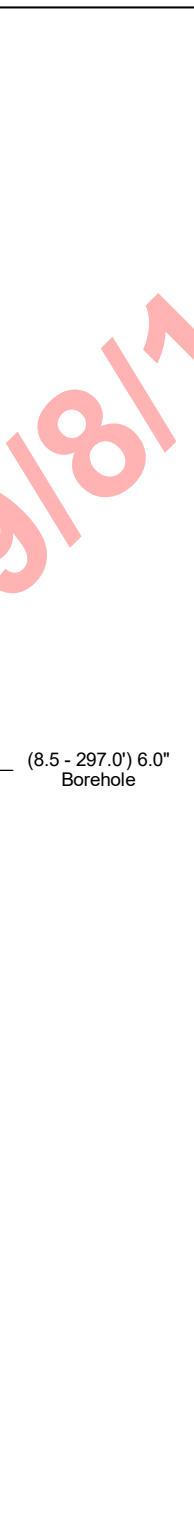



Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started:	06/28/2019	Surface Elevation:	N/A	Well ID: RB-2 Pilot
Date Completed:	07/29/2019	Northing (NAD83):	N/A	
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	307 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Tyler Alymer	Borehole Diameter:	4-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	J. Condelaria, G. Angiano	Depth to First Water:	23.77 ft bgs	
Logger:	Joe Latham	Editor:	N/A	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction		Calculated Material Volumes	Material Volumes Installed
101	RB-2-VAS-102-107 (<0.033 U ppb) 7/1/2019 15:21	Topock - Alluvium Deposits	GC					
102		Topock - Alluvium Deposits	GM					
103		Topock - Alluvium Deposits	GC		(5.0 - 243.5') Cemex #3 MESH (8x10)	(8.5 - 297.0') 6.0" Borehole	(5.0 - 243.5') 97.7 bags	(5.0 - 243.5') 126 bags (29%) Note: Lapis Lustre Sand
104		Topock - Alluvium Deposits	GM					
105		Topock - Alluvium Deposits	GC					
106		Topock - Alluvium Deposits	GM					
107		Topock - Alluvium Deposits	GM					
108		Topock - Alluvium Deposits	GM					
109		Topock - Alluvium Deposits	GM					
110		Topock - Alluvium Deposits	GM					
111		Topock - Alluvium Deposits	GM					
112		Topock - Alluvium Deposits	GM					
113		Topock - Alluvium Deposits	GM					
114		Topock - Alluvium Deposits	GM					
115		Topock - Alluvium Deposits	GM					
116		Topock - Alluvium Deposits	GM					
117		Topock - Alluvium Deposits	GM					
118		Topock - Alluvium Deposits	GM					
119		Topock - Alluvium Deposits	GM					
120		Topock - Alluvium Deposits	GM					

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started:	06/28/2019	Surface Elevation:	N/A	Well ID: RB-2 Pilot
Date Completed:	07/29/2019	Northing (NAD83):	N/A	
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	307 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Tyler Alymer	Borehole Diameter:	4-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	J. Condelaria, G. Angiano	Depth to First Water:	23.77 ft bgs	
Logger:	Joe Latham	Editor:	N/A	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction		Calculated Material Volumes	Material Volumes Installed
121		Topock - Alluvium Deposits	GM				(5.0 - 243.5') 97.7 bags	(5.0 - 243.5') 126 bags (29%) Note: Lapis Lustre Sand
122								
123								
124								
125								
126								
127								
128		Topock - Alluvium Deposits	ML					
129								
130								
131								
132								
133		Topock - Alluvium Deposits	GM					
134								
135								
136								
137								
138	Topock - Alluvium Deposits	SM						
139								
140								










Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started:	06/28/2019	Surface Elevation:	N/A	Well ID: RB-2 Pilot
Date Completed:	07/29/2019	Northing (NAD83):	N/A	
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	307 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Tyler Alymer	Borehole Diameter:	4-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	J. Condelaria, G. Angiano	Depth to First Water:	23.77 ft bgs	
Logger:	Joe Latham	Editor:	N/A	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
141		Topock - Alluvium Deposits	SM				
142							
143							
144	RB-2-VAS-142-147 (<0.17 U ppb) 7/9/2019 13:20	Topock - Alluvium Deposits	GM				
145							
146		Topock - Alluvium Deposits	SM				
147							
148		Topock - Alluvium Deposits	SM				
149							
150					(5.0 - 243.5') Cemex #3 MESH (8x10)	(8.5 - 297.0') 6.0" Borehole	(5.0 - 243.5') 97.7 bags
151		Topock - Alluvium Deposits	SM				(5.0 - 243.5') 126 bags (29%) Note: Lapis Lustre Sand
152							
153							
154		Topock - Alluvium Deposits	GM				
155							
156							
157							
158		Topock - Alluvium Deposits	GM				
159							
160		Topock - Alluvium	GC				









Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started:	06/28/2019	Surface Elevation:	N/A	Well ID: RB-2 Pilot
Date Completed:	07/29/2019	Northing (NAD83):	N/A	
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	307 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Tyler Alymer	Borehole Diameter:	4-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	J. Condelaria, G. Angiano	Depth to First Water:	23.77 ft bgs	
Logger:	Joe Latham	Editor:	N/A	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction		Calculated Material Volumes	Material Volumes Installed
		Deposits						
161	RB-2-VAS-172-177 (<0.17 U ppb) 7/12/2019 14:55	Topock - Alluvium Deposits	GM				(5.0 - 243.5') 97.7 bags	(5.0 - 243.5') 126 bags (29%) Note: Lapis Lustre Sand
162								
163		Topock - Alluvium Deposits	GM					
164								
165								
166	Topock - Alluvium Deposits	SM						
167								
168								
169	Topock - Alluvium Deposits	SM						
170								
171	Topock - Alluvium Deposits	SM						
172								
173	Topock - Alluvium Deposits	SM						
174								
175	Topock - Alluvium Deposits	SM						
176								
177	Topock - Alluvium Deposits	SM						
178								
179	Topock - Alluvium Deposits	SM						
180								

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started:	06/28/2019	Surface Elevation:	N/A	Well ID: RB-2 Pilot
Date Completed:	07/29/2019	Northing (NAD83):	N/A	
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	307 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Tyler Alymer	Borehole Diameter:	4-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	J. Condelaria, G. Angiano	Depth to First Water:	23.77 ft bgs	
Logger:	Joe Latham	Editor:	N/A	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction		Calculated Material Volumes	Material Volumes Installed
181		Topock - Alluvium Deposits	SM		<div>(5.0 - 243.5') Cemex #3 MESH (8x10)</div>	<div>(8.5 - 297.0') 6.0" Borehole</div>	<div>(5.0 - 243.5') 97.7 bags</div>	<div>(5.0 - 243.5') 126 bags (29%) Note: Lapis Lustre Sand</div>
182		Topock - Alluvium Deposits	SW					
183								
184								
185								
186								
187								
188		Topock - Alluvium Deposits	GW-GM					
189		Topock - Alluvium Deposits	SM					
190		Topock - Alluvium Deposits	GM					
191								
192	Topock - Alluvium Deposits	SW-SM						
193								
194								
195								
196								
197	Topock - Alluvium Deposits	SM						
198								
199								
200			ML					

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started:	06/28/2019	Surface Elevation:	N/A	Well ID: RB-2 Pilot
Date Completed:	07/29/2019	Northing (NAD83):	N/A	
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	307 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Tyler Alymer	Borehole Diameter:	4-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	J. Condelaria, G. Angiano	Depth to First Water:	23.77 ft bgs	
Logger:	Joe Latham	Editor:	N/A	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
201		Topock - Alluvium Deposits	ML				
202							
203		Topock - Alluvium Deposits	SM				
204		Topock - Alluvium Deposits	SM				
205	RB-2-VAS-202-207 (<0.17 U ppb) 7/14/2019 09:20	Topock - Alluvium Deposits	ML				
206		Topock - Alluvium Deposits	SM				
207							
208							
209							
210					(5.0 - 243.5') Cemex #3 MESH (8x10)	(8.5 - 297.0') 6.0" Borehole	(5.0 - 243.5') 97.7 bags
211							(5.0 - 243.5') 126 bags (29%) Note: Lapis Lustre Sand
212		Topock - Alluvium Deposits	SC				
213							
214							
215							
216							
217							
218		Topock - Alluvium Deposits	SC				
219							
220			GC				





Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started:	06/28/2019	Surface Elevation:	N/A	Well ID: RB-2 Pilot
Date Completed:	07/29/2019	Northing (NAD83):	N/A	
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	307 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Tyler Alymer	Borehole Diameter:	4-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	J. Condelaria, G. Angiano	Depth to First Water:	23.77 ft bgs	
Logger:	Joe Latham	Editor:	N/A	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction		Calculated Material Volumes	Material Volumes Installed
221		Topock - Alluvium Deposits	GC					
222								
223								
224								
225								
226								
227								
228								
229		Topock - Alluvium Deposits	SC					
230					(5.0 - 243.5') Cemex #3 MESH (8x10)	(8.5 - 297.0') 6.0" Borehole	(5.0 - 243.5') 97.7 bags	(5.0 - 243.5') 126 bags (29%) Note: Lapis Lustre Sand
231								
232								
233								
234								
235								
236								
237								
238	RB-2-VAS-237-242 (<0.17 U ppb) 7/15/2019 13:38	Topock - Alluvium Deposits	GC					
239								
240								

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started:	06/28/2019	Surface Elevation:	N/A	Well ID: RB-2 Pilot
Date Completed:	07/29/2019	Northing (NAD83):	N/A	
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	307 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Tyler Alymer	Borehole Diameter:	4-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	J. Condelaria, G. Angiano	Depth to First Water:	23.77 ft bgs	
Logger:	Joe Latham	Editor:	N/A	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
241	RB-2-VAS-237-242 (<0.17 U ppb) 7/15/2019 13:38	Topock - Alluvium Deposits	GC		(5.0 - 243.5') Cemex #3 MESH (8x10)	(5.0 - 243.5') 97.7 bags	(5.0 - 243.5') 126 bags (29%) Note: Lapis Lustre Sand
242		Topock - Weathered Bedrock - conglomerate	CL				
243							
244		Topock - Weathered Bedrock - conglomerate	SC		(243.5 - 254.0') Cemex #1/20 MESH (20x40)	(243.5 - 254.0') 4.1 bags	(243.5 - 254.0') 8 bags (95%) Note: Lapis Lustre Sand
245							
246							
247							
248		Topock - Weathered Bedrock - conglomerate	CL		(8.5 - 297.0') 6.0" Borehole		
249							
250							
251							
252							
253							
254							
255							
256							
257							
258							
259							
260							
					(254.0 - 307.0') Bentonite seal chips	(254.0 - 307.0') 12.9 bags	(254.0 - 307.0') 18.5 bags (43%) Note: Puregold Medium Chips

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started:	06/28/2019	Surface Elevation:	N/A	Well ID: RB-2 Pilot
Date Completed:	07/29/2019	Northing (NAD83):	N/A	
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	307 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Tyler Alymer	Borehole Diameter:	4-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	J. Condellaria, G. Angiano	Depth to First Water:	23.77 ft bgs	
Logger:	Joe Latham	Editor:	N/A	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
261							
262							
263							
264							
265							
266							
267							
268							
269							
270					(254.0 - 307.0') Bentonite seal chips	(8.5 - 297.0') 6.0" Borehole	(254.0 - 307.0') 12.9 bags
271							
272							
273							
274							
275							
276	RB-2-VAS- 274-279 (<0.17 U ppb) 7/18/2019 09:17	Topock - Weathered Bedrock - conglomerate	SC				
277							
278		Topock - Weathered Bedrock - conglomerate	CL				
279							
280		Topock - Weathered Bedrock - conglomerate	CL				



Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started:	06/28/2019	Surface Elevation:	N/A	Well ID: RB-2 Pilot
Date Completed:	07/29/2019	Northing (NAD83):	N/A	
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	307 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Tyler Alymer	Borehole Diameter:	4-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	J. Condelaria, G. Angiano	Depth to First Water:	23.77 ft bgs	
Logger:	Joe Latham	Editor:	N/A	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
281							
282		Topock - Weathered Bedrock - conglomerate	CL				
283							
284							
285							
286							
287							
288							
289	RB-2-VAS-287-292 (<0.17 U ppb) 7/26/2019 11:56	Topock - Weathered Bedrock - conglomerate	CL		(8.5 - 297.0') 6.0" Borehole		
290					(254.0 - 307.0') Bentonite seal chips	(254.0 - 307.0') 12.9 bags	(254.0 - 307.0') 18.5 bags (43%) Note: Puregold Medium Chips
291							
292							
293							
294							
295							
296							
297		Topock - Competent Bedrock - conglomerate					
298							
299					(297.0 - 307.0') 4" Borehole		
300							





Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started:	06/28/2019	Surface Elevation:	N/A	Well ID: RB-2 Pilot
Date Completed:	07/29/2019	Northing (NAD83):	N/A	
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	307 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Tyler Alymer	Borehole Diameter:	4-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	J. Condelaria, G. Angiano	Depth to First Water:	23.77 ft bgs	
Logger:	Joe Latham	Editor:	N/A	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction		Calculated Material Volumes	Material Volumes Installed
301		Topock - Competent Bedrock - conglomerate			(254.0 - 307.0') Bentonite seal chips		(254.0 - 307.0') 12.9 bags	(254.0 - 307.0') 18.5 bags (43%) Note: Puregold Medium Chips
302								
303								
304								
305								
306								
307								
308								
309								
310								
311								
312								
313								
314								
315								
316								
317								
318								
319								
320								

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started: 04/25/2019	Surface Elevation: 466.3 ft amsl	Boring No.: RB-3 Pilot
Date Completed: 05/07/2019	Northing (NAD83): 2103172.5	
Drilling Co.: Cascade	Easting (NAD83): 7616213.0	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 245 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type: Terrasonic track mount	Borehole Diameter: 6-12 inches	Location: PG&E Topock, Topock, California
Driller Name: Dan O'Mara	Depth to First Water: 11.35 ft bgs	
Drilling Asst: E. Huellmantel / J. Pacheco	Sampling Method: 4 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger: Gantt Jeffers	Sampling Interval: Continuous	
Editor: Grant Willford	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
1	0			Topock - Fill	SP		(0.0 - 8.0') Topock - Fill; Poorly graded sand (SP); pale brown (10YR 6/3); fine grained to medium grained, subangular to round; trace mica; dry; roots and wood fragments present	(0.0 - 4.0') No recovery due to loose dredge sands.	
2									
3									
4									
5	12			Topock - Fill	SP		(5') very fine grained to medium grained; trace silt; decrease in grain size	(5.0 - 10.0') Poor recovery due to loose dredge sands.	
6									
7							(6.5'); moist; iron oxide staining; no roots or fragments of wood		
8									
9	36			Topock - Fill	NR		(8.0 - 15.0') No recovery (NR)	(11.5') Approximate Depth to Water	
10									
11									
12									
13									
14									
15									
16	36	RB-3-SS-15-18 5/2/2019 09:19	RB-3-VAS-15-20 (<0.033 U) 4/26/2019 15:35	Topock - Fill	SP		(15.0 - 18.0') Topock - Fill; Poorly graded sand (SP); dark grayish brown / dark yellowish brown(10YR 4/2); very fine grained to medium grained, subangular to round; trace silt; trace organics; trace mica; wet; organic odor	(11.5') Approximate Depth to Water	
17									
18									
19									
20									
							(18.0 - 20.0') No recovery (NR)		









Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	04/25/2019	Surface Elevation:	466.3 ft amsl	Boring No.: RB-3 Pilot	
Date Completed:	05/07/2019	Northing (NAD83):	2103172.5		
Drilling Co.:	Cascade	Easting (NAD83):	7616213.0	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	245 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Terrasonic track mount	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Topock, California
Driller Name:	Dan O'Mara	Depth to First Water:	11.35 ft bgs		
Drilling Asst:	E. Huellmantel / J. Pacheco	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	Gantt Jeffers	Sampling Interval:	Continuous		
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
21	60	RB-3-SS-20-25 5/2/2019 09:21		Topock - Fill	SP		(20.0 - 33.0') Topock - Fill; Poorly graded sand (SP); dark grayish brown / dark yellowish brown(10YR 4/2) little black (5Y 2.5/1); very fine grained to fine grained, subangular to round; little organics; trace mica; wet; organic odor		
22									
23									
24									
25	96	RB-3-SS-25-30 5/2/2019 09:24		Topock - Fill	SP		(25') brown (7.5YR 4/2); very fine grained; no organics; decrease in sand grain size, color change		(25.0 - 35.0') 10 gallons of water used; 0 gallons of water recovered; 10 gallons of water lost
26									
27									
28							(27.5') dark grayish brown / dark yellowish brown(10YR 4/2); very fine grained to fine grained; no organics; increase in sand grain size, color change		
29		RB-3-SS-30-33 5/2/2019 09:26		Topock - Fill	SP				
30							(29.5') very fine grained to medium grained; increase in grain size sand		
31									
32									
33					NR		(33.0 - 35.0') No recovery (NR)		
34									
35									
36									
37	108	RB-3-SS-35-40 5/2/2019 09:39		Topock - Fill	SP		(35.0 - 39.5') Topock - Fill; Poorly graded sand (SP); dark grayish brown / dark yellowish brown(10YR 4/2); very fine grained to medium grained, subangular to round; trace mica; wet		(35.0 - 45.0') 15 gallons of water used; 0 gallons of water recovered; 15 gallons of water lost
38									
39									
40									
					SW		(39.5 - 44.0') Topock - Fluvial Deposits; Well graded sand (SW);		

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started: 04/25/2019	Surface Elevation: 466.3 ft amsl	Boring No.: RB-3 Pilot
Date Completed: 05/07/2019	Northing (NAD83): 2103172.5	
Drilling Co.: Cascade	Easting (NAD83): 7616213.0	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 245 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type: Terrasonic track mount	Borehole Diameter: 6-12 inches	Location: PG&E Topock, Topock, California
Driller Name: Dan O'Mara	Depth to First Water: 11.35 ft bgs	
Drilling Asst: E. Huellmantel / J. Pacheco	Sampling Method: 4 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger: Gantt Jeffers	Sampling Interval: Continuous	
Editor: Grant Willford	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
41	108	RB-3-SS-40-44 5/2/2019 09:41		Topock - Fluvial Deposits	SW		brown (10YR 5/3); very fine grained to very coarse grained, subround to round; trace granules to large pebbles, round; trace mica; wet		(35.0 - 45.0') 15 gallons of water used; 0 gallons of water recovered; 15 gallons of water lost
42									
43									
44									
45	72	RB-3-SS-45-50 5/2/2019 09:43		Topock - Fluvial Deposits	NR		(44.0 - 45.0') No recovery (NR)		(45.0 - 55.0') 10 gallons of water used; 0 gallons of water recovered; 10 gallons of water lost
46									
47									
48									
49	120	RB-3-SS-50-56 5/2/2019 09:45	RB-3-VAS-50-55 (0.100 J) 4/27/2019 11:10	Topock - Fluvial Deposits	GW		(47.0 - 50.0') Topock - Fluvial Deposits; Well graded gravel with sand (GW); dark grayish brown / dark yellowish brown(10YR 4/2); granules to small cobbles, subround to round; some very fine to very coarse grained sand, subangular to round; trace silt; some coarser clasts composed of metadiorite; trace mica; wet		(55.0 - 65.0') 15 gallons of water used; 0 gallons of water recovered; 15 gallons of water lost
50									
51									
52									
53	120	RB-3-SS-56-60 5/2/2019 09:53		Topock - Fluvial Deposits	SP		(50.0 - 51.0') Topock - Fluvial Deposits; Poorly graded sand (SP); brown (10YR 5/3); fine grained, subround to round; trace mica; wet		
54									
55									
56									
57	120	RB-3-SS-56-60 5/2/2019 09:53		Topock - Fluvial Deposits	NR		(51.0 - 55.0') No recovery (NR)		
58									
59									
60									
61	120	RB-3-SS-56-60 5/2/2019 09:53		Topock - Fluvial Deposits	GW		(55.0 - 57.0') Topock - Fluvial Deposits; Well graded gravel with sand (GW); dark grayish brown / dark yellowish brown(10YR 4/2); granules to small cobbles, subround to round; some very fine to very coarse grained sand, subangular to round; trace silt; some coarser clasts composed of metadiorite; trace mica; wet		
62									
63									
64									
65	120	RB-3-SS-56-60 5/2/2019 09:53		Topock - Fluvial Deposits	ML		(57.0 - 59.5') Topock - Fluvial Deposits; Silt with sand (ML); brown (7.5YR 5/4); medium plasticity, slow dilatency; little very fine to very coarse grained sand, subangular to subround; little clay; trace small to very large pebbles, subround to round; trace subround; trace organics; trace mica; wet; soft to medium stiff		
66									
67									
68									
69	120	RB-3-SS-56-60 5/2/2019 09:53		Topock - Fluvial Deposits	ML		(59.5 - 65.0') Topock - Alluvium Deposits; Sandy silt with gravel (ML);		
70									
71									
72									





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Date Started: <u>04/25/2019</u>	Surface Elevation: <u>466.3 ft amsl</u>	Boring No.: <u>RB-3 Pilot</u>
Date Completed: <u>05/07/2019</u>	Northing (NAD83): <u>2103172.5</u>	
Drilling Co.: <u>Cascade</u>	Easting (NAD83): <u>7616213.0</u>	Client: <u>PG&E</u>
Drilling Method: <u>Sonic Drilling</u>	Total Depth: <u>245 ft bgs</u>	Project: <u>Final GW Remedy Phase 1</u>
Drill Rig Type: <u>Terrasonic track mount</u>	Borehole Diameter: <u>6-12 inches</u>	Location: <u>PG&E Topock, Topock, California</u>
Driller Name: <u>Dan O'Mara</u>	Depth to First Water: <u>11.35 ft bgs</u>	
Drilling Asst: <u>E. Huellmantel / J. Pacheco</u>	Sampling Method: <u>4 inch x 10 ft Core Barrel</u>	Project Number: <u>RC000753.0051</u>
Logger: <u>Gantt Jeffers</u>	Sampling Interval: <u>Continuous</u>	
Editor: <u>Grant Willford</u>	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
61	120	RB-3-SS-60-65 5/2/2019 09:58		Topock - Alluvium Deposits	ML		brown (7.5YR 4/3) trace weak red (2.5YR 4/2); low plasticity, no dilatency; some granules to very large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subround; coarser clasts composed of metadiorite; trace mica; moist; very stiff; weak cementation; interbedded silt and granule to very large pebble lenses, weathered pebbles		(55.0 - 65.0') 15 gallons of water used; 0 gallons of water recovered; 15 gallons of water lost
62									
63									
64									
65	120	RB-3-SS-65-70 5/2/2019 10:01		Topock - Alluvium Deposits	GM		(65.0 - 66.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); brown (7.5YR 4/3); granules to very large pebbles, angular to subangular; and very fine to very coarse grained sand, angular to subround; little silt; coarser clasts composed of metadiorite; trace mica; wet	(65.0 - 75.0') Rough drilling	(65.0 - 75.0') 15 gallons of water used; 0 gallons of water recovered; 15 gallons of water lost
66				Topock - Alluvium Deposits	SM		(66.0 - 77.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (5YR 5/4) trace red (2.5YR 4/6); fine grained to very coarse grained, angular to subangular; some granules to very large pebbles, angular to subangular; some silt; trace subangular; trace clay; coarser clasts composed of metadiorite; trace mica; dry to moist; weak cementation; interbedded silt and granule to very large pebble lenses, weathered pebbles		
67									
68									
69									
70									
71									
72									
73		(72'); little silt; increase in granules and pebbles							
74		(74'); some silt; decrease granules and pebbles							
75		120	RB-3-SS-75-80 5/2/2019 10:10		Topock - Alluvium Deposits	ML			
76									
77									
78									
79									
80				Topock - Alluvium Deposits	SM		(79.0 - 89.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (5YR 5/4) trace red (2.5YR 4/6); fine grained to very coarse grained, angular to subangular; some granules to very large		







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Date Started:	<u>04/25/2019</u>	Surface Elevation:	<u>466.3 ft amsl</u>	Boring No.: <u>RB-3 Pilot</u>	
Date Completed:	<u>05/07/2019</u>	Northing (NAD83):	<u>2103172.5</u>		
Drilling Co.:	<u>Cascade</u>	Easting (NAD83):	<u>7616213.0</u>	Client:	<u>PG&E</u>
Drilling Method:	<u>Sonic Drilling</u>	Total Depth:	<u>245 ft bgs</u>	Project:	<u>Final GW Remedy Phase 1</u>
Drill Rig Type:	<u>Terrasonic track mount</u>	Borehole Diameter:	<u>6-12 inches</u>	Location:	<u>PG&E Topock, Topock, California</u>
Driller Name:	<u>Dan O'Mara</u>	Depth to First Water:	<u>11.35 ft bgs</u>		
Drilling Asst:	<u>E. Huellmantel / J. Pacheco</u>	Sampling Method:	<u>4 inch x 10 ft Core Barrel</u>	Project Number:	<u>RC000753.0051</u>
Logger:	<u>Gantt Jeffers</u>	Sampling Interval:	<u>Continuous</u>		
Editor:	<u>Grant Willford</u>	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
81	120	RB-3-SS-80-85 5/2/2019 10:18	RB-3-VAS-80-85 (0.132 J) 4/27/2019 15:18	Topock - Alluvium Deposits	SM		pebbles, angular to subangular; some silt; coarser clasts composed of metadiorite; trace mica; wet; weak cementation; interbedded silt and granule to very large pebble lenses, weathered pebbles	(80.0 - 85.0') Geology osberved good interval to collect a sample	
82							(81.5'); and granules to very large pebbles, angular to subangular; little silt; none cementation		
83									
84									
85	120	RB-3-SS-85-90 5/2/2019 10:21		Topock - Alluvium Deposits	ML		(87') reddish brown / moderate brown(5YR 4/4); some granules to very large pebbles, angular to subangular; some silt; trace clay; weak cementation; color change		(85.0 - 95.0') 20 gallons of water used; 0 gallons of water recovered; 20 gallons of water lost
86									
87									
88									
89		Topock - Alluvium Deposits		SM		(89.0 - 91.0') Topock - Alluvium Deposits; Sandy silt with gravel (ML); reddish brown / moderate brown(5YR 4/4) trace red (2.5YR 4/6); no plasticity, no dilatency; some very fine to very coarse grained sand, angular to subround; little granules to very large pebbles, angular to subangular; trace subangular; trace clay; trace mica; coarser clasts composed of metadiorite; moist; weak cementation; interbedded very fine to very coarse sand and granule to very large pebble lenses, weathered pebbles			
90									
91									
92									
93									
94									
95	120	RB-3-SS-95-100 5/2/2019 11:11	Topock - Alluvium Deposits	GM		(95.0 - 101.5') Topock - Alluvium Deposits; Silty gravel with sand (GM); reddish brown / moderate brown(5YR 4/4) trace red (2.5YR 4/6); granules to very large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subround; little silt; coarser clasts composed of metadiorite; trace mica; wet; interbedded silt and very fine to very coarse sand lenses, weathered pebbles		(95.0 - 105.0') 25 gallons of water used; 0 gallons of water recovered; 25 gallons of water lost	
96									
97									
98									
99									
100									

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Date Started: <u>04/25/2019</u>	Surface Elevation: <u>466.3 ft amsl</u>	Boring No.: <u>RB-3 Pilot</u>
Date Completed: <u>05/07/2019</u>	Northing (NAD83): <u>2103172.5</u>	
Drilling Co.: <u>Cascade</u>	Easting (NAD83): <u>7616213.0</u>	Client: <u>PG&E</u>
Drilling Method: <u>Sonic Drilling</u>	Total Depth: <u>245 ft bgs</u>	Project: <u>Final GW Remedy Phase 1</u>
Drill Rig Type: <u>Terrasonic track mount</u>	Borehole Diameter: <u>6-12 inches</u>	Location: <u>PG&E Topock, Topock, California</u>
Driller Name: <u>Dan O'Mara</u>	Depth to First Water: <u>11.35 ft bgs</u>	
Drilling Asst: <u>E. Huellmantel / J. Pacheco</u>	Sampling Method: <u>4 inch x 10 ft Core Barrel</u>	Project Number: <u>RC000753.0051</u>
Logger: <u>Gantt Jeffers</u>	Sampling Interval: <u>Continuous</u>	
Editor: <u>Grant Willford</u>	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
101	120	RB-3-SS-100-105 5/2/2019 11:16		Topock - Alluvium Deposits	GM				(95.0 - 105.0') 25 gallons of water used; 0 gallons of water recovered; 25 gallons of water lost
102				Topock - Alluvium Deposits	SM		(101.5 - 105.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown / moderate brown(5YR 4/4) trace red (2.5YR 4/6); fine grained to very coarse grained, subangular to subround; some granules to very large pebbles, angular to subangular; little silt; coarser clasts composed of metadiorite; trace mica; wet; weak cementation; interbedded silt and granule to very large pebble lenses, weathered pebbles		
103									
104									
105	120	RB-3-SS-105-107 5/2/2019 11:18		Topock - Alluvium Deposits	GM		(105.0 - 108.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); reddish brown / moderate brown(5YR 4/4) little red (2.5YR 4/6); granules to very large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subround; little silt; coarser clasts composed of metadiorite; trace mica; wet; interbedded silt and very fine to very coarse sand lenses, weathered pebbles		(105.0 - 115.0') 25 gallons of water used; 0 gallons of water recovered; 25 gallons of water lost
106				Topock - Alluvium Deposits	SM		(108.0 - 109.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown / moderate brown(5YR 4/4) little red (2.5YR 4/6); fine grained to very coarse grained, subangular to subround; some granules to very large pebbles, angular to subangular; some silt; coarser clasts composed of metadiorite; trace mica; wet; interbedded silt and granule to very large pebble lenses, weathered pebbles		
107									
108									
109									
110				Topock - Alluvium Deposits	GM		(109.0 - 115.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); reddish brown / moderate brown(5YR 4/4) trace red (2.5YR 4/6); granules to very large pebbles, angular to subangular; and very fine to very coarse grained sand, angular to subangular; little silt; coarser clasts composed of metadiorite; trace mica; wet; interbedded silt and very fine to very coarse sand lenses, weathered pebbles		
111	120	RB-3-SS-110-115 5/2/2019 11:21							
112									
113									
114									
115	120	RB-3-SS-115-120 5/2/2019 11:24		Topock - Alluvium Deposits	SM		(115.0 - 135.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown / moderate brown(5YR 4/4) little red (2.5YR 4/6); fine grained to very coarse grained, subangular to subround; some granules to very large pebbles, angular to subangular; some silt; trace angular; coarser clasts composed of metadiorite; trace mica; wet; interbedded silt and granule to very large pebble lenses, weathered pebbles		
116									
117									
118									
119									
120									





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Date Started:	04/25/2019	Surface Elevation:	466.3 ft amsl	Boring No.: RB-3 Pilot	
Date Completed:	05/07/2019	Northing (NAD83):	2103172.5		
Drilling Co.:	Cascade	Easting (NAD83):	7616213.0	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	245 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Terrasonic track mount	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Topock, California
Driller Name:	Dan O'Mara	Depth to First Water:	11.35 ft bgs		
Drilling Asst:	E. Huellmantel / J. Pacheco	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	Gantt Jeffers	Sampling Interval:	Continuous		
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
121							(120.5'); weak cementation; increase in silt, decrease in granule to pebbles		
122	120	RB-3-SS-120-125 5/2/2019 11:31	RB-3-VAS-120-125 (<0.17 U) 4/28/2019 11:29						
123									
124									
125									
126									(125.0 - 135.0') 25 gallons of water used; 0 gallons of water recovered; 25 gallons of water lost
127		RB-3-SS-125-130 5/2/2019 11:44		Topock - Alluvium Deposits	SM		(127.5'); none cementation; increase in granule to pebbles, decrease silt		
128									
129									
130	120								
131									
132		RB-3-SS-130-135 5/2/2019 11:46							
133									
134									
135									
136							(135.0 - 144.5') Topock - Alluvium Deposits; Silty gravel with sand (GM); reddish brown / moderate brown(5YR 4/4) trace red (2.5YR 4/6); granules to small cobbles, angular to subangular; and very fine to very coarse grained sand, angular to subangular; little silt; coarser clasts composed of metadiorite; trace mica; wet; interbedded silt and very fine to very coarse sand lenses, weathered pebbles		(135.0 - 145.0') 25 gallons of water used; 0 gallons of water recovered; 25 gallons of water lost
137	120	RB-3-SS-135-140 5/2/2019 11:50		Topock - Alluvium Deposits	GM				
138									
139									
140									

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Date Started:	<u>04/25/2019</u>	Surface Elevation:	<u>466.3 ft amsl</u>	Boring No.: <u>RB-3 Pilot</u>	
Date Completed:	<u>05/07/2019</u>	Northing (NAD83):	<u>2103172.5</u>		
Drilling Co.:	<u>Cascade</u>	Easting (NAD83):	<u>7616213.0</u>	Client:	<u>PG&E</u>
Drilling Method:	<u>Sonic Drilling</u>	Total Depth:	<u>245 ft bgs</u>	Project:	<u>Final GW Remedy Phase 1</u>
Drill Rig Type:	<u>Terrasonic track mount</u>	Borehole Diameter:	<u>6-12 inches</u>	Location:	<u>PG&E Topock, Topock, California</u>
Driller Name:	<u>Dan O'Mara</u>	Depth to First Water:	<u>11.35 ft bgs</u>		
Drilling Asst:	<u>E. Huellmantel / J. Pacheco</u>	Sampling Method:	<u>4 inch x 10 ft Core Barrel</u>	Project Number:	<u>RC000753.0051</u>
Logger:	<u>Gantt Jeffers</u>	Sampling Interval:	<u>Continuous</u>		
Editor:	<u>Grant Willford</u>	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
141	120	RB-3-SS-140-145 5/2/2019 11:54		Topock - Alluvium Deposits	GM				(135.0 - 145.0') 25 gallons of water used; 0 gallons of water recovered; 25 gallons of water lost
142									
143									
144									
145	120	RB-3-SS-145-150 5/2/2019 11:57		Topock - Alluvium Deposits	SM		(144.5 - 149.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown / moderate brown(5YR 4/4) trace red (2.5YR 4/6); fine grained to very coarse grained, subangular to subround; some granules to very large pebbles, angular to subangular; some silt; coarser clasts composed of metadiorite; trace mica; wet; interbedded silt and granule to very large pebble lenses		(145.0 - 155.0') 35 gallons of water used; 0 gallons of water recovered; 35 gallons of water lost
146									
147									
148									
149		RB-3-SS-150-155 5/2/2019 12:05	RB-3-VAS-150-155 (<0.17 U) 4/29/2019 10:13	Topock - Alluvium Deposits	GM		(149.0 - 152.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); reddish brown / moderate brown(5YR 4/4) trace red (2.5YR 4/6); granules to small cobbles, angular to subangular; some very fine to very coarse grained sand, angular to subangular; some silt; coarser clasts composed of metadiorite; trace mica; wet; interbedded silt and sand very fine to very coarse sand lenses		
150									
151									
152									
153	120	RB-3-SS-155-160 5/2/2019 12:11		Topock - Weathered Bedrock - conglomerate	ML		(152.0 - 155.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown / moderate brown(5YR 4/4) trace red (2.5YR 4/6); fine grained to very coarse grained, angular to subround; some granules to very large pebbles, angular to subangular; some silt; coarser clasts composed of metadiorite; trace mica; wet; interbedded silt and granule to very large pebble lenses	(155.0 - 165.0') Core is moderately cemented groundwater sample to be collected above	
154									
155									
156									
157									
158									
159									
160									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started: 04/25/2019	Surface Elevation: 466.3 ft amsl	Boring No.: RB-3 Pilot
Date Completed: 05/07/2019	Northing (NAD83): 2103172.5	
Drilling Co.: Cascade	Easting (NAD83): 7616213.0	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 245 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type: Terrasonic track mount	Borehole Diameter: 6-12 inches	Location: PG&E Topock, Topock, California
Driller Name: Dan O'Mara	Depth to First Water: 11.35 ft bgs	
Drilling Asst: E. Huellmantel / J. Pacheco	Sampling Method: 4 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger: Gantt Jeffers	Sampling Interval: Continuous	
Editor: Grant Willford	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
161	120	RB-3-SS-160-165 5/2/2019 12:13					(160'); dry	(155.0 - 165.0') Core is moderately cemented groundwater sample to be collected above	
162									
163									
164									
165	120	RB-3-SS-165-170 5/2/2019 12:14		Topock - Weathered Bedrock - conglomerate	ML		(169'); dry	(165.0 - 175.0') Rough drilling	(165.0 - 175.0') 30 gallons of water used; 10 gallons of water recovered; 20 gallons of water lost
166									
167									
168									
169									
170									
171									
172									
173									
174									
175	120	RB-3-SS-170-175 5/2/2019 12:18							
176									
177									
178									
179									
180		RB-3-SS-175-180 5/2/2019 12:20							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	04/25/2019	Surface Elevation:	466.3 ft amsl	Boring No.: <u>RB-3 Pilot</u>	
Date Completed:	05/07/2019	Northing (NAD83):	2103172.5		
Drilling Co.:	Cascade	Easting (NAD83):	7616213.0	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	245 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Terrasonic track mount	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Topock, California
Driller Name:	Dan O'Mara	Depth to First Water:	11.35 ft bgs		
Drilling Asst:	E. Huellmantel / J. Pacheco	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	Gantt Jeffers	Sampling Interval:	Continuous		
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
181	120	RB-3-SS-180-185 5/2/2019 12:22	RB-3-VAS-180-185 <0.033 U <0.033 U 4/29/2019 15:38						
182									
183									
184									
185	120	RB-3-SS-185-190 5/2/2019 12:24		Topock - Weathered Bedrock - conglomerate	ML		(190'); dry		
186									
187									
188									
189									
190									
191									
192									
193									
194									
195	120	RB-3-SS-190-195 5/2/2019 12:28		Topock - Weathered Bedrock - conglomerate	SM		(191.5 - 196.0') Topock - Weathered Bedrock - conglomerate; Silty sand with gravel (SM); reddish brown (2.5YR 4/4) trace red (2.5YR 4/6); fine grained to very coarse grained, angular to subangular; some granules to very large pebbles, angular to subangular; some silt; trace angular; trace clay; coarser clasts composed of metadiorite; trace mica; wet		
196									
197									
198									
199									
200	120	RB-3-SS-195-200 5/2/2019 12:37		Topock - Weathered Bedrock - conglomerate	ML		(196.0 - 212.5') Topock - Weathered Bedrock - conglomerate; Sandy silt with gravel (ML); reddish brown (2.5YR 4/4) trace dark red (2.5YR 3/6); no plasticity, no dilatency; some granules to very large pebbles, angular to subangular; some very fine to very coarse grained sand, subangular to subround; trace angular to subangular; trace clay; coarser clasts composed of metadiorite; trace mica; moist; very stiff to hard; weak cementation; interbedded very fine to very coarse sand and granule to very large pebble lenses (197.5'); low plasticity; little granules to very large pebbles, angular to subangular; increase in silt, decrease in sand, no cobbles (199'); no plasticity; some granules to very large pebbles, angular to subangular; decrease in silt, increase in sand	(195.0 - 215.0') Rough drilling	

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

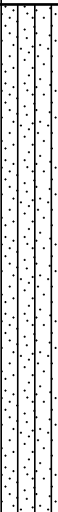

SOIL BORING LOG, PG&E TOPOCK, C:\USERS\MCGRANED\DOCUMENTS\PG&E TOPOCK\DRIFT BORING LOGS\GINT FILES\09_06_19\TOPOCK DATA TEMPLATE FOR FLOG.GDT, 09/06/19 09:56

Date Started:	04/25/2019	Surface Elevation:	466.3 ft amsl	Boring No.: <u>RB-3 Pilot</u>	
Date Completed:	05/07/2019	Northing (NAD83):	2103172.5		
Drilling Co.:	Cascade	Easting (NAD83):	7616213.0	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	245 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Terrasonic track mount	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Topock, California
Driller Name:	Dan O'Mara	Depth to First Water:	11.35 ft bgs		
Drilling Asst:	E. Huellmantel / J. Pacheco	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	Gantt Jeffers	Sampling Interval:	Continuous		
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
201	120	RB-3-SS-200-205 5/2/2019 12:39						(195.0 - 215.0') Rough drilling	
202									
203									
204									
205	120	RB-3-SS-205-210 5/2/2019 12:41	RB-3-VAS-205-210 (<0.17 U) 4/30/2019 15:15	Topock - Weathered Bedrock - conglomerate	ML			(205.0') Sample interval chosen based on lithology	
206									
207									
208									
209		RB-3-SS-210-215 5/2/2019 12:43						(212.5 - 218.0') Topock - Weathered Bedrock - conglomerate; Silty sand with gravel (SM); reddish brown (2.5YR 4/4) trace red (2.5YR 4/6); fine grained to very coarse grained, angular to subangular; some granules to very large pebbles, angular to subangular; some silt; trace clay; coarser clasts composed of metadiorite; trace mica; dry to moist; weak cementation; interbedded silt and granules to pebbles, weathered pebbles	
210									
211									
212									
213									
214									
215	120	RB-3-SS-215-220 5/2/2019 12:44		Topock - Weathered Bedrock - conglomerate	SM				
216									
217									
218									
219									
220									
				Topock - Weathered Bedrock - conglomerate	ML		(218.0 - 227.0') Topock - Weathered Bedrock - conglomerate; Sandy silt with gravel (ML); reddish brown (2.5YR 4/4) trace dark red (2.5YR 3/6); low plasticity, no dilatency; some granules to very large pebbles, angular to subangular; some very fine to very coarse grained sand, subangular to subround; trace clay; coarser clasts composed of metadiorite; trace mica; moist; very stiff; weak cementation; interbedded sand very fine to very coarse sand and granule to very		


Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started: <u>04/25/2019</u>	Surface Elevation: <u>466.3 ft amsl</u>	Boring No.: <u>RB-3 Pilot</u>
Date Completed: <u>05/07/2019</u>	Northing (NAD83): <u>2103172.5</u>	
Drilling Co.: <u>Cascade</u>	Easting (NAD83): <u>7616213.0</u>	Client: <u>PG&E</u>
Drilling Method: <u>Sonic Drilling</u>	Total Depth: <u>245 ft bgs</u>	Project: <u>Final GW Remedy Phase 1</u>
Drill Rig Type: <u>Terrasonic track mount</u>	Borehole Diameter: <u>6-12 inches</u>	Location: <u>PG&E Topock, Topock, California</u>
Driller Name: <u>Dan O'Mara</u>	Depth to First Water: <u>11.35 ft bgs</u>	
Drilling Asst: <u>E. Huellmantel / J. Pacheco</u>	Sampling Method: <u>4 inch x 10 ft Core Barrel</u>	Project Number: <u>RC000753.0051</u>
Logger: <u>Gantt Jeffers</u>	Sampling Interval: <u>Continuous</u>	
Editor: <u>Grant Willford</u>	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid		
221	120			Topock - Weathered Bedrock - conglomerate	ML		large pebble lenses, weathered pebbles				
222											
223											
224											
225											
226	120					Topock - Weathered Bedrock - conglomerate	SM				(227.0 - 245.0') Topock - Weathered Bedrock - conglomerate; Silty sand with gravel (SM); reddish brown (2.5YR 4/4) trace red (2.5YR 4/6); fine grained to very coarse grained, angular to subangular; some granules to very large pebbles, angular to subangular; some silt; trace angular to subangular; trace clay; coarser clasts composed of metadiorite; trace mica; moist; weak cementation; interbedded silt and granules to pebbles
227											
228											
229											
230											
231											
232											
233											
234											
235		120							Topock - Weathered Bedrock - conglomerate		SM
236											
237											
238											
239											
240											

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Date Started:	04/25/2019	Surface Elevation:	466.3 ft amsl	Boring No.: <u>RB-3 Pilot</u>	
Date Completed:	05/07/2019	Northing (NAD83):	2103172.5		
Drilling Co.:	Cascade	Easting (NAD83):	7616213.0	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	245 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Terrasonic track mount	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Topock, California
Driller Name:	Dan O'Mara	Depth to First Water:	11.35 ft bgs		
Drilling Asst:	E. Huellmantel / J. Pacheco	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	Gantt Jeffers	Sampling Interval:	Continuous		
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
241	120			Topock - Weathered Bedrock - conglomerate	SM		(241'); dry to moist; some dry lenses		
242			--no sample-- (Interval did not produce.) 5/1/2019 14:00						
243									
244									
245							End of Boring at 245.0 'bgs.		
246									
247									
248									
249									
250									
251									
252									
253									
254									
255									
256									
257									
258									
259									
260									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

SOIL BORING LOG PG&E TOPOCK C:\USERS\MCGRANED\DOCUMENTS\PG&E TOPOCK\DRIFT BORING LOGS\GINT FILES\06_19\TOPOCK DATABASE FOR FLOG.GPJ TOPOCK DATA TEMPLATE FOR FLOG.GDT 06/06/19 09:56

Date Started:	04/25/2019	Surface Elevation:	466.3 ft amsl	Well ID: RB-3 Pilot	
Date Completed:	05/07/2019	Northing (NAD83):	2103172.5		
Drilling Co.:	Cascade	Easting (NAD83):	7616213.0	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	245 ft bgs	Project:	Final GW Remedy Phase I
Driller Name:	Dan O'Mara	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Needles, California
Drilling Asst:	E. Huellmantel / J. Pacheco	Depth to First Water:	11.35 ft bgs		
Logger:	Gantt Jeffers	Editor:	Grant Willford	Project Number:	RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction		Calculated Material Volumes	Material Volumes Installed
1								
2					(0.0 - 4.5') Choker Sand Seal	(0.0 - 4.0') 12" Borehole	(0.0 - 4.5') 7.1 bags	(0.0 - 4.5') 6 bags (-15%) Note: Wildcat Washed Plastering
3								
4		Topock - Fill	SP					
5								
6								
7								
8								
9								
10								
11								
12			NR		(4.5 - 210.0') Cemex #3 MESH (8x10)	(4.0 - 245.0') 6" Borehole	(4.5 - 210.0') 80.7 bags	(4.5 - 210.0') 94 bags (16%) Note: Lapis Lustre Sand
13								
14								
15								
16								
17	RB-3-VAS-15-20 (<0.033 U) 4/26/2019 15:35	Topock - Fill	SP					
18								
19			NR					
20								

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Date Started:	04/25/2019	Surface Elevation:	466.3 ft amsl	Well ID: RB-3 Pilot
Date Completed:	05/07/2019	Northing (NAD83):	2103172.5	
Drilling Co.:	Cascade	Easting (NAD83):	7616213.0	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	245 ft bgs	Project: Final GW Remedy Phase I
Driller Name:	Dan O'Mara	Borehole Diameter:	6-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	E. Huellmantel / J. Pacheco	Depth to First Water:	11.35 ft bgs	
Logger:	Gantt Jeffers	Editor:	Grant Willford	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction		Calculated Material Volumes	Material Volumes Installed
21								
22								
23								
24								
25								
26								
27		Topock - Fill	SP					
28								
29								
30					(4.5 - 210.0') Cemex #3 MESH (8x10)	(4.0 - 245.0') 6" Borehole	(4.5 - 210.0') 80.7 bags	(4.5 - 210.0') 94 bags (16%) Note: Lapis Lustre Sand
31								
32								
33								
34			NR					
35								
36								
37		Topock - Fill	SP					
38								
39								
40			SW					

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started:	04/25/2019	Surface Elevation:	466.3 ft amsl	Well ID: RB-3 Pilot
Date Completed:	05/07/2019	Northing (NAD83):	2103172.5	
Drilling Co.:	Cascade	Easting (NAD83):	7616213.0	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	245 ft bgs	Project: Final GW Remedy Phase I
Driller Name:	Dan O'Mara	Borehole Diameter:	6-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	E. Huellmantel / J. Pacheco	Depth to First Water:	11.35 ft bgs	
Logger:	Gantt Jeffers	Editor:	Grant Willford	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction		Calculated Material Volumes	Material Volumes Installed
41								
42		Topock - Fluvial Deposits	SW					
43								
44								
45			NR					
46		Topock - Fluvial Deposits	SW					
47								
48		Topock - Fluvial Deposits	GW					
49								
50					(4.5 - 210.0') Cemex #3 MESH (8x10)	(4.0 - 245.0') 6" Borehole	(4.5 - 210.0') 80.7 bags	(4.5 - 210.0') 94 bags (16%) Note: Lapis Lustre Sand
51		Topock - Fluvial Deposits	SP					
52	RB-3-VAS-50-55 (0.100 J) 4/27/2019 11:10							
53			NR					
54								
55								
56		Topock - Fluvial Deposits	GW					
57								
58		Topock - Fluvial Deposits	ML					
59								
60			ML					

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started:	04/25/2019	Surface Elevation:	466.3 ft amsl	Well ID: RB-3 Pilot
Date Completed:	05/07/2019	Northing (NAD83):	2103172.5	
Drilling Co.:	Cascade	Easting (NAD83):	7616213.0	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	245 ft bgs	Project: Final GW Remedy Phase I
Driller Name:	Dan O'Mara	Borehole Diameter:	6-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	E. Huellmantel / J. Pacheco	Depth to First Water:	11.35 ft bgs	
Logger:	Gantt Jeffers	Editor:	Grant Willford	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
61		Topock - Alluvium Deposits	ML				
62							
63							
64							
65		Topock - Alluvium Deposits	GM				
66							
67		Topock - Alluvium Deposits	SM		(4.5 - 210.0') Cemex #3 MESH (8x10)	(4.0 - 245.0') 6" Borehole	(4.5 - 210.0') 80.7 bags
68							
69							
70							
71							
72							
73							
74							
75							
76							
77							
78		Topock - Alluvium Deposits	ML				
79							
80		Topock - Alluvium Deposits	SM				

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started: <u>04/25/2019</u>	Surface Elevation: <u>466.3 ft amsl</u>	Well ID: RB-3 Pilot
Date Completed: <u>05/07/2019</u>	Northing (NAD83): <u>2103172.5</u>	
Drilling Co.: <u>Cascade</u>	Easting (NAD83): <u>7616213.0</u>	Client: <u>PG&E</u>
Drilling Method: <u>Sonic Drilling</u>	Total Depth: <u>245 ft bgs</u>	Project: <u>Final GW Remedy Phase I</u>
Driller Name: <u>Dan O'Mara</u>	Borehole Diameter: <u>6-12 inches</u>	Location: <u>PG&E Topock, Needles, California</u>
Drilling Asst: <u>E. Huellmantel / J. Pacheco</u>	Depth to First Water: <u>11.35 ft bgs</u>	
Logger: <u>Gantt Jeffers</u>	Editor: <u>Grant Willford</u>	Project Number: <u>RC000753.0051</u>

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction		Calculated Material Volumes	Material Volumes Installed
81	RB-3-VAS-80-85 (0.132 J) 4/27/2019 15:18	Topock - Alluvium Deposits	SM					
82								
83								
84								
85								
86								
87								
88								
89								
90		Topock - Alluvium Deposits	ML		(4.5 - 210.0') Cemex #3 MESH (8x10)	(4.0 - 245.0') 6" Borehole	(4.5 - 210.0') 80.7 bags	(4.5 - 210.0') 94 bags (16%) Note: Lapis Lustre Sand
91								
92								
93		Topock - Alluvium Deposits	SM					
94								
95								
96								
97								
98		Topock - Alluvium Deposits	GM					
99								
100								


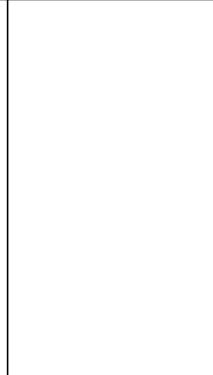
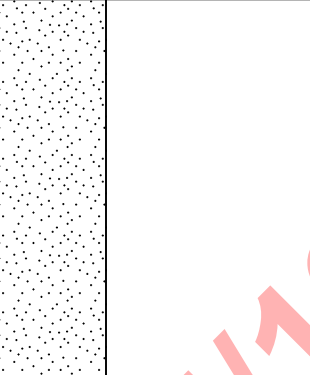




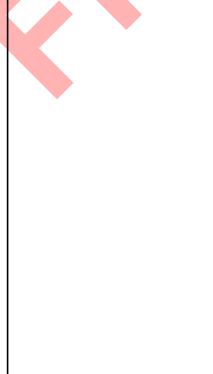
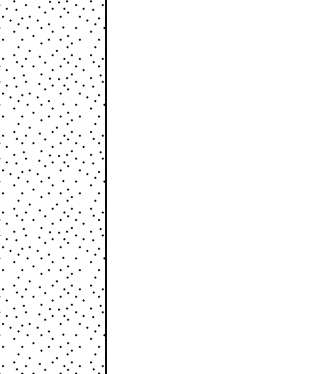
Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started: 04/25/2019	Surface Elevation: 466.3 ft amsl	Well ID: RB-3 Pilot
Date Completed: 05/07/2019	Northing (NAD83): 2103172.5	
Drilling Co.: Cascade	Easting (NAD83): 7616213.0	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 245 ft bgs	Project: Final GW Remedy Phase I
Driller Name: Dan O'Mara	Borehole Diameter: 6-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst: E. Huellmantel / J. Pacheco	Depth to First Water: 11.35 ft bgs	
Logger: Gantt Jeffers	Editor: Grant Willford	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction		Calculated Material Volumes	Material Volumes Installed
101		Topock - Alluvium Deposits	GM					
102								
103		Topock - Alluvium Deposits	SM					
104								
105								
106		Topock - Alluvium Deposits	GM					
107								
108		Topock - Alluvium Deposits	SM					
109								
110					(4.5 - 210.0') Cemex #3 MESH (8x10)	(4.0 - 245.0') 6" Borehole	(4.5 - 210.0') 80.7 bags	(4.5 - 210.0') 94 bags (16%) Note: Lapis Lustre Sand
111								
112		Topock - Alluvium Deposits	GM					
113								
114								
115								
116								
117		Topock - Alluvium Deposits	SM					
118								
119								
120								

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started:	04/25/2019	Surface Elevation:	466.3 ft amsl	Well ID: RB-3 Pilot
Date Completed:	05/07/2019	Northing (NAD83):	2103172.5	
Drilling Co.:	Cascade	Easting (NAD83):	7616213.0	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	245 ft bgs	Project: Final GW Remedy Phase I
Driller Name:	Dan O'Mara	Borehole Diameter:	6-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	E. Huellmantel / J. Pacheco	Depth to First Water:	11.35 ft bgs	
Logger:	Gantt Jeffers	Editor:	Grant Willford	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction		Calculated Material Volumes	Material Volumes Installed
121	RB-3-VAS-120-125 (<0.17 U) 4/28/2019 11:29	Topock - Alluvium Deposits	SM					
122								
123								
124								
125								
126		Topock - Alluvium Deposits	SM					
127								
128								
129								
130								
131								
132								
133								
134								
135								
136		Topock - Alluvium Deposits	GM					
137								
138								
139								
140								

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

TEMP ABANDONMENT LOG PG&E TOPOCK C:\USERS\MCG\DOCUMENTS\PG&E TOPOCK\DRIFT BORING LOGS\GINT FILES\09_05_19\TOPOCK DATA TEMPLATE FOR PLOG.GPJ TOPOCK DATABASE FOR PLOG.GPJ TOPOCK DATA TEMPLATE FOR PLOG.GPJ 09/05/19 22:28

Date Started: 04/25/2019	Surface Elevation: 466.3 ft amsl	Well ID: RB-3 Pilot
Date Completed: 05/07/2019	Northing (NAD83): 2103172.5	
Drilling Co.: Cascade	Easting (NAD83): 7616213.0	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 245 ft bgs	Project: Final GW Remedy Phase I
Driller Name: Dan O'Mara	Borehole Diameter: 6-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst: E. Huellmantel / J. Pacheco	Depth to First Water: 11.35 ft bgs	
Logger: Gantt Jeffers	Editor: Grant Willford	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction		Calculated Material Volumes	Material Volumes Installed
141	RB-3-VAS-150-155 (<0.17 U) 4/29/2019 10:13	Topock - Alluvium Deposits	GM		(4.5 - 210.0') Cemex #3 MESH (8x10)	(4.0 - 245.0') 6" Borehole	(4.5 - 210.0') 80.7 bags	(4.5 - 210.0') 94 bags (16%) Note: Lapis Lustre Sand
142								
143								
144								
145	RB-3-VAS-150-155 (<0.17 U) 4/29/2019 10:13	Topock - Alluvium Deposits	SM		(4.5 - 210.0') Cemex #3 MESH (8x10)	(4.0 - 245.0') 6" Borehole	(4.5 - 210.0') 80.7 bags	(4.5 - 210.0') 94 bags (16%) Note: Lapis Lustre Sand
146								
147								
148								
149	RB-3-VAS-150-155 (<0.17 U) 4/29/2019 10:13	Topock - Alluvium Deposits	GM		(4.5 - 210.0') Cemex #3 MESH (8x10)	(4.0 - 245.0') 6" Borehole	(4.5 - 210.0') 80.7 bags	(4.5 - 210.0') 94 bags (16%) Note: Lapis Lustre Sand
150								
151								
152								
153	RB-3-VAS-150-155 (<0.17 U) 4/29/2019 10:13	Topock - Alluvium Deposits	SM		(4.5 - 210.0') Cemex #3 MESH (8x10)	(4.0 - 245.0') 6" Borehole	(4.5 - 210.0') 80.7 bags	(4.5 - 210.0') 94 bags (16%) Note: Lapis Lustre Sand
154								
155								
156								
157	RB-3-VAS-150-155 (<0.17 U) 4/29/2019 10:13	Topock - Weathered Bedrock - conglomerate	ML		(4.5 - 210.0') Cemex #3 MESH (8x10)	(4.0 - 245.0') 6" Borehole	(4.5 - 210.0') 80.7 bags	(4.5 - 210.0') 94 bags (16%) Note: Lapis Lustre Sand
158								
159								
160								

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started: <u>04/25/2019</u>	Surface Elevation: <u>466.3 ft amsl</u>	Well ID: RB-3 Pilot
Date Completed: <u>05/07/2019</u>	Northing (NAD83): <u>2103172.5</u>	
Drilling Co.: <u>Cascade</u>	Easting (NAD83): <u>7616213.0</u>	Client: <u>PG&E</u>
Drilling Method: <u>Sonic Drilling</u>	Total Depth: <u>245 ft bgs</u>	Project: <u>Final GW Remedy Phase I</u>
Driller Name: <u>Dan O'Mara</u>	Borehole Diameter: <u>6-12 inches</u>	Location: <u>PG&E Topock, Needles, California</u>
Drilling Asst: <u>E. Huellmantel / J. Pacheco</u>	Depth to First Water: <u>11.35 ft bgs</u>	
Logger: <u>Gantt Jeffers</u>	Editor: <u>Grant Willford</u>	Project Number: <u>RC000753.0051</u>

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction		Calculated Material Volumes	Material Volumes Installed
161								
162								
163								
164								
165								
166								
167								
168								
169								
170		Topock - Weathered Bedrock - conglomerate	ML		(4.5 - 210.0') Cemex #3 MESH (8x10)	(4.0 - 245.0') 6" Borehole	(4.5 - 210.0') 80.7 bags	(4.5 - 210.0') 94 bags (16%) Note: Lapis Lustre Sand
171								
172								
173								
174								
175								
176								
177								
178								
179								
180								

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started: <u>04/25/2019</u>	Surface Elevation: <u>466.3 ft amsl</u>	Well ID: RB-3 Pilot
Date Completed: <u>05/07/2019</u>	Northing (NAD83): <u>2103172.5</u>	
Drilling Co.: <u>Cascade</u>	Easting (NAD83): <u>7616213.0</u>	Client: <u>PG&E</u>
Drilling Method: <u>Sonic Drilling</u>	Total Depth: <u>245 ft bgs</u>	Project: <u>Final GW Remedy Phase I</u>
Driller Name: <u>Dan O'Mara</u>	Borehole Diameter: <u>6-12 inches</u>	Location: <u>PG&E Topock, Needles, California</u>
Drilling Asst: <u>E. Huellmantel / J. Pacheco</u>	Depth to First Water: <u>11.35 ft bgs</u>	
Logger: <u>Gantt Jeffers</u>	Editor: <u>Grant Willford</u>	Project Number: <u>RC000753.0051</u>

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
181	RB-3-VAS-180-185 (<0.033 U <0.033 U) 4/29/2019 15:38	Topock - Weathered Bedrock - conglomerate	ML		(4.5 - 210.0') Cemex #3 MESH (8x10)	(4.0 - 245.0') 6" Borehole	(4.5 - 210.0') 80.7 bags
182							
183							
184							
185		Topock - Weathered Bedrock - conglomerate	ML		(4.5 - 210.0') Cemex #3 MESH (8x10)	(4.0 - 245.0') 6" Borehole	(4.5 - 210.0') 80.7 bags
186							
187							
188							
189		Topock - Weathered Bedrock - conglomerate	SM		(4.5 - 210.0') Cemex #3 MESH (8x10)	(4.0 - 245.0') 6" Borehole	(4.5 - 210.0') 80.7 bags
190							
191							
192							
193		Topock - Weathered Bedrock - conglomerate	ML		(4.5 - 210.0') Cemex #3 MESH (8x10)	(4.0 - 245.0') 6" Borehole	(4.5 - 210.0') 80.7 bags
194							
195							
196							
197		Topock - Weathered Bedrock - conglomerate	ML		(4.5 - 210.0') Cemex #3 MESH (8x10)	(4.0 - 245.0') 6" Borehole	(4.5 - 210.0') 80.7 bags
198							
199							
200							

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Date Started:	04/25/2019	Surface Elevation:	466.3 ft amsl	Well ID: RB-3 Pilot
Date Completed:	05/07/2019	Northing (NAD83):	2103172.5	
Drilling Co.:	Cascade	Easting (NAD83):	7616213.0	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	245 ft bgs	Project: Final GW Remedy Phase I
Driller Name:	Dan O'Mara	Borehole Diameter:	6-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	E. Huellmantel / J. Pacheco	Depth to First Water:	11.35 ft bgs	
Logger:	Gantt Jeffers	Editor:	Grant Willford	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
201							
202							
203							
204							
205					(4.5 - 210.0') Cemex #3 MESH (8x10)	(4.5 - 210.0') 80.7 bags	(4.5 - 210.0') 94 bags (16%) Note: Lapis Lustre Sand
206		Topock - Weathered Bedrock - conglomerate	ML				
207	RB-3-VAS-205-210 (<0.17 U) 4/30/2019 15:15						
208							
209							
210					(4.0 - 245.0') 6" Borehole		
211							
212							
213							
214							
215		Topock - Weathered Bedrock - conglomerate	SM		(210.0 - 221.0') Indicator Sand	(210.0 - 221.0') 4.3 bags	(210.0 - 221.0') 5 bags (16%) Note: Wildcat Washed Plastering
216							
217							
218							
219		Topock - Weathered Bedrock - conglomerate	ML				
220							


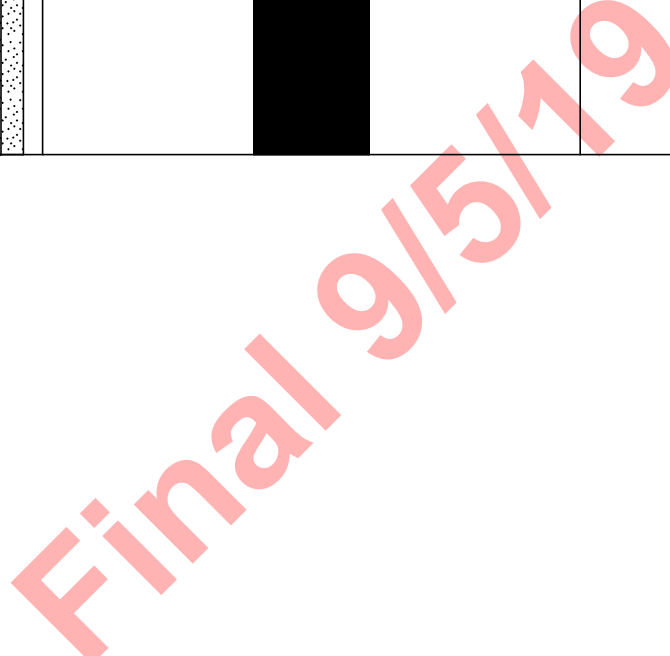
Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started:	04/25/2019	Surface Elevation:	466.3 ft amsl	Well ID: RB-3 Pilot
Date Completed:	05/07/2019	Northing (NAD83):	2103172.5	
Drilling Co.:	Cascade	Easting (NAD83):	7616213.0	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	245 ft bgs	Project: Final GW Remedy Phase I
Driller Name:	Dan O'Mara	Borehole Diameter:	6-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	E. Huellmantel / J. Pacheco	Depth to First Water:	11.35 ft bgs	
Logger:	Gantt Jeffers	Editor:	Grant Willford	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction		Calculated Material Volumes	Material Volumes Installed			
221		Topock - Weathered Bedrock - conglomerate	ML		(210.0 - 221.0') Indicator Sand		(210.0 - 221.0') 4.3 bags	(210.0 - 221.0') 5 bags (16%) Note: Wildcat Washed Plastering			
222											
223											
224											
225											
226											
227											
228		Topock - Weathered Bedrock - conglomerate	SM								
229											
230											
231								(221.0 - 245.0') Bentonite seal chips		(221.0 - 245.0') 6.5 bags	(221.0 - 245.0') 7.5 bags (15%) Note: Puregold Medium Chips
232											
233											
234											
235											
236											
237											
238											
239											
240											

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Date Started:	04/25/2019	Surface Elevation:	466.3 ft amsl	Well ID: RB-3 Pilot
Date Completed:	05/07/2019	Northing (NAD83):	2103172.5	
Drilling Co.:	Cascade	Easting (NAD83):	7616213.0	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	245 ft bgs	Project: Final GW Remedy Phase I
Driller Name:	Dan O'Mara	Borehole Diameter:	6-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	E. Huellmantel / J. Pacheco	Depth to First Water:	11.35 ft bgs	
Logger:	Gantt Jeffers	Editor:	Grant Willford	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction		Calculated Material Volumes	Material Volumes Installed
241	--no sample-- (Interval did not produce.) 5/1/2019 14:00	Topock - Weathered Bedrock - conglomerate	SM		(221.0 - 245.0') Bentonite seal chips	(4.0 - 245.0') 6" Borehole	(221.0 - 245.0') 6.5 bags	(221.0 - 245.0') 7.5 bags (15%) Note: Puregold Medium Chips
242								
243								
244								
245								
246								
247								
248								
249								
250								
251								
252								
253								
254								
255								
256								
257								
258								
259								
260								

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

TEMP ABANDONMENT LOG_PG&E_TOPOCK C:\USERS\SMC\GRAND\DOCUMENTS\PG&E_TOPOCK\DRAFT BORING LOGS\GINT FILES\09_05_19\TOPOCK DATABASE FOR PLOG.GPJ TOPOCK DATA TEMPLATE FOR PLOG.GDT 09/05/19 22:28

Date Started:	08/24/2019	Surface Elevation:	466.3 ft amsl	Boring No.: RB-3
Date Completed:	09/07/2019	Northing (NAD83):	2103172.5	
Drilling Co.:	Cascade	Easting (NAD83):	7616213.0	Client: PG&E
Drilling Method:	Dual Rotary	Total Depth:	224 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Foremost DR-24HD	Conductor Casing Diameter:	18 inches	Location: PG&E Topock, Needles, California
Driller Name:	Jon Martinez	Drill Casing Diameter:	16 inches	
Drilling Asst:	A. & H. Amezcuita	Drill Bit:	15.5 inch & 17.5 Tricone	Project Number: RC000753.0051
Tool-Pusher:	Scott Johnson	Depth to First Water:	11.35 ft bgs	
Rig Geologist:	A. Mack / E. Redner	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Drilling Run and Average Penetration Rate	USCS Code	USCS Class	Casing Diameter	Description (See Pilot boring log for full geologic descriptions)	Drilling Notes	Drilling Fluid
1	(0.0 - 3.0) 968.21 mins/ft	SP	(0.0 - 3.0') 18.0" Steel Casing	(0.0 - 3.0') 18.0" Steel Casing	(0.0 - 8.0') Topock - Fill; Poorly graded sand (SP)	(0.0 - 10.0') Drilled with water.	(0.0 - 21.1') 3589.76 gallons of water used; 91.2 gallons of water recovered; 3498.56 gallons of water lost
2							
3							
4	(3.0 - 21.1) 3.30 mins/ft	NR	(3.0 - 21.1') 18.0" Steel Casing	(3.0 - 21.1') 18.0" Steel Casing		(3.0') Drilling stopped due to a clogged discharge hose.	
5							
6							
7							
8					(8.0 - 15.0') No recovery (NR)		
9							
10							
11						(10.0') Observed trace amounts of Cemex #3 MESH (8x10) Lapis Luster Sand in drill cuttings (see photo log).	
12						(10.0 - 21.1') Drilled with water.	
13							
14							
15					(15.0 - 18.0') Topock - Fill; Poorly graded sand (SP)		
16							
17							
18					(18.0 - 20.0') No recovery (NR)		
19							
20							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater

Remarks: NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval for RB-3 Pilot

Date Started:	08/24/2019	Surface Elevation:	466.3 ft amsl	Boring No.: <u>RB-3</u>
Date Completed:	09/07/2019	Northing (NAD83):	2103172.5	
Drilling Co.:	Cascade	Easting (NAD83):	7616213.0	Client: PG&E
Drilling Method:	Dual Rotary	Total Depth:	224 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Foremost DR-24HD	Conductor Casing Diameter:	18 inches	Location: PG&E Topock, Needles, California
Driller Name:	Jon Martinez	Drill Casing Diameter:	16 inches	
Drilling Asst:	A. & H. Amezguita	Drill Bit:	15.5 inch & 17.5 Tricone	Project Number: RC000753.0051
Tool-Pusher:	Scott Johnson	Depth to First Water:	11.35 ft bgs	
Rig Geologist:	A. Mack / E. Redner	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Drilling Run and Average Penetration Rate	USCS Code	USCS Class	Casing Diameter	Description (See Pilot boring log for full geologic descriptions)	Drilling Notes	Drilling Fluid
21	(3.0 - 21.1) 3.30 mins/ft			(3.0 - 21.1') 18.0" Steel Casing	(20.0 - 33.0') Topock - Fill; Poorly graded sand (SP)	(20.0') Observed trace amounts of Cemex #3 MESH (8x10) Lapis Luster Sand in drill cuttings (see photo log).	
22						(21.0 - 41.3') Drilled with water.	(21.1 - 61.2') 6417.18 gallons of water used; 3705.6 gallons of water recovered; 2711.58 gallons of water lost
23							
24							
25							
26							
27		SP					
28							
29							
30							
31	(21.1 - 41.3) 1.93 mins/ft			(21.1 - 41.3') 18.0" Steel Casing		(30.0') Drilled with water.	
32							
33					(33.0 - 35.0') No recovery (NR)		
34		NR					
35					(35.0 - 39.5') Topock - Fill; Poorly graded sand (SP)		
36							
37		SP					
38							
39							
40		SW			(39.5 - 44.0') Topock - Fluvial	(39.6 - 59.2') Drill rods chattering.	

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater

Remarks: NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval for RB-3 Pilot

Date Started:	08/24/2019	Surface Elevation:	466.3 ft amsl	Boring No.: <u>RB-3</u>	
Date Completed:	09/07/2019	Northing (NAD83):	2103172.5		
Drilling Co.:	Cascade	Easting (NAD83):	7616213.0	Client:	PG&E
Drilling Method:	Dual Rotary	Total Depth:	224 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Foremost DR-24HD	Conductor Casing Diameter:	18 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Jon Martinez	Drill Casing Diameter:	16 inches		
Drilling Asst:	A. & H. Amezcuita	Drill Bit:	15.5 inch & 17.5 Tricone	Project Number:	RC000753.0051
Tool-Pusher:	Scott Johnson	Depth to First Water:	11.35 ft bgs		
Rig Geologist:	A. Mack / E. Redner	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Drilling Run and Average Penetration Rate	USCS Code	USCS Class	Casing Diameter	Description (See Pilot boring log for full geologic descriptions)	Drilling Notes	Drilling Fluid
41	(21.1 - 41.3) 1.93 mins/ft			(21.1 - 41.3') 18.0" Steel Casing	Deposits; Well graded sand (SW)	(40.0') Observed trace amounts of Cemex #3 MESH (8x10) Lapis Luster Sand in drill cuttings (see photo log).	
42		SW				(41.3 - 61.2') Drill rods chattering.	
43							
44							
45		NR			(44.0 - 45.0') No recovery (NR)		
46		SW			(45.0 - 47.0') Topock - Fluvial Deposits; Well graded sand (SW)		
47							
48		GW			(47.0 - 50.0') Topock - Fluvial Deposits; Well graded gravel with sand (GW)		
49							
50							
51	(41.3 - 61.2) 3.34 mins/ft	SP		(41.3 - 61.2') 18.0" Steel Casing	(50.0 - 51.0') Topock - Fluvial Deposits; Poorly graded sand (SP)	(50.0') Observed trace amounts of Cemex #3 MESH (8x10) Lapis Luster Sand in drill cuttings (see photo log).	
52					(51.0 - 55.0') No recovery (NR)		
53		NR					
54							
55							
56		GW			(55.0 - 57.0') Topock - Fluvial Deposits; Well graded gravel with sand (GW)		
57							
58		ML			(57.0 - 59.5') Topock - Fluvial Deposits; Silt with sand (ML)		
59							
60		ML			(59.5 - 65.0') Topock - Alluvium		

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater

Remarks: NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval for RB-3 Pilot

Date Started:	08/24/2019	Surface Elevation:	466.3 ft amsl	Boring No.: RB-3	
Date Completed:	09/07/2019	Northing (NAD83):	2103172.5		
Drilling Co.:	Cascade	Easting (NAD83):	7616213.0	Client:	PG&E
Drilling Method:	Dual Rotary	Total Depth:	224 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Foremost DR-24HD	Conductor Casing Diameter:	18 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Jon Martinez	Drill Casing Diameter:	16 inches		
Drilling Asst:	A. & H. Amezcuita	Drill Bit:	15.5 inch & 17.5 Tricone	Project Number:	RC000753.0051
Tool-Pusher:	Scott Johnson	Depth to First Water:	11.35 ft bgs		
Rig Geologist:	A. Mack / E. Redner	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Drilling Run and Average Penetration Rate	USCS Code	USCS Class	Casing Diameter	Description (See Pilot boring log for full geologic descriptions)	Drilling Notes	Drilling Fluid
61	(41.3 - 61.2) 3.34 mins/ft			(41.3 - 61.2') 18.0" Steel Casing	Deposits; Sandy silt with gravel (ML)	(60.0') Observed trace amounts of Cemex #3 MESH (8x10) Lapis Luster Sand in drill cuttings (see photo log).	
62		ML				(61.2 - 81.2') Drilled with water.	(61.2 - 101.1') 24063.76 gallons of water used; 25318.84 gallons of water recovered; 1255.08 gallons of water gained
63							
64							
65		GM			(65.0 - 66.0') Topock - Alluvium Deposits; Silty gravel with sand (GM)		
66					(66.0 - 77.0') Topock - Alluvium Deposits; Silty sand with gravel (SM)		
67							
68							
69							
70	(61.2 - 81.1) 8.77 mins/ft	SM		(61.2 - 81.1') 18.0" Steel Casing		(70.0') Observed trace amounts of Cemex #3 MESH (8x10) Lapis Luster Sand in drill cuttings (see photo log).	
71							
72							
73							
74							
75							
76							
77		ML			(77.0 - 79.0') Topock - Alluvium Deposits; Sandy silt with gravel (ML)		
78							
79		SM			(79.0 - 89.0') Topock - Alluvium Deposits; Silty sand with gravel (SM)		
80							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater

Remarks: NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval for RB-3 Pilot






Date Started:	08/24/2019	Surface Elevation:	466.3 ft amsl	Boring No.: <u>RB-3</u>
Date Completed:	09/07/2019	Northing (NAD83):	2103172.5	
Drilling Co.:	Cascade	Easting (NAD83):	7616213.0	Client: PG&E
Drilling Method:	Dual Rotary	Total Depth:	224 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Foremost DR-24HD	Conductor Casing Diameter:	18 inches	Location: PG&E Topock, Needles, California
Driller Name:	Jon Martinez	Drill Casing Diameter:	16 inches	
Drilling Asst:	A. & H. Amezcuita	Drill Bit:	15.5 inch & 17.5 Tricone	Project Number: RC000753.0051
Tool-Pusher:	Scott Johnson	Depth to First Water:	11.35 ft bgs	
Rig Geologist:	A. Mack / E. Redner	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Drilling Run and Average Penetration Rate	USCS Code	USCS Class	Casing Diameter	Description (See Pilot boring log for full geologic descriptions)	Drilling Notes	Drilling Fluid
81	(61.2 - 81.1) 8.77 mins/ft			(61.2 - 81.1') 18.0" Steel Casing		(80.0') Observed trace amounts of Cemex #3 MESH (8x10) Lapis Luster Sand in drill cuttings (see photo log).	
82						(81.2 - 101.1') Drilled with water.	
83							
84							
85		SM					
86							
87							
88							
89							
90		ML			(89.0 - 91.0') Topock - Alluvium Deposits; Sandy silt with gravel (ML)		
91	(81.1 - 101.5) 3.91 mins/ft			(81.1 - 101.5') 18.0" Steel Casing		(90.0') Observed trace amounts of Cemex #3 MESH (8x10) Lapis Luster Sand in drill cuttings (see photo log).	
92					(91.0 - 95.0') Topock - Alluvium Deposits; Silty sand with gravel (SM)		
93		SM					
94							
95							
96					(95.0 - 101.5') Topock - Alluvium Deposits; Silty gravel with sand (GM)		
97							
98		GM					
99							
100							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater

Remarks: NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval for RB-3 Pilot

Date Started:	08/24/2019	Surface Elevation:	466.3 ft amsl	Boring No.: RB-3
Date Completed:	09/07/2019	Northing (NAD83):	2103172.5	
Drilling Co.:	Cascade	Easting (NAD83):	7616213.0	Client: PG&E
Drilling Method:	Dual Rotary	Total Depth:	224 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Foremost DR-24HD	Conductor Casing Diameter:	18 inches	Location: PG&E Topock, Needles, California
Driller Name:	Jon Martinez	Drill Casing Diameter:	16 inches	
Drilling Asst:	A. & H. Amezcuita	Drill Bit:	15.5 inch & 17.5 Tricone	Project Number: RC000753.0051
Tool-Pusher:	Scott Johnson	Depth to First Water:	11.35 ft bgs	
Rig Geologist:	A. Mack / E. Redner	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Drilling Run and Average Penetration Rate	USCS Code	USCS Class	Casing Diameter	Description (See Pilot boring log for full geologic descriptions)	Drilling Notes	Drilling Fluid
101	(81.1 - 101.5) 3.91 mins/ft	GM		(81.1 - 101.5') 18.0" Steel Casing		(100.0') Observed trace amounts of Cemex #3 MESH (8x10) Lapis Luster Sand in drill cuttings (see photo log).	
102	(101.5 - 110.6) 3.92 mins/ft	SM		(101.5 - 110.6') 18.0" Steel Casing	(101.5 - 105.0') Topock - Alluvium Deposits; Silty sand with gravel (SM)	(101.5 - 116.6') Drilled with water.	(101.5 - 110.6') 773.24 gallons of water used; 1258.92 gallons of water recovered; 485.68 gallons of water gained
103							
104							
105							
106					(105.0 - 108.0') Topock - Alluvium Deposits; Silty gravel with sand (GM)		
107	(110.6 - 120.8) 2.43 mins/ft	GM		(110.6 - 120.8') 16.0" Steel Casing	(108.0 - 109.0') Topock - Alluvium Deposits; Silty sand with gravel (SM)	(110.6 - 120.8') Drilled with water.	(110.6 - 120.8') 6010 gallons of water used; 1802 gallons of water recovered; 4208 gallons of water lost
108							
109					(109.0 - 115.0') Topock - Alluvium Deposits; Silty gravel with sand (GM)		
110							
111					(110.0') Observed trace amounts of Cemex #3 MESH (8x10) Lapis Luster Sand in drill cuttings (see photo log), stopped drilling to formation collapse around borehole and under rig.		
112	(116.6 - 124.8) 2.43 mins/ft	SM		(116.6 - 124.8') 16.0" Steel Casing	(115.0 - 135.0') Topock - Alluvium Deposits; Silty sand with gravel (SM)	(116.6 - 124.8') Drilled with water.	(116.6 - 124.8') 6010 gallons of water used; 1802 gallons of water recovered; 4208 gallons of water lost
113							
114							
115							
116							
117	(116.6 - 124.8) 2.43 mins/ft	SM		(116.6 - 124.8') 16.0" Steel Casing		(116.6 - 124.8') Drilled with water.	(116.6 - 124.8') 6010 gallons of water used; 1802 gallons of water recovered; 4208 gallons of water lost
118							
119							
120							
121							

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Remarks: NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval for RB-3 Pilot

Date Started:	08/24/2019	Surface Elevation:	466.3 ft amsl	Boring No.: RB-3	
Date Completed:	09/07/2019	Northing (NAD83):	2103172.5		
Drilling Co.:	Cascade	Easting (NAD83):	7616213.0	Client:	PG&E
Drilling Method:	Dual Rotary	Total Depth:	224 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Foremost DR-24HD	Conductor Casing Diameter:	18 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Jon Martinez	Drill Casing Diameter:	16 inches		
Drilling Asst:	A. & H. Amezcuita	Drill Bit:	15.5 inch & 17.5 Tricone	Project Number:	RC000753.0051
Tool-Pusher:	Scott Johnson	Depth to First Water:	11.35 ft bgs		
Rig Geologist:	A. Mack / E. Redner	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Drilling Run and Average Penetration Rate	USCS Code	USCS Class	Casing Diameter	Description (See Pilot boring log for full geologic descriptions)	Drilling Notes	Drilling Fluid
121	(110.6 - 120.8) 2.43 mins/ft					(120.0') Observed trace amounts of Cemex #3 MESH (8x10) Lapis Luster Sand in drill cuttings (see photo log).	
122						(120.8 - 140.5') Drilled with water.	(120.8 - 201.2') 16966 gallons of water used; 8868.8 gallons of water recovered; 8097.2 gallons of water lost
123							
124							
125							
126						(124.8 - 144.8') Drilled with water.	(124.8 - 204.8') 17466 gallons of water used; 12871.6 gallons of water recovered; 4594.4 gallons of water lost
127							
128		SM					
129							
130						(130.0') Observed trace amounts of Cemex #3 MESH (8x10) Lapis Luster Sand in drill cuttings (see photo log).	
131	(120.8 - 140.5) 2.49 mins/ft			(120.8 - 140.5') 16.0" Steel Casing		(131.0') Drill rods chattering.	
132							
133							
134							
135							
136					(135.0 - 144.5') Topock - Alluvium Deposits; Silty gravel with sand (GM)		
137							
138		GM					
139							
140							

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Remarks: NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval for RB-3 Pilot

Date Started:	08/24/2019	Surface Elevation:	466.3 ft amsl	Boring No.: <u>RB-3</u>
Date Completed:	09/07/2019	Northing (NAD83):	2103172.5	
Drilling Co.:	Cascade	Easting (NAD83):	7616213.0	Client: PG&E
Drilling Method:	Dual Rotary	Total Depth:	224 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Foremost DR-24HD	Conductor Casing Diameter:	18 inches	Location: PG&E Topock, Needles, California
Driller Name:	Jon Martinez	Drill Casing Diameter:	16 inches	
Drilling Asst:	A. & H. Amezcuita	Drill Bit:	15.5 inch & 17.5 Tricone	Project Number: RC000753.0051
Tool-Pusher:	Scott Johnson	Depth to First Water:	11.35 ft bgs	
Rig Geologist:	A. Mack / E. Redner	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Drilling Run and Average Penetration Rate	USCS Code	USCS Class	Casing Diameter	Description (See Pilot boring log for full geologic descriptions)	Drilling Notes	Drilling Fluid
141						(140.0') Observed trace amounts of Cemex #3 MESH (8x10) Lapis Luster Sand in drill cuttings (see photo log). (140.5 - 161.6') Drilled with water.	
142		GM					
143							
144							
145					(144.5 - 149.0') Topock - Alluvium Deposits; Silty sand with gravel (SM)	(144.8 - 164.8') Drilled with water.	
146		SM					
147							
148							
149					(149.0 - 152.0') Topock - Alluvium Deposits; Silty gravel with sand (GM)		
150	(140.5 - 161.6) 1.52 mins/ft	GM		(140.5 - 161.6') 16.0" Steel Casing		(150.0') Observed trace amounts of Cemex #3 MESH (8x10) Lapis Luster Sand in drill cuttings (see photo log).	
151							
152					(152.0 - 155.0') Topock - Alluvium Deposits; Silty sand with gravel (SM)		
153		SM					
154							
155					(155.0 - 191.5') Topock - Weathered Bedrock - conglomerate; Sandy silt with gravel (ML)		
156							
157							
158		ML					
159							
160							

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Remarks: NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval for RB-3 Pilot

Date Started:	08/24/2019	Surface Elevation:	466.3 ft amsl	Boring No.: <u>RB-3</u>	
Date Completed:	09/07/2019	Northing (NAD83):	2103172.5		
Drilling Co.:	Cascade	Easting (NAD83):	7616213.0	Client:	PG&E
Drilling Method:	Dual Rotary	Total Depth:	224 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Foremost DR-24HD	Conductor Casing Diameter:	18 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Jon Martinez	Drill Casing Diameter:	16 inches		
Drilling Asst:	A. & H. Amezguita	Drill Bit:	15.5 inch & 17.5 Tricone	Project Number:	RC000753.0051
Tool-Pusher:	Scott Johnson	Depth to First Water:	11.35 ft bgs		
Rig Geologist:	A. Mack / E. Redner	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Drilling Run and Average Penetration Rate	USCS Code	USCS Class	Casing Diameter	Description (See Pilot boring log for full geologic descriptions)	Drilling Notes	Drilling Fluid
161	(140.5 - 161.6) 1.52 mins/ft			(140.5 - 161.6') 16.0" Steel Casing		(160.0') Observed trace amounts of Cemex #3 MESH (8x10) Lapis Luster Sand in drill cuttings (see photo log).	
162						(161.6 - 181.5') Drilled with water.	
163						(163.0') Drill rods chattering.	
164							
165						(164.8 - 184.8') Drilled with water.	
166							
167							
168							
169							
170		ML				(170.0') Observed trace amounts of Cemex #3 MESH (8x10) Lapis Luster Sand in drill cuttings (see photo log).	
171	(161.6 - 181.8) 1.93 mins/ft			(161.6 - 181.8') 16.0" Steel Casing			
172							
173							
174							
175							
176							
177							
178							
179							
180							

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Remarks: NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval for RB-3 Pilot

Date Started:	08/24/2019	Surface Elevation:	466.3 ft amsl	Boring No.: <u>RB-3</u>
Date Completed:	09/07/2019	Northing (NAD83):	2103172.5	
Drilling Co.:	Cascade	Easting (NAD83):	7616213.0	Client: PG&E
Drilling Method:	Dual Rotary	Total Depth:	224 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Foremost DR-24HD	Conductor Casing Diameter:	18 inches	Location: PG&E Topock, Needles, California
Driller Name:	Jon Martinez	Drill Casing Diameter:	16 inches	
Drilling Asst:	A. & H. Amezuguita	Drill Bit:	15.5 inch & 17.5 Tricone	Project Number: RC000753.0051
Tool-Pusher:	Scott Johnson	Depth to First Water:	11.35 ft bgs	
Rig Geologist:	A. Mack / E. Redner	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Drilling Run and Average Penetration Rate	USCS Code	USCS Class	Casing Diameter	Description (See Pilot boring log for full geologic descriptions)	Drilling Notes	Drilling Fluid
181	(161.6 - 181.8) 1.93 mins/ft			(161.6 - 181.8') 16.0" Steel Casing		(180.0') Observed trace amounts of Cemex #3 MESH (8x10) Lapis Luster Sand in drill cuttings (see photo log).	
182						(181.8 - 201.2') Drilled with water.	
183							
184							
185						(184.8 - 204.8') Drilled with water.	
186		ML					
187							
188							
189							
190							
191	(181.8 - 201.2) 1.34 mins/ft			(181.8 - 201.2') 16.0" Steel Casing		(190.0') Observed trace amounts of Cemex #3 MESH (8x10) Lapis Luster Sand in drill cuttings (see photo log).	
192					(191.5 - 196.0') Topock - Weathered Bedrock - conglomerate; Silty sand with gravel (SM)		
193		SM					
194							
195							
196					(196.0 - 212.5') Topock - Weathered Bedrock - conglomerate; Sandy silt with gravel (ML)		
197							
198		ML					
199							
200							

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Remarks: NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval for RB-3 Pilot


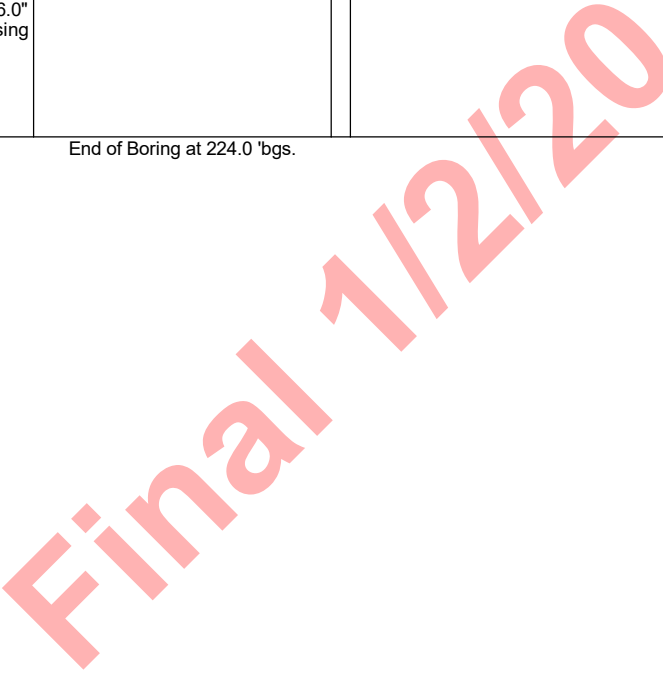
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Date Completed:	09/07/2019	Northing (NAD83):	2103172.5	
Drilling Co.:	Cascade	Easting (NAD83):	7616213.0	Client: PG&E
Drilling Method:	Dual Rotary	Total Depth:	224 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Foremost DR-24HD	Conductor Casing Diameter:	18 inches	Location: PG&E Topock, Needles, California
Driller Name:	Jon Martinez	Drill Casing Diameter:	16 inches	
Drilling Asst:	A. & H. Amezcuita	Drill Bit:	15.5 inch & 17.5 Tricone	Project Number: RC000753.0051
Tool-Pusher:	Scott Johnson	Depth to First Water:	11.35 ft bgs	
Rig Geologist:	A. Mack / E. Redner	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Drilling Run and Average Penetration Rate	USCS Code	USCS Class	Casing Diameter	Description (See Pilot boring log for full geologic descriptions)	Drilling Notes	Drilling Fluid
201	(181.8 - 201.2) 1.34 mins/ft			(181.8 - 201.2') 16.0" Steel Casing		(200.0') Observed trace amounts of Cemex #3 MESH (8x10) Lapis Luster Sand in drill cuttings (see photo log).	
202						(201.2 - 224.0') Drilled with water.	(201.2 - 222.0') 10065 gallons of water used; 8360.8 gallons of water recovered; 1704.2 gallons of water lost
203							
204							
205							
206							
207		ML					
208						(208.0') Hole plugged up.	
209							
210							
211	(201.2 - 220.5) 2.54 mins/ft			(201.2 - 220.5') 16.0" Steel Casing		(210.0') Observed trace amounts of Cemex #3 MESH (8x10) Lapis Luster Sand in drill cuttings (see photo log).	
212							
213					(212.5 - 218.0') Topock - Weathered Bedrock - conglomerate; Silty sand with gravel (SM)		
214							
215		SM					
216							
217							
218							
219		ML			(218.0 - 224.0') Topock - Weathered Bedrock - conglomerate; Sandy silt with gravel (ML)		
220							

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Remarks: NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval for RB-3 Pilot


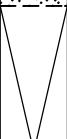
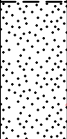

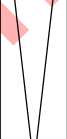

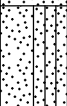
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Date Completed:	09/07/2019	Northing (NAD83):	2103172.5		
Drilling Co.:	Cascade	Easting (NAD83):	7616213.0	Client:	PG&E
Drilling Method:	Dual Rotary	Total Depth:	224 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Foremost DR-24HD	Conductor Casing Diameter:	18 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Jon Martinez	Drill Casing Diameter:	16 inches		
Drilling Asst:	A. & H. Amezquita	Drill Bit:	15.5 inch & 17.5 Tricone	Project Number:	RC000753.0051
Tool-Pusher:	Scott Johnson	Depth to First Water:	11.35 ft bgs		
Rig Geologist:	A. Mack / E. Redner	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Drilling Run and Average Penetration Rate	USCS Code	USCS Class	Casing Diameter	Description (See Pilot boring log for full geologic descriptions)	Drilling Notes	Drilling Fluid
221	(220.5 - 224.0) 2.57 mins/ft	ML		(220.5 - 224.0') 16.0" Steel Casing		(220.0') Observed trace amounts of washed plastering sand in drill cuttings (see photo log).	
222							
223							
224							
End of Boring at 224.0 'bgs.							
225							
226							
227							
228							
229							
230							
231							
232							
233							
234							
235							
236							
237							
238							
239							
240							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater


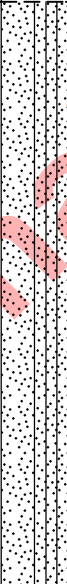
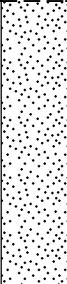
Remarks: NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval for RB-3 Pilot

Date Started:	04/11/2019	Surface Elevation:	466.0 ft amsl	Boring No.: RB-4 Pilot
Date Completed:	04/24/2019	Northing (NAD83):	2102908.7	
Drilling Co.:	Cascade	Easting (NAD83):	7616336.4	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	161 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Terrasonic track mount	Borehole Diameter:	6-12 inches	Location: PG&E Topock, Needles, California
Driller Name:	Dan O'Mara	Depth to First Water:	10.98 ft bgs	
Drilling Asst:	E. Huellmantel / J. Pacheco	Sampling Method:	4 inch x 10 ft. Core Barrel	Project Number: RC000753.0051
Logger:	D. Maurer / G. Jeffers	Sampling Interval:	Continuous	
Editor:	S. McGrane / G. Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
1	240			Topock - Fill	SP		(0.0 - 2.0') Topock - Fill; Poorly graded sand (SP); (10YR5/3); fine grained to medium grained; dry; trace amounts of wood fragments		(0.0 - 26.0') No water used
2									
3					NR		(2.0 - 6.0') No recovery (NR)	(2.0 - 6.0') Poor recovery, loose sands, no indication that core fell out of the core fell of core barrel, possibly pushing through loose sand	
4									
5									
6									
7	24			Topock - Fill	SP		(6.0 - 8.0') Topock - Fill; Poorly graded sand (SP); (10YR5/3); fine grained to medium grained; dry; trace amounts of wood fragments		
8									
9					NR		(8.0 - 16.0') No recovery (NR)	(8.0 - 16.0') Poor recovery, loose sands, possibly pushing through loose sand	
10									
11									
12					NR				
13									
14									
15									
16									
17	48	RB-4-SS-16-20 4/16/2019 11:15	RB-4-VAS-15-20 (0.0556 J ppb) 4/12/2019 09:20	Topock - Fluvial Deposits	SP		(16.0 - 17.5') Topock - Fluvial Deposits; Poorly graded sand (SP); brown (7.5YR 5/4); fine grained to medium grained; moist to wet		(15.0') Sample screen was pulled up to collect sample closer to the water table
18				Topock - Fluvial Deposits	SP-SM		(17.5 - 20.0') Topock - Fluvial Deposits; Poorly graded sand with silt (SP-SM); brown (7.5YR 4/2); very fine grained to medium grained; little silt; wet (18') brown (7.5YR 4/3)		
19									
20									







Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	04/11/2019	Surface Elevation:	466.0 ft amsl	Boring No.: <u>RB-4 Pilot</u>	
Date Completed:	04/24/2019	Northing (NAD83):	2102908.7		
Drilling Co.:	Cascade	Easting (NAD83):	7616336.4	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	161 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Terrasonic track mount	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Dan O'Mara	Depth to First Water:	10.98 ft bgs		
Drilling Asst:	E. Huellmantel / J. Pacheco	Sampling Method:	4 inch x 10 ft. Core Barrel	Project Number:	RC000753.0051
Logger:	D. Maurer / G. Jeffers	Sampling Interval:	Continuous		
Editor:	S. McGrane / G. Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid							
21	48				NR		(20.0 - 26.0') No recovery (NR)	(20.0 - 26.0') Poor recovery in loose sands. No indication of lost core. driller noted water at 24 feet. 26 to 24 feet was wet which indicated core recovered was 26 to 22 feet bgs.	(0.0 - 26.0') No water used							
22																
23																
24																
25																
26																
27	90	RB-4-SS-26-30 4/16/2019 11:20		Topock - Fluvial Deposits	SP-SM		(26.0 - 34.0') Topock - Fluvial Deposits; Poorly graded sand with silt (SP-SM); brown (7.5YR 4/2); very fine grained to medium grained; little silt; wet	(26.0 - 36.0') 15 gallons of water used; gallons of water recovered; gallons of water lost								
28		(28') brown (7.5YR 5/3)														
29																
30																
31		(31'); trace organics; 1 inch diameter by 3 inches long piece of wood observed														
32																
33																
34																
35		60					RB-4-SS-36-40 4/16/2019 11:30				Topock - Fluvial Deposits	SP		(36.0 - 40.0') Topock - Fluvial Deposits; Poorly graded sand (SP); brown (7.5YR 5/3); fine grained to medium grained; wet	(34.0 - 36.0') No recovery, soft sands, no indication that core fell out of core barrel	(36.0 - 46.0') No water used
36																
37																
38																
39																
40																

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Date Started:	04/11/2019	Surface Elevation:	466.0 ft amsl	Boring No.: <u>RB-4 Pilot</u>	
Date Completed:	04/24/2019	Northing (NAD83):	2102908.7		
Drilling Co.:	Cascade	Easting (NAD83):	7616336.4	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	161 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Terrasonic track mount	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Dan O'Mara	Depth to First Water:	10.98 ft bgs		
Drilling Asst:	E. Huellmantel / J. Pacheco	Sampling Method:	4 inch x 10 ft. Core Barrel	Project Number:	RC000753.0051
Logger:	D. Maurer / G. Jeffers	Sampling Interval:	Continuous		
Editor:	S. McGrane / G. Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid	
41	60	RB-4-VAS-41-46 (<0.033 U ppb) 4/12/2019 12:05		Topock - Fluvial Deposits	GW		(40.0 - 41.0') Topock - Fluvial Deposits; Well graded gravel with sand (GW); brown (7.5YR 5/4); small pebbles to very large pebbles, subround to round; some medium to coarse grained sand, subround to round; wet	(41.0 - 46.0') No recovery, loose sands, no indication that core fell out of core barrel	(36.0 - 46.0') No water used	
42										(41.0 - 46.0') No recovery (NR)
43										
44										
45										
46										
47	84	RB-4-SS-46-50 4/16/2019 11:35		Topock - Fluvial Deposits	SP		(46.0 - 52.0') Topock - Fluvial Deposits; Poorly graded sand with gravel (SP); brown (7.5YR 5/3); medium grained to coarse grained, subround to round; little small to very large pebbles, subround to round; wet	(46.0 - 56.0') 20 gallons of water used; 0 gallons of water recovered; 20 gallons of water lost		
48										
49		RB-4-SS-50-53 4/16/2019 11:40		Topock - Fluvial Deposits	SP-SM		(52.0 - 53.0') Topock - Fluvial Deposits; Poorly graded sand with silt (SP-SM); brown (7.5YR 5/3); fine grained to medium grained; little silt; wet			
50										
51					NR		(53.0 - 56.0') No recovery (NR)	(53.0 - 56.0') No recovery, loose sands, no indication that core fell out of core barrel		
52										
53										
54										
55										
56										
57	204	RB-4-SS-56-60 4/16/2019 11:45		Topock - Fluvial Deposits	SP-SM		(56.0 - 58.0') Topock - Fluvial Deposits; Poorly graded sand with silt (SP-SM); brown (7.5YR 5/3); fine grained to medium grained; little silt; trace medium to large pebbles, subround to round; wet	(56.0 - 76.0') 20 gallons of water used; 0 gallons of water recovered; 20 gallons of water lost		
58										
59				Topock - Fluvial Deposits	SM		(58.0 - 60.0') Topock - Fluvial Deposits; Silty sand with gravel (SM); brown (7.5YR 5/3); very fine grained to medium grained; little granules to very large pebbles; little silt; little clay			
60										







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Date Started:	04/11/2019	Surface Elevation:	466.0 ft amsl	Boring No.: <u>RB-4 Pilot</u>	
Date Completed:	04/24/2019	Northing (NAD83):	2102908.7		
Drilling Co.:	Cascade	Easting (NAD83):	7616336.4	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	161 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Terrasonic track mount	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Dan O'Mara	Depth to First Water:	10.98 ft bgs		
Drilling Asst:	E. Huellmantel / J. Pacheco	Sampling Method:	4 inch x 10 ft. Core Barrel	Project Number:	RC000753.0051
Logger:	D. Maurer / G. Jeffers	Sampling Interval:	Continuous		
Editor:	S. McGrane / G. Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
61				Topock - Fluvial Deposits	SP		(60.0 - 60.1') Topock - Fluvial Deposits; Poorly graded sand (SP); yellowish brown / moderate yellowish brown (10YR 5/4); medium grained to coarse grained, subround to round; wet		
62				Topock - Fluvial Deposits	SC		(60.1 - 60.4') Topock - Fluvial Deposits; Clayey sand (SC); brown (7.5YR 4/4); very fine grained to medium grained; some clay; little silt; wet		
63		RB-4-SS-61-65 4/16/2019 11:50		Topock - Fluvial Deposits	SP		(60.4 - 60.7') Topock - Fluvial Deposits; Lean clay (CL); dark brown (7.5YR 3/4); medium plasticity; little very fine to fine grained sand; little silt; wet		
64				Topock - Fluvial Deposits	SP		(60.7 - 65.0') Topock - Fluvial Deposits; Poorly graded sand with gravel (SP); brown (7.5YR 5/4); fine grained to medium grained; little small to very large pebbles, subround to round; trace silt; wet		
65				Topock - Fluvial Deposits	SP		(65.0 - 67.0') Topock - Fluvial Deposits; Poorly graded sand (SP); brown (7.5YR 5/4); fine grained to medium grained; trace small to medium pebbles, subround to round; trace silt		
66		RB-4-SS-65-69 4/16/2019 11:55		Topock - Fluvial Deposits	SP		(67.0 - 69.0') Topock - Fluvial Deposits; Poorly graded sand with gravel (SP); brown (7.5YR 5/4); fine grained to medium grained; little medium to large pebbles, subround to round; trace silt		
67				Topock - Fluvial Deposits	GP		(69.0 - 69.5') Topock - Fluvial Deposits; Poorly graded gravel with sand (GP); brown (7.5YR 5/4); granules to medium pebbles, subround to round; some medium to coarse grained sand, subround to round; wet		
68	204			Topock - Fluvial Deposits	SP		(69.5 - 71.0') Topock - Fluvial Deposits; Poorly graded sand (SP); brown (7.5YR 5/4); fine grained to medium grained; trace small to medium pebbles, subround to round; trace silt; wet		
69				Topock - Fluvial Deposits	SP		(71.0 - 73.0') Topock - Fluvial Deposits; Silt with sand (ML); dark brown (7.5YR 3/3) little yellowish brown (10YR 5/6); very fine grained to medium grained; low plasticity; some very fine to fine grained sand; little clay; wet		
70		RB-4-SS-71-73 4/16/2019 12:00		Topock - Fluvial Deposits	ML		(73.0 - 76.0') No recovery (NR)	(73.0 - 76.0') No recovery, loose sands, no indication that core fell out of core barrel	
71					NR		(75.5'); small layer of potential charcoal collected by on-site archeologist		
72							(76.0 - 80.0') Topock - Fluvial Deposits; Poorly graded sand (SP); brown (7.5YR 5/3); fine grained to medium grained; trace silt; wet		
73									
74									
75									
76									
77									
78	84	RB-4-SS-76-80 4/16/2019 12:05		Topock - Fluvial Deposits	SP				(76.0 - 86.0') 15 gallons of water used; 0 gallons of water recovered; 15 gallons of water lost
79									
80									

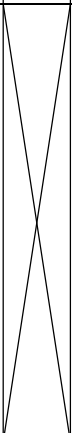
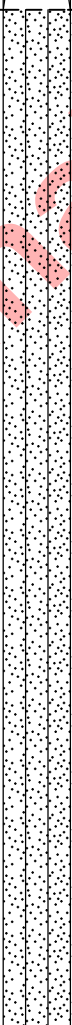
Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	04/11/2019	Surface Elevation:	466.0 ft amsl	Boring No.: <u>RB-4 Pilot</u>	
Date Completed:	04/24/2019	Northing (NAD83):	2102908.7		
Drilling Co.:	Cascade	Easting (NAD83):	7616336.4	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	161 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Terrasonic track mount	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Dan O'Mara	Depth to First Water:	10.98 ft bgs		
Drilling Asst:	E. Huellmantel / J. Pacheco	Sampling Method:	4 inch x 10 ft. Core Barrel	Project Number:	RC000753.0051
Logger:	D. Maurer / G. Jeffers	Sampling Interval:	Continuous		
Editor:	S. McGrane / G. Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
81	84	RB-4-SS-80-83 4/16/2019 12:10		Topock - Fluvial Deposits	GW		(80.0 - 83.0') Topock - Fluvial Deposits; Well graded gravel with sand (GW); brown (7.5YR 4/3); granules to very large pebbles, subround to round; some medium to very coarse grained sand, subround to round; trace silt; trace clay; wet	(83.0 - 86.0') No recovery, loose sands, no indication that core fell out of core barrel	(76.0 - 86.0') 15 gallons of water used; 0 gallons of water recovered; 15 gallons of water lost
82									
83		RB-4-VAS-81-86 (<0.033 U ppb) 4/12/2019 15:45		NR		(83.0 - 86.0') No recovery (NR)			
84									
85	168	RB-4-SS-86-88.5 4/16/2019 12:15		Topock - Fluvial Deposits	SP		(86.0 - 88.5') Topock - Fluvial Deposits; Poorly graded sand (SP); brown (7.5YR 5/4); fine grained to medium grained; trace silt; wet	(86.0 - 96.0') 15 gallons of water used; 0 gallons of water recovered; 15 gallons of water lost	
86									
87		Topock - Fluvial Deposits	GM		(88.5 - 90.0') Topock - Fluvial Deposits; Silty gravel with sand (GM); brown (7.5YR 4/3); granules to very large pebbles, subangular to round; little fine to medium grained sand; little silt; trace clay; wet				
88									
89		Topock - Fluvial Deposits	SP		(90.0 - 90.3') Topock - Fluvial Deposits; Poorly graded sand with gravel (SP); black (5Y 2.5/2); fine grained to coarse grained, subround to round; little granules to small pebbles, subround to round; trace silt; wet				
90									
91		Topock - Fluvial Deposits	GW-GM		(90.3 - 90.7') Topock - Fluvial Deposits; Poorly graded sand with gravel (SP); yellowish brown (10YR 5/6); medium grained to very coarse grained, subround to round; some granules to medium pebbles, subround to round; trace silt; wet; iron oxide staining				
92									
93		RB-4-SS-91-95 4/16/2019 12:20					(90.7 - 100.0') Topock - Fluvial Deposits; Well graded gravel with silt and sand (GW-GM); brown (7.5YR 4/3); granules to small cobbles, subround to round; little very fine to medium grained sand; little silt; trace clay; wet		
94									
95	RB-4-SS-95-100 4/16/2019 12:25						(96.0 - 106.0') 15 gallons of water used; 0 gallons of water recovered; 15 gallons of water lost		
96									
97									
98									
99									
100									

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Date Started:	04/11/2019	Surface Elevation:	466.0 ft amsl	Boring No.: <u>RB-4 Pilot</u>	
Date Completed:	04/24/2019	Northing (NAD83):	2102908.7		
Drilling Co.:	Cascade	Easting (NAD83):	7616336.4	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	161 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Terrasonic track mount	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Dan O'Mara	Depth to First Water:	10.98 ft bgs		
Drilling Asst:	E. Huellmantel / J. Pacheco	Sampling Method:	4 inch x 10 ft. Core Barrel	Project Number:	RC000753.0051
Logger:	D. Maurer / G. Jeffers	Sampling Interval:	Continuous		
Editor:	S. McGrane / G. Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid					
101	168				NR		(100.0 - 106.0') No recovery (NR)	(100.0 - 106.0') No recovery, loose sands, no indication that core fell out of core barrel	(96.0 - 106.0') 15 gallons of water used; 0 gallons of water recovered; 15 gallons of water lost					
102														
103														
104														
105														
106	240	RB-4-SS-106-110 4/16/2019 12:30		Topock - Alluvium Deposits	SM		(106.0 - 130.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); dark brown (7.5YR 3/3); very fine grained to very coarse grained, subround to round; some granules to very large pebbles, subround to round; little clay; trace silt; wet		(106.0 - 116.0') 15 gallons of water used; 0 gallons of water recovered; 15 gallons of water lost					
107														
108														
109														
110								(109'); decrease in granules and pebbles, increase in silt						
111		RB-4-SS-110-115 4/16/2019 12:35												
112														
113									(113') fine grained to very coarse grained, angular to subangular; some granules to medium pebbles, angular; decrease in granules and pebbles, increase in sand					
114														
115														
116		RB-4-SS-115-120 4/16/2019 12:40												(116.0 - 126.0') 15 gallons of water used; 0 gallons of water recovered; 15 gallons of water lost
117														
118														
119														
120														

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Date Started:	04/11/2019	Surface Elevation:	466.0 ft amsl	Boring No.: <u>RB-4 Pilot</u>	
Date Completed:	04/24/2019	Northing (NAD83):	2102908.7		
Drilling Co.:	Cascade	Easting (NAD83):	7616336.4	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	161 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Terrasonic track mount	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Dan O'Mara	Depth to First Water:	10.98 ft bgs		
Drilling Asst:	E. Huellmantel / J. Pacheco	Sampling Method:	4 inch x 10 ft. Core Barrel	Project Number:	RC000753.0051
Logger:	D. Maurer / G. Jeffers	Sampling Interval:	Continuous		
Editor:	S. McGrane / G. Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
121	240	RB-4-SS-120-125 4/16/2019 12:45	RB-4-VAS-121-126 (<0.033 U ppb) 4/13/2019 11:56	Topock - Alluvium Deposits	SM		(126') very fine grained to very coarse grained, angular to subangular; some granules to medium pebbles, angular to subangular; increase in granules and pebbles, no clay		(116.0 - 126.0') 15 gallons of water used; 0 gallons of water recovered; 15 gallons of water lost
122									
123									
124									
125	216	RB-4-SS-125-130 4/16/2019 12:50					(130.0 - 132.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); dark brown (7.5YR 3/3); granules to very large pebbles, angular; some very fine to very coarse grained sand, angular to subangular; little silt; trace clay; wet		(126.0 - 161.0') No water used
126									
127									
128									
129		RB-4-SS-130-135 4/16/2019 12:55					(132.0 - 141.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); dark brown (7.5YR 3/3); fine grained to coarse grained, angular to subangular; little granules to very large pebbles, angular to subangular; little silt; little clay; wet		
130									
131									
132									
133									
134									
135	RB-4-SS-135-140 4/16/2019 13:00	RB-4-VAS-136-141 (<0.17 U ppb) 4/13/2019 17:18	Topock - Alluvium Deposits	SM					
136									
137									
138									
139									
140									

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Date Started:	04/11/2019	Surface Elevation:	466.0 ft amsl	Boring No.: <u>RB-4 Pilot</u>	
Date Completed:	04/24/2019	Northing (NAD83):	2102908.7		
Drilling Co.:	Cascade	Easting (NAD83):	7616336.4	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	161 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Terrasonic track mount	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Dan O'Mara	Depth to First Water:	10.98 ft bgs		
Drilling Asst:	E. Huellmantel / J. Pacheco	Sampling Method:	4 inch x 10 ft. Core Barrel	Project Number:	RC000753.0051
Logger:	D. Maurer / G. Jeffers	Sampling Interval:	Continuous		
Editor:	S. McGrane / G. Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
141	216			Topock - Alluvium Deposits	SM				(126.0 - 161.0') No water used
142			Topock - Weathered Bedrock - conglomerate	SM		(141.0 - 144.0') Topock - Weathered Bedrock - conglomerate; Silty sand with gravel (SM); reddish brown (2.5YR 4/4); very fine grained to medium grained; some granules to very large pebbles, subangular to subround; some silt; trace small cobbles, subangular to subround; trace clay; moist to wet; weak cementation			
143									
144					(144.0 - 146.0') No recovery (NR)	(144.0 - 146.0') Lost core in hopper during sample collection			
145	NR								
146									
147	60				Topock - Weathered Bedrock - conglomerate	SM		(146.0 - 161.0') Topock - Weathered Bedrock - conglomerate; Silty sand with gravel (SM); reddish brown (2.5YR 4/4); very fine grained to medium grained; some silt; little granules to very large pebbles, subangular to subround; little clay; trace small cobbles, subangular to subround; moist to wet; weak cementation	
148									
149									
150									
151									
152									
153									
154									
155									
156									
157	120		RB-4-VAS-155-160 (<0.17 U ppb) 4/17/2019 12:48				(155'); trace large cobbles; trace boulders		
158									
159									
160									

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Date Started:	04/11/2019	Surface Elevation:	466.0 ft amsl	Boring No.: <u>RB-4 Pilot</u>	
Date Completed:	04/24/2019	Northing (NAD83):	2102908.7		
Drilling Co.:	Cascade	Easting (NAD83):	7616336.4	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	161 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Terrasonic track mount	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Dan O'Mara	Depth to First Water:	10.98 ft bgs		
Drilling Asst:	E. Huellmantel / J. Pacheco	Sampling Method:	4 inch x 10 ft. Core Barrel	Project Number:	RC000753.0051
Logger:	D. Maurer / G. Jeffers	Sampling Interval:	Continuous		
Editor:	S. McGrane / G. Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
161	120				SM				(126.0 - 161.0') No water used

End of Boring at 161.0' bgs.

Final 10/6/19

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	09/08/2019	Surface Elevation:	466.3 ft amsl	Well ID: RB-3
Date Completed:	09/28/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Dual Rotary	Northing (NAD83):	2103172.5	Project: Final GW Remedy Phase 1
Driller Name:	Jon Martinez	Easting (NAD83):	7616213.0	Location: PG&E Topock, Needles, California
Drilling Asst:	A. & H. Amezcuita	Borehole Diameter:	16-18 inches	
Logger:	E. Redner / D. Cornell	Water Level Start:	11.35 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	N/A	
Total Depth:	224 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
1					(0.0 - 25.0') 8" Suregrip 17 Casing		
2					(0.0 - 3.8') Formation Collapse		
3							
4		Topock - Fill	SP				
5							
6							
7							
8					(3.8 - 11.9') Portland Cement 3% Bentonite	(3.8 - 11.9') 86.9 gallons	(3.8 - 11.9') 120 gallons (38%) Note: Type I, II and V and Benseal, used >20% of the calculated volume due to potential grout migration and voids forming during drilling
9							
10					(9.5 - 10.5') Centralizer		
11			NR				
12							
13					(11.9 - 14.0') Bentonite seal pellets	(11.9 - 14.0') 4.8 buckets	(11.9 - 14.0') 5 buckets (4%) Note: Pel-Plug (TR30) 3/8"
14							
15							
16					(14.0 - 17.1') Choker Sand Seal	(14.0 - 17.1') 8.5 bags	(14.0 - 17.1') 8 bags (-6%) Note: Lapis Lustre Sand
17	RB-3-VAS-15-20 (<0.033 U ppb) 4/26/2019 15:35	Topock - Fill	SP				
18							
19			NR		(17.1 - 93.9') Cemex #0/30 MESH (30x70)	(17.1 - 93.9') 217.7 bags	(17.1 - 93.9') 204.5 bags (-6%) Note: Lapis Lustre Sand, swab filter pack for approximately 1.0 hour prior to installing choker sand seal
20							









Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, ground water data was collected during drilling of the pilot hole

Date Started:	09/08/2019	Surface Elevation:	466.3 ft amsl	Well ID: RB-3
Date Completed:	09/28/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Dual Rotary	Northing (NAD83):	2103172.5	Project: Final GW Remedy Phase 1
Driller Name:	Jon Martinez	Easting (NAD83):	7616213.0	Location: PG&E Topock, Needles, California
Drilling Asst:	A. & H. Amezguita	Borehole Diameter:	16-18 inches	
Logger:	E. Redner / D. Cornell	Water Level Start:	11.35 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	N/A	
Total Depth:	224 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction			Calculated Material Volumes	Material Volumes Installed
21					(0.0 - 25.0') 8" Suregrip 17 Casing		(3.0 - 21.1') 18.0" Borehole		
22									
23									
24									
25					(25.0 - 53.0') 8" 10-Slot 316 SS Wire Wrap Screen				
26		Topock - Fill	SP						
27									
28									
29									
30					(17.1 - 93.9') Cemex #0/30 MESH (30x70)		(21.1 - 41.3') 18.0" Borehole	(17.1 - 93.9') 217.7 bags	(17.1 - 93.9') 204.5 bags (-6%) Note: Lapis Lustre Sand, swab filter pack for approximately 1.0 hour prior to installing chocker sand seal
31									
32									
33									
34			NR						
35									
36									
37		Topock - Fill	SP						
38									
39									
40			SW						

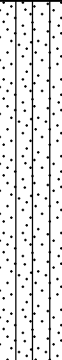
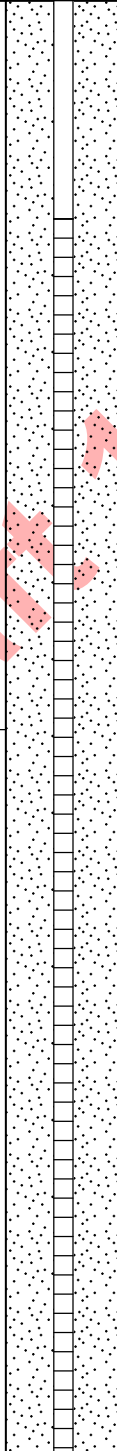


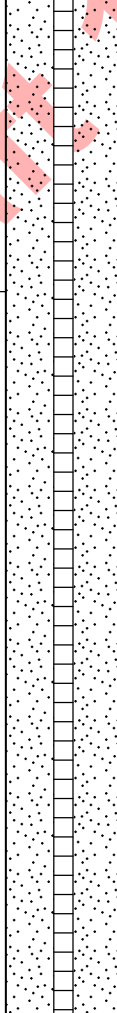

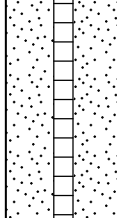

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Date Started:	09/08/2019	Surface Elevation:	466.3 ft amsl	Well ID: RB-3
Date Completed:	09/28/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Dual Rotary	Northing (NAD83):	2103172.5	Project: Final GW Remedy Phase 1
Driller Name:	Jon Martinez	Easting (NAD83):	7616213.0	Location: PG&E Topock, Needles, California
Drilling Asst:	A. & H. Amezcuita	Borehole Diameter:	16-18 inches	
Logger:	E. Redner / D. Cornell	Water Level Start:	11.35 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	N/A	
Total Depth:	224 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
41		Topock - Fluvial Deposits	SW		(25.0 - 53.0') 8" 10-Slot 316 SS Wire Wrap Screen		
42							
43							
44							
45			NR		(21.1 - 41.3') 18.0" Borehole		
46							
47							
48							
49		Topock - Fluvial Deposits	SW				
50							
51							
52							
53	RB-3-VAS-50-55 (0.100 J ppb) 4/27/2019 11:10	Topock - Fluvial Deposits	SP		(17.1 - 93.9') Cemex #0/30 MESH (30x70)	(17.1 - 93.9') 217.7 bags	(17.1 - 93.9') 204.5 bags (-6%) Note: Lapis Lustre Sand, swab filter pack for approximately 1.0 hour prior to installing chocker sand seal
54							
55							
56							
57		Topock - Fluvial Deposits	NR		(41.3 - 61.2') 18.0" Borehole		
58					(53.0 - 63.0') 8" Suregrip 17 Casing		
59							
60							
61		Topock - Fluvial Deposits	GW				
62							
63		Topock - Fluvial Deposits	ML		(56.5 - 57.5') Centralizer		
64							
65							
66		Topock - Fluvial Deposits	ML				

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Date Started:	09/08/2019	Surface Elevation:	466.3 ft amsl	Well ID: RB-3
Date Completed:	09/28/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Dual Rotary	Northing (NAD83):	2103172.5	Project: Final GW Remedy Phase 1
Driller Name:	Jon Martinez	Easting (NAD83):	7616213.0	Location: PG&E Topock, Needles, California
Drilling Asst:	A. & H. Amezguita	Borehole Diameter:	16-18 inches	
Logger:	E. Redner / D. Cornell	Water Level Start:	11.35 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	N/A	
Total Depth:	224 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction		Calculated Material Volumes	Material Volumes Installed
61		Topock - Alluvium Deposits	ML			(53.0 - 63.0') 8" Suregrip 17 Casing		
62						(41.3 - 61.2') 18.0" Borehole		
63						(63.0 - 91.0') 8" 10-Slot 316 SS Wire Wrap Screen		
64								
65		Topock - Alluvium Deposits	GM					
66		Topock - Alluvium Deposits	SM			(17.1 - 93.9') Cemex #0/30 MESH (30x70)	(17.1 - 93.9') 217.7 bags	(17.1 - 93.9') 204.5 bags (-6%) Note: Lapis Lustre Sand, swab filter pack for approximately 1.0 hour prior to installing chocker sand seal
67								
68								
69								
70								
71								
72								
73								
74								
75								
76								
77		Topock - Alluvium Deposits	ML					
78								
79								
80		Topock - Alluvium Deposits	SM					

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Date Started:	09/08/2019	Surface Elevation:	466.3 ft amsl	Well ID: RB-3
Date Completed:	09/28/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Dual Rotary	Northing (NAD83):	2103172.5	Project: Final GW Remedy Phase 1
Driller Name:	Jon Martinez	Easting (NAD83):	7616213.0	Location: PG&E Topock, Needles, California
Drilling Asst:	A. & H. Amezguita	Borehole Diameter:	16-18 inches	
Logger:	E. Redner / D. Cornell	Water Level Start:	11.35 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	N/A	
Total Depth:	224 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
81	RB-3-VAS-80-85 (0.132 J ppb) 4/27/2019 15:18	Topock - Alluvium Deposits	SM		(63.0 - 91.0') 8" 10-Slot 316 SS Wire Wrap Screen		
82					(61.2 - 81.1') 18.0" Borehole		
83							
84							
85							
86							
87					(17.1 - 93.9') Cemex #0/30 MESH (30x70)	(17.1 - 93.9') 217.7 bags	(17.1 - 93.9') 204.5 bags (-6%) Note: Lapis Lustre Sand, swab filter pack for approximately 1.0 hour prior to installing choker sand seal
88							
89							
90		Topock - Alluvium Deposits	ML				
91					(81.1 - 101.5') 18.0" Borehole		
92					(91.0 - 111.0') 8" Suregrip 17 Casing		
93		Topock - Alluvium Deposits	SM				
94							
95					(93.9 - 94.9') Cemex #60 MESH (40x70)	(93.9 - 94.9') 2.8 bags	(93.9 - 94.9') 2 bags (-29%) Note: Lapis Lustre Sand, used <20% of the calculated volume due to potential formation collapse when pulling the casing
96							
97		Topock - Alluvium Deposits	GM		(94.9 - 100.5') Bentonite seal pellets	(94.9 - 100.5') 12.8 buckets	(94.9 - 100.5') 10 buckets (-22%) Note: Pel-Plug (TR30) 3/8", used <20% of the calculated volume due to potential formation collapse when pulling the casing
98							
99							
100							

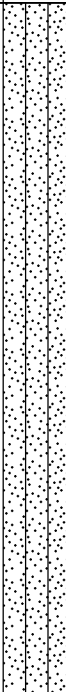

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Date Started:	09/08/2019	Surface Elevation:	466.3 ft amsl	Well ID: RB-3
Date Completed:	09/28/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Dual Rotary	Northing (NAD83):	2103172.5	Project: Final GW Remedy Phase 1
Driller Name:	Jon Martinez	Easting (NAD83):	7616213.0	Location: PG&E Topock, Needles, California
Drilling Asst:	A. & H. Amezguita	Borehole Diameter:	16-18 inches	
Logger:	E. Redner / D. Cornell	Water Level Start:	11.35 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	N/A	
Total Depth:	224 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
101		Topock - Alluvium Deposits	GM		(91.0 - 111.0') 8" Suregrip 17 Casing		
102					(81.1 - 101.5') 18.0" Borehole		
103		Topock - Alluvium Deposits	SM				
104							
105							
106		Topock - Alluvium Deposits	GM		(105.5 - 106.5') Centralizer		
107					(101.5 - 110.6') 18.0" Borehole		
108		Topock - Alluvium Deposits	SM				
109							
110					(100.5 - 224.0') Cemex #60 MESH (40x70)	(100.5 - 224.0') 264.6 bags	(100.5 - 224.0') 285 bags (8%) Note: Lapis Lustre Sand, swab filter pack for approximately 3.5 hours prior to installing bentonite seal
111							
112		Topock - Alluvium Deposits	GM		(111.0 - 216.0') 8" 8-Slot 316 SS Wire Wrap Screen		
113							
114							
115					(110.6 - 120.8') 16.0" Borehole		
116							
117		Topock - Alluvium Deposits	SM				
118							
119							
120							

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Date Started:	09/08/2019	Surface Elevation:	466.3 ft amsl	Well ID: RB-3
Date Completed:	09/28/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Dual Rotary	Northing (NAD83):	2103172.5	Project: Final GW Remedy Phase 1
Driller Name:	Jon Martinez	Easting (NAD83):	7616213.0	Location: PG&E Topock, Needles, California
Drilling Asst:	A. & H. Amezguita	Borehole Diameter:	16-18 inches	
Logger:	E. Redner / D. Cornell	Water Level Start:	11.35 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	N/A	
Total Depth:	224 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
121	RB-3-VAS-120-125 (<0.17 U ppb) 4/28/2019 11:29	Topock - Alluvium Deposits	SM		(111.0 - 216.0') 8" 8-Slot 316 SS Wire Wrap Screen		
122							
123							
124							
125							
126		Topock - Alluvium Deposits	SM		(100.5 - 224.0') Cemex #60 MESH (40x70)	(120.8 - 140.5') 16.0" Borehole	(100.5 - 224.0') 264.6 bags
127							
128							
129							
130							
131							
132							
133							
134							
135							
136							
137							
138							
139							
140							

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Date Started:	09/08/2019	Surface Elevation:	466.3 ft amsl	Well ID: RB-3
Date Completed:	09/28/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Dual Rotary	Northing (NAD83):	2103172.5	Project: Final GW Remedy Phase 1
Driller Name:	Jon Martinez	Easting (NAD83):	7616213.0	Location: PG&E Topock, Needles, California
Drilling Asst:	A. & H. Amezcuita	Borehole Diameter:	16-18 inches	
Logger:	E. Redner / D. Cornell	Water Level Start:	11.35 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	N/A	
Total Depth:	224 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
141		Topock - Alluvium Deposits	GM				
142							
143							
144							
145		Topock - Alluvium Deposits	SM				
146							
147							
148							
149							
150		Topock - Alluvium Deposits	GM		(100.5 - 224.0') Cemex #60 MESH (40x70)	(100.5 - 224.0') 264.6 bags	(100.5 - 224.0') 285 bags (8%) Note: Lapis Lustre Sand, swab filter pack for approximately 3.5 hours prior to installing bentonite seal
151							
152	RB-3-VAS-150-155 (<0.17 U ppb) 4/29/2019 10:13	Topock - Alluvium Deposits	SM				
153							
154							
155							
156							
157		Topock - Weathered Bedrock - conglomerate	ML				
158							
159							
160							

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Date Started:	09/08/2019	Surface Elevation:	466.3 ft amsl	Well ID: RB-3
Date Completed:	09/28/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Dual Rotary	Northing (NAD83):	2103172.5	Project: Final GW Remedy Phase 1
Driller Name:	Jon Martinez	Easting (NAD83):	7616213.0	Location: PG&E Topock, Needles, California
Drilling Asst:	A. & H. Amezguita	Borehole Diameter:	16-18 inches	
Logger:	E. Redner / D. Cornell	Water Level Start:	11.35 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	N/A	
Total Depth:	224 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
161					(111.0 - 216.0') 8" 8-Slot 316 SS Wire Wrap Screen (140.5 - 161.6') 16.0" Borehole		
162							
163							
164							
165							
166							
167							
168							
169							
170		Topock - Weathered Bedrock - conglomerate	ML		(100.5 - 224.0') Cemex #60 MESH (40x70)	(100.5 - 224.0') 264.6 bags	(100.5 - 224.0') 285 bags (8%) Note: Lapis Lustre Sand, swab filter pack for approximately 3.5 hours prior to installing bentonite seal
171					(161.6 - 181.8') 16.0" Borehole		
172							
173							
174							
175							
176							
177							
178							
179							
180							

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Date Started:	09/08/2019	Surface Elevation:	466.3 ft amsl	Well ID: RB-3
Date Completed:	09/28/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Dual Rotary	Northing (NAD83):	2103172.5	Project: Final GW Remedy Phase 1
Driller Name:	Jon Martinez	Easting (NAD83):	7616213.0	Location: PG&E Topock, Needles, California
Drilling Asst:	A. & H. Amezguita	Borehole Diameter:	16-18 inches	
Logger:	E. Redner / D. Cornell	Water Level Start:	11.35 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	N/A	
Total Depth:	224 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction		Calculated Material Volumes	Material Volumes Installed		
181	RB-3-VAS-180-185 (<0.033 U ppb) 4/29/2019 15:38	Topock - Weathered Bedrock - conglomerate	ML			(111.0 - 216.0') 8" 8-Slot 316 SS Wire Wrap Screen (161.6 - 181.8') 16.0" Borehole				
182										
183										
184										
185										
186		Topock - Weathered Bedrock - conglomerate	SM			(100.5 - 224.0') Cemex #60 MESH (40x70)	(181.8 - 201.2') 16.0" Borehole	(100.5 - 224.0') 264.6 bags	(100.5 - 224.0') 285 bags (8%) Note: Lapis Lustre Sand, swab filter pack for approximately 3.5 hours prior to installing bentonite seal	
187										
188										
189										
190										
191		Topock - Weathered Bedrock - conglomerate	ML							
192										
193										
194										
195										
196		Topock - Weathered Bedrock - conglomerate	ML							
197										
198										
199										
200										

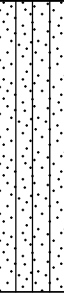
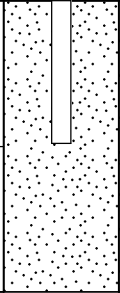
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Date Started:	09/08/2019	Surface Elevation:	466.3 ft amsl	Well ID: RB-3
Date Completed:	09/28/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Dual Rotary	Northing (NAD83):	2103172.5	Project: Final GW Remedy Phase 1
Driller Name:	Jon Martinez	Easting (NAD83):	7616213.0	Location: PG&E Topock, Needles, California
Drilling Asst:	A. & H. Amezguita	Borehole Diameter:	16-18 inches	
Logger:	E. Redner / D. Cornell	Water Level Start:	11.35 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	N/A	
Total Depth:	224 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
201					(111.0 - 216.0') 8" 8-Slot 316 SS Wire Wrap Screen		(198.0 - 205.0')
202					(181.8 - 201.2') 16.0" Borehole		Note: Note: Well screen is damaged and twisted, repairs to the well are planned pending agency approval
203							
204							
205							
206		Topock - Weathered Bedrock - conglomerate	ML				
207							
208							
209							
210					(100.5 - 224.0') Cemex #60 MESH (40x70)	(100.5 - 224.0') 264.6 bags	(100.5 - 224.0') 285 bags (8%)
211					(201.2 - 220.5') 16.0" Borehole		Note: Lapis Lustre Sand, swab filter pack for approximately 3.5 hours prior to installing bentonite seal
212	RB-3-VAS-205-210 (<0.17 U ppb) 4/30/2019 15:15						
213							
214							
215		Topock - Weathered Bedrock - conglomerate	SM				
216							
217							
218							
219		Topock - Weathered Bedrock - conglomerate	ML		(218.0 - 219.0') Centralizer		
220							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, ground water data was collected during drilling of the pilot hole

Date Started:	09/08/2019	Surface Elevation:	466.3 ft amsl	Well ID: RB-3
Date Completed:	09/28/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Dual Rotary	Northing (NAD83):	2103172.5	Project: Final GW Remedy Phase 1
Driller Name:	Jon Martinez	Easting (NAD83):	7616213.0	Location: PG&E Topock, Needles, California
Drilling Asst:	A. & H. Amezguita	Borehole Diameter:	16-18 inches	
Logger:	E. Redner / D. Cornell	Water Level Start:	11.35 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	N/A	
Total Depth:	224 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction			Calculated Material Volumes	Material Volumes Installed
221	RB-3-VAS-205-210 (<0.17 U ppb) 4/30/2019 15:15	Topock - Weathered Bedrock - conglomerate	ML			(100.5 - 224.0') Cemex #60 MESH (40x70)	(220.5 - 224.0') 16.0" Borehole	(100.5 - 224.0') 264.6 bags	(219.45 - 221.69') Note: Filled with sand, there is potential damage to the well sump, PVC fragments were bailed from the well
222									(100.5 - 224.0') 285 bags (8%) Note: Lapis Lustre Sand, swab filter pack for approximately 3.5 hours prior to installing bentonite seal
223									
224									
End of Boring at 224.0' bgs.									
225									
226									
227									
228									
229									
230									
231									
232									
233									
234									
235									
236									
237									
238									
239									
240									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, ground water data was collected during drilling of the pilot hole

Date Started:	04/11/2019	Surface Elevation:	466.0 ft amsl	Well ID: RB-4 Pilot
Date Completed:	04/24/2019	Northing (NAD83):	2102908.7	
Drilling Co.:	Cascade	Easting (NAD83):	7616336.4	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	161 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Dan O'Mara	Borehole Diameter:	6-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	E. Huellmantel / J. Pacheco	Depth to First Water:	10.98 ft bgs	
Logger:	D. Maurer / G. Jeffers	Editor:	S. McGrane / G. Willford	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
1		Topock - Fill	SP		(0.0 - 0.5') Steel Plate		
2							
3					(0.5 - 5.0') Plastering Sand	(0.5 - 5.0') 6.1 bags	(0.5 - 5.0') 3 bags (-51%) Note: Wildcat Washed
4			NR				
5							
6							
7		Topock - Fill	SP				
8							
9							
10							
11							
12			NR				
13					(5.0 - 136.0') Cemex #3 MESH (8x10)	(5.0 - 136.0') 51.4 bags	(5.0 - 136.0') 69.5 bags (35%) Note: Lapis Lustre Sand
14							
15							
16							
17	RB-4-VAS-15-20 (0.0556 J ppb) 4/12/2019 09:20	Topock - Fluvial Deposits	SP				
18							
19		Topock - Fluvial Deposits	SP-SM				
20							

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Temporary Backfill Log

Date Started:	04/11/2019	Surface Elevation:	466.0 ft amsl	Well ID: RB-4 Pilot
Date Completed:	04/24/2019	Northing (NAD83):	2102908.7	
Drilling Co.:	Cascade	Easting (NAD83):	7616336.4	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	161 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Dan O'Mara	Borehole Diameter:	6-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	E. Huellmantel / J. Pacheco	Depth to First Water:	10.98 ft bgs	
Logger:	D. Maurer / G. Jeffers	Editor:	S. McGrane / G. Willford	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
21							
22							
23			NR				
24							
25							
26							
27							
28							
29							
30		Topock - Fluvial Deposits	SP-SM		(5.0 - 136.0') Cemex #3 MESH (8x10)	(3.5 - 161.0') 6" Borehole	(5.0 - 136.0') 51.4 bags
31							
32							
33							
34							
35			NR				
36							
37							
38		Topock - Fluvial Deposits	SP				
39							
40							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started:	04/11/2019	Surface Elevation:	466.0 ft amsl	Well ID: RB-4 Pilot
Date Completed:	04/24/2019	Northing (NAD83):	2102908.7	
Drilling Co.:	Cascade	Easting (NAD83):	7616336.4	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	161 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Dan O'Mara	Borehole Diameter:	6-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	E. Huellmantel / J. Pacheco	Depth to First Water:	10.98 ft bgs	
Logger:	D. Maurer / G. Jeffers	Editor:	S. McGrane / G. Willford	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
41		Topock - Fluvial Deposits	GW				
42							
43	RB-4-VAS-41-46 (<0.033 U ppb) 4/12/2019 12:05		NR				
44							
45							
46							
47							
48							
49		Topock - Fluvial Deposits	SP				
50					(5.0 - 136.0') Cemex #3 MESH (8x10)	(3.5 - 161.0') 6" Borehole	(5.0 - 136.0') 51.4 bags
51							(5.0 - 136.0') 69.5 bags (35%) Note: Lapis Lustre Sand
52							
53		Topock - Fluvial Deposits	SP-SM				
54			NR				
55							
56							
57		Topock - Fluvial Deposits	SP-SM				
58							
59		Topock - Fluvial Deposits	SM				
60							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started:	04/11/2019	Surface Elevation:	466.0 ft amsl	Well ID: RB-4 Pilot
Date Completed:	04/24/2019	Northing (NAD83):	2102908.7	
Drilling Co.:	Cascade	Easting (NAD83):	7616336.4	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	161 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Dan O'Mara	Borehole Diameter:	6-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	E. Huellmantel / J. Pacheco	Depth to First Water:	10.98 ft bgs	
Logger:	D. Maurer / G. Jeffers	Editor:	S. McGrane / G. Willford	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
61		Topock - Fluvial Deposits	SP				
62		Topock - Fluvial Deposits	SC				
63		Topock - Fluvial Deposits	CL				
64		Topock - Fluvial Deposits					
65		Topock - Fluvial Deposits	SP				
66		Topock - Fluvial Deposits	SP				
67		Topock - Fluvial Deposits	SP				
68		Topock - Fluvial Deposits	SP				
69		Topock - Fluvial Deposits	GP				
70		Topock - Fluvial Deposits	SP		(5.0 - 136.0') Cemex #3 MESH (8x10)	(3.5 - 161.0') 6" Borehole	(5.0 - 136.0') 51.4 bags
71		Topock - Fluvial Deposits	SP				
72		Topock - Fluvial Deposits	ML				
73		Topock - Fluvial Deposits	NR				
74		Topock - Fluvial Deposits	NR				
75		Topock - Fluvial Deposits	NR				
76		Topock - Fluvial Deposits	NR				
77		Topock - Fluvial Deposits	SP				
78		Topock - Fluvial Deposits	SP				
79		Topock - Fluvial Deposits	SP				
80		Topock - Fluvial Deposits	SP				

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Date Started:	04/11/2019	Surface Elevation:	466.0 ft amsl	Well ID: RB-4 Pilot
Date Completed:	04/24/2019	Northing (NAD83):	2102908.7	
Drilling Co.:	Cascade	Easting (NAD83):	7616336.4	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	161 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Dan O'Mara	Borehole Diameter:	6-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	E. Huellmantel / J. Pacheco	Depth to First Water:	10.98 ft bgs	
Logger:	D. Maurer / G. Jeffers	Editor:	S. McGrane / G. Willford	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
81	RB-4-VAS-81-86 (<0.033 U ppb) 4/12/2019 15:45	Topock - Fluvial Deposits	GW				
82							
83							
84							
85			NR				
86							
87		Topock - Fluvial Deposits	SP		(5.0 - 136.0') Cemex #3 MESH (8x10)	(3.5 - 161.0') 6" Borehole	(5.0 - 136.0') 51.4 bags
88							
89		Topock - Fluvial Deposits	GM				
90		Topock - Fluvial Deposits	SP				
91		Topock - Fluvial Deposits	SP				
92							
93							
94							
95		Topock - Fluvial Deposits	GW-GM				
96							
97							
98							
99							
100							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Temporary Backfill Log

Date Started:	04/11/2019	Surface Elevation:	466.0 ft amsl	Well ID: RB-4 Pilot
Date Completed:	04/24/2019	Northing (NAD83):	2102908.7	
Drilling Co.:	Cascade	Easting (NAD83):	7616336.4	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	161 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Dan O'Mara	Borehole Diameter:	6-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	E. Huellmantel / J. Pacheco	Depth to First Water:	10.98 ft bgs	
Logger:	D. Maurer / G. Jeffers	Editor:	S. McGrane / G. Willford	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
101							
102							
103			NR				
104							
105							
106							
107							
108							
109							
110					(5.0 - 136.0') Cemex #3 MESH (8x10)	(3.5 - 161.0') 6" Borehole	(5.0 - 136.0') 51.4 bags
111							
112							
113		Topock - Alluvium Deposits	SM				(5.0 - 136.0') 69.5 bags (35%) Note: Lapis Lustre Sand
114							
115							
116							
117							
118							
119							
120							

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Date Started:	04/11/2019	Surface Elevation:	466.0 ft amsl	Well ID: RB-4 Pilot
Date Completed:	04/24/2019	Northing (NAD83):	2102908.7	
Drilling Co.:	Cascade	Easting (NAD83):	7616336.4	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	161 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Dan O'Mara	Borehole Diameter:	6-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	E. Huellmantel / J. Pacheco	Depth to First Water:	10.98 ft bgs	
Logger:	D. Maurer / G. Jeffers	Editor:	S. McGrane / G. Willford	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction		Calculated Material Volumes	Material Volumes Installed			
121	RB-4-VAS-121-126 (<0.033 U ppb) 4/13/2019 11:56	Topock - Alluvium Deposits	SM			(5.0 - 136.0') Cemex #3 MESH (8x10)	(5.0 - 136.0') 51.4 bags	(5.0 - 136.0') 69.5 bags (35%) Note: Lapis Lustre Sand			
122											
123											
124											
125											
126	RB-4-VAS-136-141 (<0.17 U ppb) 4/13/2019 17:18	Topock - Alluvium Deposits	GM			(5.0 - 136.0') Cemex #3 MESH (8x10)	(5.0 - 136.0') 51.4 bags	(5.0 - 136.0') 69.5 bags (35%) Note: Lapis Lustre Sand			
127											
128		Topock - Alluvium Deposits	SM						(136.0 - 146.0') Plastering Sand	(136.0 - 146.0') 3.9 bags	(136.0 - 146.0') 4 bags (3%) Note: Wildcat Washed
129											
130											
131											
132											
133											
134											
135											
136											
137											
138											
139											
140											

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started:	04/11/2019	Surface Elevation:	466.0 ft amsl	Well ID: RB-4 Pilot
Date Completed:	04/24/2019	Northing (NAD83):	2102908.7	
Drilling Co.:	Cascade	Easting (NAD83):	7616336.4	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	161 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Dan O'Mara	Borehole Diameter:	6-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	E. Huellmantel / J. Pacheco	Depth to First Water:	10.98 ft bgs	
Logger:	D. Maurer / G. Jeffers	Editor:	S. McGrane / G. Willford	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
141		Topock - Alluvium Deposits	SM				
142		Topock - Weathered Bedrock - conglomerate	SM		(136.0 - 146.0') Plastering Sand	(136.0 - 146.0') 3.9 bags	(136.0 - 146.0') 4 bags (3%) Note: Wildcat Washed
143							
144							
145			NR				
146							
147							
148							
149							
150					(3.5 - 161.0') 6" Borehole		
151							
152							
153		Topock - Weathered Bedrock - conglomerate	SM		(146.0 - 161.0') Bentonite seal chips	(146.0 - 161.0') 4.1 bags	(146.0 - 161.0') 4 bags (-2%) Note: Puregold Medium Chips
154							
155							
156							
157	RB-4-VAS-155-160 (<0.17 U ppb) 4/17/2019 12:48						
158							
159							
160							

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Date Started:	04/11/2019	Surface Elevation:	466.0 ft amsl	Well ID: RB-4 Pilot
Date Completed:	04/24/2019	Northing (NAD83):	2102908.7	
Drilling Co.:	Cascade	Easting (NAD83):	7616336.4	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	161 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Dan O'Mara	Borehole Diameter:	6-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	E. Huellmantel / J. Pacheco	Depth to First Water:	10.98 ft bgs	
Logger:	D. Maurer / G. Jeffers	Editor:	S. McGrane / G. Willford	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction		Calculated Material Volumes	Material Volumes Installed
161			SM		(146.0 - 161.0') Bentonite seal chips	(3.5 - 161.0') 6" Borehole	(146.0 - 161.0') 4.1 bags	(146.0 - 161.0') 4 bags (-2%) Note: Puregold Medium Chips
162								
163								
164								
165								
166								
167								
168								
169								
170								
171								
172								
173								
174								
175								
176								
177								
178								
179								
180								

Final 10/6/19

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started:	08/06/2019	Surface Elevation:	N/A	Boring No.: <u>RB-4</u>
Date Completed:	08/21/2019	Northing (NAD83):	N/A	
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client: PG&E
Drilling Method:	Dual Rotary	Total Depth:	146 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Foremost DR-24HD	Conductor Casing Diameter:	18 inches	Location: PG&E Topock, Needles, California
Driller Name:	Jon Martinez	Drill Casing Diameter:	16 inches	
Drilling Asst:	A. & H. Amezcuita	Drill Bit:	15.5 inch Tricone	Project Number: RC000753.0051
Tool-Pusher:	Scott Johnson	Depth to First Water:	10.98 ft bgs	
Rig Geologist:	E. Nygaard / A. Mack	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Drilling Run and Average Penetration Rate	USCS Code	USCS Class	Casing Diameter	Description (See Pilot boring log for full geologic descriptions)	Drilling Notes	Drilling Fluid
1		SP			(0.0 - 2.0') Topock - Fill; Poorly graded sand (SP); (10YR5/3)	(0.0 - 20.0') Smooth drilling	(0.0 - 40.0') 4176 gallons of water used; 2800 gallons of water recovered; 1376 gallons of water lost
2					(2.0 - 6.0') No recovery (NR)		
3							
4		NR					
5							
6					(6.0 - 8.0') Topock - Fill; Poorly graded sand (SP); (10YR5/3)		
7		SP					
8					(8.0 - 16.0') No recovery (NR)		
9							
10	(0.0 - 20.0) 2.25 mins/ft			(0.0 - 20.0') 18.0" Steel Casing		(10.0') Observed Cemex #3 MESH (8x10) sand in drill cuttings (see photo log)	
11							
12		NR					
13							
14							
15							
16					(16.0 - 17.5') Topock - Fluvial Deposits; Poorly graded sand (SP); brown (7.5YR 5/4)		
17		SP					
18					(17.5 - 20.0') Topock - Fluvial Deposits; Poorly graded sand with silt (SP-SM); brown (7.5YR 4/2) (18') brown (7.5YR 4/3)		
19		SP-SM					
20							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater

Remarks: NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval for RB-4 Pilot; Gallons

Gained/Lost: (+) = water gained from the formation, (-) = water lost to the formation

Date Started:	08/06/2019	Surface Elevation:	N/A	Boring No.: RB-4
Date Completed:	08/21/2019	Northing (NAD83):	N/A	
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client: PG&E
Drilling Method:	Dual Rotary	Total Depth:	146 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Foremost DR-24HD	Conductor Casing Diameter:	18 inches	Location: PG&E Topock, Needles, California
Driller Name:	Jon Martinez	Drill Casing Diameter:	16 inches	
Drilling Asst:	A. & H. Amezguita	Drill Bit:	15.5 inch Tricone	Project Number: RC000753.0051
Tool-Pusher:	Scott Johnson	Depth to First Water:	10.98 ft bgs	
Rig Geologist:	E. Nygaard / A. Mack	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	








Depth (ft)	Drilling Run and Average Penetration Rate	USCS Code	USCS Class	Casing Diameter	Description (See Pilot boring log for full geologic descriptions)	Drilling Notes	Drilling Fluid
21					(20.0 - 26.0') No recovery (NR)	(20.0') Observed Cemex #3 MESH (8x10) sand in drill cuttings (see photo log) (20.1 - 40.0') Drilling became a little rougher (21.0') Observed Cemex #3 MESH (8x10) sand in drill cuttings (see photo log)	(0.0 - 40.0') 4176 gallons of water used; 2800 gallons of water recovered; 1376 gallons of water lost
22							
23		NR					
24							
25							
26					(26.0 - 34.0') Topock - Fluvial Deposits; Poorly graded sand with silt (SP-SM); brown (7.5YR 4/2)		
27							
28							
29							
30	(20.0 - 40.0) 3.75 mins/ft	SP-SM		(20.0 - 40.0') 18.0" Steel Casing		(30.0') Observed Cemex #3 MESH (8x10) sand in drill cuttings (see photo log)	
31							
32							
33							
34					(34.0 - 36.0') No recovery (NR)		
35		NR					
36					(36.0 - 40.0') Topock - Fluvial Deposits; Poorly graded sand (SP); brown (7.5YR 5/3)		
37							
38		SP					
39							
40							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater

Remarks: NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval for RB-4 Pilot; Gallons

Gained/Lost: (+) = water gained from the formation, (-) = water lost to the formation

Date Started:	08/06/2019	Surface Elevation:	N/A	Boring No.: <u>RB-4</u>
Date Completed:	08/21/2019	Northing (NAD83):	N/A	
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client: PG&E
Drilling Method:	Dual Rotary	Total Depth:	146 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Foremost DR-24HD	Conductor Casing Diameter:	18 inches	Location: PG&E Topock, Needles, California
Driller Name:	Jon Martinez	Drill Casing Diameter:	16 inches	
Drilling Asst:	A. & H. Amezcuita	Drill Bit:	15.5 inch Tricone	Project Number: RC000753.0051
Tool-Pusher:	Scott Johnson	Depth to First Water:	10.98 ft bgs	
Rig Geologist:	E. Nygaard / A. Mack	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Drilling Run and Average Penetration Rate	USCS Code	USCS Class	Casing Diameter	Description (See Pilot boring log for full geologic descriptions)	Drilling Notes	Drilling Fluid
41		GW			(40.0 - 41.0') Topock - Fluvial Deposits; Well graded gravel with sand (GW); brown (7.5YR 5/4)	(40.0') Observed Cemex #3 MESH (8x10) sand in drill cuttings (see photo log)	(40.0 - 85.0') 21600 gallons of water used; 12960 gallons of water recovered; 8640 gallons of water lost
42					(41.0 - 46.0') No recovery (NR)	(40.1 - 60.0') Rough drilling	
43		NR					
44							
45							
46					(46.0 - 52.0') Topock - Fluvial Deposits; Poorly graded sand with gravel (SP); brown (7.5YR 5/3)		
47							
48							
49		SP					
50	(40.0 - 60.0) 7.01 mins/ft			(40.0 - 60.0') 18.0" Steel Casing		(50.0') Observed Cemex #3 MESH (8x10) sand in drill cuttings (see photo log)	
51							
52							
53		SP-SM			(52.0 - 53.0') Topock - Fluvial Deposits; Poorly graded sand with silt (SP-SM); brown (7.5YR 5/3)		
54					(53.0 - 56.0') No recovery (NR)		
55		NR					
56							
57		SP-SM			(56.0 - 58.0') Topock - Fluvial Deposits; Poorly graded sand with silt (SP-SM); brown (7.5YR 5/3)		
58							
59		SM			(58.0 - 60.0') Topock - Fluvial Deposits; Silty sand with gravel (SM); brown (7.5YR 5/3)		
60							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater

Remarks: NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval for RB-4 Pilot; Gallons

Gained/Lost: (+) = water gained from the formation, (-) = water lost to the formation

Date Started:	08/06/2019	Surface Elevation:	N/A	Boring No.: RB-4
Date Completed:	08/21/2019	Northing (NAD83):	N/A	
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client: PG&E
Drilling Method:	Dual Rotary	Total Depth:	146 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Foremost DR-24HD	Conductor Casing Diameter:	18 inches	Location: PG&E Topock, Needles, California
Driller Name:	Jon Martinez	Drill Casing Diameter:	16 inches	
Drilling Asst:	A. & H. Amezguita	Drill Bit:	15.5 inch Tricone	Project Number: RC000753.0051
Tool-Pusher:	Scott Johnson	Depth to First Water:	10.98 ft bgs	
Rig Geologist:	E. Nygaard / A. Mack	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	




Depth (ft)	Drilling Run and Average Penetration Rate	USCS Code	USCS Class	Casing Diameter	Description (See Pilot boring log for full geologic descriptions)	Drilling Notes	Drilling Fluid
61	(60.0 - 80.0) 5.90 mins/ft	SP		(60.0 - 80.0') 18.0" Steel Casing	(60.0 - 60.1') Topock - Fluvial Deposits; Poorly graded sand (SP); yellowish brown / moderate yellowish brown(10YR 5/4)	(60.0') Observed Cemex #3 MESH (8x10) sand in drill cuttings (see photo log)	(40.0 - 85.0') 21600 gallons of water used; 12960 gallons of water recovered; 8640 gallons of water lost
		SC					
		CL					
62		SP			(60.1 - 60.4') Topock - Fluvial Deposits; Clayey sand (SC); brown (7.5YR 4/4)		
(60.4 - 60.7') Topock - Fluvial Deposits; Lean clay (CL); dark brown (7.5YR 3/4)							
(60.7 - 65.0') Topock - Fluvial Deposits; Poorly graded sand with gravel (SP); brown (7.5YR 5/4)							
63		SP					
64							
65							
66							
67		SP			(65.0 - 67.0') Topock - Fluvial Deposits; Poorly graded sand (SP); brown (7.5YR 5/4)		
68							
69	SP		(67.0 - 69.0') Topock - Fluvial Deposits; Poorly graded sand with gravel (SP); brown (7.5YR 5/4)				
70							
71	GP		(69.0 - 69.5') Topock - Fluvial Deposits; Poorly graded gravel with sand (GP); brown (7.5YR 5/4)	(70.0') Observed Cemex #3 MESH (8x10) sand in drill cuttings (see photo log)			
72							
73	SP		(69.5 - 71.0') Topock - Fluvial Deposits; Poorly graded sand (SP); brown (7.5YR 5/4)				
74							
75	ML		(71.0 - 73.0') Topock - Fluvial Deposits; Silt with sand (ML); dark brown (7.5YR 3/3)				
76							
77	NR		(73.0 - 76.0') No recovery (NR)				
78							
79	NR			(75.0 - 80.0') Rough drilling			
80							
					(76.0 - 80.0') Topock - Fluvial Deposits; Poorly graded sand (SP); brown (7.5YR 5/3)		

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Remarks: NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval for RB-4 Pilot; Gallons

Gained/Lost: (+) = water gained from the formation, (-) = water lost to the formation

Date Started:	08/06/2019	Surface Elevation:	N/A	Boring No.: <u>RB-4</u>
Date Completed:	08/21/2019	Northing (NAD83):	N/A	
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client: PG&E
Drilling Method:	Dual Rotary	Total Depth:	146 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Foremost DR-24HD	Conductor Casing Diameter:	18 inches	Location: PG&E Topock, Needles, California
Driller Name:	Jon Martinez	Drill Casing Diameter:	16 inches	
Drilling Asst:	A. & H. Amezcuita	Drill Bit:	15.5 inch Tricone	Project Number: RC000753.0051
Tool-Pusher:	Scott Johnson	Depth to First Water:	10.98 ft bgs	
Rig Geologist:	E. Nygaard / A. Mack	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	



Depth (ft)	Drilling Run and Average Penetration Rate	USCS Code	USCS Class	Casing Diameter	Description (See Pilot boring log for full geologic descriptions)	Drilling Notes	Drilling Fluid
81	(80.0 - 85.0) 2.80 mins/ft	GW		(80.0 - 85.0') 18.0" Steel Casing	(80.0 - 83.0') Topock - Fluvial Deposits; Well graded gravel with sand (GW); brown (7.5YR 4/3)	(80.0') Observed Cemex #3 MESH (8x10) sand in drill cuttings (see photo log)	(40.0 - 85.0') 21600 gallons of water used; 12960 gallons of water recovered; 8640 gallons of water lost
82							
83							
84	(85.0 - 91.0) 28.07 mins/ft	NR		(85.0 - 91.0') 18.0" Steel Casing	(83.0 - 86.0') No recovery (NR)		; gallons recovered; gallons lost
85							
86							
87							
88							
89							
90	(90.0 - 91.0) 11.69 mins/ft	GW-GM		(91.0 - 101.0') 16.0" Steel Casing	(86.0 - 88.5') Topock - Fluvial Deposits; Poorly graded sand (SP); brown (7.5YR 5/4)		(91.0 - 106.0') 14625 gallons of water used; 11375 gallons of water recovered; 3250 gallons of water lost
91							
92							
93					(88.5 - 90.0') Topock - Fluvial Deposits; Silty gravel with sand (GM); brown (7.5YR 4/3)		
94					(90.0 - 90.3') Topock - Fluvial Deposits; Poorly graded sand with gravel (SP); black (5Y 2.5/2)	(90.0 - 101.0') Rough drilling	
95					(90.3 - 90.7') Topock - Fluvial Deposits; Poorly graded sand with gravel (SP); yellowish brown (10YR 5/6)	(91.0') Observed Cemex #3 MESH (8x10) sand in drill cuttings (see photo log)	
96					(90.7 - 100.0') Topock - Fluvial Deposits; Well graded gravel with silt and sand (GW-GM); brown (7.5YR 4/3)		
97							
98							
99							
100							

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Remarks: NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval for RB-4 Pilot; Gallons

Gained/Lost: (+) = water gained from the formation, (-) = water lost to the formation

Date Started:	08/06/2019	Surface Elevation:	N/A	Boring No.: <u>RB-4</u>	
Date Completed:	08/21/2019	Northing (NAD83):	N/A		
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client:	PG&E
Drilling Method:	Dual Rotary	Total Depth:	146 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Foremost DR-24HD	Conductor Casing Diameter:	18 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Jon Martinez	Drill Casing Diameter:	16 inches		
Drilling Asst:	A. & H. Amezguita	Drill Bit:	15.5 inch Tricone	Project Number:	RC000753.0051
Tool-Pusher:	Scott Johnson	Depth to First Water:	10.98 ft bgs		
Rig Geologist:	E. Nygaard / A. Mack	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Drilling Run and Average Penetration Rate	USCS Code	USCS Class	Casing Diameter	Description (See Pilot boring log for full geologic descriptions)	Drilling Notes	Drilling Fluid
101	(91.0 - 101.0) 11.69 mins/ft	NR		(91.0 - 101.0') 16.0" Steel Casing	(100.0 - 106.0') No recovery (NR)	(90.0 - 101.0') Rough drilling (91.1 - 106.0') Rough drilling (91.1 - 106.0') Rough drilling	(91.0 - 106.0') 14625 gallons of water used; 11375 gallons of water recovered; 3250 gallons of water lost
102	(101.0 - 106.0) 7.35 mins/ft			(101.0 - 106.0') 16.0" Steel Casing		(101.0 - 106.0') Observed Cemex #3 MESH (8x10) sand in drill cuttings (see photo log)	
103							
104							
105							
106	(106.0 - 120.0) 3.59 mins/ft	SM		(106.0 - 120.0') 16.0" Steel Casing	(106.0 - 130.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); dark brown (7.5YR 3/3)	(110.0') Observed Cemex #3 MESH (8x10) sand in drill cuttings (see photo log)	(106.0 - 146.0') 4875 gallons of water used; 8125 gallons of water recovered; 3250 gallons of water gained
107							
108							
109							
110							
111							
112							
113							
114							
115							
116							
117							
118							
119							
120							

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Remarks: NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval for RB-4 Pilot; Gallons

Gained/Lost: (+) = water gained from the formation, (-) = water lost to the formation

Date Started:	08/06/2019	Surface Elevation:	N/A	Boring No.: <u>RB-4</u>	
Date Completed:	08/21/2019	Northing (NAD83):	N/A		
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client:	PG&E
Drilling Method:	Dual Rotary	Total Depth:	146 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Foremost DR-24HD	Conductor Casing Diameter:	18 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Jon Martinez	Drill Casing Diameter:	16 inches		
Drilling Asst:	A. & H. Amezcuita	Drill Bit:	15.5 inch Tricone	Project Number:	RC000753.0051
Tool-Pusher:	Scott Johnson	Depth to First Water:	10.98 ft bgs		
Rig Geologist:	E. Nygaard / A. Mack	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Drilling Run and Average Penetration Rate	USCS Code	USCS Class	Casing Diameter	Description (See Pilot boring log for full geologic descriptions)	Drilling Notes	Drilling Fluid
121						(120.0') Observed Cemex #3 MESH (8x10) sand in drill cuttings (see photo log)	(106.0 - 146.0') 4875 gallons of water used; 8125 gallons of water recovered; 3250 gallons of water gained
122							
123							
124							
125		SM					
126							
127							
128							
129							
130	(120.0 - 140.0) 1.32 mins/ft			(120.0 - 140.0') 16.0" Steel Casing	(130.0 - 132.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); dark brown (7.5YR 3/3)	(130.0') Observed Cemex #3 MESH (8x10) sand in drill cuttings (see photo log)	
131		GM					
132					(132.0 - 141.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); dark brown (7.5YR 3/3)		
133							
134							
135							
136		SM					
137							
138							
139							
140							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater

Remarks: NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval for RB-4 Pilot; Gallons

Gained/Lost: (+) = water gained from the formation, (-) = water lost to the formation

Date Started:	08/06/2019	Surface Elevation:	N/A	Boring No.: <u>RB-4</u>	
Date Completed:	08/21/2019	Northing (NAD83):	N/A		
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client:	PG&E
Drilling Method:	Dual Rotary	Total Depth:	146 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Foremost DR-24HD	Conductor Casing Diameter:	18 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Jon Martinez	Drill Casing Diameter:	16 inches		
Drilling Asst:	A. & H. Amezguita	Drill Bit:	15.5 inch Tricone	Project Number:	RC000753.0051
Tool-Pusher:	Scott Johnson	Depth to First Water:	10.98 ft bgs		
Rig Geologist:	E. Nygaard / A. Mack	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Drilling Run and Average Penetration Rate	USCS Code	USCS Class	Casing Diameter	Description (See Pilot boring log for full geologic descriptions)	Drilling Notes	Drilling Fluid
141	(140.0 - 146.0) 1.95 mins/ft	SM		(140.0 - 146.0') 15.5" Steel Casing		(140.0') Observed plastering sand in drill cuttings (see photo log)	(106.0 - 146.0') 4875 gallons of water used; 8125 gallons of water recovered; 3250 gallons of water gained
142					(141.0 - 144.0') Topock - Weathered Bedrock - conglomerate; Silty sand with gravel (SM); reddish brown (2.5YR 4/4)		
143		SM					
144					(144.0 - 146.0') No recovery (NR)		
145		NR					
146					End of Boring at 146.0' bgs.		
147							
148							
149							
150							
151							
152							
153							
154							
155							
156							
157							
158							
159							
160							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater

Remarks: NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval for RB-4 Pilot; Gallons Gained/Lost: (+) = water gained from the formation, (-) = water lost to the formation

Date Started:	08/06/2019	Surface Elevation:	N/A	Boring No.: <u>RB-4</u>
Date Completed:	08/21/2019	Northing (NAD83):	N/A	
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client: PG&E
Drilling Method:	Dual Rotary	Total Depth:	146 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Foremost DR-24HD	Conductor Casing Diameter:	18 inches	Location: PG&E Topock, Needles, California
Driller Name:	Jon Martinez	Drill Casing Diameter:	16 inches	
Drilling Asst:	A. & H. Amezguita	Drill Bit:	15.5 inch Tricone	Project Number: RC000753.0051
Tool-Pusher:	Scott Johnson	Depth to First Water:	10.98 ft bgs	
Rig Geologist:	E. Nygaard / A. Mack	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Drilling Run and Average Penetration Rate	USCS Code	USCS Class	Casing Diameter	Description (See Pilot boring log for full geologic descriptions)	Drilling Notes	Drilling Fluid
1		SP			(0.0 - 2.0') Topock - Fill; Poorly graded sand (SP); (10YR5/3)	(0.0 - 20.0') Smooth drilling	(0.0 - 40.0') 4176 gallons of water used; 2800 gallons of water recovered; 1376 gallons of water lost
2					(2.0 - 6.0') No recovery (NR)		
3							
4		NR					
5							
6					(6.0 - 8.0') Topock - Fill; Poorly graded sand (SP); (10YR5/3)		
7		SP					
8					(8.0 - 16.0') No recovery (NR)		
9							
10	(0.0 - 20.0) 2.25 mins/ft			(0.0 - 20.0') 18.0" Steel Casing		(10.0') Observed Cemex #3 MESH (8x10) sand in drill cuttings (see photo log)	
11							
12		NR					
13							
14							
15							
16					(16.0 - 17.5') Topock - Fluvial Deposits; Poorly graded sand (SP); brown (7.5YR 5/4)		
17		SP					
18					(17.5 - 20.0') Topock - Fluvial Deposits; Poorly graded sand with silt (SP-SM); brown (7.5YR 4/2) (18') brown (7.5YR 4/3)		
19		SP-SM					
20							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater

Remarks: NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval for RB-4 Pilot; Gallons

Gained/Lost: (+) = water gained from the formation, (-) = water lost to the formation

Date Started:	08/06/2019	Surface Elevation:	N/A	Boring No.: RB-4
Date Completed:	08/21/2019	Northing (NAD83):	N/A	
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client: PG&E
Drilling Method:	Dual Rotary	Total Depth:	146 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Foremost DR-24HD	Conductor Casing Diameter:	18 inches	Location: PG&E Topock, Needles, California
Driller Name:	Jon Martinez	Drill Casing Diameter:	16 inches	
Drilling Asst:	A. & H. Amezcuita	Drill Bit:	15.5 inch Tricone	Project Number: RC000753.0051
Tool-Pusher:	Scott Johnson	Depth to First Water:	10.98 ft bgs	
Rig Geologist:	E. Nygaard / A. Mack	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	








Depth (ft)	Drilling Run and Average Penetration Rate	USCS Code	USCS Class	Casing Diameter	Description (See Pilot boring log for full geologic descriptions)	Drilling Notes	Drilling Fluid
21					(20.0 - 26.0') No recovery (NR)	(20.0') Observed Cemex #3 MESH (8x10) sand in drill cuttings (see photo log) (20.1 - 40.0') Drilling became a little rougher (21.0') Observed Cemex #3 MESH (8x10) sand in drill cuttings (see photo log)	(0.0 - 40.0') 4176 gallons of water used; 2800 gallons of water recovered; 1376 gallons of water lost
22							
23		NR					
24							
25							
26					(26.0 - 34.0') Topock - Fluvial Deposits; Poorly graded sand with silt (SP-SM); brown (7.5YR 4/2)		
27							
28							
29							
30	(20.0 - 40.0) 3.75 mins/ft	SP-SM		(20.0 - 40.0') 18.0" Steel Casing		(30.0') Observed Cemex #3 MESH (8x10) sand in drill cuttings (see photo log)	
31							
32							
33							
34					(34.0 - 36.0') No recovery (NR)		
35		NR					
36					(36.0 - 40.0') Topock - Fluvial Deposits; Poorly graded sand (SP); brown (7.5YR 5/3)		
37							
38		SP					
39							
40							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater

Remarks: NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval for RB-4 Pilot; Gallons

Gained/Lost: (+) = water gained from the formation, (-) = water lost to the formation

Date Started:	08/06/2019	Surface Elevation:	N/A	Boring No.: <u>RB-4</u>
Date Completed:	08/21/2019	Northing (NAD83):	N/A	
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client: PG&E
Drilling Method:	Dual Rotary	Total Depth:	146 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Foremost DR-24HD	Conductor Casing Diameter:	18 inches	Location: PG&E Topock, Needles, California
Driller Name:	Jon Martinez	Drill Casing Diameter:	16 inches	
Drilling Asst:	A. & H. Amezcuita	Drill Bit:	15.5 inch Tricone	Project Number: RC000753.0051
Tool-Pusher:	Scott Johnson	Depth to First Water:	10.98 ft bgs	
Rig Geologist:	E. Nygaard / A. Mack	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Drilling Run and Average Penetration Rate	USCS Code	USCS Class	Casing Diameter	Description (See Pilot boring log for full geologic descriptions)	Drilling Notes	Drilling Fluid
41		GW			(40.0 - 41.0') Topock - Fluvial Deposits; Well graded gravel with sand (GW); brown (7.5YR 5/4)	(40.0') Observed Cemex #3 MESH (8x10) sand in drill cuttings (see photo log)	(40.0 - 85.0') 21600 gallons of water used; 12960 gallons of water recovered; 8640 gallons of water lost
42					(41.0 - 46.0') No recovery (NR)	(40.1 - 60.0') Rough drilling	
43		NR					
44							
45							
46					(46.0 - 52.0') Topock - Fluvial Deposits; Poorly graded sand with gravel (SP); brown (7.5YR 5/3)		
47							
48							
49		SP					
50	(40.0 - 60.0) 7.01 mins/ft			(40.0 - 60.0') 18.0" Steel Casing		(50.0') Observed Cemex #3 MESH (8x10) sand in drill cuttings (see photo log)	
51							
52					(52.0 - 53.0') Topock - Fluvial Deposits; Poorly graded sand with silt (SP-SM); brown (7.5YR 5/3)		
53		SP-SM					
54					(53.0 - 56.0') No recovery (NR)		
55		NR					
56					(56.0 - 58.0') Topock - Fluvial Deposits; Poorly graded sand with silt (SP-SM); brown (7.5YR 5/3)		
57		SP-SM					
58					(58.0 - 60.0') Topock - Fluvial Deposits; Silty sand with gravel (SM); brown (7.5YR 5/3)		
59		SM					
60							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater

Remarks: NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval for RB-4 Pilot; Gallons

Gained/Lost: (+) = water gained from the formation, (-) = water lost to the formation

Date Started:	08/06/2019	Surface Elevation:	N/A	Boring No.: <u>RB-4</u>
Date Completed:	08/21/2019	Northing (NAD83):	N/A	
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client: PG&E
Drilling Method:	Dual Rotary	Total Depth:	146 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Foremost DR-24HD	Conductor Casing Diameter:	18 inches	Location: PG&E Topock, Needles, California
Driller Name:	Jon Martinez	Drill Casing Diameter:	16 inches	
Drilling Asst:	A. & H. Amezcuita	Drill Bit:	15.5 inch Tricone	Project Number: RC000753.0051
Tool-Pusher:	Scott Johnson	Depth to First Water:	10.98 ft bgs	
Rig Geologist:	E. Nygaard / A. Mack	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	




Depth (ft)	Drilling Run and Average Penetration Rate	USCS Code	USCS Class	Casing Diameter	Description (See Pilot boring log for full geologic descriptions)	Drilling Notes	Drilling Fluid
61	(60.0 - 80.0) 5.90 mins/ft	SP		(60.0 - 80.0') 18.0" Steel Casing	(60.0 - 60.1') Topock - Fluvial Deposits; Poorly graded sand (SP); yellowish brown / moderate yellowish brown(10YR 5/4)	(60.0') Observed Cemex #3 MESH (8x10) sand in drill cuttings (see photo log)	(40.0 - 85.0') 21600 gallons of water used; 12960 gallons of water recovered; 8640 gallons of water lost
		SC					
		CL					
62		SP			(60.1 - 60.4') Topock - Fluvial Deposits; Clayey sand (SC); brown (7.5YR 4/4)		
					(60.4 - 60.7') Topock - Fluvial Deposits; Lean clay (CL); dark brown (7.5YR 3/4)		
63					(60.7 - 65.0') Topock - Fluvial Deposits; Poorly graded sand with gravel (SP); brown (7.5YR 5/4)		
64							
65		SP			(65.0 - 67.0') Topock - Fluvial Deposits; Poorly graded sand (SP); brown (7.5YR 5/4)		
66							
67		SP			(67.0 - 69.0') Topock - Fluvial Deposits; Poorly graded sand with gravel (SP); brown (7.5YR 5/4)		
68							
69		GP			(69.0 - 69.5') Topock - Fluvial Deposits; Poorly graded gravel with sand (GP); brown (7.5YR 5/4)		
70	SP		(69.5 - 71.0') Topock - Fluvial Deposits; Poorly graded sand (SP); brown (7.5YR 5/4)	(70.0') Observed Cemex #3 MESH (8x10) sand in drill cuttings (see photo log)			
71	ML		(71.0 - 73.0') Topock - Fluvial Deposits; Silt with sand (ML); dark brown (7.5YR 3/3)				
72							
73	NR		(73.0 - 76.0') No recovery (NR)				
74							
75							
76	SP		(76.0 - 80.0') Topock - Fluvial Deposits; Poorly graded sand (SP); brown (7.5YR 5/3)	(75.0 - 80.0') Rough drilling			
77							
78							
79							
80							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater

Remarks: NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval for RB-4 Pilot; Gallons

Gained/Lost: (+) = water gained from the formation, (-) = water lost to the formation

Date Started:	08/06/2019	Surface Elevation:	N/A	Boring No.: <u>RB-4</u>
Date Completed:	08/21/2019	Northing (NAD83):	N/A	
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client: PG&E
Drilling Method:	Dual Rotary	Total Depth:	146 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Foremost DR-24HD	Conductor Casing Diameter:	18 inches	Location: PG&E Topock, Needles, California
Driller Name:	Jon Martinez	Drill Casing Diameter:	16 inches	
Drilling Asst:	A. & H. Amezcuita	Drill Bit:	15.5 inch Tricone	Project Number: RC000753.0051
Tool-Pusher:	Scott Johnson	Depth to First Water:	10.98 ft bgs	
Rig Geologist:	E. Nygaard / A. Mack	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	


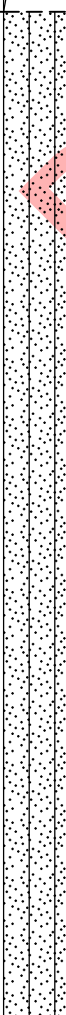
Depth (ft)	Drilling Run and Average Penetration Rate	USCS Code	USCS Class	Casing Diameter	Description (See Pilot boring log for full geologic descriptions)	Drilling Notes	Drilling Fluid
81	(80.0 - 85.0) 2.80 mins/ft	GW		(80.0 - 85.0') 18.0" Steel Casing	(80.0 - 83.0') Topock - Fluvial Deposits; Well graded gravel with sand (GW); brown (7.5YR 4/3)	(80.0') Observed Cemex #3 MESH (8x10) sand in drill cuttings (see photo log)	(40.0 - 85.0') 21600 gallons of water used; 12960 gallons of water recovered; 8640 gallons of water lost
82							
83							
84	(85.0 - 91.0) 28.07 mins/ft	NR		(85.0 - 91.0') 18.0" Steel Casing	(83.0 - 86.0') No recovery (NR)		; gallons recovered; gallons lost
85							
86							
87							
88							
89							
90	(91.0 - 101.0) 11.69 mins/ft	GW-GM		(91.0 - 101.0') 16.0" Steel Casing	(86.0 - 88.5') Topock - Fluvial Deposits; Poorly graded sand (SP); brown (7.5YR 5/4)		(91.0 - 106.0') 14625 gallons of water used; 11375 gallons of water recovered; 3250 gallons of water lost
91							
92							
93					(88.5 - 90.0') Topock - Fluvial Deposits; Silty gravel with sand (GM); brown (7.5YR 4/3)		
94					(90.0 - 90.3') Topock - Fluvial Deposits; Poorly graded sand with gravel (SP); black (5Y 2.5/2)		
95					(90.3 - 90.7') Topock - Fluvial Deposits; Poorly graded sand with gravel (SP); yellowish brown (10YR 5/6)		
96					(90.7 - 100.0') Topock - Fluvial Deposits; Well graded gravel with silt and sand (GW-GM); brown (7.5YR 4/3)	(91.0 - 101.0') Rough drilling, observed Cemex #3 MESH (8x10) sand in drill cuttings (see photo log)	
97							
98							
99							
100							

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Remarks: NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval for RB-4 Pilot; Gallons

Gained/Lost: (+) = water gained from the formation, (-) = water lost to the formation

Date Started:	08/06/2019	Surface Elevation:	N/A	Boring No.: <u>RB-4</u>
Date Completed:	08/21/2019	Northing (NAD83):	N/A	
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client: PG&E
Drilling Method:	Dual Rotary	Total Depth:	146 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Foremost DR-24HD	Conductor Casing Diameter:	18 inches	Location: PG&E Topock, Needles, California
Driller Name:	Jon Martinez	Drill Casing Diameter:	16 inches	
Drilling Asst:	A. & H. Amezcuita	Drill Bit:	15.5 inch Tricone	Project Number: RC000753.0051
Tool-Pusher:	Scott Johnson	Depth to First Water:	10.98 ft bgs	
Rig Geologist:	E. Nygaard / A. Mack	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Drilling Run and Average Penetration Rate	USCS Code	USCS Class	Casing Diameter	Description (See Pilot boring log for full geologic descriptions)	Drilling Notes	Drilling Fluid
101	(91.0 - 101.0) 11.69 mins/ft	NR		(91.0 - 101.0') 16.0" Steel Casing	(100.0 - 106.0') No recovery (NR)	(91.0 - 101.0') Rough drilling, observed Cemex #3 MESH (8x10) sand in drill cuttings (see photo log)	(91.0 - 106.0') 14625 gallons of water used; 11375 gallons of water recovered; 3250 gallons of water lost
102						(101.0 - 106.0') Rough drilling, Observed Cemex #3 MESH (8x10) sand in drill cuttings (see photo log)	
103							
104	(101.0 - 106.0) 7.35 mins/ft			(101.0 - 106.0') 16.0" Steel Casing			
105		SM					
106					(106.0 - 130.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); dark brown (7.5YR 3/3)		(106.0 - 146.0') 4875 gallons of water used; 8125 gallons of water recovered; 3250 gallons of water gained
107							
108							
109							
110							
111						(110.0') Observed Cemex #3 MESH (8x10) sand in drill cuttings (see photo log)	
112							
113	(106.0 - 120.0) 3.59 mins/ft			(106.0 - 120.0') 16.0" Steel Casing			
114							
115							
116							
117							
118							
119							
120							

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Remarks: NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval for RB-4 Pilot; Gallons

Gained/Lost: (+) = water gained from the formation, (-) = water lost to the formation

Date Started:	08/06/2019	Surface Elevation:	N/A	Boring No.: <u>RB-4</u>	
Date Completed:	08/21/2019	Northing (NAD83):	N/A		
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client:	PG&E
Drilling Method:	Dual Rotary	Total Depth:	146 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Foremost DR-24HD	Conductor Casing Diameter:	18 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Jon Martinez	Drill Casing Diameter:	16 inches		
Drilling Asst:	A. & H. Amezcuita	Drill Bit:	15.5 inch Tricone	Project Number:	RC000753.0051
Tool-Pusher:	Scott Johnson	Depth to First Water:	10.98 ft bgs		
Rig Geologist:	E. Nygaard / A. Mack	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Drilling Run and Average Penetration Rate	USCS Code	USCS Class	Casing Diameter	Description (See Pilot boring log for full geologic descriptions)	Drilling Notes	Drilling Fluid
121						(120.0') Observed Cemex #3 MESH (8x10) sand in drill cuttings (see photo log)	(106.0 - 146.0') 4875 gallons of water used; 8125 gallons of water recovered; 3250 gallons of water gained
122							
123							
124							
125		SM					
126							
127							
128							
129							
130	(120.0 - 140.0) 1.32 mins/ft			(120.0 - 140.0') 16.0" Steel Casing	(130.0 - 132.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); dark brown (7.5YR 3/3)	(130.0') Observed Cemex #3 MESH (8x10) sand in drill cuttings (see photo log)	
131		GM					
132					(132.0 - 141.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); dark brown (7.5YR 3/3)		
133							
134							
135							
136		SM					
137							
138							
139							
140							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater

Remarks: NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval for RB-4 Pilot; Gallons

Gained/Lost: (+) = water gained from the formation, (-) = water lost to the formation













Date Started:	08/06/2019	Surface Elevation:	N/A	Boring No.: <u>RB-4</u>	
Date Completed:	08/21/2019	Northing (NAD83):	N/A		
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client:	PG&E
Drilling Method:	Dual Rotary	Total Depth:	146 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Foremost DR-24HD	Conductor Casing Diameter:	18 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Jon Martinez	Drill Casing Diameter:	16 inches		
Drilling Asst:	A. & H. Amezguita	Drill Bit:	15.5 inch Tricone	Project Number:	RC000753.0051
Tool-Pusher:	Scott Johnson	Depth to First Water:	10.98 ft bgs		
Rig Geologist:	E. Nygaard / A. Mack	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Drilling Run and Average Penetration Rate	USCS Code	USCS Class	Casing Diameter	Description (See Pilot boring log for full geologic descriptions)	Drilling Notes	Drilling Fluid
141	(140.0 - 146.0) 1.95 mins/ft	SM		(140.0 - 146.0') 15.5" Steel Casing		(140.0') Observed plastering sand in drill cuttings (see photo log)	(106.0 - 146.0') 4875 gallons of water used; 8125 gallons of water recovered; 3250 gallons of water gained
142					(141.0 - 144.0') Topock - Weathered Bedrock - conglomerate; Silty sand with gravel (SM); reddish brown (2.5YR 4/4)		
143		SM					
144					(144.0 - 146.0') No recovery (NR)		
145		NR					
146					End of Boring at 146.0' bgs.		
147							
148							
149							
150							
151							
152							
153							
154							
155							
156							
157							
158							
159							
160							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater

Remarks: NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval for RB-4 Pilot; Gallons Gained/Lost: (+) = water gained from the formation, (-) = water lost to the formation

Date Started:	04/03/2019	Surface Elevation:	464.7 ft amsl	Boring No.: <u>RB-5 Pilot</u>	
Date Completed:	04/10/2019	Northing (NAD83):	2102420.7		
Drilling Co.:	Cascade	Easting (NAD83):	7616398.0	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	97 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Terrasonic track mount	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Dan O'Mara	Depth to First Water:	10.04 ft bgs		
Drilling Asst:	E. Huellmantel / J. Pacheco	Sampling Method:	4 inch x 10 ft. Core Barrel	Project Number:	RC000753.0051
Logger:	S. McGrane / D. Maurer	Sampling Interval:	Continuous		
Editor:	S. McGrane / G. Jeffers	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
1	0			Topock - Fill	SP		(0.0 - 4.0') Topock - Fill; Poorly graded sand (SP); brown (7.5YR 5/4); very fine grained to medium grained, subround to round; trace silt; dry; logged from cuttings in hoppers from conductor casing clean out run.	(0.0 - 4.0') During the clean out run to set the conductor casing, soil core was put into the hopper and not bagged	(0.0 - 17.0') No water used
2									
3									
4									
5	48			Topock - Fill	SP		(4.0 - 6.0') Topock - Fill; Poorly graded sand (SP); brown (10YR 5/3); very fine grained to medium grained, subangular to round; trace clay; trace organics; dry; trace silt nodules (5'); moist		
6									
7									
8									
9		RB-5-SS-7.0-12.0 4/10/2019 14:10		Topock - Fill	SP		(6.0 - 7.0') Topock - Fill; Clayey sand (SC); brown (7.5YR 5/4); very fine grained to fine grained, subangular to round; little clay; trace silt; trace organics; moist		
10									
11									
12									
13	84	RB-5-SS-12.0-14.0 4/10/2019 10:00		Topock - Fill	SP-SM		(7.0 - 8.0') Topock - Fill; Poorly graded sand (SP); brown (7.5YR 5/4); very fine grained to fine grained, subround to round; trace silt; trace clay; moist	(8.0 - 17.0') Poor recovery, core fell out of core barrel, 5 ft recovered and 2 ft retrieved with second run, actual depths of contacts unclear due to loss of core (10.0') Approximate depth to water table	
14									
15									
16									
17		RB-5-VAS-12.0-17.0 (0.125 J ppb) 4/4/2019 10:49		Topock - Fluvial Deposits	SP		(8.0 - 10.5') Topock - Fill; Poorly graded sand with silt (SP-SM); brown (7.5YR 5/3); very fine grained to medium grained, subangular to round; little silt; trace clay; trace organics; moist		
18									
19									
20									
21	60	RB-5-17.0-19.5 4/10/2019 10:05		Topock - Fluvial Deposits	SM		(10.5 - 11.8') Topock - Fluvial Deposits; Poorly graded sand (SP); brown (7.5YR 5/4); very fine grained to fine grained, subround to round; trace silt; moist to wet		
22									
23									
24									
25				Topock - Fluvial Deposits	SM		(11.8 - 12.0') Topock - Fluvial Deposits; Silty sand (SM); dark gray (7.5YR 4/1) with brown (7.5YR 5/3); very fine grained to fine grained, subround to round; little silt; trace clay; moist to wet; organic odor		
26									
27									
28									
29				Topock - Fluvial Deposits	SM		(12.0 - 13.0') Topock - Fill; Poorly graded sand with silt (SP-SM); brown (7.5YR 5/3); very fine grained to medium grained, subangular to round; little silt; trace clay; trace organics; moist; slough from having to retrieve lost core		
30									
31									
32									
33				Topock - Fluvial Deposits	NR		(13.0 - 14.0') Topock - Fluvial Deposits; Silty sand (SM); dark gray (7.5YR 4/1) with brown (7.5YR 5/3); very fine grained to fine grained, subround to round; little silt; trace clay; moist to wet; organic odor		
34									
35									
36									
37				Topock - Fluvial Deposits	SM		(14.0 - 17.0') No recovery (NR); poor recovery when lost core was retrieved		
38									
39									
40									
41				Topock - Fluvial Deposits	SM		(17.0 - 19.5') Topock - Fluvial Deposits; Silty sand (SM); (7.5R 5/3) with dark gray (7.5YR 4/1); very fine grained to fine grained, subround to round; little silt; trace medium grained sand, subangular to subround; wet; organic odor (18'); trace clay; increase in sand	(17.0 - 22.0') Drilled with water had heaving sands	(17.0 - 22.0') 10 gallons of water used; 5 gallons of water recovered; 5 gallons of water lost
42									
43									
44									
45				Topock - Fluvial Deposits	SP-SM		(19.5 - 21.0') Topock - Fluvial Deposits; Poorly graded sand with		
46									
47									
48									






Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	04/03/2019	Surface Elevation:	464.7 ft amsl	Boring No.: <u>RB-5 Pilot</u>	
Date Completed:	04/10/2019	Northing (NAD83):	2102420.7		
Drilling Co.:	Cascade	Easting (NAD83):	7616398.0	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	97 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Terrasonic track mount	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Dan O'Mara	Depth to First Water:	10.04 ft bgs		
Drilling Asst:	E. Huellmantel / J. Pacheco	Sampling Method:	4 inch x 10 ft. Core Barrel	Project Number:	RC000753.0051
Logger:	S. McGrane / D. Maurer	Sampling Interval:	Continuous		
Editor:	S. McGrane / G. Jeffers	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
21	60	RB-5 19.5-22.0 4/10/2019 10:10		Topock - Fluvial Deposits	SP-SM		silt (SP-SM); brown (7.5YR 4/2) with dark gray (7.5YR 4/1); very fine grained to fine grained, subround to round; little silt; wet; organic odor; laminated	(17.0 - 22.0') Drilled with water had heaving sands	(17.0 - 22.0') 10 gallons of water used; 5 gallons of water recovered; 5 gallons of water lost
22				Topock - Fluvial Deposits	SP		(21.0 - 22.0') Topock - Fluvial Deposits; Poorly graded sand (SP); dark gray (7.5YR 4/1) with brown (7.5YR 5/3); very fine grained to medium grained, subround to round; trace silt; trace clay; wet; organic odor		
23					NR		(22.0 - 24.0') No recovery (NR)	(22.0') Change in logging geologist to D. Maurer	(22.0 - 77.0') No water used
24									
25							(24.0 - 47.0') Topock - Fluvial Deposits; Poorly graded sand (SP); brown (7.5YR 4/2) with dark gray (7.5YR 4/1); very fine grained to fine grained, subround to round; trace silt; wet		
26									
27		RB-5 25.0-30.0 4/10/2019 10:15							
28									
29									
30	138								
31									
32		RB-5 30.0-35.0 4/10/2019 10:20		Topock - Fluvial Deposits	SP				
33									
34							(34') very fine grained to medium grained, subround to round		
35									
36									
37		RB-5 35.0-40.0 4/10/2019 10:25						(37.0 - 47.0') Soft drilling	
38									
39	120								
40									

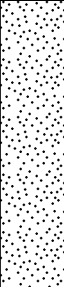




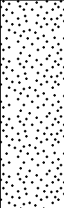
Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	04/03/2019	Surface Elevation:	464.7 ft amsl	Boring No.: <u>RB-5 Pilot</u>	
Date Completed:	04/10/2019	Northing (NAD83):	2102420.7		
Drilling Co.:	Cascade	Easting (NAD83):	7616398.0	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	97 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Terrasonic track mount	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Dan O'Mara	Depth to First Water:	10.04 ft bgs		
Drilling Asst:	E. Huellmantel / J. Pacheco	Sampling Method:	4 inch x 10 ft. Core Barrel	Project Number:	RC000753.0051
Logger:	S. McGrane / D. Maurer	Sampling Interval:	Continuous		
Editor:	S. McGrane / G. Jeffers	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid		
41	120	RB-5 40.0-45.0 4/10/2019 10:30		Topock - Fluvial Deposits	SP			(37.0' - 47.0') Soft drilling	(22.0' - 77.0') No water used		
42											
43											
44											
45											
46		RB-5 45.0-47.0 4/10/2019 10:35	RB-5-VAS-42-47 (<0.033U ppb) 4/9/2019 10:15								
47	36			Topock - Fluvial Deposits	GW		(47.0' - 48.0') Topock - Fluvial Deposits; Well graded gravel with sand (GW); brown (7.5YR 5/4); granules to very large pebbles, subround to round; and very fine to medium grained sand; trace small cobbles, subround to round; wet	(47.0') Change of rig geologist to D. Maurer			
48				Topock - Fluvial Deposits	SP		(48.0' - 50.0') Topock - Fluvial Deposits; Poorly graded sand (SP); brown (7.5YR 5/4); very fine grained to medium grained, subround to round; trace granules to small, subround to round; trace silt; wet				
49		RB-5 48.0-50.0 4/10/2019 10:40									
50									(50.0' - 57.0') No recovery (NR)	(50.0' - 57.0') No recovery, drilled through loose sands, no indication of core loss out of core barrel	
51											
52											
53											
54											
55											
56											
57	156	RB-5 57.0-60.0 4/10/2019 10:45		Topock - Fluvial Deposits	SP		(57.0' - 64.0') Topock - Fluvial Deposits; Poorly graded sand (SP); brown (7.5YR 5/4); very fine grained to coarse grained; trace granules to medium pebbles, subround to round; wet	(57.0' - 62.0') Drilled through loose sands, no indication of core loss from the core barrel			
58							(59'); little granules to large pebbles, subround to round				
59											
60											

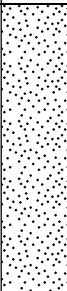




Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	04/03/2019	Surface Elevation:	464.7 ft amsl	Boring No.: <u>RB-5 Pilot</u>	
Date Completed:	04/10/2019	Northing (NAD83):	2102420.7		
Drilling Co.:	Cascade	Easting (NAD83):	7616398.0	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	97 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Terrasonic track mount	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Dan O'Mara	Depth to First Water:	10.04 ft bgs		
Drilling Asst:	E. Huellmantel / J. Pacheco	Sampling Method:	4 inch x 10 ft. Core Barrel	Project Number:	RC000753.0051
Logger:	S. McGrane / D. Maurer	Sampling Interval:	Continuous		
Editor:	S. McGrane / G. Jeffers	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid	
61	156	RB-5 60.0-64.0 4/10/2019 10:50		Topock - Fluvial Deposits	SP			(57.0 - 62.0') Drilled through loose sands, no indication of core loss from the core barrel	(22.0 - 77.0') No water used	
62										
63										
64				(64.0 - 66.0') No recovery (NR)	(64.0 - 66.0') Lost 2 feet of core in hopper during core collection					
65										
66										
67		RB-5 66.0-69.0 4/10/2019 10:55		Topock - Fluvial Deposits	SP		(66.0 - 69.0') Topock - Fluvial Deposits; Poorly graded sand (SP); brown (7.5YR 5/4); very fine grained to coarse grained; little granules to large pebbles, subround to round; wet			
68										
69										
70				(69.0 - 73.0') No recovery (NR)	(69.0 - 73.0') Loss of core during collection					
71										
72										
73				Topock - Fluvial Deposits	SP		(73.0 - 75.0') Topock - Fluvial Deposits; Poorly graded sand with gravel (SP); brown (7.5YR 5/4); very fine grained to medium grained; little small to very large pebbles, subround to round; wet	(73.0 - 77.0') Drilling through loose sands, no indication of core loss from the core barrel, CL at 76.0 to 77.0 not collected per direction of on-site archaeologist		
74										
75										
76		Topock - Fluvial Deposits	SP		(75.0 - 76.0') Topock - Fluvial Deposits; Poorly graded sand (SP); brown (7.5YR 5/4); very fine grained to medium grained; trace clay; wet					
77		Topock - Fluvial Deposits	CL		(76.0 - 77.0') Topock - Fluvial Deposits; Lean clay (CL); brown (7.5YR 4/2); medium plasticity; trace very fine to medium grained sand; wet					
78	96		Topock - Fluvial Deposits	SP		(77.0 - 84.0') Topock - Fluvial Deposits; Poorly graded sand (SP); brown (7.5YR 5/4); very fine grained to medium grained; trace silt; wet		(77.0 - 87.0') 10 gallons of water used; 0 gallons of water recovered; 10 gallons of water lost		
79										
80										

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Date Started:	04/03/2019	Surface Elevation:	464.7 ft amsl	Boring No.: <u>RB-5 Pilot</u>	
Date Completed:	04/10/2019	Northing (NAD83):	2102420.7		
Drilling Co.:	Cascade	Easting (NAD83):	7616398.0	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	97 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Terrasonic track mount	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Dan O'Mara	Depth to First Water:	10.04 ft bgs		
Drilling Asst:	E. Huellmantel / J. Pacheco	Sampling Method:	4 inch x 10 ft. Core Barrel	Project Number:	RC000753.0051
Logger:	S. McGrane / D. Maurer	Sampling Interval:	Continuous		
Editor:	S. McGrane / G. Jeffers	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid	
81	96	RB-5 80.0-85.0 4/10/2019 11:10		Topock - Fluvial Deposits	SP				(77.0 - 87.0') 10 gallons of water used; 0 gallons of water recovered; 10 gallons of water lost	
82										
83										
84				Topock - Fluvial Deposits	GW		(84.0 - 85.0') Topock - Fluvial Deposits; Well graded gravel (GW); brown (7.5YR 5/4); granules to very large pebbles, subangular to round; trace very fine to very coarse grained sand, subangular to subround; wet			
85										
86				NR		(85.0 - 87.0') No recovery (NR)	(85.0 - 87.0') Drilled through loose sands, no indication of core loss from the core barrel			
87										
88	120	RB-5-SS-87.0-89.0 4/10/2019 11:15		Topock - Weathered Bedrock - conglomerate	GM		(87.0 - 89.0') Topock - Weathered Bedrock - conglomerate; Silty gravel with sand (GM); dusky red (2.5YR 3/2); granules to very large pebbles, angular to subround; some very fine to medium grained sand; little silt; trace clay; wet; weak cementation		(87.0 - 97.0') No water used	
89				Topock - Competent Bedrock - conglomerate						(89.0 - 97.0') Topock - Competent Bedrock - conglomerate; dusky red (2.5YR 3/2); moist; friable
90										
91										
92										
93										
94										
95										
96										
97										
98										
99										
100										

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Date Started:	04/03/2019	Surface Elevation:	464.7 ft amsl	Well ID: RB-5 Pilot
Date Completed:	04/10/2019	Northing (NAD83):	2102420.7	
Drilling Co.:	Cascade	Easting (NAD83):	7616398.0	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	97 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Dan O'Mara	Borehole Diameter:	6-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	E. Huellmantel / J. Pacheco	Depth to First Water:	10.04 ft bgs	
Logger:	S. McGrane / D. Maurer	Editor:	S. McGrane / G. Jeffers	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
1					(0.0 - 0.5') Steel plate with BMPs		
2		Topock - Fill	SP		(0.0 - 4.0') 12" Borehole		
3					(0.5 - 5.0') Washed Plastering Sand	(0.5 - 5.0') 6.7 bags	(0.5 - 5.0') 5.5 bags (-18%) Note: Wildcat Washed
4							
5		Topock - Fill	SP				
6							
7		Topock - Fill	SC				
8		Topock - Fill	SP				
9							
10		Topock - Fill	SP-SM				
11							
12		Topock - Fluvial Deposits	SP				
13		Topock - Fluvial Deposits	SM				
14		Topock - Fill	SP-SM		(5.0 - 86.0') Pea Gravel	(5.0 - 86.0') 31.8 bags	(5.0 - 86.0') 33 bags (4%) Note: Cal-Silica 3/8"x1/4"
15							
16		Topock - Fluvial Deposits	SM				
17							
18							
19		Topock - Fluvial Deposits	SM				
20							
21			SP-SM				

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Temporary Backfill Log

Date Started:	04/03/2019	Surface Elevation:	464.7 ft amsl	Well ID: RB-5 Pilot
Date Completed:	04/10/2019	Northing (NAD83):	2102420.7	
Drilling Co.:	Cascade	Easting (NAD83):	7616398.0	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	97 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Dan O'Mara	Borehole Diameter:	6-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	E. Huellmantel / J. Pacheco	Depth to First Water:	10.04 ft bgs	
Logger:	S. McGrane / D. Maurer	Editor:	S. McGrane / G. Jeffers	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
21		Topock - Fluvial Deposits	SP-SM				
22		Topock - Fluvial Deposits	SP				
23			NR				
24							
25							
26							
27							
28							
29							
30					(5.0 - 86.0') Pea Gravel	(4.0 - 97.0') 6" Borehole	(5.0 - 86.0') 31.8 bags
31							
32		Topock - Fluvial Deposits	SP				(5.0 - 86.0') 33 bags (4%) Note: Cal-Silica 3/8"x1/4"
33							
34							
35							
36							
37							
38							
39							
40							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Temporary Backfill Log

Date Started:	04/03/2019	Surface Elevation:	464.7 ft amsl	Well ID: RB-5 Pilot
Date Completed:	04/10/2019	Northing (NAD83):	2102420.7	
Drilling Co.:	Cascade	Easting (NAD83):	7616398.0	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	97 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Dan O'Mara	Borehole Diameter:	6-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	E. Huellmantel / J. Pacheco	Depth to First Water:	10.04 ft bgs	
Logger:	S. McGrane / D. Maurer	Editor:	S. McGrane / G. Jeffers	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
41							
42							
43							
44	RB-5-VAS-42-47 (<0.033U ppb) 4/9/2019 10:15	Topock - Fluvial Deposits	SP				
45							
46							
47		Topock - Fluvial Deposits	GW				
48							
49		Topock - Fluvial Deposits	SP				
50					(5.0 - 86.0') Pea Gravel	(4.0 - 97.0') 6" Borehole	(5.0 - 86.0') 31.8 bags
51							
52							
53							
54							
55							
56							
57							
58							
59		Topock - Fluvial Deposits	SP				
60							

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Date Started:	04/03/2019	Surface Elevation:	464.7 ft amsl	Well ID: RB-5 Pilot
Date Completed:	04/10/2019	Northing (NAD83):	2102420.7	
Drilling Co.:	Cascade	Easting (NAD83):	7616398.0	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	97 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Dan O'Mara	Borehole Diameter:	6-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	E. Huellmantel / J. Pacheco	Depth to First Water:	10.04 ft bgs	
Logger:	S. McGrane / D. Maurer	Editor:	S. McGrane / G. Jeffers	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction		Calculated Material Volumes	Material Volumes Installed									
61		Topock - Fluvial Deposits	SP														
62																	
63																	
64			NR														
65																	
66																	
67		Topock - Fluvial Deposits	SP														
68																	
69																	
70			NR														
71																	
72																	
73		Topock - Fluvial Deposits	SP														
74																	
75																	
76		Topock - Fluvial Deposits	SP														
77		Topock - Fluvial Deposits	CL														
78		Topock - Fluvial Deposits	SP														
79																	
80																	

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started:	04/03/2019	Surface Elevation:	464.7 ft amsl	Well ID: RB-5 Pilot
Date Completed:	04/10/2019	Northing (NAD83):	2102420.7	
Drilling Co.:	Cascade	Easting (NAD83):	7616398.0	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	97 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Dan O'Mara	Borehole Diameter:	6-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	E. Huellmantel / J. Pacheco	Depth to First Water:	10.04 ft bgs	
Logger:	S. McGrane / D. Maurer	Editor:	S. McGrane / G. Jeffers	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
81	RB-5-VAS-82-87 (0.127 J ppb) 4/9/2019 14:05	Topock - Fluvial Deposits	SP		(5.0 - 86.0') Pea Gravel	(5.0 - 86.0') 31.8 bags	(5.0 - 86.0') 33 bags (4%) Note: Cal-Silica 3/8"x1/4"
82		Topock - Fluvial Deposits	GW				
83			NR				
84		Topock - Weathered Bedrock - conglomerate	GM		(4.0 - 97.0') 6" Borehole	(86.0 - 97.0') 4.3 bags	(86.0 - 97.0') 4 bags (-7%) Note: Lapis Lustre Sand
85							
86		Topock - Competent Bedrock - conglomerate					
87							
88							
89							
90							
91							
92							
93							
94							
95							
96							
97							
98							
99							
100							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started:	07/11/2019	Surface Elevation:	N/A	Boring No.: RB-5
Date Completed:	07/28/2019	Northing (NAD83):	N/A	
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client: PG&E
Drilling Method:	Dual Rotary	Total Depth:	99.25 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Foremost DR-24 HD	Conductor Casing Diameter:	24 inches	Location: PG&E Topock, Needles, California
Driller Name:	Jon Martinez	Drill Casing Diameter:	18 inches	
Drilling Asst:	H. & A. Amezquita	Drill Bit:	17 inch tricone	Project Number: RC000753.0051
Tool-Pusher:	Arnold Lamon	Depth to First Water:	10.04 ft bgs	
Rig Geologist:	Drew Martzolf	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Drilling Run and Average Penetration Rate	USCS Code	USCS Class	Casing Diameter	Description (See Pilot boring log for full geologic descriptions)	Drilling Notes	Drilling Fluid
1					(0.0 - 4.0') Topock - Fill; Poorly graded sand (SP); brown (7.5YR 5/4)		(0.0 - 20.0') 237.9 gallons of water used; 70 gallons of water recovered; 167.9 gallons of water lost
2		SP					
3							
4					(4.0 - 6.0') Topock - Fill; Poorly graded sand (SP); brown (10YR 5/3)		
5		SP					
6					(6.0 - 7.0') Topock - Fill; Clayey sand (SC); brown (7.5YR 5/4)		
7		SC					
8		SP			(7.0 - 8.0') Topock - Fill; Poorly graded sand (SP); brown (7.5YR 5/4)		
9					(8.0 - 10.5') Topock - Fill; Poorly graded sand with silt (SP-SM); brown (7.5YR 5/3)		
10	(0.0 - 20.0) 2.10 mins/ft	SP-SM		(0.0 - 20.0') 24.0" Steel Casing		(10.0') Observed pea gravel in drill cuttings (see photo log).	
11		SP			(10.5 - 11.8') Topock - Fluvial Deposits; Poorly graded sand (SP); brown (7.5YR 5/4)		
12		SM			(11.8 - 12.0') Topock - Fluvial Deposits; Silty sand (SM); dark gray (7.5YR 4/1)		
13		SP-SM			(12.0 - 13.0') Topock - Fill; Poorly graded sand with silt (SP-SM); brown (7.5YR 5/3)		
14		SM			(13.0 - 14.0') Topock - Fluvial Deposits; Silty sand (SM); dark gray (7.5YR 4/1)		
15					(14.0 - 17.0') No recovery (NR)	(15.0') Water generated by formation after reaching water table approximate 15 feet bgs.	
16		NR					
17					(17.0 - 19.5') Topock - Fluvial Deposits; Silty sand (SM); (7.5R 5/3)		
18		SM					
19							
20		SP-SM			(19.5 - 21.0') Topock - Fluvial		

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Remarks: NR = no recovery, blue water table symbol represents approximate depth to water during the first VAS sample collected from

RB-5 Pilot

Date Started:	07/11/2019	Surface Elevation:	N/A	Boring No.: RB-5
Date Completed:	07/28/2019	Northing (NAD83):	N/A	
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client: PG&E
Drilling Method:	Dual Rotary	Total Depth:	99.25 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Foremost DR-24 HD	Conductor Casing Diameter:	24 inches	Location: PG&E Topock, Needles, California
Driller Name:	Jon Martinez	Drill Casing Diameter:	18 inches	
Drilling Asst:	H. & A. Amezquita	Drill Bit:	17 inch tricone	Project Number: RC000753.0051
Tool-Pusher:	Arnold Lamon	Depth to First Water:	10.04 ft bgs	
Rig Geologist:	Drew Martzolf	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Drilling Run and Average Penetration Rate	USCS Code	USCS Class	Casing Diameter	Description (See Pilot boring log for full geologic descriptions)	Drilling Notes	Drilling Fluid
21		SP-SM			Deposits; Poorly graded sand with silt (SP-SM); brown (7.5YR 4/2)	(20.0') Heaving sands at 20 feet bgs following installation of 18-inch casing to 41.46 fts, see Drilling Notes from 41.5-61.5 ft., observed pea gravel in drill cuttings (see photo log)	(20.0 - 41.5') 1789.74 gallons of water used; 1683.5 gallons of water recovered; 106.24 gallons of water lost
22		SP			(21.0 - 22.0') Topock - Fluvial Deposits; Poorly graded sand (SP); dark gray (7.5YR 4/1)		
23		NR			(22.0 - 24.0') No recovery (NR)		
24					(24.0 - 47.0') Topock - Fluvial Deposits; Poorly graded sand (SP); brown (7.5YR 4/2)		
25							
26							
27							
28							
29							
30	(20.0 - 41.5) 2.13 mins/ft			(20.0 - 41.5') 24.0" Steel Casing		(30.0') Observed pea gravel in drill cuttings (see photo log).	
31							
32		SP					
33							
34							
35							
36							
37							
38							
39							
40							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater

Remarks: NR = no recovery, blue water table symbol represents approximate depth to water during the first VAS sample collected from

RB-5 Pilot

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater
Remarks: NR = no recovery, blue water table symbol represents approximate depth to water during the first VAS sample collected from RB-5 Pilot

Date Started:	07/11/2019	Surface Elevation:	N/A	Boring No.: RB-5
Date Completed:	07/28/2019	Northing (NAD83):	N/A	
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client: PG&E
Drilling Method:	Dual Rotary	Total Depth:	99.25 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Foremost DR-24 HD	Conductor Casing Diameter:	24 inches	Location: PG&E Topock, Needles, California
Driller Name:	Jon Martinez	Drill Casing Diameter:	18 inches	
Drilling Asst:	H. & A. Amezquita	Drill Bit:	17 inch tricone	Project Number: RC000753.0051
Tool-Pusher:	Arnold Lamon	Depth to First Water:	10.04 ft bgs	
Rig Geologist:	Drew Martzolf	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

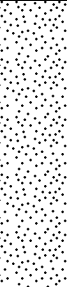




Depth (ft)	Drilling Run and Average Penetration Rate	USCS Code	USCS Class	Casing Diameter	Description (See Pilot boring log for full geologic descriptions)	Drilling Notes	Drilling Fluid
61	(41.5 - 61.5) 2.75 mins/ft			(41.5 - 61.5) 18.0" Steel Casing		(60.0') Observed pea gravel in drill cuttings (see photo log).	(41.5 - 61.5') 2971.92 gallons of water used; 3399.66 gallons of water recovered; 427.74 gallons of water gained
62		SP					(61.5 - 80.0') 5565.59 gallons of water used; 5656.11 gallons of water recovered; 90.519999999995 gallons of water gained
63							
64					(64.0 - 66.0') No recovery (NR)		
65		NR					
66					(66.0 - 69.0') Topock - Fluvial Deposits; Poorly graded sand (SP); brown (7.5YR 5/4)		
67		SP					
68							
69					(69.0 - 73.0') No recovery (NR)		
70							
71	(61.5 - 80.0) 5.25 mins/ft	NR		(61.5 - 80.0') 18.0" Steel Casing		(70.0') Observed pea gravel in drill cuttings (see photo log).	
72						(71.0') Tri-cone drill bit was ahead of the 18" casing, sands heaved into the outer casing above the tri-cone bit and locked it up the bit in the casing.	
73					(73.0 - 75.0') Topock - Fluvial Deposits; Poorly graded sand with gravel (SP); brown (7.5YR 5/4)		
74		SP					
75					(75.0 - 76.0') Topock - Fluvial Deposits; Poorly graded sand (SP); brown (7.5YR 5/4)		
76		SP					
77		CL			(76.0 - 77.0') Topock - Fluvial Deposits; Lean clay (CL); brown (7.5YR 4/2)		
78					(77.0 - 84.0') Topock - Fluvial Deposits; Poorly graded sand (SP); brown (7.5YR 5/4)		
79		SP					
80							

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Remarks: NR = no recovery, blue water table symbol represents approximate depth to water during the first VAS sample collected from

RB-5 Pilot

Date Started:	07/11/2019	Surface Elevation:	N/A	Boring No.: RB-5	
Date Completed:	07/28/2019	Northing (NAD83):	N/A		
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client:	PG&E
Drilling Method:	Dual Rotary	Total Depth:	99.25 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Foremost DR-24 HD	Conductor Casing Diameter:	24 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Jon Martinez	Drill Casing Diameter:	18 inches		
Drilling Asst:	H. & A. Amezcuita	Drill Bit:	17 inch tricone	Project Number:	RC000753.0051
Tool-Pusher:	Arnold Lamon	Depth to First Water:	10.04 ft bgs		
Rig Geologist:	Drew Martzolf	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Drilling Run and Average Penetration Rate	USCS Code	USCS Class	Casing Diameter	Description (See Pilot boring log for full geologic descriptions)	Drilling Notes	Drilling Fluid
81	(80.0 - 84.0) 2.50 mins/ft	SP		(80.0 - 84.0') 18.0" Steel Casing		(80.0 - 90.0') Observed Cemex #3 MESH (8x10) Lapis Luster Sand and pea gravel in drill cuttings (see photo log). Approximately 2100 gallons of water was used and 2130 gallons were recovered to remove sand from the casing.	(80.0 - 84.0') 5400 gallons of water used; 5590 gallons of water recovered; 190 gallons of water gained
82							
83							
84	(84.0 - 87.0) 22.67 mins/ft	GW		(84.0 - 87.0') 18.0" Steel Casing	(84.0 - 85.0') Topock - Fluvial Deposits; Well graded gravel (GW); brown (7.5YR 5/4)	(84.0') On 7/15/2019, approximately 2725 gallons of water was used and 2775 gallons were recovered to remove heaving sands in drill casing at 84 feet bgs. On 7/16/19, approximately 350 gallons of water was used and 7703.59 gallons were recovered to remove heaving sands in drill casing at 84 feet bgs. Volumes used and recovered are included in the Drilling Fluid notes.	(84.0 - 87.0') 3267.68 gallons of water used; 11380.33 gallons of water recovered; 8112.65 gallons of water gained
85					(85.0 - 87.0') No recovery (NR)		
86		NR					
87	(87.0 - 99.3) 13.96 mins/ft	GM		(87.0 - 99.3') 18.0" Steel Casing	(87.0 - 89.0') Topock - Weathered Bedrock - conglomerate; Silty gravel with sand (GM); dusky red (2.5YR 3/2)	(87.0 - 99.3') 5939.8 gallons of water used; 6148.42 gallons of water recovered; 208.62 gallons of water gained	
88							
89					(89.0 - 99.3') Topock - Competent Bedrock - conglomerate; dusky red (2.5YR 3/2)	(90.0') Observed Cemex #3 MESH (8x10) Lapis Luster Sand in drill cuttings (see photo log)	
90							
91							
92							
93							
94							
95							
96							
97							
98							
99							
100	End of Boring at 99.3 'bgs.						

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Remarks: NR = no recovery, blue water table symbol represents approximate depth to water during the first VAS sample collected from

RB-5 Pilot

Date Started:	07/11/2019	Surface Elevation:	N/A	Well ID: RB-5
Date Completed:	07/28/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Dual Rotary	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	Jon Martinez	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	H. & A. Amezcua	Borehole Diameter:	18-24 inches	
Logger:	Drew Martzolf	Water Level Start:	10.04 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	N/A	
Total Depth:	99.25 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
1					(0.0 - 24.0') 8" Suregrip 17 Casing		
2		Topock - Fill	SP		(0.0 - 3.9') Cemex #60 Mesh (40/70) and Cemex #0/30 Mesh (30x50)	(0.0 - 3.9') 21.8 bags	(0.0 - 3.9') 26 bags (19%) Note: Lapis Lustre Sand
3							
4							
5		Topock - Fill	SP				
6		Topock - Fill	SC				
7		Topock - Fill	SP				
8					(3.9 - 12.0') Portland cement and up to 3% Bentonite	(3.9 - 12.0') 168.1 gallons	(3.9 - 12.0') 153 gallons (-9%) Note: Type I, II, and V Portland Cement and Hydrogel
9		Topock - Fill	SP-SM				
10					(0.0 - 20.0') 24.0" Borehole		
11		Topock - Fluvial Deposits	SP				
12		Topock - Fluvial Deposits	SM				
13		Topock - Fill	SP-SM		(12.0 - 13.2') Bentonite seal chips	(12.0 - 13.2') 2.4 bags	(12.0 - 13.2') 5 bags (108%) Note: Puregold Medium Chips
14		Topock - Fluvial Deposits	SM				
15	RB-5-VAS-12.0-17.0 (0.125 J ppb) 4/4/2019 10:49				(13.2 - 16.1') Cemex #60 (40x70) Mesh	(13.2 - 16.1') 8.2 bags	(13.2 - 16.1') 16 bags (95%) Note: Lapis Lustre Sand
16			NR				
17							
18		Topock - Fluvial Deposits	SM		(16.1 - 47.1') Cemex #0/30 Mesh (30x50)	(16.1 - 47.1') 87.9 bags	(16.1 - 47.1') 121 bags (38%) Note: Lapis Lustre Sand, swabbed filter pack for 74 minutes prior to installation of transition sand
19							
20			SP-SM				

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Date Started:	07/11/2019	Surface Elevation:	N/A	Well ID: RB-5
Date Completed:	07/28/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Dual Rotary	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	Jon Martinez	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	H. & A. Amezcuita	Borehole Diameter:	18-24 inches	
Logger:	Drew Martzolf	Water Level Start:	10.04 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	N/A	
Total Depth:	99.25 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
21		Topock - Fluvial Deposits	SP-SM		(0.0 - 24.0') 8" Suregrip 17 Casing		
22		Topock - Fluvial Deposits	SP				
23			NR				
24							
25					(24.0 - 44.0') 8" Stainless Steel 316 (10-slot) Screen		
26							
27							
28							
29							
30					(16.1 - 47.1') Cemex #0/30 Mesh (30x50)	(20.0 - 41.5') 24.0" Borehole	(16.1 - 47.1') 87.9 bags
31							(16.1 - 47.1') 121 bags (38%) Note: Lapis Lustre Sand, swabbed filter pack for 74 minutes prior to installation of transition sand
32		Topock - Fluvial Deposits	SP				
33							
34							
35							
36							
37							
38							
39							
40							


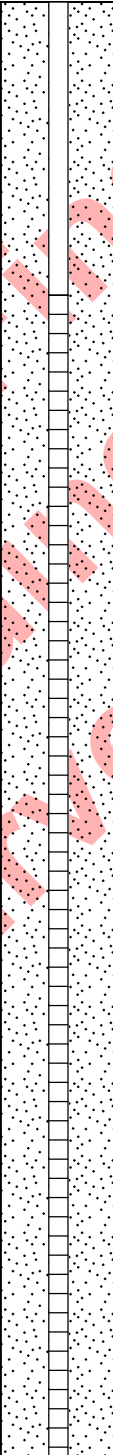








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Date Started:	07/11/2019	Surface Elevation:	N/A	Well ID: RB-5
Date Completed:	07/28/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Dual Rotary	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	Jon Martinez	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	H. & A. Amezcua	Borehole Diameter:	18-24 inches	
Logger:	Drew Martzolf	Water Level Start:	10.04 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	N/A	
Total Depth:	99.25 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
41	RB-5-VAS-42-47 ($<0.033\text{U}$ ppb) 4/9/2019 10:15	Topock - Fluvial Deposits	SP		(24.0 - 44.0') 8" Stainless Steel 316 (10-slot) Screen		
42					(16.1 - 47.1') Cemex #0/30 Mesh (30x50)		
43					(44.0 - 64.0') 8" Suregrip 17 Casing		
44					(20.0 - 41.5') 24.0" Borehole		
45					(16.1 - 47.1') 87.9 bags		(16.1 - 47.1') 121 bags (38%) Note: Lapis Lustre Sand, swabbed filter pack for 74 minutes prior to installation of transition sand
46		Topock - Fluvial Deposits	GW		(47.1 - 47.7') Cemex #60 (40x70) Mesh	(47.1 - 47.7') 1.6 bags	(47.1 - 47.7') 2 bags (25%) Note: Lapis Lustre Sand
47							
48		Topock - Fluvial Deposits	SP				
49							
50		NR			(41.5 - 61.5') 18.0" Borehole		
51					(47.7 - 55.2') Bentonite seal chips	(47.7 - 55.2') 14.9 bags	(47.7 - 55.2') 8 bags (-46%) Note: Puregold Medium Chips, difference in calculated volume compared to actual volume is $<80\%$ of design volume due to coarse loose formation displacing chips during installation
52							
53							
54					(55.2 - 56.2') Cemex #0/30 Mesh (30x50)	(55.2 - 56.2') 2.7 bags	(55.2 - 56.2') 2 bags (-26%) Note: Lapis Lustre Sand
55							
56		Topock - Fluvial Deposits	SP		(56.2 - 99.3') Cemex 2/12 Mesh (12x20)	(56.2 - 99.3') 125.2 bags	(56.2 - 99.3') 114 bags (-9%) Note: Lapis Lustre Sand, swabbed filter pack for ~98 minutes prior to installation of transition sand
57							
58							
59							
60							

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Date Started:	07/11/2019	Surface Elevation:	N/A	Well ID: RB-5
Date Completed:	07/28/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Dual Rotary	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	Jon Martinez	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	H. & A. Amezcuita	Borehole Diameter:	18-24 inches	
Logger:	Drew Martzolf	Water Level Start:	10.04 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	N/A	
Total Depth:	99.25 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction			Calculated Material Volumes	Material Volumes Installed	
61		Topock - Fluvial Deposits	SP		(44.0 - 64.0') 8" Suregrip 17 Casing			(41.5 - 61.5') 18.0" Borehole	(56.2 - 99.3') 125.2 bags	(56.2 - 99.3') 114 bags (-9%) Note: Lapis Lustre Sand, swabbed filter pack for ~98 minutes prior to installation of transition sand
62										
63										
64			NR		(64.0 - 89.0') 8" Stainless Steel 316 (30-slot) Screen					
65										
66		Topock - Fluvial Deposits	SP							
67										
68										
69			NR		(56.2 - 99.3') Cemex 2/12 Mesh (12x20)					
70										
71										
72		Topock - Fluvial Deposits	SP							
73										
74		Topock - Fluvial Deposits	SP							
75										
76		Topock - Fluvial Deposits	CL							
77		Topock - Fluvial Deposits	SP							
78										
79										
80										

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Date Started:	07/11/2019	Surface Elevation:	N/A	Well ID: RB-5
Date Completed:	07/28/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Dual Rotary	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	Jon Martinez	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	H. & A. Amezcuita	Borehole Diameter:	18-24 inches	
Logger:	Drew Martzolf	Water Level Start:	10.04 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	N/A	
Total Depth:	99.25 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
81	RB-5-VAS-82-87 (0.127 J ppb) 4/9/2019 14:05	Topock - Fluvial Deposits	SP		(64.0 - 89.0') 8" Stainless Steel 316 (30-slot) Screen		
82							
83		Topock - Fluvial Deposits	GW		(80.0 - 84.0') 18.0" Borehole		
84							
85			NR		(84.0 - 87.0') 18.0" Borehole		
86							
87		Topock - Weathered Bedrock - conglomerate	GM				
88							
89					(56.2 - 99.3') Cemex 2/12 Mesh (12x20)	(56.2 - 99.3') 125.2 bags	(56.2 - 99.3') 114 bags (-9%) Note: Lapis Lustre Sand, swabbed filter pack for ~98 minutes prior to installation of transition sand
90							
91							
92		Topock - Competent Bedrock - conglomerate					
93					(87.0 - 99.3') 18.0" Borehole		
94							
95							
96							
97							
98							
99							
100					End of Boring at 99.3' bgs.		

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Date Started:	05/08/2019	Surface Elevation:	N/A	Well ID: MW-O-120, MW-O-140
Date Completed:	05/12/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	Dan O'Mara	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	E. Huellmantel / J. Pacheco	Borehole Diameter:	6-12 inches	
Logger:	Grant Willford	Water Level Start:	12.4 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	7/23/2019	
Total Depth:	146 ft bgs	Well Completion:	<input type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
0					(+2.0 - 100.0') 2" Casing (+3.0 - 0.0') Casing Monument		Note: 12x12-inch Lockable Steel Monument
1							
2			NR				
3					(0.9 - 5.0') Concrete		(0.9 - 5.0') 35 bags (%) Note: 24-inch Diameter Concrete Well Pad, King Kon-Crete 4000 PSI, Grout Removed to install
4							
5							
6							
7		Topock - Fill	SP				
8							
9					(5.0 - 14.0') Bentonite seal chips	(5.0 - 14.0') 6.3 bags	(5.0 - 14.0') 9 bags (43%) Note: Puregold Medium Chips
10							
11					(11.5 - 12.5') Centralizer	(4.0 - 143.0') 10" Borehole	
12							
13			NR				
14	MW-O-VAS-12.5-17 (0.163 J ppb) 5/8/2019 14:20						
15					(14.0 - 85.0') High Solids Grout	(14.0 - 85.0') 266.4 gallons	(14.0 - 85.0') 350 gallons (31%) Note: Type I, II and V and Benseal
16		Topock - Fluvial Deposits	SP-SM				
17							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = No Recovery, blue water table symbol represents depth to water measured during first VAS interval

Date Started:	05/08/2019	Surface Elevation:	N/A	Well ID: MW-O-120, MW-O-140
Date Completed:	05/12/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	Dan O'Mara	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	E. Huellmantel / J. Pacheco	Borehole Diameter:	6-12 inches	
Logger:	Grant Willford	Water Level Start:	12.4 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	7/23/2019	
Total Depth:	146 ft bgs	Well Completion:	<input type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
18					(+2.0 - 100.0') 2" Casing		
19							
20							
21							
22		Topock - Fluvial Deposits	SP-SM				
23							
24							
25							
26							
27		Topock - Fluvial Deposits	CH		(14.0 - 85.0') High Solids Grout	(4.0 - 143.0') 10" Borehole	(14.0 - 85.0') 266.4 gallons
28							(14.0 - 85.0') 350 gallons (31%) Note: Type I, II and V and Benseal
29							
30							
31							
32		Topock - Fluvial Deposits	SP-SM				
33							
34							
35							
36							
37		Topock - Fluvial Deposits	SP-SM				

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Date Started:	05/08/2019	Surface Elevation:	N/A	Well ID: MW-O-120, MW-O-140
Date Completed:	05/12/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	Dan O'Mara	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	E. Huellmantel / J. Pacheco	Borehole Diameter:	6-12 inches	
Logger:	Grant Willford	Water Level Start:	12.4 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	7/23/2019	
Total Depth:	146 ft bgs	Well Completion:	<input type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
38					(+2.0 - 100.0') 2" Casing		
39							
40							
41		Topock - Fluvial Deposits	SP-SM				
42							
43							
44							
45							
46							
47		Topock - Fluvial Deposits	SW		(14.0 - 85.0') High Solids Grout	(4.0 - 143.0') 10" Borehole	(14.0 - 85.0') 266.4 gallons
48							(14.0 - 85.0') 350 gallons (31%) Note: Type I, II and V and Benseal
49							
50		Topock - Fluvial Deposits	SW				
51							
52		Topock - Fluvial Deposits	SP-SM				
53	MW-O-VAS-51-56 (<0.033 U ppb) 5/9/2019 09:18						
54		Topock - Fluvial Deposits	SM				
55							
56							
57		Topock - Alluvium Deposits	CL				

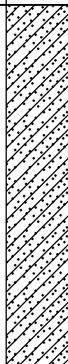
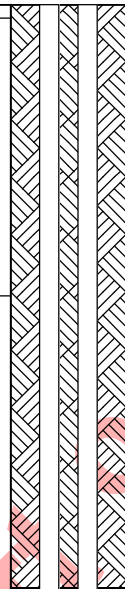

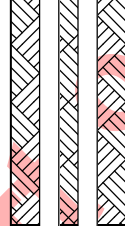
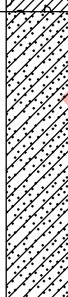
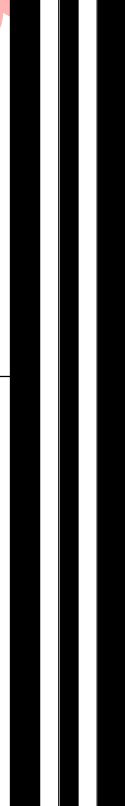
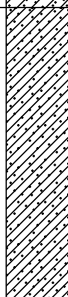
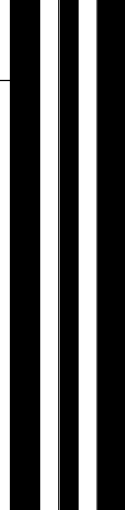

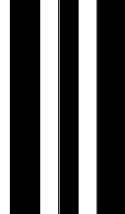
Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = No Recovery, blue water table symbol represents depth to water measured during first VAS interval

Date Started:	05/08/2019	Surface Elevation:	N/A	Well ID: MW-O-120, MW-O-140
Date Completed:	05/12/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	Dan O'Mara	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	E. Huellmantel / J. Pacheco	Borehole Diameter:	6-12 inches	
Logger:	Grant Willford	Water Level Start:	12.4 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	7/23/2019	
Total Depth:	146 ft bgs	Well Completion:	<input type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
58		Topock - Alluvium Deposits	CL		(+2.0 - 100.0') 2" Casing		
59							
60							
61							
62		Topock - Alluvium Deposits	SC		(61.5 - 62.5') Centralizer		
63							
64							
65							
66							
67					(14.0 - 85.0') High Solids Grout	(4.0 - 143.0') 10" Borehole	(14.0 - 85.0') 266.4 gallons
68	MW-O-VAS-66-71 (0.178 J ppb) 5/9/2019 14:30						(14.0 - 85.0') 350 gallons (31%) Note: Type I, II and V and Benseal
69							
70							
71		Topock - Alluvium Deposits	SC				
72							
73							
74							
75							
76		Topock - Alluvium Deposits	SC				
77							

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Date Started:	05/08/2019	Surface Elevation:	N/A	Well ID: MW-O-120, MW-O-140
Date Completed:	05/12/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	Dan O'Mara	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	E. Huellmantel / J. Pacheco	Borehole Diameter:	6-12 inches	
Logger:	Grant Willford	Water Level Start:	12.4 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	7/23/2019	
Total Depth:	146 ft bgs	Well Completion:	<input type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction			Calculated Material Volumes	Material Volumes Installed
78		Topock - Alluvium Deposits	SC		(+2.0 - 100.0') 2" Casing		(+1.8 - 130.0') 2" PVC Sch 40 Casing	(14.0 - 85.0') 266.4 gallons	(14.0 - 85.0') 350 gallons (31%) Note: Type I, II and V and Benseal
79									
80									
81									
82		Topock - Alluvium Deposits	CL		(14.0 - 85.0') High Solids Grout				
83									
84									
85									
86		Topock - Alluvium Deposits	SC				(4.0 - 143.0') 10" Borehole	(85.0 - 98.0') 11.9 buckets	(85.0 - 98.0') 12 buckets (1%) Note: Pel-Plug (TR30) 3/8"
87									
88									
89									
90		Topock - Alluvium Deposits	CL		(85.0 - 98.0') Bentonite seal pellets				
91									
92									
93									
94		Topock - Alluvium Deposits	SC						
95									
96									
97									

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Date Started:	05/08/2019	Surface Elevation:	N/A	Well ID: MW-O-120, MW-O-140
Date Completed:	05/12/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	Dan O'Mara	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	E. Huellmantel / J. Pacheco	Borehole Diameter:	6-12 inches	
Logger:	Grant Willford	Water Level Start:	12.4 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	7/23/2019	
Total Depth:	146 ft bgs	Well Completion:	<input type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
98					(+2.0 - 100.0') 2" Casing		
99					(+1.8 - 130.0') 2" PVC Sch 40 Casing	(85.0 - 98.0') 11.9 buckets	(85.0 - 98.0') 12 buckets (1%) Note: Pel-Plug (TR30) 3/8"
100							
101					(100.0 - 120.0') 2" Sch 40 PVC (20-slot) Screen		
102	MW-O-VAS-101-107 (<0.033 U ppb) 5/10/2019 12:32	Topock - Alluvium Deposits	SC				
103							
104							
105							
106							
107							
108	MW-O-VAS-106-111 (<0.17 U) 5/11/2019 08:25	Topock - Alluvium Deposits	SM		(98.0 - 124.0') Cemex #3 MESH (8x10)	(98.0 - 124.0') 25.2 bags	(98.0 - 124.0') 36 bags (43%) Note: Lapis Lustre Sand
109					(4.0 - 143.0') 10" Borehole		
110							
111							
112							
113							
114		Topock - Alluvium Deposits	SM				
115							
116							
117		Topock - Alluvium Deposits	SM				

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Date Started:	05/08/2019	Surface Elevation:	N/A	Well ID: MW-O-120, MW-O-140
Date Completed:	05/12/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	Dan O'Mara	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	E. Huellmantel / J. Pacheco	Borehole Diameter:	6-12 inches	
Logger:	Grant Willford	Water Level Start:	12.4 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	7/23/2019	
Total Depth:	146 ft bgs	Well Completion:	<input type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction		Calculated Material Volumes	Material Volumes Installed
118		Topock - Alluvium Deposits	SM		(100.0 - 120.0') 2" Sch 40 PVC (20-slot) Screen	(+1.8 - 130.0') 2" PVC Sch 40 Casing	(98.0 - 124.0') 25.2 bags	(98.0 - 124.0') 36 bags (43%) Note: Lapis Lustre Sand
119								
120								
121								
122								
123								
124								
125								
126								
127								
128		Topock - Alluvium Deposits	ML		(124.0 - 128.0') Bentonite seal pellets	(4.0 - 143.0') 10" Borehole	(124.0 - 128.0') 3.8 buckets	(124.0 - 128.0') 5 buckets (32%) Note: Pel-Plug (TR30) 3/8"
129								
130								
131								
132								
133								
134								
135								
136								
137					Topock - Alluvium Deposits	SM		
138								
139								
140								
141								
142								
143								
144								
145								
146								

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Date Started:	05/08/2019	Surface Elevation:	N/A	Well ID: MW-O-120, MW-O-140
Date Completed:	05/12/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	Dan O'Mara	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	E. Huellmantel / J. Pacheco	Borehole Diameter:	6-12 inches	
Logger:	Grant Willford	Water Level Start:	12.4 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	7/23/2019	
Total Depth:	146 ft bgs	Well Completion:	<input type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
138	MW-O-VAS-136-141 (<0.17 U ppb) 5/11/2019 14:26	Topock - Alluvium Deposits	SM		(128.0 - 143.0') Cemex #3 MESH (8x10)		
139							
140						(128.0 - 143.0') 15.8 bags	(128.0 - 143.0') 19.5 bags (23%) Note: Lapis Lustre Sand
141					(140.5 - 141.5') Centralizer		
142							
143		Topock - Competent Bedrock - conglomerate			(140.0 - 142.3') Sump and End Cap		
144							
145					(143.0 - 146.0') Bentonite seal chips	(143.0 - 146.0') 0.8 bags	(143.0 - 146.0') 1 bags (25%) Note: Enviroplug Medium Chips, installed to 142 ft. bgs, 1.5 ft removed during reaming
146							
147					End of Boring at 146.0' bgs.		
148							
149							
150							
151							
152							
153							
154							
155							
156							
157							

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Date Started:	05/08/2019	Surface Elevation:	N/A	Boring No.: MW-Od
Date Completed:	05/12/2019	Northing (NAD83):	N/A	
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	146 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Terrasonic track mount	Borehole Diameter:	6-12 inches	Location: PG&E Topock, Needles, California
Driller Name:	Dan O'Mara	Depth to First Water:	12.4 ft bgs	
Drilling Asst:	E. Huellmantel / J. Pacheco	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger:	Grant Willford	Sampling Interval:	Continuous	
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
1							(0.0 - 4.0') No recovery (NR)	(0.0 - 4.0') No recovery due to loose dredge sands.	(0.0 - 96.0') 1930 gallons of water used; 1500 gallons of water recovered; 430 gallons of water lost
2					NR				
3									
4									
5	24			Topock - Fill	SP		(4.0 - 10.0') Topock - Fill; Poorly graded sand (SP); light yellowish brown (10YR 6/4); very fine grained to fine grained, subangular to subround; trace small pebbles, subround to round; trace silt; dry; homogeneous; some organics present 4-6 ft. bgs		
6									
7									
8									
9									
10									
11	48						(10.0 - 16.0') No recovery (NR)	(10.0 - 16.0') No recovery due to loose dredge sands.	
12									
13					NR			(12.5') Sampler dropped 0.5 due to lose sands	
14									
15			MW-O-VAS-12.5-17 (0.163 J ppb) 5/8/2019 14:20						
16									
17							(16.0 - 26.8') Topock - Fluvial Deposits; Poorly graded sand with silt (SP-SM); very dark grayish brown (10YR 3/2); very fine grained to fine grained, subangular to subround; little silt; wet	(16.0 - 36.0') Soft drilling	
18	222			Topock - Fluvial Deposits	SP-SM				
19									
20									

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Date Started:	05/08/2019	Surface Elevation:	N/A	Boring No.: MW-Od
Date Completed:	05/12/2019	Northing (NAD83):	N/A	
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	146 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Terrasonic track mount	Borehole Diameter:	6-12 inches	Location: PG&E Topock, Needles, California
Driller Name:	Dan O'Mara	Depth to First Water:	12.4 ft bgs	
Drilling Asst:	E. Huellmantel / J. Pacheco	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger:	Grant Willford	Sampling Interval:	Continuous	
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
21				Topock - Fluvial Deposits	SP-SM			(16.0 - 36.0') Soft drilling	(0.0 - 96.0') 1930 gallons of water used; 1500 gallons of water recovered; 430 gallons of water lost
22									
23									
24									
25									
26									
27				Topock - Fluvial Deposits	CH		(26.8 - 27.8') Topock - Fluvial Deposits; Fat clay (CH); dark grayish brown / dark yellowish brown(10YR 4/2); high plasticity; little silt; trace very fine grained sand, subround to round; moist; very soft to soft; homogeneous		
28	222						(27.8 - 36.0') Topock - Fluvial Deposits; Poorly graded sand with silt (SP-SM); dark grayish brown / dark yellowish brown(10YR 4/2); very fine grained to fine grained, subangular to subround; little silt; wet		
29				Topock - Fluvial Deposits	SP-SM				
30									
31									
32									
33									
34									
35									
36									
37				Topock - Fluvial Deposits	SP-SM		(36.0 - 45.0') Topock - Fluvial Deposits; Poorly graded sand with silt (SP-SM); light yellowish brown (10YR 6/4); very fine grained to fine grained, subangular to subround; little silt; trace clay; wet to moist	(36.0 - 56.0') Soft drilling	
38	240								
39									
40									


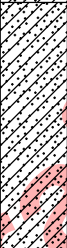

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Date Started:	05/08/2019	Surface Elevation:	N/A	Boring No.: <u>MW-Od</u>	
Date Completed:	05/12/2019	Northing (NAD83):	N/A		
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	146 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Terrasonic track mount	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Dan O'Mara	Depth to First Water:	12.4 ft bgs		
Drilling Asst:	E. Huellmantel / J. Pacheco	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	Grant Willford	Sampling Interval:	Continuous		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
41				Topock - Fluvial Deposits	SP-SM			(36.0 - 56.0') Soft drilling	(0.0 - 96.0') 1930 gallons of water used; 1500 gallons of water recovered; 430 gallons of water lost
42									
43									
44									
45									
46				Topock - Fluvial Deposits	SW		(45.0 - 50.0') Topock - Fluvial Deposits; Well graded sand (SW); light yellowish brown (10YR 6/4); very fine grained to coarse grained, subangular to subround; trace granules to small pebbles, subround to round; trace silt; wet		
47									
48	240								
49									
50				Topock - Fluvial Deposits	SW		(50.0 - 51.0') Topock - Fluvial Deposits; Well graded sand (SW); light yellowish brown (10YR 6/4); very fine grained to coarse grained, subangular to round; little granules to large pebbles, subangular to round; trace silt; wet; gravel composed of mixed lithology		
51									
52				Topock - Fluvial Deposits	SP-SM		(51.0 - 52.0') Topock - Fluvial Deposits; Poorly graded sand with silt (SP-SM); light yellowish brown (10YR 6/4); very fine grained to fine grained, subangular to subround; little silt; trace clay; wet to moist		
53			MW-O-VAS-51-56 (<0.033 U ppb) 5/9/2019 09:18	Topock - Fluvial Deposits	SM		(52.0 - 56.0') Topock - Fluvial Deposits; Silty sand with gravel (SM); brown (10YR 4/3); very fine grained to coarse grained, subangular to subround; little granules to large pebbles, subangular to round; little silt; wet; gravel composed of mixed lithology		
54									
55									
56									
57									
58	120			Topock - Alluvium Deposits	CL		(56.0 - 60.0') Topock - Alluvium Deposits; Sandy lean clay with gravel (CL); brown (7.5YR 5/3); low plasticity; and very fine to very coarse grained sand, angular to subround; little granules to medium pebbles, angular to subround; little silt; moist; medium stiff; moderate cementation; gravel composed of mixed lithology	(56.0 - 66.0') Rough drilling	
59									
60									



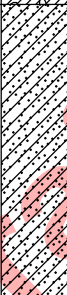


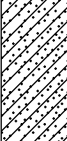
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Date Started:	05/08/2019	Surface Elevation:	N/A	Boring No.: MW-Od
Date Completed:	05/12/2019	Northing (NAD83):	N/A	
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	146 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Terrasonic track mount	Borehole Diameter:	6-12 inches	Location: PG&E Topock, Needles, California
Driller Name:	Dan O'Mara	Depth to First Water:	12.4 ft bgs	
Drilling Asst:	E. Huellmantel / J. Pacheco	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger:	Grant Willford	Sampling Interval:	Continuous	
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
61	120			Topock - Alluvium Deposits	SC		(60.0 - 66.0') Topock - Alluvium Deposits; Clayey sand with gravel (SC); brown (7.5YR 5/3); very fine grained to very coarse grained, angular to subround; little granules to medium pebbles, angular to subangular; little silt; little clay; moist; strong cementation; iron oxide staining	(56.0 - 66.0') Rough drilling	(0.0 - 96.0') 1930 gallons of water used; 1500 gallons of water recovered; 430 gallons of water lost
62									
63							(63'); dry		
64									
65	120		MW-O-VAS-66-71 (0.178 J ppb) 5/9/2019 14:30	Topock - Alluvium Deposits	SC		(66.0 - 76.0') Topock - Alluvium Deposits; Clayey sand with gravel (SC); brown (7.5YR 5/3); very fine grained to very coarse grained, angular to subround; some granules to medium pebbles, angular to subangular; little silt; little clay; moist to wet; moderate cementation; iron oxide staining	(66.0 - 76.0') Rough drilling	
66									
67									
68									
69							(69'); to 71.0' slightly saturated		
70									
71									
72									
73	120			Topock - Alluvium Deposits	SC				
74							(74'); dry		
75									
76									
77							(76.0 - 82.0') Topock - Alluvium Deposits; Clayey sand with gravel (SC); brown (7.5YR 5/4); very fine grained to coarse grained, angular to subround; some clay; little granules to medium pebbles, angular to subangular; little silt; moist; strong cementation; gravel composed of mixed litholgy, borderline moist-dry	(76.0 - 86.0') Rough drilling	
78									
79									
80									




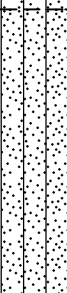
Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = No Recovery, blue water table symbol represents depth to water measured during first VAS interval

Date Started:	05/08/2019	Surface Elevation:	N/A	Boring No.: MW-Od
Date Completed:	05/12/2019	Northing (NAD83):	N/A	
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	146 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Terrasonic track mount	Borehole Diameter:	6-12 inches	Location: PG&E Topock, Needles, California
Driller Name:	Dan O'Mara	Depth to First Water:	12.4 ft bgs	
Drilling Asst:	E. Huellmantel / J. Pacheco	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger:	Grant Willford	Sampling Interval:	Continuous	
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
81	120			Topock - Alluvium Deposits	SC			(76.0 - 86.0') Rough drilling	(0.0 - 96.0') 1930 gallons of water used; 1500 gallons of water recovered; 430 gallons of water lost
82				Topock - Alluvium Deposits	CL		(82.0 - 86.0') Topock - Alluvium Deposits; Gravelly lean clay with sand (CL); brown (7.5YR 4/3); medium plasticity; some silt; little granules to medium pebbles, angular to subangular; little very fine to very coarse grained sand, angular to subround; moist; hard; strong cementation		
83									
84									
85	120			Topock - Alluvium Deposits	SC		(86.0 - 90.0') Topock - Alluvium Deposits; Clayey sand with gravel (SC); brown (7.5YR 4/3); very fine grained to coarse grained, angular to subround; little granules to medium pebbles, angular to subround; little silt; little clay; moist to wet; gravel composed of mixed lithology (87'); to 89.5' saturated	(86.0 - 96.0') Rough drilling	
86									
87									
88				Topock - Alluvium Deposits	CL		(90.0 - 96.0') Topock - Alluvium Deposits; Sandy lean clay with gravel (CL); brown (7.5YR 4/3) trace light reddish brown(2.5YR 6/3); medium plasticity; some silt; little granules to medium pebbles, angular to subangular; little very fine to very coarse grained sand, angular to subround; moist to dry; medium stiff to very stiff; moderate cementation; gravel composed of mixed lithology, low to medium plasticity		
89									
90									
91	120			Topock - Alluvium Deposits	CL		(93'); to 93.6' dry		
92									
93									
94									
95	120			Topock - Alluvium Deposits	SC		(96.0 - 106.0') Topock - Alluvium Deposits; Clayey sand with gravel (SC); (7.5YR 4/); very fine grained to very coarse grained, angular to subround; little granules to medium pebbles, angular to subround; little silt; little clay; moist to dry; moderate cementation	(96.0 - 106.0') Rough drilling	
96									
97									
98									
99									
100									

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Date Started:	05/08/2019	Surface Elevation:	N/A	Boring No.: MW-Od
Date Completed:	05/12/2019	Northing (NAD83):	N/A	
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	146 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Terrasonic track mount	Borehole Diameter:	6-12 inches	Location: PG&E Topock, Needles, California
Driller Name:	Dan O'Mara	Depth to First Water:	12.4 ft bgs	
Drilling Asst:	E. Huellmantel / J. Pacheco	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger:	Grant Willford	Sampling Interval:	Continuous	
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
101	120		MW-O-VAS- 101-107 (<0.033 U ppb) 5/10/2019 12:32	Topock - Alluvium Deposits	SC		(105.3'); to 105.8' dry	(96.0 - 106.0') Rough drilling	
102									
103									
104									
105									
106	120		MW-O-VAS- 106-111 (<0.17 U) 5/11/2019 08:25	Topock - Alluvium Deposits	SM		(106.0 - 112.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 5/3); very fine grained to very coarse grained, angular to subround; some granules to very large pebbles, angular to subround; little silt; trace clay; wet; weak cementation; gravel composed of mixed lithology mostly metadiorite	(106.0 - 116.0') Soft drilling, sample interval 106 to 111 was low yielding	
107									
108									
109									
110									
111				Topock - Alluvium Deposits	SM		(112.0 - 116.0') Topock - Alluvium Deposits; Silty sand (SM); brown (7.5YR 5/3); very fine grained to very coarse grained, angular to subround; little granules to medium pebbles, angular to subround; little silt; little clay; wet		
112									
113									
114									
115									
116	Topock - Alluvium Deposits	SM		(116.0 - 127.8') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown / moderate brown(5YR 4/4); very fine grained to very coarse grained, angular to subround; little granules to large pebbles, angular to subround; little silt; little clay; wet; weak cementation; iron oxide staining; gravel composed of mixed litholgy mostly metadiorite, some red staining on pebbles	(116.0 - 126.0') Soft drilling	(116.0 - 126.0') 40 gallons of water used; 0 gallons of water recovered; 40 gallons of water lost			
117									
118									
119									
120									


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Date Started:	05/08/2019	Surface Elevation:	N/A	Boring No.: <u>MW-Od</u>	
Date Completed:	05/12/2019	Northing (NAD83):	N/A		
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	146 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Terrasonic track mount	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Dan O'Mara	Depth to First Water:	12.4 ft bgs		
Drilling Asst:	E. Huellmantel / J. Pacheco	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	Grant Willford	Sampling Interval:	Continuous		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid	
121	120			Topock - Alluvium Deposits	SM			(116.0 - 126.0') Soft drilling	(116.0 - 126.0') 40 gallons of water used; 0 gallons of water recovered; 40 gallons of water lost	
122										
123										
124										
125										
126	120					Topock - Alluvium Deposits	ML	(127.8 - 130.0') Topock - Alluvium Deposits; Sandy silt with gravel (ML); reddish brown / moderate brown(5YR 4/4); low plasticity; and very fine to very coarse grained sand, angular to subround; little granules to medium pebbles, angular to subangular; moist; stiff; moderate cementation; iron oxide staining; gravel composed of mixed litholgy mostly metadiorite, some iron staining on pebbles	(125.0') Artesian flow occured during the removal of 6 inch casing	(126.0 - 143.0') 640 gallons of water used; 290 gallons of water recovered; 350 gallons of water lost
127									(126.0 - 132.0') Soft drilling	
128									(128.0') to 146' cleared borehole with water	
129										
130										
131										
132										
133		Topock - Alluvium Deposits	SM			(130.0 - 136.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (5YR 5/4) little red (2.5YR 5/8); very fine grained to very coarse grained, angular to subround; some silt; little granules to very large pebbles, angular to subround; little clay; moist; moderate cementation; iron oxide staining	(132.0 - 136.0') Rough drilling			
134										
135										
136										
137	120				MW-O-VAS-136-141 (<0.17 U ppb) 5/11/2019 14:26			Topock - Alluvium Deposits	SM	(136.0 - 140.0') Topock - Alluvium Deposits; Silty sand (SM); reddish brown / moderate brown(5YR 4/4) some red (2.5YR 4/8); very fine grained to very coarse grained, angular to subround; some silt; little granules to large pebbles, angular to subround; trace clay; wet to moist; weak cementation; iron oxide staining
138										
139										
140										

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Date Started:	05/08/2019	Surface Elevation:	N/A	Boring No.: MW-Od
Date Completed:	05/12/2019	Northing (NAD83):	N/A	
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	146 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Terrasonic track mount	Borehole Diameter:	6-12 inches	Location: PG&E Topock, Needles, California
Driller Name:	Dan O'Mara	Depth to First Water:	12.4 ft bgs	
Drilling Asst:	E. Huellmantel / J. Pacheco	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger:	Grant Willford	Sampling Interval:	Continuous	
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
141	120			Topock - Competent Bedrock - conglomerate			(140.0 - 146.0') Topock - Competent Bedrock - conglomerate; reddish brown (2.5YR 4/4) little red (2.5YR 4/6); moist to dry; strong cementation; friable, heavily fractured-pulverized, mostly dry through out some slightly moist portions of core	(140.0 - 146.0') Rough drilling, encountered bedrock much shallower than expected, independent QA inspector observed core and agreed that core was bedrock, sample interval from 141 to 146 ft. bgs was low yielding	(126.0 - 143.0') 640 gallons of water used; 290 gallons of water recovered; 350 gallons of water lost
142									
143									
144									
145									
146									
147							End of Boring at 146.0' bgs.		
148									
149									
150									
151									
152									
153									
154									
155									
156									
157									
158									
159									
160									

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Date Started:	08/10/2019	Surface Elevation:	N/A	Well ID: MW-X-45, MW-X-120
Date Completed:	08/12/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	Steve Vasquez	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	O. Flores / L. Amaya	Borehole Diameter:	10-12 inches	
Logger:	Anthony Mack	Water Level Start:	9.6 ft bgs	Project Number: RC000753.0051
Editor:	Grant Wilford	Development End Date:	N/A	
Total Depth:	127 ft bgs	Well Completion:	<input type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
1					(0.0 - 24.2') 2" PVC Sch 40 Casing		
2							
3							
4							
5							
6							
7							
8					(3.2 - 17.1') Portland Cement 6% Bentonite		
9			NR				
10					(9.5 - 10.5') Centralizer		
11						(3.2 - 17.1') 60.7 gallons	(3.2 - 17.1') 100 gallons (65%) Note: Type I, II and V and Benseal
12							
13							
14	MW-X-VAS-12-17 (<0.033 U ppb) 6/25/2019 15:10						
15							
16							
17							
18			NR		(17.1 - 22.0') Bentonite seal chips	(17.1 - 22.0') 3.41 bags	(17.1 - 22.0') 4 bags (17%) Note: Puregold Medium Chips
19							
20					(17.0 - 127.0') 10.0" Borehole		


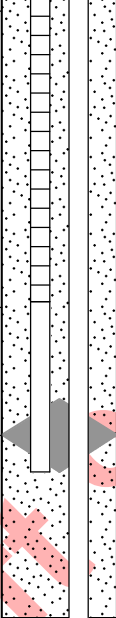

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Date Started:	08/10/2019	Surface Elevation:	N/A	Well ID: MW-X-45, MW-X-120
Date Completed:	08/12/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	Steve Vasquez	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	O. Flores / L. Amaya	Borehole Diameter:	10-12 inches	
Logger:	Anthony Mack	Water Level Start:	9.6 ft bgs	Project Number: RC000753.0051
Editor:	Grant Wilford	Development End Date:	N/A	
Total Depth:	127 ft bgs	Well Completion:	<input type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
21					(0.0 - 24.2') 2" PVC Sch 40 Casing		
22					(17.1 - 22.0') Bentonite seal chips	(17.1 - 22.0') 3.41 bags	(17.1 - 22.0') 4 bags (17%) Note: Puregold Medium Chips
23			NR				
24							
25					(24.2 - 44.2') 2" Sch 40 PVC (20-slot) Screen		
26							
27							
28							
29							
30							
31							
32		Topock - Fill	SP		(22.0 - 48.5') Cemex #3 MESH (8x10)	(22.0 - 48.5') 26.5 bags	(22.0 - 48.5') 31 bags (17%) Note: Lapis Lustre Sand
33							
34	MW-X-VAS-32-37 (<0.033 U ppb) 6/26/2019 11:45						
35							
36							
37		Topock - Fluvial Deposits	SW				
38							
39							
40							

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Date Started:	08/10/2019	Surface Elevation:	N/A	Well ID: MW-X-45, MW-X-120
Date Completed:	08/12/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	Steve Vasquez	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	O. Flores / L. Amaya	Borehole Diameter:	10-12 inches	
Logger:	Anthony Mack	Water Level Start:	9.6 ft bgs	Project Number: RC000753.0051
Editor:	Grant Wilford	Development End Date:	N/A	
Total Depth:	127 ft bgs	Well Completion:	<input type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction		Calculated Material Volumes	Material Volumes Installed
41		Topock - Fluvial Deposits	SW		(24.2 - 44.2') 2" Sch 40 PVC (20-slot) Screen		(0.0 - 99.8') 2" PVC Sch 40 Casing	(22.0 - 48.5') 26.5 bags (22.0 - 48.5') 31 bags (17%) Note: Lapis Lustre Sand
42								
43								
44								
45								
46					(44.2 - 46.5') Sump and End Cap			
47		Topock - Fluvial Deposits	GW		(40.0 - 46.5') Centralizer			
48								
49								
50							(17.0 - 127.0') 10.0" Borehole	
51								
52								
53								
54			NR					
55					(48.5 - 96.4') Bentonite seal chips		(48.5 - 96.4') 34.9 bags	(48.5 - 96.4') 37 bags (6%) Note: Puregold Medium Chips
56								
57								
58								
59								
60								

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Date Started:	08/10/2019	Surface Elevation:	N/A	Well ID: MW-X-45, MW-X-120
Date Completed:	08/12/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	Steve Vasquez	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	O. Flores / L. Amaya	Borehole Diameter:	10-12 inches	
Logger:	Anthony Mack	Water Level Start:	9.6 ft bgs	Project Number: RC000753.0051
Editor:	Grant Wilford	Development End Date:	N/A	
Total Depth:	127 ft bgs	Well Completion:	<input type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
61					(0.0 - 99.8') 2" PVC Sch 40 Casing		
62							
63							
64							
65							
66							
67							
68							
69							
70			NR		(48.5 - 96.4') Bentonite seal chips	(17.0 - 127.0') 10.0" Borehole	(48.5 - 96.4') 34.9 bags
71							(48.5 - 96.4') 37 bags (6%) Note: Puregold Medium Chips
72							
73	MW-X-VAS-71-76 (<0.033 U ppb) 6/27/2019 08:52						
74							
75							
76							
77							
78							
79							
80							

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Date Started:	08/10/2019	Surface Elevation:	N/A	Well ID: MW-X-45, MW-X-120
Date Completed:	08/12/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	Steve Vasquez	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	O. Flores / L. Amaya	Borehole Diameter:	10-12 inches	
Logger:	Anthony Mack	Water Level Start:	9.6 ft bgs	Project Number: RC000753.0051
Editor:	Grant Wilford	Development End Date:	N/A	
Total Depth:	127 ft bgs	Well Completion:	<input type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
81					(0.0 - 99.8') 2" PVC Sch 40 Casing		
82							
83							
84							
85					(84.5 - 85.5') Centralizer		
86							
87							
88							
89			NR		(48.5 - 96.4') Bentonite seal chips	(48.5 - 96.4') 34.9 bags	(48.5 - 96.4') 37 bags (6%) Note: Puregold Medium Chips
90					(17.0 - 127.0') 10.0" Borehole		
91							
92							
93							
94							
95							
96							
97							
98		Topock - Fluvial Deposits	SW		(96.4 - 124.0') Cemex #3 MESH (8x10)	(96.4 - 124.0') 28.4 bags	(96.4 - 124.0') 35 bags (23%) Note: Lapis Lustre Sand
99							
100							

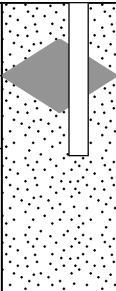

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval at MW-Xd

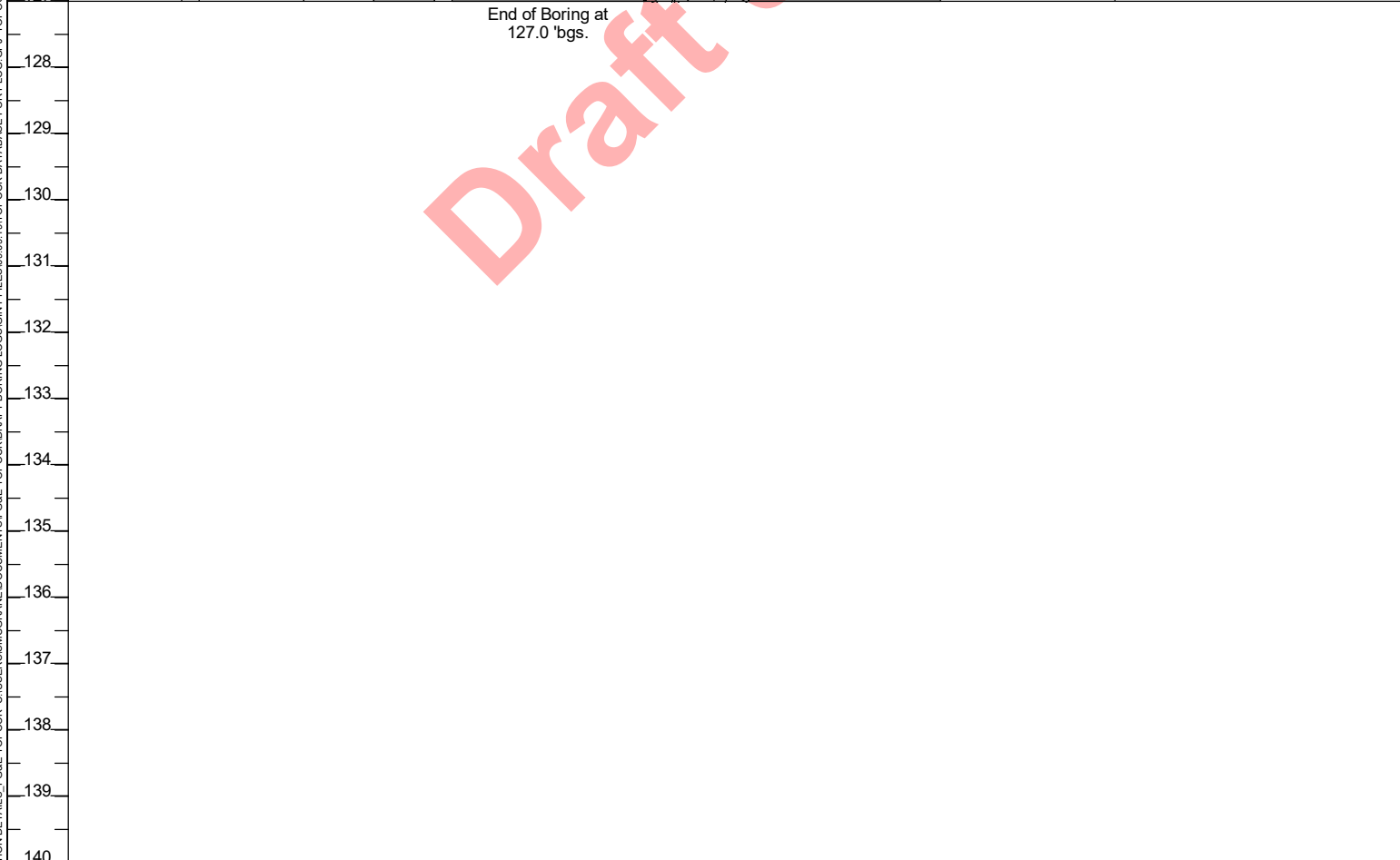
Date Started:	08/10/2019	Surface Elevation:	N/A	Well ID: MW-X-45, MW-X-120
Date Completed:	08/12/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	Steve Vasquez	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	O. Flores / L. Amaya	Borehole Diameter:	10-12 inches	
Logger:	Anthony Mack	Water Level Start:	9.6 ft bgs	Project Number: RC000753.0051
Editor:	Grant Wilford	Development End Date:	N/A	
Total Depth:	127 ft bgs	Well Completion:	<input type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
101							
102							
103		Topock - Fluvial Deposits	SW				
104							
105							
106							
107							
108		Topock - Fluvial Deposits	GW				
109	MW-X-VAS-107-112 (<0.033 U ppb) 6/27/2019 15:04	Topock - Fluvial Deposits	SM				
110							
111							
112							
113							
114	MW-X-VAS-112-117 (<0.033 U ppb) 6/28/2019 09:56	Topock - Fluvial Deposits	GW				
115							
116							
117		Topock - Alluvium Deposits	GW-GM				
118							
119		Topock - Alluvium Deposits	SM				
120							

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Date Started: 08/10/2019	Surface Elevation: N/A	Well ID: MW-X-45, MW-X-120
Date Completed: 08/12/2019	Shallow Well Elevation: N/A	
Drilling Co.: Cascade	Deep Well Elevation: N/A	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): N/A	Project: Final GW Remedy Phase 1
Driller Name: Steve Vasquez	Easting (NAD83): N/A	Location: PG&E Topock, Needles, California
Drilling Asst: O. Flores / L. Amaya	Borehole Diameter: 10-12 inches	
Logger: Anthony Mack	Water Level Start: 9.6 ft bgs	Project Number: RC000753.0051
Editor: Grant Wilford	Development End Date: N/A	
Total Depth: 127 ft bgs	Well Completion: <input type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction			Calculated Material Volumes	Material Volumes Installed
121		Topock - Alluvium Deposits	SM		(120.5 - 121.5') Centralizer	(119.8 - 122.1') Sump and End Cap	(96.4 - 124.0') 28.4 bags	(96.4 - 124.0') 35 bags (23%) Note: Lapis Lustre Sand	
122					(96.4 - 124.0') Cemex #3 MESH (8x10)				
123									
124					(17.0 - 127.0') 10.0" Borehole				
125		NR		(124.0 - 125.0') Bentonite seal chips		(124.0 - 125.0') 0.8 bags	(124.0 - 125.0') 1 bags (25%) Note: Puregold Medium Chips		
126	(125.0 - 127.0') Slough								
127									



Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval at MW-Xd

Date Started:	06/20/2019	Surface Elevation:	N/A	Well ID: MW-X-170, MW-X-320
Date Completed:	07/31/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	E. Ramos / S. Vasquez	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	O. Flores / L. Amaya	Borehole Diameter:	6-12 inches	
Logger:	GJ / SM / CS	Water Level Start:	9.6 ft bgs	Project Number: RC000753.0051
Editor:	Grant Willford	Development End Date:	N/A	
Total Depth:	417 ft bgs	Well Completion:	<input type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
1					(0.0 - 150.8') 2" PVC Sch 80 Casing		
2							
3							
4					(3.0 - 5.0') Bentonite seal chips	(3.0 - 5.0') 2.06	(3.0 - 5.0') 7 (240%) Note: Puregold Medium Chips, installed due to void and heat of hydration concerns
5							
6		Topock - Fill	SP				
7							
8							
9							
10					(0.0 - 42.0') 12.0" Borehole		
11					(5.0 - 17.0') Portland Cement 6% Bentonite	(5.0 - 17.0') 66.5 gallons	(5.0 - 17.0') 100 gallons (50%) Note: Type I, II and V and Benseal
12							
13							
14	MW-X-VAS-12-17 (<0.033 U ppb) 6/25/2019 15:10		NR				
15							
16							
17							
18					(17.0 - 118.2') Bentonite seal chips	(17.0 - 118.2') 78.82 bags	(17.0 - 118.2') 77 bags (-2%) Note: Puregold Medium Chips
19		Topock - Fill	SW		Centralizer (19.5 - 20.5')		
20							

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Date Started:	06/20/2019	Surface Elevation:	N/A	Well ID: MW-X-170, MW-X-320
Date Completed:	07/31/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	E. Ramos / S. Vasquez	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	O. Flores / L. Amaya	Borehole Diameter:	6-12 inches	
Logger:	GJ / SM / CS	Water Level Start:	9.6 ft bgs	Project Number: RC000753.0051
Editor:	Grant Willford	Development End Date:	N/A	
Total Depth:	417 ft bgs	Well Completion:	<input type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
21					(19.5 - 20.5') Centralizer		
22							
23					(0.0 - 150.8') 2" PVC Sch 80 Casing		
24							
25							
26							
27							
28		Topock - Fill	SW				
29							
30					(17.0 - 118.2') Bentonite seal chips	(0.0 - 42.0') 12.0" Borehole	(17.0 - 118.2') 78.82 bags
31							(17.0 - 118.2') 77 bags (-2%) Note: Puregold Medium Chips
32							
33							
34	MW-X-VAS-32-37 (<0.033 U ppb) 6/26/2019 11:45						
35							
36							
37		Topock - Fluvial Deposits	SW				
38							
39							
40							

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Date Started:	06/20/2019	Surface Elevation:	N/A	Well ID: MW-X-170, MW-X-320
Date Completed:	07/31/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	E. Ramos / S. Vasquez	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	O. Flores / L. Amaya	Borehole Diameter:	6-12 inches	
Logger:	GJ / SM / CS	Water Level Start:	9.6 ft bgs	Project Number: RC000753.0051
Editor:	Grant Willford	Development End Date:	N/A	
Total Depth:	417 ft bgs	Well Completion:	<input type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
41					(0.0 - 150.8') 2" PVC Sch 80 Casing		
42							
43							
44			NR				
45							
46							
47							
48		Topock - Fluvial Deposits	SW				
49		Topock - Fluvial Deposits	GW				
50					(17.0 - 118.2') Bentonite seal chips	(17.0 - 118.2') 78.82 bags	(17.0 - 118.2') 77 bags (-2%) Note: Puregold Medium Chips
51							
52		Topock - Fluvial Deposits	SW				
53							
54							
55		Topock - Fluvial Deposits	SP				
56							
57							
58		Topock - Fluvial Deposits	SW				
59							
60							









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Date Started:	06/20/2019	Surface Elevation:	N/A	Well ID: MW-X-170, MW-X-320
Date Completed:	07/31/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	E. Ramos / S. Vasquez	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	O. Flores / L. Amaya	Borehole Diameter:	6-12 inches	
Logger:	GJ / SM / CS	Water Level Start:	9.6 ft bgs	Project Number: RC000753.0051
Editor:	Grant Willford	Development End Date:	N/A	
Total Depth:	417 ft bgs	Well Completion:	<input type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
61		Topock - Fluvial Deposits	SW		(0.0 - 150.8') 2" PVC Sch 80 Casing		
62							
63		Topock - Fluvial Deposits	SP				
64							
65							
66							
67							
68							
69		Topock - Fluvial Deposits	SW				
70					(69.5 - 70.5') Centralizer	(42.0 - 324.0') 10.0" Borehole	(17.0 - 118.2') 78.82 bags
71							(17.0 - 118.2') 77 bags (-2%) Note: Puregold Medium Chips
72					(17.0 - 118.2') Bentonite seal chips		
73	MW-X-VAS-71-76 (<0.033 U ppb) 6/27/2019 08:52						
74							
75							
76		Topock - Fluvial Deposits	SP				
77							
78		Topock - Fluvial Deposits	SW				
79							
80							

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Date Started:	06/20/2019	Surface Elevation:	N/A	Well ID: MW-X-170, MW-X-320
Date Completed:	07/31/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	E. Ramos / S. Vasquez	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	O. Flores / L. Amaya	Borehole Diameter:	6-12 inches	
Logger:	GJ / SM / CS	Water Level Start:	9.6 ft bgs	Project Number: RC000753.0051
Editor:	Grant Willford	Development End Date:	N/A	
Total Depth:	417 ft bgs	Well Completion:	<input type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction		Calculated Material Volumes	Material Volumes Installed
81		Topock - Fluvial Deposits	SW		(0.0 - 150.8') 2" PVC Sch 80 Casing	(0.0 - 300.8') 2" PVC Sch 80 Casing		
82								
83		Topock - Fluvial Deposits	SW					
84								
85								
86		Topock - Fluvial Deposits	SW-SM		(17.0 - 118.2') Bentonite seal chips	(42.0 - 324.0') 10.0" Borehole		
87								
88								
89								
90		Topock - Fluvial Deposits	GW-GM					
91								
92	Topock - Fluvial Deposits	SP						
93								
94	Topock - Fluvial Deposits	SW						
95								
96		NR						
97								
98	Topock - Fluvial Deposits	SW						
99								
100								

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Date Started:	06/20/2019	Surface Elevation:	N/A	Well ID: MW-X-170, MW-X-320
Date Completed:	07/31/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	E. Ramos / S. Vasquez	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	O. Flores / L. Amaya	Borehole Diameter:	6-12 inches	
Logger:	GJ / SM / CS	Water Level Start:	9.6 ft bgs	Project Number: RC000753.0051
Editor:	Grant Willford	Development End Date:	N/A	
Total Depth:	417 ft bgs	Well Completion:	<input type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
101					(0.0 - 150.8') 2" PVC Sch 80 Casing		
102		Topock - Fluvial Deposits	SW				
103							
104		Topock - Fluvial Deposits	SW				
105							
106		Topock - Fluvial Deposits	SW				
107							
108		Topock - Fluvial Deposits	GW				
109	MW-X-VAS-107-112 (<0.033 U ppb) 6/27/2019 15:04	Topock - Fluvial Deposits	SM		(17.0 - 118.2') Bentonite seal chips	(17.0 - 118.2') 78.82 bags	(17.0 - 118.2') 77 bags (-2%) Note: Puregold Medium Chips
110							
111					(103.0 - 118.2') Bentonite seal chips	(103.0 - 118.2') 10.59 bags	(103.0 - 118.2') 12 bags (13%) Note: Puregold Medium Chips
112							
113		Topock - Fluvial Deposits	GW				
114	MW-X-VAS-112-117 (<0.033 U ppb) 6/28/2019 09:56	Topock - Fluvial Deposits	SM		(42.0 - 324.0') 10.0" Borehole		
115							
116							
117							
118		Topock - Alluvium Deposits	SM				
119					(118.2 - 146.8') Bentonite seal pellets Centralizer	(118.2 - 146.8') 22.9 buckets	(118.2 - 146.8') 25 buckets (9%) Note: Pel-Plug (TR30) 3/8"
120					(119.5 - 120.5')		

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Date Started:	06/20/2019	Surface Elevation:	N/A	Well ID: MW-X-170, MW-X-320
Date Completed:	07/31/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	E. Ramos / S. Vasquez	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	O. Flores / L. Amaya	Borehole Diameter:	6-12 inches	
Logger:	GJ / SM / CS	Water Level Start:	9.6 ft bgs	Project Number: RC000753.0051
Editor:	Grant Willford	Development End Date:	N/A	
Total Depth:	417 ft bgs	Well Completion:	<input type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
121					(119.5 - 120.5') Centralizer		
122							
123					(0.0 - 150.8') 2" PVC Sch 80 Casing		
124							
125							
126							
127							
128							
129							
130		Topock - Alluvium Deposits	SM		(118.2 - 146.8') Bentonite seal pellets	(42.0 - 324.0') 10.0" Borehole	(118.2 - 146.8') 22.9 buckets
131							(118.2 - 146.8') 25 buckets (9%) Note: Pel-Plug (TR30) 3/8"
132							
133							
134							
135							
136							
137							
138							
139							
140							

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Date Started:	06/20/2019	Surface Elevation:	N/A	Well ID: MW-X-170, MW-X-320
Date Completed:	07/31/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	E. Ramos / S. Vasquez	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	O. Flores / L. Amaya	Borehole Diameter:	6-12 inches	
Logger:	GJ / SM / CS	Water Level Start:	9.6 ft bgs	Project Number: RC000753.0051
Editor:	Grant Willford	Development End Date:	N/A	
Total Depth:	417 ft bgs	Well Completion:	<input type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
141					(0.0 - 150.8') 2" PVC Sch 80 Casing		
142							
143							
144					(118.2 - 146.8') Bentonite seal pellets	(118.2 - 146.8') 22.9 buckets	(118.2 - 146.8') 25 buckets (9%) Note: Pel-Plug (TR30) 3/8"
145							
146							
147							
148		Topock - Alluvium Deposits	SM				
149							
150							
151					(150.8 - 170.8') 2" Sch 80 PVC (20-slot) Screen		
152	MW-X-VAS-152-157 (<0.17 U ppb) 6/29/2019 09:19						
153					(146.8 - 174.0') Cemex #3 MESH (8x10)	(146.8 - 174.0') 26.6 bags	(146.8 - 174.0') 34 bags (28%) Note: Lapis Lustre Sand
154							
155							
156							
157							
158			NR				
159							
160							

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Date Started:	06/20/2019	Surface Elevation:	N/A	Well ID: MW-X-170, MW-X-320
Date Completed:	07/31/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	E. Ramos / S. Vasquez	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	O. Flores / L. Amaya	Borehole Diameter:	6-12 inches	
Logger:	GJ / SM / CS	Water Level Start:	9.6 ft bgs	Project Number: RC000753.0051
Editor:	Grant Willford	Development End Date:	N/A	
Total Depth:	417 ft bgs	Well Completion:	<input type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
161			NR		(150.8 - 170.8') 2" Sch 80 PVC (20-slot) Screen		
162							
163							
164							
165							
166							
167		Topock - Alluvium Deposits	CL		(146.8 - 174.0') Cemex #3 MESH (8x10)	(146.8 - 174.0') 26.6 bags	(146.8 - 174.0') 34 bags (28%) Note: Lapis Lustre Sand
168							
169		Topock - Alluvium Deposits	CL				
170							
171							
172					(170.5 - 172.0') Centralizer		
173					(170.8 - 173.2') Sump and End Cap		
174							
175		Topock - Alluvium Deposits	SM				
176							
177		Topock - Alluvium Deposits	GP		(174.0 - 297.4') Bentonite seal pellets	(174.0 - 297.4') 103.3 buckets	(174.0 - 297.4') 119 buckets (15%) Note: Pel-Plug (TR30) 3/8"
178							
179			NR				
180							

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Date Started:	06/20/2019	Surface Elevation:	N/A	Well ID: MW-X-170, MW-X-320
Date Completed:	07/31/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	E. Ramos / S. Vasquez	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	O. Flores / L. Amaya	Borehole Diameter:	6-12 inches	
Logger:	GJ / SM / CS	Water Level Start:	9.6 ft bgs	Project Number: RC000753.0051
Editor:	Grant Willford	Development End Date:	N/A	
Total Depth:	417 ft bgs	Well Completion:	<input type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
181	MW-X-VAS-182-187 (<0.17 U ppb) 6/29/2019 15:28		NR		(0.0 - 300.8') 2" PVC Sch 80 Casing		
182							
183		Topock - Alluvium Deposits	SM				
184							
185							
186		Topock - Alluvium Deposits	SC				
187							
188		Topock - Alluvium Deposits	ML				
189							
190		Topock - Alluvium Deposits	SM				
191		Topock - Alluvium Deposits	CL		(174.0 - 297.4') Bentonite seal pellets	(42.0 - 324.0') 10.0" Borehole	(174.0 - 297.4') 103.3 buckets
192		Topock - Alluvium Deposits	MH				(174.0 - 297.4') 119 buckets (15%) Note: Pel-Plug (TR30) 3/8"
193							
194		Topock - Alluvium Deposits	ML				
195							
196							
197							
198		Topock - Alluvium Deposits	ML				
199							
200		Topock - Alluvium Deposits	CL				

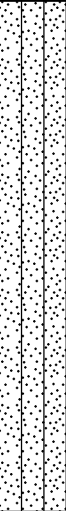
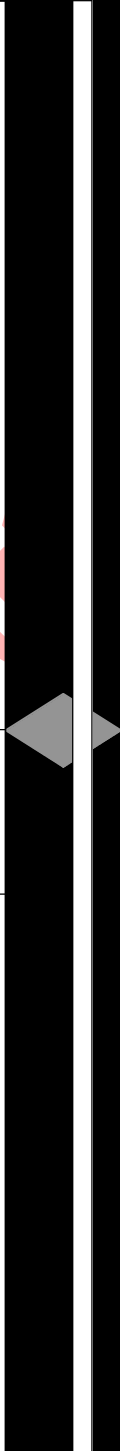

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	06/20/2019	Surface Elevation:	N/A	Well ID: MW-X-170, MW-X-320
Date Completed:	07/31/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	E. Ramos / S. Vasquez	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	O. Flores / L. Amaya	Borehole Diameter:	6-12 inches	
Logger:	GJ / SM / CS	Water Level Start:	9.6 ft bgs	Project Number: RC000753.0051
Editor:	Grant Willford	Development End Date:	N/A	
Total Depth:	417 ft bgs	Well Completion:	<input type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
201		Topock - Alluvium Deposits	CL		(0.0 - 300.8') 2" PVC Sch 80 Casing		
202							
203							
204							
205							
206							
207							
208							
209	MW-X-VAS-207-212 (<0.17 U ppb) 6/30/2019 13:28						
210		Topock - Alluvium Deposits	SM		(174.0 - 297.4') Bentonite seal pellets	(42.0 - 324.0') 10.0" Borehole	(174.0 - 297.4') 103.3 buckets
211							(174.0 - 297.4') 119 buckets (15%) Note: Pel-Plug (TR30) 3/8"
212							
213							
214							
215							
216							
217							
218							
219							
220							

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Date Started:	06/20/2019	Surface Elevation:	N/A	Well ID: MW-X-170, MW-X-320
Date Completed:	07/31/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	E. Ramos / S. Vasquez	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	O. Flores / L. Amaya	Borehole Diameter:	6-12 inches	
Logger:	GJ / SM / CS	Water Level Start:	9.6 ft bgs	Project Number: RC000753.0051
Editor:	Grant Willford	Development End Date:	N/A	
Total Depth:	417 ft bgs	Well Completion:	<input type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction		Calculated Material Volumes	Material Volumes Installed
221		Topock - Alluvium Deposits	SM			(0.0 - 300.8') 2" PVC Sch 80 Casing	(174.0 - 297.4') 103.3 buckets	(174.0 - 297.4') 119 buckets (15%) Note: Pel-Plug (TR30) 3/8"
222								
223								
224								
225								
226								
227								
228		Topock - Alluvium Deposits	SM			(229.5 - 230.5') Centralizer		
229								
230								
231								
232	(174.0 - 297.4') Bentonite seal pellets							
233								
234								
235								
236								
237								
238								
239								
240								

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Well Construction Log

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Date Started:	06/20/2019	Surface Elevation:	N/A	Well ID: MW-X-170, MW-X-320
Date Completed:	07/31/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	E. Ramos / S. Vasquez	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	O. Flores / L. Amaya	Borehole Diameter:	6-12 inches	
Logger:	GJ / SM / CS	Water Level Start:	9.6 ft bgs	Project Number: RC000753.0051
Editor:	Grant Willford	Development End Date:	N/A	
Total Depth:	417 ft bgs	Well Completion:	<input type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
241					(0.0 - 300.8') 2" PVC Sch 80 Casing		
242							
243		Topock - Alluvium Deposits	SM				
244							
245							
246							
247	MW-X-VAS-245-255 (<0.033 U ppb) 7/1/2019 13:35						
248							
249							
250		Topock - Alluvium Deposits	SM		(174.0 - 297.4') Bentonite seal pellets	(42.0 - 324.0') 10.0" Borehole	(174.0 - 297.4') 103.3 buckets
251							(174.0 - 297.4') 119 buckets (15%) Note: Pel-Plug (TR30) 3/8"
252							
253							
254							
255							
256							
257		Topock - Alluvium Deposits	SM				
258							
259							
260			SM				

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Date Started:	06/20/2019	Surface Elevation:	N/A	Well ID: MW-X-170, MW-X-320
Date Completed:	07/31/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	E. Ramos / S. Vasquez	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	O. Flores / L. Amaya	Borehole Diameter:	6-12 inches	
Logger:	GJ / SM / CS	Water Level Start:	9.6 ft bgs	Project Number: RC000753.0051
Editor:	Grant Willford	Development End Date:	N/A	
Total Depth:	417 ft bgs	Well Completion:	<input type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
261		Topock - Alluvium Deposits	SM		(0.0 - 300.8') 2" PVC Sch 80 Casing		
262							
263							
264							
265							
266							
267							
268							
269		Topock - Alluvium Deposits	SM		(269.5 - 270.5') Centralizer	(174.0 - 297.4') 103.3 buckets	(174.0 - 297.4') 119 buckets (15%) Note: Pel-Plug (TR30) 3/8"
270					(42.0 - 324.0') 10.0" Borehole		
271							
272					(174.0 - 297.4') Bentonite seal pellets		
273							
274							
275							
276							
277							
278							
279							
280							

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Date Started:	06/20/2019	Surface Elevation:	N/A	Well ID: MW-X-170, MW-X-320
Date Completed:	07/31/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	E. Ramos / S. Vasquez	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	O. Flores / L. Amaya	Borehole Diameter:	6-12 inches	
Logger:	GJ / SM / CS	Water Level Start:	9.6 ft bgs	Project Number: RC000753.0051
Editor:	Grant Willford	Development End Date:	N/A	
Total Depth:	417 ft bgs	Well Completion:	<input type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
281					(0.0 - 300.8') 2" PVC Sch 80 Casing		
282							
283							
284							
285							
286							
287							
288							
289					(174.0 - 297.4') Bentonite seal pellets	(174.0 - 297.4') 103.3 buckets	(174.0 - 297.4') 119 buckets (15%) Note: Pel-Plug (TR30) 3/8"
290		Topock - Alluvium Deposits	SM		(42.0 - 324.0') 10.0" Borehole		
291							
292							
293							
294	MW-X-VAS-292-297 (<0.17 U ppb) 7/2/2019 14:45						
295							
296							
297							
298							
299					(297.4 - 324.0') Cemex #3 MESH (8x10)	(297.4 - 324.0') 28 bags	(297.4 - 324.0') 33 bags (18%) Note: Lapis Lustre Sand
300							

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Date Started:	06/20/2019	Surface Elevation:	N/A	Well ID: MW-X-170, MW-X-320
Date Completed:	07/31/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	E. Ramos / S. Vasquez	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	O. Flores / L. Amaya	Borehole Diameter:	6-12 inches	
Logger:	GJ / SM / CS	Water Level Start:	9.6 ft bgs	Project Number: RC000753.0051
Editor:	Grant Willford	Development End Date:	N/A	
Total Depth:	417 ft bgs	Well Completion:	<input type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
301					(0.0 - 300.8') 2" PVC Sch 80 Casing		
302					(300.8 - 320.8') 2" PVC Sch 80 Screen		
303							
304							
305							
306							
307							
308							
309							
310		Topock - Alluvium Deposits	SM		(297.4 - 324.0') Cemex #3 MESH (8x10)	(297.4 - 324.0') 28 bags	(297.4 - 324.0') 33 bags (18%) Note: Lapis Lustre Sand
311							
312							
313							
314							
315							
316							
317							
318							
319							
320							


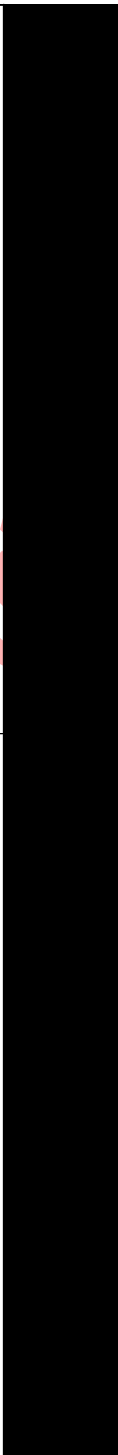











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Date Started: 06/20/2019	Surface Elevation: N/A	Well ID: MW-X-170, MW-X-320
Date Completed: 07/31/2019	Shallow Well Elevation: N/A	
Drilling Co.: Cascade	Deep Well Elevation: N/A	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): N/A	Project: Final GW Remedy Phase 1
Driller Name: E. Ramos / S. Vasquez	Easting (NAD83): N/A	Location: PG&E Topock, Needles, California
Drilling Asst: O. Flores / L. Amaya	Borehole Diameter: 6-12 inches	
Logger: GJ / SM / CS	Water Level Start: 9.6 ft bgs	Project Number: RC000753.0051
Editor: Grant Willford	Development End Date: N/A	
Total Depth: 417 ft bgs	Well Completion: <input type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
321		Topock - Alluvium Deposits	SM		(320.5 - 321.5') Centralizer	(297.4 - 324.0') 28 bags	(297.4 - 324.0') 33 bags (18%) Note: Lapis Lustre Sand
322					(300.8 - 320.8') 2" PVC Sch 80 Screen		
323					(297.4 - 324.0') Cemex #3 MESH (8x10)		
324					(42.0 - 324.0') 10.0" Borehole		
325					(320.8 - 323.2') Sump and End Cap		
326							
327		Topock - Alluvium Deposits	MH				
328		Topock - Alluvium Deposits	SM				
329							
330		Topock - Alluvium Deposits	MH				
331							
332		Topock - Alluvium Deposits	MH		(324.0 - 417.0') Bentonite seal chips	(324.0 - 417.0') 25.3 bags	(324.0 - 417.0') 34 bags (34%) Note: Puregold Medium Chips
333							
334		Topock - Alluvium Deposits	MH				
335							
336		Topock - Alluvium Deposits	MH				
337							
338	MW-X-VAS-337-342 (<0.17 U ppb) 7/11/2019 11:30	Topock - Alluvium Deposits	ML				
339		Topock - Alluvium Deposits	ML				
340							

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Date Started: 06/20/2019	Surface Elevation: N/A	Well ID: MW-X-170, MW-X-320
Date Completed: 07/31/2019	Shallow Well Elevation: N/A	
Drilling Co.: Cascade	Deep Well Elevation: N/A	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): N/A	Project: Final GW Remedy Phase 1
Driller Name: E. Ramos / S. Vasquez	Easting (NAD83): N/A	Location: PG&E Topock, Needles, California
Drilling Asst: O. Flores / L. Amaya	Borehole Diameter: 6-12 inches	
Logger: GJ / SM / CS	Water Level Start: 9.6 ft bgs	Project Number: RC000753.0051
Editor: Grant Willford	Development End Date: N/A	
Total Depth: 417 ft bgs	Well Completion: <input type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction		Calculated Material Volumes	Material Volumes Installed
341	MW-X-VAS-337-342 (<0.17 U ppb) 7/11/2019 11:30	Topock - Alluvium Deposits	ML					
342		Topock - Alluvium Deposits	GM					
343		Topock - Alluvium Deposits	SM					
344								
345								
346		Topock - Alluvium Deposits	ML					
347		Topock - Older Alluvium Deposits	MH					
348			ML					
349		Topock - Older Alluvium Deposits	SW-SM					
350								
351								
352	Topock - Older Alluvium Deposits	ML						
353	Topock - Older Alluvium Deposits	SW-SM						
354								
355								
356	Topock - Weathered Bedrock - conglomerate	MH						
357	Topock - Weathered Bedrock - conglomerate	ML						
358								
359								
360	Topock - Weathered Bedrock -	ML						




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Date Started:	06/20/2019	Surface Elevation:	N/A	Well ID: MW-X-170, MW-X-320
Date Completed:	07/31/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	E. Ramos / S. Vasquez	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	O. Flores / L. Amaya	Borehole Diameter:	6-12 inches	
Logger:	GJ / SM / CS	Water Level Start:	9.6 ft bgs	Project Number: RC000753.0051
Editor:	Grant Willford	Development End Date:	N/A	
Total Depth:	417 ft bgs	Well Completion:	<input type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
361		conglomerate					
362							
363							
364							
365							
366							
367		Topock - Weathered Bedrock - conglomerate	ML				
368							
369							
370					(324.0 - 417.0') Bentonite seal chips	(324.0 - 417.0') 6.0" Borehole	(324.0 - 417.0') 25.3 bags
371							(324.0 - 417.0') 34 bags (34%) Note: Puregold Medium Chips
372							
373							
374							
375		Topock - Weathered Bedrock - conglomerate	SM				
376							
377		Topock - Weathered Bedrock - conglomerate	GW-GM				
378							
379		Topock - Weathered Bedrock - conglomerate	GM				
380							


















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Date Started:	06/20/2019	Surface Elevation:	N/A	Well ID: MW-X-170, MW-X-320
Date Completed:	07/31/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	E. Ramos / S. Vasquez	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	O. Flores / L. Amaya	Borehole Diameter:	6-12 inches	
Logger:	GJ / SM / CS	Water Level Start:	9.6 ft bgs	Project Number: RC000753.0051
Editor:	Grant Willford	Development End Date:	N/A	
Total Depth:	417 ft bgs	Well Completion:	<input type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
381		Topock - Weathered Bedrock - conglomerate	GM				
382							
383							
384	MW-X-VAS-382-387 (<0.17 U ppb) 7/13/2019 14:43						
385		Topock - Weathered Bedrock - conglomerate	CL				
386							
387							
388							
389							
390					(324.0 - 417.0') Bentonite seal chips	(324.0 - 417.0') 6.0" Borehole	(324.0 - 417.0') 25.3 bags
391							
392							
393							
394							
395		Topock - Weathered Bedrock - conglomerate	CL				
396							
397							
398							
399							
400							

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Date Started: 06/20/2019	Surface Elevation: N/A	Well ID: MW-X-170, MW-X-320
Date Completed: 07/31/2019	Shallow Well Elevation: N/A	
Drilling Co.: Cascade	Deep Well Elevation: N/A	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): N/A	Project: Final GW Remedy Phase 1
Driller Name: E. Ramos / S. Vasquez	Easting (NAD83): N/A	Location: PG&E Topock, Needles, California
Drilling Asst: O. Flores / L. Amaya	Borehole Diameter: 6-12 inches	
Logger: GJ / SM / CS	Water Level Start: 9.6 ft bgs	Project Number: RC000753.0051
Editor: Grant Willford	Development End Date: N/A	
Total Depth: 417 ft bgs	Well Completion: <input type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
401		Topock - Weathered Bedrock - conglomerate	CL				
402		Topock - Weathered Bedrock - conglomerate	GC				
403		Topock - Weathered Bedrock - conglomerate	ML				
404		Topock - Weathered Bedrock - conglomerate	GC				
405		Topock - Weathered Bedrock - conglomerate	SM				
406		Topock - Weathered Bedrock - conglomerate	CL				
407		Topock - Weathered Bedrock - conglomerate	SM				
408		Topock - Weathered Bedrock - conglomerate	GC				
409		Topock - Weathered Bedrock - conglomerate	GC		(324.0 - 417.0') Bentonite seal chips	(324.0 - 417.0') 6.0" Borehole	(324.0 - 417.0') 25.3 bags
410		Topock - Weathered Bedrock - conglomerate	GC				
411		Topock - Weathered Bedrock - conglomerate	SM				
412		Topock - Weathered Bedrock - conglomerate	SM				
413		Topock - Weathered Bedrock - conglomerate	SM				
414	MW-X-VAS-412-417 (<0.17 U ppb) 7/15/2019 12:43	Topock - Weathered Bedrock - conglomerate	GM				
415		Topock - Weathered Bedrock - conglomerate	GM				
416		Topock - Weathered Bedrock - conglomerate	GM				
417		Topock - Weathered Bedrock - conglomerate	GM				
418					End of Boring at 417.0' bgs.		
419							
420							

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Date Started:	06/20/2019	Surface Elevation:	N/A	Boring No.: MW-Xd	
Date Completed:	07/31/2019	Northing (NAD83):	N/A		
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	417 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	E. Ramos / S. Vasquez	Depth to First Water:	9.6 ft bgs		
Drilling Asst:	O. Flores / L. Amaya	Sampling Method:	4 Inch X 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	GJ / SM / CS	Sampling Interval:	Continuous		
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
1							(0.0 - 12.0') Topock - Fill; Poorly graded sand (SP); brown (10YR 5/3); fine grained to medium grained, angular to subround; trace mica; trace wood; dry; no odor		(0.0 - 177.0') 5100 gallons of water used; 1600 gallons of water recovered; 3500 gallons of water lost
2									
3									
4	96								
5									
6				Topock - Fill	SP				
7									
8							(8'); trace clay; trace organics; no wood particles. 3.0" lense of fat clay @ 8.0' bgs (5Y 4/1)	(8.0 - 17.0') Soft drilling. No recovery 12 to 17 ft bgs due to compaction of dredge sands	
9									
10		No Sieve Samples Collected					(10'); moist; no clay		
11							(11'); wet	(11.0') Approximate Depth to Water	
12							(12.0 - 19.0') No recovery (NR)		
13	48								
14			MW-X-VAS-12-17 (<0.033 U ppb) 6/25/2019 15:10						
15									
16					NR				
17									
18	24							(17.0 - 19.0') Casing pushed through dredge sand from weight of core barrel and casing. No recovery.	
19								(19.0 - 27.0') Soft drilling	
20	96			Topock - Fill	SW		(19.0 - 36.5') Topock - Fill; Well graded sand (SW); yellowish brown / moderate yellowish brown (10YR 5/4); fine grained to coarse grained, subangular to subround; little mica; trace		

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Boring Log

Sheet: 2 of 21

Date Started:	06/20/2019	Surface Elevation:	N/A	Boring No.: MW-Xd	
Date Completed:	07/31/2019	Northing (NAD83):	N/A		
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	417 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	E. Ramos / S. Vasquez	Depth to First Water:	9.6 ft bgs		
Drilling Asst:	O. Flores / L. Amaya	Sampling Method:	4 Inch X 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	GJ / SM / CS	Sampling Interval:	Continuous		
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid		
21	96	No Sieve Samples Collected		Topock - Fill	SW		organics; wet; no odor; increase organics at 36.2-36.5' bgs	(19.0 - 27.0') Soft drilling	(0.0 - 177.0') 5100 gallons of water used; 1600 gallons of water recovered; 3500 gallons of water lost		
22											
23											
24											
25											
26											
27	120		MW-X-VAS- 32-37 (<0.033 U ppb) 6/26/2019 11:45								(27.0 - 36.5') Soft drilling
28											
29											
30											
31											
32											
33									(32.0 - 37.0') Heaving sands		
34											
35											
36											
37											
38											
39	36			Topock - Fluvial Deposits	SW		(36.5 - 40.0') Topock - Fluvial Deposits; Well graded sand (SW); grayish brown (10YR 5/2); fine grained to very coarse grained, subangular to round; little granules to very large pebbles, round; trace round; little mica; coarser clast consists of quartz and basalt; wet; organic odor (37'); no granules and pebbles				
40							(38.5'); trace granules to very large pebbles, subround to round				

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	06/20/2019	Surface Elevation:	N/A	Boring No.: <u>MW-Xd</u>	
Date Completed:	07/31/2019	Northing (NAD83):	N/A		
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	417 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	E. Ramos / S. Vasquez	Depth to First Water:	9.6 ft bgs		
Drilling Asst:	O. Flores / L. Amaya	Sampling Method:	4 Inch X 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	GJ / SM / CS	Sampling Interval:	Continuous		
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
41	36				NR		(40.0 - 47.0') No recovery (NR)		(0.0 - 177.0') 5100 gallons of water used; 1600 gallons of water recovered; 3500 gallons of water lost
42									
43									
44									
45									
46									
47									
48				Topock - Fluvial Deposits	SW		(47.0 - 48.2') Topock - Fluvial Deposits; Well graded sand (SW); grayish brown (10YR 5/2); fine grained to very coarse grained, subangular to round; trace granules to large pebbles, round; trace mica; coarser clast composed of quartz; wet		
49				Topock - Fluvial Deposits	GW		(48.2 - 50.5') Topock - Fluvial Deposits; Well graded gravel with sand (GW); grayish brown (10YR 5/2); granules to small cobbles, subangular to round; some fine to coarse grained sand, subangular to round; trace mica; coarser clast composed of granite and basalt; wet		
50		No Sieve Samples Collected							
51									
52	120			Topock - Fluvial Deposits	SW		(50.5 - 53.8') Topock - Fluvial Deposits; Well graded sand with gravel (SW); grayish brown (10YR 5/2); fine grained to very coarse grained, subangular to subround; little granules to very large pebbles, subangular to subround; trace round; trace mica; coarser clasts composed of granite and basalt; wet		
53									
54									
55				Topock - Fluvial Deposits	SP		(53.8 - 57.0') Topock - Fluvial Deposits; Poorly graded sand (SP); brown (10YR 5/3); very fine grained to fine grained, subround to round; trace granules to very large pebbles, subround to round; wet		
56									
57									
58	120			Topock - Fluvial Deposits	SW		(57.0 - 62.2') Topock - Fluvial Deposits; Well graded sand (SW); brown (10YR 5/3); very fine grained to coarse grained, round; trace mica; wet		
59									
60									

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Date Started:	06/20/2019	Surface Elevation:	N/A	Boring No.: MW-Xd
Date Completed:	07/31/2019	Northing (NAD83):	N/A	
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	417 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	6-12 inches	Location: PG&E Topock, Needles, California
Driller Name:	E. Ramos / S. Vasquez	Depth to First Water:	9.6 ft bgs	
Drilling Asst:	O. Flores / L. Amaya	Sampling Method:	4 Inch X 10 ft Core Barrel	Project Number: RC000753.0051
Logger:	GJ / SM / CS	Sampling Interval:	Continuous	
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
61	120			Topock - Fluvial Deposits	SW				(0.0 - 177.0') 5100 gallons of water used; 1600 gallons of water recovered; 3500 gallons of water lost
62				Topock - Fluvial Deposits	SP		(62.2 - 63.5') Topock - Fluvial Deposits; Poorly graded sand (SP); brown (10YR 5/3); very fine grained to fine grained, round; trace mica; wet		
63				Topock - Fluvial Deposits	SW		(63.5 - 75.5') Topock - Fluvial Deposits; Well graded sand with gravel (SW); brown (10YR 5/3); very fine grained to very coarse grained, subangular to round; little granules to very large pebbles, subangular to round; trace subangular to subround; trace mica; coarser clast composed of basalt, granite, and metadiorite; wet		
64	120	No Sieve Samples Collected		Topock - Fluvial Deposits	SW				
65				Topock - Fluvial Deposits	SW				
66				Topock - Fluvial Deposits	SW				
67	120			Topock - Fluvial Deposits	SW				
68				Topock - Fluvial Deposits	SW				
69				Topock - Fluvial Deposits	SW				
70	120			Topock - Fluvial Deposits	SW				
71				Topock - Fluvial Deposits	SW				
72				Topock - Fluvial Deposits	SW				
73	120			Topock - Fluvial Deposits	SW				
74				Topock - Fluvial Deposits	SW				
75				Topock - Fluvial Deposits	SW				
76	120			Topock - Fluvial Deposits	SW				
77				Topock - Fluvial Deposits	SW				
78				Topock - Fluvial Deposits	SW				
79	120			Topock - Fluvial Deposits	SW				
80				Topock - Fluvial Deposits	SW				










Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	06/20/2019	Surface Elevation:	N/A	Boring No.: <u>MW-Xd</u>	
Date Completed:	07/31/2019	Northing (NAD83):	N/A		
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	417 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	E. Ramos / S. Vasquez	Depth to First Water:	9.6 ft bgs		
Drilling Asst:	O. Flores / L. Amaya	Sampling Method:	4 Inch X 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	GJ / SM / CS	Sampling Interval:	Continuous		
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
81	120			Topock - Fluvial Deposits	SW				(0.0 - 177.0') 5100 gallons of water used; 1600 gallons of water recovered; 3500 gallons of water lost
82									
83									
84	108			Topock - Fluvial Deposits	SW		(83.5 - 87.0') Topock - Fluvial Deposits; Well graded sand with gravel (SW); brown (10YR 5/3); very fine grained to very coarse grained; little granules to very large pebbles, subangular to round; trace subround to round; trace mica; coarse clasts composed of granite, basalt, and quartz; wet; granules and pebbles increase with depth		
85									
86									
87	96	No Sieve Samples Collected		Topock - Fluvial Deposits	SW-SM		(87.0 - 93.0') Topock - Fluvial Deposits; Well graded sand with silt (SW-SM); brown (10YR 5/3); very fine grained to very coarse grained, subangular to round; little granules to large pebbles, subround to round; little silt; trace mica; coarser clasts composed of metadiorite; wet		
88									
89									
90	96			Topock - Fluvial Deposits	GW-GM		(93.0 - 94.0') Topock - Fluvial Deposits; Well graded gravel with silt and sand (GW-GM); brown (10YR 5/3); granules to small cobbles, subangular to round; and very fine to very coarse grained sand, subangular to subround; little silt; trace mica; coarser clasts composed of metadiorite; wet		
91				Topock - Fluvial Deposits	SP		(94.0 - 95.0') Topock - Fluvial Deposits; Poorly graded sand (SP); strong brown (7.5YR 4/6); very fine grained to fine grained, subround to round; trace silt; trace mica; wet		
92				Topock - Fluvial Deposits	SW		(95.0 - 96.0') Topock - Fluvial Deposits; Well graded sand with gravel (SW); brown (10YR 5/3); very fine grained to medium grained, subangular to round; some granules to very large pebbles, subround to round; trace subround to round; trace silt; trace mica; coarser clasts composed of metadiorite; wet; fractured cobble/boulder fragments within formation		
93	96				NR				
94									
95									
96	96			Topock - Fluvial Deposits	SW		(96.0 - 97.0') No recovery (NR)		
97									
98				Topock - Fluvial Deposits	SW		(97.0 - 104.0') Topock - Fluvial Deposits; Well graded sand (SW); brown (10YR 5/3); very fine grained to very coarse grained, subangular to subround; trace granules to small pebbles, subround to round; trace mica; wet		
99									
100									

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Date Started:	06/20/2019	Surface Elevation:	N/A	Boring No.: <u>MW-Xd</u>	
Date Completed:	07/31/2019	Northing (NAD83):	N/A		
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	417 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	E. Ramos / S. Vasquez	Depth to First Water:	9.6 ft bgs		
Drilling Asst:	O. Flores / L. Amaya	Sampling Method:	4 Inch X 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	GJ / SM / CS	Sampling Interval:	Continuous		
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
101	96			Topock - Fluvial Deposits	SW				(0.0 - 177.0') 5100 gallons of water used; 1600 gallons of water recovered; 3500 gallons of water lost
102									
103									
104									
105	84			Topock - Fluvial Deposits	SW		(104.0 - 105.0') Topock - Fluvial Deposits; Well graded sand with gravel (SW); dark grayish brown / dark yellowish brown(10YR 4/2); very fine grained to very coarse grained, subround to round; and granules to very large pebbles, subangular to round; trace subround to round; trace silt; trace mica; coarser clasts composed of metadiorite; wet; fractured cobbles/ boulder fragments within formation		(102.0 - 105.0') Tight formation
106				Topock - Fluvial Deposits	SW		(105.0 - 107.0') Topock - Fluvial Deposits; Well graded sand (SW); brown (10YR 5/3); very fine grained to very coarse grained, subangular to subround; little granules to small pebbles, subround to round; trace silt; trace mica; wet		
107				Topock - Fluvial Deposits	GW		(107.0 - 108.0') Topock - Fluvial Deposits; Well graded gravel with sand (GW); brown (10YR 4/3); granules to very large pebbles, subround to round; some very fine to very coarse grained sand, subangular to round; trace silt; trace mica; coarse clasts composed of metadiorite, granite, basalt, quartz; wet		
108				Topock - Fluvial Deposits	SM		(108.0 - 112.0') Topock - Fluvial Deposits; Silty sand with gravel (SM); dark grayish brown / dark yellowish brown(10YR 4/2); very fine grained to coarse grained, subangular to round; some granules to very large pebbles, subround to round; some silt; little subround to round; trace mica; trace organics; wet; organic odor; coarser clasts composed of metadiorite and granite, pulverized cobble/boulder fragments observed (109') brown (10YR 5/3); little silt; no organics; increase in very fine to very coarse grained sand		
109	60		MW-X-VAS-107-112 (<0.033 U ppb) 6/27/2019 15:04	Topock - Fluvial Deposits	SM				(112.0 - 117.0') Rough drilling
110									
111									
112									
113	120		MW-X-VAS-112-117 (<0.033 U ppb) 6/28/2019 09:56	Topock - Fluvial Deposits	GW		(112.0 - 114.0') Topock - Fluvial Deposits; Well graded gravel with sand (GW); dark gray (10YR 4/1); very fine grained to small cobbles, subangular to round; little very fine to very coarse grained sand, subangular to round; trace silt; trace clay; trace organics; coarser clasts composed of metadiorite; wet; organic odor		
114				Topock - Fluvial Deposits	SM		(114.0 - 116.0') Topock - Fluvial Deposits; Silty sand with gravel (SM); brown (10YR 4/3); very fine grained to very coarse grained, subangular to round; some granules to very large pebbles, subangular to round; little silt; trace subround to round; trace mica; trace organics; wet; organic odor; coarser clasts composed of metadiorite		
115									
116									
117	120			Topock - Alluvium Deposits	SM		(116.0 - 157.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 4/4) trace red / moderate reddish brown(10R 4/6); very fine grained to very coarse grained, angular to subround; some granules to very large pebbles, angular to subangular; little silt; trace subangular; trace mica; coarser clasts composed of metadiorite; wet; mottled (117') reddish brown / moderate brown(5YR 4/4) little red / moderate reddish brown(10R 4/6); some silt; decrease in granules to very large pebbles, no cobbles (118'); little silt; increase in very fine to very coarse sand, weathered granules to very large pebbles		
118									
119									
120									

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Date Started:	06/20/2019	Surface Elevation:	N/A	Boring No.: MW-Xd	
Date Completed:	07/31/2019	Northing (NAD83):	N/A		
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	417 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	E. Ramos / S. Vasquez	Depth to First Water:	9.6 ft bgs		
Drilling Asst:	O. Flores / L. Amaya	Sampling Method:	4 Inch X 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	GJ / SM / CS	Sampling Interval:	Continuous		
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
121									(0.0 - 177.0') 5100 gallons of water used; 1600 gallons of water recovered; 3500 gallons of water lost
122									
123									
124	120								
125									
126									
127									
128							(128'); some silt; little granules to very large pebbles, angular to subangular; decrease in very fine to very coarse sand		
129									
130		No Sieve Samples Collected		Topock - Alluvium Deposits	SM				
131									
132	120								
133									
134							(134'); little silt; increase in very fine to very coarse, increase in granules to very large pebbles		
135									
136									
137									
138									
139	120						(138'); some granules to very large pebbles, angular to subangular; slight decrease in silt		
140									

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Boring Log

Sheet: 8 of 21

Date Started:	06/20/2019	Surface Elevation:	N/A	Boring No.: MW-Xd	
Date Completed:	07/31/2019	Northing (NAD83):	N/A		
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	417 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	E. Ramos / S. Vasquez	Depth to First Water:	9.6 ft bgs		
Drilling Asst:	O. Flores / L. Amaya	Sampling Method:	4 Inch X 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	GJ / SM / CS	Sampling Interval:	Continuous		
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
141	120	No Sieve Samples Collected		Topock - Alluvium Deposits	SM	(148'); and silt; moist to wet; decrease in very fine to very coarse sand			(0.0 - 177.0') 5100 gallons of water used; 1600 gallons of water recovered; 3500 gallons of water lost
142									
143									
144									
145									
146	120	No Sieve Samples Collected		Topock - Alluvium Deposits	SM	(148'); and silt; moist to wet; decrease in very fine to very coarse sand			
147									
148									
149									
150									
151	120	No Sieve Samples Collected		Topock - Alluvium Deposits	SM	(148'); and silt; moist to wet; decrease in very fine to very coarse sand			
152									
153									
154									
155									
156	72	No Sieve Samples Collected	MW-X-VAS-152-157 (<0.17 U ppb) 6/29/2019 09:19	Topock - Alluvium Deposits	NR	(155'); some granules to very large pebbles, angular to subangular; little silt; wet; increase in very fine to very coarse sand			
157									
158									
159									
160									

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Date Started:	06/20/2019	Surface Elevation:	N/A	Boring No.: MW-Xd
Date Completed:	07/31/2019	Northing (NAD83):	N/A	
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	417 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	6-12 inches	Location: PG&E Topock, Needles, California
Driller Name:	E. Ramos / S. Vasquez	Depth to First Water:	9.6 ft bgs	
Drilling Asst:	O. Flores / L. Amaya	Sampling Method:	4 Inch X 10 ft Core Barrel	Project Number: RC000753.0051
Logger:	GJ / SM / CS	Sampling Interval:	Continuous	
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid		
161	72	No Sieve Samples Collected			NR			(157.0 - 167.0') Loose sands fell out of core barrel into hopper when bagging core, 165 to 167 drilling got hard	(0.0 - 177.0') 5100 gallons of water used; 1600 gallons of water recovered; 3500 gallons of water lost		
162											
163											
164											
165											
166											
167											
168	120			Topock - Alluvium Deposits	CL		(167.0 - 174.5') Topock - Alluvium Deposits; Sandy lean clay with gravel (CL); reddish brown / moderate brown(5YR 4/4); medium plasticity; some very fine to very coarse grained sand, angular to subangular; little granules to very large pebbles, angular to subangular; little silt; coarser clasts composed of metadiorite; moist; some meta-diorite clasts are weathered	(167.0 - 177.0') Smooth drilling			
169											
170											
171				Topock - Alluvium Deposits	CL						
172											
173											
174								(173.5'); moist to wet			
175		Topock - Alluvium Deposits	SM		(174.5 - 177.0') Topock - Alluvium Deposits; Silty sand (SM); reddish brown / moderate brown(5YR 4/4); very fine grained to very coarse grained, angular to subround; some silt; little granules to medium pebbles, angular to subangular; little clay; trace large to very large pebbles, angular to subangular; wet						
176											
177			Topock - Alluvium Deposits	GP		(177.0 - 177.5') Topock - Alluvium Deposits; Poorly graded gravel (GP); boulders; wet	(177.0 - 187.0') Normal drilling	(177.0 - 327.0') 5395 gallons of water used; 4465 gallons of water recovered; 930 gallons of water lost			
178	84				(177.5 - 180.5') No recovery (NR)						
179			NR								
180											




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Date Started:	06/20/2019	Surface Elevation:	N/A	Boring No.: MW-Xd
Date Completed:	07/31/2019	Northing (NAD83):	N/A	
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	417 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	6-12 inches	Location: PG&E Topock, Needles, California
Driller Name:	E. Ramos / S. Vasquez	Depth to First Water:	9.6 ft bgs	
Drilling Asst:	O. Flores / L. Amaya	Sampling Method:	4 Inch X 10 ft Core Barrel	Project Number: RC000753.0051
Logger:	GJ / SM / CS	Sampling Interval:	Continuous	
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
181	84		MW-X-VAS-182-187 (<0.17 U ppb) 6/29/2019 15:28	Topock - Alluvium Deposits	NR		(180.5 - 187.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown / moderate brown(5YR 4/4); very fine grained to very coarse grained, angular to subround; little granules to medium pebbles, subangular to subround; little silt; trace subangular; trace clay; trace large to very large pebbles subangular; wet	(177.0 - 187.0') Normal drilling	(177.0 - 327.0') 5395 gallons of water used; 4465 gallons of water recovered; 930 gallons of water lost
182									
183									
184					SM	(183.5'); little granules to very large pebbles, angular to subangular; little clay			
185						(184.5'); little granules to large pebbles, angular to subangular; trace clay			
186									
187	120	No Sieve Samples Collected		Topock - Alluvium Deposits	SC		(187.0 - 188.0') Topock - Alluvium Deposits; Clayey sand with gravel (SC); reddish brown (2.5YR 4/4); very fine grained to very coarse grained, angular to subround; some clay; little granules to large pebbles, angular to subangular; little silt; coarser clasts composed of metadiorite; iron oxide staining on metadiorite pebbles; wet	(187.0 - 197.0') Normal drilling	
188				Topock - Alluvium Deposits	ML	(188.0 - 189.5') Topock - Alluvium Deposits; Sandy silt with gravel (ML); red (2.5YR 4/6); medium plasticity; some very fine to very coarse grained sand, angular to subround; little granules to large pebbles, angular to subangular; little clay; coarser clasts composed of metadiorite; moist to wet; very stiff			
189				Topock - Alluvium Deposits	SM	(189.5 - 190.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (2.5YR 4/4) to dark reddish brown (2.5YR 3/4); very fine grained to very coarse grained, angular to subround; some silt; little granules to very large pebbles, angular to subround; little clay; coarser clasts composed of metadiorite; moist to wet			
190				Topock - Alluvium Deposits	CL	(190.0 - 191.5') Topock - Alluvium Deposits; Sandy lean clay with gravel (CL); reddish brown (2.5YR 4/4); medium plasticity; some very fine to very coarse grained sand, angular to subround; little granules to small pebbles, angular to subround; little silt; moist; very stiff			
191				Topock - Alluvium Deposits	MH	(191.5 - 192.5') Topock - Alluvium Deposits; Sandy elastic silt with gravel (MH); reddish brown (2.5YR 4/4); high plasticity; some very fine to very coarse grained sand, angular to subround; little granules to medium pebbles, angular to subround; little clay; coarser clasts composed of metadiorite; moist; very stiff			
192				Topock - Alluvium Deposits	ML	(192.5 - 197.0') Topock - Alluvium Deposits; Sandy silt with gravel (ML); light red(2.5YR 7/6); medium plasticity; some very fine to very coarse grained sand, angular to subround; little granules to medium pebbles, angular to subangular; little clay; coarser clasts composed of metadiorite; moist; green staining			
193				Topock - Alluvium Deposits	ML	(197.0 - 199.0') Topock - Alluvium Deposits; Sandy silt with gravel (ML); reddish brown (2.5YR 4/4); low plasticity; some very fine to medium grained sand, angular to subround; little granules to medium pebbles, angular to subangular; little clay; trace coarse to very coarse grained sand angular to subangular; moist; very stiff			
194				Topock - Alluvium Deposits	ML	(199.0 - 202.0') Topock - Alluvium Deposits; Sandy lean clay with gravel (CL); reddish brown (2.5YR 4/4); medium plasticity; some very fine to very coarse grained sand, angular to subround; little			
195				Topock - Alluvium Deposits	CL				
196				Topock - Alluvium Deposits	CL				
197	120			Topock - Alluvium Deposits	ML		(197.0 - 199.0') Topock - Alluvium Deposits; Sandy silt with gravel (ML); reddish brown (2.5YR 4/4); low plasticity; some very fine to medium grained sand, angular to subround; little granules to medium pebbles, angular to subangular; little clay; trace coarse to very coarse grained sand angular to subangular; moist; very stiff		
198				Topock - Alluvium Deposits	ML				
199				Topock - Alluvium Deposits	CL	(199.0 - 202.0') Topock - Alluvium Deposits; Sandy lean clay with gravel (CL); reddish brown (2.5YR 4/4); medium plasticity; some very fine to very coarse grained sand, angular to subround; little			
200									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	06/20/2019	Surface Elevation:	N/A	Boring No.: MW-Xd	
Date Completed:	07/31/2019	Northing (NAD83):	N/A		
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	417 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	E. Ramos / S. Vasquez	Depth to First Water:	9.6 ft bgs		
Drilling Asst:	O. Flores / L. Amaya	Sampling Method:	4 Inch X 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	GJ / SM / CS	Sampling Interval:	Continuous		
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
201	120			Topock - Alluvium Deposits	CL		granules to large pebbles, angular to subround; little silt; coarser clasts composed of metadiorite; moist; very stiff		(177.0 - 327.0') 5395 gallons of water used; 4465 gallons of water recovered; 930 gallons of water lost
202									
203							(202.0 - 227.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); red (2.5YR 4/6); very fine grained to very coarse grained, angular to subround; some silt; little granules to large pebbles, angular to subround; little clay; coarser clasts composed of metadiorite; moist		
204							(204'); little silt; trace clay; moist to wet		
205							(204.5'); some silt; trace very large pebbles, subangular; trace subangular; moist to wet		
206	108						(206.3'); little silt; no cobbles, increase in sand		(207.0 - 217.0') Normal drilling, approximately 6 inches of sample fell out of core barrel at ~208.5 during bagging, material was the same as in the core
207									
208									
209							(209'); some silt; no clay, weathered granules to very large pebbles		
210									
211	114			Topock - Alluvium Deposits	SM		(210.5'); little clay; moist to wet; decrease in silt, decrease in sand		
212									
213									
214									
215									
216									
217									
218									
219									
220									

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Date Started:	06/20/2019	Surface Elevation:	N/A	Boring No.: MW-Xd	
Date Completed:	07/31/2019	Northing (NAD83):	N/A		
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	417 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	E. Ramos / S. Vasquez	Depth to First Water:	9.6 ft bgs		
Drilling Asst:	O. Flores / L. Amaya	Sampling Method:	4 Inch X 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	GJ / SM / CS	Sampling Interval:	Continuous		
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
221	114			Topock - Alluvium Deposits	SM				(177.0 - 327.0') 5395 gallons of water used; 4465 gallons of water recovered; 930 gallons of water lost
222									
223									
224									
225									
226	111.6	No Sieve Samples Collected		Topock - Alluvium Deposits	SM		(227.0 - 230.0') Topock - Alluvium Deposits; Silty sand (SM); reddish brown (2.5YR 4/4); very fine grained to very coarse grained, angular to subround; some silt; little granules to large pebbles, angular to subangular; trace clay; coarser clasts composed of metadiorite; moist; iron oxide staining; weathered granules to very large pebbles	(227.0 - 232.0') Normal drilling	
227									
228									
229									
230									
231	114						(230'); increase in silt, decrease in very fine to very coarse sand	(232.0 - 237.0') Rough drilling	
232									
233									
234									
235									
236	114						(237'); and silt; little clay; decrease in very fine to very coarse sand	(237.0 - 245.0') Normal drilling	
237									
238									
239									
240									



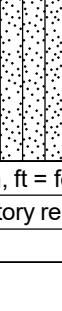
Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	06/20/2019	Surface Elevation:	N/A	Boring No.: MW-Xd
Date Completed:	07/31/2019	Northing (NAD83):	N/A	
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	417 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	6-12 inches	Location: PG&E Topock, Needles, California
Driller Name:	E. Ramos / S. Vasquez	Depth to First Water:	9.6 ft bgs	
Drilling Asst:	O. Flores / L. Amaya	Sampling Method:	4 Inch X 10 ft Core Barrel	Project Number: RC000753.0051
Logger:	GJ / SM / CS	Sampling Interval:	Continuous	
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
241	114			Topock - Alluvium Deposits	SM		(240.0 - 247.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (2.5YR 4/4); very fine grained to very coarse grained, angular to subround; some silt; little granules to very large pebbles, angular to subangular; trace clay; coarser clasts composed of metadiorite; moist; weathered granules to very large pebbles, dry 243.5'-244' bgs	(237.0 - 245.0') Normal drilling	(177.0 - 327.0') 5395 gallons of water used; 4465 gallons of water recovered; 930 gallons of water lost
242									
243									
244									
245	120			Topock - Alluvium Deposits	SM		(244.5'); little silt; wet; iron oxide staining; increase in very fine to very coarse sand, no clay	(245.0 - 247.0') Hard drilling	
246									
247									
248									
249	120			Topock - Alluvium Deposits	SM		(247.0 - 254.0') Topock - Alluvium Deposits; Silty sand (SM); reddish brown (2.5YR 4/4); very fine grained to very coarse grained, angular to subround; some silt; little granules to very large pebbles, angular to subangular; little clay; trace mica; coarser clasts composed of metadiorite; moist; weathered granules to very large pebble	(247.0 - 257.0') Normal drilling	
250									
251									
252									
253	120			Topock - Alluvium Deposits	SM		(254.0 - 259.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (2.5YR 4/4) little (7.5R 4/6); very fine grained to very coarse grained, angular to subround; some silt; little granules to very large pebbles, angular to subangular; trace clay; moist; mottled; iron oxide staining; wet at 256' bgs, weathered granules to very large pebbles	(257.0 - 267.0') Normal drilling	
254									
255									
256									
257	120			Topock - Alluvium Deposits	SM				
258									
259									
260							(259.5 - 269.0') Topock - Alluvium Deposits; Silty sand (SM);		

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Date Started:	06/20/2019	Surface Elevation:	N/A	Boring No.: MW-Xd
Date Completed:	07/31/2019	Northing (NAD83):	N/A	
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	417 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	6-12 inches	Location: PG&E Topock, Needles, California
Driller Name:	E. Ramos / S. Vasquez	Depth to First Water:	9.6 ft bgs	
Drilling Asst:	O. Flores / L. Amaya	Sampling Method:	4 Inch X 10 ft Core Barrel	Project Number: RC000753.0051
Logger:	GJ / SM / CS	Sampling Interval:	Continuous	
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
261	120	No Sieve Samples Collected		Topock - Alluvium Deposits	SM		reddish brown (2.5YR 4/4) little (7.5R 4/6); very fine grained to very coarse grained, angular to subround; medium plasticity, no dilatency; some silt; little granules to very large pebbles, angular to subangular; little clay; coarser clasts composed of metadiorite; moist; mottled; weathered gravel granules to very large pebbles	(257.0 - 267.0') Normal drilling	(177.0 - 327.0') 5395 gallons of water used; 4465 gallons of water recovered; 930 gallons of water lost
262									
263									
264									
265									
266	120			Topock - Alluvium Deposits	SM		(269.0 - 327.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (2.5YR 4/4) some (7.5R 4/6); very fine grained to very coarse grained, angular to subround; some granules to very large pebbles, angular to subangular; some silt; little clay; trace angular; coarser clasts composed of metadiorite; moist; mottled; weathered granules to small cobbles	(267.0 - 277.0') Normal drilling	
267									
268									
269									
270									
271	120	Topock - Alluvium Deposits	SM		(275'); little granules to very large pebbles, angular to subround; trace angular to subangular; increase in silt, increase in very fine to very coarse sand, dry from 283-285' bgs				
272									
273									
274									
275									
276	120								
277									
278									
279									
280									

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Date Started:	06/20/2019	Surface Elevation:	N/A	Boring No.: MW-Xd	
Date Completed:	07/31/2019	Northing (NAD83):	N/A		
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	417 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	E. Ramos / S. Vasquez	Depth to First Water:	9.6 ft bgs		
Drilling Asst:	O. Flores / L. Amaya	Sampling Method:	4 Inch X 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	GJ / SM / CS	Sampling Interval:	Continuous		
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
281	120							(281.0 - 287.0') Rough drilling	(177.0 - 327.0') 5395 gallons of water used; 4465 gallons of water recovered; 930 gallons of water lost
282									
283									
284									
285									
286	120	No Sieve Samples Collected		Topock - Alluvium Deposits	SM		(287') red / moderate reddish brown(10R 4/6) and reddish brown (2.5YR 4/4); trace clay; dry to moist; decrease in silt, increase in very fine to very coarse sand	(287.0 - 297.0') Rough drilling	
287									
288									
289									
290									
291	120						(291'); decrease in silt, increase in very fine to very coarse sand		
292									
293									
294									
295									
296	120	MW-X-VAS-292-297 (<0.17 U ppb) 7/2/2019 14:45					(293'); moist to wet		
297									
298									
299									
300									
							(299.5') reddish brown (2.5YR 4/4) some red / moderate reddish	(297.0 - 307.0') Rough drilling	










Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	06/20/2019	Surface Elevation:	N/A	Boring No.: MW-Xd	
Date Completed:	07/31/2019	Northing (NAD83):	N/A		
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	417 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	E. Ramos / S. Vasquez	Depth to First Water:	9.6 ft bgs		
Drilling Asst:	O. Flores / L. Amaya	Sampling Method:	4 Inch X 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	GJ / SM / CS	Sampling Interval:	Continuous		
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
301	120						brown(10R 4/6); some granules to very large pebbles, angular to subangular; decrease in very fine to very coarse sand	(297.0 - 307.0') Rough drilling	(177.0 - 327.0') 5395 gallons of water used; 4465 gallons of water recovered; 930 gallons of water lost
302									
303							(303'); little granules to very large pebbles, angular to subangular; little silt; increase in very fine to very coarse sand		
304									
305									
306	120	No Sieve Samples Collected		Topock - Alluvium Deposits	SM				(307.0 - 317.0') Rough drilling
307							(307'); some granules to very large pebbles, angular to subangular; trace angular to subangular; dry to moist; decrease in very fine to very coarse sand		
308									
309									
310									
311	120								(317.0 - 323.0') Normal drilling
312							(312') dark reddish brown (2.5YR 3/4) trace red / moderate reddish brown(10R 4/6); some silt; moist to wet; increase in very fine to very coarse sand		
313									
314									
315									
316	120								
317									
318									
319									
320									












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Date Started:	06/20/2019	Surface Elevation:	N/A	Boring No.: MW-Xd
Date Completed:	07/31/2019	Northing (NAD83):	N/A	
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	417 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	6-12 inches	Location: PG&E Topock, Needles, California
Driller Name:	E. Ramos / S. Vasquez	Depth to First Water:	9.6 ft bgs	
Drilling Asst:	O. Flores / L. Amaya	Sampling Method:	4 Inch X 10 ft Core Barrel	Project Number: RC000753.0051
Logger:	GJ / SM / CS	Sampling Interval:	Continuous	
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
321	120			Topock - Alluvium Deposits	SM		(321'); little silt; dry to moist; iron oxide staining; increase in very fine to very coarse sand	(317.0 - 323.0') Normal drilling	(177.0 - 327.0') 5395 gallons of water used; 4465 gallons of water recovered; 930 gallons of water lost
322									
323									
324								(323.0 - 326.0') Rough drilling	
325									
326	1200	No Sieve Samples Collected		Topock - Alluvium Deposits	MH		(327.0 - 328.2') Topock - Alluvium Deposits; Gravelly elastic silt with sand (MH); reddish brown (2.5YR 4/4); medium plasticity; some granules to very large pebbles, angular to subround; little very fine to very coarse grained sand, subangular to subround; little clay; some coarser clasts composed of metadiorite; moist; medium stiff; moderate cementation	(327.0 - 337.0') Normal Drilling	
327									
328				Topock - Alluvium Deposits	SM		(328.2 - 329.9') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (2.5YR 4/4); very fine grained to small cobbles, subangular to subround; low plasticity; some silt; little granules to large pebbles, angular to subround; little clay; moist; weak cementation		
329				Topock - Alluvium Deposits	MH		(329.9 - 334.0') Topock - Alluvium Deposits; Gravelly elastic silt with sand (MH); reddish brown (2.5YR 4/4); medium plasticity; some granules to large pebbles, angular to subangular; little very fine to very coarse grained sand, subangular to subround; little clay; moist; medium stiff; weak cementation		
330							(331'); trace clay; increase in granules and pebbles, decrease in silt and clay		
331									
332				Topock - Alluvium Deposits	MH		(334.0 - 337.5') Topock - Alluvium Deposits; Sandy elastic silt with gravel (MH); reddish brown (2.5YR 4/4); medium plasticity; some fine to very coarse grained sand, subangular to subround; little granules to very large pebbles, angular to subangular; trace clay; moist; medium stiff; weak cementation		
333									
334									
335				Topock - Alluvium Deposits	ML		(337.5 - 338.0') Topock - Alluvium Deposits; Gravelly silt with sand (ML); reddish brown (2.5YR 4/4); low plasticity; some granules to very large pebbles, angular to subangular; little very fine to very coarse grained sand, subangular to subround; trace clay; moist; medium stiff; weak cementation	(337.0 - 345.0') Normal drilling, drilled 8 ft due to sluff	
336							(338.0 - 341.0') Topock - Alluvium Deposits; Gravelly silt with sand (ML); reddish brown (2.5YR 4/4); medium plasticity; some granules to very large pebbles, angular to subangular; little very		
337	96		MW-X-VAS-337-342 (<0.17 U ppb) 7/11/2019 11:30	Topock - Alluvium Deposits	ML				
338				Topock - Alluvium Deposits	ML				
339				Topock - Alluvium Deposits	ML				
340									

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Date Started:	06/20/2019	Surface Elevation:	N/A	Boring No.: <u>MW-Xd</u>	
Date Completed:	07/31/2019	Northing (NAD83):	N/A		
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	417 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	E. Ramos / S. Vasquez	Depth to First Water:	9.6 ft bgs		
Drilling Asst:	O. Flores / L. Amaya	Sampling Method:	4 Inch X 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	GJ / SM / CS	Sampling Interval:	Continuous		
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
341	96		MW-X-VAS-337-342 (<0.17 U ppb) 7/11/2019 11:30	Topock - Alluvium Deposits	ML		fine to very coarse grained sand, subangular to subround; little clay; moist; stiff; moderate cementation (339'); wet to moist; weak cementation; decrease in granules and pebbles, increase in silt	(337.0 - 345.0') Normal drilling, drilled 8 ft due to sluff	
342				Topock - Alluvium Deposits	GM		(341.0 - 342.5') Topock - Alluvium Deposits; Silty gravel with sand (GM); reddish brown (2.5YR 4/4); granules to very large pebbles, angular to subround; some fine to very coarse grained sand, subangular to subround; little silt; trace clay; moist		
343				Topock - Alluvium Deposits	SM		(342.5 - 345.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (2.5YR 4/4); medium grained to very coarse grained, angular to subround; some granules to very large pebbles, angular to subround; little silt; trace clay; moist; weak cementation		
344									
345				144	No Sieve Samples Collected		Topock - Alluvium Deposits	ML	
346									
347	Topock - Older Alluvium Deposits	MH					(347'); moist to dry; soft; weak cementation; increase in granules and pebbles, increase in sand, decrease in silt		
348									
349	Topock - Older Alluvium Deposits	ML					(348.0 - 348.3') Topock - Older Alluvium Deposits; Gravelly elastic silt with sand (MH); light brown (7.5YR 6/4); medium plasticity; some clay; little granules to medium pebbles, angular to subround; trace very fine to fine grained sand, subangular to round; dry; soft; weak cementation		
350									
351	Topock - Older Alluvium Deposits	ML					(348.3 - 352.0') Topock - Older Alluvium Deposits; Gravelly silt with sand (ML); reddish brown (2.5YR 4/4); low plasticity; some small to large pebbles, angular to subround; little fine to coarse grained sand, subangular to subround; moist to dry; soft; weak cementation		
352									
353	Topock - Older Alluvium Deposits	SW-SM					(352.0 - 355.0') Topock - Older Alluvium Deposits; Well graded sand with silt and gravel (SW-SM); reddish brown (2.5YR 4/4); very fine grained to medium grained, subangular to subround; little granules to very large pebbles, angular to subround; little silt; little clay; trace small cobbles, subangular; moist to dry; weak cementation	(352.0 - 357.0') Rough drilling	
354									
355	60			Topock - Weathered Bedrock - conglomerate	MH		(355.0 - 357.0') Topock - Weathered Bedrock - conglomerate; Gravelly elastic silt with sand (MH); reddish brown (2.5YR 4/4); medium plasticity; some granules to very large pebbles, angular to subround; little very fine to fine grained sand, subangular to subround; little clay; little coarser clasts composed of metadiorite; dry to moist; stiff; moderate cementation	(357.0 - 362.0') Rough drilling and sluff encountered	
356				Topock - Weathered Bedrock - conglomerate	ML		(357.0 - 359.0') Topock - Weathered Bedrock - conglomerate; Sandy silt with gravel (ML); reddish brown (2.5YR 4/4); low plasticity; some very fine to medium grained sand, subangular to subround; little granules to very large pebbles, angular to subround; little clay; moist; medium stiff; weak cementation		
357									
358				Topock - Weathered Bedrock - conglomerate	ML		(359.0 - 374.0') Topock - Weathered Bedrock - conglomerate; Sandy silt with gravel (ML); reddish brown (2.5YR 4/4); low plasticity; some very fine to very coarse grained sand, subangular		
359									
360				Topock - Weathered Bedrock -	ML				


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Date Started:	06/20/2019	Surface Elevation:	N/A	Boring No.: MW-Xd	
Date Completed:	07/31/2019	Northing (NAD83):	N/A		
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	417 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	E. Ramos / S. Vasquez	Depth to First Water:	9.6 ft bgs		
Drilling Asst:	O. Flores / L. Amaya	Sampling Method:	4 Inch X 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	GJ / SM / CS	Sampling Interval:	Continuous		
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
361	60			conglomerate			to subround; little granules to very large pebbles, angular to subround; little clay; trace coarser clasts composed of metadiorite; dry to moist; soft	(357.0 - 362.0') Rough drilling and sluff encountered	
362							(361'); moist to wet		
363							(361.5'); moist to wet; soft; weak cementation; increase in sand and decrease in silt	(362.0 - 372.0') Soft drilling	
364									
365									
366									
367	120			Topock - Weathered Bedrock - conglomerate	ML		(363'); dry to moist		
368									
369									
370							(369'); dry to moist; soft; weak cementation; increase in sand and decrease in silt		
371									
372									
373								(372.0 - 377.0') Normal drilling	
374									
375	60			Topock - Weathered Bedrock - conglomerate	SM		(374.0 - 377.0') Topock - Weathered Bedrock - conglomerate; Silty sand with gravel (SM); reddish brown (2.5YR 4/4); fine grained to very coarse grained, subangular to subround; some granules to very large pebbles, angular to subround; trace clay; moist; medium dense; moderate cementation		
376									
377				Topock - Weathered Bedrock - conglomerate	GW-GM		(377.0 - 377.5') Topock - Weathered Bedrock - conglomerate; Well graded gravel with silt and sand (GW-GM); reddish brown (2.5YR 4/4); granules to boulders, subangular to subround; little very fine to very coarse grained sand, subangular to subround; little silt; dry to moist; weak cementation	(377.0 - 382.0') Normal drilling	
378				Topock - Weathered Bedrock - conglomerate					
379	60			Topock - Weathered Bedrock - conglomerate	GM		(377.5 - 382.0') Topock - Weathered Bedrock - conglomerate; Silty gravel with sand (GM); reddish brown (2.5YR 4/4); granules to very large pebbles, angular to subround; little very fine to very coarse grained sand, subangular to subround; little silt; trace clay; trace coarser clasts composed of metadiorite; dry to moist;		
380									













Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	06/20/2019	Surface Elevation:	N/A	Boring No.: MW-Xd
Date Completed:	07/31/2019	Northing (NAD83):	N/A	
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	417 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	6-12 inches	Location: PG&E Topock, Needles, California
Driller Name:	E. Ramos / S. Vasquez	Depth to First Water:	9.6 ft bgs	
Drilling Asst:	O. Flores / L. Amaya	Sampling Method:	4 Inch X 10 ft Core Barrel	Project Number: RC000753.0051
Logger:	GJ / SM / CS	Sampling Interval:	Continuous	
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
381	60			Topock - Weathered Bedrock - conglomerate	GM		moderate cementation	(377.0 - 382.0') Normal drilling	
382									
383									
384									
385									
386									
387	132								
388									
389									
390									
391									
392									
393									
394									
395									
396									
397	162								
398									
399									
400									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	06/20/2019	Surface Elevation:	N/A	Boring No.: MW-Xd
Date Completed:	07/31/2019	Northing (NAD83):	N/A	
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	417 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	6-12 inches	Location: PG&E Topock, Needles, California
Driller Name:	E. Ramos / S. Vasquez	Depth to First Water:	9.6 ft bgs	
Drilling Asst:	O. Flores / L. Amaya	Sampling Method:	4 Inch X 10 ft Core Barrel	Project Number: RC000753.0051
Logger:	GJ / SM / CS	Sampling Interval:	Continuous	
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
401	162	No Sieve Samples Collected		Topock - Weathered Bedrock - conglomerate	CL		(400.0 - 401.0') Topock - Weathered Bedrock - conglomerate; Gravelly lean clay with sand (CL); reddish brown (2.5YR 4/4); medium plasticity; some silt; little granules to large pebbles, angular to subround; little fine to very coarse grained sand, subangular to subround; trace small cobbles, subangular; moist; soft to medium stiff; weak cementation	(393.0 - 403.0') Normal drilling	
402				Topock - Weathered Bedrock - conglomerate	GC		(401.0 - 402.2') Topock - Weathered Bedrock - conglomerate; Clayey gravel with sand (GC); reddish brown (2.5YR 4/4); granules to very large pebbles, angular to subround; little fine to very coarse grained sand, subangular to subround; little silt; little clay; little coarser clasts composed of metadiorite; moist; weak cementation	(403.0 - 407.0') Soft drilling	
403				Topock - Weathered Bedrock - conglomerate	ML		(402.2 - 403.6') Topock - Weathered Bedrock - conglomerate; Gravelly silt with sand (ML); reddish brown (2.5YR 4/4); low plasticity; some granules to very large pebbles, angular to subround; little medium to very coarse grained sand, subangular to subround; little clay; moist; soft; weak cementation		
404				Topock - Weathered Bedrock - conglomerate	GC		(403.6 - 404.0') Topock - Weathered Bedrock - conglomerate; Clayey gravel with sand (GC); reddish brown (2.5YR 4/4); granules to small cobbles, angular to subround; little medium to very coarse grained sand, subangular to subround; little silt; little clay; little coarser clasts composed of metadiorite; moist; weak cementation		
405				Topock - Weathered Bedrock - conglomerate	SM		(404.0 - 406.1') Topock - Weathered Bedrock - conglomerate; Silty sand with gravel (SM); reddish brown (2.5YR 4/4); fine grained to very coarse grained, subangular to subround; some granules to very large pebbles, angular to subround; little silt; little clay; little coarser clasts composed of metadiorite; moist; weak cementation	(407.0 - 417.0') Soft drilling	
406				Topock - Weathered Bedrock - conglomerate	SM		(406.1 - 407.0') Topock - Weathered Bedrock - conglomerate; Sandy lean clay with gravel (CL); reddish brown (2.5YR 4/4); medium plasticity; some silt; little granules to large pebbles, subangular to subround; little fine to very coarse grained sand, subangular to subround; moist; soft; weak cementation		
407	120		MW-X-VAS-412-417 (<0.17 U ppb) 7/15/2019 12:43	Topock - Weathered Bedrock - conglomerate	CL		(407.0 - 408.0') Topock - Weathered Bedrock - conglomerate; Silty sand with gravel (SM); reddish brown (2.5YR 4/4); fine grained to very coarse grained, subangular to subround; low plasticity; some granules to very large pebbles, angular to subround; little silt; little clay; moist; weak cementation	(412.0 - 417.0') Cleared bottom of borehole with water	
408				Topock - Weathered Bedrock - conglomerate	SM		(408.0 - 411.0') Topock - Weathered Bedrock - conglomerate; Clayey gravel with sand (GC); reddish brown (2.5YR 4/4); granules to small cobbles, angular to subround; some fine to very coarse grained sand, subangular to subround; little silt; little clay; moist; weak cementation		
409				Topock - Weathered Bedrock - conglomerate	GC		(411.0 - 414.8') Topock - Weathered Bedrock - conglomerate; Silty sand with gravel (SM); reddish brown (2.5YR 4/4); fine grained to very coarse grained, subangular to subround; low plasticity; some granules to very large pebbles, angular to subround; some silt; little clay; moist; weak cementation		
410				Topock - Weathered Bedrock - conglomerate	GC		(413.3') moist; weak cementation; increase in granules and pebbles and sand, decrease in silt and clay		
411				Topock - Weathered Bedrock - conglomerate	GM		(414.8 - 417.0') Topock - Weathered Bedrock - conglomerate; Silty gravel with sand (GM); reddish brown (2.5YR 4/4); granules to very large pebbles, angular to subround; some fine to very coarse grained sand, subangular to subround; little silt; little clay; some coarser clasts composed of metadiorite; moist; moderate cementation		
412				Topock - Weathered Bedrock - conglomerate	GM				(412.0 - 417.0') 375 gallons of water used; 0 gallons of water recovered; 375 gallons of water lost
413							End of Boring at 417.0' bgs.		
414									
415									
416									
417									
418									
419									
420									

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Date Started:	08/10/2019	Surface Elevation:	N/A	Boring No.: MW-Xs	
Date Completed:	08/12/2019	Northing (NAD83):	N/A		
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	127 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	10-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Steve Vasquez	Depth to First Water:	9.6 ft bgs		
Drilling Asst:	O. Flores / L. Amaya	Sampling Method:	4 inch x 10 ft. Core Barrel	Project Number:	RC000753.0051
Logger:	Anthony Mack	Sampling Interval:	Screen Intervals		
Editor:	Grant Wilford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
1							(0.0 - 17.0') No recovery (NR); did not collect or log core, see MW-Xd for lithology	(0.0 - 17.0') Soft drilling	
2									
3									
4									
5									
6									
7									
8									
9	0				NR				
10		No Sieve Samples Collected							
11									
12									
13									
14									
15			MW-X-VAS-12-17 (<0.033 U ppb) 6/25/2019 15:10						
16									
17							(17.0 - 27.0') No recovery (NR)	(17.0 - 27.0') Loose fine grained sands did not stay in core barrel.	
18	0				NR				
19									
20									

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Boring Log




Sheet: 2 of 7

Date Started:	08/10/2019	Surface Elevation:	N/A	Boring No.: MW-Xs	
Date Completed:	08/12/2019	Northing (NAD83):	N/A		
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	127 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	10-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Steve Vasquez	Depth to First Water:	9.6 ft bgs		
Drilling Asst:	O. Flores / L. Amaya	Sampling Method:	4 inch x 10 ft. Core Barrel	Project Number:	RC000753.0051
Logger:	Anthony Mack	Sampling Interval:	Screen Intervals		
Editor:	Grant Wilford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
21	0				NR			(17.0 - 27.0') Loose fine grained sands did not stay in core barrel.	
22									
23									
24									
25									
26	1440	No Sieve Samples Collected		Topock - Fill	SP		(27.0 - 36.0') Topock - Fill; Poorly graded sand (SP); dark yellowish brown (10YR 4/4); very fine grained to medium grained, subangular to round; trace silt; wet; no odor	(27.0 - 40.0') Soft drilling	
27									
28									
29									
30									
31									
32									
33									
34									
35									
36									
37									
38									
39									
40									
				Topock - Fluvial Deposits	SW		(36.0 - 46.5') Topock - Fluvial Deposits; Well graded sand with gravel (SW); grayish brown (10YR 5/2); fine grained to very coarse grained, subangular to subround; little granules to small pebbles, subangular to subround; trace silt; wet; no odor		

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Date Started:	08/10/2019	Surface Elevation:	N/A	Boring No.: MW-Xs
Date Completed:	08/12/2019	Northing (NAD83):	N/A	
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	127 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	10-12 inches	Location: PG&E Topock, Needles, California
Driller Name:	Steve Vasquez	Depth to First Water:	9.6 ft bgs	
Drilling Asst:	O. Flores / L. Amaya	Sampling Method:	4 inch x 10 ft. Core Barrel	Project Number: RC000753.0051
Logger:	Anthony Mack	Sampling Interval:	Screen Intervals	
Editor:	Grant Wilford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid		
41	1440			Topock - Fluvial Deposits	SW		(44.5'); little granules to large pebbles; increase in pebble size	(40.0 - 127.0') rough drilling began at approx 95 ft. between 110-117, too much torque on drill, casing was pulled to approx 40 ft to use water to assist reaming 10" borehole	(40.0 - 127.0') 4960.4 gallons of water used; 2031.68 gallons of water recovered; 2928.72 gallons of water lost		
42											
43											
44											
45											
46	0	No Sieve Samples Collected		Topock - Fluvial Deposits	GW		(46.5 - 47.0') Topock - Fluvial Deposits; Well graded gravel with sand (GW); dark grayish brown / dark yellowish brown(10YR 4/2); angular to subangular; some fine to coarse grained sand, subangular to subround; trace silt; no odor				
47										(47.0 - 97.0') No recovery (NR); did not collect or log core, see MW-Xd for lithology	
48				NR	NR						
49											
50											
51											
52											
53											
54											
55											
56											
57											
58											
59											
60											

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval at MW-Xd

Date Started:	08/10/2019	Surface Elevation:	N/A	Boring No.: MW-Xs	
Date Completed:	08/12/2019	Northing (NAD83):	N/A		
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	127 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	10-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Steve Vasquez	Depth to First Water:	9.6 ft bgs		
Drilling Asst:	O. Flores / L. Amaya	Sampling Method:	4 inch x 10 ft. Core Barrel	Project Number:	RC000753.0051
Logger:	Anthony Mack	Sampling Interval:	Screen Intervals		
Editor:	Grant Wilford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
61								(40.0 - 127.0') rough drilling began at approx 95 ft. between 110-117, too much torque on drill, casing was pulled to approx 40 ft to use water to assist reaming 10" borehole	(40.0 - 127.0') 4960.4 gallons of water used; 2031.68 gallons of water recovered; 2928.72 gallons of water lost
62									
63									
64									
65									
66									
67									
68									
69									
70	0	No Sieve Samples Collected			NR				
71									
72									
73			MW-X-VAS-71-76 (<0.033 U ppb) 6/27/2019 08:52						
74									
75									
76									
77									
78									
79									
80									






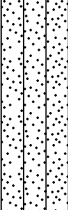
Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval at MW-Xd

Date Started:	08/10/2019	Surface Elevation:	N/A	Boring No.: MW-Xs	
Date Completed:	08/12/2019	Northing (NAD83):	N/A		
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	127 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	10-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Steve Vasquez	Depth to First Water:	9.6 ft bgs		
Drilling Asst:	O. Flores / L. Amaya	Sampling Method:	4 inch x 10 ft. Core Barrel	Project Number:	RC000753.0051
Logger:	Anthony Mack	Sampling Interval:	Screen Intervals		
Editor:	Grant Wilford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
81								(40.0 - 127.0') rough drilling began at approx 95 ft. between 110-117, too much torque on drill, casing was pulled to approx 40 ft to use water to assist reaming 10" borehole	(40.0 - 127.0') 4960.4 gallons of water used; 2031.68 gallons of water recovered; 2928.72 gallons of water lost
82									
83									
84									
85									
86									
87									
88									
89	0				NR				
90		No Sieve Samples Collected							
91									
92									
93									
94									
95									
96									
97									
98							(97.0 - 107.0') Topock - Fluvial Deposits; Well graded sand (SW); brown (10YR 4/3); fine grained to very coarse grained, subangular to subround; trace granules, subangular to subround; wet; no odor		
99	1440			Topock - Fluvial Deposits	SW				
100									

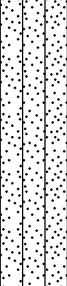
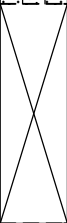
Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval at MW-Xd

Date Started:	08/10/2019	Surface Elevation:	N/A	Boring No.: MW-Xs
Date Completed:	08/12/2019	Northing (NAD83):	N/A	
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	127 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	10-12 inches	Location: PG&E Topock, Needles, California
Driller Name:	Steve Vasquez	Depth to First Water:	9.6 ft bgs	
Drilling Asst:	O. Flores / L. Amaya	Sampling Method:	4 inch x 10 ft. Core Barrel	Project Number: RC000753.0051
Logger:	Anthony Mack	Sampling Interval:	Screen Intervals	
Editor:	Grant Wilford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
101	1440	No Sieve Samples Collected		Topock - Fluvial Deposits	SW			(40.0 - 127.0') rough drilling began at approx 95 ft. between 110-117, too much torque on drill, casing was pulled to approx 40 ft to use water to assist reaming 10" borehole	(40.0 - 127.0') 4960.4 gallons of water used; 2031.68 gallons of water recovered; 2928.72 gallons of water lost
102									
103									
104									
105									
106									
107									
108	MW-X-VAS-107-112 (<0.033 U ppb) 6/27/2019 15:04		Topock - Fluvial Deposits	GW		(107.0 - 108.0') Topock - Fluvial Deposits; Well graded gravel with sand (GW); brown (10YR 4/3); granules to very large pebbles, angular to subround; some very fine to medium grained sand, subangular to subround; trace silt; no odor			
109			Topock - Fluvial Deposits	SM			(108.0 - 112.0') Topock - Fluvial Deposits; Silty sand with gravel (SM); dark grayish brown / dark yellowish brown(10YR 4/2); very fine grained to medium grained, subangular to subround; some granules to large pebbles, angular to subround; some silt; trace angular to subround; wet; no odor		
110									
111	MW-X-VAS-112-117 (<0.033 U ppb) 6/28/2019 09:56		Topock - Fluvial Deposits	GW		(112.0 - 116.0') Topock - Fluvial Deposits; Well graded gravel with sand (GW); dark grayish brown / dark yellowish brown(10YR 4/2); granules to large cobbles, subangular to round; some fine to very coarse grained sand, subangular to subround; trace small cobbles; wet; no odor			
112									
113									
114		Topock - Alluvium Deposits	GW-GM		(116.0 - 117.0') Topock - Alluvium Deposits; Well graded gravel with silt and sand (GW-GM); brown (7.5YR 4/4) trace weak red / pale reddish brown(10R 5/4); granules to small cobbles, angular to round; some very fine to medium grained sand, subangular to round; little silt; wet; no odor				
115									
116	1008			Topock - Alluvium Deposits	SM		(117.0 - 124.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (5YR 4/3) trace red (10R 5/6); very fine grained to medium grained, subangular to subround; some granules to large pebbles, angular to subround; some silt; trace angular to subround; wet; no odor		
117							(118') increase in granules and pebbles		
118									
119									
120									

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Date Started:	08/10/2019	Surface Elevation:	N/A	Boring No.: MW-Xs
Date Completed:	08/12/2019	Northing (NAD83):	N/A	
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	127 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	10-12 inches	Location: PG&E Topock, Needles, California
Driller Name:	Steve Vasquez	Depth to First Water:	9.6 ft bgs	
Drilling Asst:	O. Flores / L. Amaya	Sampling Method:	4 inch x 10 ft. Core Barrel	Project Number: RC000753.0051
Logger:	Anthony Mack	Sampling Interval:	Screen Intervals	
Editor:	Grant Wilford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
121	1008			Topock - Alluvium Deposits	SM			(40.0 - 127.0') rough drilling began at approx 95 ft. between 110-117, too much torque on drill, casing was pulled to approx 40 ft to use water to assist reaming 10" borehole	(40.0 - 127.0') 4960.4 gallons of water used; 2031.68 gallons of water recovered; 2928.72 gallons of water lost
122									
123									
124									
125	0				NR		(124.0 - 127.0') No recovery (NR): Did not collect or log core, see MW-Xd for lithology		
126									
127									
128									
129									
130									
131									
132									
133									
134									
135									
136									
137									
138									
139									
140									

End of Boring at 127.0' bgs.

Draft 9/8/19

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Date Started:	05/13/2019	Surface Elevation:	N/A	Well ID: MW-M-57, MW-M-95
Date Completed:	07/30/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	Tyler Alymer	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	C. Winland/J. Candelaria	Borehole Diameter:	10-12 inches	
Logger:	M. Andrews/C. Stewart	Water Level Start:	44.23 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	6/17/2019	
Total Depth:	99 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
1			NR		(0.0 - 2.0') Concrete Pad (0.5 - 42.0') 2" PVC Sch 80 Casing		(0.0 - 2.0') 9 bags Note: 2.5 x 2.5 ft concrete pad with 18 diameter lockable vault, King Kon-Crete 4000 PSI
2							
3							
4					(2.0 - 6.0') Portland Cement 6% Bentonite	(2.0 - 6.0') 22.2 gallons	(2.0 - 6.0') 50 gallons (125%) Note: Type I, II and V with 6% Bentonite
5							
6							
7					(6.0 - 8.5') Bentonite seal chips	(6.0 - 8.5') 2.57 bags	(6.0 - 8.5') 8 bags (211%) Note: Puregold Medium Chips, use to fill void
8							
9					(8.5 - 8.8') Portland Cement 6% Bentonite	(8.5 - 8.8') 1.2 gallons	(8.5 - 8.8') 50 gallons (4067%) Note: Type I, II and V with 6% Bentonite, void took grout
10							
11			NR		(10.5 - 11.5') Centralizer	(8.8 - 13.5') 3.45 bags	(8.8 - 13.5') 8 bags (132%) Note: Halliburton Uniform Granular, boulder fell into borehole about 10' bgs, during casing pull, no apparent damage to well casing
12					(8.8 - 13.5') Bentonite seal chips		
13							
14							
15							
16							
17					(13.5 - 25.0') Grout	(13.5 - 25.0') 45.5 gallons	(13.5 - 25.0') 100 gallons (120%) Note: Type I, II and V with 6% Bentonite
18							
19							
20							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = No Recovery, blue water table symbol represents depth to water measured post development

Date Started:	05/13/2019	Surface Elevation:	N/A	Well ID: MW-M-57, MW-M-95
Date Completed:	07/30/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	Tyler Alymer	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	C. Winland/J. Candelaria	Borehole Diameter:	10-12 inches	
Logger:	M. Andrews/C. Stewart	Water Level Start:	44.23 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	6/17/2019	
Total Depth:	99 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
21					(0.5 - 42.0') 2" PVC Sch 80 Casing		
22							
23					(13.5 - 25.0') Grout	(13.5 - 25.0') 45.5 gallons	(13.5 - 25.0') 100 gallons (120%) Note: Type I, II and V with 6% Bentonite
24							
25							
26							
27							
28							
29			NR				
30					(25.0 - 36.0') Bentonite seal chips	(25.0 - 36.0') 8.08 bags	(25.0 - 36.0') 9 bags (11%) Note: Puregold Medium Chips
31							
32							
33							
34							
35							
36							
37							
38		Topock - Alluvium Deposits	SM		(36.0 - 61.0') Cemex #3 MESH (8x10)	(36.0 - 61.0') 25.4 bags	(36.0 - 61.0') 39 bags (54%) Note: Lapis Lustre Sand
39							
40							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = No Recovery, blue water table symbol represents depth to water measured post development

Date Started: 05/13/2019	Surface Elevation: N/A	Well ID: MW-M-57, MW-M-95
Date Completed: 07/30/2019	Shallow Well Elevation: N/A	
Drilling Co.: Cascade	Deep Well Elevation: N/A	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): N/A	Project: Final GW Remedy Phase 1
Driller Name: Tyler Alymer	Easting (NAD83): N/A	Location: PG&E Topock, Needles, California
Drilling Asst: C. Winland/J. Candelaria	Borehole Diameter: 10-12 inches	
Logger: M. Andrews/C. Stewart	Water Level Start: 44.23 ft bgs	Project Number: RC000753.0051
Editor: Sean McGrane	Development End Date: 6/17/2019	
Total Depth: 99 ft bgs	Well Completion: <input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
41		Topock - Alluvium Deposits	SM		(0.5 - 42.0') 2" PVC Sch 80 Casing (40.5 - 41.5') Centralizer		
42							
43		Topock - Alluvium Deposits	SC		(42.0 - 57.0') 2" Sch 80 PVC (20-slot) Screen		
44							
45		Topock - Alluvium Deposits	SM				
46							
47							
48		Topock - Alluvium Deposits	SC				
49							
50		Topock - Alluvium Deposits	SM		(36.0 - 61.0') Cemex #3 MESH (8x10)	(36.0 - 61.0') 25.4 bags	(36.0 - 61.0') 39 bags (54%) Note: Lapis Lustre Sand
51							
52		Topock - Alluvium Deposits	GM				
53							
54	MW-M-VAS-52-57 (28 ppb) 3/28/2019 11:10	Topock - Alluvium Deposits	SM				
55							
56							
57							
58			NR		(57.5 - 58.5') Centralizer		
59					(57.0 - 59.4') Sump and End Cap		
60							

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Date Started:	05/13/2019	Surface Elevation:	N/A	Well ID: MW-M-57, MW-M-95
Date Completed:	07/30/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	Tyler Alymer	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	C. Winland/J. Candelaria	Borehole Diameter:	10-12 inches	
Logger:	M. Andrews/C. Stewart	Water Level Start:	44.23 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	6/17/2019	
Total Depth:	99 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
61					(36.0 - 61.0') Cemex #3 MESH (8x10)	(36.0 - 61.0') 25.4 bags	(36.0 - 61.0') 39 bags (54%) Note: Lapis Lustre Sand
62							
63							
64			NR				
65							
66					(61.0 - 70.0') Bentonite seal pellets	(61.0 - 70.0') 7.9 buckets	(61.0 - 70.0') 8 buckets (1%) Note: Pel-Plug (TR30) 3/8" <input type="checkbox"/>
67							
68		Topock - Alluvium Deposits	GM				
69							
70		Topock - Alluvium Deposits	SM		(69.5 - 70.5') Centralizer	(8.0 - 99.0') 10" Borehole	
71							
72							
73							
74	MW-M-VAS-72-77 (<0.033 U ppb) 3/29/2019 14:01	Topock - Alluvium Deposits	GM				
75					(70.0 - 99.0') Cemex #3 MESH (8x10)	(70.0 - 99.0') 32 bags	(70.0 - 99.0') 31 bags (-3%) Note: Lapis Lustre Sand
76							
77							
78		Topock - Alluvium Deposits	GM				
79							
80							

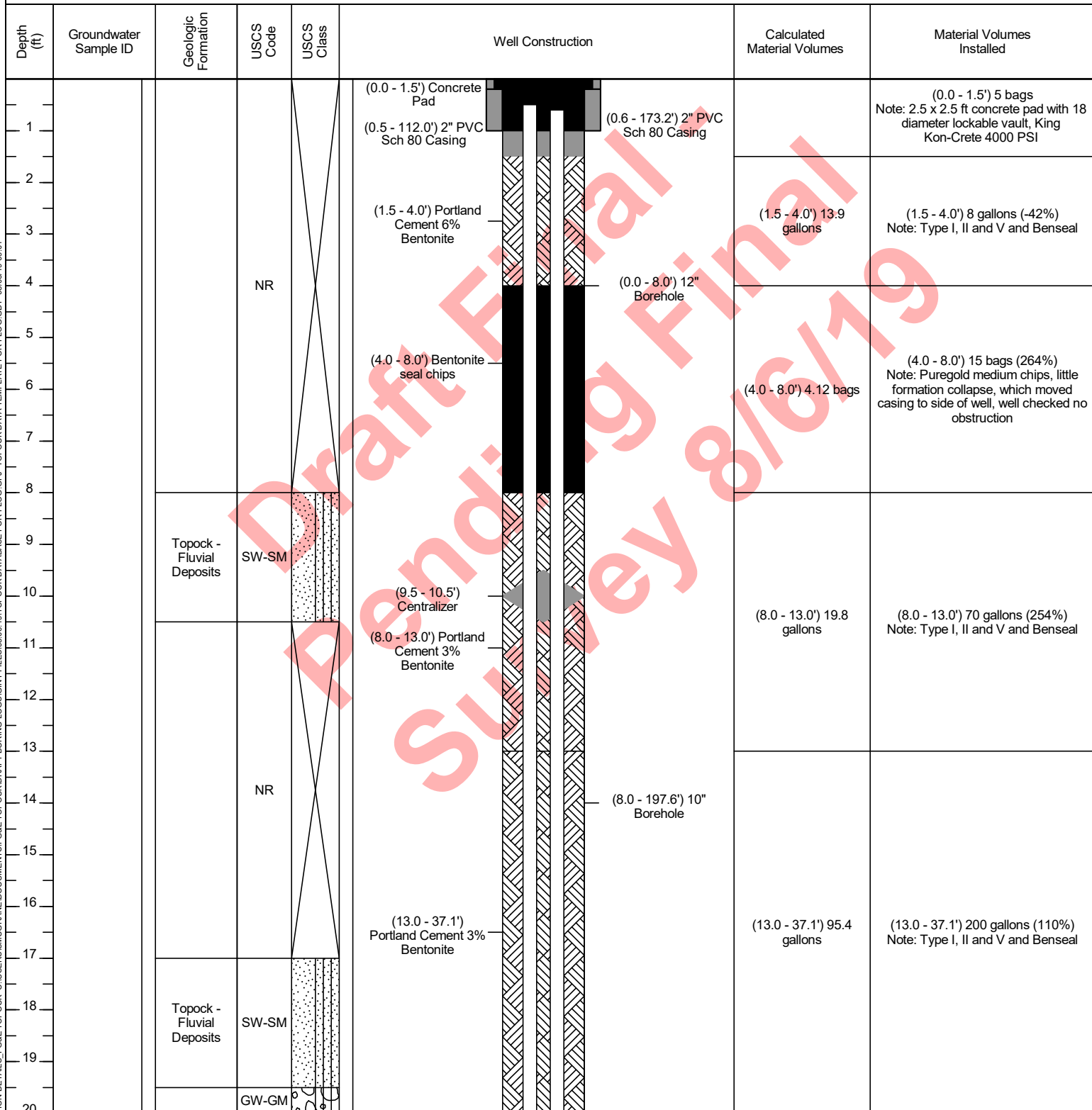
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Date Started: 05/13/2019	Surface Elevation: N/A	Well ID: MW-M-57, MW-M-95
Date Completed: 07/30/2019	Shallow Well Elevation: N/A	
Drilling Co.: Cascade	Deep Well Elevation: N/A	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): N/A	Project: Final GW Remedy Phase 1
Driller Name: Tyler Alymer	Easting (NAD83): N/A	Location: PG&E Topock, Needles, California
Drilling Asst: C. Winland/J. Candelaria	Borehole Diameter: 10-12 inches	
Logger: M. Andrews/C. Stewart	Water Level Start: 44.23 ft bgs	Project Number: RC000753.0051
Editor: Sean McGrane	Development End Date: 6/17/2019	
Total Depth: 99 ft bgs	Well Completion: <input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
81		Topock - Alluvium Deposits	GM				
82							
83							
84		Topock - Alluvium Deposits	ML				
85							
86		Topock - Alluvium Deposits	SM				
87							
88							
89		Topock - Alluvium Deposits	SC				
90					(70.0 - 99.0') Cemex #3 MESH (8x10)		
91							
92		Topock - Alluvium Deposits	SW-SM				
93							
94							
95							
96					(95.5 - 96.5') Centralizer		
97							
98			NR				
99							
100					End of Boring at 99.0' bgs.		












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Date Started: 03/20/2019	Surface Elevation: N/A	Well ID: MW-M-132, MW-M-193
Date Completed: 07/30/2019	Shallow Well Elevation: N/A	
Drilling Co.: Cascade	Deep Well Elevation: N/A	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): N/A	Project: Final GW Remedy Phase I
Driller Name: Tyler Alymer	Easting (NAD83): N/A	Location: PG&E Topock, Needles, California
Drilling Asst: C. Winland/J. Candelaria	Borehole Diameter: 4-12 inches	
Logger: C. Bonessi/R. Moniz	Water Level Start: 44.85 ft bgs	Project Number: RC000753.0051
Editor: Sean McGrane	Development End Date: 6/15/2019	
Total Depth: 216 ft bgs	Well Completion: <input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	



Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = No Recovery, blue water table symbol represents depth to water measured post development

Date Started: 03/20/2019	Surface Elevation: N/A	Well ID: MW-M-132, MW-M-193
Date Completed: 07/30/2019	Shallow Well Elevation: N/A	
Drilling Co.: Cascade	Deep Well Elevation: N/A	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): N/A	Project: Final GW Remedy Phase I
Driller Name: Tyler Alymer	Easting (NAD83): N/A	Location: PG&E Topock, Needles, California
Drilling Asst: C. Winland/J. Candelaria	Borehole Diameter: 4-12 inches	
Logger: C. Bonessi/R. Moniz	Water Level Start: 44.85 ft bgs	Project Number: RC000753.0051
Editor: Sean McGrane	Development End Date: 6/15/2019	
Total Depth: 216 ft bgs	Well Completion: <input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction			Calculated Material Volumes	Material Volumes Installed
21		Topock - Fluvial Deposits	GW-GM		(0.5 - 112.0') 2" PVC Sch 80 Casing			(0.6 - 173.2') 2" PVC Sch 80 Casing	
22									
23									
24									
25									
26									
27		Topock - Fluvial Deposits	SW-SM		(13.0 - 37.1') Portland Cement 3% Bentonite			(13.0 - 37.1') 95.4 gallons	(13.0 - 37.1') 200 gallons (110%) Note: Type I, II and V and Benseal
28									
29									
30									
31									
32									
33									
34									
35									
36									
37		Topock - Fluvial Deposits	SM		(34.5 - 35.5') Centralizer				
38									
39									
40									
					(37.1 - 46.0') Bentonite seal chips			(37.1 - 46.0') 6.54 bags	(37.1 - 46.0') 24 bags (267%) Note: Puregold Medium Chips. Bentonite sinking into high solids grout.

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = No Recovery, blue water table symbol represents depth to water measured post development

Date Started: 03/20/2019	Surface Elevation: N/A	Well ID: MW-M-132, MW-M-193
Date Completed: 07/30/2019	Shallow Well Elevation: N/A	
Drilling Co.: Cascade	Deep Well Elevation: N/A	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): N/A	Project: Final GW Remedy Phase I
Driller Name: Tyler Alymer	Easting (NAD83): N/A	Location: PG&E Topock, Needles, California
Drilling Asst: C. Winland/J. Candelaria	Borehole Diameter: 4-12 inches	
Logger: C. Bonessi/R. Moniz	Water Level Start: 44.85 ft bgs	Project Number: RC000753.0051
Editor: Sean McGrane	Development End Date: 6/15/2019	
Total Depth: 216 ft bgs	Well Completion: <input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
41		Topock - Fluvial Deposits	SM		(0.5 - 112.0') 2" PVC Sch 80 Casing		
42							
43					(37.1 - 46.0') Bentonite seal chips	(37.1 - 46.0') 6.54 bags	(37.1 - 46.0') 24 bags (267%) Note: Puregold Medium Chips. Bentonite sinking into high solids grout.
44		Topock - Alluvium Deposits	GM				
45							
46							
47							
48							
49		Topock - Alluvium Deposits	GM				
50							
51					(8.0 - 197.6') 10" Borehole		
52							
53					(46.0 - 94.3') High Solids Grout	(46.0 - 94.3') 191.2 gallons	(46.0 - 94.3') 228 gallons (19%) Note: Aqua Guard Bentonite Grout
54	MW-M-VAS-52-57 (28 ppb) 3/28/2019 11:10						
55		Topock - Alluvium Deposits	GW				
56							
57							
58							
59		Topock - Alluvium Deposits	SM				
60							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = No Recovery, blue water table symbol represents depth to water measured post development

Date Started: 03/20/2019	Surface Elevation: N/A	Well ID: MW-M-132, MW-M-193
Date Completed: 07/30/2019	Shallow Well Elevation: N/A	
Drilling Co.: Cascade	Deep Well Elevation: N/A	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): N/A	Project: Final GW Remedy Phase I
Driller Name: Tyler Alymer	Easting (NAD83): N/A	Location: PG&E Topock, Needles, California
Drilling Asst: C. Winland/J. Candelaria	Borehole Diameter: 4-12 inches	
Logger: C. Bonessi/R. Moniz	Water Level Start: 44.85 ft bgs	Project Number: RC000753.0051
Editor: Sean McGrane	Development End Date: 6/15/2019	
Total Depth: 216 ft bgs	Well Completion: <input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
61		Topock - Alluvium Deposits	SM		(0.5 - 112.0') 2" PVC Sch 80 Casing		
62		Topock - Alluvium Deposits	GM				
63							
64		Topock - Alluvium Deposits	SM		(64.5 - 65.5') Centralizer		
65							
66							
67							
68							
69							
70		Topock - Alluvium Deposits	GM		(46.0 - 94.3') High Solids Grout	(46.0 - 94.3') 191.2 gallons	(46.0 - 94.3') 228 gallons (19%) Note: Aqua Guard Bentonite Grout
71							
72							
73							
74	MW-M-VAS-72-77 (<0.033 U ppb) 3/29/2019 14:01						
75							
76		Topock - Alluvium Deposits	SW-SM				
77							
78		Topock - Alluvium Deposits	GM				
79							
80		Topock - Alluvium Deposits	SW-SM				

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Date Started:	03/20/2019	Surface Elevation:	N/A	Well ID: MW-M-132, MW-M-193
Date Completed:	07/30/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	N/A	Project: Final GW Remedy Phase I
Driller Name:	Tyler Alymer	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	C. Winland/J. Candelaria	Borehole Diameter:	4-12 inches	
Logger:	C. Bonessi/R. Moniz	Water Level Start:	44.85 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	6/15/2019	
Total Depth:	216 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
81		Topock - Alluvium Deposits	ML		(0.5 - 112.0') 2" PVC Sch 80 Casing		
82							
83		Topock - Alluvium Deposits	GW-GM				
84							
85							
86							
87							
88					(46.0 - 94.3') High Solids Grout	(46.0 - 94.3') 191.2 gallons	(46.0 - 94.3') 228 gallons (19%) Note: Aqua Guard Bentonite Grout
89		Topock - Alluvium Deposits	SM				
90							
91							
92							
93							
94							
95							
96		Topock - Alluvium Deposits	ML		(94.3 - 96.3') Cemex #3 MESH (8x10)	(94.3 - 96.3') 2.1 bags	(94.3 - 96.3') 6 bags (186%) Note: Lapis Lustre Sand, drillers were concerned about bentonite swelling in casing overnight placed sand in casing and open borehole, sand filled void
97							
98		Topock - Alluvium Deposits	SM		(96.3 - 106.9') Bentonite seal pellets	(96.3 - 106.9') 9 buckets	(96.3 - 106.9') 9.5 buckets (6%) Note: Pel-Plug (TR30) 3/8"
99							
100					(99.5 - 100.5') Centralizer		

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Date Started:	03/20/2019	Surface Elevation:	N/A	Well ID: MW-M-132, MW-M-193
Date Completed:	07/30/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	N/A	Project: Final GW Remedy Phase I
Driller Name:	Tyler Alymer	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	C. Winland/J. Candelaria	Borehole Diameter:	4-12 inches	
Logger:	C. Bonessi/R. Moniz	Water Level Start:	44.85 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	6/15/2019	
Total Depth:	216 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
101		Topock - Alluvium Deposits	ML		(99.5 - 100.5') Centralizer		
102					(0.5 - 112.0') 2" PVC Sch 80 Casing		
103							
104		Topock - Alluvium Deposits	SM		(96.3 - 106.9') Bentonite seal pellets	(96.3 - 106.9') 9 buckets	(96.3 - 106.9') 9.5 buckets (6%) Note: Pel-Plug (TR30) 3/8"
105							
106							
107							
108							
109	MW-M-VAS-107-112 (<0.033 U ppb) 3/30/2019 13:59	Topock - Alluvium Deposits	SM				
110							
111							
112							
113					(112.0 - 132.0') 2" Sch 80 PVC (20-slot) Screen		
114					(106.9 - 136.0') Cemex #3 MESH (8x10)	(106.9 - 136.0') 30.2 bags	(106.9 - 136.0') 35 bags (16%) Note: Lapis Lustre Sand
115							
116							
117		Topock - Alluvium Deposits	GM				
118							
119							
120							

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Date Started: 03/20/2019	Surface Elevation: N/A	Well ID: MW-M-132, MW-M-193
Date Completed: 07/30/2019	Shallow Well Elevation: N/A	
Drilling Co.: Cascade	Deep Well Elevation: N/A	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): N/A	Project: Final GW Remedy Phase I
Driller Name: Tyler Alymer	Easting (NAD83): N/A	Location: PG&E Topock, Needles, California
Drilling Asst: C. Winland/J. Candelaria	Borehole Diameter: 4-12 inches	
Logger: C. Bonessi/R. Moniz	Water Level Start: 44.85 ft bgs	Project Number: RC000753.0051
Editor: Sean McGrane	Development End Date: 6/15/2019	
Total Depth: 216 ft bgs	Well Completion: <input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
121		Topock - Alluvium Deposits	GM		(112.0 - 132.0') 2" Sch 80 PVC (20-slot) Screen		
122							
123		Topock - Alluvium Deposits	SM				
124							
125		Topock - Alluvium Deposits	GW-GM				
126							
127							
128					(106.9 - 136.0') Cemex #3 MESH (8x10)	(106.9 - 136.0') 30.2 bags	(106.9 - 136.0') 35 bags (16%) Note: Lapis Lustre Sand
129							
130							
131							
132							
133					(132.5 - 133.5') Centralizer		
134		Topock - Alluvium Deposits	GM		(132.0 - 134.4') Sump and End Cap		
135							
136							
137							
138					(136.0 - 163.0') Bentonite seal pellets	(136.0 - 163.0') 23.8 buckets	(136.0 - 163.0') 25 buckets (5%) Note: Pel-Plug (TR30) 3/8"
139							
140							

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Date Started:	03/20/2019	Surface Elevation:	N/A	Well ID: MW-M-132, MW-M-193
Date Completed:	07/30/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	N/A	Project: Final GW Remedy Phase I
Driller Name:	Tyler Alymer	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	C. Winland/J. Candelaria	Borehole Diameter:	4-12 inches	
Logger:	C. Bonessi/R. Moniz	Water Level Start:	44.85 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	6/15/2019	
Total Depth:	216 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
141					(0.6 - 173.2') 2" PVC Sch 80 Casing		
142		Topock - Alluvium Deposits	GM				
143							
144		Topock - Alluvium Deposits	ML				
145							
146							
147							
148							
149	MW-M-VAS-147-152 (<0.17 U ppb) 3/31/2019 15:21	Topock - Alluvium Deposits	SM		(136.0 - 163.0') Bentonite seal pellets	(8.0 - 197.6') 10" Borehole	(136.0 - 163.0') 23.8 buckets
150							(136.0 - 163.0') 25 buckets (5%) Note: Pel-Plug (TR30) 3/8"
151							
152							
153							
154							
155							
156							
157		Topock - Alluvium Deposits	GM				
158							
159							
160							

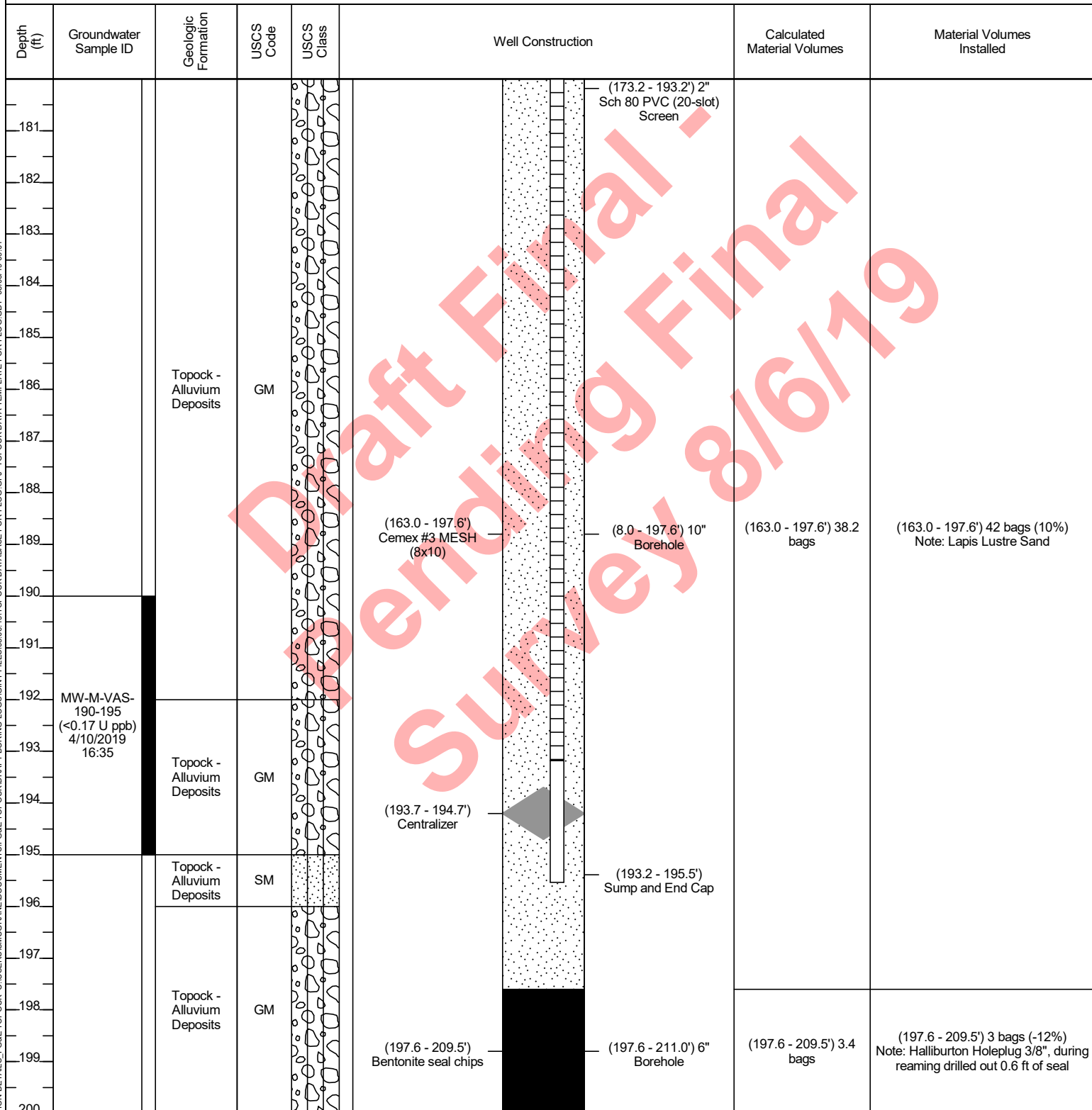
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Date Started: 03/20/2019	Surface Elevation: N/A	Well ID: MW-M-132, MW-M-193
Date Completed: 07/30/2019	Shallow Well Elevation: N/A	
Drilling Co.: Cascade	Deep Well Elevation: N/A	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): N/A	Project: Final GW Remedy Phase I
Driller Name: Tyler Alymer	Easting (NAD83): N/A	Location: PG&E Topock, Needles, California
Drilling Asst: C. Winland/J. Candelaria	Borehole Diameter: 4-12 inches	
Logger: C. Bonessi/R. Moniz	Water Level Start: 44.85 ft bgs	Project Number: RC000753.0051
Editor: Sean McGrane	Development End Date: 6/15/2019	
Total Depth: 216 ft bgs	Well Completion: <input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
161							
162							
163		Topock - Alluvium Deposits	GM		(0.6 - 173.2') 2" PVC Sch 80 Casing (136.0 - 163.0') Bentonite seal pellets	(136.0 - 163.0') 23.8 buckets	(136.0 - 163.0') 25 buckets (5%) Note: Pel-Plug (TR30) 3/8"
164							
165							
166							
167		Topock - Alluvium Deposits	SM				
168							
169							
170							
171							
172					(163.0 - 197.6') Cemex #3 MESH (8x10)	(163.0 - 197.6') 38.2 bags	(163.0 - 197.6') 42 bags (10%) Note: Lapis Lustre Sand
173		Topock - Alluvium Deposits	GM		(8.0 - 197.6') 10" Borehole (173.2 - 193.2') 2" Sch 80 PVC (20-slot) Screen		
174	MW-M-VAS-172-177 (<0.033 U ppb) 4/2/2019 14:57						
175							
176							
177		Topock - Alluvium Deposits	GM				
178							
179							
180							





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Date Started: 03/20/2019	Surface Elevation: N/A	Well ID: MW-M-132, MW-M-193
Date Completed: 07/30/2019	Shallow Well Elevation: N/A	
Drilling Co.: Cascade	Deep Well Elevation: N/A	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): N/A	Project: Final GW Remedy Phase I
Driller Name: Tyler Alymer	Easting (NAD83): N/A	Location: PG&E Topock, Needles, California
Drilling Asst: C. Winland/J. Candelaria	Borehole Diameter: 4-12 inches	
Logger: C. Bonessi/R. Moniz	Water Level Start: 44.85 ft bgs	Project Number: RC000753.0051
Editor: Sean McGrane	Development End Date: 6/15/2019	
Total Depth: 216 ft bgs	Well Completion: <input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	



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Date Started: 03/20/2019	Surface Elevation: N/A	Well ID: MW-M-132, MW-M-193
Date Completed: 07/30/2019	Shallow Well Elevation: N/A	
Drilling Co.: Cascade	Deep Well Elevation: N/A	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): N/A	Project: Final GW Remedy Phase I
Driller Name: Tyler Alymer	Easting (NAD83): N/A	Location: PG&E Topock, Needles, California
Drilling Asst: C. Winland/J. Candelaria	Borehole Diameter: 4-12 inches	
Logger: C. Bonessi/R. Moniz	Water Level Start: 44.85 ft bgs	Project Number: RC000753.0051
Editor: Sean McGrane	Development End Date: 6/15/2019	
Total Depth: 216 ft bgs	Well Completion: <input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction		Calculated Material Volumes	Material Volumes Installed						
201	--no sample-- (Interval did not produce.) 4/10/2019 12:28	Topock - Alluvium Deposits	GM			(197.6 - 209.5') 6" Borehole	(197.6 - 209.5') 3.4 bags	(197.6 - 209.5') 3 bags (-12%) Note: Halliburton Holeplug 3/8", during reaming drilled out 0.6 ft of seal						
202														
203														
204														
205		Topock - Bedrock - metadiorite	GM		(197.6 - 211.0') 6" Borehole	(197.6 - 209.5') 3.4 bags								
206														
207		Topock - Bedrock - metadiorite				(209.5 - 216.0') 1.2 buckets	(209.5 - 216.0') 1 buckets (-17%) Note: Pel-Plug (TR30) 3/8"							
208														
209														
210														
211														
212														
213														
214														
215														
216														
End of Boring at 216.0' bgs.														
217														
218														
219														
220														




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Date Started: 03/20/2019	Surface Elevation: N/A	Boring No.: MW-Md
Date Completed: 04/30/2019	Northing (NAD83): N/A	
Drilling Co.: Cascade	Easting (NAD83): N/A	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 216 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type: Borat Longyear Track Mount	Borehole Diameter: 4-12 inches	Location: PG&E Topock, Needles, California
Driller Name: Tyler Alymer	Depth to First Water: 44.85 ft bgs	
Drilling Asst: C. Winland/J. Candelaria	Sampling Method: 4 inch x 10 ft. Core Barrel	Project Number: RC000753.0051
Logger: C. Bonessi/R. Moniz/D. Maurer	Sampling Interval: Continuous	
Editor: Sean McGrane	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
1	0			NR			(0.0 - 8.0') (NR); Hand cleared for utility clearance to 1 foot bgs, ~2 foot boulder encountered had to used rig to break boulder loose, drilled to 8 ft. bgs with no core collected, no recovery	(0.0 - 8.0') Added 10 gallons of water to hydrate bentonite mud tub seal.	(0.0 - 37.0') No water used
2									
3									
4									
5	0								
6									
7									
8									
9	No Sieve Samples Collected			Topock - Fluvial Deposits	SW-SM		(8.0 - 10.5') Topock - Fluvial Deposits; Well graded sand with silt and gravel (SW-SM); light olive brown (2.5Y 5/4); very fine grained to very coarse grained, subangular to subround; some granules to very large pebbles, subangular to subround; trace cobbles, subangular to subround; trace silt; trace clay; dry; some moisture present due to hydration of bentonite	(8.0 - 32.0') Soft drilling, formation collapsing after every run	
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21	24			NR			(10.5 - 17.0') (NR); No recovery.		
22									
23	120			Topock - Fluvial Deposits	SW-SM		(17.0 - 19.5') Topock - Fluvial Deposits; Well graded sand with silt and gravel (SW-SM); light olive brown (2.5Y 5/4); very fine grained to very coarse grained, subangular to subround; some granules to very large pebbles, subangular to subround; trace cobbles, subangular to subround; trace silt; trace clay; dry; some moisture present due to hydration of bentonite		
24									
25									
26									
27							(19.5 - 27.0') Topock - Fluvial Deposits; Well graded gravel with silt		
28									
29									
30									

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Date Started: 03/20/2019	Surface Elevation: N/A	Boring No.: MW-Md
Date Completed: 04/30/2019	Northing (NAD83): N/A	
Drilling Co.: Cascade	Easting (NAD83): N/A	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 216 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type: Borat Longyear Track Mount	Borehole Diameter: 4-12 inches	Location: PG&E Topock, Needles, California
Driller Name: Tyler Alymer	Depth to First Water: 44.85 ft bgs	
Drilling Asst: C. Winland/J. Candelaria	Sampling Method: 4 inch x 10 ft. Core Barrel	Project Number: RC000753.0051
Logger: C. Bonessi/R. Moniz/D. Maurer	Sampling Interval: Continuous	
Editor: Sean McGrane	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
21	120			Topock - Fluvial Deposits	GW-GM		and sand (GW-GM); light olive brown (2.5Y 5/4); granules to very large pebbles, subangular to subround; some very fine to very coarse grained sand, subangular to subround; trace cobbles, subangular to subround; trace silt; trace clay; dry	(8.0 - 32.0') Soft drilling, formation collapsing after every run	(0.0 - 37.0') No water used
22									
23									
24									
25									
26	60	No Sieve Samples Collected		Topock - Fluvial Deposits	SW-SM		(27.0 - 38.0') Topock - Fluvial Deposits; Well graded sand with silt and gravel (SW-SM); light olive brown (2.5Y 5/4); very fine grained to very coarse grained, subangular to subround; some granules to very large pebbles, subangular to subround; little silt; trace cobbles, subangular to subround; dry	(32.0 - 37.0') Hard drilling, due to boulder, borehole collapsing after each clean out run. rod broke while doing clean out at 35 ft bgs	(37.0 - 205.0') 5 gallons of water used; 5 gallons of water recovered; 0 gallons of water lost
27									
28									
29									
30									
31	60			Topock - Fluvial Deposits	SM		(32'); iron oxide staining; ~2 ft. diameter boulder	(37.0 - 42.0') Drill rods chattering, change geologist from CB to RM (37.1') Change in geologist from CB to RM.	(37.0 - 205.0') No used
32									
33									
34									
35									
36	60			Topock - Fluvial Deposits			(38.0 - 42.0') Topock - Fluvial Deposits; Silty sand with gravel (SM); strong brown (7.5YR 5/6); very fine grained to very coarse grained, angular to subangular; some granules to very large pebbles, angular to subangular; some silt; little cobbles, subangular; dry to moist; weak cementation; iron oxide staining; cobbles composed of sandstone/breccia		
37									
38									
39									
40									

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Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = No Recovery, blue water table symbol represents depth to water measured during first VAS interval

Date Started:	03/20/2019	Surface Elevation:	N/A	Boring No.: MW-Md	
Date Completed:	04/30/2019	Northing (NAD83):	N/A		
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	216 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Borat Longyear Track Mount	Borehole Diameter:	4-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Tyler Alymer	Depth to First Water:	44.85 ft bgs		
Drilling Asst:	C. Winland/J. Candelaria	Sampling Method:	4 inch x 10 ft. Core Barrel	Project Number:	RC000753.0051
Logger:	C. Bonessi/R. Moniz/D. Maurer	Sampling Interval:	Continuous		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
61	114			Topock - Alluvium Deposits	SM		clay; trace cobbles, angular to subround; moist	(57.0 - 67.0') Hard drilling and became harder at 61ft	(37.0 - 205.0') No used
62				Topock - Alluvium Deposits	GM		(61.0 - 63.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); light brownish gray / pale yellowish brown (10YR 6/2); granules to very large pebbles, subangular to subround; little very fine to medium grained sand, subangular to subround; little silt; trace clay; dry		
63									
64									
65				Topock - Alluvium Deposits	SM		(63.0 - 67.0') Topock - Alluvium Deposits; Silty sand (SM); brown (7.5YR 4/3); very fine grained to medium grained, angular to subround; little granules to very large pebbles, angular to subround; little silt; trace cobbles, angular to subround; trace clay; dry; weak cementation; iron oxide staining		
66							(65'); potential caliche deposits in sediments		
67									
68							(67.0 - 75.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); brown (7.5YR 4/3); granules to very large pebbles, angular to subround; some cobbles, angular to subround; some very fine to very coarse grained sand, angular to subround; little silt; moist	(67.0 - 77.0') Softer drilling	
69									
70							(69.5') brown (10YR 5/3); some silt; little cobbles, angular to subround; little clay; moist; weak cementation		
71				Topock - Alluvium Deposits	GM		(70.5'); dry; potential caliche deposits in sediments (71'); moist		
72	120						(72'); wet; lens of green staining		
73									
74			MW-M-VAS-72-77 (<0.033 U ppb) 3/29/2019 14:01						
75									
76				Topock - Alluvium Deposits	SW-SM		(75.0 - 78.0') Topock - Alluvium Deposits; Well graded sand with gravel (SW-SM); weak red (2.5YR 5/2); very fine grained to coarse grained, angular to subround; little granules to very large pebbles, angular to subround; little silt; trace cobbles, angular to subangular; wet		
77									
78								(77.0 - 87.0') Soft drilling, lost core 82 to 87 ft downhole	
79	120			Topock - Alluvium Deposits	GM		(78.0 - 79.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); weak red (2.5YR 4/2); granules to very large pebbles, angular to subround; little cobbles, angular to subround; little very fine to very coarse grained sand, angular to subround; little silt; little clay; wet		
80				Topock - Alluvium Deposits	SW-SM		(79.0 - 80.0') Topock - Alluvium Deposits; Poorly graded sand with silt and gravel (SW-SM); weak red (2.5YR 5/2); medium grained to very coarse grained, angular to subround; and granules to very large		










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Date Started: <u>03/20/2019</u>	Surface Elevation: <u>N/A</u>	Boring No.: <u>MW-Md</u>
Date Completed: <u>04/30/2019</u>	Northing (NAD83): <u>N/A</u>	
Drilling Co.: <u>Cascade</u>	Easting (NAD83): <u>N/A</u>	Client: <u>PG&E</u>
Drilling Method: <u>Sonic Drilling</u>	Total Depth: <u>216 ft bgs</u>	Project: <u>Final GW Remedy Phase 1</u>
Drill Rig Type: <u>Borat Longyear Track Mount</u>	Borehole Diameter: <u>4-12 inches</u>	Location: <u>PG&E Topock, Needles, California</u>
Driller Name: <u>Tyler Alymer</u>	Depth to First Water: <u>44.85 ft bgs</u>	
Drilling Asst: <u>C. Winland/J. Candelaria</u>	Sampling Method: <u>4 inch x 10 ft. Core Barrel</u>	Project Number: <u>RC000753.0051</u>
Logger: <u>C. Bonessi/R. Moniz/D. Maurer</u>	Sampling Interval: <u>Continuous</u>	
Editor: <u>Sean McGrane</u>	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid		
81	120	No Sieve Samples Collected		Topock - Alluvium Deposits	ML		pebbles, angular to subround; little silt; trace cobbles, angular to subangular; wet (80.0 - 82.0') Topock - Alluvium Deposits; Sandy silt with gravel (ML); brown (7.5YR 4/3); low plasticity; some very fine to medium grained sand, angular to subround; little granules to very large pebbles, angular to subangular; little clay; moist to wet; medium stiff	(77.0 - 87.0') Soft drilling, lost core 82 to 87 ft downhole	(37.0 - 205.0') No used		
82				Topock - Alluvium Deposits	GW-GM		(82.0 - 84.0') Topock - Alluvium Deposits; Well graded gravel with silt and sand (GW-GM); weak red (2.5YR 5/2); granules to very large pebbles, angular to subround; some medium to very coarse grained sand, angular to subround; little cobbles, angular to subangular; little silt; wet				
83							(84.0 - 95.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 4/3); medium grained to very coarse grained, angular to subround; some granules to very large pebbles, angular to subround; some silt; little cobbles, angular to subround; trace clay; moist; interbedded with layers of silty gravel, with sand and gravelly silt with sand				
84											
85	120				Topock - Alluvium Deposits	SM		(91.7') dry; with lenses of potential caliche in sediments and weak cementation		(87.0 - 97.0') Soft drilling, recovered 82 to 87 ft core	
86											
87											
88											
89	120					Topock - Alluvium Deposits	ML			(95.0 - 97.0') Topock - Alluvium Deposits; Sandy silt with gravel (ML); brown (7.5YR 4/3); low plasticity; some medium to very coarse grained sand, angular to subround; little granules to very large pebbles, angular to subround; little cobbles, angular to subround; trace clay; moist	
90											
91											
92											
93	120			Topock - Alluvium Deposits	SM		(97.0 - 100.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 4/3); medium grained to very coarse grained, angular to subround; some granules to very large pebbles, angular to subround; some silt; trace cobbles, angular to subround; trace clay; moist; interbedded with layers of silty gravel with sand and gravelly silt with sand				
94											
95											
96											
97	120			Topock - Alluvium Deposits	ML						
98											
99											
100											






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Date Started: 03/20/2019	Surface Elevation: N/A	Boring No.: MW-Md
Date Completed: 04/30/2019	Northing (NAD83): N/A	
Drilling Co.: Cascade	Easting (NAD83): N/A	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 216 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type: Borat Longyear Track Mount	Borehole Diameter: 4-12 inches	Location: PG&E Topock, Needles, California
Driller Name: Tyler Alymer	Depth to First Water: 44.85 ft bgs	
Drilling Asst: C. Winland/J. Candelaria	Sampling Method: 4 inch x 10 ft. Core Barrel	Project Number: RC000753.0051
Logger: C. Bonessi/R. Moniz/D. Maurer	Sampling Interval: Continuous	
Editor: Sean McGrane	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
101	120			Topock - Alluvium Deposits	ML		(100.0 - 103.5') Topock - Alluvium Deposits; Sandy silt with gravel (ML); brown (7.5YR 4/3); low plasticity; some very fine to medium grained sand, angular to subround; little granules to very large pebbles, angular to subround; trace cobbles, angular to subround; trace clay; moist; weak cementation; iron oxide staining (101'); dry; with lens of potential caliche in sediments and weak cementation	(97.0 - 127.0') Formation collapse during clean out drilling with 10 inch casing, soft drilling (97' to 107'), slightly rough drilling (107' to 109'), soft drilling (109' to 117'), soft drilling lost 5 feet of sample downhole (117' to 127') with 6 inch casing	(37.0 - 205.0') No used
102				Topock - Alluvium Deposits	SM		(103.5 - 105.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); grayish brown (2.5Y 5/2) and brown (7.5YR 4/3); medium grained to very coarse grained; little granules to very large pebbles, angular to subround; little silt; trace cobbles, angular to subround; trace clay; moist; interbedded color changes (104'); to 104.5', wet silty gravel lens		
103				Topock - Alluvium Deposits	SM		(105.0 - 114.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 4/3); medium grained to very coarse grained, angular to subround; some granules to very large pebbles, angular to subround; some silt; trace cobbles, angular to subround; trace clay; moist; interbedded layers with poor to moderate gradation (106'); to 107', dry with green staining (107'); to 109.5', wet		
104	108	No Sieve Samples Collected	MW-M-VAS-107-112 (<0.033 U ppb) 3/30/2019 13:59	Topock - Alluvium Deposits	SM			(107.0') During reaming with 10-inch casing flapper bit broke, getting poor recovery, driller thinks material is getting pushed into formation or falling down 6-inch rathole	
105				Topock - Alluvium Deposits	GM		(114.5 - 122.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); brown (7.5YR 4/3); granules to very large pebbles, angular to subround; some very fine to medium grained sand, angular to subangular; some silt; little cobbles, angular to subround; trace clay; moist; green staining		
106				Topock - Alluvium Deposits	GM		(118.2'); sand lens at 118.2 ft		
107	120			Topock - Alluvium Deposits	GM				
108				Topock - Alluvium Deposits	GM				
109				Topock - Alluvium Deposits	GM				

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Date Started: <u>03/20/2019</u>	Surface Elevation: <u>N/A</u>	Boring No.: <u>MW-Md</u>
Date Completed: <u>04/30/2019</u>	Northing (NAD83): <u>N/A</u>	
Drilling Co.: <u>Cascade</u>	Easting (NAD83): <u>N/A</u>	Client: <u>PG&E</u>
Drilling Method: <u>Sonic Drilling</u>	Total Depth: <u>216 ft bgs</u>	Project: <u>Final GW Remedy Phase 1</u>
Drill Rig Type: <u>Borat Longyear Track Mount</u>	Borehole Diameter: <u>4-12 inches</u>	Location: <u>PG&E Topock, Needles, California</u>
Driller Name: <u>Tyler Alymer</u>	Depth to First Water: <u>44.85 ft bgs</u>	
Drilling Asst: <u>C. Winland/J. Candelaria</u>	Sampling Method: <u>4 inch x 10 ft. Core Barrel</u>	Project Number: <u>RC000753.0051</u>
Logger: <u>C. Bonessi/R. Moniz/D. Maurer</u>	Sampling Interval: <u>Continuous</u>	
Editor: <u>Sean McGrane</u>	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid		
121	120	No Sieve Samples Collected		Topock - Alluvium Deposits	GM		(120.5'); weathered metamorphic cobble, black and green staining around cobble	(97.0 - 127.0') Formation collapse during clean out drilling with 10 inch casing, soft drilling (97' to 107'), slightly rough drilling (107' to 109'), soft drilling (109' to 117'), soft drilling lost 5 feet of sample downhole (117' to 127') with 6 inch casing	(37.0 - 205.0') No used		
122				Topock - Alluvium Deposits	SM		(122.0 - 124.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); dark grayish brown / dark yellowish brown(10YR 4/2); very fine grained to very coarse grained, angular to subangular; little granules to very large pebbles, angular to subangular; little silt; trace clay; wet				
123											
124											
125											
126	Topock - Alluvium Deposits			GW-GM		(124.0 - 128.0') Topock - Alluvium Deposits; Well graded gravel with silt and sand (GW-GM); light olive brown (2.5Y 5/6); granules to very large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subangular; little silt; trace cobbles; wet; iron oxide staining; occasional sandier and siltier lenses					
127						(126') brown (7.5YR 4/3); orange staining					
128						(127'); moist					
129	60			No Sieve Samples Collected		Topock - Alluvium Deposits	GM			(128.0 - 144.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); light olive brown (2.5Y 5/6); granules to very large pebbles, angular to subangular; little very fine to very coarse grained sand, angular to subangular; little silt; little clay; trace cobbles; gravel lens; moist	(127.0 - 132.0') Soft drilling, recovered lost 5 feet of sample from drilling run (117' to 127')
130											
131		(131'); to 131.5' cobbles									
132		(132') brown (7.5YR 4/2)									
133		(133.5'); dry; with potential caliche in sediments and weak cementation									
134	90	No Sieve Samples Collected				Topock - Alluvium Deposits	GM			(132.0 - 142.0') Rough drilling	
135											
136											
137											
138											
139											
140											


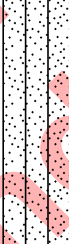


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Date Started:	03/20/2019	Surface Elevation:	N/A	Boring No.: MW-Md	
Date Completed:	04/30/2019	Northing (NAD83):	N/A		
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	216 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Borat Longyear Track Mount	Borehole Diameter:	4-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Tyler Alymer	Depth to First Water:	44.85 ft bgs		
Drilling Asst:	C. Winland/J. Candelaria	Sampling Method:	4 inch x 10 ft. Core Barrel	Project Number:	RC000753.0051
Logger:	C. Bonessi/R. Moniz/D. Maurer	Sampling Interval:	Continuous		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
141	90			Topock - Alluvium Deposits	GM			(132.0 - 142.0') Rough drilling	(37.0 - 205.0') No used
142									
143									
144				Topock - Alluvium Deposits	ML		(144.0 - 144.5') Topock - Alluvium Deposits; Sandy silt with gravel (ML); brown (10YR 5/3); low plasticity; some very fine to medium grained sand, angular to subangular; trace granules to very large pebbles, angular to subround; wet, liquefied		
145									
146									
147	120						(144.5 - 154.4') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 4/2) and brown (7.5YR 4/3); very fine grained to very coarse grained, angular to subround; some granules to very large pebbles, angular to subround; some silt; trace cobbles, angular to subangular; trace clay; moist to wet; occasional gravelly and silty lenses 2in to 6in thick		
148									
149			MW-M-VAS-147-152 (<0.17 U ppb) 3/31/2019 15:21	Topock - Alluvium Deposits	SM				
150		No Sieve Samples Collected							
151									
152									
153								(152.0 - 167.0') Soft drilling	
154									
155							(154.4 - 166.5') Topock - Alluvium Deposits; Silty gravel with sand (GM); brown (7.5YR 4/2) and brown (7.5YR 4/3); granules to very large pebbles, angular to subround; some very fine to medium grained sand, angular to subround; some silt; little cobbles, angular to subangular; moist to wet; iron oxide staining; occasional sand lenes 2in to 6in thick		
156	180								
157				Topock - Alluvium Deposits	GM		(157'); dry; with red and green staining		
158							(158'); moist		
159									
160									





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Date Started: 03/20/2019	Surface Elevation: N/A	Boring No.: MW-Md
Date Completed: 04/30/2019	Northing (NAD83): N/A	
Drilling Co.: Cascade	Easting (NAD83): N/A	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 216 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type: Borat Longyear Track Mount	Borehole Diameter: 4-12 inches	Location: PG&E Topock, Needles, California
Driller Name: Tyler Alymer	Depth to First Water: 44.85 ft bgs	
Drilling Asst: C. Winland/J. Candelaria	Sampling Method: 4 inch x 10 ft. Core Barrel	Project Number: RC000753.0051
Logger: C. Bonessi/R. Moniz/D. Maurer	Sampling Interval: Continuous	
Editor: Sean McGrane	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
161	180	No Sieve Samples Collected		Topock - Alluvium Deposits	GM		(164'); moist to dry	(152.0 - 167.0') Soft drilling	(37.0 - 205.0') No used
162									
163									
164									
165									
166									
167	Topock - Alluvium Deposits		SM		(166.5 - 170.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (5YR 4/3); very fine grained to medium grained, angular to subround; some silt; little granules to very large pebbles, angular to subround; trace cobbles, angular to subangular; trace clay; wet	(167.0 - 177.0') Soft drilling			
168									
169									
170									
171									
172	Topock - Alluvium Deposits	GM		(170.0 - 176.5') Topock - Alluvium Deposits; Silty gravel with sand (GM); brown (7.5YR 4/3) with brown (7.5YR 5/2); granules to very large pebbles, angular to subround; some cobbles, angular to subangular; little very fine to medium grained sand, angular to subangular; little silt; moist	(172'); dry; to 176.5', with red and green staining, potential caliche in sediments and weak cementation	(177.0 - 192.0') Soft drilling			
173									
174									
175									
176									
177	Topock - Alluvium Deposits	GM		(176.5 - 192.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); reddish brown / moderate brown(5YR 4/4); granules to small pebbles, angular to subangular; some very fine to very coarse grained sand; little medium to very large pebbles, angular to subangular; little cobbles; little silt; trace clay; wet to moist; interbedded GW and GM with occasional well graded sand with gravel lenses 2in to 6 in thick					
178									
179									
180									




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Date Started: 03/20/2019	Surface Elevation: N/A	Boring No.: MW-Md
Date Completed: 04/30/2019	Northing (NAD83): N/A	
Drilling Co.: Cascade	Easting (NAD83): N/A	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 216 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type: Borat Longyear Track Mount	Borehole Diameter: 4-12 inches	Location: PG&E Topock, Needles, California
Driller Name: Tyler Alymer	Depth to First Water: 44.85 ft bgs	
Drilling Asst: C. Winland/J. Candelaria	Sampling Method: 4 inch x 10 ft. Core Barrel	Project Number: RC000753.0051
Logger: C. Bonessi/R. Moniz/D. Maurer	Sampling Interval: Continuous	
Editor: Sean McGrane	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
181	180	No Sieve Samples Collected		Topock - Alluvium Deposits	GM			(177.0 - 192.0') Soft drilling	(37.0 - 205.0') No used
182									
183									
184									
185									
186									
187	120		MW-M-VAS-190-195 (<0.17 U ppb) 4/10/2019 16:35		Topock - Alluvium Deposits	GM		(192.0 - 195.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); reddish brown / moderate brown(5YR 4/4) trace reddish brown (2.5YR 4/4); granules to large pebbles, angular to subround; some very fine to very coarse grained sand, angular to subround; little silt; little clay; trace cobbles; wet; weak cementation	(192.0') Change in geologist to CB
188									
189									
190									
191									
192									
193	120	MW-M-VAS-190-195 (<0.17 U ppb) 4/10/2019 16:35		Topock - Alluvium Deposits	SM		(195.0 - 196.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown / moderate brown(5YR 4/4); very fine grained to coarse grained, angular to subround; some silt; little granules to large pebbles, angular to subround; trace clay; wet	(196.0 - 203.0') Rough drilling	
194									
195									
196									
197									
198									
199	120	MW-M-VAS-190-195 (<0.17 U ppb) 4/10/2019 16:35		Topock - Alluvium Deposits	GM		(196.0 - 205.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); reddish brown / moderate brown(5YR 4/4) trace reddish brown (2.5YR 4/4); granules to large pebbles, angular to subround; some very fine to very coarse grained sand, angular to subround; little silt; little clay; trace cobbles; wet; weak cementation		
200									

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Date Started: 03/20/2019	Surface Elevation: N/A	Boring No.: MW-Md
Date Completed: 04/30/2019	Northing (NAD83): N/A	
Drilling Co.: Cascade	Easting (NAD83): N/A	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 216 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type: Borat Longyear Track Mount	Borehole Diameter: 4-12 inches	Location: PG&E Topock, Needles, California
Driller Name: Tyler Alymer	Depth to First Water: 44.85 ft bgs	
Drilling Asst: C. Winland/J. Candelaria	Sampling Method: 4 inch x 10 ft. Core Barrel	Project Number: RC000753.0051
Logger: C. Bonessi/R. Moniz/D. Maurer	Sampling Interval: Continuous	
Editor: Sean McGrane	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
201	120			Topock - Alluvium Deposits	GM			(196.0 - 203.0') Rough drilling	(37.0 - 205.0') No used
202									
203									
204									
205									
206	72	No Sieve Samples Collected		Topock - Bedrock - metadiorite	GM		(205.0 - 208.0') Topock - Bedrock - metadiorite; Silty gravel with sand (GM); grayish brown (2.5Y 5/2) with greenish gray(10Y 6/1); granules to large pebbles, angular to subround; some very fine to very coarse grained sand, angular to subround; some silt; little clay; moist; moderate cementation; weathered metadiorite	(205.0 - 211.0') Very tight drilling, locked up core barrel at 208'	(205.0 - 211.0') 600 gallons of water used; 600 gallons of water recovered; 0 gallons of water lost
207									
208									
209									
210									
211	48			Topock - Bedrock - metadiorite			(208.0 - 216.0') Topock - Bedrock - metadiorite; grayish brown (2.5Y 5/2) with greenish gray(10Y 6/1); granules to large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subangular; some silt; little clay; dry; moderate cementation; bedrock pulverized during drilling	(211.0 - 216.0') Rough drilling, hard, rods and head chattering	(211.0 - 216.0') No used
212									
213									
214									
215									
216	End of Boring at 216.0' bgs.								
217									
218									
219									
220									

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Date Started:	<u>05/13/2019</u>	Surface Elevation:	<u>N/A</u>	Boring No.: <u>MW-MS</u>
Date Completed:	<u>05/28/2019</u>	Northing (NAD83):	<u>N/A</u>	
Drilling Co.:	<u>Cascade</u>	Easting (NAD83):	<u>N/A</u>	Client: <u>PG&E</u>
Drilling Method:	<u>Sonic Drilling</u>	Total Depth:	<u>99 ft bgs</u>	Project: <u>Final GW Remedy Phase 1</u>
Drill Rig Type:	<u>Borat Longyear Track Mount</u>	Borehole Diameter:	<u>10-12 inches</u>	Location: <u>PG&E Topock, Needles, California</u>
Driller Name:	<u>Tyler Alymer</u>	Depth to First Water:	<u>44.23 ft bgs</u>	
Drilling Asst:	<u>C. Winland/J. Candelaria</u>	Sampling Method:	<u>8 inch x 10 ft. Core Barrel</u>	Project Number: <u>RC000753.0051</u>
Logger:	<u>Michael Andrews</u>	Sampling Interval:	<u>Screen Interval</u>	
Editor:	<u>Sean McGrane</u>	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
1					NR		(0.0 - 3.0') (NR); Hand cleared for utility clearance, could not hand clear past 3 ft. bgs recieved approval to start drilling, not logged, no recovery		(0.0 - 6.0') No water used
2									
3									
4							(3.0 - 37.0') (NR); Core not collected or logged, no recovery, see boring log MW-Md for lithology		
5									
6								(6.0 - 13.0') Rough drilling	(6.0 - 7.0') 5 gallons of water used; 5 gallons of water recovered; 0 gallons of water lost
7									(7.0 - 99.0') No water used
8									
9									
10		No Sieve Samples Collected							
11					NR				
12									
13									
14									
15									
16									
17									
18									
19								(18.0 - 19.0') Drill rods chattering	
20								(19.0 - 20.0') Rough drilling, drill rods	

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Date Started: 05/13/2019	Surface Elevation: N/A	Boring No.: MW-Ms
Date Completed: 05/28/2019	Northing (NAD83): N/A	
Drilling Co.: Cascade	Easting (NAD83): N/A	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 99 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type: Borat Longyear Track Mount	Borehole Diameter: 10-12 inches	Location: PG&E Topock, Needles, California
Driller Name: Tyler Alymer	Depth to First Water: 44.23 ft bgs	
Drilling Asst: C. Winland/J. Candelaria	Sampling Method: 8 inch x 10 ft. Core Barrel	Project Number: RC000753.0051
Logger: Michael Andrews	Sampling Interval: Screen Interval	
Editor: Sean McGrane	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
21								chattering (20.0 - 27.0') Casing getting stuck, voids forming, rough drilling and drill rods chattering (20' to 26')	(7.0 - 99.0') No water used
22									
23									
24									
25									
26									
27									
28									
29					NR				
30		No Sieve Samples Collected							
31									
32									
33									
34								(33.0 - 38.0') Drill rods chattering	
35									
36									
37									
38	108			Topock - Alluvium Deposits	SM		(37.0 - 42.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); (7.5R 4/3); very fine grained to very coarse grained, angular to subangular; some granules to very large pebbles, angular to subangular; little silt; trace clay; dry to moist		
39									
40									

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Date Started: <u>05/13/2019</u>	Surface Elevation: <u>N/A</u>	Boring No.: <u>MW-Ms</u>
Date Completed: <u>05/28/2019</u>	Northing (NAD83): <u>N/A</u>	
Drilling Co.: <u>Cascade</u>	Easting (NAD83): <u>N/A</u>	Client: <u>PG&E</u>
Drilling Method: <u>Sonic Drilling</u>	Total Depth: <u>99 ft bgs</u>	Project: <u>Final GW Remedy Phase 1</u>
Drill Rig Type: <u>Borat Longyear Track Mount</u>	Borehole Diameter: <u>10-12 inches</u>	Location: <u>PG&E Topock, Needles, California</u>
Driller Name: <u>Tyler Alymer</u>	Depth to First Water: <u>44.23 ft bgs</u>	
Drilling Asst: <u>C. Winland/J. Candelaria</u>	Sampling Method: <u>8 inch x 10 ft. Core Barrel</u>	Project Number: <u>RC000753.0051</u>
Logger: <u>Michael Andrews</u>	Sampling Interval: <u>Screen Interval</u>	
Editor: <u>Sean McGrane</u>	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
41	108			Topock - Alluvium Deposits	SM				(7.0 - 99.0') No water used
42									
43				Topock - Alluvium Deposits	SC		(42.5 - 44.0') Topock - Alluvium Deposits; Clayey sand with gravel (SC); brown (10YR 4/3); fine grained to very coarse grained, angular to subround; some granules to large pebbles, angular to subangular; little clay; trace silt; dry to moist		
44									
45		No Sieve Samples Collected		Topock - Alluvium Deposits	SM		(44.0 - 46.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (10YR 4/3); very fine grained to very coarse grained, angular to subround; little granules to large pebbles, angular; little silt; trace clay; trace mica; wet		
46									
47							(46.0 - 47.0'); No recovery		
48									
49	120			Topock - Alluvium Deposits	SC		(47.0 - 49.5') Topock - Alluvium Deposits; Clayey sand with gravel (SC); brown (10YR 4/3); very fine grained to very coarse grained, angular to subround; some granules to very large pebbles, angular to subangular; some cobbles, angular to subangular; little silt; little clay; wet	(47.0 - 52.0') Rough drilling	
50									
51				Topock - Alluvium Deposits	SM		(49.5 - 52.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (10YR 4/3); fine grained to coarse grained, angular to subangular; some granules to very large pebbles, angular to subangular; some silt; trace clay; wet		
52									
53		MW-M-VAS-52-57 (28 ppb) 3/28/2019 11:10		Topock - Alluvium Deposits	GM		(52.0 - 53.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); dark grayish brown / dark yellowish brown (10YR 4/2); granules to very large pebbles, angular to subangular; little fine to very coarse grained sand, angular to subround; little silt; trace cobbles, angular to subangular; trace boulders; trace clay; wet		
54									
55				Topock - Alluvium Deposits	SM		(53.0 - 57.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); dark yellowish brown (10YR 4/4); very fine grained to very coarse grained, subround; some small to large pebbles, angular to subangular; some silt; trace clay; trace mica; wet to moist		
56									
57									
58									
59									
60									
							(57.0 - 67.0') (NR); Core not collected or logged, no recovery, see boring log MW-Md for lithology		
					NR				

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Date Started: 05/13/2019	Surface Elevation: N/A	Boring No.: MW-Ms
Date Completed: 05/28/2019	Northing (NAD83): N/A	
Drilling Co.: Cascade	Easting (NAD83): N/A	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 99 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type: Borat Longyear Track Mount	Borehole Diameter: 10-12 inches	Location: PG&E Topock, Needles, California
Driller Name: Tyler Alymer	Depth to First Water: 44.23 ft bgs	
Drilling Asst: C. Winland/J. Candelaria	Sampling Method: 8 inch x 10 ft. Core Barrel	Project Number: RC000753.0051
Logger: Michael Andrews	Sampling Interval: Screen Interval	
Editor: Sean McGrane	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
61									(7.0 - 99.0') No water used
62									
63									
64					NR				
65									
66									
67									
68				Topock - Alluvium Deposits	GM		(67.0 - 68.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); (7.5R 4/4); granules to very large pebbles, angular to subround; some fine to very coarse grained sand, angular to subround; little silt; trace clay; wet	(67.0 - 77.0') Rough drilling	
69							(68.0 - 72.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (5YR 4/3); medium grained to very coarse grained, angular to subround; some silt; little granules to large pebbles, angular to subangular; trace cobbles, angular to subangular; trace clay; wet		
70				Topock - Alluvium Deposits	SM		(69.5') some small to very large pebbles, angular to subangular; trace cobbles, angular to subangular; trace mica		
71									
72	120								
73							(72.0 - 76.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); reddish brown / moderate brown (5YR 4/4); granules to very large pebbles, angular to subangular; some fine to very coarse grained sand, angular to subangular; little silt; trace cobbles, angular to subangular; trace clay; wet		
74			MW-M-VAS-72-77 (<0.033 U ppb) 3/29/2019 14:01	Topock - Alluvium Deposits	GM				
75									
76									
77							(76.0 - 83.5') Topock - Alluvium Deposits; Silty gravel with sand (GM); dark yellowish brown (10YR 4/4); granules to very large pebbles, angular to subangular; some fine to very coarse grained sand, angular to subround; little silt; trace cobbles, angular; wet		
78	120			Topock - Alluvium Deposits	GM				
79									
80									

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Date Started: 05/13/2019	Surface Elevation: N/A	Boring No.: MW-Ms
Date Completed: 05/28/2019	Northing (NAD83): N/A	
Drilling Co.: Cascade	Easting (NAD83): N/A	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 99 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type: Borat Longyear Track Mount	Borehole Diameter: 10-12 inches	Location: PG&E Topock, Needles, California
Driller Name: Tyler Alymer	Depth to First Water: 44.23 ft bgs	
Drilling Asst: C. Winland/J. Candelaria	Sampling Method: 8 inch x 10 ft. Core Barrel	Project Number: RC000753.0051
Logger: Michael Andrews	Sampling Interval: Screen Interval	
Editor: Sean McGrane	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
81	120			Topock - Alluvium Deposits	GM		(81'); decrease in cobbles		(7.0 - 99.0') No water used
82				Topock - Alluvium Deposits	ML		(83.5 - 85.0') Topock - Alluvium Deposits; Sandy silt with gravel (ML); brown (10YR 4/3); low plasticity; some very fine to very coarse grained sand, angular to subangular; little granules to medium pebbles, angular; wet		
83				Topock - Alluvium Deposits	SM		(85.0 - 88.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (10YR 4/3); very fine grained to very coarse grained, angular to subround; little granules to large pebbles, angular to subangular; little silt; wet		
84	120	No Sieve Samples Collected		Topock - Alluvium Deposits	SC		(88.5 - 90.5') Topock - Alluvium Deposits; Clayey sand with gravel (SC); brown (10YR 4/3); medium grained to very coarse grained, angular to subround; little small to very large pebbles, angular to subangular; little silt; little clay; trace cobbles, angular; moist to dry	(87.0 - 97.0') Rough drilling	
85				Topock - Alluvium Deposits	SW-SM		(90.5 - 97.0') Topock - Alluvium Deposits; Well graded sand with silt and gravel (SW-SM); dark yellowish brown (10YR 4/4); medium grained to very coarse grained, angular to round; some granules to large pebbles, angular to subangular; little silt; wet		
86				Topock - Alluvium Deposits	NR		(97.0 - 99.0') (NR); Core not collected or logged, no recovery, see boring log MW-Md for lithology		
87									
88									
89									
90									
91									
92									
93									
94									
95									
96									
97									
98									
99									
100									

End of Boring at 99.0 'bgs.

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Date Started:	06/16/2019	Surface Elevation:	N/A	Well ID: MW-R-109, MW-R-139
Date Completed:	07/31/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	Eddie Ramos	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	L. Amaya/ O. Flores	Borehole Diameter:	10-12 inches	
Logger:	G. Jeffers / A. Mack	Water Level Start:	90.27 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	7/13/2019	
Total Depth:	143 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
1					(0.0 - 1.4') Concrete Pad (0.5 - 89.0') 2" PVC Sch 80 Casing (0.6 - 119.0') 2" PVC Sch 80 Casing		(0.0 - 1.4') 6.5 bags Note: 2.5 x 2.5 ft concrete pad with 18 diameter lockable vault, King Kon-Crete 4000 PSI
2							
3					(1.4 - 4.0') Bentonite seal chips	(1.4 - 4.0') 2.68 bags	(1.4 - 4.0') 7 bags (161%) Note: Puregold Medium Chips, used to fill void from approximately 2 to 4 ft bgs
4							
5							
6							
7							
8							
9							Note: During development an obstruction was observed at ~8 ft. bgs, a bulge in the casing was observed with a downhole camera, the casing does not appear to be compromised
10			NR				
11							
12					(4.0 - 75.0') Portland Cement 6% Bentonite	(4.0 - 75.0') 286.1 gallons	(4.0 - 75.0') 480 gallons (68%) Note: Used Type I, II, and V and Hydrogel
13							
14							
15							
16							
17							
18							
19							
20					(15.0 - 143.0') 10.0" Borehole		

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Date Started:	06/16/2019	Surface Elevation:	N/A	Well ID: MW-R-109, MW-R-139
Date Completed:	07/31/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	Eddie Ramos	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	L. Amaya/ O. Flores	Borehole Diameter:	10-12 inches	
Logger:	G. Jeffers / A. Mack	Water Level Start:	90.27 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	7/13/2019	
Total Depth:	143 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
21					(0.5 - 89.0') 2" PVC Sch 80 Casing		
22							
23							
24							
25							
26							
27							
28							
29							
30			NR		(4.0 - 75.0') Portland Cement 6% Bentonite	(4.0 - 75.0') 286.1 gallons	(4.0 - 75.0') 480 gallons (68%) Note: Used Type I, II, and V and Hydrogel
31					(29.5 - 30.5') Centralizer		
32							
33							
34							
35							
36							
37							
38							
39							
40							

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Date Started:	06/16/2019	Surface Elevation:	N/A	Well ID: MW-R-109, MW-R-139
Date Completed:	07/31/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	Eddie Ramos	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	L. Amaya/ O. Flores	Borehole Diameter:	10-12 inches	
Logger:	G. Jeffers / A. Mack	Water Level Start:	90.27 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	7/13/2019	
Total Depth:	143 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
41					(0.5 - 89.0') 2" PVC Sch 80 Casing		
42							
43							
44							
45							
46							
47							
48							
49							
50			NR		(4.0 - 75.0') Portland Cement 6% Bentonite	(4.0 - 75.0') 286.1 gallons	(4.0 - 75.0') 480 gallons (68%) Note: Used Type I, II, and V and Hydrogel
51							
52							
53							
54							
55							
56							
57							
58							
59							
60							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval MW-Rd, VAS collected during drilling MW-Rd

Date Started:	06/16/2019	Surface Elevation:	N/A	Well ID: MW-R-109, MW-R-139
Date Completed:	07/31/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	Eddie Ramos	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	L. Amaya/ O. Flores	Borehole Diameter:	10-12 inches	
Logger:	G. Jeffers / A. Mack	Water Level Start:	90.27 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	7/13/2019	
Total Depth:	143 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
61					(0.5 - 89.0') 2" PVC Sch 80 Casing		
62							
63							
64							
65							
66							
67							
68					(4.0 - 75.0') Portland Cement 6% Bentonite	(4.0 - 75.0') 286.1 gallons	(4.0 - 75.0') 480 gallons (68%) Note: Used Type I, II, and V and Hydrogel
69							
70			NR		(69.5 - 70.5') Centralizer		
71							
72							
73							
74							
75							
76							
77							
78					(75.0 - 85.0') Bentonite seal chips	(75.0 - 85.0') 6.97 bags	(75.0 - 85.0') 8 bags (15%) Note: Puregold Medium Chips
79							
80							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval MW-Rd, VAS collected during drilling MW-Rd

Date Started:	06/16/2019	Surface Elevation:	N/A	Well ID: MW-R-109, MW-R-139
Date Completed:	07/31/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	Eddie Ramos	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	L. Amaya/ O. Flores	Borehole Diameter:	10-12 inches	
Logger:	G. Jeffers / A. Mack	Water Level Start:	90.27 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	7/13/2019	
Total Depth:	143 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
81					(0.5 - 89.0') 2" PVC Sch 80 Casing		
82							
83					(75.0 - 85.0') Bentonite seal chips	(75.0 - 85.0') 6.97 bags	(75.0 - 85.0') 8 bags (15%) Note: Puregold Medium Chips
84			NR				
85							
86							
87							
88		Topock - Alluvium Deposits	SW-SM				
89					(89.0 - 109.0') 2" Sch 80 PVC (20-slot) Screen		
90							
91							
92		Topock - Alluvium Deposits	GM		(15.0 - 143.0') 10.0" Borehole		
93					(85.0 - 113.0') Cemex #3 MESH (8x10)	(85.0 - 113.0') 27.2 bags	(85.0 - 113.0') 34 bags (25%) Note: Lapis Lustre Sand
94	MW-R-VAS-92-97 (45 ppb) 5/13/2019 11:44						
95							
96							
97		Topock - Alluvium Deposits	SM				
98							
99		Topock - Alluvium Deposits	SW-SM				
100							

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Date Started:	06/16/2019	Surface Elevation:	N/A	Well ID: MW-R-109, MW-R-139
Date Completed:	07/31/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	Eddie Ramos	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	L. Amaya/ O. Flores	Borehole Diameter:	10-12 inches	
Logger:	G. Jeffers / A. Mack	Water Level Start:	90.27 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	7/13/2019	
Total Depth:	143 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
101		Topock - Alluvium Deposits	SW-SM		(89.0 - 109.0') 2" Sch 80 PVC (20-slot) Screen		
102			SM				
103							
104							
105			NR				
106							
107					(85.0 - 113.0') Cemex #3 MESH (8x10)	(85.0 - 113.0') 27.2 bags	(85.0 - 113.0') 34 bags (25%) Note: Lapis Lustre Sand
108							
109		Topock - Alluvium Deposits	SM				
110					(109.5 - 110.5') Centralizer		
111					(109.0 - 111.3') Sump and End Cap		
112							
113							
114			NR				
115					(113.0 - 117.0') Bentonite seal pellets	(113.0 - 117.0') 3.3 buckets	(113.0 - 117.0') 4 buckets (21%) Note: Pel-Plug (TR30) 3/8"
116							
117							
118	MW-R-VAS-117-122 (5.8 ppb) 5/14/2019 10:14		NR		(117.0 - 143.0') Cemex #3 MESH (8x10)	(117.0 - 143.0') 27.3 bags	(117.0 - 143.0') 34 bags (25%) Note: Lapis Lustre Sand
119		Topock - Alluvium Deposits	SM				
120					(119.0 - 139.0') 2" Sch 80 PVC (20-slot) Screen		


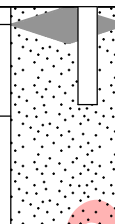
Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval MW-Rd, VAS collected during drilling MW-Rd

Date Started: 06/16/2019	Surface Elevation: N/A	Well ID: MW-R-109, MW-R-139
Date Completed: 07/31/2019	Shallow Well Elevation: N/A	
Drilling Co.: Cascade	Deep Well Elevation: N/A	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): N/A	Project: Final GW Remedy Phase 1
Driller Name: Eddie Ramos	Easting (NAD83): N/A	Location: PG&E Topock, Needles, California
Drilling Asst: L. Amaya/ O. Flores	Borehole Diameter: 10-12 inches	
Logger: G. Jeffers / A. Mack	Water Level Start: 90.27 ft bgs	Project Number: RC000753.0051
Editor: Sean McGrane	Development End Date: 7/13/2019	
Total Depth: 143 ft bgs	Well Completion: <input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
121	MW-R-VAS-117-122 (5.8 ppb) 5/14/2019 10:14	Topock - Alluvium Deposits	SM		(119.0 - 139.0') 2" Sch 80 PVC (20-slot) Screen		
122							
123		Topock - Alluvium Deposits	GW-GM				
124							
125							
126							
127							
128							
129		Topock - Alluvium Deposits	GM		(117.0 - 143.0') Cemex #3 MESH (8x10)		
130					(15.0 - 143.0') 10.0" Borehole	(117.0 - 143.0') 27.3 bags	(117.0 - 143.0') 34 bags (25%) Note: Lapis Lustre Sand
131							
132							
133		Topock - Alluvium Deposits	GW-GM				
134							
135							
136							
137							
138		Topock - Alluvium Deposits	SM				
139							
140		Topock - Alluvium Deposits	SW-SM		(139.5 - 140.5') Centralizer		

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval MW-Rd, VAS collected during drilling MW-Rd

Date Started:	06/16/2019	Surface Elevation:	N/A	Well ID: MW-R-109, MW-R-139
Date Completed:	07/31/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	Eddie Ramos	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	L. Amaya/ O. Flores	Borehole Diameter:	10-12 inches	
Logger:	G. Jeffers / A. Mack	Water Level Start:	90.27 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	7/13/2019	
Total Depth:	143 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction			Calculated Material Volumes	Material Volumes Installed
141		Topock - Alluvium Deposits	SW-SM		(139.5 - 140.5') Centralizer		(15.0 - 143.0') 10.0" Borehole	(117.0 - 143.0') 27.3 bags	(117.0 - 143.0') 34 bags (25%) Note: Lapis Lustre Sand
142	(117.0 - 143.0') Cemex #3 MESH (8x10)				(139.0 - 141.4') Sump and End Cap				
143									
144					End of Boring at 143.0' bgs.				
145									
146									
147									
148									
149									
150									
151									
152									
153									
154									
155									
156									
157									
158									
159									
160									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval MW-Rd, VAS collected during drilling MW-Rd

Date Started:	05/11/2019	Surface Elevation:	N/A	Well ID: MW-R-192, MW-R-275
Date Completed:	07/31/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	E. Ramos / D. O'Mara	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	L. Amaya/ O. Flores	Borehole Diameter:	4-12 inches	
Logger:	G. Jeffers / C. Stewart	Water Level Start:	90.59 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	7/9/2019	
Total Depth:	287 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed		
1		Topock - Alluvium Deposits	SM		(0.0 - 1.5') Concrete Pad (0.5 - 172.0') 2" PVC Sch 80 Casing		(0.0 - 1.5') 7 bags Note: 2.5 x 2.5 ft concrete pad with 18 diameter lockable vault, King Kon-Crete 4000 PSI		
2									
3									
4									
5									
6		Topock - Alluvium Deposits	SW-SM		(1.5 - 10.0') Bentonite Chips	(1.5 - 10.0') 8.75 bags	(1.5 - 10.0') 19 bags (117%) Note: Puregold Medium Chips, used to fill 24 to 36 inch void from ~5 to 10 ft bgs		
7									
8								(0.0 - 15.0') 12.0" Borehole	
9									
10									
11		Topock - Alluvium Deposits	NR		(10.0 - 66.8') Portland Cement 6% Bentonite	(10.0 - 66.8') 221.8 gallons	Note: During installation of the first lift of high solids grout a 10 ft section of tremie pipe became unthreaded, during attempts to retrieve the pipe, the pipe fell to ~20 ft. bgs and was grouted in place in with the Portland Cement 6% Bentonite grout (10.0 - 66.8') 320 gallons (44%) Note: Type I, II, and V and Benseal		
12									
13									
14									
15									
16		Topock - Alluvium Deposits	SM						
17									
18		Topock - Alluvium Deposits	SW-SM						
19									
20					(15.0 - 279.0') 10.0" Borehole				

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started: 05/11/2019	Surface Elevation: N/A	Well ID: MW-R-192, MW-R-275
Date Completed: 07/31/2019	Shallow Well Elevation: N/A	
Drilling Co.: Cascade	Deep Well Elevation: N/A	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): N/A	Project: Final GW Remedy Phase 1
Driller Name: E. Ramos / D. O'Mara	Easting (NAD83): N/A	Location: PG&E Topock, Needles, California
Drilling Asst: L. Amaya/ O. Flores	Borehole Diameter: 4-12 inches	
Logger: G. Jeffers / C. Stewart	Water Level Start: 90.59 ft bgs	Project Number: RC000753.0051
Editor: Sean McGrane	Development End Date: 7/9/2019	
Total Depth: 287 ft bgs	Well Completion: <input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
21		Topock - Alluvium Deposits	SW-SM		(0.5 - 172.0') 2" PVC Sch 80 Casing		
22		Topock - Alluvium Deposits	SM				
23							
24							
25							
26					(25.5 - 26.5') Centralizer		
27							
28		Topock - Alluvium Deposits	SW-SM				
29							
30					(10.0 - 66.8') Portland Cement 6% Bentonite	(10.0 - 66.8') 221.8 gallons	(10.0 - 66.8') 320 gallons (44%) Note: Type I, II, and V and Benseal
31							
32							
33							
34		Topock - Alluvium Deposits	SW				
35							
36			NR				
37							
38		Topock - Alluvium Deposits	SM				
39							
40							

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Date Started: 05/11/2019	Surface Elevation: N/A	Well ID: MW-R-192, MW-R-275
Date Completed: 07/31/2019	Shallow Well Elevation: N/A	
Drilling Co.: Cascade	Deep Well Elevation: N/A	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): N/A	Project: Final GW Remedy Phase 1
Driller Name: E. Ramos / D. O'Mara	Easting (NAD83): N/A	Location: PG&E Topock, Needles, California
Drilling Asst: L. Amaya/ O. Flores	Borehole Diameter: 4-12 inches	
Logger: G. Jeffers / C. Stewart	Water Level Start: 90.59 ft bgs	Project Number: RC000753.0051
Editor: Sean McGrane	Development End Date: 7/9/2019	
Total Depth: 287 ft bgs	Well Completion: <input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
41		Topock - Alluvium Deposits	SM		(0.5 - 172.0') 2" PVC Sch 80 Casing		
42							
43							
44		Topock - Alluvium Deposits	SW-SM				
45							
46							
47							
48			NR				
49							
50					(10.0 - 66.8') Portland Cement 6% Bentonite	(10.0 - 66.8') 221.8 gallons	(10.0 - 66.8') 320 gallons (44%) Note: Type I, II, and V and Benseal
51							
52		Topock - Alluvium Deposits	SW-SM				
53							
54							
55							
56							
57							
58			NR				
59							
60							

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Date Started: 05/11/2019	Surface Elevation: N/A	Well ID: MW-R-192, MW-R-275
Date Completed: 07/31/2019	Shallow Well Elevation: N/A	
Drilling Co.: Cascade	Deep Well Elevation: N/A	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): N/A	Project: Final GW Remedy Phase 1
Driller Name: E. Ramos / D. O'Mara	Easting (NAD83): N/A	Location: PG&E Topock, Needles, California
Drilling Asst: L. Amaya/ O. Flores	Borehole Diameter: 4-12 inches	
Logger: G. Jeffers / C. Stewart	Water Level Start: 90.59 ft bgs	Project Number: RC000753.0051
Editor: Sean McGrane	Development End Date: 7/9/2019	
Total Depth: 287 ft bgs	Well Completion: <input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
61		Topock - Alluvium Deposits	SW-SM		(0.5 - 172.0') 2" PVC Sch 80 Casing		
62							
63		Topock - Alluvium Deposits	SM		(10.0 - 66.8') Portland Cement 6% Bentonite	(10.0 - 66.8') 221.8 gallons	(10.0 - 66.8') 320 gallons (44%) Note: Type I, II, and V and Benseal
64							
65		Topock - Alluvium Deposits	SW		(65.5 - 66.5') Centralizer		
66							
67							
68							
69		Topock - Alluvium Deposits	SM		(66.8 - 71.0') Bentonite seal chips	(66.8 - 71.0') 2.96 bags	(66.8 - 71.0') 5.5 bags (86%) Note: Enviroplug Medium Chips, chips partially settled into high solids grout
70					(15.0 - 279.0') 10.0" Borehole		
71							
72							
73							
74							
75							
76		Topock - Alluvium Deposits	SW-SM		(71.0 - 149.7') High Solids Grout	(71.0 - 149.7') 295.2 gallons	(71.0 - 149.7') 320 gallons (8%) Note: Baroid Industrial Drilling Products - Aquaguard Bentonite Grout
77							
78							
79							
80							

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Date Started: 05/11/2019	Surface Elevation: N/A	Well ID: MW-R-192, MW-R-275
Date Completed: 07/31/2019	Shallow Well Elevation: N/A	
Drilling Co.: Cascade	Deep Well Elevation: N/A	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): N/A	Project: Final GW Remedy Phase 1
Driller Name: E. Ramos / D. O'Mara	Easting (NAD83): N/A	Location: PG&E Topock, Needles, California
Drilling Asst: L. Amaya/ O. Flores	Borehole Diameter: 4-12 inches	
Logger: G. Jeffers / C. Stewart	Water Level Start: 90.59 ft bgs	Project Number: RC000753.0051
Editor: Sean McGrane	Development End Date: 7/9/2019	
Total Depth: 287 ft bgs	Well Completion: <input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction			Calculated Material Volumes	Material Volumes Installed
81		Topock - Alluvium Deposits	SW-SM						Note: 1/2 Bag of Bentonite Chips and 1/2 bag of #3 Cemex Sand installed in annulus to find depth to high solids grout
82									
83									
84									
85									
86	MW-R-VAS-92-97 (45 ppb) 5/13/2019 11:44	Topock - Alluvium Deposits	SM				(71.0 - 149.7') 295.2 gallons		(71.0 - 149.7') 320 gallons (8%) Note: Baroid Industrial Drilling Products - Aquaguard Bentonite Grout
87									
88									
89									
90									
91									
92									
93									
94									
95									
96									
97									
98									
99									
100									

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Date Started:	<u>05/11/2019</u>	Surface Elevation:	<u>N/A</u>	Well ID: MW-R-192, MW-R-275
Date Completed:	<u>07/31/2019</u>	Shallow Well Elevation:	<u>N/A</u>	
Drilling Co.:	<u>Cascade</u>	Deep Well Elevation:	<u>N/A</u>	Client: <u>PG&E</u>
Drilling Method:	<u>Sonic Drilling</u>	Northing (NAD83):	<u>N/A</u>	Project: <u>Final GW Remedy Phase 1</u>
Driller Name:	<u>E. Ramos / D. O'Mara</u>	Easting (NAD83):	<u>N/A</u>	Location: <u>PG&E Topock, Needles, California</u>
Drilling Asst:	<u>L. Amaya/ O. Flores</u>	Borehole Diameter:	<u>4-12 inches</u>	
Logger:	<u>G. Jeffers / C. Stewart</u>	Water Level Start:	<u>90.59 ft bgs</u>	Project Number: <u>RC000753.0051</u>
Editor:	<u>Sean McGrane</u>	Development End Date:	<u>7/9/2019</u>	
Total Depth:	<u>287 ft bgs</u>	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
101					(0.5 - 172.0') 2" PVC Sch 80 Casing		
102							
103							
104							
105							
106					(105.5 - 106.5') Centralizer		Note: 1 Bag of Bentonite Chips and 1/2 bag of #3 Cemex Sand installed in annulus to find depth to high solids grout
107							
108		Topock - Alluvium Deposits	SM				
109							
110					(71.0 - 149.7') High Solids Grout	(15.0 - 279.0') 10.0" Borehole	(71.0 - 149.7') 320 gallons (8%) Note: Baroid Industrial Drilling Products - Aquaguard Bentonite Grout
111						(71.0 - 149.7') 295.2 gallons	
112							
113							
114							
115							
116							
117							
118	MW-R-VAS-117-122 (5.8 ppb) 5/14/2019 10:14	Topock - Alluvium Deposits	GM				
119							
120							

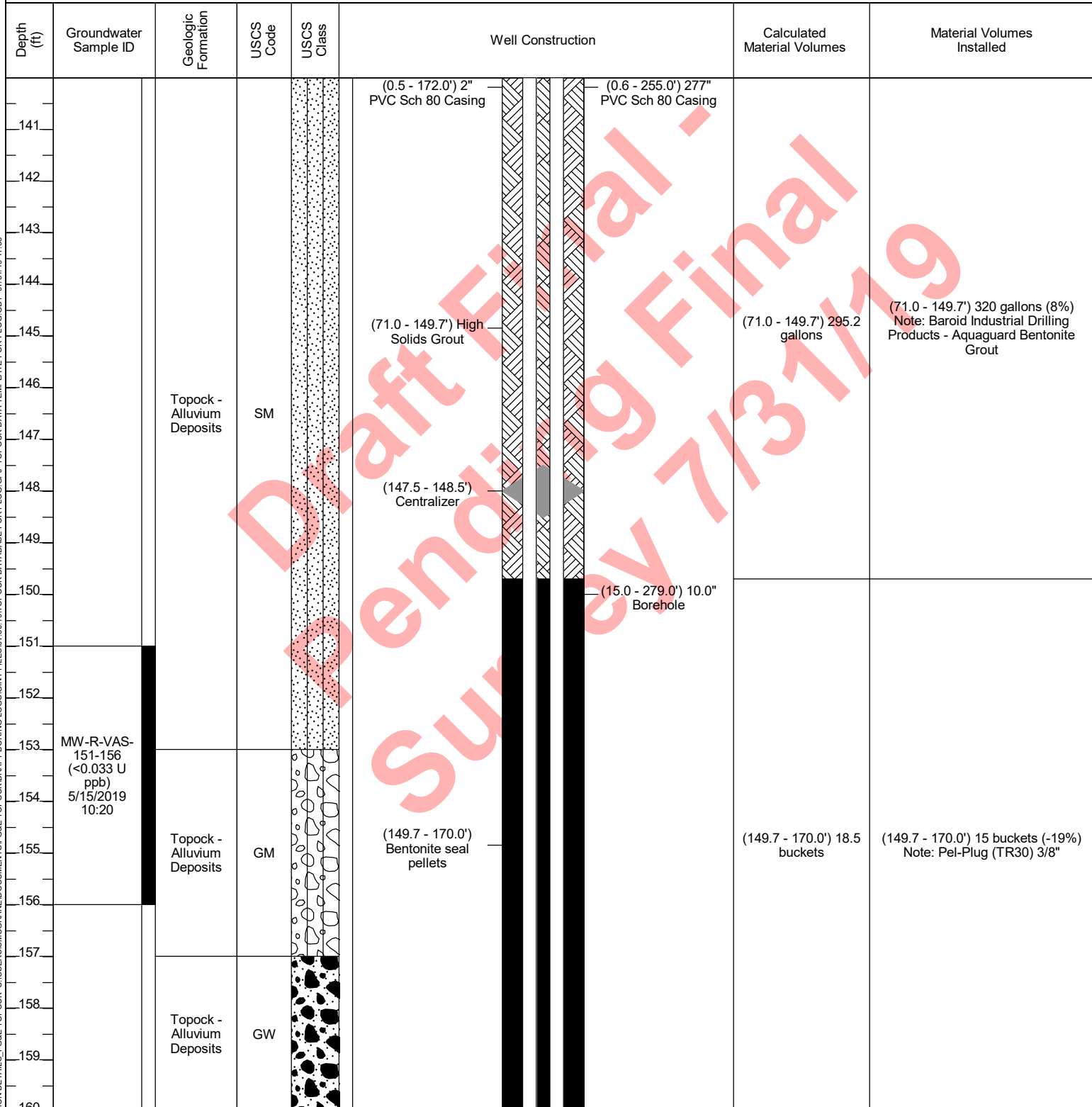
Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	05/11/2019	Surface Elevation:	N/A	Well ID: MW-R-192, MW-R-275
Date Completed:	07/31/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	E. Ramos / D. O'Mara	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	L. Amaya/ O. Flores	Borehole Diameter:	4-12 inches	
Logger:	G. Jeffers / C. Stewart	Water Level Start:	90.59 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	7/9/2019	
Total Depth:	287 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction			Calculated Material Volumes	Material Volumes Installed
121	MW-R-VAS-117-122 (5.8 ppb) 5/14/2019 10:14	Topock - Alluvium Deposits	GM		(0.5 - 172.0') 2" PVC Sch 80 Casing				
122									
123									
124									
125									
126		Topock - Alluvium Deposits	SM		(71.0 - 149.7') High Solids Grout			(71.0 - 149.7') 295.2 gallons	(71.0 - 149.7') 320 gallons (8%) Note: Baroid Industrial Drilling Products - Aquaguard Bentonite Grout
127									
128									
129									
130									
131		Topock - Alluvium Deposits	GM						
132									
133									
134									
135									
136		Topock - Alluvium Deposits	ML						
137									
138									
139									
140									










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Date Started:	05/11/2019	Surface Elevation:	N/A	Well ID: MW-R-192, MW-R-275
Date Completed:	07/31/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	E. Ramos / D. O'Mara	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	L. Amaya/ O. Flores	Borehole Diameter:	4-12 inches	
Logger:	G. Jeffers / C. Stewart	Water Level Start:	90.59 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	7/9/2019	
Total Depth:	287 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	



Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started: 05/11/2019	Surface Elevation: N/A	Well ID: MW-R-192, MW-R-275
Date Completed: 07/31/2019	Shallow Well Elevation: N/A	
Drilling Co.: Cascade	Deep Well Elevation: N/A	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): N/A	Project: Final GW Remedy Phase 1
Driller Name: E. Ramos / D. O'Mara	Easting (NAD83): N/A	Location: PG&E Topock, Needles, California
Drilling Asst: L. Amaya/ O. Flores	Borehole Diameter: 4-12 inches	
Logger: G. Jeffers / C. Stewart	Water Level Start: 90.59 ft bgs	Project Number: RC000753.0051
Editor: Sean McGrane	Development End Date: 7/9/2019	
Total Depth: 287 ft bgs	Well Completion: <input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction			Calculated Material Volumes	Material Volumes Installed
161		Topock - Alluvium Deposits	GW		(0.5 - 172.0') 2" PVC Sch 80 Casing		(0.6 - 255.0') 277" PVC Sch 80 Casing	(149.7 - 170.0') 18.5 buckets	(149.7 - 170.0') 15 buckets (-19%) Note: Pel-Plug (TR30) 3/8"
162									
163									
164									
165	(149.7 - 170.0') Bentonite seal pellets								
166									
167									
168									
169		Topock - Alluvium Deposits	SM				(15.0 - 279.0') 10.0" Borehole	(170.0 - 196.0') 25.2 bags	(170.0 - 196.0') 30.75 bags (22%) Note: Lapis Lustre Sand
170									
171									
172									
173	(172.0 - 192.0') 2" Sch 80 PVC (20-slot) Screen								
174									
175	(170.0 - 196.0') Cemex #3 MESH (8x10)								
176									
177		Topock - Alluvium Deposits	SW-SM						
178									
179									
180									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	05/11/2019	Surface Elevation:	N/A	Well ID: MW-R-192, MW-R-275
Date Completed:	07/31/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	E. Ramos / D. O'Mara	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	L. Amaya/ O. Flores	Borehole Diameter:	4-12 inches	
Logger:	G. Jeffers / C. Stewart	Water Level Start:	90.59 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	7/9/2019	
Total Depth:	287 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
181		Topock - Alluvium Deposits	SM		(172.0 - 192.0') 2" Sch 80 PVC (20-slot) Screen		
182							
183		Topock - Alluvium Deposits	ML				
184							
185							
186							
187							
188					(170.0 - 196.0') Cemex #3 MESH (8x10)	(170.0 - 196.0') 25.2 bags	(170.0 - 196.0') 30.75 bags (22%) Note: Lapis Lustre Sand
189							
190					(15.0 - 279.0') 10.0" Borehole		
191							
192		Topock - Alluvium Deposits	SM				
193					(192.5 - 193.5') Centralizer		
194	MW-R-VAS-192-197 (<0.033 U ppb) 5/16/2019 09:55				(192.0 - 194.0') Sump and End Cap		
195							
196							
197							
198					(196.0 - 253.0') Bentonite seal pellets	(196.0 - 253.0') 54.2 buckets	(196.0 - 253.0') 54 buckets (0%) Note: Pel-Plug (TR30) 3/8"
199							
200							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	05/11/2019	Surface Elevation:	N/A	Well ID: MW-R-192, MW-R-275
Date Completed:	07/31/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	E. Ramos / D. O'Mara	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	L. Amaya/ O. Flores	Borehole Diameter:	4-12 inches	
Logger:	G. Jeffers / C. Stewart	Water Level Start:	90.59 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	7/9/2019	
Total Depth:	287 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
201					(0.6 - 255.0') 277" PVC Sch 80 Casing		
202							
203							
204							
205							
206							
207							
208							
209							
210		Topock - Alluvium Deposits	SM		(196.0 - 253.0') Bentonite seal pellets (15.0 - 279.0') 10.0" Borehole	(196.0 - 253.0') 54.2 buckets	(196.0 - 253.0') 54 buckets (0%) Note: Pel-Plug (TR30) 3/8"
211							
212							
213							
214							
215							
216							
217							
218							
219							
220							

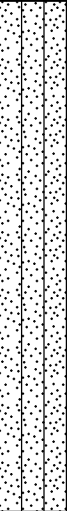



Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started: 05/11/2019	Surface Elevation: N/A	Well ID: MW-R-192, MW-R-275
Date Completed: 07/31/2019	Shallow Well Elevation: N/A	
Drilling Co.: Cascade	Deep Well Elevation: N/A	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): N/A	Project: Final GW Remedy Phase 1
Driller Name: E. Ramos / D. O'Mara	Easting (NAD83): N/A	Location: PG&E Topock, Needles, California
Drilling Asst: L. Amaya/ O. Flores	Borehole Diameter: 4-12 inches	
Logger: G. Jeffers / C. Stewart	Water Level Start: 90.59 ft bgs	Project Number: RC000753.0051
Editor: Sean McGrane	Development End Date: 7/9/2019	
Total Depth: 287 ft bgs	Well Completion: <input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
221					(0.6 - 255.0') 277" PVC Sch 80 Casing		
222							
223							
224							
225							
226							
227							
228							
229	MW-R-VAS-227-232 (<0.033 U ppb) 5/17/2019 10:05	Topock - Alluvium Deposits	SM		(196.0 - 253.0') Bentonite seal pellets	(15.0 - 279.0') 10.0" Borehole	(196.0 - 253.0') 54.2 buckets
230							(196.0 - 253.0') 54 buckets (0%) Note: Pel-Plug (TR30) 3/8"
231							
232							
233							
234							
235							
236					(235.5 - 236.5') Centralizer		
237							
238							
239							
240							

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Date Started: 05/11/2019	Surface Elevation: N/A	Well ID: MW-R-192, MW-R-275
Date Completed: 07/31/2019	Shallow Well Elevation: N/A	
Drilling Co.: Cascade	Deep Well Elevation: N/A	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): N/A	Project: Final GW Remedy Phase 1
Driller Name: E. Ramos / D. O'Mara	Easting (NAD83): N/A	Location: PG&E Topock, Needles, California
Drilling Asst: L. Amaya/ O. Flores	Borehole Diameter: 4-12 inches	
Logger: G. Jeffers / C. Stewart	Water Level Start: 90.59 ft bgs	Project Number: RC000753.0051
Editor: Sean McGrane	Development End Date: 7/9/2019	
Total Depth: 287 ft bgs	Well Completion: <input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction		Calculated Material Volumes	Material Volumes Installed
241	MW-R-VAS-255-260 (<0.17 U ppb) 5/29/2019 12:00	Topock - Alluvium Deposits	SM			(0.6 - 255.0') 277" PVC Sch 80 Casing	(196.0 - 253.0') 54.2 buckets	(196.0 - 253.0') 54 buckets (0%) Note: Pel-Plug (TR30) 3/8"
242								
243								
244								
245								
246		Topock - Alluvium Deposits	GM			(196.0 - 253.0') Bentonite seal pellets	(253.0 - 279.0') 27.3 bags	(253.0 - 279.0') 36 bags (32%) Note: Lapis Lustre Sand
247								
248								
249								
250								
251								
252								
253								
254								
255	Topock - Alluvium Deposits					SM		
256								
257								
258								
259								
260								

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Date Started:	05/11/2019	Surface Elevation:	N/A	Well ID: MW-R-192, MW-R-275
Date Completed:	07/31/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	E. Ramos / D. O'Mara	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	L. Amaya/ O. Flores	Borehole Diameter:	4-12 inches	
Logger:	G. Jeffers / C. Stewart	Water Level Start:	90.59 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	7/9/2019	
Total Depth:	287 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
261		Topock - Alluvium Deposits	SM		(255.0 - 275.0') 277" Sch 80 PVC (20-slot) Screen		
262							
263							
264							
265							
266							
267							
268		Topock - Weathered Bedrock - conglomerate	SM				
269					(253.0 - 279.0') Cemex #3 MESH (8x10)	(15.0 - 279.0') 10.0" Borehole	(253.0 - 279.0') 27.3 bags
270							(253.0 - 279.0') 36 bags (32%) Note: Lapis Lustre Sand
271	MW-R-VAS-269-274 (<0.17 U ppb) 5/30/2019 14:30						
272							
273							
274							
275							
276		Topock - Competent Bedrock - conglomerate			(275.5 - 276.5') Centralizer	(275.0 - 277.0') Sump and End Cap	
277							
278							
279					(279.0 - 287.0') Bentonite seal chips	(279.0 - 287.0') 6" Borehole	(279.0 - 287.0') 2.18 bags
280							(279.0 - 287.0') 2 bags (-8%) Note: Enviroplug Medium Chips





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Date Started:	05/11/2019	Surface Elevation:	N/A	Well ID: MW-R-192, MW-R-275
Date Completed:	07/31/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	N/A	Project: Final GW Remedy Phase 1
Driller Name:	E. Ramos / D. O'Mara	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	L. Amaya/ O. Flores	Borehole Diameter:	4-12 inches	
Logger:	G. Jeffers / C. Stewart	Water Level Start:	90.59 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	7/9/2019	
Total Depth:	287 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction		Calculated Material Volumes	Material Volumes Installed
281		Topock - Competent Bedrock - conglomerate			(279.0 - 287.0') Bentonite seal chips	(279.0 - 287.0') 6" Borehole	(279.0 - 287.0') 2.18 bags	(279.0 - 287.0') 2 bags (-8%) Note: Enviroplug Medium Chips
282								
283								
284			NR					
285								
286								
287								
288					End of Boring at 287.0' bgs.			
289								
290								
291								
292								
293								
294								
295								
296								
297								
298								
299								
300								

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Date Started: 05/11/2019	Surface Elevation: N/A	Boring No.: MW-Rd
Date Completed: 06/04/2019	Northing (NAD83): N/A	
Drilling Co.: Cascade	Easting (NAD83): N/A	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 287 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type: Prosonic Truck Mount	Borehole Diameter: 4-12 inches	Location: PG&E Topock, Needles, California
Driller Name: E. Ramos / D. O'Mara	Depth to First Water: 90.59 ft bgs	
Drilling Asst: L. Amaya/ O. Flores	Sampling Method: 4 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger: G. Jeffers / C. Stewart	Sampling Interval: Continuous	
Editor: Sean McGrane	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid		
1	60	No Sieve Samples Collected		Topock - Alluvium Deposits	SM		(0.0 - 7.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (10YR 5/3); very fine grained to very coarse grained, angular to subround; little granules to very large pebbles, angular to subround; little silt; trace cobbles, angular to subround; dry; coarser clasts compose of granite, basalt and metadiorite	(0.0 - 5.0') Hand augered to 5 feet bgs for utility clearance	(0.0 - 27.0') No water used		
2											
3											
4								(3.5 - 5.0') Lost 12" casing down hole			
5	24										
6											
7											
8											
9	84				Topock - Alluvium Deposits	SW-SM		(7.0 - 14.0') Topock - Alluvium Deposits; Well graded sand with silt and gravel (SW-SM); brown (10YR 5/3); very fine grained to very coarse grained, angular to subround; little granules to very large pebbles, angular to subangular; little silt; trace cobbles, angular to subangular; trace mica; coarser clasts composed of metadiorite; dry			
10											
11											
12											
13											
14											
15											
16											
17	120					Topock - Alluvium Deposits	SM			(17.0 - 19.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (10YR 5/3); very fine grained to very coarse grained, angular to subround; some granules to very large pebbles, angular to subangular; little silt; trace cobbles, angular to subangular; trace mica; coarser clasts composed of metadiorite; dry; iron oxide staining	
18											
19											
20											
							(14.0 - 17.0') No recovery (NR)	(13.0') 12 inch casing started to fall added 2 more feet of casing and set at 15 ft. bgs			
					NR						
							(19.0 - 21.0') Topock - Alluvium Deposits; Well graded sand with silt and gravel (SW-SM); brown (10YR 5/3); very fine grained to very coarse grained, angular to subround; some granules to very large				

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Date Started: 05/11/2019	Surface Elevation: N/A	Boring No.: MW-Rd
Date Completed: 06/04/2019	Northing (NAD83): N/A	
Drilling Co.: Cascade	Easting (NAD83): N/A	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 287 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type: Prosonic Truck Mount	Borehole Diameter: 4-12 inches	Location: PG&E Topock, Needles, California
Driller Name: E. Ramos / D. O'Mara	Depth to First Water: 90.59 ft bgs	
Drilling Asst: L. Amaya/ O. Flores	Sampling Method: 4 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger: G. Jeffers / C. Stewart	Sampling Interval: Continuous	
Editor: Sean McGrane	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
21	120			Topock - Alluvium Deposits	SW-SM		pebbles, angular to subangular; little silt; trace cobbles, angular to subangular; trace boulders, subangular; trace mica; coarser clasts composed of metadiorite; dry		(0.0 - 27.0') No water used
22				Topock - Alluvium Deposits	SM		(21.0 - 24.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (10YR 5/3); very fine grained to very coarse grained, angular to subround; some granules to very large pebbles, angular to subangular; little silt; trace cobbles, angular to subangular; trace mica; coarser clasts composed of metadiorite; dry		
23									
24									
25	60	No Sieve Samples Collected		Topock - Alluvium Deposits	SW-SM		(24.0 - 33.0') Topock - Alluvium Deposits; Well graded sand with silt and gravel (SW-SM); brown (10YR 5/3); very fine grained to very coarse grained, angular to subround; some granules to very large pebbles, angular to subangular; little silt; trace cobbles, angular to subangular; trace mica; coarser clasts composed of metadiorite; dry		(27.0 - 32.0') Core barrel and sediments in core hot, slow drilling due to tight formation and soils falling out of core during clean out runs
26									
27									
28									
29	36			Topock - Alluvium Deposits	SW-SM		(28.5'); pulverized boulder		(32.0 - 37.0') Core barrel and sediments in core hot, slow drilling due to tight formation and soils falling out of core during clean out runs
30							(29'); and granules to very large pebbles, angular to subangular; decrease in sand		
31									
32							(32'); some granules to very large pebbles, angular to subangular; increase in sand		
33	60			Topock - Alluvium Deposits	SW		(33.0 - 35.0') Topock - Alluvium Deposits; Well graded sand with gravel (SW); brown (10YR 5/3); very fine grained to very coarse grained, angular to subround; some granules to very large pebbles, angular to subangular; trace silt; trace mica; coarser clasts composed of metadiorite; dry		(37.0 - 42.0') Slow drilling due to tight formation and soils falling out of core during clean out runs
34									
35									
36									
37	60				NR		(35.0 - 37.0') No recovery (NR)		(37.0 - 42.0') 5 gallons of water used; 0 gallons of water recovered; 5 gallons of water lost
38									
39									
40				Topock - Alluvium Deposits	SM		(37.0 - 41.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (10YR 5/3); very fine grained to very coarse grained, angular to subround; some silt; little granules to very large pebbles, angular to subangular; trace clay; trace mica; coarser clasts composed of metadiorite; dry		

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Date Started:	05/11/2019	Surface Elevation:	N/A	Boring No.: MW-Rd	
Date Completed:	06/04/2019	Northing (NAD83):	N/A		
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	287 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	4-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	E. Ramos / D. O'Mara	Depth to First Water:	90.59 ft bgs		
Drilling Asst:	L. Amaya/ O. Flores	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	G. Jeffers / C. Stewart	Sampling Interval:	Continuous		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
41	60			Topock - Alluvium Deposits	SM			(37.0 - 47.0') Slow drilling due to tight formation and soils falling out of core during clean out runs	(37.0 - 42.0') 5 gallons of water used; 0 gallons of water recovered; 5 gallons of water lost
42							(41.0 - 47.0') Topock - Alluvium Deposits; Well graded sand with silt and gravel (SW-SM); brown (10YR 5/3); very fine grained to very coarse grained, angular to subround; some granules to very large pebbles, angular to subangular; little silt; trace mica; coarser clasts composed of metadiorite; dry; trace oxidized staining.		
43									
44				Topock - Alluvium Deposits	SW-SM				
45	60								
46									
47									
48							(47.0 - 50.0') No recovery (NR); core bag broke soils fell into hopper	(47.0 - 52.0') Drill rods chattering, slow drilling due to tight formation and soils falling out of core during clean out runs	
49					NR				
50									
51	48						(50.0 - 57.0') Topock - Alluvium Deposits; Well graded sand with silt and gravel (SW-SM); brown (10YR 5/3); very fine grained to very coarse grained, angular to subangular; little granules to very large pebbles, angular to subangular; little silt; trace clay; trace mica; coarser clasts composed of metadiorite; dry		
52									
53				Topock - Alluvium Deposits	SW-SM			(52.0 - 54.0') Slow drilling due to tight formation and soils falling out of core during clean out runs	
54									
55							(54.0 - 57.0'); some granules to very large pebbles, angular to subangular; decrease in sand, no clay	(54.0 - 72.0') Drill rods chattering, slow drilling due to tight formation and soils falling out of core during clean out runs	
56	36								
57									
58							(57.0 - 60.0') No recovery (NR)	(57.0 - 60.0') Core bag broke, core lost in hopper	
59	24				NR				
60									

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Date Started:	05/11/2019	Surface Elevation:	N/A	Boring No.: <u>MW-Rd</u>	
Date Completed:	06/04/2019	Northing (NAD83):	N/A		
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	287 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	4-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	E. Ramos / D. O'Mara	Depth to First Water:	90.59 ft bgs		
Drilling Asst:	L. Amaya/ O. Flores	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	G. Jeffers / C. Stewart	Sampling Interval:	Continuous		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
61	24			Topock - Alluvium Deposits	SW-SM		(60.0 - 62.0') Topock - Alluvium Deposits; Well graded sand with silt and gravel (SW-SM); brown (10YR 4/3); very fine grained to very coarse grained, angular to subangular; some granules to very large pebbles, angular to subangular; little silt; trace mica; coarser clasts composed of metadiorite; dry	(54.0 - 72.0') Drill rods chattering, slow drilling due to tight formation and soils falling out of core during clean out runs	(42.0 - 270.0') No water used
62				Topock - Alluvium Deposits	SM		(62.0 - 64.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (10YR 5/3); very fine grained to very coarse grained, angular to subround; some silt; little granules to very large pebbles, angular to subangular; trace clay; trace mica; coarser clasts composed of metadiorite; dry		
63				Topock - Alluvium Deposits	SW		(64.5 - 66.5') Topock - Alluvium Deposits; Well graded sand with gravel (SW); brown (10YR 5/3); very fine grained to very coarse grained, angular to subangular; some granules to very large pebbles, angular to subangular; trace silt; trace clay; trace mica; dry; larger clasts consist of metadiorite and conglomerate		
64				Topock - Alluvium Deposits	SM		(66.5 - 72.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (10YR 5/3) little brown (10YR 4/3); very fine grained to very coarse grained, angular to subround; some granules to very large pebbles, angular to subangular; little silt; trace mica; dry; larger clasts consist of metadiorite and conglomerate		
65	120			Topock - Alluvium Deposits	SM				
66									
67									
68									
69									
70									
71									
72									
73	60			Topock - Alluvium Deposits	SW-SM		(72.0 - 86.0') Topock - Alluvium Deposits; Well graded sand with silt and gravel (SW-SM); brown (10YR 5/3) some brown (10YR 4/3); very fine grained to very coarse grained, angular to subangular; some granules to very large pebbles, angular to subangular; little silt; trace cobbles, angular; trace mica; dry; larger clasts consist of metadiorite and conglomerate, trace oxidized staining	(72.0 - 92.0') Slow drilling due to tight formation and soils falling out of core during clean out runs	
74									
75									
76									
77									
78	108								
79									
80									

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Date Started:	05/11/2019	Surface Elevation:	N/A	Boring No.: <u>MW-Rd</u>	
Date Completed:	06/04/2019	Northing (NAD83):	N/A		
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	287 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	4-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	E. Ramos / D. O'Mara	Depth to First Water:	90.59 ft bgs		
Drilling Asst:	L. Amaya/ O. Flores	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	G. Jeffers / C. Stewart	Sampling Interval:	Continuous		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
81	108			Topock - Alluvium Deposits	SW-SM			(72.0 - 92.0') Slow drilling due to tight formation and soils falling out of core during clean out runs	(42.0 - 270.0') No water used
82									
83									
84									
85	72	No Sieve Samples Collected					(86.0 - 117.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (10YR 5/3); very fine grained to very coarse grained, angular to subround; some granules to very large pebbles, angular to subangular; little silt; trace clay; trace mica; dry; larger clasts consist of metadiorite and conglomerate (87'); decrease in silt, increase in sand		
86									
87									
88									
89	60						(91'); moist; weak cementation		
90									
91									
92									
93	120			Topock - Alluvium Deposits	SM		(92'); some silt; little small to very large pebbles, angular to subangular; wet; no clay, no cementation	(92.0') Approximate depth to water	
94									
95									
96									
97							(94.5'); some small to very large pebbles, angular to subangular; trace clay; weak cementation; increase in silt, decrease in sand		
98									
99									
100									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	05/11/2019	Surface Elevation:	N/A	Boring No.: <u>MW-Rd</u>
Date Completed:	06/04/2019	Northing (NAD83):	N/A	
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	287 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	4-12 inches	Location: PG&E Topock, Needles, California
Driller Name:	E. Ramos / D. O'Mara	Depth to First Water:	90.59 ft bgs	
Drilling Asst:	L. Amaya/ O. Flores	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger:	G. Jeffers / C. Stewart	Sampling Interval:	Continuous	
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
101									(42.0 - 270.0') No water used
102									
103									
104	120								
105									
106									
107									
108									
109				Topock - Alluvium Deposits	SM				
110		No Sieve Samples Collected							
111									
112	120						(112'); pulverized weathered metadiorite boulder fragments		
113							(112.5') brown (10YR 5/3) trace reddish brown (2.5YR 5/4); some granules to very large pebbles, angular to subangular; decrease silt, no cementation, trace mottling		
114									
115									
116							(116'); decrease silt, increase granules and pebbles	(115.0 - 122.0') Soft drilling	
117									
118	60		MW-R-VAS-117-122 (5.8 ppb) 5/14/2019 10:14	Topock - Alluvium Deposits	GM		(117.0 - 128.5') Topock - Alluvium Deposits; Silty gravel with sand (GM); brown (10YR 5/3) little reddish brown (2.5YR 5/4); granules to small cobbles, angular to subangular; some very fine to very coarse grained sand, angular to subround; little silt; trace mica; coarser clasts composed of metadiorite; wet; silt nodules		
119									
120									

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Date Started:	05/11/2019	Surface Elevation:	N/A	Boring No.: <u>MW-Rd</u>
Date Completed:	06/04/2019	Northing (NAD83):	N/A	
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	287 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	4-12 inches	Location: PG&E Topock, Needles, California
Driller Name:	E. Ramos / D. O'Mara	Depth to First Water:	90.59 ft bgs	
Drilling Asst:	L. Amaya/ O. Flores	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger:	G. Jeffers / C. Stewart	Sampling Interval:	Continuous	
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
121	60		MW-R-VAS-117-122 (5.8 ppb) 5/14/2019 10:14					(115.0 - 122.0') Soft drilling	(42.0 - 270.0') No water used
122									
123									
124									
125	60			Topock - Alluvium Deposits	GM		(125'); and very fine to very coarse grained sand, angular to subangular; decrease in granules to cobbles		
126									
127									
128									
129				Topock - Alluvium Deposits	SM		(128.5 - 130.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (10YR 5/3) trace reddish brown (2.5YR 5/4); very fine grained to very coarse grained, angular to subangular; some granules to very large pebbles, angular to subangular; some silt; trace mica; coarser clasts composed of metadiorite; wet		
130		No Sieve Samples Collected							
131									
132	120			Topock - Alluvium Deposits	GM		(130.5 - 137.5') Topock - Alluvium Deposits; Silty gravel with sand (GM); brown (10YR 5/3) trace reddish brown (2.5YR 5/4); granules to small cobbles, angular to subangular; and very fine to very coarse grained sand, angular to subangular; little silt; trace mica; coarser clasts composed of metadiorite; wet; silt nodules		
133									
134									
135									
136									
137									
138	120			Topock - Alluvium Deposits	ML		(137.5 - 138.5') Topock - Alluvium Deposits; Sandy silt with gravel (ML); brown (10YR 5/3); medium plasticity; some granules to very large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subangular; trace mica; coarser clasts composed of metadiorite; wet; soft to medium stiff		
139				Topock - Alluvium Deposits	SM		(138.5 - 153.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (10YR 5/3) trace reddish brown (2.5YR 5/4); very fine grained to very coarse grained, angular to subangular; some granules		
140									





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Date Started:	05/11/2019	Surface Elevation:	N/A	Boring No.: MW-Rd	
Date Completed:	06/04/2019	Northing (NAD83):	N/A		
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	287 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	4-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	E. Ramos / D. O'Mara	Depth to First Water:	90.59 ft bgs		
Drilling Asst:	L. Amaya/ O. Flores	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	G. Jeffers / C. Stewart	Sampling Interval:	Continuous		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
141							to very large pebbles, angular to subangular; little silt; trace mica; coarser clasts composed of metadiorite; wet; interbedded silt and granule to pebble lenses		(42.0 - 270.0') No water used
142							(141'); some silt; decrease in sand, increase in granules and pebbles		
143							(142.5'); little silt; increase in sand, increase in granules and pebbles		
144	120								
145									
146									
147				Topock - Alluvium Deposits	SM				
148									
149							(149'); some silt; decrease in sand		
150		No Sieve Samples Collected							
151									
152	120							(151.0 - 156.0') Cave in prevented sampler from being set at 152 to 157 ft. bgs	
153		MW-R-VAS-151-156 (<0.033 U ppb) 5/15/2019 10:20		Topock - Alluvium Deposits	GM		(153.0 - 157.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); brown (10YR 5/3) little reddish brown (5YR 5/4); granules to very large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subangular; little silt; trace mica; coarser clasts composed of metadiorite; wet; interbedded silt and sand lenses, trace reddish brown (2.5YR 5/4)		
154									
155									
156									
157									
158	120			Topock - Alluvium Deposits	GW		(157.0 - 168.5') Topock - Alluvium Deposits; Well graded gravel with sand (GW); brown (10YR 4/3); granules to very large pebbles, angular to subangular; and very fine to very coarse grained sand, angular to subangular; trace silt; trace mica; coarser clasts composed of metadiorite; wet; silt nodules	(157.0 - 167.0') Soft drilling	
159									
160									

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Date Started:	05/11/2019	Surface Elevation:	N/A	Boring No.: <u>MW-Rd</u>	
Date Completed:	06/04/2019	Northing (NAD83):	N/A		
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	287 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	4-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	E. Ramos / D. O'Mara	Depth to First Water:	90.59 ft bgs		
Drilling Asst:	L. Amaya/ O. Flores	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	G. Jeffers / C. Stewart	Sampling Interval:	Continuous		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid		
161	120	No Sieve Samples Collected		Topock - Alluvium Deposits	GW			(157.0 - 167.0') Soft drilling	(42.0 - 270.0') No water used		
162											
163											
164											
165											
166	120					Topock - Alluvium Deposits	SM		(168.5 - 179.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 4/4); very fine grained to very coarse grained, angular to subangular; some granules to very large pebbles, angular to subangular; little silt; trace mica; coarser clasts composed of metadiorite; wet; interbedded silt and granule to pebble lenses (170'); some silt; trace cobbles, angular to subangular; increase in granules and pebbles, decrease in sand		
167											
168											
169											
170											
171											
172											
173		(173'); pulverized boulder fragments									
174		(174'); increase in silt, decrease in sand									
175											
176	120			Topock - Alluvium Deposits	SW-SM		(177.0 - 179.0') dark yellowish brown (10YR 4/4) some brown (7.5YR 4/3); trace clay; mottled; iron oxide staining; decrease in granules and pebbles, no cobbles				
177											
178											
179											
180				Topock - Alluvium Deposits	SW-SM		(179.0 - 180.0') Topock - Alluvium Deposits; Well graded sand with silt and gravel (SW-SM); dark yellowish brown (10YR 4/4) some brown (7.5YR 4/3); very fine grained to very coarse grained, angular				

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Date Started: 05/11/2019	Surface Elevation: N/A	Boring No.: MW-Rd
Date Completed: 06/04/2019	Northing (NAD83): N/A	
Drilling Co.: Cascade	Easting (NAD83): N/A	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 287 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type: Prosonic Truck Mount	Borehole Diameter: 4-12 inches	Location: PG&E Topock, Needles, California
Driller Name: E. Ramos / D. O'Mara	Depth to First Water: 90.59 ft bgs	
Drilling Asst: L. Amaya/ O. Flores	Sampling Method: 4 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger: G. Jeffers / C. Stewart	Sampling Interval: Continuous	
Editor: Sean McGrane	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
181	120			Topock - Alluvium Deposits	SM		to subangular; some granules to very large pebbles, angular to subangular; little silt; trace cobbles, angular to subangular; trace mica; coarser clasts composed of metadiorite; wet; mottled (180.0 - 181.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (10YR 4/3) little brown (7.5YR 4/3); very fine grained to very coarse grained, angular to subangular; some granules to very large pebbles, angular to subangular; little silt; trace mica; coarser clasts composed of metadiorite; wet; mottled; interbedded silt and granule to pebble lenses (181.0 - 182.0'); some silt; trace clay; iron oxide staining; decrease in sand		(42.0 - 270.0') No water used
182				Topock - Alluvium Deposits	ML		(182.0 - 183.0') Topock - Alluvium Deposits; Sandy silt with gravel (ML); brown (7.5YR 4/3); low plasticity; some granules to very large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subround; trace cobbles, subangular; coarser clasts composed of metadiorite; wet; stiff to very stiff; weak cementation; iron oxide staining; trace weathered granules and pebbles		
183				Topock - Alluvium Deposits	SM		(183.0 - 247.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 4/3) some brown (10YR 5/3); very fine grained to very coarse grained, angular to subangular; some granules to very large pebbles, angular to subangular; some silt; trace cobbles, angular to subangular; trace mica; coarser clasts composed of metadiorite; wet; laminated; weak cementation; little weathered granules and pebbles, interbedded silt and granule to cobble lenses, mottled, (186'); dry; for 0.5 ft. (187'); decrease in silt, increase in granules and pebbles		
184									
185									
186	60	No Sieve Samples Collected		Topock - Alluvium Deposits	SM			(188.0 - 207.0') Drill rod broke off during reaming, was retrieved to continue drilling	
187									
188									
189									
190	60		MW-R-VAS-192-197 (<0.033 U ppb) 5/16/2019 09:55	Topock - Alluvium Deposits	SM		(193'); increase in sand, decrease in silt, no cementation, no lamination		
191									
192									
193									
194	120			Topock - Alluvium Deposits	SM		(198'); increase in silt, decrease in granules and pebbles		
195									
196									
197									
198	120			Topock - Alluvium Deposits	SM				
199									
200									

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Date Started: 05/11/2019	Surface Elevation: N/A	Boring No.: MW-Rd
Date Completed: 06/04/2019	Northing (NAD83): N/A	
Drilling Co.: Cascade	Easting (NAD83): N/A	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 287 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type: Prosonic Truck Mount	Borehole Diameter: 4-12 inches	Location: PG&E Topock, Needles, California
Driller Name: E. Ramos / D. O'Mara	Depth to First Water: 90.59 ft bgs	
Drilling Asst: L. Amaya/ O. Flores	Sampling Method: 4 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger: G. Jeffers / C. Stewart	Sampling Interval: Continuous	
Editor: Sean McGrane	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
201	120						(200'); and silt; decrease in granules to pebbles	(188.0 - 207.0') Drill rod broke off during reaming, was retrieved to continue drilling	(42.0 - 270.0') No water used
202									
203									
204									
205							(205'); some silt; increase in granules and pebbles		
206								(207.0 - 227.0') Soft drilling (10" casing)	
207							(207'); trace clay; decrease in sand		
208									
209									
210									
211	120	No Sieve Samples Collected		Topock - Alluvium Deposits	SM				
212									
213									
214									
215							(215'); some silt; increase in silt, decrease in sand		
216	120								
217							(217'); decrease in silt, increase in sand, increase in granules and pebbles, no clay, silt nodules		
218									
219									
220									

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Date Started: 05/11/2019	Surface Elevation: N/A	Boring No.: MW-Rd
Date Completed: 06/04/2019	Northing (NAD83): N/A	
Drilling Co.: Cascade	Easting (NAD83): N/A	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 287 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type: Prosonic Truck Mount	Borehole Diameter: 4-12 inches	Location: PG&E Topock, Needles, California
Driller Name: E. Ramos / D. O'Mara	Depth to First Water: 90.59 ft bgs	
Drilling Asst: L. Amaya/ O. Flores	Sampling Method: 4 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger: G. Jeffers / C. Stewart	Sampling Interval: Continuous	
Editor: Sean McGrane	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid		
221	120	No Sieve Samples Collected			SM		(225'); little silt; increase in granules and pebbles	(207.0 - 227.0') Soft drilling (10" casing)	(42.0 - 270.0') No water used		
222											
223											
224											
225											
226	60		MW-R-VAS-227-232 (<0.033 U ppb) 5/17/2019 10:05				Topock - Alluvium Deposits			(232') brown (7.5YR 4/4) and reddish brown / moderate brown(5YR 4/4); and granules to very large pebbles, angular to subangular; trace cobbles, angular to subangular; decrease in silt, mottled	(227.0 - 232.0') Picked sample location based on lithology
227											
228											
229											
230											
231	180					(233.5'); pulverized boulder fragments within silt matrix, 1 foot thick	(227.0 - 267.0') Soft drilling (10" casing)				
232											
233											
234											
235											
236											
237											
238											
239											
240											
							(239.5'); some granules to very large pebbles, angular to subangular;				

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Date Started: 05/11/2019	Surface Elevation: N/A	Boring No.: MW-Rd
Date Completed: 06/04/2019	Northing (NAD83): N/A	
Drilling Co.: Cascade	Easting (NAD83): N/A	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 287 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type: Prosonic Truck Mount	Borehole Diameter: 4-12 inches	Location: PG&E Topock, Needles, California
Driller Name: E. Ramos / D. O'Mara	Depth to First Water: 90.59 ft bgs	
Drilling Asst: L. Amaya/ O. Flores	Sampling Method: 4 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger: G. Jeffers / C. Stewart	Sampling Interval: Continuous	
Editor: Sean McGrane	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
241	180			Topock - Alluvium Deposits	SM		trace cobbles, angular to subangular; increase in silt	(227.0 - 267.0') Soft drilling (10" casing)	(42.0 - 270.0') No water used
242							(241'); and granules to very large pebbles, angular to subangular; trace cobbles, angular to subangular; decrease in silt		
243									
244									
245									
246	120	No Sieve Samples Collected		Topock - Alluvium Deposits	GM		(247.0 - 258.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); brown (7.5YR 4/4) and reddish brown / moderate brown(5YR 4/4); granules to small cobbles, angular to subangular; and very fine to very coarse grained sand, angular to subangular; little silt; trace mica; coarser clasts composed of metadiorite; wet; mottled; trace weathered granules to cobbles, silt nodules, interbedded silt and sand lenses		
247									
248									
249									
250									
251									
252									
253									
254									
255									
256	120		MW-R-VAS-255-260 (<0.17 U ppb) 5/29/2019 12:00	Topock - Alluvium Deposits	SM		(256'); 1 foot thick very saturated zone		
257									
258									
259									
260							(258.0 - 261.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 4/4); very fine grained to very coarse grained, angular to subangular; some granules to very large pebbles, angular to subangular; some silt; trace cobbles, angular to subangular; trace mica; coarser clasts composed of metadiorite; wet; trace weathered granules and pebbles, interbedded silt and granule to pebble lenses, gradual increase in silt with depth		


Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	05/11/2019	Surface Elevation:	N/A	Boring No.: <u>MW-Rd</u>	
Date Completed:	06/04/2019	Northing (NAD83):	N/A		
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	287 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	4-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	E. Ramos / D. O'Mara	Depth to First Water:	90.59 ft bgs		
Drilling Asst:	L. Amaya/ O. Flores	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	G. Jeffers / C. Stewart	Sampling Interval:	Continuous		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
261	120			Topock - Alluvium Deposits	SM		(261'); pulverized boulder fragments	(227.0 - 267.0') Soft drilling (10" casing)	(42.0 - 270.0') No water used
262							(261.5 - 274.5') Topock - Weathered Bedrock - conglomerate; Silty sand with gravel (SM); reddish brown / moderate brown(5YR 4/4) trace red / moderate reddish brown(10R 4/6); very fine grained to very coarse grained, angular to subangular; some granules to very large pebbles, angular to subangular; some silt; trace clay; trace mica; coarser clasts composed of metadiorite; wet; weak cementation; interbedded silt and granule to pebble lenses	(247.0 - 274.0') Smooth drilling (10" casing)	
263								(247.0 - 274.0') Smooth drilling (10" casing)	
264									
265	120	No Sieve Samples Collected	MW-R-VAS-269-274 (<0.17 U ppb) 5/30/2019 14:30	Topock - Weathered Bedrock - conglomerate	SM		(267'); increase in silt, no clay	(265.0 - 267.0') Tight formation	(270.0 - 279.0') Formation collapse after pulling 10" casing up 10 ft
266									
267									
268							(268.5'); little silt; trace cobbles, angular to subangular; increase in sand, increase in granules to cobbles	(267.0 - 279.0') Tight and rough drilling (10" casing)	
269									
270				Topock - Competent Bedrock - conglomerate			(270'); weathered metadiorite		(274.0 - 279.0') Tight and rough drilling (10" casing)
271							(271'); increase in sand, increase silt, decrease in granules and pebbles, weathered fractured boulder of metadiorite		
272									
273									
274									
275	60						(274.5 - 283.5') Topock - Competent Bedrock - conglomerate; reddish brown / moderate brown(5YR 4/4); moist to dry; friable		(277.0 - 282.0') Tight formation
276									
277							(277'); dry		
278									
279									
280									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	<u>05/11/2019</u>	Surface Elevation:	<u>N/A</u>	Boring No.: <u>MW-Rd</u>
Date Completed:	<u>06/04/2019</u>	Northing (NAD83):	<u>N/A</u>	
Drilling Co.:	<u>Cascade</u>	Easting (NAD83):	<u>N/A</u>	Client: <u>PG&E</u>
Drilling Method:	<u>Sonic Drilling</u>	Total Depth:	<u>287 ft bgs</u>	Project: <u>Final GW Remedy Phase 1</u>
Drill Rig Type:	<u>Prosonic Truck Mount</u>	Borehole Diameter:	<u>4-12 inches</u>	Location: <u>PG&E Topock, Needles, California</u>
Driller Name:	<u>E. Ramos / D. O'Mara</u>	Depth to First Water:	<u>90.59 ft bgs</u>	
Drilling Asst:	<u>L. Amaya/ O. Flores</u>	Sampling Method:	<u>4 inch x 10 ft Core Barrel</u>	Project Number: <u>RC000753.0051</u>
Logger:	<u>G. Jeffers / C. Stewart</u>	Sampling Interval:	<u>Continuous</u>	
Editor:	<u>Sean McGrane</u>	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid	
281	60	No Sieve Samples Collected		Topock - Competent Bedrock - conglomerate				(277.0 - 282.0') Tight formation		
282										
283	18					NR		(283.5 - 287.0') No recovery (NR); see drilling notes		(282.0 - 287.0') Rough drilling, core fell out of core barrel downhole
284										
285										
286										
287										
End of Boring at 287.0' bgs.										
288										
289										
290										
291										
292										
293										
294										
295										
296										
297										
298										
299										
300										

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started: 06/16/2019	Surface Elevation: N/A	Boring No.: MW-Rs
Date Completed: 06/17/2019	Northing (NAD83): N/A	
Drilling Co.: Cascade	Easting (NAD83): N/A	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 143 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type: Prosonic Truck Mount	Borehole Diameter: 10-12 inches	Location: PG&E Topock, Needles, California
Driller Name: Eddie Ramos	Depth to First Water: 90.27 ft bgs	
Drilling Asst: L. Amaya/ O. Flores	Sampling Method: 4 inch x 10 ft. Core Barrel	Project Number: RC000753.0051
Logger: G. Jeffers / A. Mack	Sampling Interval: Screen Intervals	
Editor: Sean McGrane	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
1							(0.0 - 87.0') (NR); Core not collected or logged, no recovery, see boring log MW-Rd for lithology		(0.0 - 133.0') No water used
2									
3	60								
4									
5									
6									
7									
8	60								
9									
10		No Sieve Samples Collected			NR			(10.0 - 14.0') 12 inch conductor casing dropped and mud tub seal had to be reset	
11									
12									
13									
14	96								
15									
16									
17								(15.0') 12 inch casing dropped to 15 ft. bgs reset mud tub seal, driller indicated formation was collapsing @ 17 ft. bgs, when examining core, ~1 ft boulder was observed, will pay close attention to borehole when installing well	
18									
19	108								
20									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval MW-Rd, VAS collected during drilling MW-Rd

Date Started: 06/16/2019	Surface Elevation: N/A	Boring No.: MW-Rs
Date Completed: 06/17/2019	Northing (NAD83): N/A	
Drilling Co.: Cascade	Easting (NAD83): N/A	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 143 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type: Prosonic Truck Mount	Borehole Diameter: 10-12 inches	Location: PG&E Topock, Needles, California
Driller Name: Eddie Ramos	Depth to First Water: 90.27 ft bgs	
Drilling Asst: L. Amaya/ O. Flores	Sampling Method: 4 inch x 10 ft. Core Barrel	Project Number: RC000753.0051
Logger: G. Jeffers / A. Mack	Sampling Interval: Screen Intervals	
Editor: Sean McGrane	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
21									(0.0 - 133.0') No water used
22									
23									
24	108								
25									
26									
27									
28								(27.0') Tight formation	
29									
30		No Sieve Samples Collected			NR				
31									
32	120								
33									
34									
35									
36									
37									
38	60								
39									
40									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval MW-Rd, VAS collected during drilling MW-Rd

Date Started: 06/16/2019	Surface Elevation: N/A	Boring No.: MW-Rs
Date Completed: 06/17/2019	Northing (NAD83): N/A	
Drilling Co.: Cascade	Easting (NAD83): N/A	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 143 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type: Prosonic Truck Mount	Borehole Diameter: 10-12 inches	Location: PG&E Topock, Needles, California
Driller Name: Eddie Ramos	Depth to First Water: 90.27 ft bgs	Project Number: RC000753.0051
Drilling Asst: L. Amaya/ O. Flores	Sampling Method: 4 inch x 10 ft. Core Barrel	
Logger: G. Jeffers / A. Mack	Sampling Interval: Screen Intervals	
Editor: Sean McGrane	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
41	60								(0.0 - 133.0') No water used
42									
43									
44									
45	60								
46									
47									
48									
49									
50		No Sieve Samples Collected			NR				
51									
52	120								
53									
54									
55									
56									
57									
58	120								
59									
60									



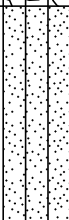

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval MW-Rd, VAS collected during drilling MW-Rd

Date Started: 06/16/2019	Surface Elevation: N/A	Boring No.: MW-Rs
Date Completed: 06/17/2019	Northing (NAD83): N/A	
Drilling Co.: Cascade	Easting (NAD83): N/A	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 143 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type: Prosonic Truck Mount	Borehole Diameter: 10-12 inches	Location: PG&E Topock, Needles, California
Driller Name: Eddie Ramos	Depth to First Water: 90.27 ft bgs	Project Number: RC000753.0051
Drilling Asst: L. Amaya/ O. Flores	Sampling Method: 4 inch x 10 ft. Core Barrel	
Logger: G. Jeffers / A. Mack	Sampling Interval: Screen Intervals	
Editor: Sean McGrane	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
61									(0.0 - 133.0') No water used
62									
63									
64	120								
65									
66									
67									
68									
69									
70		No Sieve Samples Collected			NR				
71									
72	120								
73									
74									
75									
76									
77									
78									
79	120								
80									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval MW-Rd, VAS collected during drilling MW-Rd

Date Started: 06/16/2019	Surface Elevation: N/A	Boring No.: MW-Rs
Date Completed: 06/17/2019	Northing (NAD83): N/A	
Drilling Co.: Cascade	Easting (NAD83): N/A	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 143 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type: Prosonic Truck Mount	Borehole Diameter: 10-12 inches	Location: PG&E Topock, Needles, California
Driller Name: Eddie Ramos	Depth to First Water: 90.27 ft bgs	
Drilling Asst: L. Amaya/ O. Flores	Sampling Method: 4 inch x 10 ft. Core Barrel	Project Number: RC000753.0051
Logger: G. Jeffers / A. Mack	Sampling Interval: Screen Intervals	
Editor: Sean McGrane	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
81	120	No Sieve Samples Collected	MW-R-VAS-92-97 (45 ppb) 5/13/2019 11:44		NR				(0.0 - 133.0') No water used
82									
83									
84									
85									
86									
87									
88	Topock - Alluvium Deposits			SW-SM	(87.0 - 88.5') Topock - Alluvium Deposits; Well graded sand with silt and gravel (SW-SM); brown (7.5YR 4/3); very fine grained to very coarse grained, angular to subround; and granules to very large pebbles, angular to subangular; little silt; trace cobbles, subangular; trace mica; moist; cobble at bottom of formation, coarser clasts consist of grandodiorite and metadiorite				
89	Topock - Alluvium Deposits			GM		(88.5 - 95.5') Topock - Alluvium Deposits; Silty gravel with sand (GM); brown (7.5YR 4/3); granules to small cobbles, angular to subangular; some very fine to very coarse grained sand, angular to subangular; little silt; coarser clasts composed of metadiorite; moist			
90									
91		(91'); some silt; trace clay; decrease in granules to very large pebbles							
92		(93'); increase in granules to small cobbles							
93									
94	Topock - Alluvium Deposits	SM		(95.5 - 98.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 4/3); very fine grained to very coarse grained, angular to subangular; and granules to very large pebbles, angular to subangular; little silt; trace cobbles, angular to subangular; coarser clasts composed of metadiorite; wet					
95									
96									
97									
98									
99	Topock - Alluvium Deposits	SW-SM		(98.5 - 100.5') Topock - Alluvium Deposits; Well graded sand with silt and gravel (SW-SM); brown (7.5YR 4/3); very fine grained to very coarse grained, angular to subangular; and granules to very large pebbles, angular to subround; little silt; wet; larger clasts consist of metadiorite					
100									

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Date Started: 06/16/2019	Surface Elevation: N/A	Boring No.: MW-Rs
Date Completed: 06/17/2019	Northing (NAD83): N/A	
Drilling Co.: Cascade	Easting (NAD83): N/A	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 143 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type: Prosonic Truck Mount	Borehole Diameter: 10-12 inches	Location: PG&E Topock, Needles, California
Driller Name: Eddie Ramos	Depth to First Water: 90.27 ft bgs	
Drilling Asst: L. Amaya/ O. Flores	Sampling Method: 4 inch x 10 ft. Core Barrel	Project Number: RC000753.0051
Logger: G. Jeffers / A. Mack	Sampling Interval: Screen Intervals	
Editor: Sean McGrane	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
101	60			Topock - Alluvium Deposits	SM		(100.5 - 102.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 4/3); very fine grained to very coarse grained, angular to subangular; some granules to very large pebbles, angular to subround; little silt; wet; larger clasts consist of metadiorite		(0.0 - 133.0') No water used
102							(102.0 - 108.0') (NR)	(102.0 - 108.0') Heaving sands	
103									
104									
105									
106									
107									
108									
109				Topock - Alluvium Deposits	SM		(108.0 - 110.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 5/3); very fine grained to very coarse grained, angular to subangular; some granules to large pebbles, angular to subround; little silt; wet; 35,50,15,0		
110							(110.0 - 117.0') (NR); Core not collected or logged, no recovery, see boring log MW-Rd for lithology	(110.0 - 117.0') Core not collected	
111									
112									
113									
114									
115									
116									
117									
118									
119									
120	60		MW-R-VAS-117-122 (5.8 ppb) 5/14/2019 10:14	Topock - Alluvium Deposits	SM		(119.0 - 122.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 4/3); very fine grained to very coarse grained, angular to subangular; some granules to very large pebbles, angular		

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Date Started: 06/16/2019	Surface Elevation: N/A	Boring No.: MW-Rs
Date Completed: 06/17/2019	Northing (NAD83): N/A	
Drilling Co.: Cascade	Easting (NAD83): N/A	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 143 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type: Prosonic Truck Mount	Borehole Diameter: 10-12 inches	Location: PG&E Topock, Needles, California
Driller Name: Eddie Ramos	Depth to First Water: 90.27 ft bgs	
Drilling Asst: L. Amaya/ O. Flores	Sampling Method: 4 inch x 10 ft. Core Barrel	Project Number: RC000753.0051
Logger: G. Jeffers / A. Mack	Sampling Interval: Screen Intervals	
Editor: Sean McGrane	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
121	60		MW-R-VAS-117-122 (5.8 ppb) 5/14/2019 10:14	Topock - Alluvium Deposits	SM		to subround; little silt; trace clay; coarser clasts composed of metadiorite; wet (120') brown (7.5YR 4/3) with dusky red (10R 3/3); trace cobbles, subangular to subround; mottled		(0.0 - 133.0') No water used
122									
123							(122.0 - 129.0') Topock - Alluvium Deposits; Well graded gravel with silt and sand (GW-GM); dark brown (7.5YR 3/3); granules to very large pebbles, subangular to subround; and very fine to very coarse grained sand, angular to subround; little silt; coarser clasts composed of metadiorite; wet		
124									
125									
126				Topock - Alluvium Deposits	GW-GM		(125') dark brown (7.5YR 3/3) with dusky red (10R 3/3); trace cobbles, angular to subangular; mottled		
127	120								
128									
129									
130		No Sieve Samples Collected		Topock - Alluvium Deposits	GM		(129.0 - 132.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); dark brown (7.5YR 3/3); granules to very large pebbles, subangular to subround; little very fine to very coarse grained sand, subangular to subround; little silt; trace cobbles, subangular to subround; coarser clasts composed of metadiorite; wet		
131									
132									
133									
134									
135				Topock - Alluvium Deposits	GW-GM		(132.0 - 137.0') Topock - Alluvium Deposits; Well graded gravel with silt and sand (GW-GM); dark brown (7.5YR 3/3); granules to very large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subangular; little silt; coarser clasts composed of metadiorite; wet (133') dark brown (7.5YR 3/3) with dusky red (10R 3/3); mottled	(133.0 - 143.0') Water used to blow out fines before well install, volume of water used and recovered not documented	
136	132								
137									
138				Topock - Alluvium Deposits	SM		(137.0 - 139.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 4/3); very fine grained to very coarse grained, angular to subround; some granules to large pebbles, angular to subround; little silt; coarser clasts composed of metadiorite; wet; metadiorite boulder fragments in 6" silt matrix at 137.5 ft bgs, 1" clay lens at 138 ft bgs		
139									
140				Topock - Alluvium Deposits	SW-SM		(139.0 - 143.0') Topock - Alluvium Deposits; Well graded sand with silt and gravel (SW-SM); brown (7.5YR 4/3) with dusky red (10R 3/3); very fine grained to very coarse grained, angular to subangular; some		

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval MW-Rd, VAS collected during drilling MW-Rd

Date Started:	06/16/2019	Surface Elevation:	N/A	Boring No.: MW-Rs	
Date Completed:	06/17/2019	Northing (NAD83):	N/A		
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	143 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	10-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Eddie Ramos	Depth to First Water:	90.27 ft bgs		
Drilling Asst:	L. Amaya/ O. Flores	Sampling Method:	4 inch x 10 ft. Core Barrel	Project Number:	RC000753.0051
Logger:	G. Jeffers / A. Mack	Sampling Interval:	Screen Intervals		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
141	132	No Sieve Samples Collected		Topock - Alluvium Deposits	SW-SM		granules to very large pebbles, angular to subround; little silt; coarser clasts composed of metadiorite; wet; mottled	(133.0 - 143.0') Water used to blow out fines before well install, volume of water used and recovered not documented	
142									
143							End of Boring at 143.0' bgs.		
144									
145									
146									
147									
148									
149									
150									
151									
152									
153									
154									
155									
156									
157									
158									
159									
160									

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Boring Log

Sheet: 1 of 7

Date Started:	03/31/2019	Surface Elevation:	N/A	Boring No.: MW-10D
Date Completed:	04/01/2019	Northing (NAD83):	N/A	
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	130 ft bgs	Project: Final GW Remedy Phase I
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	6-12 inches	Location: PG&E Topock, Needles, California
Driller Name:	Steve Vasquez	Depth to First Water:	73.86 ft bgs	
Drilling Asst:	L. Amaya/ O. Flores	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger:	G. Jeffers / G. Willford	Sampling Interval:	Continuous	
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
1	36						(0.0 - 3.0'); Hand augered for utility clearance	(0.0 - 3.0') Boulders and cobbles prevented clearing to 5 ft. bgs	(0.0 - 130.0') No water used
2									
3									
4									
5	48			Topock - Alluvium Deposits	SW		(3.0 - 7.0') Topock - Alluvium Deposits; Well graded sand with gravel (SW); brown (10YR 5/3); very fine grained to very coarse grained, angular to subangular; some granules to very large pebbles, angular to subangular; trace cobbles, angular to subangular; trace boulders; trace silt; trace mica; dry; interbedded gravel lense, larger clasts consist of meta-diorite, boulders fractured		
6									
7									
8							(7.0 - 27.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (10YR 5/3); very fine grained to very coarse grained, angular to subangular; some granules to very large pebbles, angular to subangular; little silt; trace cobbles, angular to subangular; trace boulders; trace clay; trace mica; dry; interbedded gravel lenses, larger clasts consist of meta-diorite, boulders fractured	(7.0 - 17.0') Bag for soil core broke lost part of the core, soil compaction	
9									
10		No sieve samples collected							
11									
12	96								
13				Topock - Alluvium Deposits	SM				
14									
15									
16									
17									
18	72							(17.0 - 23.0') Rough drilling, core barrel cracked.	
19									
20									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	03/31/2019	Surface Elevation:	N/A	Boring No.: MW-10D	
Date Completed:	04/01/2019	Northing (NAD83):	N/A		
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	130 ft bgs	Project:	Final GW Remedy Phase I
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Steve Vasquez	Depth to First Water:	73.86 ft bgs		
Drilling Asst:	L. Amaya/ O. Flores	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	G. Jeffers / G. Willford	Sampling Interval:	Continuous		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
21	72			Topock - Alluvium Deposits	SM			(17.0 - 23.0') Rough drilling, core barrel cracked.	(0.0 - 130.0') No water used
22									
23									
24	48			Topock - Alluvium Deposits	GM		(27.5 - 29.5') Topock - Alluvium Deposits; Silty gravel with sand (GM); brown (7.5YR 4/3); granules to very large pebbles, angular; some very fine to very coarse grained sand, angular to subangular; some silt; trace cobbles, angular; trace mica; dry; weak cementation; larger clasts consist of meta-diorite		
25									
26									
27				Topock - Alluvium Deposits	SM		(29.5 - 63.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 5/3) trace red / moderate reddish brown(10R 4/6); very fine grained to very coarse grained, angular to subangular; some granules to very large pebbles, angular to subangular; some silt; trace cobbles, angular to subangular; trace boulders; trace clay; trace mica; dry; mottled; weak cementation; interbedded gravel lenses, larger clasts consist of meta-diorite, boulders fractured		
28									
29									
30	108	No sieve samples collected		Topock - Alluvium Deposits	SM		(32.5 - 33.5'); increase in silt, decrease in sand		
31									
32									
33				Topock - Alluvium Deposits	SM		(33.5 - 35.5'); trace caliche; decrease in silt, increase in sand		
34									
35									
36	96			Topock - Alluvium Deposits	SM		(35.5 - 39.0'); increase in silt, decrease in sand, decrease granules and pebbles		
37									
38									
39				Topock - Alluvium Deposits	SM		(39.0 - 44.0'); decrease in silt, increase in granules and pebbles		
40									

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SOIL BORING LOG PG&E TOPOCK C:\USERS\MCGRANE\DOCUMENTS\PG&E TOPOCK\DRIFT BORING LOGS\GINT FILES\07.03.19\TOPOCK DATABASE FOR PLOG.GPJ TOPOCK DATA TEMPLATE FOR PLOG.GPJ 07/03/19 11:36

Boring Log

Sheet: 3 of 7

Date Started:	03/31/2019	Surface Elevation:	N/A	Boring No.: MW-10D	
Date Completed:	04/01/2019	Northing (NAD83):	N/A		
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	130 ft bgs	Project:	Final GW Remedy Phase I
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Steve Vasquez	Depth to First Water:	73.86 ft bgs		
Drilling Asst:	L. Amaya/ O. Flores	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	G. Jeffers / G. Willford	Sampling Interval:	Continuous		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
41									(0.0 - 130.0') No water used
42	96								
43									
44									
45							(44.0 - 47.0'); little silt; increase in sand, no cobbles		
46	36								
47									
48							(47.0 - 52.5'); some silt; decrease in sand, increase in granules and pebbles		
49									
50		No sieve samples collected		Topock - Alluvium Deposits	SM				
51	84								
52									
53							(52.5 - 57.0'); decrease in silt, increase sand, increase in granules and pebbles, decrease in clay		
54									
55	36								
56									
57							(57.0 - 58.8'); some silt; moderate cementation; increase in silt, decrease in sand, decrease in granules and pebbles, fractured gravel fragments at 58.5' bgs	(57.0 - 59.0') Rough drilling, drill rods chattering.	
58	24								
59							(58.8'); weak cementation; decrease in silt, increase in granules, fractured gravel fragments at 62.5' bgs		
60	96								

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

SOIL BORING LOG PG&E TOPOCK C:\USERS\MCGRANE\DOCUMENTS\PG&E TOPOCK\DRIFT BORING LOGS\GINT FILES\07.03.19\TOPOCK DATABASE FOR PLOG.GPJ TOPOCK DATA TEMPLATE FOR PLOG.GPJ 07/03/19 11:36

Date Started:	03/31/2019	Surface Elevation:	N/A	Boring No.: MW-10D
Date Completed:	04/01/2019	Northing (NAD83):	N/A	
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	130 ft bgs	Project: Final GW Remedy Phase I
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	6-12 inches	Location: PG&E Topock, Needles, California
Driller Name:	Steve Vasquez	Depth to First Water:	73.86 ft bgs	
Drilling Asst:	L. Amaya/ O. Flores	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger:	G. Jeffers / G. Willford	Sampling Interval:	Continuous	
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
61	96			Topock - Alluvium Deposits	SM				(0.0 - 130.0') No water used
62									
63				Topock - Alluvium Deposits	ML		(63.0 - 64.5') Topock - Alluvium Deposits; Sandy silt with gravel (ML); brown (7.5YR 5/4); no plasticity; some granules to very large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subangular; trace mica; dry; medium stiff to stiff; weak cementation; larger clasts consist of meta-diorite		
64	108	No sieve samples collected					(64.5 - 74.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 5/3) trace dusky red / dark reddish brown(10R 3/4); very fine grained to very coarse grained, angular to subangular; some granules to very large pebbles, angular; some silt; trace cobbles, angular; trace caliche; trace mica; dry; mottled; weak cementation; larger clasts consist of meta-diorite, interbedded silt lenses, fractured gravel fragments at 71.5' and 73' bgs		
65									
66									
67									
68									
69				Topock - Alluvium Deposits	SM				
70	12								
71									
72									
73	120	No samples collected MW-10 screened across interval							
74				Topock - Alluvium Deposits	ML		(74.0 - 75.0') Topock - Alluvium Deposits; Sandy silt with gravel (ML); brown (7.5YR 5/4); low plasticity, no dilatency; some small to large pebbles, angular; some very fine to very coarse grained sand, angular to subangular; trace mica; moist; stiff to very stiff; weak cementation; larger clasts consist of meta-diorite		
75									
76				Topock - Alluvium Deposits	SM		(75.0 - 77.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 5/3) trace dusky red / dark reddish brown(10R 3/4); very fine grained to very coarse grained, angular to subangular; some granules to very large pebbles, angular; some silt; trace cobbles, angular; trace mica; moist; mottled; larger clasts consist of metadiorite, interbedded silt and silty gravel lenses, fractured gravel fragments at 76.5' bgs		
77							(77.0 - 81.5') Topock - Alluvium Deposits; Silty gravel with sand (GM); brown (10YR 5/3); granules to very large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subround; some silt; wet; larger clast consist of metadiorite, interbedded silt, silty sand and silty gravel lenses	(77.0 - 77.0') Approximate depth to water	
78				Topock - Alluvium Deposits	GM				
79									
80									






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Date Started:	03/31/2019	Surface Elevation:	N/A	Boring No.: MW-10D
Date Completed:	04/01/2019	Northing (NAD83):	N/A	
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	130 ft bgs	Project: Final GW Remedy Phase I
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	6-12 inches	Location: PG&E Topock, Needles, California
Driller Name:	Steve Vasquez	Depth to First Water:	73.86 ft bgs	
Drilling Asst:	L. Amaya/ O. Flores	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger:	G. Jeffers / G. Willford	Sampling Interval:	Continuous	
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
81				Topock - Alluvium Deposits	GM		(81'); little silt; increase sand and gravel		(0.0 - 130.0') No water used
82							(81.5 - 96.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 4/4); very fine grained to very coarse grained, angular to subround; some granules to very large pebbles, angular to subangular; some silt; trace cobbles, subangular; trace mica; wet; larger clast consist of metadiorite, interbedded silt, silty sand and silty gravel lenses, weathered gravel		
83	120								
84									
85									
86									
87									
88									
89				Topock - Alluvium Deposits	SM				
90		No sieve samples collected	No samples collected MW-10 screened across interval						
91									
92	120								
93									
94									
95									
96									
97									
98				Topock - Alluvium Deposits	GM		(96.5 - 104.5') Topock - Alluvium Deposits; Silty gravel with sand (GM); brown (7.5YR 4/3) trace brown (7.5YR 4/4); granules to very large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subround; little silt; trace mica; wet; mottled; larger clasts consist of metadiorite, interbedded silt and silty sand lenses, weathered gravel		
99	120								
100									

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Date Started:	03/31/2019	Surface Elevation:	N/A	Boring No.: MW-10D
Date Completed:	04/01/2019	Northing (NAD83):	N/A	
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	130 ft bgs	Project: Final GW Remedy Phase I
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	6-12 inches	Location: PG&E Topock, Needles, California
Driller Name:	Steve Vasquez	Depth to First Water:	73.86 ft bgs	
Drilling Asst:	L. Amaya/ O. Flores	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger:	G. Jeffers / G. Willford	Sampling Interval:	Continuous	
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	




Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid		
101	120		No samples collected MW-10 screened across interval	Topock - Alluvium Deposits	GM				(0.0 - 130.0') No water used		
102											
103				Topock - Alluvium Deposits	SM		(104.5 - 107.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 4/4) little very dark gray (7.5YR 3/1); very fine grained to very coarse grained, angular to subangular; some granules to very large pebbles, angular to subangular; some silt; trace cobbles, angular to subangular; trace mica; trace organics; wet; mottled; larger clasts consist of metadiorite, interbedded silty gravel, silt nodules				
104											
105	60	No sieve samples collected	MW-10D-VAS-107-112 (96 ppb) 4/1/2019 14:32	Topock - Alluvium Deposits	GM		(107.0 - 115.5') Topock - Alluvium Deposits; Silty gravel with sand (GM); brown (7.5YR 4/4) and very dark gray (7.5YR 3/1); granules to small cobbles, angular to subangular; some very fine to very coarse grained sand, angular to subround; some silt; trace mica; little organics; wet; mottled; larger clasts consist of metadiorite, interbedded silt and sily sand lenses, trace silt nodules, trace reddish brown 5YR 4/4				
106											
107											
108											
109	174			Topock - Alluvium Deposits	SM		(115.5 - 116.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (5YR 5/4); very fine grained to very coarse grained, angular to subangular; some granules to very large pebbles, angular; some silt; trace cobbles, angular to subangular; little mica; wet; iron oxide staining; larger clasts consist of metadiorite, trace weathered rock				
110											
111				Topock - Alluvium Deposits	GM		(116.5 - 121.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); very dark gray (7.5YR 3/1) some brown (7.5YR 5/4); granules to very large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subround; some silt; trace cobbles, angular to subangular; trace mica; little organics; wet; mottled; iron oxide staining; larger clasts consist of metadiorite, interbedded silt and sily sand lenses, trace silt nodules, trace 5 YR 4/4 reddish brown				
112											
113											
114											
115											
116											
117											
118											
119											
120											

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Boring Log

Sheet: 7 of 7

Date Started:	03/31/2019	Surface Elevation:	N/A	Boring No.: MW-10D
Date Completed:	04/01/2019	Northing (NAD83):	N/A	
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	130 ft bgs	Project: Final GW Remedy Phase I
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	6-12 inches	Location: PG&E Topock, Needles, California
Driller Name:	Steve Vasquez	Depth to First Water:	73.86 ft bgs	
Drilling Asst:	L. Amaya/ O. Flores	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger:	G. Jeffers / G. Willford	Sampling Interval:	Continuous	
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
121	174	No sieve samples collected	MW-10D-VAS-118-123 (190 ppb) 4/2/2019 12:05	Topock - Alluvium Deposits	GM		(121.0 - 123.0') Topock - Alluvium Deposits; Sandy silt with gravel (ML); reddish brown (5YR 4/3) and very dark gray (5YR 3/1); low plasticity; some very fine to very coarse grained sand, angular to subangular; little granules to very large pebbles, angular to subangular; trace mica; trace organics; moist to wet; stiff to very stiff; mottled; larger clasts consist of metadiorite		(0.0 - 130.0') No water used
122				Topock - Alluvium Deposits	ML				
123									
124									
125									
126	36	No sieve samples collected		Topock - Weathered Bedrock - conglomerate	ML		(123.0 - 127.0') Topock - Weathered Bedrock - conglomerate; Sandy silt with gravel (ML); reddish brown (2.5YR 4/3) little red (2.5YR 5/6); no plasticity, no dilatancy; some very fine to very coarse grained sand, angular to subangular; little granules to very large pebbles, angular to subangular; trace mica; moist; stiff to very stiff; mottled; weak cementation; larger clasts consist of metadiorite		(127.0 - 130.0') Rough drilling, bedrock encountered at 127 ft. bgs
127									
128									
129									
130									
131							End of Boring at 130.0' bgs.		
132									
133									
134									
135									
136									
137									
138									
139									
140									

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Date Started:	03/31/2019	Surface Elevation:	N/A	Well ID: MW-10D
Date Completed:	04/01/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	N/A	Project: Final GW Remedy Phase I
Driller Name:	Steve Vasquez	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	L. Amaya/ O. Flores	Borehole Diameter:	6-12 inches	
Logger:	G. Jeffers / G. Willford	Water Level Start:	73.86 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	4/11/2019	
Total Depth:	130 ft bgs	Well Completion:	<input type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
1					(0.0 - 108.1') 2" PVC Sch 80 Casing		
2							
3							
4		Topock - Alluvium Deposits	SW				
5							
6							
7							
8							
9							
10							
11							
12					(3.0 - 46.0') Portland Cement 5% Bentonite		(3.0 - 46.0') 82 gallons (78%) Note: Type I, Type II, Type V with Hydrogel.
13		Topock - Alluvium Deposits	SM			(3.0 - 46.0') 46 gallons	
14							
15							
16							
17							
18							
19							
20							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, NR = no recovery, blue water table symbol represents depth to water measured post development

Date Started:	03/31/2019	Surface Elevation:	N/A	Well ID: MW-10D
Date Completed:	04/01/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	N/A	Project: Final GW Remedy Phase I
Driller Name:	Steve Vasquez	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	L. Amaya/ O. Flores	Borehole Diameter:	6-12 inches	
Logger:	G. Jeffers / G. Willford	Water Level Start:	73.86 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	4/11/2019	
Total Depth:	130 ft bgs	Well Completion:	<input type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
21					(0.0 - 108.1') 2" PVC Sch 80 Casing		
22							
23							
24		Topock - Alluvium Deposits	SM				
25					(24.5 - 25.5') Centralizer		
26							
27							
28		Topock - Alluvium Deposits	GM				
29							
30					(3.0 - 46.0') Portland Cement 5% Bentonite	(3.0 - 46.0') 46 gallons	(3.0 - 46.0') 82 gallons (78%) Note: Type I, Type II, Type V with Hydrogel.
31							
32							
33							
34							
35		Topock - Alluvium Deposits	SM				
36							
37							
38							
39							
40							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, NR = no recovery, blue water table symbol represents depth to water measured post development

Date Started:	03/31/2019	Surface Elevation:	N/A	Well ID: MW-10D
Date Completed:	04/01/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	N/A	Project: Final GW Remedy Phase I
Driller Name:	Steve Vasquez	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	L. Amaya/ O. Flores	Borehole Diameter:	6-12 inches	
Logger:	G. Jeffers / G. Willford	Water Level Start:	73.86 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	4/11/2019	
Total Depth:	130 ft bgs	Well Completion:	<input type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
41					(0.0 - 108.1') 2" PVC Sch 80 Casing		
42							
43					(3.0 - 46.0') Portland Cement 5% Bentonite	(3.0 - 46.0') 46 gallons	(3.0 - 46.0') 82 gallons (78%) Note: Type I, Type II, Type V with Hydrogel.
44							
45							
46							
47							
48							
49							
50		Topock - Alluvium Deposits	SM		(3.0 - 112.0') 6" Borehole		
51							
52							
53					(46.0 - 101.5') Portland Cement 5% Bentonite	(46.0 - 101.5') 72.1 gallons	(46.0 - 101.5') 190 gallons (164%) Note: Type I, Type II, Type V with Hydrogel, grout settled to 46 ft bgs 4.4.2019.
54							
55							
56							
57							
58							
59							
60							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, NR = no recovery, blue water table symbol represents depth to water measured post development

Date Started:	03/31/2019	Surface Elevation:	N/A	Well ID: MW-10D
Date Completed:	04/01/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	N/A	Project: Final GW Remedy Phase I
Driller Name:	Steve Vasquez	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	L. Amaya/ O. Flores	Borehole Diameter:	6-12 inches	
Logger:	G. Jeffers / G. Willford	Water Level Start:	73.86 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	4/11/2019	
Total Depth:	130 ft bgs	Well Completion:	<input type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
61		Topock - Alluvium Deposits	SM		(0.0 - 108.1') 2" PVC Sch 80 Casing		
62							
63		Topock - Alluvium Deposits	ML				
64							
65		Topock - Alluvium Deposits	SM				
66							
67							
68							
69							
70					(46.0 - 101.5') Portland Cement 5% Bentonite	(3.0 - 112.0') 6" Borehole	(46.0 - 101.5') 72.1 gallons
71							
72							
73							
74		Topock - Alluvium Deposits	ML				
75					(74.5 - 75.5') Centralizer		
76		Topock - Alluvium Deposits	SM				
77							
78	No samples collected MW-10 screened across interval	Topock - Alluvium Deposits	GM				(46.0 - 101.5') 190 gallons (164%) Note: Type I, Type II, Type V with Hydrogel, grout settled to 46 ft bgs 4.4.2019.
79							
80							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, NR = no recovery, blue water table symbol represents depth to water measured post development

Date Started: 03/31/2019	Surface Elevation: N/A	Well ID: MW-10D
Date Completed: 04/01/2019	Shallow Well Elevation: N/A	
Drilling Co.: Cascade	Deep Well Elevation: N/A	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): N/A	Project: Final GW Remedy Phase I
Driller Name: Steve Vasquez	Easting (NAD83): N/A	Location: PG&E Topock, Needles, California
Drilling Asst: L. Amaya/ O. Flores	Borehole Diameter: 6-12 inches	
Logger: G. Jeffers / G. Willford	Water Level Start: 73.86 ft bgs	Project Number: RC000753.0051
Editor: Sean McGrane	Development End Date: 4/11/2019	
Total Depth: 130 ft bgs	Well Completion: <input type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
81		Topock - Alluvium Deposits	GM		(0.0 - 108.1') 2" PVC Sch 80 Casing		
82							
83							
84							
85							
86							
87							
88							
89		Topock - Alluvium Deposits	SM				
90	No samples collected MW-10 screened across interval				(46.0 - 101.5') Portland Cement 5% Bentonite		
91					(3.0 - 112.0') 6" Borehole	(46.0 - 101.5') 72.1 gallons	(46.0 - 101.5') 190 gallons (164%) Note: Type I, Type II, Type V with Hydrogel, grout settled to 46 ft bgs 4.4.2019.
92							
93							
94							
95							
96							
97							
98		Topock - Alluvium Deposits	GM				
99							
100							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, NR = no recovery, blue water table symbol represents depth to water measured post development

Date Started: 03/31/2019	Surface Elevation: N/A	Well ID: MW-10D
Date Completed: 04/01/2019	Shallow Well Elevation: N/A	
Drilling Co.: Cascade	Deep Well Elevation: N/A	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): N/A	Project: Final GW Remedy Phase I
Driller Name: Steve Vasquez	Easting (NAD83): N/A	Location: PG&E Topock, Needles, California
Drilling Asst: L. Amaya/ O. Flores	Borehole Diameter: 6-12 inches	
Logger: G. Jeffers / G. Willford	Water Level Start: 73.86 ft bgs	Project Number: RC000753.0051
Editor: Sean McGrane	Development End Date: 4/11/2019	
Total Depth: 130 ft bgs	Well Completion: <input type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
101	No samples collected MW-10 screened across interval	Topock - Alluvium Deposits	GM		(0.0 - 108.1') 2" PVC Sch 80 Casing (46.0 - 101.5') Portland Cement 5% Bentonite	(46.0 - 101.5') 72.1 gallons	(46.0 - 101.5') 190 gallons (164%) Note: Type I, Type II, Type V with Hydrogel, grout settled to 46 ft bgs 4.4.2019.
102					(101.5 - 105.0') Bentonite seal chips	(101.5 - 105.0') 0.85 bags	(101.5 - 105.0') 1 bags (18%) Note: Enviroplug 3/8"
103		Topock - Alluvium Deposits	SM		(3.0 - 112.0') 6" Borehole		
104					(108.1 - 123.1') 2" Sch 80 PVC (20-slot) Screen		
105	MW-10D-VAS-107-112 (96 ppb) 4/1/2019 14:32	Topock - Alluvium Deposits	GM		(105.0 - 127.0') Cemex #3 MESH (8x10)	(105.0 - 127.0') 7.8 bags	(105.0 - 127.0') 7.4 bags (-5%) Note: Lapis Lustre Sand
106					(112.0 - 130.0') 6" Borehole		
107							
108							
109	MW-10D-VAS-118-123 (190 ppb) 4/2/2019 12:05	Topock - Alluvium Deposits	GM				
110							
111							
112							

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Date Started:	03/31/2019	Surface Elevation:	N/A	Well ID: MW-10D
Date Completed:	04/01/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	N/A	Project: Final GW Remedy Phase I
Driller Name:	Steve Vasquez	Easting (NAD83):	N/A	Location: PG&E Topock, Needles, California
Drilling Asst:	L. Amaya/ O. Flores	Borehole Diameter:	6-12 inches	
Logger:	G. Jeffers / G. Willford	Water Level Start:	73.86 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	4/11/2019	
Total Depth:	130 ft bgs	Well Completion:	<input type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction		Calculated Material Volumes	Material Volumes Installed
121	MW-10D-VAS-118-123 (190 ppb) 4/2/2019 12:05	Topock - Alluvium Deposits	GM		(108.1 - 123.1') 2" Sch 80 PVC (20-slot) Screen			
122		Topock - Alluvium Deposits	ML					
123		Topock - Weathered Bedrock - conglomerate	ML		(105.0 - 127.0') Cemex #3 MESH (123.8' x 124.5') Centralizer	(112.0 - 130.0') 6" Borehole	(105.0 - 127.0') 7.8 bags	(105.0 - 127.0') 7.4 bags (-5%) Note: Lapis Lustre Sand
124					(123.1 - 125.5') Sump and End Cap			
125		Topock - Competent Bedrock - conglomerate			(127.0 - 130.0') Bentonite Chips		(127.0 - 130.0') 0.8 bags	(127.0 - 130.0') 0.75 bags (-6%) Note: Enviroplug 3/8"
126								
127								
128								
129								
130					End of Boring at 130.0' bgs.			
131								
132								
133								
134								
135								
136								
137								
138								
139								
140								

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Date Started: 12/16/2018	Surface Elevation: 529.6 ft amsl	Well ID: MW-L-90, MW-L-180
Date Completed: 04/09/2018	Shallow Well Elevation: 529.2 ft amsl	
Drilling Co.: Cascade	Deep Well Elevation: 529.1 ft amsl	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): 2102862.2	Project: Final Groundwater Remedy Phase
Driller Name: Dan O'Mara	Easting (NAD83): 7615260.4	Location: 1
Drilling Asst: E. Huellmantel / T. Wolfe	Borehole Diameter: 10-12 inches	PG&E Topock, Needles, California
Logger: Michael Andrews	Water Level Start: 74.65 ft bgs	Project Number: RC000753.0051
Editor: Sean McGrane	Development End Date: 3/29/2019	
Total Depth: 184 ft bgs	Well Completion: <input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
1					(0.0 - 1.0') Concrete Pad (0.5 - 70.0') 2" PVC Sch 40 Casing (0.6 - 160.0') 2" PVC Sch 80 Casing		(0.0 - 1.0') 20 bags (%) Note: 3.5 x 3.5 ft concrete pad with 18" dia lockable vault, King Kon-Crete 4000 PSI
2					(2.0 - 3.0') Portland Cement 6% Bentonite	(2.0 - 3.0') 5.5 gallons	(2.0 - 3.0') 8 gallons (45%) Note: Topped off with Type I, II, and V with Hydrogel on 4/1/19.
3					(3.0 - 8.0') Portland Cement 6% Bentonite	(3.0 - 8.0') 26.6 gallons	(3.0 - 8.0') 30 gallons (13%) Note: Type I, II, and V with Hydrogel
4					(0.0 - 7.0') 12" Borehole		
5							
6							
7							
8							
9							
10							
11							
12							
13					(8.0 - 18.0') Bentonite seal chips	(8.0 - 18.0') 8.14 bags	(8.0 - 18.0') 25 bags (207%) Note: Chips used to fill large void, chips hydrated for 1 hour.
14					(7.0 - 184.0') 10" Borehole		
15							
16							
17							
18							
19					(18.0 - 65.0') Portland Cement 6% Bentonite	(18.0 - 65.0') 206.1 gallons	(18.0 - 65.0') 700 gallons (240%) Note: Type I, II, and V with Hydrogel
20							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = No Recovery, blue water table symbol represents depth to water measured post development Note: water samples were collected from MW-Ld borehole.

Date Started:	12/16/2018	Surface Elevation:	529.6 ft amsl	Well ID: MW-L-90, MW-L-180	
Date Completed:	04/09/2018	Shallow Well Elevation:	529.2 ft amsl		
Drilling Co.:	Cascade	Deep Well Elevation:	529.1 ft amsl	Client:	PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	2102862.2	Project:	Final Groundwater Remedy Phase
Driller Name:	Dan O'Mara	Easting (NAD83):	7615260.4	Location:	1
Drilling Asst:	E. Huellmantel / T. Wolfe	Borehole Diameter:	10-12 inches	PG&E Topock, Needles, California	
Logger:	Michael Andrews	Water Level Start:	74.65 ft bgs	Project Number: RC000753.0051	
Editor:	Sean McGrane	Development End Date:	3/29/2019		
Total Depth:	184 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up		

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
21					(0.5 - 70.0') 2" PVC Sch 40 Casing		
22							
23							
24							
25							
26							
27							
28							
29							
30					(18.0 - 65.0') Portland Cement 6% Bentonite	(18.0 - 65.0') 206.1 gallons	(18.0 - 65.0') 700 gallons (240%) Note: Type I, II, and V with Hydrogel
31							
32					(31.5 - 32.5') Centralizer		
33							
34							
35							
36							
37							
38							
39							
40							

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Date Started: 12/16/2018	Surface Elevation: 529.6 ft amsl	Well ID: MW-L-90, MW-L-180
Date Completed: 04/09/2018	Shallow Well Elevation: 529.2 ft amsl	
Drilling Co.: Cascade	Deep Well Elevation: 529.1 ft amsl	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): 2102862.2	Project: Final Groundwater Remedy Phase
Driller Name: Dan O'Mara	Easting (NAD83): 7615260.4	Location: 1
Drilling Asst: E. Huellmantel / T. Wolfe	Borehole Diameter: 10-12 inches	PG&E Topock, Needles, California
Logger: Michael Andrews	Water Level Start: 74.65 ft bgs	Project Number: RC000753.0051
Editor: Sean McGrane	Development End Date: 3/29/2019	
Total Depth: 184 ft bgs	Well Completion: <input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
41					(0.5 - 70.0') 2" PVC Sch 40 Casing		
42							
43							
44							
45							
46							
47							
48							
49							
50					(18.0 - 65.0') Portland Cement 6% Bentonite	(7.0 - 184.0') 10" Borehole	(18.0 - 65.0') 206.1 gallons
51							(18.0 - 65.0') 700 gallons (240%) Note: Type I, II, and V with Hydrogel
52							
53							
54							
55							
56							
57							
58							
59							
60							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = No Recovery, blue water table symbol represents depth to water measured post development Note: water samples were collected from MW-Ld borehole.

Date Started: 12/16/2018	Surface Elevation: 529.6 ft amsl	Well ID: MW-L-90, MW-L-180
Date Completed: 04/09/2018	Shallow Well Elevation: 529.2 ft amsl	
Drilling Co.: Cascade	Deep Well Elevation: 529.1 ft amsl	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): 2102862.2	Project: Final Groundwater Remedy Phase
Driller Name: Dan O'Mara	Easting (NAD83): 7615260.4	Location: 1
Drilling Asst: E. Huellmantel / T. Wolfe	Borehole Diameter: 10-12 inches	PG&E Topock, Needles, California
Logger: Michael Andrews	Water Level Start: 74.65 ft bgs	Project Number: RC000753.0051
Editor: Sean McGrane	Development End Date: 3/29/2019	
Total Depth: 184 ft bgs	Well Completion: <input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
61					(0.5 - 70.0') 2" PVC Sch 40 Casing		
62							
63					(18.0 - 65.0') Portland Cement 6% Bentonite	(18.0 - 65.0') 206.1 gallons	(18.0 - 65.0') 700 gallons (240%) Note: Type I, II, and V with Hydrogel
64							
65							
66					(65.0 - 67.0') Bentonite seal chips	(65.0 - 67.0') 1.63 bags	(65.0 - 67.0') 3 bags (84%) Note: Puregold Medium Chips
67		Topock - Fluvial Deposits	SM				
68							
69							
70		Topock - Fluvial Deposits	SW-SM				
71					(70.0 - 90.0') 2" Sch 40 PVC (20-slot) Screen		
72							
73							
74					(67.0 - 94.0') Cemex #3 MESH (8x10)	(67.0 - 94.0') 31.6 bags	(67.0 - 94.0') 41 bags (30%) Note: Lapis Lustre Sand
75		Topock - Fluvial Deposits	SM				
76							
77							
78	MW-L-VAS-76-81 (31 ppb) 10/6/2018 16:34						
79		Topock - Fluvial Deposits	GW-GM				
80							

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Date Started: 12/16/2018	Surface Elevation: 529.6 ft amsl	Well ID: MW-L-90, MW-L-180
Date Completed: 04/09/2018	Shallow Well Elevation: 529.2 ft amsl	
Drilling Co.: Cascade	Deep Well Elevation: 529.1 ft amsl	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): 2102862.2	Project: Final Groundwater Remedy Phase
Driller Name: Dan O'Mara	Easting (NAD83): 7615260.4	Location: 1
Drilling Asst: E. Huellmantel / T. Wolfe	Borehole Diameter: 10-12 inches	PG&E Topock, Needles, California
Logger: Michael Andrews	Water Level Start: 74.65 ft bgs	Project Number: RC000753.0051
Editor: Sean McGrane	Development End Date: 3/29/2019	
Total Depth: 184 ft bgs	Well Completion: <input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
81		Topock - Fluvial Deposits	GW-GM		(70.0 - 90.0') 2" Sch 40 PVC (20-slot) Screen		
82							
83		Topock - Alluvium Deposits	NR				
84							
85							
86							
87					(67.0 - 94.0') Cemex #3 MESH (8x10)	(67.0 - 94.0') 31.6 bags	(67.0 - 94.0') 41 bags (30%) Note: Lapis Lustre Sand
88							
89							
90		Topock - Alluvium Deposits	SM		(90.5 - 91.5') Centralizer		
91							
92					(90.0 - 92.3') Sump and End Cap		
93							
94							
95		Topock - Alluvium Deposits	SM				
96							
97					(94.0 - 158.0') Bentonite seal pellets	(94.0 - 158.0') 62.3 buckets	(94.0 - 158.0') 61 buckets (-2%) Note: Pel-Plug (TR30) 3/8"
98			NR				
99							
100							

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Date Started: 12/16/2018	Surface Elevation: 529.6 ft amsl	Well ID: MW-L-90, MW-L-180
Date Completed: 04/09/2018	Shallow Well Elevation: 529.2 ft amsl	
Drilling Co.: Cascade	Deep Well Elevation: 529.1 ft amsl	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): 2102862.2	Project: Final Groundwater Remedy Phase
Driller Name: Dan O'Mara	Easting (NAD83): 7615260.4	Location: 1
Drilling Asst: E. Huellmantel / T. Wolfe	Borehole Diameter: 10-12 inches	PG&E Topock, Needles, California
Logger: Michael Andrews	Water Level Start: 74.65 ft bgs	Project Number: RC000753.0051
Editor: Sean McGrane	Development End Date: 3/29/2019	
Total Depth: 184 ft bgs	Well Completion: <input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
101					(0.6 - 160.0') 2" PVC Sch 80 Casing		
102							
103							
104							
105							
106							
107							
108	MW-L-VAS-106-111 (0.84 ppb) 10/9/2018 11:46						
109							
110			NR		(94.0 - 158.0') Bentonite seal pellets	(7.0 - 184.0') 10" Borehole	(94.0 - 158.0') 61 buckets (-2%) Note: Pel-Plug (TR30) 3/8"
111							
112							
113							
114							
115							
116							
117							
118							
119							
120							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = No Recovery, blue water table symbol represents depth to water measured post development Note: water samples were collected from MW-Ld borehole.

Date Started: 12/16/2018	Surface Elevation: 529.6 ft amsl	Well ID: MW-L-90, MW-L-180
Date Completed: 04/09/2018	Shallow Well Elevation: 529.2 ft amsl	
Drilling Co.: Cascade	Deep Well Elevation: 529.1 ft amsl	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): 2102862.2	Project: Final Groundwater Remedy Phase
Driller Name: Dan O'Mara	Easting (NAD83): 7615260.4	Location: 1
Drilling Asst: E. Huellmantel / T. Wolfe	Borehole Diameter: 10-12 inches	PG&E Topock, Needles, California
Logger: Michael Andrews	Water Level Start: 74.65 ft bgs	Project Number: RC000753.0051
Editor: Sean McGrane	Development End Date: 3/29/2019	
Total Depth: 184 ft bgs	Well Completion: <input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
121					(0.6 - 160.0') 2" PVC Sch 80 Casing		
122							
123							
124							
125							
126							
127							
128							
129							
130			NR		(94.0 - 158.0') Bentonite seal pellets	(94.0 - 158.0') 62.3 buckets	(94.0 - 158.0') 61 buckets (-2%) Note: Pel-Plug (TR30) 3/8"
131							
132					(131.5 - 132.5') Centralizer		
133							
134							
135							
136							
137							
138							
139							
140							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = No Recovery, blue water table symbol represents depth to water measured post development Note: water samples were collected from MW-Ld borehole.

Date Started: 12/16/2018	Surface Elevation: 529.6 ft amsl	Well ID: MW-L-90, MW-L-180
Date Completed: 04/09/2018	Shallow Well Elevation: 529.2 ft amsl	
Drilling Co.: Cascade	Deep Well Elevation: 529.1 ft amsl	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): 2102862.2	Project: Final Groundwater Remedy Phase
Driller Name: Dan O'Mara	Easting (NAD83): 7615260.4	Location: 1
Drilling Asst: E. Huellmantel / T. Wolfe	Borehole Diameter: 10-12 inches	PG&E Topock, Needles, California
Logger: Michael Andrews	Water Level Start: 74.65 ft bgs	Project Number: RC000753.0051
Editor: Sean McGrane	Development End Date: 3/29/2019	
Total Depth: 184 ft bgs	Well Completion: <input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
141	MW-L-VAS-141-146 (<0.033 U ppb) 10/10/2018 14:58				(0.6 - 160.0') 2" PVC Sch 80 Casing		
142							
143							
144							
145							
146							
147		NR			(94.0 - 158.0') Bentonite seal pellets	(94.0 - 158.0') 62.3 buckets	(94.0 - 158.0') 61 buckets (-2%) Note: Pel-Plug (TR30) 3/8"
148							
149							
150							
151							
152							
153							
154							
155							
156							
157		Topock - Alluvium Deposits	GM		(158.0 - 180.0') Cemex #3 MESH (8x10)	(158.0 - 180.0') 31.7 bags	(158.0 - 180.0') 31 bags (-2%) Note: Lapis Lustre Sand
158							
159							
160							

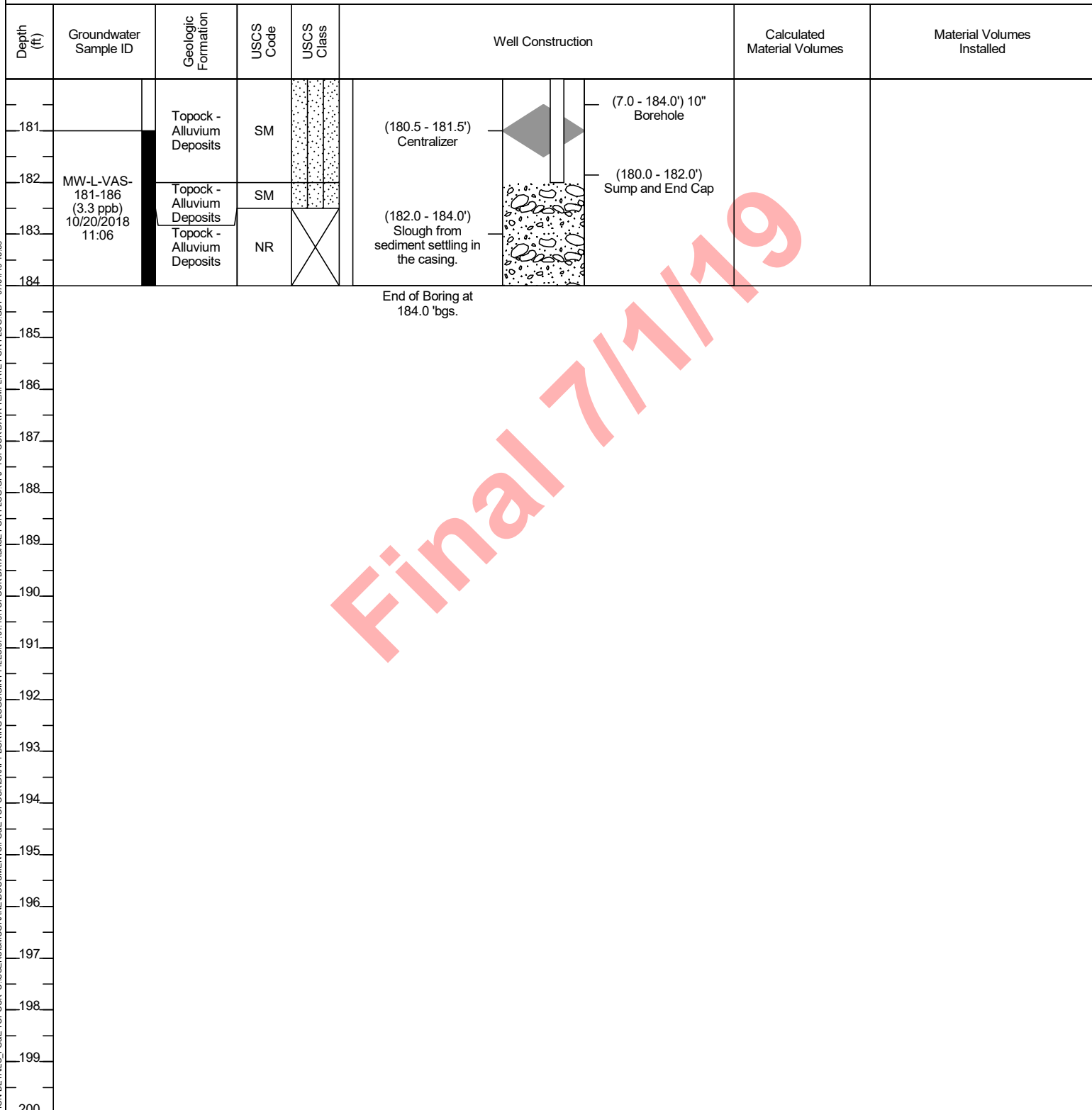
Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = No Recovery, blue water table symbol represents depth to water measured post development Note: water samples were collected from MW-Ld borehole.

Date Started: 12/16/2018	Surface Elevation: 529.6 ft amsl	Well ID: MW-L-90, MW-L-180
Date Completed: 04/09/2018	Shallow Well Elevation: 529.2 ft amsl	
Drilling Co.: Cascade	Deep Well Elevation: 529.1 ft amsl	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): 2102862.2	Project: Final Groundwater Remedy Phase
Driller Name: Dan O'Mara	Easting (NAD83): 7615260.4	Location: 1
Drilling Asst: E. Huellmantel / T. Wolfe	Borehole Diameter: 10-12 inches	PG&E Topock, Needles, California
Logger: Michael Andrews	Water Level Start: 74.65 ft bgs	Project Number: RC000753.0051
Editor: Sean McGrane	Development End Date: 3/29/2019	
Total Depth: 184 ft bgs	Well Completion: <input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
161		Topock - Alluvium Deposits	SM		(160.0 - 180.0') 2" Sch 80 PVC (20-slot) Screen		
162							
163							
164		Topock - Alluvium Deposits	GM				
165							
166							
167							
168		Topock - Alluvium Deposits	SM				
169							
170					(158.0 - 180.0') Cemex #3 MESH (8x10)		
171		Topock - Alluvium Deposits	GM		(7.0 - 184.0') 10" Borehole	(158.0 - 180.0') 31.7 bags	(158.0 - 180.0') 31 bags (-2%) Note: Lapis Lustre Sand
172							
173							
174							
175							
176							
177							
178		Topock - Alluvium Deposits	SM				
179							
180							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = No Recovery, blue water table symbol represents depth to water measured post development Note: water samples were collected from MW-Ld borehole.

Date Started: 12/16/2018	Surface Elevation: 529.6 ft amsl	Well ID: MW-L-90, MW-L-180
Date Completed: 04/09/2018	Shallow Well Elevation: 529.2 ft amsl	
Drilling Co.: Cascade	Deep Well Elevation: 529.1 ft amsl	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): 2102862.2	Project: Final Groundwater Remedy Phase
Driller Name: Dan O'Mara	Easting (NAD83): 7615260.4	Location: 1
Drilling Asst: E. Huellmantel / T. Wolfe	Borehole Diameter: 10-12 inches	PG&E Topock, Needles, California
Logger: Michael Andrews	Water Level Start: 74.65 ft bgs	Project Number: RC000753.0051
Editor: Sean McGrane	Development End Date: 3/29/2019	
Total Depth: 184 ft bgs	Well Completion: <input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	



Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = No Recovery, blue water table symbol represents depth to water measured post development Note: water samples were collected from MW-Ld borehole.

Date Started: 11/27/2018	Surface Elevation: 530.0 ft amsl	Well ID: MW-L-225, MW-L-245
Date Completed: 04/04/2019	Shallow Well Elevation: 529.8 ft amsl	
Drilling Co.: Cascade	Deep Well Elevation: 529.6 ft amsl	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): 2102858.8	Project: Final Groundwater Remedy Phase
Driller Name: Dan O'Mara	Easting (NAD83): 7615264.9	Location: 1
Drilling Asst: E. Huellmantel / J. Campbell	Borehole Diameter: 4-12 inches	PG&E Topock, Needles, California
Logger: S. McGrane / G. Jeffers	Water Level Start: 76.27 ft bgs	Project Number: RC000753.0051
Editor: Sean McGrane	Development End Date: 3/4/2019	
Total Depth: 315 ft bgs	Well Completion: <input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
1		Topock - Fluvial Deposits	SW		(0.0 - 1.0') Concrete Pad (0.5 - 205.0') 2" PVC Sch 80 Casing (0.6 - 235.0') 2" PVC Sch 80 Casing		(0.0 - 1.0') 12 bags (%) Note: 3.5 x 3.5 ft concrete pad with 18" dia lockable vault, King Kon-Crete 4000 PSI
2		Topock - Fluvial Deposits	SW				
3		Topock - Fluvial Deposits	SW				
4		Topock - Fluvial Deposits	SW				
5		Topock - Fluvial Deposits	SW				
6		Topock - Fluvial Deposits	SW				
7		Topock - Fluvial Deposits	SM				
8		Topock - Fluvial Deposits	SM		(1.0 - 15.0') Portland Cement 5% Bentonite	(1.0 - 15.0') 77.6	(1.0 - 15.0') 100 (29%) Note: Type I, II and V and Benseal, large void at approximately 15 feet bgs
9		Topock - Fluvial Deposits	SM				
10		Topock - Fluvial Deposits	SM				
11		Topock - Fluvial Deposits	SM				
12		Topock - Fluvial Deposits	SW-SM				
13		Topock - Fluvial Deposits	SW-SM				
14		Topock - Fluvial Deposits	SW-SM				
15		Topock - Fluvial Deposits	SW-SM				
16		Topock - Fluvial Deposits	SW-SM				
17		Topock - Fluvial Deposits	SW-SM				
18		Topock - Fluvial Deposits	SW-SM		(15.0 - 50.0') Portland Cement 5% Bentonite	(15.0 - 50.0') 168.6 gallons	(15.0 - 50.0') 450 gallons (167%) Note: Type I, II and V and Benseal
19		Topock - Fluvial Deposits	SW-SM				
20		Topock - Fluvial Deposits	SW-SM				

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Date Started: 11/27/2018	Surface Elevation: 530.0 ft amsl	Well ID: MW-L-225, MW-L-245
Date Completed: 04/04/2019	Shallow Well Elevation: 529.8 ft amsl	
Drilling Co.: Cascade	Deep Well Elevation: 529.6 ft amsl	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): 2102858.8	Project: Final Groundwater Remedy Phase
Driller Name: Dan O'Mara	Easting (NAD83): 7615264.9	Location: 1
Drilling Asst: E. Huellmantel / J. Campbell	Borehole Diameter: 4-12 inches	PG&E Topock, Needles, California
Logger: S. McGrane / G. Jeffers	Water Level Start: 76.27 ft bgs	Project Number: RC000753.0051
Editor: Sean McGrane	Development End Date: 3/4/2019	
Total Depth: 315 ft bgs	Well Completion: <input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
21		Topock - Fluvial Deposits	SW-SM		(0.5 - 205.0') 2" PVC Sch 80 Casing		
22		Topock - Fluvial Deposits	SM				
23		Topock - Fluvial Deposits	GP				
24						(0.0 - 28.0') 12" Borehole	
25			NR				
26							
27		Topock - Fluvial Deposits	ML				
28							
29		Topock - Fluvial Deposits	ML				
30		Topock - Fluvial Deposits	GW		(15.0 - 50.0') Portland Cement 5% Bentonite	(15.0 - 50.0') 168.6 gallons	(15.0 - 50.0') 450 gallons (167%) Note: Type I, II and V and Benseal
31							
32		Topock - Fluvial Deposits	ML				
33							
34						(28.0 - 249.0') 10" Borehole	
35							
36		Topock - Fluvial Deposits	SM				
37							
38							
39		Topock - Fluvial Deposits	SM				
40		Topock - Fluvial Deposits	SM				

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Date Started: 11/27/2018	Surface Elevation: 530.0 ft amsl	Well ID: MW-L-225, MW-L-245
Date Completed: 04/04/2019	Shallow Well Elevation: 529.8 ft amsl	
Drilling Co.: Cascade	Deep Well Elevation: 529.6 ft amsl	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): 2102858.8	Project: Final Groundwater Remedy Phase
Driller Name: Dan O'Mara	Easting (NAD83): 7615264.9	Location: 1
Drilling Asst: E. Huellmantel / J. Campbell	Borehole Diameter: 4-12 inches	PG&E Topock, Needles, California
Logger: S. McGrane / G. Jeffers	Water Level Start: 76.27 ft bgs	Project Number: RC000753.0051
Editor: Sean McGrane	Development End Date: 3/4/2019	
Total Depth: 315 ft bgs	Well Completion: <input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
41		Topock - Fluvial Deposits	SM		(0.5 - 205.0') 2" PVC Sch 80 Casing		
42							
43							
44		Topock - Fluvial Deposits	SW				
45					(15.0 - 50.0') Portland Cement 5% Bentonite	(15.0 - 50.0') 168.6 gallons	(15.0 - 50.0') 450 gallons (167%) Note: Type I, II and V and Benseal
46					(46.5 - 47.5') Centralizer		
47							
48		Topock - Fluvial Deposits	SM				
49							
50					(28.0 - 249.0') 10" Borehole		
51							
52		Topock - Fluvial Deposits	SW-SM				
53							
54					(50.0 - 58.0') Bentonite seal chips	(50.0 - 58.0') 6.25 bags	(50.0 - 58.0') 2 bags (-68%) Note: Puregold Medium chips, borehole diameter most likely smaller due to grout caking borehole walls.
55		Topock - Fluvial Deposits	SW				
56							
57							
58							
59		Topock - Fluvial Deposits	SM		(58.0 - 66.0') Portland Cement 5% Bentonite	(58.0 - 66.0') 35.1 gallons	(58.0 - 66.0') 310 gallons (783%) Note: Type I, II and V and Benseal, void from 58 to 66 ft bgs
60							

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Date Started: 11/27/2018	Surface Elevation: 530.0 ft amsl	Well ID: MW-L-225, MW-L-245
Date Completed: 04/04/2019	Shallow Well Elevation: 529.8 ft amsl	
Drilling Co.: Cascade	Deep Well Elevation: 529.6 ft amsl	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): 2102858.8	Project: Final Groundwater Remedy Phase
Driller Name: Dan O'Mara	Easting (NAD83): 7615264.9	Location: 1
Drilling Asst: E. Huellmantel / J. Campbell	Borehole Diameter: 4-12 inches	PG&E Topock, Needles, California
Logger: S. McGrane / G. Jeffers	Water Level Start: 76.27 ft bgs	Project Number: RC000753.0051
Editor: Sean McGrane	Development End Date: 3/4/2019	
Total Depth: 315 ft bgs	Well Completion: <input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
61		Topock - Fluvial Deposits	SM		(0.5 - 205.0') 2" PVC Sch 80 Casing		
62							
63		Topock - Fluvial Deposits	GW		(58.0 - 66.0') Portland Cement 5% Bentonite	(58.0 - 66.0') 35.1 gallons	(58.0 - 66.0') 310 gallons (783%) Note: Type I, II and V and Benseal, void from 58 to 66 ft bgs
64							
65							
66		Topock - Fluvial Deposits	SM				
67							
68		Topock - Fluvial Deposits	SW-SM				
69							
70					(28.0 - 249.0') 10" Borehole		
71							
72							
73					(66.0 - 91.0') Bentonite seal chips	(66.0 - 91.0') 20.4 bags	(66.0 - 91.0') 18 bags (-12%) Note: Purgold Medium Chips
74		Topock - Fluvial Deposits	SM				
75							
76							
77							
78	MW-L-VAS-76-81 (31 ppb) 10/6/2018 16:34						
79							
80		Topock - Alluvium	ML				

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Date Started: 11/27/2018	Surface Elevation: 530.0 ft amsl	Well ID: MW-L-225, MW-L-245
Date Completed: 04/04/2019	Shallow Well Elevation: 529.8 ft amsl	
Drilling Co.: Cascade	Deep Well Elevation: 529.6 ft amsl	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): 2102858.8	Project: Final Groundwater Remedy Phase
Driller Name: Dan O'Mara	Easting (NAD83): 7615264.9	Location: 1
Drilling Asst: E. Huellmantel / J. Campbell	Borehole Diameter: 4-12 inches	PG&E Topock, Needles, California
Logger: S. McGrane / G. Jeffers	Water Level Start: 76.27 ft bgs	Project Number: RC000753.0051
Editor: Sean McGrane	Development End Date: 3/4/2019	
Total Depth: 315 ft bgs	Well Completion: <input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
81		Deposits			(0.5 - 205.0') 2" PVC Sch 80 Casing		
82		Topock - Alluvium Deposits	SM				
83							
84		Topock - Alluvium Deposits	SM				
85							
86					(66.0 - 91.0') Bentonite seal chips	(66.0 - 91.0') 20.4 bags	(66.0 - 91.0') 18 bags (-12%) Note: Purgold Medium Chips
87							
88							
89		Topock - Alluvium Deposits	SM				
90							
91					(28.0 - 249.0') 10" Borehole		
92							
93							
94		Topock - Alluvium Deposits	ML				
95		Topock - Alluvium Deposits	SM				
96					(91.0 - 201.0') High Solids Bentonite Grout	(91.0 - 201.0') 482.5 gallon	(91.0 - 201.0') 570.2 gallon (18%) Note: Grout settled 20 ft below projected depth of 71 ft.
97		Topock - Alluvium Deposits	ML				
98							
99							
100							

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Date Started: 11/27/2018	Surface Elevation: 530.0 ft amsl	Well ID: MW-L-225, MW-L-245
Date Completed: 04/04/2019	Shallow Well Elevation: 529.8 ft amsl	
Drilling Co.: Cascade	Deep Well Elevation: 529.6 ft amsl	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): 2102858.8	Project: Final Groundwater Remedy Phase
Driller Name: Dan O'Mara	Easting (NAD83): 7615264.9	Location: 1
Drilling Asst: E. Huellmantel / J. Campbell	Borehole Diameter: 4-12 inches	PG&E Topock, Needles, California
Logger: S. McGrane / G. Jeffers	Water Level Start: 76.27 ft bgs	Project Number: RC000753.0051
Editor: Sean McGrane	Development End Date: 3/4/2019	
Total Depth: 315 ft bgs	Well Completion: <input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
101					(0.5 - 205.0') 2" PVC Sch 80 Casing		
102							
103							
104							
105							
106		Topock - Alluvium Deposits	ML				
107					(106.5 - 107.5') Centralizer		
108	MW-L-VAS-106-111 (0.84 ppb) 10/9/2018 11:46						
109							
110					(91.0 - 201.0') High Solids Bentonite Grout	(91.0 - 201.0') 482.5 gallon	(91.0 - 201.0') 570.2 gallon (18%) Note: Grout settled 20 ft below projected depth of 71 ft.
111							
112							
113		Topock - Alluvium Deposits	ML				
114							
115							
116							
117		Topock - Alluvium Deposits	ML				
118							
119							
120							

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Date Started: 11/27/2018	Surface Elevation: 530.0 ft amsl	Well ID: MW-L-225, MW-L-245
Date Completed: 04/04/2019	Shallow Well Elevation: 529.8 ft amsl	
Drilling Co.: Cascade	Deep Well Elevation: 529.6 ft amsl	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): 2102858.8	Project: Final Groundwater Remedy Phase
Driller Name: Dan O'Mara	Easting (NAD83): 7615264.9	Location: 1
Drilling Asst: E. Huellmantel / J. Campbell	Borehole Diameter: 4-12 inches	PG&E Topock, Needles, California
Logger: S. McGrane / G. Jeffers	Water Level Start: 76.27 ft bgs	Project Number: RC000753.0051
Editor: Sean McGrane	Development End Date: 3/4/2019	
Total Depth: 315 ft bgs	Well Completion: <input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
121		Topock - Alluvium Deposits	ML		(0.5 - 205.0') 2" PVC Sch 80 Casing		
122							
123		Topock - Alluvium Deposits	ML				
124							
125							
126							
127		Topock - Alluvium Deposits	ML				
128							
129							
130					(91.0 - 201.0') High Solids Bentonite Grout	(28.0 - 249.0') 10" Borehole	(91.0 - 201.0') 482.5 gallon
131							(91.0 - 201.0') 570.2 gallon (18%) Note: Grout settled 20 ft below projected depth of 71 ft.
132							
133							
134							
135		Topock - Alluvium Deposits	ML				
136							
137							
138							
139							
140			ML				

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Date Started: 11/27/2018	Surface Elevation: 530.0 ft amsl	Well ID: MW-L-225, MW-L-245
Date Completed: 04/04/2019	Shallow Well Elevation: 529.8 ft amsl	
Drilling Co.: Cascade	Deep Well Elevation: 529.6 ft amsl	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): 2102858.8	Project: Final Groundwater Remedy Phase
Driller Name: Dan O'Mara	Easting (NAD83): 7615264.9	Location: 1
Drilling Asst: E. Huellmantel / J. Campbell	Borehole Diameter: 4-12 inches	PG&E Topock, Needles, California
Logger: S. McGrane / G. Jeffers	Water Level Start: 76.27 ft bgs	Project Number: RC000753.0051
Editor: Sean McGrane	Development End Date: 3/4/2019	
Total Depth: 315 ft bgs	Well Completion: <input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction			Calculated Material Volumes	Material Volumes Installed
141	MW-L-VAS-141-146 (<0.033 U ppb) 10/10/2018 14:58	Topock - Alluvium Deposits	ML		(0.5 - 205.0') 2" PVC Sch 80 Casing		(0.6 - 235.0') 2" PVC Sch 80 Casing		
142									
143									
144									
145									
146		Topock - Alluvium Deposits	SM		(91.0 - 201.0') High Solids Bentonite Grout		(28.0 - 249.0') 10" Borehole	(91.0 - 201.0') 482.5 gallon	(91.0 - 201.0') 570.2 gallon (18%) Note: Grout settled 20 ft below projected depth of 71 ft.
147									
148									
149		Topock - Alluvium Deposits	SM						
150									
151									
152		Topock - Alluvium Deposits	GM						
153									
154									
155		Topock - Alluvium Deposits	SM						
156									
157									
158	Topock - Alluvium Deposits	ML							
159									
160									
161	Topock - Alluvium Deposits	GM							
162									
163									
164	Topock - Alluvium Deposits	SM							
165									
166									
167	Topock - Alluvium Deposits	GM							
168									
169									
170	Topock - Alluvium Deposits	SM							
171									
172									
173	Topock - Alluvium Deposits	GM							
174									
175									
176	Topock - Alluvium Deposits	SM							
177									
178									
179	Topock - Alluvium Deposits	GM							
180									
181									
182	Topock - Alluvium Deposits	SM							
183									
184									
185	Topock - Alluvium Deposits	GM							
186									
187									
188	Topock - Alluvium Deposits	SM							
189									
190									
191	Topock - Alluvium Deposits	GM							
192									
193									
194	Topock - Alluvium Deposits	SM							
195									
196									
197	Topock - Alluvium Deposits	GM							
198									
199									
200	Topock - Alluvium Deposits	SM							
201									
202									
203	Topock - Alluvium Deposits	GM							
204									
205									
206	Topock - Alluvium Deposits	SM							
207									
208									
209	Topock - Alluvium Deposits	GM							
210									
211									
212	Topock - Alluvium Deposits	SM							
213									
214									
215	Topock - Alluvium Deposits	GM							
216									
217									
218	Topock - Alluvium Deposits	SM							
219									
220									
221	Topock - Alluvium Deposits	GM							
222									
223									
224	Topock - Alluvium Deposits	SM							
225									
226									
227	Topock - Alluvium Deposits	GM							
228									
229									
230	Topock - Alluvium Deposits	SM							
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233	Topock - Alluvium Deposits	GM							
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236	Topock - Alluvium Deposits	SM							
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238									
239	Topock - Alluvium Deposits	GM							
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251	Topock - Alluvium Deposits	GM							
252									
253									
254	Topock - Alluvium Deposits	SM							
255									
256									
257	Topock - Alluvium Deposits	GM							
258									
259									
260	Topock - Alluvium Deposits	SM							
261									
262									
263	Topock - Alluvium Deposits	GM							
264									
265									
266	Topock - Alluvium Deposits	SM							
267									
268									
269	Topock - Alluvium Deposits	GM							
270									
271									
272	Topock - Alluvium Deposits	SM							
273									
274									
275	Topock - Alluvium Deposits	GM							
276									
277									
278	Topock - Alluvium Deposits	SM							
279									
280									
281	Topock - Alluvium Deposits	GM							
282									
283									
284	Topock - Alluvium Deposits	SM							
285									
286									
287	Topock - Alluvium Deposits	GM							
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290	Topock - Alluvium Deposits	SM							
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293	Topock - Alluvium Deposits	GM							
294									
295									
296	Topock - Alluvium Deposits	SM							
297									
298									
299	Topock - Alluvium Deposits	GM							
300									
301									
302	Topock - Alluvium Deposits	SM							
303									
304									
305	Topock - Alluvium Deposits	GM							
306									
307									
308	Topock - Alluvium Deposits	SM							
309									
310									
311	Topock - Alluvium Deposits	GM							
312									
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314	Topock - Alluvium Deposits	SM							
315									
316									
317	Topock - Alluvium Deposits	GM							
318									
319									
320	Topock - Alluvium Deposits	SM							
321									
322									
323	Topock - Alluvium Deposits	GM							
324									
325									
326	Topock - Alluvium Deposits	SM							
327									
328									
329	Topock - Alluvium Deposits	GM							
330									
331									
332	Topock - Alluvium Deposits	SM							
333									
334									
335	Topock - Alluvium Deposits	GM							
336									
337									
338	Topock - Alluvium Deposits	SM							
339									
340									
341	Topock - Alluvium Deposits	GM							
342									
343									
344	Topock - Alluvium Deposits	SM							
345									
346									
347	Topock - Alluvium Deposits	GM							
348									
349									
350	Topock - Alluvium Deposits	SM							
351									
352									
353	Topock - Alluvium Deposits	GM							
354									
355									
356	Topock - Alluvium Deposits	SM							
357									
358									
359	Topock - Alluvium Deposits	GM							
360									
361									
362	Topock - Alluvium Deposits	SM							
363									
364									
365	Topock - Alluvium Deposits	GM							
366									
367									
368	Topock - Alluvium Deposits	SM							
369									
370									
371	Topock - Alluvium Deposits	GM							
372									
373									
374	Topock - Alluvium Deposits	SM							
375									
376									
377	Topock - Alluvium Deposits	GM							
378									
379									
380	Topock - Alluvium Deposits	SM							
381									
382									
383	Topock - Alluvium Deposits	GM							
384									
385									
386	Topock - Alluvium Deposits	SM							
387									
388									
389	Topock - Alluvium Deposits	GM							
390									
391									
392	Topock - Alluvium Deposits	SM							
393									
394									
395	Topock - Alluvium Deposits	GM							
396									
397									
398	Topock - Alluvium Deposits	SM							
399									
400									
401	Topock - Alluvium Deposits	GM							
402									
403									
404	Topock - Alluvium Deposits	SM							
405									
406									
407	Topock - Alluvium Deposits	GM							
408									
409									
410	Topock - Alluvium Deposits	SM							
411									
412									
413	Topock - Alluvium Deposits	GM							
414									
415									
416	Topock - Alluvium Deposits	SM							
417									
418									
419	Topock - Alluvium Deposits	GM							
420									
421									
422	Topock - Alluvium Deposits	SM							
423									
424									
425	Topock - Alluvium Deposits	GM							
426									
427									
428	Topock - Alluvium Deposits	SM							
429									
430									
431	Topock - Alluvium Deposits	GM							
432									
433									
434	Topock - Alluvium Deposits	SM							
435									
436									
437	Topock - Alluvium Deposits	GM							
438									
439									
440	Topock - Alluvium Deposits	SM							
441									
442									
443	Topock - Alluvium Deposits	GM							
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446	Topock - Alluvium Deposits	SM							
447									
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449	Topock - Alluvium Deposits	GM							
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452	Topock - Alluvium Deposits	SM							
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455	Topock - Alluvium Deposits	GM							
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458	Topock - Alluvium Deposits	SM							
459									
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461	Topock - Alluvium Deposits	GM							
462									
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464	Topock - Alluvium Deposits	SM							
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467	Topock - Alluvium Deposits	GM							
468									
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470	Topock - Alluvium Deposits	SM							
471									
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473	Topock - Alluvium Deposits	GM							
474									
475									
476	Topock - Alluvium Deposits	SM							
477									
478									
479	Topock - Alluvium Deposits	GM							
480									
481									
482	Topock - Alluvium Deposits	SM							
483									
484									
485	Topock - Alluvium Deposits	GM							
486									
487									
488	Topock - Alluvium Deposits	SM							
489									
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491	Topock - Alluvium Deposits	GM							
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494	Topock - Alluvium Deposits	SM							
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497	Topock - Alluvium Deposits	GM							
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500	Topock - Alluvium Deposits	SM							
501									
502									
503	Topock - Alluvium Deposits	GM							
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506	Topock - Alluvium Deposits	SM							
507									
508									
509	Topock - Alluvium Deposits	GM							
510									
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512	Topock - Alluvium Deposits	SM							
513									
514									
515	Topock - Alluvium Deposits	GM							
516									
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518	Topock - Alluvium Deposits	SM							
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521	Topock - Alluvium Deposits	GM							
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527	Topock - Alluvium Deposits	GM							
528									
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530	Topock - Alluvium Deposits	SM							
531									
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533	Topock - Alluvium Deposits	GM							
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536	Topock - Alluvium Deposits	SM							
537									
538									
539	Topock - Alluvium Deposits	GM							
540									
541									
542	Topock - Alluvium Deposits	SM							
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560	Topock - Alluvium Deposits	SM							
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563	Topock - Alluvium Deposits	GM							
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565									
566	Topock - Alluvium Deposits	SM							
567									
568									
569	Topock - Alluvium Deposits	GM							
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572	Topock - Alluvium Deposits	SM							
573									
574									
575	Topock - Alluvium Deposits	GM							
576									
577									
578	Topock - Alluvium Deposits	SM							
579									
580									
581	Topock - Alluvium Deposits	GM							
582									
583									
584	Topock - Alluvium Deposits	SM							
585									
586									
587	Topock - Alluvium Deposits	GM							
588									
589									
590	Topock - Alluvium Deposits	SM							

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Date Started: 11/27/2018	Surface Elevation: 530.0 ft amsl	Well ID: MW-L-225, MW-L-245
Date Completed: 04/04/2019	Shallow Well Elevation: 529.8 ft amsl	
Drilling Co.: Cascade	Deep Well Elevation: 529.6 ft amsl	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): 2102858.8	Project: Final Groundwater Remedy Phase
Driller Name: Dan O'Mara	Easting (NAD83): 7615264.9	Location: 1
Drilling Asst: E. Huellmantel / J. Campbell	Borehole Diameter: 4-12 inches	PG&E Topock, Needles, California
Logger: S. McGrane / G. Jeffers	Water Level Start: 76.27 ft bgs	Project Number: RC000753.0051
Editor: Sean McGrane	Development End Date: 3/4/2019	
Total Depth: 315 ft bgs	Well Completion: <input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
161		Topock - Alluvium Deposits	SM		(0.5 - 205.0') 2" PVC Sch 80 Casing		
162							
163							
164		Topock - Alluvium Deposits	SM				
165							
166		Topock - Alluvium Deposits	GM		(166.5 - 167.5') Centralizer		
167							
168		Topock - Alluvium Deposits	SM				
169							
170					(91.0 - 201.0') High Solids Bentonite Grout		
171		Topock - Alluvium Deposits	GM				
172							
173							
174							
175		Topock - Alluvium Deposits	GM				
176							
177		Topock - Alluvium Deposits	SM				
178							
179		Topock - Alluvium Deposits	SM				
180							

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Date Started: 11/27/2018	Surface Elevation: 530.0 ft amsl	Well ID: MW-L-225, MW-L-245
Date Completed: 04/04/2019	Shallow Well Elevation: 529.8 ft amsl	
Drilling Co.: Cascade	Deep Well Elevation: 529.6 ft amsl	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): 2102858.8	Project: Final Groundwater Remedy Phase
Driller Name: Dan O'Mara	Easting (NAD83): 7615264.9	Location: 1
Drilling Asst: E. Huellmantel / J. Campbell	Borehole Diameter: 4-12 inches	PG&E Topock, Needles, California
Logger: S. McGrane / G. Jeffers	Water Level Start: 76.27 ft bgs	Project Number: RC000753.0051
Editor: Sean McGrane	Development End Date: 3/4/2019	
Total Depth: 315 ft bgs	Well Completion: <input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
181	MW-L-VAS-181-186 (3.3 ppb) 10/20/2018 11:06	Topock - Alluvium Deposits	SM		(0.5 - 205.0') 2" PVC Sch 80 Casing		
182							
183		Topock - Alluvium Deposits	ML				
184							
185		Topock - Alluvium Deposits	SM				
186							
187		Topock - Alluvium Deposits	ML				
188							
189							
190					(91.0 - 201.0') High Solids Bentonite Grout	(28.0 - 249.0') 10" Borehole	(91.0 - 201.0') 482.5 gallon
191							
192		Topock - Alluvium Deposits	SM				
193							
194							
195							
196							
197							
198		Topock - Alluvium Deposits	ML				
199							
200							

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Date Started: 11/27/2018	Surface Elevation: 530.0 ft amsl	Well ID: MW-L-225, MW-L-245
Date Completed: 04/04/2019	Shallow Well Elevation: 529.8 ft amsl	
Drilling Co.: Cascade	Deep Well Elevation: 529.6 ft amsl	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): 2102858.8	Project: Final Groundwater Remedy Phase
Driller Name: Dan O'Mara	Easting (NAD83): 7615264.9	Location: 1
Drilling Asst: E. Huellmantel / J. Campbell	Borehole Diameter: 4-12 inches	PG&E Topock, Needles, California
Logger: S. McGrane / G. Jeffers	Water Level Start: 76.27 ft bgs	Project Number: RC000753.0051
Editor: Sean McGrane	Development End Date: 3/4/2019	
Total Depth: 315 ft bgs	Well Completion: <input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
201		Topock - Alluvium Deposits	ML		(0.5 - 205.0') 2" PVC Sch 80 Casing	(91.0 - 201.0') 482.5 gallon	(91.0 - 201.0') 570.2 gallon (18%) Note: Grout settled 20 ft below projected depth of 71 ft.
202					(201.0 - 203.0') Bentonite seal pellets	(201.0 - 203.0') 2.1 buckets	(201.0 - 203.0') 2.5 buckets (19%) Note: Pel-Plug (TR30) 3/8"
203		Topock - Alluvium Deposits	SM				
204							
205					(205.0 - 225.0') 2" Sch 80 PVC (20-slot) Screen		
206		Topock - Alluvium Deposits	ML				
207		Topock - Alluvium Deposits	GM				
208							
209							
210					(28.0 - 249.0') 10" Borehole		
211		Topock - Alluvium Deposits	GM		(203.0 - 228.5') Cemex #3 MESH (8x10)	(203.0 - 228.5') 29.9 bags	(203.0 - 228.5') 29 bags (-3%) Note: Lapis Lustre Sand
212							
213							
214							
215		Topock - Alluvium Deposits	SM				
216							
217		Topock - Alluvium Deposits	SM				
218							
219	MW-L-VAS-218-223 (66 ppb) 10/21/2018 10:50						
220			GM				

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Date Started: 11/27/2018	Surface Elevation: 530.0 ft amsl	Well ID: MW-L-225, MW-L-245
Date Completed: 04/04/2019	Shallow Well Elevation: 529.8 ft amsl	
Drilling Co.: Cascade	Deep Well Elevation: 529.6 ft amsl	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): 2102858.8	Project: Final Groundwater Remedy Phase
Driller Name: Dan O'Mara	Easting (NAD83): 7615264.9	Location: 1
Drilling Asst: E. Huellmantel / J. Campbell	Borehole Diameter: 4-12 inches	PG&E Topock, Needles, California
Logger: S. McGrane / G. Jeffers	Water Level Start: 76.27 ft bgs	Project Number: RC000753.0051
Editor: Sean McGrane	Development End Date: 3/4/2019	
Total Depth: 315 ft bgs	Well Completion: <input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
221	MW-L-VAS-218-223 (66 ppb) 10/21/2018 10:50	Topock - Alluvium Deposits	GM		(205.0 - 225.0') 2" Sch 80 PVC (20-slot) Screen		
222							
223							
224		Topock - Weathered Bedrock - conglomerate	ML		(203.0 - 228.5') Cemex #3 MESH (8x10)	(203.0 - 228.5') 29.9 bags	(203.0 - 228.5') 29 bags (-3%) Note: Lapis Lustre Sand
225					(225.5 - 226.5') Centralizer		
226					(225.0 - 227.4') Sump and End Cap		
227							
228							
229		Topock - Weathered Bedrock - conglomerate	ML		(228.5 - 233.0') Bentonite seal pellets	(228.5 - 233.0') 4.4 buckets	(228.5 - 233.0') 4 buckets (-9%) Note: Pel-Plug (TR30) 3/8"
230					(28.0 - 249.0') 10" Borehole		
231							
232							
233							
234		Topock - Weathered Bedrock - conglomerate	ML		(233.0 - 249.0') Cemex #3 MESH (8x10)	(233.0 - 249.0') 19.5 bags	(233.0 - 249.0') 25 bags (28%) Note: Lapis Lustre Sand
235							
236					(235.0 - 245.0') 2" Sch 80 PVC (20-slot) Screen		
237							
238							
239							
240							

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Date Started: 11/27/2018	Surface Elevation: 530.0 ft amsl	Well ID: MW-L-225, MW-L-245
Date Completed: 04/04/2019	Shallow Well Elevation: 529.8 ft amsl	
Drilling Co.: Cascade	Deep Well Elevation: 529.6 ft amsl	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): 2102858.8	Project: Final Groundwater Remedy Phase
Driller Name: Dan O'Mara	Easting (NAD83): 7615264.9	Location: 1
Drilling Asst: E. Huellmantel / J. Campbell	Borehole Diameter: 4-12 inches	PG&E Topock, Needles, California
Logger: S. McGrane / G. Jeffers	Water Level Start: 76.27 ft bgs	Project Number: RC000753.0051
Editor: Sean McGrane	Development End Date: 3/4/2019	
Total Depth: 315 ft bgs	Well Completion: <input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
241		Topock - Weathered Bedrock - conglomerate	SM		(235.0 - 245.0') 2" Sch 80 PVC (20-slot) Screen		
242							
243							
244							
245		Topock - Weathered Bedrock - conglomerate	ML		(233.0 - 249.0') Cemex #3 MESH (8x10)	(233.0 - 249.0') 19.5 bags	(233.0 - 249.0') 25 bags (28%) Note: Lapis Lustre Sand
246					(245.5 - 246.5') Centralizer		
247					(28.0 - 249.0') 10" Borehole		
248					(245.0 - 247.3') Sump and End Cap		
249		Topock - Weathered Bedrock - conglomerate	ML				
250							
251							
252							
253		Topock - Weathered Bedrock - conglomerate	ML				
254							
255					(249.0 - 266.0') Bentonite seal chips	(249.0 - 266.0') 7.4 bags	(249.0 - 266.0') 8 bags (8%) Note: Purgold Medium Chips
256							
257							
258							
259		Topock - Weathered Bedrock - conglomerate	ML				
260							

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Date Started: 11/27/2018	Surface Elevation: 530.0 ft amsl	Well ID: MW-L-225, MW-L-245
Date Completed: 04/04/2019	Shallow Well Elevation: 529.8 ft amsl	
Drilling Co.: Cascade	Deep Well Elevation: 529.6 ft amsl	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): 2102858.8	Project: Final Groundwater Remedy Phase
Driller Name: Dan O'Mara	Easting (NAD83): 7615264.9	Location: 1
Drilling Asst: E. Huellmantel / J. Campbell	Borehole Diameter: 4-12 inches	PG&E Topock, Needles, California
Logger: S. McGrane / G. Jeffers	Water Level Start: 76.27 ft bgs	Project Number: RC000753.0051
Editor: Sean McGrane	Development End Date: 3/4/2019	
Total Depth: 315 ft bgs	Well Completion: <input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
261	MW-L-VAS-261-266 (<0.17 U ppb) 10/22/2018 14:50	Topock - Weathered Bedrock - conglomerate	ML		(249.0 - 266.0') Bentonite seal chips	(249.0 - 266.0') 7.4 bags	(249.0 - 266.0') 8 bags (8%) Note: Purgold Medium Chips
262							
263							
264							
265		Topock - Weathered Bedrock - conglomerate	ML		(249.0 - 303.0') 7" Borehole	(266.0 - 308.0') 77.5 gallons	(266.0 - 308.0') 80 gallons (3%) Note: Type I, II and V
266							
267							
268							
269							
270							
271							
272							
273							
274							
275							
276							
277							
278							
279							
280							

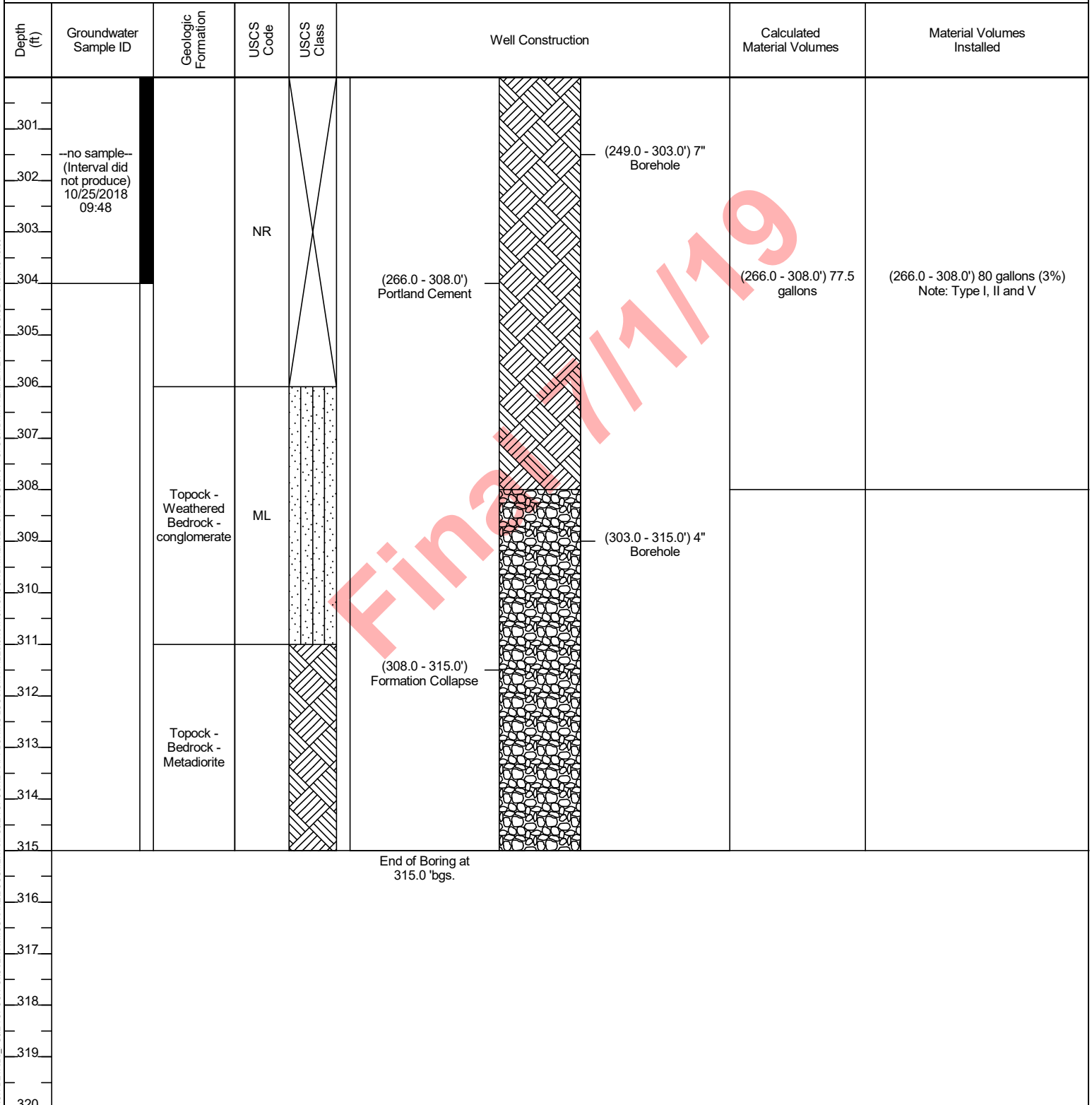
Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = No Recovery, blue water table symbol represents depth to water measured post development

Date Started: 11/27/2018	Surface Elevation: 530.0 ft amsl	Well ID: MW-L-225, MW-L-245
Date Completed: 04/04/2019	Shallow Well Elevation: 529.8 ft amsl	
Drilling Co.: Cascade	Deep Well Elevation: 529.6 ft amsl	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): 2102858.8	Project: Final Groundwater Remedy Phase
Driller Name: Dan O'Mara	Easting (NAD83): 7615264.9	Location: 1
Drilling Asst: E. Huellmantel / J. Campbell	Borehole Diameter: 4-12 inches	PG&E Topock, Needles, California
Logger: S. McGrane / G. Jeffers	Water Level Start: 76.27 ft bgs	Project Number: RC000753.0051
Editor: Sean McGrane	Development End Date: 3/4/2019	
Total Depth: 315 ft bgs	Well Completion: <input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
281		Topock - Weathered Bedrock - conglomerate	ML				
282							
283							
284							
285							
286							
287							
288							
289							
290		Topock - Weathered Bedrock - conglomerate	ML		(266.0 - 308.0') Portland Cement	(249.0 - 303.0') 7" Borehole	(266.0 - 308.0') 77.5 gallons
291							(266.0 - 308.0') 80 gallons (3%) Note: Type I, II and V
292							
293							
294							
295							
296							
297							
298							
299							
300			NR				






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Date Started: 11/27/2018	Surface Elevation: 530.0 ft amsl	Well ID: MW-L-225, MW-L-245
Date Completed: 04/04/2019	Shallow Well Elevation: 529.8 ft amsl	
Drilling Co.: Cascade	Deep Well Elevation: 529.6 ft amsl	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): 2102858.8	Project: Final Groundwater Remedy Phase
Driller Name: Dan O'Mara	Easting (NAD83): 7615264.9	Location: 1
Drilling Asst: E. Huellmantel / J. Campbell	Borehole Diameter: 4-12 inches	PG&E Topock, Needles, California
Logger: S. McGrane / G. Jeffers	Water Level Start: 76.27 ft bgs	Project Number: RC000753.0051
Editor: Sean McGrane	Development End Date: 3/4/2019	
Total Depth: 315 ft bgs	Well Completion: <input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	



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Date Started: 10/03/2018	Surface Elevation: 530.0 ft amsl	Boring No.: MW-Ld
Date Completed: 11/27/2018	Northing (NAD83): 2102858.8	
Drilling Co.: Cascade	Easting (NAD83): 7615264.9	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 315 ft bgs	Project: Final Groundwater Remedy Phase
Drill Rig Type: Terrasonic track mount	Borehole Diameter: 4-12 inches	Location: 1
Driller Name: Dan O'Mara	Depth to First Water: 76.27 ft bgs	PG&E Topock, Needles, California
Drilling Asst: E. Huellmantel / J. Campbell	Sampling Method: 4 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger: S. McGrane / G. Jeffers	Sampling Interval: Continuous	
Editor: Sean McGrane	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
1	72	No sieve samples collected		Topock - Fluvial Deposits	SW		(0.0 - 1.5') Topock - Fluvial Deposits; Well graded sand with gravel (SW); brown (10YR 4/3); very fine grained to very coarse grained, angular to subround; some granule to large pebbles; some coarse to very coarse grained sand, subangular to subround; trace cobbles; trace boulders, angular to subangular; trace silt; dry	(0.0 - 5.0') Hand cleared for utility clearance	
2				Topock - Fluvial Deposits	SW		(1.5 - 6.0') Topock - Fluvial Deposits; Well graded sand with gravel (SW); brown (7.5YR 4/3); very fine grained to very coarse grained, subangular to round; some granule to medium pebbles, angular to subangular; trace silt; dry		
3									
4									
5									
6	120			Topock - Fluvial Deposits	SM		(6.0 - 11.0') Topock - Fluvial Deposits; Sand Silty sand (SM); brown (7.5YR 4/3); very fine grained to very coarse grained, angular to subrounded; some granule to very large pebbles, angular to subangular; some silt; trace cobbles, angular; trace boulders, angular to subangular; dry		
7									
8									
9				Topock - Fluvial Deposits	SW-SM		(11.0 - 16.0') Topock - Fluvial Deposits; Well graded sand with silt and gravel (SW-SM); dark grayish brown / dark yellowish brown(10YR 4/2); very fine grained to very coarse grained, angular to subangular; some granule to large pebbles; little silt; trace cobbles, angular to subangular; dry		
10									
11									
12	96			Topock - Fluvial Deposits	SW-SM		(16.0 - 21.5') Topock - Fluvial Deposits; Well graded sand with silt and gravel (SW-SM); very dark gray (10YR 3/1); very fine grained to very coarse grained, angular to subangular; some granule to very large pebbles; little silt; trace cobbles, angular to subangular; dry	(16.0') Lost core barrel down hole	
13									
14									
15									
16									
17									
18									
19									
20									

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Date Started:	10/03/2018	Surface Elevation:	530.0 ft amsl	Boring No.: MW-Ld	
Date Completed:	11/27/2018	Northing (NAD83):	2102858.8		
Drilling Co.:	Cascade	Easting (NAD83):	7615264.9	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	315 ft bgs	Project:	Final Groundwater Remedy Phase
Drill Rig Type:	Terrasonic track mount	Borehole Diameter:	4-12 inches	Location:	1
Driller Name:	Dan O'Mara	Depth to First Water:	76.27 ft bgs	PG&E Topock, Needles, California	
Drilling Asst:	E. Huellmantel / J. Campbell	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number: RC000753.0051	
Logger:	S. McGrane / G. Jeffers	Sampling Interval:	Continuous		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
21	96			Topock - Fluvial Deposits	SW-SM				
22				Topock - Fluvial Deposits	SM		(21.5 - 22.5') Topock - Fluvial Deposits; Silty sand with gravel (SM); dark gray (10YR 4/1); very fine grained to very coarse grained, angular to subround; some granule to very large pebbles, angular to subangular; some silt; dry		
23				Topock - Fluvial Deposits	GP		(22.5 - 24.0') Topock - Fluvial Deposits; Poorly graded gravel (GP); black (10YR 2/1); small cobbles to large cobbles, angular to subround; dry		
24							(24.0 - 26.0') (NR); No Recovery sample bags broke		
25	60				NR			(26.0') Rough drilling	
26									
27				Topock - Fluvial Deposits	ML		(26.0 - 28.0') Topock - Fluvial Deposits; Sandy silt with gravel (ML); brown (10YR 5/3); no plasticity; some very fine to very coarse grained sand, angular to subangular; little granule to very large pebbles, angular to subangular; trace cobbles, angular to subangular; trace mica; dry		
28				Topock - Fluvial Deposits	ML		(28.0 - 29.5') Topock - Fluvial Deposits; Sandy silt with gravel (ML); brown (10YR 5/3); no plasticity; and very fine to very coarse grained sand, angular to subangular; little granule to very large pebbles, angular to subangular; trace cobbles, angular to subangular; trace mica; dry		
29	84			Topock - Fluvial Deposits	GW		(29.5 - 31.0') Topock - Fluvial Deposits; Well graded gravel with sand (GW); dark yellowish brown (10YR 4/4); granules to small cobbles, angular to subround; little very fine to coarse grained sand, subangular to subround; dry	(31.0') Lost core barrel down hole	
30									
31				Topock - Fluvial Deposits	ML		(31.0 - 34.5') Topock - Fluvial Deposits; Sandy silt with gravel (ML); brown (10YR 5/3); no plasticity; some very fine to very coarse grained sand, angular to subangular; little granule to very large pebbles, angular to subangular; trace cobbles, angular to subangular; trace mica; dry		
32									
33	96							(36.0 - 38.0') Drilled to extra two feet to collect lost core 31 to 36 ft. bgs	
34									
35				Topock - Fluvial Deposits	SM		(34.5 - 38.0') Topock - Fluvial Deposits; Silty sand (SM); brown (10YR 5/3); very fine grained to fine grained, subangular to subround; and silt; dry		
36									
37	96			Topock - Fluvial Deposits	SM		(38.0 - 39.0') Topock - Fluvial Deposits; Silty sand with gravel (SM); grayish brown (2.5Y 5/2); very fine grained to very coarse grained, angular to subround; some silt; little granule to large pebbles, angular to subangular; moist		
38				Topock - Fluvial Deposits	SM		(39.0 - 43.0') Topock - Fluvial Deposits; Silty sand (SM); very dark grayish brown (2.5Y 3/2); very fine grained to coarse grained, angular to subangular; and silt; trace granule to medium pebbles, angular to		
39									
40									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = No Recovery, blue water table symbol represents depth to water measured during the second VAS interval

Date Started: <u>10/03/2018</u>	Surface Elevation: <u>530.0 ft amsl</u>	Boring No.: <u>MW-Ld</u>
Date Completed: <u>11/27/2018</u>	Northing (NAD83): <u>2102858.8</u>	
Drilling Co.: <u>Cascade</u>	Easting (NAD83): <u>7615264.9</u>	Client: <u>PG&E</u>
Drilling Method: <u>Sonic Drilling</u>	Total Depth: <u>315 ft bgs</u>	Project: <u>Final Groundwater Remedy Phase</u>
Drill Rig Type: <u>Terrasonic track mount</u>	Borehole Diameter: <u>4-12 inches</u>	Location: <u>1</u>
Driller Name: <u>Dan O'Mara</u>	Depth to First Water: <u>76.27 ft bgs</u>	<u>PG&E Topock, Needles, California</u>
Drilling Asst: <u>E. Huellmantel / J. Campbell</u>	Sampling Method: <u>4 inch x 10 ft Core Barrel</u>	Project Number: <u>RC000753.0051</u>
Logger: <u>S. McGrane / G. Jeffers</u>	Sampling Interval: <u>Continuous</u>	
Editor: <u>Sean McGrane</u>	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
41	96			Topock - Fluvial Deposits	SM		subangular; trace clay; moist		
42									
43									
44				Topock - Fluvial Deposits	SW		(43.0 - 46.0') Topock - Fluvial Deposits; Well graded sand (SW); brown (7.5YR 5/3); very fine grained to very coarse grained, subangular to subround; trace granule to very large pebbles, angular to subround; trace cobbles, subround; trace silt; dry		
45	120	No sieve samples collected							
46									
47				Topock - Fluvial Deposits	SM		(46.0 - 51.5') Topock - Fluvial Deposits; Silty sand with gravel (SM); brown (10YR 4/3); very fine grained to very coarse grained, subangular to subround; little granule to very large pebbles, subangular to subround; little silt; trace cobbles, subangular to subround; trace clay; trace mica; dry; gravel coursening downward in formation.		
48									
49	120			Topock - Fluvial Deposits	SW-SM		(51.5 - 52.0') Topock - Fluvial Deposits; Well graded sand with silt (SW-SM); brown (10YR 5/3); very fine grained to medium grained, angular to subround; trace silt; little mica; dry		
50									
51									
52				Topock - Fluvial Deposits	SW		(52.0 - 59.0') Topock - Fluvial Deposits; Well graded sand with gravel (SW); very dark grayish brown (10YR 3/2); very fine grained to very coarse grained, angular to subangular; and granule to very large pebbles, subangular to round; trace cobbles, subangular to subround; some mica; dry		
53	120								
54									
55				Topock - Fluvial Deposits	SM		(59.0 - 62.0') Topock - Fluvial Deposits; Silty sand (SM); brown (10YR 5/3); very fine grained to very coarse grained, angular to subround; little silt; little clay; trace granule to large pebbles, angular to subround;		
56									
57									
58									
59									
60									

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Date Started:	<u>10/03/2018</u>	Surface Elevation:	<u>530.0 ft amsl</u>	Boring No.: <u>MW-Ld</u>	
Date Completed:	<u>11/27/2018</u>	Northing (NAD83):	<u>2102858.8</u>		
Drilling Co.:	<u>Cascade</u>	Easting (NAD83):	<u>7615264.9</u>	Client:	<u>PG&E</u>
Drilling Method:	<u>Sonic Drilling</u>	Total Depth:	<u>315 ft bgs</u>	Project:	<u>Final Groundwater Remedy Phase</u>
Drill Rig Type:	<u>Terrasonic track mount</u>	Borehole Diameter:	<u>4-12 inches</u>	Location:	<u>1</u>
Driller Name:	<u>Dan O'Mara</u>	Depth to First Water:	<u>76.27 ft bgs</u>	<u>PG&E Topock, Needles, California</u>	
Drilling Asst:	<u>E. Huellmantel / J. Campbell</u>	Sampling Method:	<u>4 inch x 10 ft Core Barrel</u>	Project Number: <u>RC000753.0051</u>	
Logger:	<u>S. McGrane / G. Jeffers</u>	Sampling Interval:	<u>Continuous</u>		
Editor:	<u>Sean McGrane</u>	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
61	120	No sieve samples collected		Topock - Fluvial Deposits	SM		dry		
62				Topock - Fluvial Deposits	GW		(62.0 - 65.5') Topock - Fluvial Deposits; Well graded gravel with sand (GW); light brownish gray / pale yellowish brown(10YR 6/2); granules to small cobbles, angular to subround; little very fine to very coarse grained sand, angular to subround; trace boulders, angular to subangular; dry		
63									
64									
65	Topock - Fluvial Deposits			SM		(65.5 - 67.0') Topock - Fluvial Deposits; Silty sand with gravel (SM); dark grayish brown / dark yellowish brown(10YR 4/2); very fine grained to very coarse grained, angular to subround; little granule to large pebbles, angular to subangular; little silt; little clay; trace cobbles, angular; dry			
66									
67									
68	Topock - Fluvial Deposits			SW-SM		(67.0 - 69.0') Topock - Fluvial Deposits; Well graded gravel with silt (SW-SM); light brownish gray / pale yellowish brown(10YR 6/2); very fine grained to very coarse grained, angular to subangular; little silt; trace granule to medium pebbles, subangular to round; dry			
69									
70									
71	120			Topock - Fluvial Deposits	SM		(69.0 - 79.5') Topock - Fluvial Deposits; Silty sand with gravel (SM); brown (7.5YR 5/3); fine grained to very coarse grained, subangular to subround; little granule to very large pebbles, subangular to round; little silt; trace cobbles, angular to subangular; trace boulders, subangular to well-round; little mica; dry		
72									
73									
74									
75									
76									
77	(76.0') Approximate depth of water table			(76.0 - 86.0') 60 gal of water used					
78									
79									
80									
81	Topock - Alluvium	ML		(79.5 - 80.0') Topock - Alluvium Deposits; Sandy silt with gravel (ML);					

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Date Started: 10/03/2018	Surface Elevation: 530.0 ft amsl	Boring No.: MW-Ld
Date Completed: 11/27/2018	Northing (NAD83): 2102858.8	
Drilling Co.: Cascade	Easting (NAD83): 7615264.9	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 315 ft bgs	Project: Final Groundwater Remedy Phase
Drill Rig Type: Terrasonic track mount	Borehole Diameter: 4-12 inches	Location: 1
Driller Name: Dan O'Mara	Depth to First Water: 76.27 ft bgs	PG&E Topock, Needles, California
Drilling Asst: E. Huellmantel / J. Campbell	Sampling Method: 4 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger: S. McGrane / G. Jeffers	Sampling Interval: Continuous	
Editor: Sean McGrane	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
81	120			Deposits			reddish brown(2.5YR 4/3) with reddish brown (5YR 5/3); no plasticity; some very fine to very coarse grained sand, subangular to subround; little granule to very large pebbles, subround to round; wet		(76.0 - 86.0') 60 gal of water used
82				Topock - Alluvium Deposits	SM		(80.0 - 82.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); dark grayish brown / dark yellowish brown(10YR 4/2); very fine grained to very coarse grained, angular to subangular; some granule to large pebbles, angular to subround; some silt; wet		
83				Topock - Alluvium Deposits	SM		(82.5 - 86.0') Topock - Alluvium Deposits; Silty sand (SM); grayish brown (10YR 5/2); very fine grained to very coarse grained, angular to subangular; and silt; trace granule to very large pebbles, angular to subangular; trace cobbles, angular; trace clay; some caliche; dry; strong cementation		(86.0 - 96.0') 20 gal of water used
84									
85	120	No sieve samples collected		Topock - Alluvium Deposits	SM		(86.0 - 93.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); dark grayish brown / dark yellowish brown(10YR 4/2); very fine grained to very coarse grained, angular to subangular; some silt; little granule to very large pebbles, angular to subangular; little clay; moist; moderate cementation		
86									
87									
88									
89				Topock - Alluvium Deposits	SM		(89.5'); decrease in granules to large pebbles, increase in silt		
90									
91									
92									
93	234			Topock - Alluvium Deposits	ML		(93.5 - 94.0') Topock - Alluvium Deposits; Sandy silt with gravel (ML); grayish brown (2.5Y 5/2); no plasticity; some very fine to very coarse grained sand, angular to subround; little granule to large pebbles, angular to subround; little silt; little clay; wet; weak cementation		(96.0 - 106.0') 50 gal of water used
94					SM		(94.0 - 95.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); dark grayish brown / dark yellowish brown(10YR 4/2); very fine grained to very coarse grained, angular to subangular; some silt; little granule to large pebbles, angular to subangular; little clay; trace cobbles, angular to subangular; moist; moderate cementation		
95				Topock - Alluvium Deposits	ML		(95.0 - 112.0') Topock - Alluvium Deposits; Sandy silt with gravel (ML); grayish brown (2.5Y 5/2); no plasticity; some very fine to very coarse grained sand, angular to subangular; little granule to very large pebbles, angular to subangular; trace clay; trace mica; wet; strong cementation		
96							(96'); moist to dry; iron oxide staining; increase in granules to very large pebbles, decrease in sand, increase in silt, decrease in clay		
97									
98									
99									
100									

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Date Started:	10/03/2018	Surface Elevation:	530.0 ft amsl	Boring No.: MW-Ld	
Date Completed:	11/27/2018	Northing (NAD83):	2102858.8		
Drilling Co.:	Cascade	Easting (NAD83):	7615264.9	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	315 ft bgs	Project:	Final Groundwater Remedy Phase
Drill Rig Type:	Terrasonic track mount	Borehole Diameter:	4-12 inches	Location:	1
Driller Name:	Dan O'Mara	Depth to First Water:	76.27 ft bgs	PG&E Topock, Needles, California	
Drilling Asst:	E. Huellmantel / J. Campbell	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number: RC000753.0051	
Logger:	S. McGrane / G. Jeffers	Sampling Interval:	Continuous		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
101									(96.0 - 106.0') 50 gal of water used
102									
103									
104									
105									
106				Topock - Alluvium Deposits	ML		(106'); wet; moderate cementation; iron oxide staining; decrease in granules to large pebbles, increase in sand		(106.0 - 116.0') 100 gal of water used
107							(107'); moist to dry; strong cementation; iron oxide staining; increase in granules to large pebbles, decrease in sand		
108	234		MW-L-VAS-106-111 (0.84 ppb) 10/9/2018 11:46						
109		No sieve samples collected							
110									
111									
112									
113				Topock - Alluvium Deposits	ML		(112.0 - 114.0') Topock - Alluvium Deposits; Sandy silt with gravel (ML); brown (10YR 5/3) little dark reddish brown (2.5YR 3/4); no plasticity; some granule to very large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subangular; trace clay; trace mica; little caliche; moist to dry; strong cementation; iron oxide staining		
114									
115							(114.0 - 121.0') Topock - Alluvium Deposits; Sandy silt with gravel (ML); grayish brown (2.5Y 5/2); no plasticity; some very fine to very coarse grained sand, angular to subangular; little granule to very large pebbles, angular to subangular; trace clay; trace mica; with caliche; moist; moderate cementation; iron oxide staining		
116									
117				Topock - Alluvium Deposits	ML		(116') brown (10YR 4/3); no caliche; iron oxide staining		(116.0 - 126.0') 130 gal of water used
118	108								
119									
120									






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Date Started:	10/03/2018	Surface Elevation:	530.0 ft amsl	Boring No.: MW-Ld	
Date Completed:	11/27/2018	Northing (NAD83):	2102858.8		
Drilling Co.:	Cascade	Easting (NAD83):	7615264.9	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	315 ft bgs	Project:	Final Groundwater Remedy Phase
Drill Rig Type:	Terrasonic track mount	Borehole Diameter:	4-12 inches	Location:	1
Driller Name:	Dan O'Mara	Depth to First Water:	76.27 ft bgs	PG&E Topock, Needles, California	
Drilling Asst:	E. Huellmantel / J. Campbell	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number: RC000753.0051	
Logger:	S. McGrane / G. Jeffers	Sampling Interval:	Continuous		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
121	108			Topock - Alluvium Deposits	ML				(116.0 - 126.0') 130 gal of water used
122				Topock - Alluvium Deposits	ML		(121.0 - 126.0') Topock - Alluvium Deposits; Sandy silt with gravel (ML); brown (10YR 4/3) and reddish brown / moderate brown (5YR 4/4); no plasticity; some granule to very large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subangular; trace mica; trace caliche; moist; strong cementation; iron oxide staining		
123									
124									
125	No sieve samples collected			Topock - Alluvium Deposits	ML		(126.0 - 131.0') Topock - Alluvium Deposits; Sandy silt with gravel (ML); dark grayish brown / dark yellowish brown (10YR 4/2); no plasticity; some granule to very large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subangular; trace clay; little mica; moist; weak cementation; iron oxide staining		(126.0 - 136.0') 140 gal of water used
126									
127				Topock - Alluvium Deposits	ML				
128									
129									
130				Topock - Alluvium Deposits	ML		(131.0 - 139.5') Topock - Alluvium Deposits; Sandy silt with gravel (ML); dark yellowish brown (10YR 4/4); no plasticity; some very fine to very coarse grained sand, angular to subangular; little granule to large pebbles, angular to subangular; little clay; little mica; wet; iron oxide staining		
131							(132'); some granule to large pebbles, angular to subangular; trace clay; iron oxide staining; decrease sand, increase silt		
132									
133									
134									
135				Topock - Alluvium Deposits	ML		(136'); iron oxide staining; increase gravel, decrease silt		(136.0 - 146.0') 60 gal of water used
136									
137									
138									
139				Topock - Alluvium Deposits	ML				
140							(139.5 - 146.0') Topock - Alluvium Deposits; Gravelly silt with sand		

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Date Started:	<u>10/03/2018</u>	Surface Elevation:	<u>530.0 ft amsl</u>	Boring No.: <u>MW-Ld</u>	
Date Completed:	<u>11/27/2018</u>	Northing (NAD83):	<u>2102858.8</u>		
Drilling Co.:	<u>Cascade</u>	Easting (NAD83):	<u>7615264.9</u>	Client:	<u>PG&E</u>
Drilling Method:	<u>Sonic Drilling</u>	Total Depth:	<u>315 ft bgs</u>	Project:	<u>Final Groundwater Remedy Phase</u>
Drill Rig Type:	<u>Terrasonic track mount</u>	Borehole Diameter:	<u>4-12 inches</u>	Location:	<u>1</u>
Driller Name:	<u>Dan O'Mara</u>	Depth to First Water:	<u>76.27 ft bgs</u>	<u>PG&E Topock, Needles, California</u>	
Drilling Asst:	<u>E. Huellmantel / J. Campbell</u>	Sampling Method:	<u>4 inch x 10 ft Core Barrel</u>	Project Number: <u>RC000753.0051</u>	
Logger:	<u>S. McGrane / G. Jeffers</u>	Sampling Interval:	<u>Continuous</u>		
Editor:	<u>Sean McGrane</u>	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
141	182.4		MW-L-VAS-141-146 (<0.033 U ppb) 10/10/2018 14:58	Topock - Alluvium Deposits	ML		(ML); brown (10YR 4/3); no plasticity; some granule to very large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subangular; trace mica; wet; iron oxide staining		(136.0 - 146.0') 60 gal of water used
142									
143									
144									
145									
146	120	No sieve samples collected		Topock - Alluvium Deposits	SM		(146.0 - 151.0') Topock - Alluvium Deposits; Sandy silt with gravel (SM); dark grayish brown / dark yellowish brown(10YR 4/2); very fine grained to very coarse grained, angular to subangular; some granule to very large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subangular; little silt; trace cobbles, angular; trace mica; dry; weak cementation	(146.0') Seepage from outside conductor casing, pull 6" casing and 7" conductor casing and install 12" conductor casing	(146.0 - 156.0') 40 gal of water used
147									
148									
149									
150				Topock - Alluvium Deposits	SM		(151.0 - 153.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (10YR 4/3); very fine grained to very coarse grained, angular to subround; some granule to very large pebbles, angular to subangular; some silt; little clay; trace cobbles, angular; trace mica; wet; weak cementation; iron oxide staining		
151									
152									
153									
154				Topock - Alluvium Deposits	GM		(153.0 - 154.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); brown (10YR 4/3); granules to very large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subangular; some silt; trace mica; moist; weak cementation; iron oxide staining		
155									
156									
157									
158	Topock - Alluvium Deposits	SM		(154.0 - 155.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (10YR 4/3); very fine grained to very coarse grained, angular to subround; some granule to very large pebbles, angular to subangular; some silt; little clay; trace cobbles, angular; trace mica; wet; moderate cementation; iron oxide staining					
159									
160									
157	120			Topock - Alluvium Deposits	GM		(155.0 - 156.0') Topock - Alluvium Deposits; Sandy silt with gravel (ML); brown (10YR 4/3); low plasticity; some granule to very large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subangular; little clay; trace mica; moist; strong cementation; iron oxide staining	(156.0') Refill casing (110 gallons) after sampling from 261-266ft bgs	(156.0 - 166.0') 50 gal of water used
158									
159									
160									
							(156.0 - 157.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); brown (10YR 4/3); granules to very large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subangular; little silt; little clay; trace mica; wet; weak cementation; iron oxide staining		
							(157.0 - 163.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (10YR 4/3); very fine grained to very coarse grained, angular to subround; some granule to very large pebbles, angular to subangular; some silt; little clay; trace mica; moist; strong cementation;		

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = No Recovery, blue water table symbol represents depth to water measured during the second VAS interval

Date Started: <u>10/03/2018</u>	Surface Elevation: <u>530.0 ft amsl</u>	Boring No.: <u>MW-Ld</u>
Date Completed: <u>11/27/2018</u>	Northing (NAD83): <u>2102858.8</u>	
Drilling Co.: <u>Cascade</u>	Easting (NAD83): <u>7615264.9</u>	Client: <u>PG&E</u>
Drilling Method: <u>Sonic Drilling</u>	Total Depth: <u>315 ft bgs</u>	Project: <u>Final Groundwater Remedy Phase</u>
Drill Rig Type: <u>Terrasonic track mount</u>	Borehole Diameter: <u>4-12 inches</u>	Location: <u>1</u>
Driller Name: <u>Dan O'Mara</u>	Depth to First Water: <u>76.27 ft bgs</u>	<u>PG&E Topock, Needles, California</u>
Drilling Asst: <u>E. Huellmantel / J. Campbell</u>	Sampling Method: <u>4 inch x 10 ft Core Barrel</u>	Project Number: <u>RC000753.0051</u>
Logger: <u>S. McGrane / G. Jeffers</u>	Sampling Interval: <u>Continuous</u>	
Editor: <u>Sean McGrane</u>	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
161	120			Topock - Alluvium Deposits	SM		iron oxide staining		(156.0 - 166.0') 50 gal of water used
162									
163									
164				Topock - Alluvium Deposits	SM		(163.0 - 166.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (5YR 5/4); very fine grained to very coarse grained, angular to subangular; some granule to very large pebbles, angular to subangular; some silt; little clay; little mica; wet; weak cementation; iron oxide staining		
165									
166									
167				Topock - Alluvium Deposits	GM		(166.0 - 167.5') Topock - Alluvium Deposits; Silty gravel with sand (GM); brown (10YR 4/3); granules to boulders, angular to subangular; some very fine to very coarse grained sand, angular to subangular; little silt; little clay; some mica; wet; strong cementation; iron oxide staining		(166.0 - 176.0') 45 gal of water used
168									
169				Topock - Alluvium Deposits	SM		(167.5 - 170.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (10YR 4/3); very fine grained to very coarse grained, angular to subround; some granule to very large pebbles, angular to subangular; some silt; little clay; trace mica; wet; strong cementation; iron oxide staining		
170									
171									
172				Topock - Alluvium Deposits	GM		(170.0 - 174.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); brown (10YR 5/3); granules to boulders, angular to subangular; some very fine to very coarse grained sand, angular to subangular; little silt; trace clay; some mica; wet; strong cementation; iron oxide staining		
173									
174									
175				Topock - Alluvium Deposits	GM		(174.0 - 176.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); dark grayish brown / dark yellowish brown (10YR 4/2); granules to very large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subangular; some silt; little clay; some mica; wet; strong cementation		
176									
177	134.4			Topock - Alluvium Deposits	SM		(176.0 - 177.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 5/3); very fine grained to very coarse grained, angular to subangular; some small to very large pebbles, angular to subangular; some silt; little clay; little mica; wet; strong cementation; iron oxide staining		(176.0 - 186.0') 20 gal of water used
178									
179				Topock - Alluvium Deposits	SM		(177.5 - 181.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 5/3); very fine grained to very coarse grained, angular to subangular; some silt; little small to very large pebbles, angular to subangular; trace clay; little mica; wet; moderate cementation; iron oxide staining		
180									

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Date Started: <u>10/03/2018</u>	Surface Elevation: <u>530.0 ft amsl</u>	Boring No.: <u>MW-Ld</u>
Date Completed: <u>11/27/2018</u>	Northing (NAD83): <u>2102858.8</u>	
Drilling Co.: <u>Cascade</u>	Easting (NAD83): <u>7615264.9</u>	Client: <u>PG&E</u>
Drilling Method: <u>Sonic Drilling</u>	Total Depth: <u>315 ft bgs</u>	Project: <u>Final Groundwater Remedy Phase</u>
Drill Rig Type: <u>Terrasonic track mount</u>	Borehole Diameter: <u>4-12 inches</u>	Location: <u>1</u>
Driller Name: <u>Dan O'Mara</u>	Depth to First Water: <u>76.27 ft bgs</u>	<u>PG&E Topock, Needles, California</u>
Drilling Asst: <u>E. Huellmantel / J. Campbell</u>	Sampling Method: <u>4 inch x 10 ft Core Barrel</u>	Project Number: <u>RC000753.0051</u>
Logger: <u>S. McGrane / G. Jeffers</u>	Sampling Interval: <u>Continuous</u>	
Editor: <u>Sean McGrane</u>	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
181	134.4		MW-L-VAS-181-186 (3.3 ppb) 10/20/2018 11:06	Topock - Alluvium Deposits	SM				(176.0 - 186.0') 20 gal of water used
182				Topock - Alluvium Deposits	ML		(181.5 - 184.5') Topock - Alluvium Deposits; Sandy silt with gravel (ML); brown (10YR 5/3); medium plasticity; some granule to very large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subround; wet; iron oxide staining		
183				Topock - Alluvium Deposits	SM		(184.5 - 186.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (10YR 5/3); very fine grained to very coarse grained, angular to subround; some small to very large pebbles, angular to subangular; some silt; trace clay; some mica; wet; weak cementation; iron oxide staining		
184	No sieve samples collected			Topock - Alluvium Deposits	SM				(186.0 - 196.0') 35 gal of water used
185				Topock - Alluvium Deposits	ML		(186.5 - 188.5') Topock - Alluvium Deposits; Sandy silt with gravel (ML); brown (7.5YR 4/3); no plasticity; some granule to very large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subangular; little clay; moist; strong cementation; iron oxide staining		
186				Topock - Alluvium Deposits	SM		(188.5 - 195.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 5/4); very fine grained to very coarse grained, angular to subangular; some granule to very large pebbles, angular to subangular; some silt; little clay; some mica; dry to moist; strong cementation; iron oxide staining		
187				Topock - Alluvium Deposits	ML				
188				Topock - Alluvium Deposits	ML		(195.0 - 201.0') Topock - Alluvium Deposits; Sandy silt with gravel (ML); reddish brown / moderate brown(5YR 4/4) and brown (10YR 4/3); low plasticity; some granule to very large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subangular; trace clay; some mica; wet; stiff; mottled; weak cementation; iron oxide staining		(196.0 - 206.0') 20 gal of water used
189	120			Topock - Alluvium Deposits	ML				
190				Topock - Alluvium Deposits	ML				
191				Topock - Alluvium Deposits	ML				
192				Topock - Alluvium Deposits	ML				
193				Topock - Alluvium Deposits	ML				
194				Topock - Alluvium Deposits	ML				
195				Topock - Alluvium Deposits	ML				
196				Topock - Alluvium Deposits	ML				
197				Topock - Alluvium Deposits	ML				
198				Topock - Alluvium Deposits	ML				
199				Topock - Alluvium Deposits	ML				
200				Topock - Alluvium Deposits	ML				




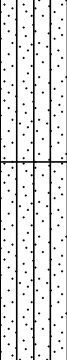
Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = No Recovery, blue water table symbol represents depth to water measured during the second VAS interval

Date Started: 10/03/2018	Surface Elevation: 530.0 ft amsl	Boring No.: MW-Ld
Date Completed: 11/27/2018	Northing (NAD83): 2102858.8	
Drilling Co.: Cascade	Easting (NAD83): 7615264.9	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 315 ft bgs	Project: Final Groundwater Remedy Phase
Drill Rig Type: Terrasonic track mount	Borehole Diameter: 4-12 inches	Location: 1
Driller Name: Dan O'Mara	Depth to First Water: 76.27 ft bgs	PG&E Topock, Needles, California
Drilling Asst: E. Huellmantel / J. Campbell	Sampling Method: 4 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger: S. McGrane / G. Jeffers	Sampling Interval: Continuous	
Editor: Sean McGrane	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
201	120			Topock - Alluvium Deposits	ML				(196.0 - 206.0') 20 gal of water used
202				Topock - Alluvium Deposits	SM		(201.0 - 205.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (10YR 5/3); very fine grained to very coarse grained, angular to subround; some granule to very large pebbles, angular to subround; some silt; trace clay; some mica; dry to moist; moderate cementation; iron oxide staining		
203									
204									
205				Topock - Alluvium Deposits	ML		(205.0 - 206.5') Topock - Alluvium Deposits; Sandy silt with gravel (ML); brown (10YR 5/3) and reddish brown / moderate brown (5YR 4/4); no plasticity; some granule to very large pebbles; some very fine to very coarse grained sand, angular to subangular; trace clay; little mica; wet; medium stiff; mottled; weak cementation; iron oxide staining		
206				Topock - Alluvium Deposits	GM		(206.5 - 208.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); dark grayish brown / dark yellowish brown (10YR 4/2); granules to very large pebbles, angular to subangular; some silt; little very fine to very coarse grained sand, angular to subangular; little clay; trace mica; moist; moderate cementation; iron oxide staining		(206.0 - 216.0') 40 gal of water used
207									
208									
209	133.2	No sieve samples collected		Topock - Alluvium Deposits	GM		(208.0 - 215.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); dark grayish brown / dark yellowish brown (10YR 4/2); granules to very large pebbles, angular to subangular; no plasticity; some very fine to very coarse grained sand, angular to subangular; some silt; little clay; trace mica; moist; moderate cementation; iron oxide staining		
210									
211									
212									
213	111.6			Topock - Alluvium Deposits	SM		(215.0 - 216.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 4/4) and reddish brown (5YR 5/4); very fine grained to very coarse grained, angular to subangular; some granule to very large pebbles, angular to subangular; some silt; trace mica; moist; mottled; weak cementation; iron oxide staining		
214				Topock - Alluvium Deposits	SM		(216.0 - 219.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown / moderate brown (5YR 4/4); very fine grained to very coarse grained, angular to subangular; some granule to very large pebbles, angular to subangular; some silt; little mica; wet; iron oxide staining		
215								(216.0') Driller's observed some heaving when tagging depths during reaming with 10-inch casing	(216.0 - 226.0') 125 gal of water used
216									
217									
218									
219									
220									

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Date Started:	10/03/2018	Surface Elevation:	530.0 ft amsl	Boring No.: MW-Ld	
Date Completed:	11/27/2018	Northing (NAD83):	2102858.8		
Drilling Co.:	Cascade	Easting (NAD83):	7615264.9	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	315 ft bgs	Project:	Final Groundwater Remedy Phase
Drill Rig Type:	Terrasonic track mount	Borehole Diameter:	4-12 inches	Location:	1
Driller Name:	Dan O'Mara	Depth to First Water:	76.27 ft bgs	PG&E Topock, Needles, California	
Drilling Asst:	E. Huellmantel / J. Campbell	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number: RC000753.0051	
Logger:	S. McGrane / G. Jeffers	Sampling Interval:	Continuous		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
221	111.6		MW-L-VAS-218-223 (66 ppb) 10/21/2018 10:50	Topock - Alluvium Deposits	GM		(GM); reddish brown / moderate brown(5YR 4/4); granules to very large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subround; some silt; little mica; wet; iron oxide staining		(216.0 - 226.0') 125 gal of water used (220.0 - 250.0') 1100 gal of water used
222				Topock - Weathered Bedrock - conglomerate	ML		(222.0 - 227.5') Topock - Weathered Bedrock - conglomerate; Sandy silt with gravel (ML); reddish brown (5YR 5/4) with gray / light olive gray(5Y 6/1); no plasticity; some granule to very large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subangular; trace clay; little mica; moist; stiff to very stiff; mottled; moderate cementation; iron oxide staining		
223							(227.5 - 236.0') Topock - Weathered Bedrock - conglomerate; Sandy silt with gravel (ML); reddish brown (5YR 5/4); no plasticity; some granules to very large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subangular; little clay; little mica; moist; stiff to very stiff; moderate cementation; iron oxide staining		
224							(230') yellowish red (5YR 4/6); dry; very stiff; strong cementation; iron oxide staining		
225	120	No sieve samples collected		Topock - Weathered Bedrock - conglomerate	ML		(233.5'); trace clay; iron oxide staining; increase in sand and silt		(226.0 - 236.0') 40 gal of water used
226									
227				Topock - Weathered Bedrock - conglomerate	ML		(236.0 - 240.0') Topock - Weathered Bedrock - conglomerate; Sandy silt with gravel (ML); reddish brown (5YR 5/4); no plasticity; some granule to very large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subangular; trace cobbles, subangular; trace clay; little mica; moist to wet; weak cementation; iron oxide staining		
228									
229	120								
230									
231									
232									
233	120								
234									
235									
236									
237	120								
238									
239									
240									

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Date Started: <u>10/03/2018</u>	Surface Elevation: <u>530.0 ft amsl</u>	Boring No.: <u>MW-Ld</u>
Date Completed: <u>11/27/2018</u>	Northing (NAD83): <u>2102858.8</u>	
Drilling Co.: <u>Cascade</u>	Easting (NAD83): <u>7615264.9</u>	Client: <u>PG&E</u>
Drilling Method: <u>Sonic Drilling</u>	Total Depth: <u>315 ft bgs</u>	Project: <u>Final Groundwater Remedy Phase</u>
Drill Rig Type: <u>Terrasonic track mount</u>	Borehole Diameter: <u>4-12 inches</u>	Location: <u>1</u>
Driller Name: <u>Dan O'Mara</u>	Depth to First Water: <u>76.27 ft bgs</u>	<u>PG&E Topock, Needles, California</u>
Drilling Asst: <u>E. Huellmantel / J. Campbell</u>	Sampling Method: <u>4 inch x 10 ft Core Barrel</u>	Project Number: <u>RC000753.0051</u>
Logger: <u>S. McGrane / G. Jeffers</u>	Sampling Interval: <u>Continuous</u>	
Editor: <u>Sean McGrane</u>	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
241	120			Topock - Weathered Bedrock - conglomerate	SM		(240.0 - 244.0') Topock - Weathered Bedrock - conglomerate; Silty sand with gravel (SM); reddish brown / moderate brown(5YR 4/4); very fine grained to very coarse grained, angular to subangular; some granule to very large pebbles, angular to subround; some silt; trace cobbles, subangular; little mica; wet; iron oxide staining		(220.0 - 250.0') 1100 gal of water used (226.1 - 246.0') 1100 gal of water used (226.1 - 246.0') 1100 gal of water used
242									
243									
244									
245				Topock - Weathered Bedrock - conglomerate	ML		(244.0 - 254.0') Topock - Weathered Bedrock - conglomerate; Sandy silt with gravel (ML); reddish brown / moderate brown(5YR 4/4); no plasticity; some granule to very large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subangular; little mica; moist to wet; medium stiff to stiff; iron oxide staining		(246.0 - 256.0') 40 gal of water used
246									
247									
248									
249	114	No sieve samples collected		Topock - Weathered Bedrock - conglomerate	ML				(250.0 - 256.0') 40 gal of water used
250									
251									
252									
253	108			Topock - Weathered Bedrock - conglomerate	ML		(254.0 - 258.0') Topock - Weathered Bedrock - conglomerate; Sandy silt with gravel (ML); reddish brown / moderate brown(5YR 4/4); no plasticity; some granule to very large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subangular; trace cobbles, angular; trace clay; little mica; moist; medium stiff to stiff; weak cementation; iron oxide staining		(256.0 - 266.0') 140 gal of water used
254									
255									
256									
257				Topock - Weathered Bedrock - conglomerate	ML		(258.0 - 262.5') Topock - Weathered Bedrock - conglomerate; Sandy silt with gravel (ML); reddish brown / moderate brown(5YR 4/4); medium plasticity; some granule to very large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subangular; little clay; little mica; moist; medium stiff to stiff; weak cementation; iron oxide staining		
258									
259									
260									






Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = No Recovery, blue water table symbol represents depth to water measured during the second VAS interval

Date Started: <u>10/03/2018</u>	Surface Elevation: <u>530.0 ft amsl</u>	Boring No.: <u>MW-Ld</u>
Date Completed: <u>11/27/2018</u>	Northing (NAD83): <u>2102858.8</u>	
Drilling Co.: <u>Cascade</u>	Easting (NAD83): <u>7615264.9</u>	Client: <u>PG&E</u>
Drilling Method: <u>Sonic Drilling</u>	Total Depth: <u>315 ft bgs</u>	Project: <u>Final Groundwater Remedy Phase</u>
Drill Rig Type: <u>Terrasonic track mount</u>	Borehole Diameter: <u>4-12 inches</u>	Location: <u>1</u>
Driller Name: <u>Dan O'Mara</u>	Depth to First Water: <u>76.27 ft bgs</u>	<u>PG&E Topock, Needles, California</u>
Drilling Asst: <u>E. Huellmantel / J. Campbell</u>	Sampling Method: <u>4 inch x 10 ft Core Barrel</u>	Project Number: <u>RC000753.0051</u>
Logger: <u>S. McGrane / G. Jeffers</u>	Sampling Interval: <u>Continuous</u>	
Editor: <u>Sean McGrane</u>	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
261	108	No sieve samples collected	MW-L-VAS-261-266 (<0.17 U ppb) 10/22/2018 14:50	Topock - Weathered Bedrock - conglomerate	ML		(261'); dry to moist; moderate cementation	(261.0 - 266.0') Sample collected with a disposable bailer	(256.0 - 266.0') 140 gal of water used
262									
263				(262.5 - 283.0') Topock - Weathered Bedrock - conglomerate; Sandy silt with gravel (ML); dark reddish brown (2.5YR 3/4); medium plasticity; some granule to very large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subangular; little clay; little mica; wet; medium stiff; iron oxide staining					
264									
265	138								(266.0 - 267.0') 30 gal of water used (267.0 - 276.0') 40 gal of water used
266									
267									
268									
269									
270									
271									
272									
273									
274									
275									
276									
277	120								
278									
279									
280									

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Date Started: <u>10/03/2018</u>	Surface Elevation: <u>530.0 ft amsl</u>	Boring No.: <u>MW-Ld</u>
Date Completed: <u>11/27/2018</u>	Northing (NAD83): <u>2102858.8</u>	
Drilling Co.: <u>Cascade</u>	Easting (NAD83): <u>7615264.9</u>	Client: <u>PG&E</u>
Drilling Method: <u>Sonic Drilling</u>	Total Depth: <u>315 ft bgs</u>	Project: <u>Final Groundwater Remedy Phase</u>
Drill Rig Type: <u>Terrasonic track mount</u>	Borehole Diameter: <u>4-12 inches</u>	Location: <u>1</u>
Driller Name: <u>Dan O'Mara</u>	Depth to First Water: <u>76.27 ft bgs</u>	<u>PG&E Topock, Needles, California</u>
Drilling Asst: <u>E. Huellmantel / J. Campbell</u>	Sampling Method: <u>4 inch x 10 ft Core Barrel</u>	Project Number: <u>RC000753.0051</u>
Logger: <u>S. McGrane / G. Jeffers</u>	Sampling Interval: <u>Continuous</u>	
Editor: <u>Sean McGrane</u>	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid		
281	120	No sieve samples collected		Topock - Weathered Bedrock - conglomerate	ML		(283.0 - 299.0') Topock - Weathered Bedrock - conglomerate; Gravelly silt with sand (ML); reddish brown / moderate brown(5YR 4/4); medium plasticity; some granule to very large pebbles, angular to subangular; little very fine to very coarse grained sand, angular to subangular; little silt; little clay; trace mica; moist; stiff; strong cementation				
282											
283											
284											
285											
286	120					Topock - Weathered Bedrock - conglomerate	ML				
287											
288											
289											
290											
291	120										
292											
293											
294											
295											
296	36										
297											
298											
299											
300					NR		(299.0 - 306.0') (NR); No Recovery, sample fell out of core barrel	(299.0') Attempted to collect GW			

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = No Recovery, blue water table symbol represents depth to water measured during the second VAS interval

Date Started: <u>10/03/2018</u>	Surface Elevation: <u>530.0 ft amsl</u>	Boring No.: <u>MW-Ld</u>
Date Completed: <u>11/27/2018</u>	Northing (NAD83): <u>2102858.8</u>	
Drilling Co.: <u>Cascade</u>	Easting (NAD83): <u>7615264.9</u>	Client: <u>PG&E</u>
Drilling Method: <u>Sonic Drilling</u>	Total Depth: <u>315 ft bgs</u>	Project: <u>Final Groundwater Remedy Phase</u>
Drill Rig Type: <u>Terrasonic track mount</u>	Borehole Diameter: <u>4-12 inches</u>	Location: <u>1</u>
Driller Name: <u>Dan O'Mara</u>	Depth to First Water: <u>76.27 ft bgs</u>	<u>PG&E Topock, Needles, California</u>
Drilling Asst: <u>E. Huellmantel / J. Campbell</u>	Sampling Method: <u>4 inch x 10 ft Core Barrel</u>	Project Number: <u>RC000753.0051</u>
Logger: <u>S. McGrane / G. Jeffers</u>	Sampling Interval: <u>Continuous</u>	
Editor: <u>Sean McGrane</u>	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
301	36	No sieve samples collected	--no sample-- (Interval did not produce) 10/25/2018 09:48		NR			sample but formation was non-permeable and produced no water.	
302									
303									
304									
305	18		(303.0 - 306.0') 6-inch casing got stuck and approximately 3 ft broke off down hole and could not be retrieved (304.0') Rough Drilling (305.0') Drill rods chattering						
306				(306.0 - 311.0') Topock - Weathered Bedrock - conglomerate; Sandy silt (ML); dark reddish brown(2.5YR 3/3); medium plasticity; some fine to medium grained sand, subangular to subround; trace granule to small pebbles, angular to subround; trace coarse-grained sand; trace mica; dry; very stiff; strong cementation					
307									
308									
309	84		(306.0 - 308.0') Drilled extra two feet to collect lost core, core sample was saturated with drilling/formation water above 307 ft. bgs						
310				(311.0 - 315.0') Topock - Bedrock - Metadiorite; dry; partially weathered metadiorite					
311									
312									
313	(311.0') Rough drilling								
314		(313.5') Core barrel stuck down hole, pulled both core barrel and 6" casing							
315									
End of Boring at 315.0 'bgs.									
316									
317									
318									
319									
320									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = No Recovery, blue water table symbol represents depth to water measured during the second VAS interval

Date Started:	12/03/2018	Surface Elevation:	529.6 ft amsl	Boring No.: MW-Ls	
Date Completed:	12/15/2018	Northing (NAD83):	2102862.2		
Drilling Co.:	Cascade	Easting (NAD83):	7615260.4	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	184 ft bgs	Project:	Final Groundwater Remedy Phase
Drill Rig Type:	Terrasonic track mount	Borehole Diameter:	10-12 inches	Location:	1
Driller Name:	Dan O'Mara	Depth to First Water:	74.65 ft bgs	PG&E Topock, Needles, California	
Drilling Asst:	E. Huellmantel / T. Wolfe	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number: RC000753.0051	
Logger:	Michael Andrews	Sampling Interval:	Screen intervals		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
1							(0.0 - 66.0'); No recovery cores not collected, see Boring Log MW-Ld for lithology	(0.0 - 18.0') Drilling rate 51.34 minutes, drill rods chattering 1 to 12 ft. bgs, rough drilling 12 to 18 ft. bgs	(0.0 - 184.0') No water used
2									
3									
4									
5									
6									
7								(6.0') Rough drilling due to 20-inch boulder	
8									
9								(8.0') Drilled slow due to 20-inch boulder	
10		No sieve samples collected							
11									
12									
13									
14									
15									
16									
17									
18									
19								(18.0 - 26.0') Drill time 21.11 minutes, voids forming, rough drilling, 6-inch to 20-inch boulder (19.0')	
20									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = No Recovery, blue water table symbol represents depth to water measured during drilling Note: water samples were collected from MW-Ld borehole.

Date Started: 12/03/2018	Surface Elevation: 529.6 ft amsl	Boring No.: MW-Ls
Date Completed: 12/15/2018	Northing (NAD83): 2102862.2	
Drilling Co.: Cascade	Easting (NAD83): 7615260.4	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 184 ft bgs	Project: Final Groundwater Remedy Phase
Drill Rig Type: Terrasonic track mount	Borehole Diameter: 10-12 inches	Location: 1
Driller Name: Dan O'Mara	Depth to First Water: 74.65 ft bgs	PG&E Topock, Needles, California
Drilling Asst: E. Huellmantel / T. Wolfe	Sampling Method: 4 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger: Michael Andrews	Sampling Interval: Screen intervals	
Editor: Sean McGrane	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
21								Formation collapsing (18.0 - 26.0') Drill time 21.11 minutes, voids forming, rough drilling, 6-inch to 20-inch boulder	(0.0 - 184.0') No water used
22									
23									
24								(24.0') Heavy rig chatter	
25									
26								(26.0 - 36.0') Drill time 10.35 minutes, rough drilling 31 to 36 ft bgs	
27									
28								(28.0') Voids forming	
29									
30		No sieve samples collected							
31									
32									
33									
34									
35									
36									
37								(36.0 - 56.0') Drill time 73.45 minutes, rough drilling, voids forming 38 to 40 ft. bgs and 46 to 56 ft. bgs (37.0') Rough drilling	
38									
39									
40									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = No Recovery, blue water table symbol represents depth to water measured during drilling Note: water samples were collected from MW-Ld borehole.

Date Started:	12/03/2018	Surface Elevation:	529.6 ft amsl	Boring No.: MW-Ls	
Date Completed:	12/15/2018	Northing (NAD83):	2102862.2		
Drilling Co.:	Cascade	Easting (NAD83):	7615260.4	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	184 ft bgs	Project:	Final Groundwater Remedy Phase
Drill Rig Type:	Terrasonic track mount	Borehole Diameter:	10-12 inches	Location:	1
Driller Name:	Dan O'Mara	Depth to First Water:	74.65 ft bgs	PG&E Topock, Needles, California	
Drilling Asst:	E. Huellmantel / T. Wolfe	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number: RC000753.0051	
Logger:	Michael Andrews	Sampling Interval:	Screen intervals		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
41								(36.0 - 56.0') Drill time 73.45 minutes, rough drilling, voids forming 38 to 40 ft. bgs and 46 to 56 ft. bgs	(0.0 - 184.0') No water used
42									
43									
44								(43.0') Rough drilling	
45									
46									
47									
48									
49									
50		No sieve samples collected							
51									
52									
53									
54									
55									
56									
57								(56.0 - 66.0') Drill time 17.05 minutes, voids forming, rough drilling 61 to 65 ft. bgs	
58									
59									
60									






Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = No Recovery, blue water table symbol represents depth to water measured during drilling Note: water samples were collected from MW-Ld borehole.

Date Started:	<u>12/03/2018</u>	Surface Elevation:	<u>529.6 ft amsl</u>	Boring No.: <u>MW-Ls</u>
Date Completed:	<u>12/15/2018</u>	Northing (NAD83):	<u>2102862.2</u>	
Drilling Co.:	<u>Cascade</u>	Easting (NAD83):	<u>7615260.4</u>	Client: <u>PG&E</u>
Drilling Method:	<u>Sonic Drilling</u>	Total Depth:	<u>184 ft bgs</u>	Project: <u>Final Groundwater Remedy Phase</u>
Drill Rig Type:	<u>Terrasonic track mount</u>	Borehole Diameter:	<u>10-12 inches</u>	Location: <u>1</u>
Driller Name:	<u>Dan O'Mara</u>	Depth to First Water:	<u>74.65 ft bgs</u>	<u>PG&E Topock, Needles, California</u>
Drilling Asst:	<u>E. Huellmantel / T. Wolfe</u>	Sampling Method:	<u>4 inch x 10 ft Core Barrel</u>	Project Number: <u>RC000753.0051</u>
Logger:	<u>Michael Andrews</u>	Sampling Interval:	<u>Screen intervals</u>	
Editor:	<u>Sean McGrane</u>	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
61								(56.0 - 66.0') Drill time 17.05 minutes, voids forming, rough drilling 61 to 65 ft. bgs (60.0') Heavy rig chatter	(0.0 - 184.0') No water used
62									
63									
64									
65									
66									
67				Topock - Fluvial Deposits	SM		(66.0 - 68.0') Topock - Fluvial Deposits; Silty sand with gravel (SM); brown (10YR 4/3); very fine grained to coarse grained, subangular to subround; some granule to large pebbles, angular to subangular; little silt; little clay; trace cobbles, angular; trace mica; dry to moist; no odor (67') yellowish brown / moderate yellowish brown (10YR 5/4); little granules to very large pebbles, angular to round; little cobbles, angular to round; trace clay; little mica; dry to moist; no odor	(66.0 - 70.0') Voids forming	
68									
69	72			Topock - Fluvial Deposits	SW-SM		(68.0 - 72.0') Topock - Fluvial Deposits; Well graded sand with silt and gravel (SW-SM); dark yellowish brown (10YR 4/4); fine grained to very coarse grained, angular to subround; some granule to large pebble, angular to subangular; some cobbles, angular to round; little silt; trace boulders, subangular to well-rounded; little mica; dry to moist		
70		No sieve samples collected							
71							(70.5') brown (10YR 4/3); little granule to large pebble, angular to round; trace cobbles, angular to round (71'); wet		
72									
73							(72.0 - 78.5') Topock - Fluvial Deposits; Silty sand with gravel (SM); brown (10YR 4/3); very fine grained to very coarse grained, subangular to round; some granule to very large pebble, angular to round; some silt; little cobbles, angular to subangular; little clay; little mica; dry to wet; dry to moist to wet with depth	(72.0 - 76.0') Rough drilling, drill rods chattering, drill time 24.30 minutes	
74	48						(74') angular to round; trace clay		
75				Topock - Fluvial Deposits	SM				
76									
77							(76') dark grayish brown / dark yellowish brown (10YR 4/2); some granule to very large pebble, angular to round; some silt; trace cobbles, subangular to subround; trace clay; trace mica; wet; no odor; increase in granules and very large pebbles (77'); 6" lens with increase in fines	(76.0') Approximate depth to water table	
78	63		MW-L-VAS-76-81 (31 ppb) 10/6/2018 16:34				(78'); 6" lens with increase in fines	(76.1 - 86.0') Drill time 24.45, 76.5 to 81 ft. bgs drill rods chattering, 78 to 84 ft hard/rough drilling	
79				Topock - Fluvial Deposits	GW-GM		(78.5 - 81.3') Topock - Fluvial Deposits; Well graded gravel with silt and sand (GW-GM); dark grayish brown / dark yellowish brown (10YR 4/2); granules to very large pebbles, angular to round; little cobbles, angular to round; little very fine to medium grained sand, subangular to round; trace boulders, boulder; trace silt; trace clay; wet; no odor		
80									

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Date Started:	<u>12/03/2018</u>	Surface Elevation:	<u>529.6 ft amsl</u>	Boring No.: <u>MW-Ls</u>	
Date Completed:	<u>12/15/2018</u>	Northing (NAD83):	<u>2102862.2</u>		
Drilling Co.:	<u>Cascade</u>	Easting (NAD83):	<u>7615260.4</u>	Client:	<u>PG&E</u>
Drilling Method:	<u>Sonic Drilling</u>	Total Depth:	<u>184 ft bgs</u>	Project:	<u>Final Groundwater Remedy Phase</u>
Drill Rig Type:	<u>Terrasonic track mount</u>	Borehole Diameter:	<u>10-12 inches</u>	Location:	<u>1</u>
Driller Name:	<u>Dan O'Mara</u>	Depth to First Water:	<u>74.65 ft bgs</u>	<u>PG&E Topock, Needles, California</u>	
Drilling Asst:	<u>E. Huellmantel / T. Wolfe</u>	Sampling Method:	<u>4 inch x 10 ft Core Barrel</u>	Project Number: <u>RC000753.0051</u>	
Logger:	<u>Michael Andrews</u>	Sampling Interval:	<u>Screen intervals</u>		
Editor:	<u>Sean McGrane</u>	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
81	63	No sieve samples collected		Topock - Fluvial Deposits	GW-GM			(76.1 - 86.0') Drill time 24.45, 76.5 to 81 ft. bgs drill rods chattering, 78 to 84 ft hard/rough drilling	(0.0 - 184.0') No water used
82				Topock - Alluvium Deposits	NR		(81.3 - 86.0') Topock - Alluvium Deposits; (NR); No recovery, boulder at 81.25 jammed up core barrel		
83									
84									
85									
86	108			Topock - Alluvium Deposits	SM		(86.0 - 94.5') Topock - Alluvium Deposits; Sandy silt with gravel (SM); (7.5R 4/3); very fine grained to very coarse grained, subangular to round; some silt; little granule to very large pebble, angular to subangular; trace clay; wet	(86.0 - 96.0') Soft drilling, drill time 21.30 minutes, core very wet	
87									
88									
89									
90									
91		Topock - Alluvium Deposits	SM		(94.5 - 96.0') Topock - Alluvium Deposits; Silty sand (SM); brown (7.5YR 4/3); very fine grained to coarse grained, angular to subround; and silt; little clay; trace granules to large pebbles, subangular to round; trace cobbles, angular to subangular; little mica; wet; no odor	(96.0 - 106.0') Drill time 15.01 minutes, drill rods chattering 96 to 101 ft. bgs, 102 to 106 soft drilling			
92									
93									
94									
95		NR	NR		(96.0 - 156.0') (NR); iron oxide staining; No recovery core not collected see Boring Log MW-Ld for lithology				
96									
97									
98									
99									
100									

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Date Started: 12/03/2018	Surface Elevation: 529.6 ft amsl	Boring No.: MW-Ls
Date Completed: 12/15/2018	Northing (NAD83): 2102862.2	
Drilling Co.: Cascade	Easting (NAD83): 7615260.4	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 184 ft bgs	Project: Final Groundwater Remedy Phase
Drill Rig Type: Terrasonic track mount	Borehole Diameter: 10-12 inches	Location: 1
Driller Name: Dan O'Mara	Depth to First Water: 74.65 ft bgs	PG&E Topock, Needles, California
Drilling Asst: E. Huellmantel / T. Wolfe	Sampling Method: 4 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger: Michael Andrews	Sampling Interval: Screen intervals	
Editor: Sean McGrane	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
101								(96.0 - 106.0') Drill time 15.01 minutes, drill rods chattering 96 to 101 ft. bgs, 102 to 106 soft drilling	(0.0 - 184.0') No water used
102									
103									
104									
105									
106									
107								(106.0 - 126.0') Drill time 20.15 minutes, soft drilling	
108			MW-L-VAS-106-111 (0.84 ppb) 10/9/2018 11:46						
109									
110		No sieve samples collected			NR				
111									
112									
113									
114									
115									
116									
117									
118									
119									
120									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = No Recovery, blue water table symbol represents depth to water measured during drilling Note: water samples were collected from MW-Ld borehole.

Date Started:	12/03/2018	Surface Elevation:	529.6 ft amsl	Boring No.: MW-Ls	
Date Completed:	12/15/2018	Northing (NAD83):	2102862.2		
Drilling Co.:	Cascade	Easting (NAD83):	7615260.4	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	184 ft bgs	Project:	Final Groundwater Remedy Phase
Drill Rig Type:	Terrasonic track mount	Borehole Diameter:	10-12 inches	Location:	1
Driller Name:	Dan O'Mara	Depth to First Water:	74.65 ft bgs	PG&E Topock, Needles, California	
Drilling Asst:	E. Huellmantel / T. Wolfe	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number: RC000753.0051	
Logger:	Michael Andrews	Sampling Interval:	Screen intervals		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
121								(106.0 - 126.0') Drill time 20.15 minutes, soft drilling	(0.0 - 184.0') No water used
122									
123									
124									
125									
126									
127								(126.0 - 146.0') Drill time 26.30, soft drilling	
128									
129									
130		No sieve samples collected			NR				
131									
132									
133									
134									
135									
136									
137									
138									
139									
140									


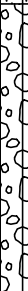



Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = No Recovery, blue water table symbol represents depth to water measured during drilling Note: water samples were collected from MW-Ld borehole.

Date Started:	12/03/2018	Surface Elevation:	529.6 ft amsl	Boring No.: MW-Ls	
Date Completed:	12/15/2018	Northing (NAD83):	2102862.2		
Drilling Co.:	Cascade	Easting (NAD83):	7615260.4	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	184 ft bgs	Project:	Final Groundwater Remedy Phase
Drill Rig Type:	Terrasonic track mount	Borehole Diameter:	10-12 inches	Location:	1
Driller Name:	Dan O'Mara	Depth to First Water:	74.65 ft bgs	PG&E Topock, Needles, California	
Drilling Asst:	E. Huellmantel / T. Wolfe	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number: RC000753.0051	
Logger:	Michael Andrews	Sampling Interval:	Screen intervals		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
141								(126.0 - 146.0') Drill time 26.30, soft drilling	(0.0 - 184.0') No water used
142									
143			MW-L-VAS-141-146 (<0.033 U ppb) 10/10/2018 14:58						
144									
145									
146									
147								(146.0 - 156.0') Drill rods chattering, drill time 15.05 minutes, drill time with 10-casing 30.20 minutes	
148					NR				
149									
150		No sieve samples collected							
151									
152									
153									
154									
155									
156									
157							(156.0 - 160.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); brown (10YR 4/3); granules to very large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subround; some silt; trace cobbles, angular to subangular; trace clay; wet	(156.0 - 166.0') Soft drilling, drill time 25.31 minutes, lost core barrel down hole	
158	117			Topock - Alluvium Deposits	GM				
159									
160							(159'); little very fine to very coarse grained sand, subangular to subround; wet; weak cementation; increase granules to very large pebbles		





Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = No Recovery, blue water table symbol represents depth to water measured during drilling Note: water samples were collected from MW-Ld borehole.

Date Started:	12/03/2018	Surface Elevation:	529.6 ft amsl	Boring No.: MW-Ls	
Date Completed:	12/15/2018	Northing (NAD83):	2102862.2		
Drilling Co.:	Cascade	Easting (NAD83):	7615260.4	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	184 ft bgs	Project:	Final Groundwater Remedy Phase
Drill Rig Type:	Terrasonic track mount	Borehole Diameter:	10-12 inches	Location:	1
Driller Name:	Dan O'Mara	Depth to First Water:	74.65 ft bgs	PG&E Topock, Needles, California	
Drilling Asst:	E. Huellmantel / T. Wolfe	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number: RC000753.0051	
Logger:	Michael Andrews	Sampling Interval:	Screen intervals		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
161	117	No sieve samples collected		Topock - Alluvium Deposits	SM		(160.0 - 163.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (5YR 4/3); very fine grained to very coarse grained, angular to round; little granule to large pebble, angular to subround; little silt; little clay; little mica; wet; no odor; weak cementation	(156.0 - 166.0') Soft drilling, drill time 25.31 minutes, lost core barrel down hole	(0.0 - 184.0') No water used
162									
163									
164									
165	Topock - Alluvium Deposits			GM		(163.5 - 167.5') Topock - Alluvium Deposits; Silty gravel with sand (GM); dark grayish brown / dark yellowish brown(10YR 4/2); granules to large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subangular; little silt; little clay; wet			
166									
167	Topock - Alluvium Deposits			SM		(167.5 - 170.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (10YR 4/3); very fine grained to very coarse grained, angular to subrounded; some granules to very large pebbles, angular to subangular; some silt; little clay; trace mica; wet; no odor	(166.0 - 182.5') Drill time 45.40 minutes, 175 to 179 ft. bgs rough drilling, 181 to 182.5 ft. bgs rough drilling		
168									
169									
170									
171	Topock - Alluvium Deposits			GM		(170.0 - 177.5') Topock - Alluvium Deposits; Silty gravel with sand (GM); brown (10YR 5/3); granules to very large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subangular; little silt; trace cobbles; trace boulders; trace clay; some mica; wet; strong cementation			
172									
173									
174						(174') dark grayish brown / dark yellowish brown(10YR 4/2); some silt; little clay; wet; strong cementation; decrease in granules to very large pebbles and sand			
175									
176						(176') brown (7.5YR 5/3); trace clay; little mica; wet; increase in silt			
177									
178		Topock - Alluvium Deposits	SM				(177.5 - 182.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 5/3); very fine grained to very coarse grained, angular; some small to very large pebbles, angular to subangular; some silt; little clay; little mica; wet; moderate cementation		
179									
180									

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Date Started:	12/03/2018	Surface Elevation:	529.6 ft amsl	Boring No.: MW-Ls	
Date Completed:	12/15/2018	Northing (NAD83):	2102862.2		
Drilling Co.:	Cascade	Easting (NAD83):	7615260.4	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	184 ft bgs	Project:	Final Groundwater Remedy Phase
Drill Rig Type:	Terrasonic track mount	Borehole Diameter:	10-12 inches	Location:	1
Driller Name:	Dan O'Mara	Depth to First Water:	74.65 ft bgs	PG&E Topock, Needles, California	
Drilling Asst:	E. Huellmantel / T. Wolfe	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number: RC000753.0051	
Logger:	Michael Andrews	Sampling Interval:	Screen intervals		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
181	198	No sieve samples collected	MW-L-VAS-181-186 (3.3 ppb) 10/20/2018 11:06	Topock - Alluvium Deposits	SM		(182.0 - 182.5') Topock - Alluvium Deposits; Silty sand (SM); (7.5R 4/3); very fine grained to very coarse grained, subangular to subround; and silt; trace granules to medium pebbles, angular to subangular; little mica; wet; no odor (182.5 - 184.0') Topock - Alluvium Deposits; (NR); No Recovery	(166.0 - 182.5') Drill time 45.40 minutes, 175 to 179 ft. bgs rough drilling, 181 to 182.5 ft. bgs rough drilling (182.4') Large boulder (182.5 - 184.0') Rough drilling	(0.0 - 184.0') No water used
182				Topock - Alluvium Deposits	SM				
183				Topock - Alluvium Deposits	NR				
184				Topock - Alluvium Deposits	NR				

End of Boring at 184.0 'bgs.

SOIL BORING LOG PG&E TOPOCK C:\USERS\MCGRANE\DOCUMENTS\PG&E TOPOCK\DRAFT BORING LOGS\GINT FILES\07.01.19\TOPOCK DATA TEMPLATE FOR FLOG.GDT 07/01/19 15:53

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = No Recovery, blue water table symbol represents depth to water measured during drilling Note: water samples were collected from MW-Ld borehole.

Date Started:	03/26/2019	Surface Elevation:	570.1 ft amsl	Well ID: MW-N-129
Date Completed:	04/12/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	569.9 ft amsl	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	2102321.2	Project: Final GW Remedy Phase I
Driller Name:	Dan O'Mara	Easting (NAD83):	7615448.1	Location: PG&E Topock, Needles, California
Drilling Asst:	E. Huellmantel / J. Pacheco	Borehole Diameter:	6-12 inches	
Logger:	D. Maurer/G. Willford	Water Level Start:	115.88 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	4/3/2019	
Total Depth:	133 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
1					(0.0 - 1.0') Concrete Pad (0.5 - 113.8') 2" PVC Sch 80 Casing		(0.0 - 1.0') 8 bags Note: 2.5 x 2.5 ft concrete pad with 18" dia lockable vault, King Kon-Crete 4000 PSI
2					(1.0 - 2.0') Cement		
3					(2.0 - 3.0') Portland Cement 5% Bentonite	(2.0 - 3.0') 5.5 gallons	(2.0 - 3.0') 3 gallons (-45%) Note: Topped off with Type I, II, and V and Hydrogel on 4/1/19.
4							
5							
6							
7							
8							
9							
10			NR				
11					(3.0 - 33.0') Portland Cement 5% Bentonite		
12						(3.0 - 33.0') 43.1 gallons	(3.0 - 33.0') 70 gallons (62%) Note: Portland cement type I, II, and V and Hydrogel - Wyoming bentonite.
13							
14							
15							
16							
17							
18					(17.5 - 18.5') Centralizer		
19							
20							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = No Recovery, blue water table symbol represents depth to water measured post development Note: water samples were collected from MW-Nd borehole

Date Started:	03/26/2019	Surface Elevation:	570.1 ft amsl	Well ID: MW-N-129
Date Completed:	04/12/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	569.9 ft amsl	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	2102321.2	Project: Final GW Remedy Phase I
Driller Name:	Dan O'Mara	Easting (NAD83):	7615448.1	Location: PG&E Topock, Needles, California
Drilling Asst:	E. Huellmantel / J. Pacheco	Borehole Diameter:	6-12 inches	
Logger:	D. Maurer/G. Willford	Water Level Start:	115.88 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	4/3/2019	
Total Depth:	133 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
21					(0.5 - 113.8') 2" PVC Sch 80 Casing		
22							
23							
24							
25							
26					(3.0 - 33.0') Portland Cement 5% Bentonite	(3.0 - 33.0') 43.1 gallons	(3.0 - 33.0') 70 gallons (62%) Note: Portland cement type I, II, and V and Hydrogel - Wyoming bentonite.
27							
28							
29							
30			NR		(5.0 - 133.0') 6" Borehole		
31							
32							
33							
34							
35							
36					(33.0 - 40.0') Bentonite seal chips	(33.0 - 40.0') 1.5 bags	(33.0 - 40.0') 1 bags (-33%) Note: Puregold & Enviro-Plug medium chips
37							
38							
39							
40							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = No Recovery, blue water table symbol represents depth to water measured post development Note: water samples were collected from MW-Nd borehole

Date Started:	03/26/2019	Surface Elevation:	570.1 ft amsl	Well ID: MW-N-129
Date Completed:	04/12/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	569.9 ft amsl	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	2102321.2	Project: Final GW Remedy Phase I
Driller Name:	Dan O'Mara	Easting (NAD83):	7615448.1	Location: PG&E Topock, Needles, California
Drilling Asst:	E. Huellmantel / J. Pacheco	Borehole Diameter:	6-12 inches	
Logger:	D. Maurer/G. Willford	Water Level Start:	115.88 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	4/3/2019	
Total Depth:	133 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
41					(0.5 - 113.8') 2" PVC Sch 80 Casing		
42							
43							
44							
45							
46							
47							
48							
49							
50			NR		(40.0 - 105.0') Portland Cement 5% Bentonite	(5.0 - 133.0') 6" Borehole	(40.0 - 105.0') 74.2 gallons
51							(40.0 - 105.0') 200 gallons (170%) Note: Portland cement type I, II, and V and Hydrogel - Wyoming bentonite.
52							
53							
54							
55							
56							
57							
58							
59							
60							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = No Recovery, blue water table symbol represents depth to water measured post development Note: water samples were collected from MW-Nd borehole

Date Started:	03/26/2019	Surface Elevation:	570.1 ft amsl	Well ID: MW-N-129
Date Completed:	04/12/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	569.9 ft amsl	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	2102321.2	Project: Final GW Remedy Phase I
Driller Name:	Dan O'Mara	Easting (NAD83):	7615448.1	Location: PG&E Topock, Needles, California
Drilling Asst:	E. Huellmantel / J. Pacheco	Borehole Diameter:	6-12 inches	
Logger:	D. Maurer/G. Willford	Water Level Start:	115.88 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	4/3/2019	
Total Depth:	133 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
61					(0.5 - 113.8') 2" PVC Sch 80 Casing		
62							
63							
64							
65							
66							
67							
68					(67.5 - 68.5') Centralizer		
69							
70			NR		(40.0 - 105.0') Portland Cement 5% Bentonite	(5.0 - 133.0') 6" Borehole	(40.0 - 105.0') 74.2 gallons
71							(40.0 - 105.0') 200 gallons (170%) Note: Portland cement type I, II, and V and Hydrogel - Wyoming bentonite.
72							
73							
74							
75							
76							
77							
78							
79							
80							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = No Recovery, blue water table symbol represents depth to water measured post development Note: water samples were collected from MW-Nd borehole

Date Started:	03/26/2019	Surface Elevation:	570.1 ft amsl	Well ID: MW-N-129
Date Completed:	04/12/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	569.9 ft amsl	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	2102321.2	Project: Final GW Remedy Phase I
Driller Name:	Dan O'Mara	Easting (NAD83):	7615448.1	Location: PG&E Topock, Needles, California
Drilling Asst:	E. Huellmantel / J. Pacheco	Borehole Diameter:	6-12 inches	
Logger:	D. Maurer/G. Willford	Water Level Start:	115.88 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	4/3/2019	
Total Depth:	133 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
81					(0.5 - 113.8') 2" PVC Sch 80 Casing		
82							
83							
84							
85							
86							
87							
88							
89							
90			NR		(40.0 - 105.0') Portland Cement 5% Bentonite	(5.0 - 133.0') 6" Borehole	(40.0 - 105.0') 74.2 gallons
91							(40.0 - 105.0') 200 gallons (170%) Note: Portland cement type I, II, and V and Hydrogel - Wyoming bentonite.
92							
93							
94							
95							
96							
97							
98							
99							
100							

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Date Started:	03/26/2019	Surface Elevation:	570.1 ft amsl	Well ID: MW-N-129
Date Completed:	04/12/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	569.9 ft amsl	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	2102321.2	Project: Final GW Remedy Phase I
Driller Name:	Dan O'Mara	Easting (NAD83):	7615448.1	Location: PG&E Topock, Needles, California
Drilling Asst:	E. Huellmantel / J. Pacheco	Borehole Diameter:	6-12 inches	
Logger:	D. Maurer/G. Willford	Water Level Start:	115.88 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	4/3/2019	
Total Depth:	133 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
101					(0.5 - 113.8') 2" PVC Sch 80 Casing		
102							
103			NR		(40.0 - 105.0') Portland Cement 5% Bentonite	(40.0 - 105.0') 74.2 gallons	(40.0 - 105.0') 200 gallons (170%) Note: Portland cement type I, II, and V and Hydrogel - Wyoming bentonite.
104							
105							
106							
107		Topock - Fluvial Deposits	GP		(105.0 - 112.0') Bentonite seal pellets	(105.0 - 112.0') 1.5 bags	(105.0 - 112.0') 1.3 bags (-13%) Note: Puregold & Enviro-Plug medium chips
108							
109							
110					(5.0 - 133.0') 6" Borehole		
111							
112		Topock - Fluvial Deposits	SM				
113							
114		Topock - Fluvial Deposits	GP		(113.8 - 129.0') 2" Sch 80 PVC (20-slot) Screen		
115							
116		Topock - Fluvial Deposits	SM		(112.0 - 133.0') Cemex #3 MESH (8x10)	(112.0 - 133.0') 5.6 bags	(112.0 - 133.0') 8 bags (43%) Note: Lapis Lustre Sand
117							
118							
119		Topock - Alluvium Deposits	SM				
120							




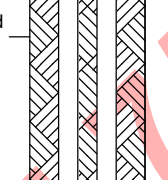

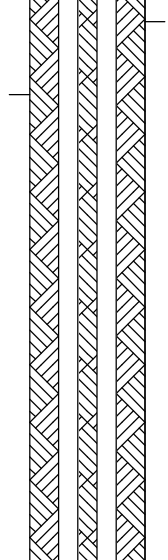
Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = No Recovery, blue water table symbol represents depth to water measured post development Note: water samples were collected from MW-Nd borehole

Date Started:	03/26/2019	Surface Elevation:	570.1 ft amsl	Well ID: MW-N-129
Date Completed:	04/12/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	569.9 ft amsl	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	2102321.2	Project: Final GW Remedy Phase I
Driller Name:	Dan O'Mara	Easting (NAD83):	7615448.1	Location: PG&E Topock, Needles, California
Drilling Asst:	E. Huellmantel / J. Pacheco	Borehole Diameter:	6-12 inches	
Logger:	D. Maurer/G. Willford	Water Level Start:	115.88 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	4/3/2019	
Total Depth:	133 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
121	MW-N-VAS-121.0-126.0 (0.51) 2/16/2019 14:09	Topock - Alluvium Deposits	SM		(113.8 - 129.0') 2" Sch 80 PVC (20-slot) Screen		
122							
123							
124		Topock - Alluvium Deposits	ML				
125							
126					(112.0 - 133.0') Cemex #3 MESH (8x10)	(5.0 - 133.0') 6" Borehole	(112.0 - 133.0') 5.6 bags
127							(112.0 - 133.0') 8 bags (43%) Note: Lapis Lustre Sand
128							
129		Topock - Alluvium Deposits	SM				
130					(129.5 - 130.5') Centralizer		
131		Topock - Fluvial Deposits	SM		(129.0 - 131.3') Sump and End Cap		
132							
133							
134					End of Boring at 133.0' bgs.		
135							
136							
137							
138							
139							
140							

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Date Started:	01/07/2019	Surface Elevation:	569.7 ft amsl	Well ID: MW-N-217, MW-N-237
Date Completed:	03/03/2019	Shallow Well Elevation:	569.4 ft amsl	
Drilling Co.:	Cascade	Deep Well Elevation:	569.5 ft amsl	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	2102325.9	Project: Final GW Remedy Phase I
Driller Name:	Dan O'Mara	Easting (NAD83):	7615441.5	Location: PG&E Topock, Needles, California
Drilling Asst:	E. Huellmantel / T. Wolfe	Borehole Diameter:	4-12 inches	
Logger:	P. Knightly/D. Maurer	Water Level Start:	114.51 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	4/2/2019	
Total Depth:	247 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction		Calculated Material Volumes	Material Volumes Installed
1		Topock - Fluvial Deposits	GW-GM		(0.0 - 1.0') Concrete Pad (0.6 - 196.7") 2" PVC Sch 80 Casing		(0.5 - 226.7") 2" PVC Sch 80 Casing	(0.0 - 1.0') 9 bags Note: 2.5 x 2.5 ft concrete pad with 18" dia. lockable vault, King Kon-Crete 4000 PSI
2					(1.0 - 3.0') Hole collapse	(0.0 - 5.0') 12" Borehole	Note: Surrounding native soil	
3								
4		Topock - Fluvial Deposits	GM		(3.0 - 7.0') Portland Cement 5% Bentonite		(3.0 - 7.0') 19 gallons	(3.0 - 7.0') 25 gallons (32%) Note: Topped off with Type I, II, and V with Hydrogel - Wyoming bentonite. on 4/1/19.
5								
6								
7		Topock - Fluvial Deposits	GW-GM		(7.0 - 107.0') Portland Cement 5% Bentonite		(7.0 - 107.0') 395.8 gallons	(7.0 - 107.0') 500 gallons (26%) Note: Portland cement type I, II, and V and Hydrogel - Wyoming bentonite.
8							(5.0 - 241.0') 10" Borehole	
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = No Recovery, blue water table symbol represents depth to water measured post development

Date Started:	01/07/2019	Surface Elevation:	569.7 ft amsl	Well ID: MW-N-217, MW-N-237
Date Completed:	03/03/2019	Shallow Well Elevation:	569.4 ft amsl	
Drilling Co.:	Cascade	Deep Well Elevation:	569.5 ft amsl	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	2102325.9	Project: Final GW Remedy Phase I
Driller Name:	Dan O'Mara	Easting (NAD83):	7615441.5	Location: PG&E Topock, Needles, California
Drilling Asst:	E. Huellmantel / T. Wolfe	Borehole Diameter:	4-12 inches	
Logger:	P. Knightly/D. Maurer	Water Level Start:	114.51 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	4/2/2019	
Total Depth:	247 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
21		Topock - Fluvial Deposits	GW-GM		(0.6 - 196.7') 2" PVC Sch 80 Casing		
22							
23		Topock - Fluvial Deposits	SP				
24							
25							
26							
27							
28			NR				
29							
30					(7.0 - 107.0') Portland Cement 5% Bentonite		(7.0 - 107.0') 500 gallons (26%) Note: Portland cement type I, II, and V and Hydrogel - Wyoming bentonite.
31		Topock - Fluvial Deposits	GW				
32							
33		Topock - Fluvial Deposits	SP				
34							
35							
36		Topock - Fluvial Deposits	SM				
37							
38		Topock - Fluvial Deposits	GW				
39							
40							




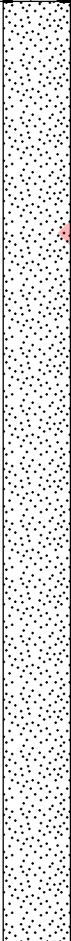
Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = No Recovery, blue water table symbol represents depth to water measured post development

Date Started:	01/07/2019	Surface Elevation:	569.7 ft amsl	Well ID: MW-N-217, MW-N-237
Date Completed:	03/03/2019	Shallow Well Elevation:	569.4 ft amsl	
Drilling Co.:	Cascade	Deep Well Elevation:	569.5 ft amsl	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	2102325.9	Project: Final GW Remedy Phase I
Driller Name:	Dan O'Mara	Easting (NAD83):	7615441.5	Location: PG&E Topock, Needles, California
Drilling Asst:	E. Huellmantel / T. Wolfe	Borehole Diameter:	4-12 inches	
Logger:	P. Knightly/D. Maurer	Water Level Start:	114.51 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	4/2/2019	
Total Depth:	247 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction			Calculated Material Volumes	Material Volumes Installed
41		Topock - Fluvial Deposits	GW		(0.6 - 196.7') 2" PVC Sch 80 Casing		(0.5 - 226.7') 2" PVC Sch 80 Casing		
42									
43									
44		Topock - Fluvial Deposits	GW						
45									
46									
47									
48									
49		Topock - Fluvial Deposits	GW						
50					(7.0 - 107.0') Portland Cement 5% Bentonite		(5.0 - 241.0') 10" Borehole	(7.0 - 107.0') 395.8 gallons	(7.0 - 107.0') 500 gallons (26%) Note: Portland cement type I, II, and V and Hydrogel - Wyoming bentonite.
51									
52									
53									
54									
55									
56		Topock - Fluvial Deposits	SW						
57									
58									
59									
60									

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Date Started:	01/07/2019	Surface Elevation:	569.7 ft amsl	Well ID: MW-N-217, MW-N-237
Date Completed:	03/03/2019	Shallow Well Elevation:	569.4 ft amsl	
Drilling Co.:	Cascade	Deep Well Elevation:	569.5 ft amsl	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	2102325.9	Project: Final GW Remedy Phase I
Driller Name:	Dan O'Mara	Easting (NAD83):	7615441.5	Location: PG&E Topock, Needles, California
Drilling Asst:	E. Huellmantel / T. Wolfe	Borehole Diameter:	4-12 inches	
Logger:	P. Knightly/D. Maurer	Water Level Start:	114.51 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	4/2/2019	
Total Depth:	247 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction			Calculated Material Volumes	Material Volumes Installed	
61		Topock - Fluvial Deposits	GW		(0.6 - 196.7') 2" PVC Sch 80 Casing			(0.5 - 226.7') 2" PVC Sch 80 Casing	(7.0 - 107.0') 395.8 gallons	(7.0 - 107.0') 500 gallons (26%) Note: Portland cement type I, II, and V and Hydrogel - Wyoming bentonite.
62										
63										
64										
65										
66										
67		Topock - Fluvial Deposits	SP		(7.0 - 107.0') Portland Cement 5% Bentonite	(5.0 - 241.0') 10" Borehole				
68										
69										
70										
71										
72										
73										
74										
75										
76										
77										
78										
79										
80										










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Date Started:	01/07/2019	Surface Elevation:	569.7 ft amsl	Well ID: MW-N-217, MW-N-237
Date Completed:	03/03/2019	Shallow Well Elevation:	569.4 ft amsl	
Drilling Co.:	Cascade	Deep Well Elevation:	569.5 ft amsl	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	2102325.9	Project: Final GW Remedy Phase I
Driller Name:	Dan O'Mara	Easting (NAD83):	7615441.5	Location: PG&E Topock, Needles, California
Drilling Asst:	E. Huellmantel / T. Wolfe	Borehole Diameter:	4-12 inches	
Logger:	P. Knightly/D. Maurer	Water Level Start:	114.51 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	4/2/2019	
Total Depth:	247 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
81			SP		(0.6 - 196.7') 2" PVC Sch 80 Casing		
82							
83							
84							
85							
86		Topock - Fluvial Deposits	GW				
87							
88							
89							
90					(7.0 - 107.0') Portland Cement 5% Bentonite	(5.0 - 241.0') 10" Borehole	(7.0 - 107.0') 395.8 gallons
91							(7.0 - 107.0') 500 gallons (26%) Note: Portland cement type I, II, and V and Hydrogel - Wyoming bentonite.
92							
93		Topock - Fluvial Deposits	SW				
94							
95							
96							
97		Topock - Fluvial Deposits	GP				
98							
99		Topock - Fluvial Deposits	GW				
100							




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Date Started:	01/07/2019	Surface Elevation:	569.7 ft amsl	Well ID: MW-N-217, MW-N-237
Date Completed:	03/03/2019	Shallow Well Elevation:	569.4 ft amsl	
Drilling Co.:	Cascade	Deep Well Elevation:	569.5 ft amsl	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	2102325.9	Project: Final GW Remedy Phase I
Driller Name:	Dan O'Mara	Easting (NAD83):	7615441.5	Location: PG&E Topock, Needles, California
Drilling Asst:	E. Huellmantel / T. Wolfe	Borehole Diameter:	4-12 inches	
Logger:	P. Knightly/D. Maurer	Water Level Start:	114.51 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	4/2/2019	
Total Depth:	247 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction			Calculated Material Volumes	Material Volumes Installed	
101		Topock - Fluvial Deposits	GW		(0.6 - 196.7') 2" PVC Sch 80 Casing		(0.5 - 226.7') 2" PVC Sch 80 Casing	(7.0 - 107.0') 395.8 gallons	(7.0 - 107.0') 500 gallons (26%) Note: Portland cement type I, II, and V and Hydrogel - Wyoming bentonite.	
102					(7.0 - 107.0') Portland Cement 5% Bentonite		(0.5 - 226.7') 2" PVC Sch 80 Casing			
103										
104										
105		Topock - Fluvial Deposits	GW-GM		(107.0 - 112.0') Bentonite seal chips		(5.0 - 241.0') 10" Borehole		(107.0 - 112.0') 3.7 bags	(107.0 - 112.0') 3 bags (-19%) Note: Enviroplug Medium Chips
106										
107										
108										
109										
110										
111										
112										
113	Topock - Fluvial Deposits	GW-GM		(112.0 - 185.0') High Solids Bentonite		(5.0 - 241.0') 10" Borehole		(112.0 - 185.0') 288.9 gallons	(112.0 - 185.0') 360 gallons (25%) Note: Enviroplug	
114										
115										
116										
117										
118										
119										
120										

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Date Started:	01/07/2019	Surface Elevation:	569.7 ft amsl	Well ID: MW-N-217, MW-N-237
Date Completed:	03/03/2019	Shallow Well Elevation:	569.4 ft amsl	
Drilling Co.:	Cascade	Deep Well Elevation:	569.5 ft amsl	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	2102325.9	Project: Final GW Remedy Phase I
Driller Name:	Dan O'Mara	Easting (NAD83):	7615441.5	Location: PG&E Topock, Needles, California
Drilling Asst:	E. Huellmantel / T. Wolfe	Borehole Diameter:	4-12 inches	
Logger:	P. Knightly/D. Maurer	Water Level Start:	114.51 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	4/2/2019	
Total Depth:	247 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
121	MW-N-VAS-121.0-126.0 (0.51) 2/16/2019 14:09	Topock - Alluvium Deposits	GM		(0.6 - 196.7') 2" PVC Sch 80 Casing		
122							
123							
124							
125							
126		Topock - Alluvium Deposits	GW-GM		(112.0 - 185.0') High Solids Bentonite	(112.0 - 185.0') 288.9 gallons	(112.0 - 185.0') 360 gallons (25%) Note: Enviroplug
127							
128							
129							
130							
131							
132							
133							
134							
135							
136		Topock - Alluvium Deposits	SM				
137							
138							
139							
140							

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Date Started:	01/07/2019	Surface Elevation:	569.7 ft amsl	Well ID: MW-N-217, MW-N-237
Date Completed:	03/03/2019	Shallow Well Elevation:	569.4 ft amsl	
Drilling Co.:	Cascade	Deep Well Elevation:	569.5 ft amsl	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	2102325.9	Project: Final GW Remedy Phase I
Driller Name:	Dan O'Mara	Easting (NAD83):	7615441.5	Location: PG&E Topock, Needles, California
Drilling Asst:	E. Huellmantel / T. Wolfe	Borehole Diameter:	4-12 inches	
Logger:	P. Knightly/D. Maurer	Water Level Start:	114.51 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	4/2/2019	
Total Depth:	247 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
141					(0.6 - 196.7') 2" PVC Sch 80 Casing		
142							
143							
144	MW-N-VAS-142.0-147.0 (<0.033 U) 2/16/2019 10:57	Topock - Alluvium Deposits	SM				
145							
146							
147							
148							
149							
150					(112.0 - 185.0') High Solids Bentonite		
151							
152							
153		Topock - Alluvium Deposits	GM				
154							
155							
156							
157							
158							
159							
160		Topock - Alluvium	GW				
					(5.0 - 241.0') 10" Borehole	(112.0 - 185.0') 288.9 gallons	(112.0 - 185.0') 360 gallons (25%) Note: Enviroplug

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Date Started:	01/07/2019	Surface Elevation:	569.7 ft amsl	Well ID: MW-N-217, MW-N-237
Date Completed:	03/03/2019	Shallow Well Elevation:	569.4 ft amsl	
Drilling Co.:	Cascade	Deep Well Elevation:	569.5 ft amsl	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	2102325.9	Project: Final GW Remedy Phase I
Driller Name:	Dan O'Mara	Easting (NAD83):	7615441.5	Location: PG&E Topock, Needles, California
Drilling Asst:	E. Huellmantel / T. Wolfe	Borehole Diameter:	4-12 inches	
Logger:	P. Knightly/D. Maurer	Water Level Start:	114.51 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	4/2/2019	
Total Depth:	247 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
		Deposits			(0.6 - 196.7') 2" PVC Sch 80 Casing		
161							
162							
163							
164		Topock - Alluvium Deposits	GM				
165							
166							
167							
168		Topock - Alluvium Deposits	SW				
169							
170					(112.0 - 185.0') High Solids Bentonite		
171		Topock - Alluvium Deposits	GM				
172							
173							
174		Topock - Alluvium Deposits	SW				
175	MW-N-VAS-173.0-178.0 (<0.033 U) 2/18/2019 09:20						
176							
177		Topock - Alluvium Deposits	GC				
178							
179							
180							

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Date Started:	01/07/2019	Surface Elevation:	569.7 ft amsl	Well ID: MW-N-217, MW-N-237
Date Completed:	03/03/2019	Shallow Well Elevation:	569.4 ft amsl	
Drilling Co.:	Cascade	Deep Well Elevation:	569.5 ft amsl	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	2102325.9	Project: Final GW Remedy Phase I
Driller Name:	Dan O'Mara	Easting (NAD83):	7615441.5	Location: PG&E Topock, Needles, California
Drilling Asst:	E. Huellmantel / T. Wolfe	Borehole Diameter:	4-12 inches	
Logger:	P. Knightly/D. Maurer	Water Level Start:	114.51 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	4/2/2019	
Total Depth:	247 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
181		Topock - Alluvium Deposits	GC		(0.6 - 196.7') 2" PVC Sch 80 Casing		
182		Topock - Alluvium Deposits	GW		(112.0 - 185.0') High Solids Bentonite	(112.0 - 185.0') 288.9 gallons	(112.0 - 185.0') 360 gallons (25%) Note: Enviroplug
183							
184		Topock - Alluvium Deposits	GC				
185							
186							
187		Topock - Alluvium Deposits	SC		(185.0 - 194.5') Bentonite seal pellets	(185.0 - 194.5') 8 bags	(185.0 - 194.5') 7.7 bags (-4%) Note: Pel-Plug (TR30) 3/8", added more bentonite pellets to avoid open borehole when removing 10 inch casing
188							
189		Topock - Alluvium Deposits	SC				
190							
191		Topock - Alluvium Deposits	GW		(192.0 - 221.0') Cemex #3 MESH (8x10)		
192							
193					(196.7 - 216.7') 2" Sch 80 PVC (20-slot) Screen	(194.5 - 221.0') 27 bags	(194.5 - 221.0') 31 bags (15%) Note: Lapis Lustre Sand
194		Topock - Alluvium Deposits	GC				
195							
196							
197							
198							
199							
200							

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Date Started:	01/07/2019	Surface Elevation:	569.7 ft amsl	Well ID: MW-N-217, MW-N-237
Date Completed:	03/03/2019	Shallow Well Elevation:	569.4 ft amsl	
Drilling Co.:	Cascade	Deep Well Elevation:	569.5 ft amsl	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	2102325.9	Project: Final GW Remedy Phase I
Driller Name:	Dan O'Mara	Easting (NAD83):	7615441.5	Location: PG&E Topock, Needles, California
Drilling Asst:	E. Huellmantel / T. Wolfe	Borehole Diameter:	4-12 inches	
Logger:	P. Knightly/D. Maurer	Water Level Start:	114.51 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	4/2/2019	
Total Depth:	247 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
201					(196.7 - 216.7') 2" Sch 80 PVC (20-slot) Screen		
202							
203							
204							
205							
206							
207							
208							
209		Topock - Alluvium Deposits	GC				
210					(192.0 - 221.0') Cemex #3 MESH (8x10)	(5.0 - 241.0') 10" Borehole	(194.5 - 221.0') 27 bags
211							(194.5 - 221.0') 31 bags (15%) Note: Lapis Lustre Sand
212	MW-N-VAS-210.0-215.0 (290) 2/21/2019 09:21						
213							
214							
215							
216							
217							
218		Topock - Weathered Bedrock - conglomerate	GC				
219					(216.7 - 219.0') Sump and End Cap		
220							

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Date Started:	01/07/2019	Surface Elevation:	569.7 ft amsl	Well ID: MW-N-217, MW-N-237
Date Completed:	03/03/2019	Shallow Well Elevation:	569.4 ft amsl	
Drilling Co.:	Cascade	Deep Well Elevation:	569.5 ft amsl	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	2102325.9	Project: Final GW Remedy Phase I
Driller Name:	Dan O'Mara	Easting (NAD83):	7615441.5	Location: PG&E Topock, Needles, California
Drilling Asst:	E. Huellmantel / T. Wolfe	Borehole Diameter:	4-12 inches	
Logger:	P. Knightly/D. Maurer	Water Level Start:	114.51 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	4/2/2019	
Total Depth:	247 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction		Calculated Material Volumes	Material Volumes Installed	
221	MW-N-VAS-228.0-233.0 (<0.17 U ppb) 2/26/2019 16:30	Topock - Weathered Bedrock - conglomerate	GC		(192.0 - 221.0') Cemex #3 MESH (8x10)	(0.5 - 226.7') 2" PVC Sch 80 Casing	(194.5 - 221.0') 27 bags	(194.5 - 221.0') 31 bags (15%) Note: Lapis Lustre Sand	
222					(221.0 - 225.0') Bentonite seal pellets		(226.7 - 236.7') 2" Sch 80 PVC (20-slot) Screen	(221.0 - 225.0') 3.5 bags	(221.0 - 225.0') 3.5 bags (0%) Note: Pel-Plug (TR30) 3/8"
223									
224									
225									
226	MW-N-VAS-228.0-233.0 (<0.17 U ppb) 2/26/2019 16:30	Topock - Weathered Bedrock - conglomerate	SW		(225.0 - 241.0') Cemex #3 MESH (8x10)	(5.0 - 241.0') 10" Borehole	(225.0 - 241.0') 17.8 bags	(225.0 - 241.0') 22 bags (24%) Note: Lapis Lustre Sand	
227									
228									
229									
230									
231									
232									
233									
234									
235									Topock - Weathered Bedrock - conglomerate
236									
237									
238									
239									
240									




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Date Started:	01/07/2019	Surface Elevation:	569.7 ft amsl	Well ID: MW-N-217, MW-N-237
Date Completed:	03/03/2019	Shallow Well Elevation:	569.4 ft amsl	
Drilling Co.:	Cascade	Deep Well Elevation:	569.5 ft amsl	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	2102325.9	Project: Final GW Remedy Phase I
Driller Name:	Dan O'Mara	Easting (NAD83):	7615441.5	Location: PG&E Topock, Needles, California
Drilling Asst:	E. Huellmantel / T. Wolfe	Borehole Diameter:	4-12 inches	
Logger:	P. Knightly/D. Maurer	Water Level Start:	114.51 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	4/2/2019	
Total Depth:	247 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
241		Topock - Weathered Bedrock - conglomerate	SC		(225.0 - 241.0') Cemex #3 MESH (8x10)	(225.0 - 241.0') 17.8 bags	(225.0 - 241.0') 22 bags (24%) Note: Lapis Lustre Sand
242							
243		Topock - Competent Bedrock - conglomerate	GM		(241.0 - 247.0') Bentonite seal chips	(241.0 - 247.0') 1.2 bags	(241.0 - 247.0') 1 bags (-17%) Note: Enviroplug Medium Chips, tagged bentonite at 240 drilled 10-inch casing to 241.
244							
245							
246							
247		Topock - Bedrock - metadiorite			End of Boring at 247.0' bgs.		
248							
249							
250							
251							
252							
253							
254							
255							
256							
257							
258							
259							
260							



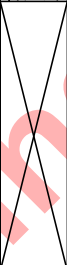

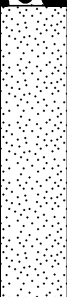
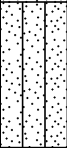

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Date Started:	01/07/2019	Surface Elevation:	569.7 ft amsl	Boring No.: <u>MW-Nd</u>	
Date Completed:	03/03/2019	Northing (NAD83):	2102325.9		
Drilling Co.:	Cascade	Easting (NAD83):	7615441.5	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	247 ft bgs	Project:	Final Groundwater Remedy Phase
Drill Rig Type:	Terrasonic track mount	Borehole Diameter:	4-12 inches	Location:	1
Driller Name:	Dan O'Mara	Depth to First Water:	114.51 ft bgs	PG&E Topock, Needles, California	
Drilling Asst:	E. Huellmantel / T. Wolfe	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number: RC000753.0051	
Logger:	P. Knightly/D. Maurer	Sampling Interval:	Continuous		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
1	72			Topock - Fluvial Deposits	GW-GM		(0.0 - 7.5') Topock - Fluvial Deposits; Well graded gravel with silt and sand (GW-GM); yellowish brown / moderate yellowish brown(10YR 5/4) some light brown (7.5YR 6/4); granules to very large pebbles, subangular to subround; some fine to very coarse grained sand, angular to subangular; little silt; trace cobbles, subangular to subround; some coarser clasts composed of metadiorite; dry	(0.0') Paul Knightly geologist on-site 0 to 107 ft bgs	
2									
3									
4									
5									
6									
7									
8	54			Topock - Fluvial Deposits	GM		(7.5 - 17.0') Topock - Fluvial Deposits; Silty gravel with sand (GM); dark grayish brown (2.5Y 4/2); granules to very large pebbles, angular to subround; some silt; little fine to very coarse grained sand; trace cobbles, angular to subround; some coarser clasts composed of metadiorite; dry		
9									
10									
11									
12									
13									
14									
15	90			Topock - Fluvial Deposits	GW-GM		(17.0 - 22.8') Topock - Fluvial Deposits; Well graded gravel with silt and sand (GW-GM); dark grayish brown / dark yellowish brown(10YR 4/2); granules to very coarse grained, subangular to subround; some fine to very coarse grained sand, subangular to subround; little silt; trace cobbles, subangular to subround; some coarser clasts composed of metadiorite; dry		
16									
17									
18									
19									
20									





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Date Started:	01/07/2019	Surface Elevation:	569.7 ft amsl	Boring No.: <u>MW-Nd</u>	
Date Completed:	03/03/2019	Northing (NAD83):	2102325.9		
Drilling Co.:	Cascade	Easting (NAD83):	7615441.5	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	247 ft bgs	Project:	Final Groundwater Remedy Phase
Drill Rig Type:	Terrasonic track mount	Borehole Diameter:	4-12 inches	Location:	1
Driller Name:	Dan O'Mara	Depth to First Water:	114.51 ft bgs	PG&E Topock, Needles, California	
Drilling Asst:	E. Huellmantel / T. Wolfe	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number: RC000753.0051	
Logger:	P. Knightly/D. Maurer	Sampling Interval:	Continuous		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
21	90			Topock - Fluvial Deposits	GW-GM				
22									
23				Topock - Fluvial Deposits	SP		(22.8 - 27.0') Topock - Fluvial Deposits; Poorly graded sand with gravel (SP); reddish yellow (7.5YR 6/6); fine grained to medium grained; little granules to very large pebbles, angular to subangular; little coarser clasts composed of metadiorite; dry		
24									
25	87.6						(25.6') and granules to large pebbles, angular to subround; little coarser clasts composed of metadiorite; dry; decrease in sand		
26							(26.2'); little granules to very large pebbles, angular to subangular; increase in sand		
27									
28									
29	96				NR		(27.0 - 30.7') (NR); No recovery		
30									
31				Topock - Fluvial Deposits	GW		(30.7 - 33.0') Topock - Fluvial Deposits; Well graded gravel with sand (GW); dark grayish brown / dark yellowish brown (10YR 4/2); granules to very large pebbles; little fine to very coarse grained sand, angular to subangular; trace cobbles; trace silt; little coarser clasts composed of metadiorite; dry		
32									
33				Topock - Fluvial Deposits	SP		(33.0 - 37.0') Topock - Fluvial Deposits; Poorly graded sand with gravel (SP); reddish yellow (7.5YR 6/6); fine grained to medium grained; little granules to very large pebbles, angular to subangular; little coarser clasts composed of metadiorite; dry		
34									
35							(36') brown (7.5YR 4/2); trace silt; trace clay; decrease in sand		
36									
37				Topock - Fluvial Deposits	SM		(37.0 - 39.0') Topock - Fluvial Deposits; Well graded gravel (SM); light brownish gray / pale yellowish brown (10YR 6/2); fine grained to very coarse grained, angular to subangular; little granules to large pebbles, subangular to subround; little silt; trace clay; some coarser clasts composed of metadiorite; moist; weak cementation; moisture from drilling fluid	(37.0 - 47.0') Rough drilling, formation collapse, drilling water was used could not determine quantity	(37.0') gal of water used
38									
39				Topock - Fluvial Deposits	GW		(39.0 - 41.0') Topock - Fluvial Deposits; Well graded gravel with sand (GW); grayish brown (2.5Y 5/2); granules to very large pebbles, angular to subround; little fine to very coarse grained sand, angular to		
40									


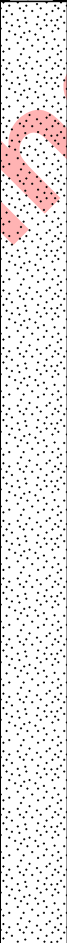
Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = No Recovery, blue water table symbol represents depth to water measured during second VAS interval

Date Started:	01/07/2019	Surface Elevation:	569.7 ft amsl	Boring No.: MW-Nd	
Date Completed:	03/03/2019	Northing (NAD83):	2102325.9		
Drilling Co.:	Cascade	Easting (NAD83):	7615441.5	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	247 ft bgs	Project:	Final Groundwater Remedy Phase
Drill Rig Type:	Terrasonic track mount	Borehole Diameter:	4-12 inches	Location:	1
Driller Name:	Dan O'Mara	Depth to First Water:	114.51 ft bgs	PG&E Topock, Needles, California	
Drilling Asst:	E. Huellmantel / T. Wolfe	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number: RC000753.0051	
Logger:	P. Knightly/D. Maurer	Sampling Interval:	Continuous		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
41	96			Topock - Fluvial Deposits	GW		subangular; trace cobbles, angular to subround; trace silt; and coarser clasts composed of metadiorite; dry	(37.0 - 47.0') Rough drilling, fromation collapse, drilling water was used could not determine quantity	
42				Topock - Fluvial Deposits	GW		(41.0 - 47.0') Topock - Fluvial Deposits; Well graded gravel with sand (GW); dark gray (2.5Y 4/1); granules to very large pebbles, angular to subround; little fine to very coarse grained sand, angular to subround; trace cobbles, angular to subround; trace silt; trace clay		
43									
44									
45									
46									
47									
48	120			Topock - Fluvial Deposits	GW		(47.0 - 52.0') Topock - Fluvial Deposits; Well graded gravel with sand (GW); dark grayish brown / dark yellowish brown(10YR 4/2); granules to very large pebbles, subangular to round; little very fine to coarse grained sand, subangular to subround; trace cobbles, subangular to round; trace silt; moist; moisture from drilling fluid	(47.0 - 67.0') Drilling water was used could not determine quantity	
49									
50									
51									
52				Topock - Fluvial Deposits	SW		(52.0 - 60.0') Topock - Fluvial Deposits; Well graded sand with gravel (SW); brown (7.5YR 5/3); fine grained to coarse grained, subangular to subround; little granules to large pebbles, subangular to round; little silt; little coarser clast composed of conglomerate; trace coarser clast composed of basalt; dry		
53									
54									
55									
56									
57									
58	120								
59									
60									

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Date Started:	01/07/2019	Surface Elevation:	569.7 ft amsl	Boring No.: MW-Nd	
Date Completed:	03/03/2019	Northing (NAD83):	2102325.9		
Drilling Co.:	Cascade	Easting (NAD83):	7615441.5	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	247 ft bgs	Project:	Final Groundwater Remedy Phase
Drill Rig Type:	Terrasonic track mount	Borehole Diameter:	4-12 inches	Location:	1
Driller Name:	Dan O'Mara	Depth to First Water:	114.51 ft bgs	PG&E Topock, Needles, California	
Drilling Asst:	E. Huellmantel / T. Wolfe	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number: RC000753.0051	
Logger:	P. Knightly/D. Maurer	Sampling Interval:	Continuous		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
61	120			Topock - Fluvial Deposits	GW		(60.0 - 67.0') Topock - Fluvial Deposits; Well graded gravel with sand (GW); brown (7.5YR 5/3); granules to very large pebbles, angular to round; some fine to medium grained sand; trace cobbles, angular to round; trace silt; and coarser clast composed of conglomerate; dry	(47.0 - 67.0') Drilling water was used could not determine quantity	
62									
63									
64									
65									
66	120			Topock - Fluvial Deposits	SP		(67.0 - 80.3') Topock - Fluvial Deposits; Poorly graded sand (SP); brown (10YR 5/3); very fine grained to medium grained; little granules to very large pebbles, subangular to round; trace cobbles, subangular to subround; trace silt; trace clay; trace coarser clast composed of conglomerate; dry to moist; moisture due to drilling fluid, conglomerate cobbles weakly cemented	(67.0 - 77.0') Slow drilling, core sample very hot	
67									
68									
69									
70									
71									
72									
73									
74									
75									
76	120								
77									
78									
79									
80									

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Date Started:	01/07/2019	Surface Elevation:	569.7 ft amsl	Boring No.: MW-Nd	
Date Completed:	03/03/2019	Northing (NAD83):	2102325.9		
Drilling Co.:	Cascade	Easting (NAD83):	7615441.5	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	247 ft bgs	Project:	Final Groundwater Remedy Phase
Drill Rig Type:	Terrasonic track mount	Borehole Diameter:	4-12 inches	Location:	1
Driller Name:	Dan O'Mara	Depth to First Water:	114.51 ft bgs	PG&E Topock, Needles, California	
Drilling Asst:	E. Huellmantel / T. Wolfe	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number: RC000753.0051	
Logger:	P. Knightly/D. Maurer	Sampling Interval:	Continuous		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
81	120			Topock - Fluvial Deposits	SP		(80.3 - 92.2') Topock - Fluvial Deposits; Well graded gravel with sand (GW); brown (7.5YR 5/3); granules to very large pebbles, subangular to round; little fine to medium grained sand; trace cobbles, subangular to round; trace silt; dry		
82									
83									
84									
85									
86	120			Topock - Fluvial Deposits	GW		(92.2 - 96.5') Topock - Fluvial Deposits; Well graded sand with gravel (SW); brown (10YR 5/3); fine grained to coarse grained, angular to subround; some granules to very large pebbles, subangular to round; trace coarser clast composed of conglomerate; dry		
87									
88									
89									
90									
91	120			Topock - Fluvial Deposits	SW		(96.5 - 97.0') Topock - Fluvial Deposits; Poorly graded gravel with sand (GP); reddish brown (2.5YR 4/4) little brown (10YR 5/3); small cobbles, subangular to round; little fine to coarse grained sand, angular to subround; dry; cobbles of conglomerate sandstone		
92									
93									
94									
95									
96	120			Topock - Fluvial Deposits	GP		(97.0 - 105.0') Topock - Fluvial Deposits; Well graded gravel with sand (GW); brown (10YR 5/3); granules to very large pebbles, subround to round; little fine to coarse grained sand, subangular to subround; trace cobbles, angular to round; trace silt; dry		
97									
98									
99									
100									







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Date Started:	01/07/2019	Surface Elevation:	569.7 ft amsl	Boring No.: MW-Nd	
Date Completed:	03/03/2019	Northing (NAD83):	2102325.9		
Drilling Co.:	Cascade	Easting (NAD83):	7615441.5	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	247 ft bgs	Project:	Final Groundwater Remedy Phase
Drill Rig Type:	Terrasonic track mount	Borehole Diameter:	4-12 inches	Location:	1
Driller Name:	Dan O'Mara	Depth to First Water:	114.51 ft bgs	PG&E Topock, Needles, California	
Drilling Asst:	E. Huellmantel / T. Wolfe	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number: RC000753.0051	
Logger:	P. Knightly/D. Maurer	Sampling Interval:	Continuous		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
101									
102									
103									
104	120			Topock - Fluvial Deposits	GW				
105									
106							(105.0 - 120.0') Topock - Fluvial Deposits; Well graded gravel with silt and sand (GW-GM); dark grayish brown (2.5Y 4/2); small pebbles to very large pebbles, angular to round; little fine to medium grained sand; little silt; dry		
107									
108							(107.0 - 117.0') reddish brown(2.5YR 5/3); granules to very large pebbles, subround to round; moist	(107.0') Derrick Maurer geologist on-site 107 to 247 ft bgs	
109									
110									
111							(110.0 - 117.0'); trace cobbles; increase in gravel, decrease in sand		
112	120								
113				Topock - Fluvial Deposits	GW-GM			(112.0 - 117.0') Rough drilling, drill rod broke and was retrieved	
114									
115									
116									
117									
118							(117.0 - 120.0') reddish brown (2.5YR 4/4); wet	(117.0') Approximate depth to water table	(117.0') 150 gal of water used
119	120								
120									




Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = No Recovery, blue water table symbol represents depth to water measured during second VAS interval

Date Started:	01/07/2019	Surface Elevation:	569.7 ft amsl	Boring No.: MW-Nd	
Date Completed:	03/03/2019	Northing (NAD83):	2102325.9		
Drilling Co.:	Cascade	Easting (NAD83):	7615441.5	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	247 ft bgs	Project:	Final Groundwater Remedy Phase
Drill Rig Type:	Terrasonic track mount	Borehole Diameter:	4-12 inches	Location:	1
Driller Name:	Dan O'Mara	Depth to First Water:	114.51 ft bgs	PG&E Topock, Needles, California	
Drilling Asst:	E. Huellmantel / T. Wolfe	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number: RC000753.0051	
Logger:	P. Knightly/D. Maurer	Sampling Interval:	Continuous		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
121	120			Topock - Alluvium Deposits	GM		(120.0 - 127.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); reddish brown (2.5YR 4/4); granules to very large pebbles, subangular to subround; little very fine to medium grained sand; little silt; wet		
122									
123									
124									
125	36		MW-N-VAS-121.0-126.0 (0.51) 2/16/2019 14:09	Topock - Alluvium Deposits	GM				
126									
127									
128									
129	84			Topock - Alluvium Deposits	GW-GM		(127.0 - 137.0') Topock - Alluvium Deposits; Well graded gravel with silt and sand (GW-GM); reddish brown (2.5YR 4/4); granules to medium pebbles, subangular to subround; some fine to medium grained sand; little silt; wet		
130							(130.0 - 132.0') reddish brown(2.5YR 4/3)		
131									
132							(132.0 - 137.0') granules to very large pebbles		
133	120			Topock - Alluvium Deposits	SM				
134									
135									
136									
137	120			Topock - Alluvium Deposits	SM		(137.0 - 147.0') Topock - Alluvium Deposits; Silty sand (SM); brown (7.5YR 4/3); fine grained to medium grained; little silt; trace granules to very large pebbles, subangular to subround; trace clay; wet		
138									
139									
140									






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Date Started:	01/07/2019	Surface Elevation:	569.7 ft amsl	Boring No.: MW-Nd	
Date Completed:	03/03/2019	Northing (NAD83):	2102325.9		
Drilling Co.:	Cascade	Easting (NAD83):	7615441.5	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	247 ft bgs	Project:	Final Groundwater Remedy Phase
Drill Rig Type:	Terrasonic track mount	Borehole Diameter:	4-12 inches	Location:	1
Driller Name:	Dan O'Mara	Depth to First Water:	114.51 ft bgs	PG&E Topock, Needles, California	
Drilling Asst:	E. Huellmantel / T. Wolfe	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number: RC000753.0051	
Logger:	P. Knightly/D. Maurer	Sampling Interval:	Continuous		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
141	120			Topock - Alluvium Deposits	SM				
142									
143									
144									
145									
146	240			Topock - Alluvium Deposits	GM		(147.0 - 159.5') Topock - Alluvium Deposits; Silty gravel with sand (GM); brown (7.5YR 4/3); granules to very large pebbles, subangular to subround; some fine to medium grained sand; little silt; little clay; wet	(147.0') 6-inch casing broke downhole and was retrieved	
147									
148									
149									
150									
151									
152									
153									
154									
155									
156									
157									
158									
159									
160				Topock - Alluvium	GW		(159.5 - 160.0') Topock - Alluvium Deposits; Well graded gravel with		








Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = No Recovery, blue water table symbol represents depth to water measured during second VAS interval

Date Started: <u>01/07/2019</u>	Surface Elevation: <u>569.7 ft amsl</u>	Boring No.: <u>MW-Nd</u>
Date Completed: <u>03/03/2019</u>	Northing (NAD83): <u>2102325.9</u>	
Drilling Co.: <u>Cascade</u>	Easting (NAD83): <u>7615441.5</u>	Client: <u>PG&E</u>
Drilling Method: <u>Sonic Drilling</u>	Total Depth: <u>247 ft bgs</u>	Project: <u>Final Groundwater Remedy Phase</u>
Drill Rig Type: <u>Terrasonic track mount</u>	Borehole Diameter: <u>4-12 inches</u>	Location: <u>1</u>
Driller Name: <u>Dan O'Mara</u>	Depth to First Water: <u>114.51 ft bgs</u>	<u>PG&E Topock, Needles, California</u>
Drilling Asst: <u>E. Huellmantel / T. Wolfe</u>	Sampling Method: <u>4 inch x 10 ft Core Barrel</u>	Project Number: <u>RC000753.0051</u>
Logger: <u>P. Knightly/D. Maurer</u>	Sampling Interval: <u>Continuous</u>	
Editor: <u>Sean McGrane</u>	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
161	240			Deposits	GM		sand (GW); brown (7.5YR 4/3); granules to very large pebbles, subangular to subround; and fine to medium grained sand; trace silt; wet		
162							(160.0 - 167.5') Topock - Alluvium Deposits; Silty gravel with sand (GM); brown (7.5YR 4/3); granules to very large pebbles, subangular to subround; some fine to medium grained sand; little silt; wet		
163									
164									
165									
166	96			Topock - Alluvium Deposits	SW		(167.5 - 170.0') Topock - Alluvium Deposits; Well graded sand with gravel (SW); brown (7.5YR 4/3); fine grained to coarse grained, subangular to subround; some granules to very large pebbles, subangular to subround; trace silt; wet	(167.0 - 175.0') Rough drilling	
167									
168									
169									
170									
171	144			Topock - Alluvium Deposits	GM		(170.0 - 173.5') Topock - Alluvium Deposits; Silty gravel with sand (GM); brown (7.5YR 4/3); granules to very large pebbles, subangular to subround; some fine to medium grained sand; little silt; wet	(173.0 - 178.0') Sample collected with bailer	
172									
173									
174									
175									
176			MW-N-VAS-173.0-178.0 (<0.033 U) 2/18/2019 09:20	Topock - Alluvium Deposits	SW		(173.5 - 175.0') Topock - Alluvium Deposits; Well graded sand with gravel (SW); brown (7.5YR 4/4); fine grained to coarse grained, subangular to subround; some granules to very large pebbles, subangular to subround; trace silt; wet		
177									
178									
179									
180				Topock - Alluvium Deposits	GC		(175.0 - 181.5') Topock - Alluvium Deposits; Clayey gravel with sand (GC); brown (10YR 5/3); granules to very large pebbles, subangular to subround; little fine to medium grained sand; little clay; trace silt; moist to wet		(177.0') 250 gal of water used

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = No Recovery, blue water table symbol represents depth to water measured during second VAS interval

Date Started: <u>01/07/2019</u>	Surface Elevation: <u>569.7 ft amsl</u>	Boring No.: <u>MW-Nd</u>
Date Completed: <u>03/03/2019</u>	Northing (NAD83): <u>2102325.9</u>	
Drilling Co.: <u>Cascade</u>	Easting (NAD83): <u>7615441.5</u>	Client: <u>PG&E</u>
Drilling Method: <u>Sonic Drilling</u>	Total Depth: <u>247 ft bgs</u>	Project: <u>Final Groundwater Remedy Phase</u>
Drill Rig Type: <u>Terrasonic track mount</u>	Borehole Diameter: <u>4-12 inches</u>	Location: <u>1</u>
Driller Name: <u>Dan O'Mara</u>	Depth to First Water: <u>114.51 ft bgs</u>	<u>PG&E Topock, Needles, California</u>
Drilling Asst: <u>E. Huellmantel / T. Wolfe</u>	Sampling Method: <u>4 inch x 10 ft Core Barrel</u>	Project Number: <u>RC000753.0051</u>
Logger: <u>P. Knightly/D. Maurer</u>	Sampling Interval: <u>Continuous</u>	
Editor: <u>Sean McGrane</u>	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
181	144			Topock - Alluvium Deposits	GC				
182				Topock - Alluvium Deposits	GW		(181.5 - 183.5') Topock - Alluvium Deposits; Well graded gravel with sand (GW); light gray (10YR 7/2); granules to very large pebbles, angular to subround; little fine to medium grained sand; trace silt; dry to moist		
183									
184				Topock - Alluvium Deposits	GC		(183.5 - 187.0') Topock - Alluvium Deposits; Clayey gravel with sand (GC); brown (10YR 5/3); granules to very large pebbles, subangular to subround; little fine to medium grained sand; little clay; trace silt; moist		
185									
186									
187	120			Topock - Alluvium Deposits	SC		(187.0 - 190.0') Topock - Alluvium Deposits; Clayey sand with gravel (SC); reddish brown / moderate brown (5YR 4/4); fine grained to medium grained; little granules to large pebbles, angular to subangular; little clay; trace silt; moist		
188									
189				Topock - Alluvium Deposits	SC		(190.0 - 193.5') Topock - Alluvium Deposits; Clayey sand (SC); brown (7.5YR 4/3); fine grained to medium grained; dry; weak cementation; increase in sand, decrease in gravel		
190									
191									
192				Topock - Alluvium Deposits	GW		(193.5 - 197.0') Topock - Alluvium Deposits; Well graded gravel (GW); (7.5R 5/3); granules to very large pebbles, angular to subround; trace fine to medium grained sand; trace silt; dry		
193	228								
194									
195				Topock - Alluvium Deposits	GC		(197.0 - 217.0') Topock - Alluvium Deposits; Clayey gravel with sand (GC); brown (7.5YR 4/3); granules to very large pebbles, subangular to subround; little fine to medium grained sand; little clay; trace silt; moist to wet		
196									
197									
198									
199									
200									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = No Recovery, blue water table symbol represents depth to water measured during second VAS interval

Date Started:	01/07/2019	Surface Elevation:	569.7 ft amsl	Boring No.: MW-Nd	
Date Completed:	03/03/2019	Northing (NAD83):	2102325.9		
Drilling Co.:	Cascade	Easting (NAD83):	7615441.5	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	247 ft bgs	Project:	Final Groundwater Remedy Phase
Drill Rig Type:	Terrasonic track mount	Borehole Diameter:	4-12 inches	Location:	1
Driller Name:	Dan O'Mara	Depth to First Water:	114.51 ft bgs	PG&E Topock, Needles, California	
Drilling Asst:	E. Huellmantel / T. Wolfe	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number: RC000753.0051	
Logger:	P. Knightly/D. Maurer	Sampling Interval:	Continuous		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
201									
202									
203									
204									
205									
206									
207									
208									
209	228			Topock - Alluvium Deposits	GC				(207.0') 70 gal of water used
210									
211									
212			MW-N-VAS-210.0-215.0 (290)						
213			2/21/2019 09:21						
214									
215									
216									
217								(216.0 - 217.0') Lost soil core down hole, tripped back in to retrieve	
218							(217.0 - 230.5') Topock - Weathered Bedrock - conglomerate; Clayey gravel with sand (GC); reddish brown / moderate brown(5YR 4/4); granules to very large pebbles, subangular to subround; some clay; little fine to medium grained sand; trace silt; moist to wet		(217.0 - 217.0') 120 gal of water used
219	240			Topock - Weathered Bedrock - conglomerate	GC				
220									




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Date Started: 01/07/2019	Surface Elevation: 569.7 ft amsl	Boring No.: MW-Nd
Date Completed: 03/03/2019	Northing (NAD83): 2102325.9	
Drilling Co.: Cascade	Easting (NAD83): 7615441.5	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 247 ft bgs	Project: Final Groundwater Remedy Phase
Drill Rig Type: Terrasonic track mount	Borehole Diameter: 4-12 inches	Location: 1
Driller Name: Dan O'Mara	Depth to First Water: 114.51 ft bgs	PG&E Topock, Needles, California
Drilling Asst: E. Huellmantel / T. Wolfe	Sampling Method: 4 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger: P. Knightly/D. Maurer	Sampling Interval: Continuous	
Editor: Sean McGrane	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
221									
222									
223									
224									
225				Topock - Weathered Bedrock - conglomerate	GC				
226									
227									
228									
229	240								
230			MW-N-VAS-228.0-233.0 (<0.17 U ppb) 2/26/2019 16:30						
231				Topock - Weathered Bedrock - conglomerate	SW		(230.5 - 231.0') Topock - Weathered Bedrock - conglomerate; Well graded sand with gravel (SW); reddish brown (5YR 4/3); medium grained to very coarse grained, subangular to subround; some granules to medium pebbles, subangular to subround; trace silt; trace coarser clasts composed of metadiorite; wet		
232							(231.0 - 240.0') Topock - Weathered Bedrock - conglomerate; Clayey gravel with sand (GC); reddish brown / moderate brown(5YR 4/4); granules to very large pebbles, subangular to subround; some clay; little fine to medium grained sand; trace silt; moist to wet		
233									
234									
235				Topock - Weathered Bedrock - conglomerate	GC				
236									
237									
238	120								
239									
240									

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Date Started: <u>01/07/2019</u>	Surface Elevation: <u>569.7 ft amsl</u>	Boring No.: <u>MW-Nd</u>
Date Completed: <u>03/03/2019</u>	Northing (NAD83): <u>2102325.9</u>	
Drilling Co.: <u>Cascade</u>	Easting (NAD83): <u>7615441.5</u>	Client: <u>PG&E</u>
Drilling Method: <u>Sonic Drilling</u>	Total Depth: <u>247 ft bgs</u>	Project: <u>Final Groundwater Remedy Phase</u>
Drill Rig Type: <u>Terrasonic track mount</u>	Borehole Diameter: <u>4-12 inches</u>	Location: <u>1</u>
Driller Name: <u>Dan O'Mara</u>	Depth to First Water: <u>114.51 ft bgs</u>	<u>PG&E Topock, Needles, California</u>
Drilling Asst: <u>E. Huellmantel / T. Wolfe</u>	Sampling Method: <u>4 inch x 10 ft Core Barrel</u>	Project Number: <u>RC000753.0051</u>
Logger: <u>P. Knightly/D. Maurer</u>	Sampling Interval: <u>Continuous</u>	
Editor: <u>Sean McGrane</u>	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
241	120			Topock - Weathered Bedrock - conglomerate	SC		(240.0 - 242.5') Topock - Weathered Bedrock - conglomerate; Clayey sand with gravel (SC); reddish brown (5YR 4/3); fine grained to medium grained; some clay; little granules to medium pebbles, subangular to subround; trace silt; moist to wet		
242									
243				Topock - Competent Bedrock - conglomerate	GM		(242.5 - 246.5') Topock - Competent Bedrock - conglomerate; Silty gravel with sand (GM); reddish brown (5YR 4/3); granules to very large pebbles, subangular to subround; little fine to medium grained sand; little silt; trace clay; dry		
244									
245									
246				Topock - Bedrock - metadiorite			(246.5 - 247.0') Topock - Bedrock - metadiorite; (10YR 2.5/1)	(246.5 - 247.0') Drill bit broke/melted and had a 0.5 of bedrock in the core	
247							End of Boring at 247.0' bgs.		
248									
249									
250									
251									
252									
253									
254									
255									
256									
257									
258									
259									
260									

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Boring Log

Sheet: 1 of 7

Date Started:	03/06/2019	Surface Elevation:	570.1 ft amsl	Boring No.: MW-Ns	
Date Completed:	03/26/2019	Northing (NAD83):	2102321.2		
Drilling Co.:	Cascade	Easting (NAD83):	7615448.1	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	133 ft bgs	Project:	Final GW Remedy Phase I
Drill Rig Type:	Terrasonic track mount	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Dan O'Mara	Depth to First Water:	115.88 ft bgs		
Drilling Asst:	E. Huellmantel / J. Pacheco	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	D. Maurer/G. Willford	Sampling Interval:	Screen Interval		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
1	72						(0.0 - 106.0') (NR); No recovery cores not collected, see Boring Log MW-Nd for lithology		
2									
3									
4									
5									
6									
7	120						NR		
8									
9									
10									
11									
12									
13	120						NR		
14									
15									
16									
17									
18									
19	120						NR		
20									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = No Recovery, blue water table symbol represents depth to water measured during MW-Nd second VAS interval Note: water samples were collected from MW-Nd borehole

SOIL BORING LOG PG&E TOPOCK C:\USERS\SMCGRANE\DOCUMENTS\PG&E TOPOCK\DATABASE FOR LOGS\GINT FILES\07.02.19\TOPOCK DRAFT BORING LOGS\GINT FILES\07.02.19\TOPOCK DATA TEMPLATE FOR PLOG.GPJ TOPOCK DATA TEMPLATE FOR PLOG.GPJ 07/02/19 16:40

Date Started:	03/06/2019	Surface Elevation:	570.1 ft amsl	Boring No.: MW-Ns	
Date Completed:	03/26/2019	Northing (NAD83):	2102321.2		
Drilling Co.:	Cascade	Easting (NAD83):	7615448.1	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	133 ft bgs	Project:	Final GW Remedy Phase I
Drill Rig Type:	Terrasonic track mount	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Dan O'Mara	Depth to First Water:	115.88 ft bgs		
Drilling Asst:	E. Huellmantel / J. Pacheco	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	D. Maurer/G. Willford	Sampling Interval:	Screen Interval		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
21	120								
22									
23									
24									
25									
26	120								
27									
28									
29									
30									
31	120								
32									
33									
34									
35									
36	120								
37									
38									
39									
40									

NR

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SOIL BORING LOG PG&E TOPOCK C:\USERS\SMCGRANE\DOCUMENTS\PG&E TOPOCK\DRAFT BORING LOGS\GINT FILES\07.02.19\TOPOCK DATABASE FOR PLOG.GPJ TOPOCK DATA TEMPLATE FOR PLOG.GDT 07/02/19 16:40

Boring Log

Sheet: 3 of 7

Date Started:	03/06/2019	Surface Elevation:	570.1 ft amsl	Boring No.: MW-Ns	
Date Completed:	03/26/2019	Northing (NAD83):	2102321.2		
Drilling Co.:	Cascade	Easting (NAD83):	7615448.1	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	133 ft bgs	Project:	Final GW Remedy Phase I
Drill Rig Type:	Terrasonic track mount	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Dan O'Mara	Depth to First Water:	115.88 ft bgs		
Drilling Asst:	E. Huellmantel / J. Pacheco	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	D. Maurer/G. Willford	Sampling Interval:	Screen Interval		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
41	120							(40.0 - 42.0') Rough drilling	
42									
43									
44									
45									
46	120							(46.0 - 56.0') Rough drilling	
47									
48									
49									
50									
51	120								
52									
53									
54									
55									
56	120								
57									
58									
59									
60									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = No Recovery, blue water table symbol represents depth to water measured during MW-Nd second VAS interval Note: water samples were collected from MW-Nd borehole

SOIL BORING LOG PG&E TOPOCK C:\USERS\SMCGRANE\DOCUMENTS\PG&E TOPOCK\DRAFT BORING LOGS\GINT FILES\07.02.19\TOPOCK DATABASE FOR PLOG.GPJ TOPOCK DATA TEMPLATE FOR PLOG.GDT 07/02/19 16:40

Date Started:	03/06/2019	Surface Elevation:	570.1 ft amsl	Boring No.: MW-Ns	
Date Completed:	03/26/2019	Northing (NAD83):	2102321.2		
Drilling Co.:	Cascade	Easting (NAD83):	7615448.1	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	133 ft bgs	Project:	Final GW Remedy Phase I
Drill Rig Type:	Terrasonic track mount	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Dan O'Mara	Depth to First Water:	115.88 ft bgs		
Drilling Asst:	E. Huellmantel / J. Pacheco	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number: RC000753.0051	
Logger:	D. Maurer/G. Willford	Sampling Interval:	Screen Interval		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
61	120								
62									
63									
64									
65	(66.0 - 76.0') Rough drilling								
66									
67									
68									
69									
70									
71									
72									
73									
74									
75									
76									
77	120								
78									
79									
80									

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SOIL BORING LOG PG&E TOPOCK C:\USERS\SMCGRANE\DOCUMENTS\PG&E TOPOCK\DRAFT BORING LOGS\GINT FILES\07.02.19\TOPOCK DATABASE FOR PLOG.GPJ TOPOCK DATA TEMPLATE FOR PLOG.GDT 07/02/19 16:40

Date Started:	03/06/2019	Surface Elevation:	570.1 ft amsl	Boring No.: MW-Ns	
Date Completed:	03/26/2019	Northing (NAD83):	2102321.2		
Drilling Co.:	Cascade	Easting (NAD83):	7615448.1	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	133 ft bgs	Project:	Final GW Remedy Phase I
Drill Rig Type:	Terrasonic track mount	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Dan O'Mara	Depth to First Water:	115.88 ft bgs		
Drilling Asst:	E. Huellmantel / J. Pacheco	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	D. Maurer/G. Willford	Sampling Interval:	Screen Interval		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
81	120								
82									
83									
84									
85									
86									
87								(86.0 - 92.0') Drill rods chattering	
88									
89									
90									
91	120								
92									
93									
94									
95									
96	120								
97									
98									
99									
100									

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Date Started:	03/06/2019	Surface Elevation:	570.1 ft amsl	Boring No.: <u>MW-Ns</u>	
Date Completed:	03/26/2019	Northing (NAD83):	2102321.2		
Drilling Co.:	Cascade	Easting (NAD83):	7615448.1	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	133 ft bgs	Project:	Final GW Remedy Phase I
Drill Rig Type:	Terrasonic track mount	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Dan O'Mara	Depth to First Water:	115.88 ft bgs		
Drilling Asst:	E. Huellmantel / J. Pacheco	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	D. Maurer/G. Willford	Sampling Interval:	Screen Interval		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
101	120				NR				
102									
103									
104									
105	60				GP				
106									
107									
108									
109	144			Topock - Fluvial Deposits	GP		(106.0 - 111.0') Topock - Fluvial Deposits; Poorly graded gravel (GP); grayish brown (2.5Y 5/2); boulders, angular; some very fine to fine grained sand, angular; little clay; dry; homogeneous; possibly composed of basalt, pulverized into powder and very very fine to coarse grained sand	(106.0 - 111.0') Rough drilling, core very hot	
110									
111									
112									
113				Topock - Fluvial Deposits	SM		(111.0 - 114.0') Topock - Fluvial Deposits; Silty sand with gravel (SM); pale yellow (2.5Y 7/3) trace (5R 7/1); very fine grained to very coarse grained, subangular to round; some silt; little granules to very large pebbles, subangular to round; trace cobbles, subround to round; trace clay; dry; gravel composed of mixed lithology		
114									
115				Topock - Fluvial Deposits	GP		(113.0 - 114.0') dark brown (10YR 3/3); moist		
116									
117				Topock - Fluvial Deposits	SM		(114.0 - 114.5') Topock - Fluvial Deposits; Poorly graded gravel (GP); dark red (10R 3/6); boulders; composed of rhyolite		
118							(114.5 - 117.0') Topock - Fluvial Deposits; Silty sand with gravel (SM); dark brown (10YR 3/3) little light brown (7.5YR 6/4); very fine grained to very coarse grained, subangular to round; some silt; little granules to very large pebbles, subangular to round; trace cobbles, subround to round; trace clay; moist; weak cementation; gravel composed of mixed lithology		
119									
120				Topock - Alluvium Deposits	SM		(117.0 - 123.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (10YR 5/3) little reddish yellow (7.5YR 6/6); very fine grained to very coarse grained, angular to subround; some granules to large pebbles, angular to subround; some silt; little clay; moist; weak cementation		

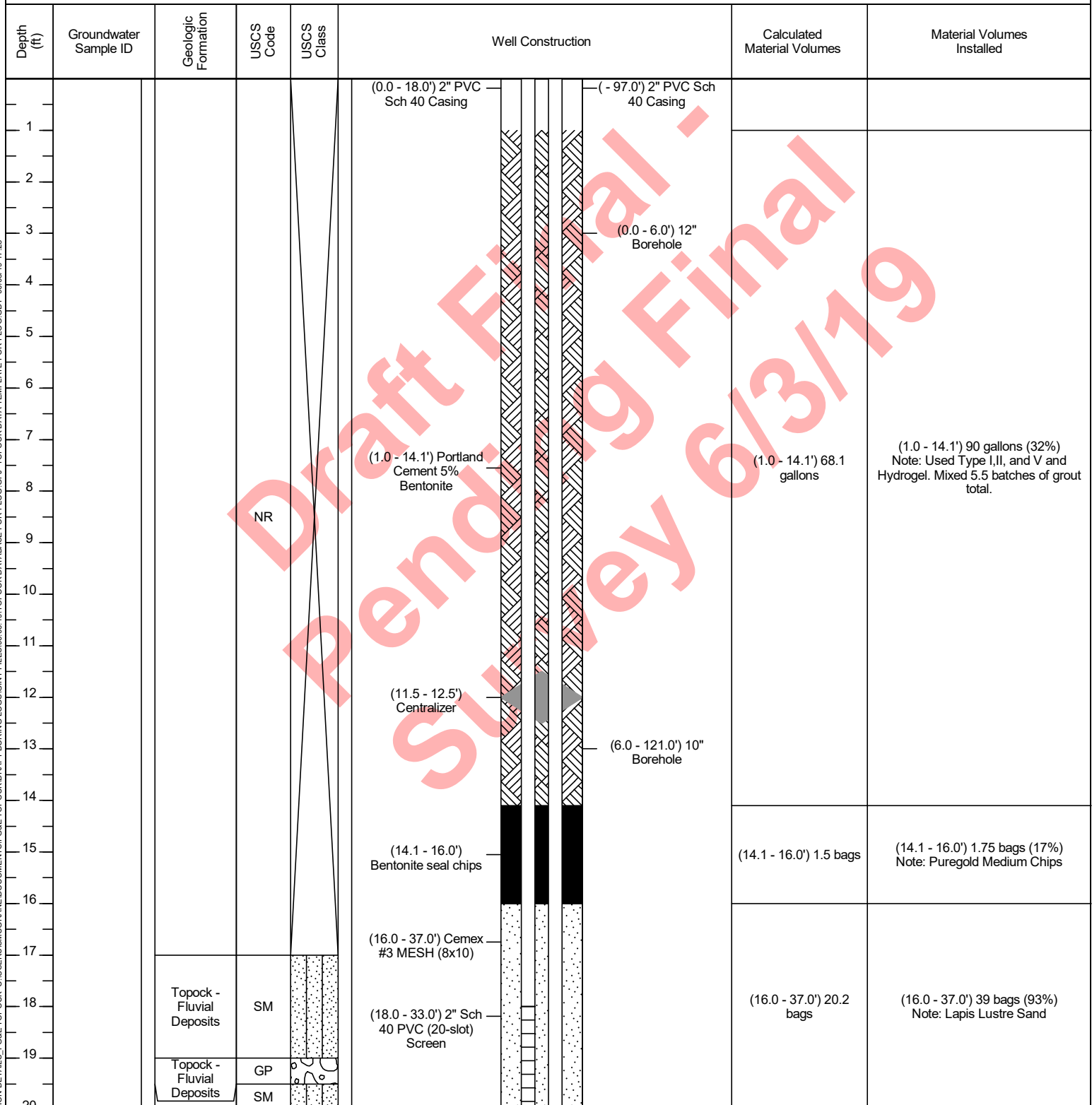
Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = No Recovery, blue water table symbol represents depth to water measured during MW-Nd second VAS interval Note: water samples were collected from MW-Nd borehole

Date Started:	03/06/2019	Surface Elevation:	570.1 ft amsl	Boring No.: <u>MW-Ns</u>	
Date Completed:	03/26/2019	Northing (NAD83):	2102321.2		
Drilling Co.:	Cascade	Easting (NAD83):	7615448.1	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	133 ft bgs	Project:	Final GW Remedy Phase I
Drill Rig Type:	Terrasonic track mount	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Dan O'Mara	Depth to First Water:	115.88 ft bgs		
Drilling Asst:	E. Huellmantel / J. Pacheco	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	D. Maurer/G. Willford	Sampling Interval:	Screen Interval		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
121	144			Topock - Alluvium Deposits	SM				
122									
123									
124	120		MW-N-VAS-121.0-126.0 (0.51) 2/16/2019 14:09	Topock - Alluvium Deposits	ML		(123.0 - 128.0') Topock - Alluvium Deposits; Sandy silt with gravel (ML); brown (7.5YR 5/4); low plasticity; some very fine to very coarse grained sand, angular to subround; little granules to medium pebbles, subangular to subround; little clay; moist; weak cementation		
125									
126									
127									
128			Topock - Alluvium Deposits	SM		(128.0 - 130.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); grayish brown (10YR 5/2); very fine grained to very coarse grained, angular to subround; some silt; little granules to very large pebbles, angular to subround; little clay; trace cobbles, subangular; dry			
129									
130			Topock - Fluvial Deposits	SM		(130.0 - 133.0') Topock - Fluvial Deposits; Silty sand with gravel (SM); light brown (7.5YR 6/4) little gray (10YR 6/1); very fine grained to very coarse grained, subangular to subround; some granules to very large pebbles, subangular to subround; some silt; trace clay; moist to wet; weak cementation; gravel composed of mixed lithology			
131									
132									
133							End of Boring at 133.0' bgs.		
134									
135									
136									
137									
138									
139									
140									

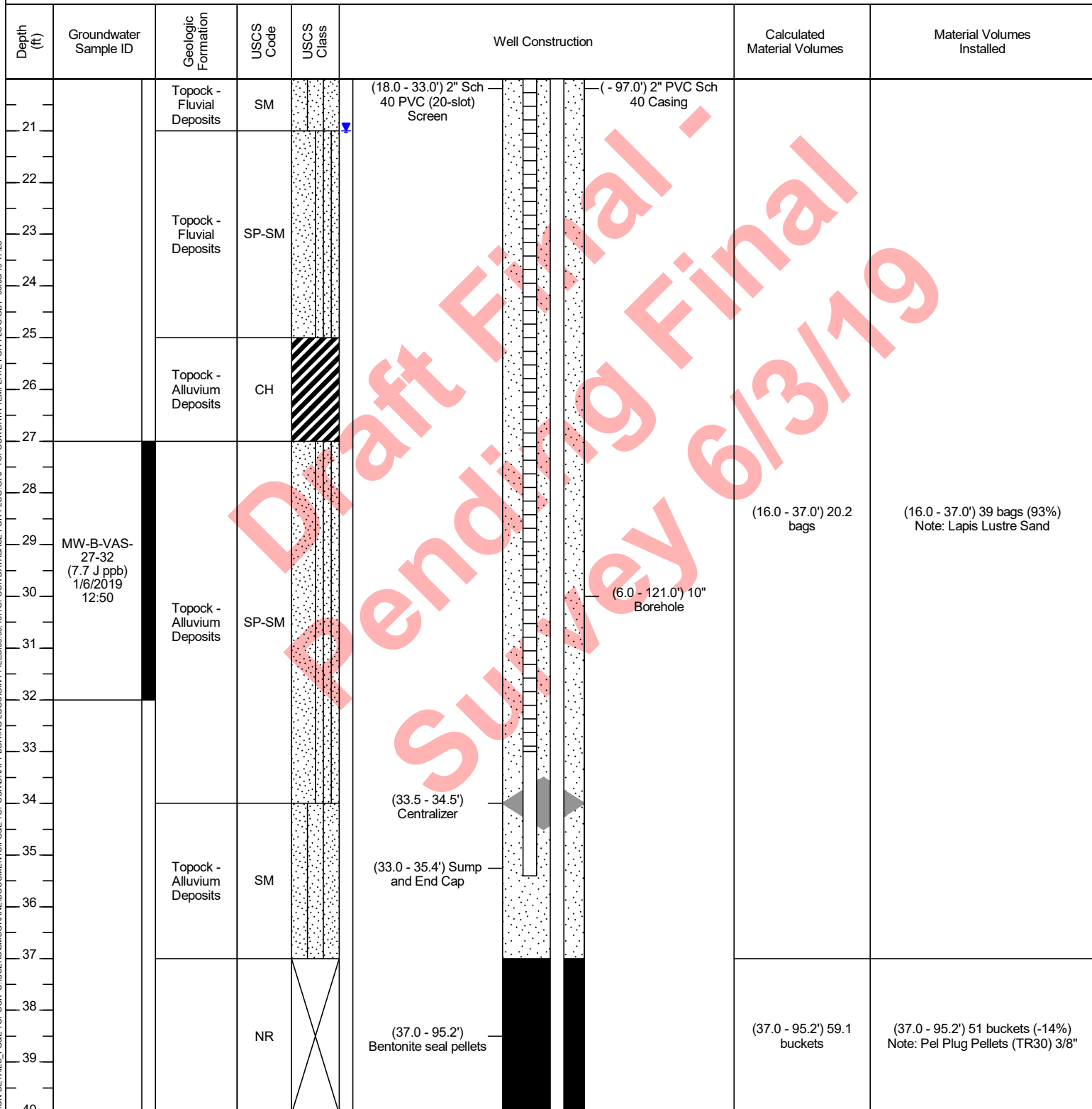
Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = No Recovery, blue water table symbol represents depth to water measured during MW-Nd second VAS interval Note: water samples were collected from MW-Nd borehole

Date Started: 03/17/2019	Surface Elevation: N/A	Well ID: MW-B-33, MW-B-117
Date Completed:	Shallow Well Elevation: N/A	
Drilling Co.: Cascade	Deep Well Elevation: N/A	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): N/A	Project: Final GW Remedy Phase I
Driller Name: Tyler Alymer	Easting (NAD83): N/A	Location: PG&E Topock, Needles, California
Drilling Asst: R. West/J. Candelaria	Borehole Diameter: 10-12 inches	
Logger: Chris Bonessi	Water Level Start: 21 ft bgs	Project Number: RC000753.0051
Editor: Michael Andrews	Development End Date: 3/31/2019	
Total Depth: 121 ft bgs	Well Completion: <input type="checkbox"/> Flush <input type="checkbox"/> Stick-up	



Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, water levels and VAS samples collected from MW-Bd

Date Started: 03/17/2019	Surface Elevation: N/A	Well ID: MW-B-33, MW-B-117
Date Completed:	Shallow Well Elevation: N/A	
Drilling Co.: Cascade	Deep Well Elevation: N/A	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): N/A	Project: Final GW Remedy Phase I
Driller Name: Tyler Alymer	Easting (NAD83): N/A	Location: PG&E Topock, Needles, California
Drilling Asst: R. West/J. Candelaria	Borehole Diameter: 10-12 inches	
Logger: Chris Bonessi	Water Level Start: 21 ft bgs	Project Number: RC000753.0051
Editor: Michael Andrews	Development End Date: 3/31/2019	
Total Depth: 121 ft bgs	Well Completion: <input type="checkbox"/> Flush <input type="checkbox"/> Stick-up	



Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, water levels and VAS samples collected from MW-Bd

Date Started: 03/17/2019	Surface Elevation: N/A	Well ID: MW-B-33, MW-B-117
Date Completed:	Shallow Well Elevation: N/A	
Drilling Co.: Cascade	Deep Well Elevation: N/A	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): N/A	Project: Final GW Remedy Phase I
Driller Name: Tyler Alymer	Easting (NAD83): N/A	Location: PG&E Topock, Needles, California
Drilling Asst: R. West/J. Candelaria	Borehole Diameter: 10-12 inches	
Logger: Chris Bonessi	Water Level Start: 21 ft bgs	Project Number: RC000753.0051
Editor: Michael Andrews	Development End Date: 3/31/2019	
Total Depth: 121 ft bgs	Well Completion: <input type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
41					(- 97.0') 2" PVC Sch 40 Casing		
42							
43							
44							
45							
46							
47							
48							
49	MW-B-VAS-47-52 (<0.17 U ppb) 1/9/2019 10:15		NR		(37.0 - 95.2') Bentonite seal pellets	(37.0 - 95.2') 59.1 buckets	(37.0 - 95.2') 51 buckets (-14%) Note: Pel Plug Pellets (TR30) 3/8"
50					(6.0 - 121.0') 10" Borehole		
51							
52							
53							
54							
55							
56							
57							
58							
59							
60							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, water levels and VAS samples collected from MW-Bd

Date Started: 03/17/2019	Surface Elevation: N/A	Well ID: MW-B-33, MW-B-117
Date Completed:	Shallow Well Elevation: N/A	
Drilling Co.: Cascade	Deep Well Elevation: N/A	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): N/A	Project: Final GW Remedy Phase I
Driller Name: Tyler Alymer	Easting (NAD83): N/A	Location: PG&E Topock, Needles, California
Drilling Asst: R. West/J. Candelaria	Borehole Diameter: 10-12 inches	
Logger: Chris Bonessi	Water Level Start: 21 ft bgs	Project Number: RC000753.0051
Editor: Michael Andrews	Development End Date: 3/31/2019	
Total Depth: 121 ft bgs	Well Completion: <input type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
61					(- 97.0') 2" PVC Sch 40 Casing		
62							
63							
64							
65							
66							
67							
68							
69	MW-B-VAS-67-72 (<0.17 U ppb) 1/9/2019 14:55		NR		(37.0 - 95.2') Bentonite seal pellets	(37.0 - 95.2') 59.1 buckets	(37.0 - 95.2') 51 buckets (-14%) Note: Pel Plug Pellets (TR30) 3/8"
70					(6.0 - 121.0') 10" Borehole		
71							
72							
73							
74							
75							
76							
77							
78					(77.5 - 78.5') Centralizer		
79							
80							

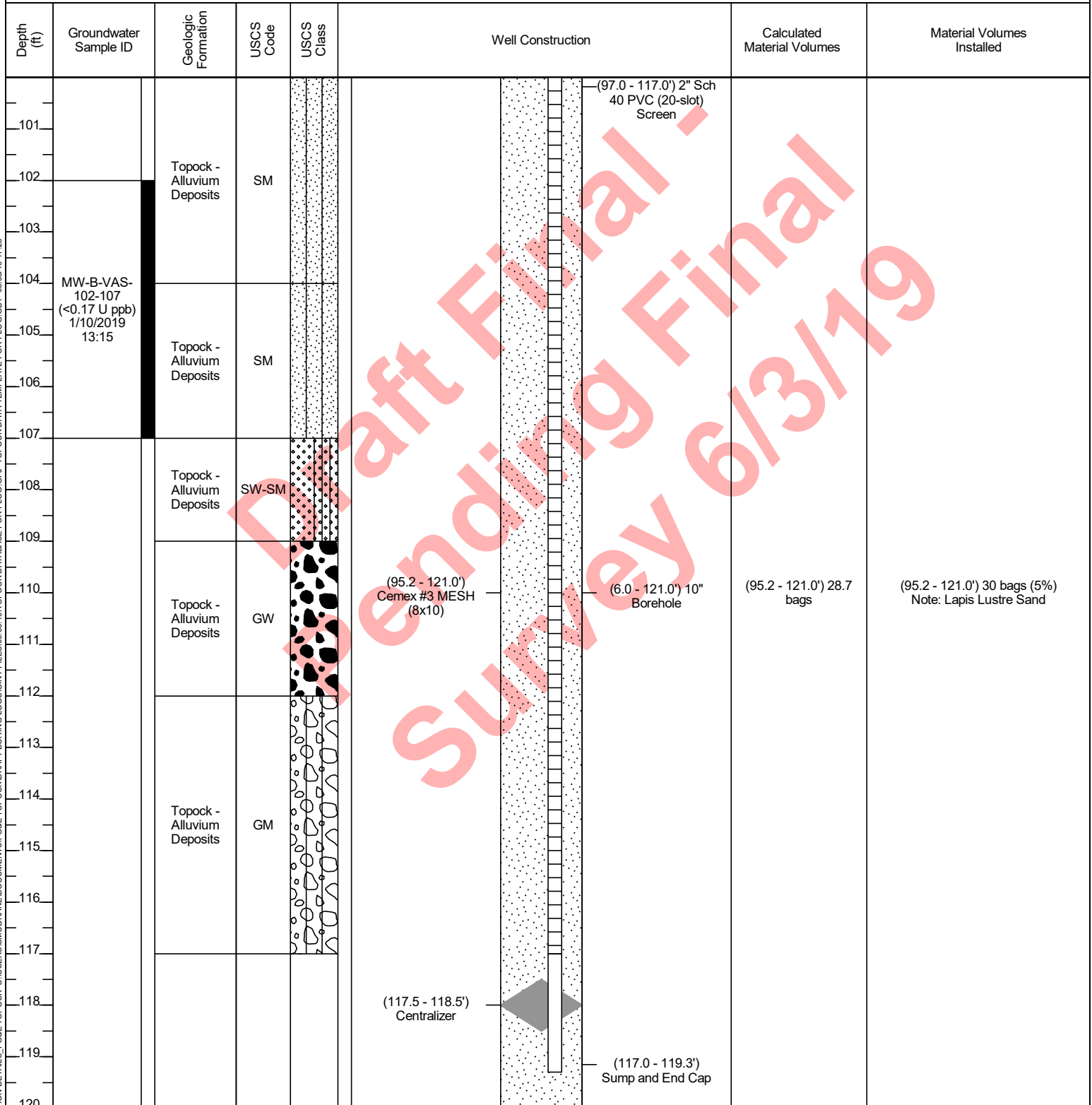
Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, water levels and VAS samples collected from MW-Bd

Date Started: 03/17/2019	Surface Elevation: N/A	Well ID: MW-B-33, MW-B-117
Date Completed:	Shallow Well Elevation: N/A	
Drilling Co.: Cascade	Deep Well Elevation: N/A	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): N/A	Project: Final GW Remedy Phase I
Driller Name: Tyler Alymer	Easting (NAD83): N/A	Location: PG&E Topock, Needles, California
Drilling Asst: R. West/J. Candelaria	Borehole Diameter: 10-12 inches	
Logger: Chris Bonessi	Water Level Start: 21 ft bgs	Project Number: RC000753.0051
Editor: Michael Andrews	Development End Date: 3/31/2019	
Total Depth: 121 ft bgs	Well Completion: <input type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
81					(- 97.0') 2" PVC Sch 40 Casing		
82							
83							
84							
85							
86							
87							
88					(37.0 - 95.2') Bentonite seal pellets	(37.0 - 95.2') 59.1 buckets	(37.0 - 95.2') 51 buckets (-14%) Note: Pel Plug Pellets (TR30) 3/8"
89		NR					
90					(6.0 - 121.0') 10" Borehole		
91							
92							
93							
94							
95							
96							
97							
98		Topock - Alluvium Deposits	SM		(95.2 - 121.0') Cemex #3 MESH (8x10)	(95.2 - 121.0') 28.7 bags	(95.2 - 121.0') 30 bags (5%) Note: Lapis Lustre Sand
99					(97.0 - 117.0') 2" Sch 40 PVC (20-slot) Screen		
100							

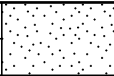
Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, water levels and VAS samples collected from MW-Bd

Date Started: 03/17/2019	Surface Elevation: N/A	Well ID: MW-B-33, MW-B-117
Date Completed:	Shallow Well Elevation: N/A	
Drilling Co.: Cascade	Deep Well Elevation: N/A	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): N/A	Project: Final GW Remedy Phase I
Driller Name: Tyler Alymer	Easting (NAD83): N/A	Location: PG&E Topock, Needles, California
Drilling Asst: R. West/J. Candelaria	Borehole Diameter: 10-12 inches	
Logger: Chris Bonessi	Water Level Start: 21 ft bgs	Project Number: RC000753.0051
Editor: Michael Andrews	Development End Date: 3/31/2019	
Total Depth: 121 ft bgs	Well Completion: <input type="checkbox"/> Flush <input type="checkbox"/> Stick-up	



Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, water levels and VAS samples collected from MW-Bd

Date Started: 03/17/2019	Surface Elevation: N/A	Well ID: MW-B-33, MW-B-117
Date Completed:	Shallow Well Elevation: N/A	
Drilling Co.: Cascade	Deep Well Elevation: N/A	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): N/A	Project: Final GW Remedy Phase I
Driller Name: Tyler Alymer	Easting (NAD83): N/A	Location: PG&E Topock, Needles, California
Drilling Asst: R. West/J. Candelaria	Borehole Diameter: 10-12 inches	
Logger: Chris Bonessi	Water Level Start: 21 ft bgs	Project Number: RC000753.0051
Editor: Michael Andrews	Development End Date: 3/31/2019	
Total Depth: 121 ft bgs	Well Completion: <input type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction			Calculated Material Volumes	Material Volumes Installed
121					(95.2 - 121.0') Cemex #3 MESH (8x10)		(6.0 - 121.0') 10" Borehole	(95.2 - 121.0') 28.7 bags	(95.2 - 121.0') 30 bags (5%) Note: Lapis Lustre Sand
122					End of Boring at 121.0' bgs.				
123									
124									
125									
126									
127									
128									
129									
130									
131									
132									
133									
134									
135									
136									
137									
138									
139									
140									








Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, water levels and VAS samples collected from MW-Bd

Date Started: 03/05/2019	Surface Elevation: N/A	Well ID: MW-B-267, MW-B-337
Date Completed:	Shallow Well Elevation: N/A	
Drilling Co.: Cascade	Deep Well Elevation: N/A	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): N/A	Project: Final GW Remedy Phase I
Driller Name: Nick Petrone	Easting (NAD83): N/A	Location: PG&E Topock, Needles, California
Drilling Asst: T. Alymer/ J. Candelaria	Borehole Diameter: 6-12 inches	
Logger: G. Willford / C. Bonessi	Water Level Start: 21 ft bgs	Project Number: RC000753.0051
Editor: Sean McGrane	Development End Date: 4/15/2019	
Total Depth: 357 ft bgs	Well Completion: <input type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
1					(0.0 - 317.0') 2" PVC Sch 80 Casing		
2					(- 247.0') 2" PVC Sch 80 Casing		
3							
4							
5					(0.0 - 10.0') 12" Borehole		
6		Topock - Fill	SM				
7					(0.0 - 14.0') Portland Cement 5% Bentonite	(0.0 - 14.0') 68.1 gallons	(0.0 - 14.0') 135 gallons (98%) Note: Type I, II and V with Benseal. Used 18 bags Portland with 1 bag bentonite.
8							
9							
10							
11							
12		Topock - Fill	GM				
13							
14		Topock - Fluvial Deposits	GM				
15					(10.0 - 341.0') 10" Borehole		
16							
17					(14.0 - 20.0') Bentonite seal chips	(14.0 - 20.0') 3.7 bags	(14.0 - 20.0') 17 bags (359%) Note: Enviroplug Medium Chips
18		Topock - Fluvial Deposits	GM				
19							
20							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started: 03/05/2019	Surface Elevation: N/A	Well ID: MW-B-267, MW-B-337
Date Completed:	Shallow Well Elevation: N/A	
Drilling Co.: Cascade	Deep Well Elevation: N/A	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): N/A	Project: Final GW Remedy Phase I
Driller Name: Nick Petrone	Easting (NAD83): N/A	Location: PG&E Topock, Needles, California
Drilling Asst: T. Alymer/ J. Candelaria	Borehole Diameter: 6-12 inches	
Logger: G. Willford / C. Bonessi	Water Level Start: 21 ft bgs	Project Number: RC000753.0051
Editor: Sean McGrane	Development End Date: 4/15/2019	
Total Depth: 357 ft bgs	Well Completion: <input type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
21		Topock - Fluvial Deposits	GM		(0.0 - 317.0') 2" PVC Sch 80 Casing		
22		Topock - Fluvial Deposits	SC				
23		Topock - Alluvium Deposits	CH				
24							
25		Topock - Alluvium Deposits	SM				
26							
27							
28							
29	MW-B-VAS-27-32 (7.7 J ppb) 1/6/2019 12:50	Topock - Alluvium Deposits	SM				
30					(20.0 - 235.0') High Solids Grout		(20.0 - 235.0') 950 gallons (9%) Note: Used 56 - 50 lbs bags of Aqua Guard high solids grout mix
31							
32		Topock - Alluvium Deposits	SC				
33							
34							
35							
36		Topock - Alluvium Deposits	SM				
37							
38							
39							
40							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	<u>03/05/2019</u>	Surface Elevation:	<u>N/A</u>	Well ID: MW-B-267, MW-B-337
Date Completed:		Shallow Well Elevation:	<u>N/A</u>	
Drilling Co.:	<u>Cascade</u>	Deep Well Elevation:	<u>N/A</u>	Client: <u>PG&E</u>
Drilling Method:	<u>Sonic Drilling</u>	Northing (NAD83):	<u>N/A</u>	Project: <u>Final GW Remedy Phase I</u>
Driller Name:	<u>Nick Petrone</u>	Easting (NAD83):	<u>N/A</u>	Location: <u>PG&E Topock, Needles, California</u>
Drilling Asst:	<u>T. Alymer/ J. Candelaria</u>	Borehole Diameter:	<u>6-12 inches</u>	
Logger:	<u>G. Willford / C. Bonessi</u>	Water Level Start:	<u>21 ft bgs</u>	Project Number: <u>RC000753.0051</u>
Editor:	<u>Sean McGrane</u>	Development End Date:	<u>4/15/2019</u>	
Total Depth:	<u>357 ft bgs</u>	Well Completion:	<input type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction		Calculated Material Volumes	Material Volumes Installed
41		Topock - Alluvium Deposits	SM		(0.0 - 317.0') 2" PVC Sch 80 Casing	(- 247.0') 2" PVC Sch 80 Casing		
42								
43								
44								
45	MW-B-VAS- 47-52 (<0.17 U ppb) 1/9/2019 10:15	Topock - Alluvium Deposits	SM		(47.5 - 48.5') Centralizer			(20.0 - 235.0') 874.7 gallons
46								
47								
48								
49		Topock - Alluvium Deposits	SM		(20.0 - 235.0') High Solids Grout	(10.0 - 341.0') 10" Borehole		(20.0 - 235.0') 950 gallons (9%) Note: Used 56 - 50 lbs bags of Aqua Guard high solids grout mix
50								
51								
52								
53		Topock - Alluvium Deposits	SM					
54								
55								
56								
57		Topock - Alluvium Deposits	SM					
58								
59								
60								

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

WELL CONSTRUCTION DETAILS PG&E TOPOCK C:\USERS\SMCGRANE\DOCUMENTS\PG&E TOPOCK\DATABASE FOR PLOG.GPJ TOPOCK DATA TEMPLATE FOR PLOG.GDT 06/05/19 12:17

Date Started:	<u>03/05/2019</u>	Surface Elevation:	<u>N/A</u>	Well ID: MW-B-267, MW-B-337
Date Completed:		Shallow Well Elevation:	<u>N/A</u>	
Drilling Co.:	<u>Cascade</u>	Deep Well Elevation:	<u>N/A</u>	Client: <u>PG&E</u>
Drilling Method:	<u>Sonic Drilling</u>	Northing (NAD83):	<u>N/A</u>	Project: <u>Final GW Remedy Phase I</u>
Driller Name:	<u>Nick Petrone</u>	Easting (NAD83):	<u>N/A</u>	Location: <u>PG&E Topock, Needles, California</u>
Drilling Asst:	<u>T. Alymer/ J. Candelaria</u>	Borehole Diameter:	<u>6-12 inches</u>	
Logger:	<u>G. Willford / C. Bonessi</u>	Water Level Start:	<u>21 ft bgs</u>	Project Number: <u>RC000753.0051</u>
Editor:	<u>Sean McGrane</u>	Development End Date:	<u>4/15/2019</u>	
Total Depth:	<u>357 ft bgs</u>	Well Completion:	<input type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction			Calculated Material Volumes	Material Volumes Installed
61		Topock - Alluvium Deposits	SM		(0.0 - 317.0') 2" PVC Sch 80 Casing		(- 247.0') 2" PVC Sch 80 Casing		
62									
63		Topock - Alluvium Deposits	ML						
64									
65		Topock - Fluvial Deposits	GM						
66	MW-B-VAS-67-72 (<0.17 U ppb) 1/9/2019 14:55	Topock - Alluvium Deposits	SM		(20.0 - 235.0') High Solids Grout		(10.0 - 341.0') 10" Borehole	(20.0 - 235.0') 874.7 gallons	(20.0 - 235.0') 950 gallons (9%) Note: Used 56 - 50 lbs bags of Aqua Guard high solids grout mix
67									
68									
69									
70		Topock - Alluvium Deposits	GM						
71									
72									
73									
74		Topock - Alluvium Deposits	SM						
75									
76									
77									
78		Topock - Alluvium Deposits	GM						
79									
80									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

WELL CONSTRUCTION DETAILS PG&E TOPOCK C:\USERS\SMCGRANE\DOCUMENTS\PG&E TOPOCK\DATABASE FOR PLOG.GPJ TOPOCK DATA TEMPLATE FOR PLOG.GDT 06/05/19 12:17

Date Started: 03/05/2019	Surface Elevation: N/A	Well ID: MW-B-267, MW-B-337
Date Completed:	Shallow Well Elevation: N/A	
Drilling Co.: Cascade	Deep Well Elevation: N/A	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): N/A	Project: Final GW Remedy Phase I
Driller Name: Nick Petrone	Easting (NAD83): N/A	Location: PG&E Topock, Needles, California
Drilling Asst: T. Alymer/ J. Candelaria	Borehole Diameter: 6-12 inches	
Logger: G. Willford / C. Bonessi	Water Level Start: 21 ft bgs	Project Number: RC000753.0051
Editor: Sean McGrane	Development End Date: 4/15/2019	
Total Depth: 357 ft bgs	Well Completion: <input type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
81					(0.0 - 317.0') 2" PVC Sch 80 Casing		
82							
83							
84		Topock - Alluvium Deposits	SM				
85							
86							
87							
88							
89		Topock - Alluvium Deposits	GM				
90					(20.0 - 235.0') High Solids Grout	(20.0 - 235.0') 874.7 gallons	(20.0 - 235.0') 950 gallons (9%) Note: Used 56 - 50 lbs bags of Aqua Guard high solids grout mix
91							
92							
93		Topock - Alluvium Deposits	SM				
94							
95							
96							
97							
98		Topock - Alluvium Deposits	ML				
99							
100							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started: 03/05/2019	Surface Elevation: N/A	Well ID: MW-B-267, MW-B-337
Date Completed:	Shallow Well Elevation: N/A	
Drilling Co.: Cascade	Deep Well Elevation: N/A	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): N/A	Project: Final GW Remedy Phase I
Driller Name: Nick Petrone	Easting (NAD83): N/A	Location: PG&E Topock, Needles, California
Drilling Asst: T. Alymer/ J. Candelaria	Borehole Diameter: 6-12 inches	
Logger: G. Willford / C. Bonessi	Water Level Start: 21 ft bgs	Project Number: RC000753.0051
Editor: Sean McGrane	Development End Date: 4/15/2019	
Total Depth: 357 ft bgs	Well Completion: <input type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
101		Topock - Alluvium Deposits	ML		(0.0 - 317.0') 2" PVC Sch 80 Casing		
102							
103							
104	MW-B-VAS-102-107 (<0.17 U ppb) 1/10/2019 13:00	Topock - Alluvium Deposits	SM				
105							
106							
107							
108					(107.5 - 108.5') Centralizer		
109							
110					(20.0 - 235.0') High Solids Grout	(20.0 - 235.0') 874.7 gallons	(20.0 - 235.0') 950 gallons (9%) Note: Used 56 - 50 lbs bags of Aqua Guard high solids grout mix
111							
112							
113		Topock - Alluvium Deposits	SM				
114							
115							
116							
117							
118							
119							
120							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started: 03/05/2019	Surface Elevation: N/A	Well ID: MW-B-267, MW-B-337
Date Completed:	Shallow Well Elevation: N/A	
Drilling Co.: Cascade	Deep Well Elevation: N/A	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): N/A	Project: Final GW Remedy Phase I
Driller Name: Nick Petrone	Easting (NAD83): N/A	Location: PG&E Topock, Needles, California
Drilling Asst: T. Alymer/ J. Candelaria	Borehole Diameter: 6-12 inches	
Logger: G. Willford / C. Bonessi	Water Level Start: 21 ft bgs	Project Number: RC000753.0051
Editor: Sean McGrane	Development End Date: 4/15/2019	
Total Depth: 357 ft bgs	Well Completion: <input type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
121		Topock - Alluvium Deposits	SM		(0.0 - 317.0') 2" PVC Sch 80 Casing		
122							
123		Topock - Alluvium Deposits	GM				
124							
125							
126							
127		Topock - Alluvium Deposits	SM				
128							
129							
130		Topock - Alluvium Deposits	GM		(20.0 - 235.0') High Solids Grout	(20.0 - 235.0') 874.7 gallons	(20.0 - 235.0') 950 gallons (9%) Note: Used 56 - 50 lbs bags of Aqua Guard high solids grout mix
131							
132							
133							
134							
135							
136							
137		Topock - Alluvium Deposits	SM				
138							
139							
140							

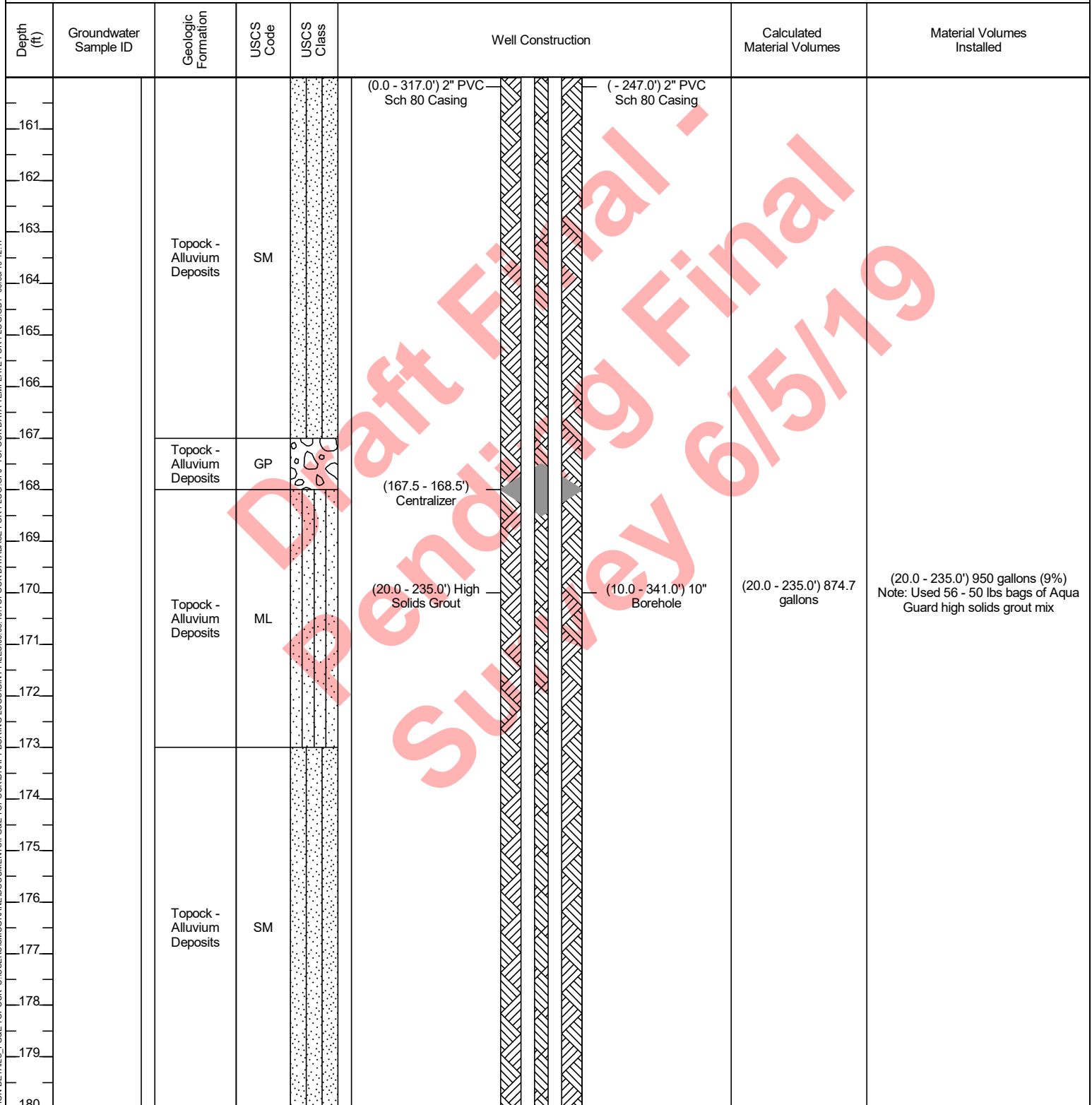
Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started: 03/05/2019	Surface Elevation: N/A	Well ID: MW-B-267, MW-B-337
Date Completed:	Shallow Well Elevation: N/A	
Drilling Co.: Cascade	Deep Well Elevation: N/A	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): N/A	Project: Final GW Remedy Phase I
Driller Name: Nick Petrone	Easting (NAD83): N/A	Location: PG&E Topock, Needles, California
Drilling Asst: T. Alymer/ J. Candelaria	Borehole Diameter: 6-12 inches	
Logger: G. Willford / C. Bonessi	Water Level Start: 21 ft bgs	Project Number: RC000753.0051
Editor: Sean McGrane	Development End Date: 4/15/2019	
Total Depth: 357 ft bgs	Well Completion: <input type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
141	MW-B-VAS-142-147 (<0.17 U ppb) 1/15/2019 14:25	Topock - Alluvium Deposits	SM		(0.0 - 317.0') 2" PVC Sch 80 Casing		
142		Topock - Alluvium Deposits	SM				
143		Topock - Alluvium Deposits	SM				
144		Topock - Alluvium Deposits	SM				
145		Topock - Alluvium Deposits	SM				
146		Topock - Alluvium Deposits	SM				
147		Topock - Alluvium Deposits	SM				
148		Topock - Alluvium Deposits	SM				
149		Topock - Alluvium Deposits	SM				
150		Topock - Alluvium Deposits	SM		(20.0 - 235.0') High Solids Grout	(20.0 - 235.0') 874.7 gallons	(20.0 - 235.0') 950 gallons (9%) Note: Used 56 - 50 lbs bags of Aqua Guard high solids grout mix
151		Topock - Alluvium Deposits	SM				
152		Topock - Alluvium Deposits	SM				
153		Topock - Alluvium Deposits	GM				
154		Topock - Alluvium Deposits	GM				
155		Topock - Alluvium Deposits	SM				
156		Topock - Alluvium Deposits	SM				
157		Topock - Alluvium Deposits	SM				
158		Topock - Alluvium Deposits	SM				
159		Topock - Alluvium Deposits	SM				
160		Topock - Alluvium Deposits	SM				

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started: 03/05/2019	Surface Elevation: N/A	Well ID: MW-B-267, MW-B-337
Date Completed:	Shallow Well Elevation: N/A	
Drilling Co.: Cascade	Deep Well Elevation: N/A	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): N/A	Project: Final GW Remedy Phase I
Driller Name: Nick Petrone	Easting (NAD83): N/A	Location: PG&E Topock, Needles, California
Drilling Asst: T. Alymer/ J. Candelaria	Borehole Diameter: 6-12 inches	
Logger: G. Willford / C. Bonessi	Water Level Start: 21 ft bgs	Project Number: RC000753.0051
Editor: Sean McGrane	Development End Date: 4/15/2019	
Total Depth: 357 ft bgs	Well Completion: <input type="checkbox"/> Flush <input type="checkbox"/> Stick-up	



Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

WELL CONSTRUCTION DETAILS: PG&E TOPOCK C:\USERS\SMOGRANE\DOCUMENTS\PG&E TOPOCK\DATA\TEMPLATE FOR PLOG.GPJ TOPOCK DATA TEMPLATE FOR PLOG.GPJ 06/05/19 12:17

Date Started:	<u>03/05/2019</u>	Surface Elevation:	<u>N/A</u>	Well ID: MW-B-267, MW-B-337
Date Completed:		Shallow Well Elevation:	<u>N/A</u>	
Drilling Co.:	<u>Cascade</u>	Deep Well Elevation:	<u>N/A</u>	Client: <u>PG&E</u>
Drilling Method:	<u>Sonic Drilling</u>	Northing (NAD83):	<u>N/A</u>	Project: <u>Final GW Remedy Phase I</u>
Driller Name:	<u>Nick Petrone</u>	Easting (NAD83):	<u>N/A</u>	Location: <u>PG&E Topock, Needles, California</u>
Drilling Asst:	<u>T. Alymer/ J. Candelaria</u>	Borehole Diameter:	<u>6-12 inches</u>	
Logger:	<u>G. Willford / C. Bonessi</u>	Water Level Start:	<u>21 ft bgs</u>	Project Number: <u>RC000753.0051</u>
Editor:	<u>Sean McGrane</u>	Development End Date:	<u>4/15/2019</u>	
Total Depth:	<u>357 ft bgs</u>	Well Completion:	<input type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction			Calculated Material Volumes	Material Volumes Installed
181	MW-B-VAS-182-187 (<0.17 U ppb) 2/13/2019 10:30	Topock - Alluvium Deposits	SM		(0.0 - 317.0') 2" PVC Sch 80 Casing		(- 247.0') 2" PVC Sch 80 Casing		
182									
183									
184		Topock - Alluvium Deposits	SM						
185									
186									
187									
188		Topock - Alluvium Deposits	SM						
189									
190						(20.0 - 235.0') High Solids Grout	(10.0 - 341.0') 10" Borehole	(20.0 - 235.0') 874.7 gallons	(20.0 - 235.0') 950 gallons (9%) Note: Used 56 - 50 lbs bags of Aqua Guard high solids grout mix
191									
192									
193		Topock - Alluvium Deposits	SM						
194									
195									
196		Topock - Alluvium Deposits	SM						
197									
198		Topock - Alluvium Deposits	SM						
199									
200									

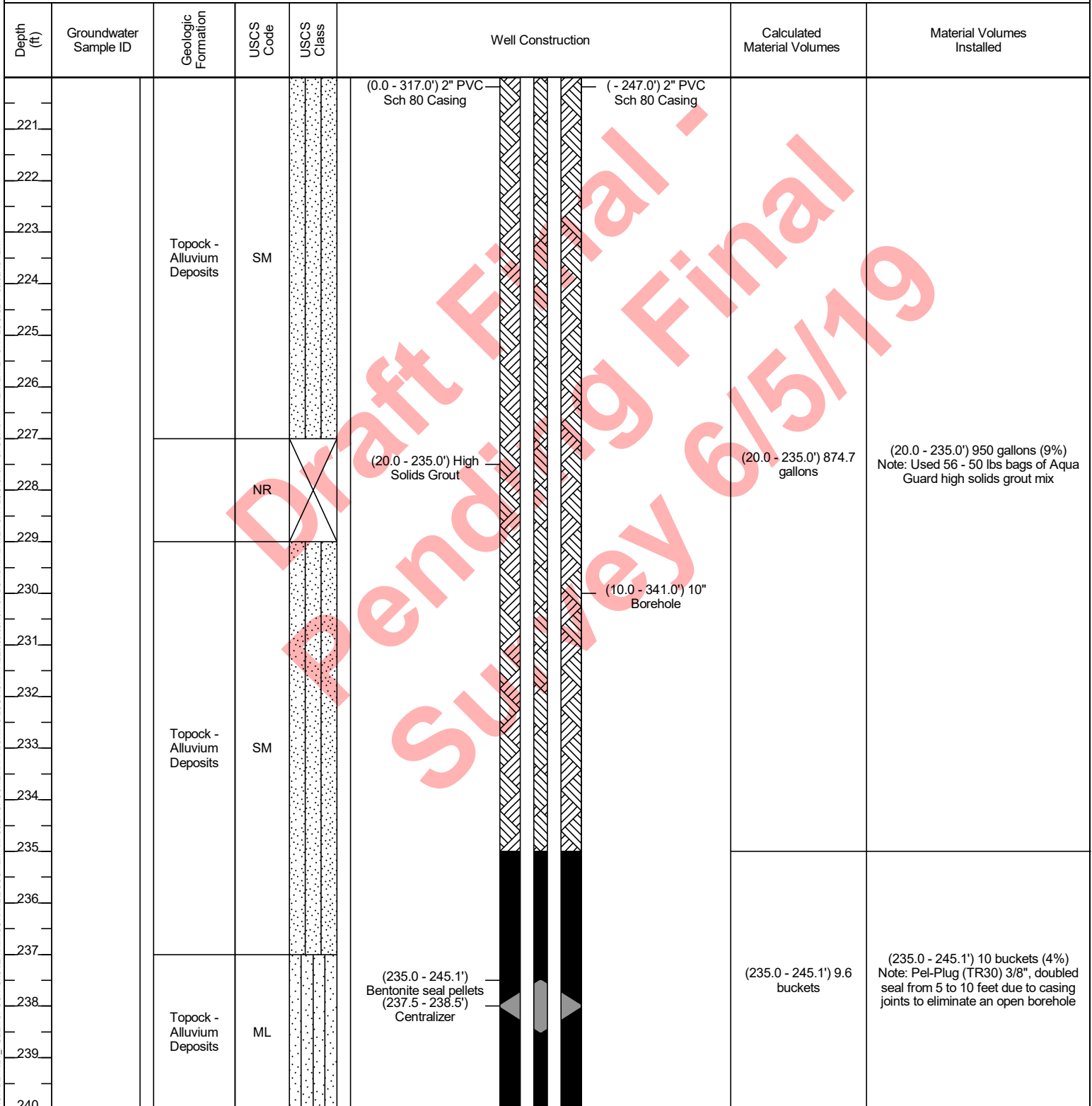
Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started: 03/05/2019	Surface Elevation: N/A	Well ID: MW-B-267, MW-B-337
Date Completed:	Shallow Well Elevation: N/A	
Drilling Co.: Cascade	Deep Well Elevation: N/A	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): N/A	Project: Final GW Remedy Phase I
Driller Name: Nick Petrone	Easting (NAD83): N/A	Location: PG&E Topock, Needles, California
Drilling Asst: T. Alymer/ J. Candelaria	Borehole Diameter: 6-12 inches	
Logger: G. Willford / C. Bonessi	Water Level Start: 21 ft bgs	Project Number: RC000753.0051
Editor: Sean McGrane	Development End Date: 4/15/2019	
Total Depth: 357 ft bgs	Well Completion: <input type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
201		Topock - Alluvium Deposits	SM		(0.0 - 317.0') 2" PVC Sch 80 Casing		
202							
203							
204							
205			NR				
206							
207							
208							
209	MW-B-VAS-207-212 (<0.17 U ppb) 2/14/2019 10:55						
210		Topock - Alluvium Deposits	SM		(20.0 - 235.0') High Solids Grout	(20.0 - 235.0') 874.7 gallons	(20.0 - 235.0') 950 gallons (9%) Note: Used 56 - 50 lbs bags of Aqua Guard high solids grout mix
211							
212							
213							
214							
215							
216							
217		Topock - Alluvium Deposits	SM				
218							
219							
220							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started: <u>03/05/2019</u>	Surface Elevation: <u>N/A</u>	Well ID: MW-B-267, MW-B-337
Date Completed: _____	Shallow Well Elevation: <u>N/A</u>	
Drilling Co.: <u>Cascade</u>	Deep Well Elevation: <u>N/A</u>	Client: <u>PG&E</u>
Drilling Method: <u>Sonic Drilling</u>	Northing (NAD83): <u>N/A</u>	Project: <u>Final GW Remedy Phase I</u>
Driller Name: <u>Nick Petrone</u>	Easting (NAD83): <u>N/A</u>	Location: <u>PG&E Topock, Needles, California</u>
Drilling Asst: <u>T. Alymer/ J. Candelaria</u>	Borehole Diameter: <u>6-12 inches</u>	
Logger: <u>G. Willford / C. Bonessi</u>	Water Level Start: <u>21 ft bgs</u>	Project Number: <u>RC000753.0051</u>
Editor: <u>Sean McGrane</u>	Development End Date: <u>4/15/2019</u>	
Total Depth: <u>357 ft bgs</u>	Well Completion: <input type="checkbox"/> Flush <input type="checkbox"/> Stick-up	



Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started: <u>03/05/2019</u>	Surface Elevation: <u>N/A</u>	Well ID: MW-B-267, MW-B-337
Date Completed: _____	Shallow Well Elevation: <u>N/A</u>	
Drilling Co.: <u>Cascade</u>	Deep Well Elevation: <u>N/A</u>	Client: <u>PG&E</u>
Drilling Method: <u>Sonic Drilling</u>	Northing (NAD83): <u>N/A</u>	Project: <u>Final GW Remedy Phase I</u>
Driller Name: <u>Nick Petrone</u>	Easting (NAD83): <u>N/A</u>	Location: <u>PG&E Topock, Needles, California</u>
Drilling Asst: <u>T. Alymer/ J. Candelaria</u>	Borehole Diameter: <u>6-12 inches</u>	
Logger: <u>G. Willford / C. Bonessi</u>	Water Level Start: <u>21 ft bgs</u>	Project Number: <u>RC000753.0051</u>
Editor: <u>Sean McGrane</u>	Development End Date: <u>4/15/2019</u>	
Total Depth: <u>357 ft bgs</u>	Well Completion: <input type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
241		Topock - Alluvium Deposits	ML		(0.0 - 317.0') 2" PVC Sch 80 Casing		
242							
243					(235.0 - 245.1') Bentonite seal pellets	(235.0 - 245.1') 9.6 buckets	(235.0 - 245.1') 10 buckets (4%) Note: Pel-Plug (TR30) 3/8", doubled seal from 5 to 10 feet due to casing joints to eliminate an open borehole
244							
245							
246							
247							
248		Topock - Alluvium Deposits	ML		(247.0 - 267.0') 2" Sch 80 PVC (20-slot) Screen		
249	MW-B-VAS-247-252 (<0.83 U ppb) 2/17/2019 11:25						
250					(10.0 - 341.0') 10" Borehole		
251							
252							
253					(245.1 - 271.0') Cemex #3 MESH (8x10)	(245.1 - 271.0') 26.5 bags	(245.1 - 271.0') 34 bags (28%) Note: Lapis Lustre Sand
254							
255							
256							
257		Topock - Alluvium Deposits	MH				
258							
259							
260							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started: 03/05/2019	Surface Elevation: N/A	Well ID: MW-B-267, MW-B-337
Date Completed:	Shallow Well Elevation: N/A	
Drilling Co.: Cascade	Deep Well Elevation: N/A	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): N/A	Project: Final GW Remedy Phase I
Driller Name: Nick Petrone	Easting (NAD83): N/A	Location: PG&E Topock, Needles, California
Drilling Asst: T. Alymer/ J. Candelaria	Borehole Diameter: 6-12 inches	
Logger: G. Willford / C. Bonessi	Water Level Start: 21 ft bgs	Project Number: RC000753.0051
Editor: Sean McGrane	Development End Date: 4/15/2019	
Total Depth: 357 ft bgs	Well Completion: <input type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
261					(0.0 - 317.0') 2" PVC Sch 80 Casing		
262							
263							
264							
265		Topock - Alluvium Deposits	MH				
266	MW-B-VAS-264-269 (<0.33 U ppb) 2/18/2019 14:00				(245.1 - 271.0') Cemex #3 MESH (8x10)	(245.1 - 271.0') 26.5 bags	(245.1 - 271.0') 34 bags (28%) Note: Lapis Lustre Sand
267							
268					(267.5 - 268.5') Centralizer		
269							
270		Topock - Alluvium Deposits	ML		(267.0 - 269.3') Sump and End Cap		
271					(10.0 - 341.0') 10" Borehole		
272							
273							
274							
275							
276		Topock - Alluvium Deposits	ML		(271.0 - 314.9') Bentonite seal pellets	(271.0 - 314.9') 44.1 buckets	(271.0 - 314.9') 42 buckets (-5%) Note: Pel-Plug (TR30) 3/8" 3/5/19 seal installation not complete, approximately 25 more ft added on 3/6/19
277							
278							
279							
280							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started: <u>03/05/2019</u>	Surface Elevation: <u>N/A</u>	Well ID: MW-B-267, MW-B-337
Date Completed: _____	Shallow Well Elevation: <u>N/A</u>	
Drilling Co.: <u>Cascade</u>	Deep Well Elevation: <u>N/A</u>	Client: <u>PG&E</u>
Drilling Method: <u>Sonic Drilling</u>	Northing (NAD83): <u>N/A</u>	Project: <u>Final GW Remedy Phase I</u>
Driller Name: <u>Nick Petrone</u>	Easting (NAD83): <u>N/A</u>	Location: <u>PG&E Topock, Needles, California</u>
Drilling Asst: <u>T. Alymer/ J. Candelaria</u>	Borehole Diameter: <u>6-12 inches</u>	
Logger: <u>G. Willford / C. Bonessi</u>	Water Level Start: <u>21 ft bgs</u>	Project Number: <u>RC000753.0051</u>
Editor: <u>Sean McGrane</u>	Development End Date: <u>4/15/2019</u>	
Total Depth: <u>357 ft bgs</u>	Well Completion: <input type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
281		Topock - Alluvium Deposits	ML		(0.0 - 317.0') 2" PVC Sch 80 Casing		
282							
283							
284							
285		Topock - Alluvium Deposits	ML				
286							
287							
288							
289	MW-B-VAS-287-292 (<0.17 U ppb) 2/20/2019 12:15	Topock - Alluvium Deposits	ML		(271.0 - 314.9') Bentonite seal pellets	(271.0 - 314.9') 44.1 buckets	(271.0 - 314.9') 42 buckets (-5%) Note: Pel-Plug (TR30) 3/8" 3/5/19 seal installation not complete, approximately 25 more ft added on 3/6/19
290							
291							
292							
293		Topock - Weathered Bedrock - conglomerate	GM				
294							
295							
296		Topock - Weathered Bedrock - conglomerate	ML				
297							
298							
299		Topock - Weathered Bedrock - conglomerate	SM				
300			GM				

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started: 03/05/2019	Surface Elevation: N/A	Well ID: MW-B-267, MW-B-337
Date Completed:	Shallow Well Elevation: N/A	
Drilling Co.: Cascade	Deep Well Elevation: N/A	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): N/A	Project: Final GW Remedy Phase I
Driller Name: Nick Petrone	Easting (NAD83): N/A	Location: PG&E Topock, Needles, California
Drilling Asst: T. Alymer/ J. Candelaria	Borehole Diameter: 6-12 inches	
Logger: G. Willford / C. Bonessi	Water Level Start: 21 ft bgs	Project Number: RC000753.0051
Editor: Sean McGrane	Development End Date: 4/15/2019	
Total Depth: 357 ft bgs	Well Completion: <input type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
301		Topock - Weathered Bedrock - conglomerate	GM		(0.0 - 317.0') 2" PVC Sch 80 Casing		
302							
303							
304							
305							
306							
307		Topock - Weathered Bedrock - conglomerate	MH		(271.0 - 314.9') Bentonite seal pellets	(271.0 - 314.9') 44.1 buckets	(271.0 - 314.9') 42 buckets (-5%) Note: Pel-Plug (TR30) 3/8" 3/5/19 seal installation not complete, approximately 25 more ft added on 3/6/19
308							
309							
310					(10.0 - 341.0') 10" Borehole		
311							
312							
313							
314							
315							
316		Topock - Weathered Bedrock - conglomerate	SM		(314.9 - 341.0') Cemex #3 MESH (8x10)		
317					(317.0 - 337.0') 2" Sch 80 PVC (20-slot) Screen	(314.9 - 341.0') 26.5 bags	(314.9 - 341.0') 31.5 bags (19%) Note: Lapis Lustre Sand
318	MW-B-VAS-317-322 (<0.17 U ppb) 2/21/2019 11:00						
319							
320							



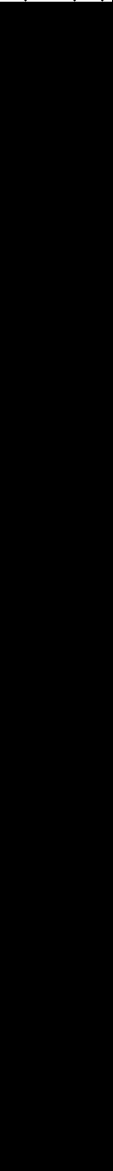

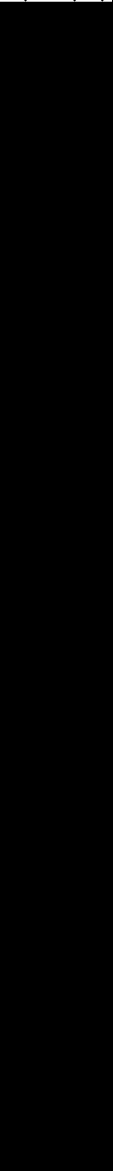
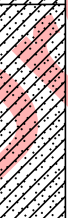
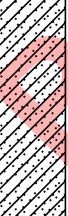
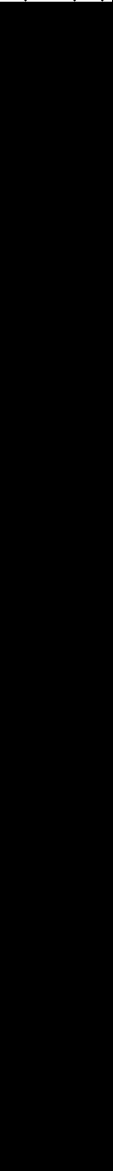

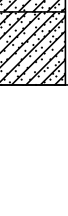
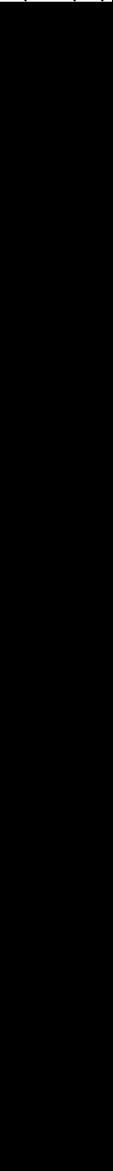

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started: 03/05/2019	Surface Elevation: N/A	Well ID: MW-B-267, MW-B-337
Date Completed:	Shallow Well Elevation: N/A	
Drilling Co.: Cascade	Deep Well Elevation: N/A	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): N/A	Project: Final GW Remedy Phase I
Driller Name: Nick Petrone	Easting (NAD83): N/A	Location: PG&E Topock, Needles, California
Drilling Asst: T. Alymer/ J. Candelaria	Borehole Diameter: 6-12 inches	
Logger: G. Willford / C. Bonessi	Water Level Start: 21 ft bgs	Project Number: RC000753.0051
Editor: Sean McGrane	Development End Date: 4/15/2019	
Total Depth: 357 ft bgs	Well Completion: <input type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
321	MW-B-VAS-317-322 (<0.17 U ppb) 2/21/2019 11:00	Topock - Weathered Bedrock - conglomerate	ML		(317.0 - 337.0') 2" Sch 80 PVC (20-slot) Screen		
322							
323							
324							
325							
326							
327							
328							
329		Topock - Weathered Bedrock - conglomerate	ML				
330					(314.9 - 341.0') Cemex #3 MESH (8x10)	(10.0 - 341.0') 10" Borehole	(314.9 - 341.0') 26.5 bags
331							(314.9 - 341.0') 31.5 bags (19%) Note: Lapis Lustre Sand
332							
333							
334							
335							
336							
337							
338		Topock - Weathered Bedrock - conglomerate	SC		(337.5 - 338.5') Centralizer		
339					(337.0 - 339.3') Sump and End Cap		
340							

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Date Started: 03/05/2019	Surface Elevation: N/A	Well ID: MW-B-267, MW-B-337
Date Completed:	Shallow Well Elevation: N/A	
Drilling Co.: Cascade	Deep Well Elevation: N/A	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): N/A	Project: Final GW Remedy Phase I
Driller Name: Nick Petrone	Easting (NAD83): N/A	Location: PG&E Topock, Needles, California
Drilling Asst: T. Alymer/ J. Candelaria	Borehole Diameter: 6-12 inches	
Logger: G. Willford / C. Bonessi	Water Level Start: 21 ft bgs	Project Number: RC000753.0051
Editor: Sean McGrane	Development End Date: 4/15/2019	
Total Depth: 357 ft bgs	Well Completion: <input type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction			Calculated Material Volumes	Material Volumes Installed
341	MW-B-VAS-339-344 (<0.33 U ppb) 2/27/2019 12:28	Topock - Weathered Bedrock - conglomerate	SC		(314.9 - 341.0') Cemex #3 MESH (8x10)		(10.0 - 341.0') 10" Borehole	(314.9 - 341.0') 26.5 bags	(314.9 - 341.0') 31.5 bags (19%) Note: Lapis Lustre Sand
342						(341.0 - 357.0') 6" Borehole	(341.0 - 357.0') 4.4 bags	(341.0 - 357.0') 4.5 bags (2%) Note: Enviroplug Medium Chips	
343									
344									
345	MW-B-VAS-352-357 (<0.33 U ppb) 2/28/2019 15:05	Topock - Weathered Bedrock - conglomerate	SC		(341.0 - 357.0') Bentonite seal chips		(341.0 - 357.0') 6" Borehole	(341.0 - 357.0') 4.4 bags	(341.0 - 357.0') 4.5 bags (2%) Note: Enviroplug Medium Chips
346									
347		Topock - Weathered Bedrock - conglomerate	SC						
348									
349	MW-B-VAS-352-357 (<0.33 U ppb) 2/28/2019 15:05	Topock - Weathered Bedrock - conglomerate	SC		(341.0 - 357.0') Bentonite seal chips		(341.0 - 357.0') 6" Borehole	(341.0 - 357.0') 4.4 bags	(341.0 - 357.0') 4.5 bags (2%) Note: Enviroplug Medium Chips
350									
351									
352		Topock - Weathered Bedrock - conglomerate	SC						
353									
354	MW-B-VAS-352-357 (<0.33 U ppb) 2/28/2019 15:05	Topock - Weathered Bedrock - conglomerate	SC		(341.0 - 357.0') Bentonite seal chips		(341.0 - 357.0') 6" Borehole	(341.0 - 357.0') 4.4 bags	(341.0 - 357.0') 4.5 bags (2%) Note: Enviroplug Medium Chips
355									
356									
357		Topock - Weathered Bedrock - conglomerate	SC						
End of Boring at 357.0' bgs.									
358									
359									
360									

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





WELL CONSTRUCTION DETAILS - PG&E TOPOCK C:\USERS\SMCGRANE\DOCUMENTS\PG&E TOPOCK\DATA\BORING LOGS\GINT FILES\06.05.18\TOPOCK\DATABASE FOR PLOG.GPJ TOPOCK DATA TEMPLATE FOR PLOG.GDT 06/05/18 12:17

Date Started:	01/04/2019	Surface Elevation:	N/A	Boring No.: MW-Bd	
Date Completed:	03/05/2019	Northing (NAD83):	N/A		
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	357 ft bgs	Project:	Final GW Remedy Phase I
Drill Rig Type:	Terrasonic track mount	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Nick Petrone	Depth to First Water:	21 ft bgs		
Drilling Asst:	T. Alymer/ J. Candelaria	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	G. Willford / C. Bonessi	Sampling Interval:	Continuous		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
1							(0.0 - 12.0') Topock - Fill; Poorly graded sand with silt (SM); very pale brown (10YR 8/3); very fine grained to fine grained, angular to subround; little silt; dry; trace organics	(0.0 - 7.0') Soft drilling	(0.0 - 297.0') No water used
2									
3									
4	39.6								
5									
6				Topock - Fill	SM				
7									
8									
9									
10									
11									
12	120			Topock - Fill	GM		(12.0 - 13.5') Topock - Fill; Silty gravel with sand (GM); (GLE Y1 4/1); medium pebbles to very large pebbles, angular; some silt; little medium to very coarse grained sand, angular; dry; 1.5' Meta-Diorite Boulder		
13									
14				Topock - Fluvial Deposits	GM		(13.5 - 17.0') Topock - Fluvial Deposits; Silty gravel with sand (GM); dark olive brown (2.5Y 3/3); granules to very large pebbles, angular to round; some very fine to very coarse grained sand, angular to subround; some silt; trace cobbles, angular to subround; dry; gravel composed of mixed lithology		
15									
16									
17									
18	108			Topock - Fluvial Deposits	GM		(17.0 - 21.5') Topock - Fluvial Deposits; Silty gravel with sand (GM); dark grayish brown / dark yellowish brown (10YR 4/2); granules to very large pebbles, angular to subround; some very fine to very coarse grained sand, angular to subround; some silt; little clay; dry		
19									
20									

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Date Started: 01/04/2019	Surface Elevation: N/A	Boring No.: MW-Bd
Date Completed: 03/05/2019	Northing (NAD83): N/A	
Drilling Co.: Cascade	Easting (NAD83): N/A	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 357 ft bgs	Project: Final GW Remedy Phase I
Drill Rig Type: Terrasonic track mount	Borehole Diameter: 6-12 inches	Location: PG&E Topock, Needles, California
Driller Name: Nick Petrone	Depth to First Water: 21 ft bgs	
Drilling Asst: T. Alymer/ J. Candelaria	Sampling Method: 4 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger: G. Willford / C. Bonessi	Sampling Interval: Continuous	
Editor: Sean McGrane	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
21	108			Topock - Fluvial Deposits	GM			(21.0') Approximate depth to water table	(0.0 - 297.0') No water used
22				Topock - Fluvial Deposits	SC		(21.5 - 22.5') Topock - Fluvial Deposits; Clayey sand with gravel (SC); reddish yellow (7.5YR 6/6); very fine grained to very coarse grained, angular to subround; some granules to very large pebbles, subangular to subround; little silt; little clay; moist; gravel composed of mixed lithology		
23				Topock - Alluvium Deposits	CH		(22.5 - 24.0') Topock - Alluvium Deposits; Fat clay with gravel (CH); reddish yellow (5YR 6/8); high plasticity; little cobbles, subangular to subround; trace very fine grained sand, subangular to subround; trace silt; moist		
24				Topock - Alluvium Deposits	SM		(24.0 - 27.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 5/3); fine grained to very coarse grained, angular to subround; some silt; little granules to medium pebbles, angular to subround; little clay; moist		
25	60		MW-B-VAS-27-32 (7.7 J ppb) 1/6/2019 12:50	Topock - Alluvium Deposits	SM		(27.0 - 32.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 5/3); very fine grained to very coarse grained, angular to round; some granules to large pebbles, angular to subround; some silt; little clay; moist		
26									
27									
28									
29	120			Topock - Alluvium Deposits	SC		(32.0 - 33.0') Topock - Alluvium Deposits; Clayey sand with gravel (SC); light brown (7.5YR 6/4); fine grained to very coarse grained, angular to round; some clay; little granules to medium pebbles, angular to subround; little silt; wet; gravel composed of mixed lithology		
30				Topock - Alluvium Deposits	SM		(33.0 - 44.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 5/3); very fine grained to very coarse grained, angular to round; little granules to medium pebbles, angular to subround; little silt; little clay; trace cobbles, subangular; wet		
31									
32									
33									
34									
35									
36									
37									
38									
39									
40									

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Date Started:	01/04/2019	Surface Elevation:	N/A	Boring No.: MW-Bd	
Date Completed:	03/05/2019	Northing (NAD83):	N/A		
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	357 ft bgs	Project:	Final GW Remedy Phase I
Drill Rig Type:	Terrasonic track mount	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Nick Petrone	Depth to First Water:	21 ft bgs		
Drilling Asst:	T. Alymer/ J. Candelaria	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	G. Willford / C. Bonessi	Sampling Interval:	Continuous		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
41	120			Topock - Alluvium Deposits	SM				(0.0 - 297.0') No water used
42									
43									
44									
45							(44.5 - 52.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 5/3) little grayish brown (10YR 5/2); very fine grained to very coarse grained, angular to round; little granules to very large pebbles, angular to subround; little cobbles, subangular to subround; little silt; little clay; wet		
46									
47	120								
48				Topock - Alluvium Deposits	SM				
49			MW-B-VAS-47-52 (<0.17 U ppb) 1/9/2019 10:15						
50									
51									
52									
53							(52.0 - 62.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 4/4); very fine grained to very fine grained, angular to round; some silt; little granules to very large pebbles, angular to round; little clay; trace cobbles, subangular to subround; moist to wet		
54									
55									
56	120			Topock - Alluvium Deposits	SM				
57									
58									
59									
60									

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Date Started: 01/04/2019	Surface Elevation: N/A	Boring No.: MW-Bd
Date Completed: 03/05/2019	Northing (NAD83): N/A	
Drilling Co.: Cascade	Easting (NAD83): N/A	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 357 ft bgs	Project: Final GW Remedy Phase I
Drill Rig Type: Terrasonic track mount	Borehole Diameter: 6-12 inches	Location: PG&E Topock, Needles, California
Driller Name: Nick Petrone	Depth to First Water: 21 ft bgs	
Drilling Asst: T. Alymer/ J. Candelaria	Sampling Method: 4 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger: G. Willford / C. Bonessi	Sampling Interval: Continuous	
Editor: Sean McGrane	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
61	120			Topock - Alluvium Deposits	SM				(0.0 - 297.0') No water used
62									
63				Topock - Alluvium Deposits	ML		(62.0 - 64.5') Topock - Alluvium Deposits; Sandy silt with gravel (ML); brown (7.5YR 4/3); medium plasticity; some very fine to medium grained sand, angular to round; little granules to medium pebbles, angular to subround; little clay; moist		
64									
65				Topock - Fluvial Deposits	GM		(64.5 - 65.5') Topock - Fluvial Deposits; Silty gravel with sand (GM); brown (7.5YR 4/4); granules to very large pebbles, angular to subround; some very fine to very coarse grained sand, angular to round; some silt; little cobbles, subangular to subround; trace clay; moist		
66									
67	120						(65.5 - 72.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 4/4); very fine grained to very coarse grained; some silt; little granules to very large pebbles, angular to subround; little cobbles, subangular to subround; trace clay; moist to wet		
68									
69			MW-B-VAS-67-72 (<0.17 U ppb) 1/9/2019 14:55	Topock - Alluvium Deposits	SM				
70									
71									
72									
73							(72.0 - 77.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); light brown (7.5YR 6/4); granules to very large pebbles, angular to round; some very fine to very coarse grained sand, angular to round; some silt; trace clay; moist to wet		
74				Topock - Alluvium Deposits	GM				
75									
76	120								
77									
78				Topock - Alluvium Deposits	SM		(77.0 - 88.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); strong brown (7.5YR 5/6); very fine grained to very coarse grained, angular to round; little small to medium pebbles, angular to subround; little silt; trace clay; wet; majority of pebbles are elongated. Gravel composed of mixed lithology.		
79									
80									

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Date Started: 01/04/2019	Surface Elevation: N/A	Boring No.: MW-Bd
Date Completed: 03/05/2019	Northing (NAD83): N/A	
Drilling Co.: Cascade	Easting (NAD83): N/A	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 357 ft bgs	Project: Final GW Remedy Phase I
Drill Rig Type: Terrasonic track mount	Borehole Diameter: 6-12 inches	Location: PG&E Topock, Needles, California
Driller Name: Nick Petrone	Depth to First Water: 21 ft bgs	
Drilling Asst: T. Alymer/ J. Candelaria	Sampling Method: 4 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger: G. Willford / C. Bonessi	Sampling Interval: Continuous	
Editor: Sean McGrane	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
81	120								(0.0 - 297.0') No water used
82									
83									
84				Topock - Alluvium Deposits	SM				
85									
86									
87	120								
88									
89				Topock - Alluvium Deposits	GM		(88.0 - 91.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); brown (7.5YR 4/3); granules to small cobbles, angular to subround; some very fine to very coarse grained sand, angular to round; some silt; trace clay; moist; gravel composed mostly of meta-diorite		
90									
91									
92							(91.0 - 97.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); strong brown (7.5YR 4/6); very fine grained to very coarse grained, angular to round; some granules to very large pebbles, angular to subround; some silt; trace cobbles, angular to subangular; trace clay; wet; gravel composed of mixed lithology		
93									
94				Topock - Alluvium Deposits	SM				
95	60								
96									
97									
98									
99	120			Topock - Alluvium Deposits	ML		(97.0 - 102.0') Topock - Alluvium Deposits; Sandy silt with gravel (ML); strong brown (7.5YR 5/6) trace red (10R 5/8); medium plasticity; some very fine to very coarse grained sand, subangular to round; little granules to medium pebbles, subangular to subround; trace clay; moist; iron oxide staining		
100									



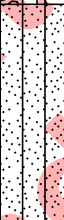



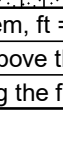
Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	01/04/2019	Surface Elevation:	N/A	Boring No.: MW-Bd	
Date Completed:	03/05/2019	Northing (NAD83):	N/A		
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	357 ft bgs	Project:	Final GW Remedy Phase I
Drill Rig Type:	Terrasonic track mount	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Nick Petrone	Depth to First Water:	21 ft bgs		
Drilling Asst:	T. Alymer/ J. Candelaria	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	G. Willford / C. Bonessi	Sampling Interval:	Continuous		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
101				Topock - Alluvium Deposits	ML				(0.0 - 297.0') No water used
102									
103									
104	120								
105									
106									
107									
108									
109									
110									
111									
112	120								
113									
114									
115									
116									
117									
118	120								
119									
120									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started: 01/04/2019	Surface Elevation: N/A	Boring No.: MW-Bd
Date Completed: 03/05/2019	Northing (NAD83): N/A	
Drilling Co.: Cascade	Easting (NAD83): N/A	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 357 ft bgs	Project: Final GW Remedy Phase I
Drill Rig Type: Terrasonic track mount	Borehole Diameter: 6-12 inches	Location: PG&E Topock, Needles, California
Driller Name: Nick Petrone	Depth to First Water: 21 ft bgs	
Drilling Asst: T. Alymer/ J. Candelaria	Sampling Method: 4 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger: G. Willford / C. Bonessi	Sampling Interval: Continuous	
Editor: Sean McGrane	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
121	120			Topock - Alluvium Deposits	SM				(0.0 - 297.0') No water used
122				Topock - Alluvium Deposits	GM		(122.0 - 126.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); strong brown (7.5YR 5/6) trace very dark gray (7.5YR 3/1); granules to very large pebbles, angular to subround; some very fine to very coarse grained sand, angular to subround; some silt; little cobbles, subangular to subround; trace clay; moist		
123									
124									
125	120			Topock - Alluvium Deposits	SM		(126.0 - 129.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); strong brown (7.5YR 5/6); very fine grained to very coarse grained, angular to subround; some granules to very large pebbles, angular to subround; some silt; trace cobbles, subangular; trace clay; moist to wet		
126									
127									
128		120			Topock - Alluvium Deposits	GM		(129.0 - 134.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); strong brown (7.5YR 5/6) some very dark gray (10YR 3/1); granules to very large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subround; some silt; trace cobbles, angular; trace clay; moist; moderate cementation	
129									
130									
131	120				Topock - Alluvium Deposits	SM		(134.0 - 144.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); strong brown (7.5YR 5/6); very fine grained to very coarse grained, angular to round; some silt; little granules to medium pebbles, subangular to subround; trace cobbles, subangular; trace clay; moist	
132									
133									
134		120			Topock - Alluvium Deposits	SM			
135									
136									
137									
138	120			Topock - Alluvium Deposits	SM				
139									
140									





Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	01/04/2019	Surface Elevation:	N/A	Boring No.: MW-Bd	
Date Completed:	03/05/2019	Northing (NAD83):	N/A		
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	357 ft bgs	Project:	Final GW Remedy Phase I
Drill Rig Type:	Terrasonic track mount	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Nick Petrone	Depth to First Water:	21 ft bgs		
Drilling Asst:	T. Alymer/ J. Candelaria	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	G. Willford / C. Bonessi	Sampling Interval:	Continuous		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
141	120			Topock - Alluvium Deposits	SM				(0.0 - 297.0') No water used
142									
143									
144									
145	120		MW-B-VAS-142-147 (<0.17 U ppb) 1/15/2019 14:25	Topock - Alluvium Deposits	SM		(144.0 - 147.0') Topock - Alluvium Deposits; Silty sand (SM); brown (7.5YR 5/4); very fine grained to very coarse grained, angular to subround; some silt; little granules to medium pebbles, subangular to round; trace clay; moist to wet		
146									
147									
148									
149	120			Topock - Alluvium Deposits	SM		(147.0 - 152.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); light brown (7.5YR 6/4)(4); very fine grained to very coarse grained, angular to subround; some silt; little granules to large pebbles, subangular to round; trace clay; moist to wet		
150									
151									
152									
153	120			Topock - Alluvium Deposits	GM		(152.5 - 154.0') Topock - Alluvium Deposits; Silty sand with gravel (GM); light brown (7.5YR 6/4); granules to very large pebbles; some very fine to very coarse grained sand, angular to subround; some silt; trace clay; moist		
154									
155				Topock - Alluvium Deposits	SM		(154.0 - 157.0') Topock - Alluvium Deposits; Silty sand (SM); brown (7.5YR 5/4); very fine grained to very coarse grained, angular to subround; some silt; little granules to medium pebbles, subangular to round; trace clay; wet		
156									
157	120								
158				Topock - Alluvium Deposits	GM		(157.0 - 160.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); dark brown (10YR 3/3) little reddish brown (2.5YR 4/4); granules to small cobbles, subangular to subround; some very fine to very coarse grained sand, angular to subround; little silt; little clay; moist		
159									
160									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started: 01/04/2019	Surface Elevation: N/A	Boring No.: MW-Bd
Date Completed: 03/05/2019	Northing (NAD83): N/A	
Drilling Co.: Cascade	Easting (NAD83): N/A	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 357 ft bgs	Project: Final GW Remedy Phase I
Drill Rig Type: Terrasonic track mount	Borehole Diameter: 6-12 inches	Location: PG&E Topock, Needles, California
Driller Name: Nick Petrone	Depth to First Water: 21 ft bgs	
Drilling Asst: T. Alymer/ J. Candelaria	Sampling Method: 4 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger: G. Willford / C. Bonessi	Sampling Interval: Continuous	
Editor: Sean McGrane	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
161	120			Topock - Alluvium Deposits	SM		(160.0 - 167.0') Topock - Alluvium Deposits; Silty sand (SM); brown (7.5YR 5/4); very fine grained to very coarse grained, angular to subround; some silt; little granules to medium pebbles, subangular to round; trace clay; wet		(0.0 - 297.0') No water used
162									
163									
164									
165									
166	120			Topock - Alluvium Deposits	GP		(167.0 - 168.0') Topock - Alluvium Deposits; Poorly graded gravel (GP); (GLE Y2 6/1); small cobbles to large cobbles, angular; trace very fine to medium grained sand, angular to subangular; trace silt; dry; pulverized metadiorite boulder		
167									
168									
169									
170									
171	120			Topock - Alluvium Deposits	ML		(168.0 - 173.0') Topock - Alluvium Deposits; Sandy silt with gravel (ML); reddish brown / moderate brown(5YR 4/4); medium plasticity; some very fine to coarse grained sand; little granules to small pebbles, subangular to subround; little clay; moist to wet		
172									
173									
174									
175									
176	120			Topock - Alluvium Deposits	SM		(173.0 - 183.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown / moderate brown(5YR 4/4); very fine grained to very coarse grained, angular to subround; some granules to large pebbles, angular to subround; some silt; trace clay; wet		
177									
178									
179									
180									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

SOIL BORING LOG PG&E TOPOCK C:\USERS\SMCGRANE\DOCUMENTS\PG&E TOPOCK\DRIFT BORING LOGS\GINT FILES\06 04 19\TOPOCK DATA TEMPLATE FOR FLOG.GDT 06/04/19 17:24

Date Started: <u>01/04/2019</u>	Surface Elevation: <u>N/A</u>	Boring No.: <u>MW-Bd</u>
Date Completed: <u>03/05/2019</u>	Northing (NAD83): <u>N/A</u>	
Drilling Co.: <u>Cascade</u>	Easting (NAD83): <u>N/A</u>	Client: <u>PG&E</u>
Drilling Method: <u>Sonic Drilling</u>	Total Depth: <u>357 ft bgs</u>	Project: <u>Final GW Remedy Phase I</u>
Drill Rig Type: <u>Terrasonic track mount</u>	Borehole Diameter: <u>6-12 inches</u>	Location: <u>PG&E Topock, Needles, California</u>
Driller Name: <u>Nick Petrone</u>	Depth to First Water: <u>21 ft bgs</u>	
Drilling Asst: <u>T. Alymer/ J. Candelaria</u>	Sampling Method: <u>4 inch x 10 ft Core Barrel</u>	Project Number: <u>RC000753.0051</u>
Logger: <u>G. Willford / C. Bonessi</u>	Sampling Interval: <u>Continuous</u>	
Editor: <u>Sean McGrane</u>	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
181	120			Topock - Alluvium Deposits	SM				(0.0 - 297.0') No water used
182									
183									
184									
185	114		MW-B-VAS-182-187 (<0.17 U ppb) 2/13/2019 10:30	Topock - Alluvium Deposits	SM		(183.0 - 187.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); grayish brown (10YR 5/2) trace red (2.5YR 4/6); very fine grained to very coarse grained, angular to subround; some granules to large pebbles, angular to subround; some silt; trace clay; moist to wet		
186									
187									
188				Topock - Alluvium Deposits	SM		(187.0 - 192.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); yellowish red / light brown(5YR 5/6); very fine grained to very coarse grained, angular to subround; some granules to very large pebbles, subangular to subround; little silt; trace cobbles, angular to subangular; trace clay; wet		
189									
190									
191									
192									
193	60			Topock - Alluvium Deposits	SM		(192.0 - 195.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 5/3); very fine grained to very coarse grained, angular to subround; some granules to very large pebbles, subangular to subround; little silt; trace cobbles, angular to subangular; trace clay; wet		
194									
195									
196				Topock - Alluvium Deposits	SM		(195.0 - 197.0') Topock - Alluvium Deposits; Silty sand (SM); light reddish brown (5YR 6/3); very fine grained to very coarse grained, angular to subround; some silt; little granules to medium pebbles, subangular to round; trace clay; moist		
197									
198									
199				Topock - Alluvium Deposits	SM		(197.0 - 202.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); light reddish brown / light brown(5YR 6/4); fine grained to very coarse grained, angular to subround; little granules to large pebbles, subangular to subround; little silt; trace cobbles, subangular; trace clay; moist		
200									





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Date Started: 01/04/2019	Surface Elevation: N/A	Boring No.: MW-Bd
Date Completed: 03/05/2019	Northing (NAD83): N/A	
Drilling Co.: Cascade	Easting (NAD83): N/A	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 357 ft bgs	Project: Final GW Remedy Phase I
Drill Rig Type: Terrasonic track mount	Borehole Diameter: 6-12 inches	Location: PG&E Topock, Needles, California
Driller Name: Nick Petrone	Depth to First Water: 21 ft bgs	
Drilling Asst: T. Alymer/ J. Candelaria	Sampling Method: 4 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger: G. Willford / C. Bonessi	Sampling Interval: Continuous	
Editor: Sean McGrane	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
201	60			Topock - Alluvium Deposits	SM				(0.0 - 297.0') No water used
202							(202.0 - 207.0') (NR)	(202.0 - 207.0') No Core Recovery. Driller noted core barrel was full during core extraction.	
203									
204									
205									
206									
207	60								
208							(207.0 - 215.0') Topock - Alluvium Deposits; Silty sand (SM); light reddish brown (5YR 6/3); very fine grained to very coarse grained, angular to subround; some silt; little granules to medium pebbles, subangular to round; trace clay; wet		
209									
210									
211									
212									
213									
214									
215	60								
216							(215.0 - 220.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); yellowish red / light brown(5YR 5/6); very fine grained to very coarse grained, angular to subround; some silt; little granules to medium pebbles, angular to subangular; trace cobbles, angular to subangular; trace clay; moist; gravel composed of mixed lithology		
217									
218									
219	114								
220									

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Date Started: 01/04/2019	Surface Elevation: N/A	Boring No.: MW-Bd
Date Completed: 03/05/2019	Northing (NAD83): N/A	
Drilling Co.: Cascade	Easting (NAD83): N/A	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 357 ft bgs	Project: Final GW Remedy Phase I
Drill Rig Type: Terrasonic track mount	Borehole Diameter: 6-12 inches	Location: PG&E Topock, Needles, California
Driller Name: Nick Petrone	Depth to First Water: 21 ft bgs	
Drilling Asst: T. Alymer/ J. Candelaria	Sampling Method: 4 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger: G. Willford / C. Bonessi	Sampling Interval: Continuous	
Editor: Sean McGrane	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
221	114			Topock - Alluvium Deposits	SM		(220.0 - 227.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); yellowish red (5YR 4/6); fine grained to very coarse grained, angular to subround; some granules to large pebbles, angular to subround; some cobbles, angular to subangular; some silt; trace clay; moist to wet		(0.0 - 297.0') No water used
222									
223									
224									
225									
226	96			Topock - Alluvium Deposits	NR		(227.0 - 229.0') (NR)	(227.0 - 229.0') No core recovery. Driller noted core barrel was full during core extraction.	
227									
228									
229									
230									
231	60			Topock - Alluvium Deposits	SM		(229.0 - 237.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); yellowish red (5YR 4/6); fine grained to very coarse grained, angular to subround; some silt; little granules to large pebbles, angular to subangular; trace cobbles, angular to subangular; trace clay; wet		
232									
233									
234									
235									
236				Topock - Alluvium Deposits	ML		(237.0 - 242.0') Topock - Alluvium Deposits; Sandy silt with gravel (ML); reddish brown (2.5YR 4/4); low plasticity; some very fine to medium grained sand, angular to subround; little granules to medium pebbles, angular to subround; little clay; moist to dry; moderate cementation	(237.0 - 242.0') Rough drilling. End cap found in core	
237									
238									
239									
240									

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Date Started:	01/04/2019	Surface Elevation:	N/A	Boring No.: MW-Bd	
Date Completed:	03/05/2019	Northing (NAD83):	N/A		
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	357 ft bgs	Project:	Final GW Remedy Phase I
Drill Rig Type:	Terrasonic track mount	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Nick Petrone	Depth to First Water:	21 ft bgs		
Drilling Asst:	T. Alymer/ J. Candelaria	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	G. Willford / C. Bonessi	Sampling Interval:	Continuous		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
241	60			Topock - Alluvium Deposits	ML			(237.0 - 242.0') Rough drilling. End cap found in core	(0.0 - 297.0') No water used
242							(242.0 - 254.0') Topock - Alluvium Deposits; Sandy silt with gravel (ML); reddish brown (2.5YR 4/4); medium plasticity; some very fine to medium grained sand, angular to subround; little granules to large pebbles, angular to round; little clay; trace cobbles, angular to subangular; moist; weak cementation; iron oxide staining	(242.0 - 252.0') Drill rods chattering	
243									
244									
245									
246									
247	120								
248				Topock - Alluvium Deposits	ML				
249			MW-B-VAS-247-252 (<0.83 U ppb) 2/17/2019 11:25						
250									
251							(251.0 - 251.2'); core slightly saturated		
252									
253								(252.0 - 254.0') Rough drilling	
254									
255							(254.0 - 269.0') Topock - Alluvium Deposits; Sandy elastic silt with gravel (MH); reddish brown (2.5YR 4/4); high plasticity; some very fine to coarse grained sand, angular to subround; little granules to small pebbles, subangular to subround; little clay; moist		
256	120								
257				Topock - Alluvium Deposits	MH				
258									
259							(258.5'); some granules to very large pebbles, subangular to subround; little clay; trace cobbles, subround; medium to high plasticity		
260									

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Date Started:	01/04/2019	Surface Elevation:	N/A	Boring No.: MW-Bd	
Date Completed:	03/05/2019	Northing (NAD83):	N/A		
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	357 ft bgs	Project:	Final GW Remedy Phase I
Drill Rig Type:	Terrasonic track mount	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Nick Petrone	Depth to First Water:	21 ft bgs		
Drilling Asst:	T. Alymer/ J. Candelaria	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	G. Willford / C. Bonessi	Sampling Interval:	Continuous		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
261	120								(0.0 - 297.0') No water used
262									
263									
264									
265				Topock - Alluvium Deposits	MH				
266			MW-B-VAS-264-269 (<0.33 U ppb) 2/18/2019 14:00					(266.0 - 269.0') Drill rods chattering	
267	120								
268									
269									
270				Topock - Alluvium Deposits	ML		(269.0 - 272.0') Topock - Alluvium Deposits; Gravelly silt with sand (ML); dark red (2.5YR 3/6); low plasticity; some granules to large pebbles, subangular to round; little very fine to very coarse grained sand, angular to subround; little clay; moist to dry; moderate cementation		
271							(271'); strong cementation; dry at 271-271.4		
272									
273									
274									
275									
276	120			Topock - Alluvium Deposits	ML		(272.0 - 282.0') Topock - Alluvium Deposits; Silty sand with gravel (ML); reddish brown (2.5YR 4/4); low plasticity; some granules to very large pebbles, angular to subround; some very fine to very coarse grained sand, angular to subround; little clay; trace cobbles, subangular to subround; moist	(275.0 - 276.0') Drill rods chattering	
277									
278									
279									
280									



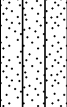
Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started: <u>01/04/2019</u>	Surface Elevation: <u>N/A</u>	Boring No.: <u>MW-Bd</u>
Date Completed: <u>03/05/2019</u>	Northing (NAD83): <u>N/A</u>	
Drilling Co.: <u>Cascade</u>	Easting (NAD83): <u>N/A</u>	Client: <u>PG&E</u>
Drilling Method: <u>Sonic Drilling</u>	Total Depth: <u>357 ft bgs</u>	Project: <u>Final GW Remedy Phase I</u>
Drill Rig Type: <u>Terrasonic track mount</u>	Borehole Diameter: <u>6-12 inches</u>	Location: <u>PG&E Topock, Needles, California</u>
Driller Name: <u>Nick Petrone</u>	Depth to First Water: <u>21 ft bgs</u>	
Drilling Asst: <u>T. Alymer/ J. Candelaria</u>	Sampling Method: <u>4 inch x 10 ft Core Barrel</u>	Project Number: <u>RC000753.0051</u>
Logger: <u>G. Willford / C. Bonessi</u>	Sampling Interval: <u>Continuous</u>	
Editor: <u>Sean McGrane</u>	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
281	120			Topock - Alluvium Deposits	ML				(0.0 - 297.0') No water used
282									(162.0 - 292.0') 700 gal of water used
283							(282.0 - 288.0') Topock - Alluvium Deposits; Sandy silt with gravel (ML); reddish brown (2.5YR 4/4); medium plasticity; some very fine to coarse grained sand, angular to round; little granules to medium pebbles, angular to subround; little clay; moist		(162.0 - 292.0') 700 gal of water used
284									(162.0 - 292.0') 700 gal of water used
285				Topock - Alluvium Deposits	ML				(162.0 - 292.0') 700 gal of water used
286									(162.0 - 292.0') 700 gal of water used
287	120								(162.0 - 292.0') 700 gal of water used
288									
289			MW-B-VAS-287-292 (<0.17 U ppb) 2/20/2019 12:15	Topock - Alluvium Deposits	ML		(288.0 - 293.0') Topock - Alluvium Deposits; Sandy silt with gravel (ML); reddish brown (2.5YR 4/4); medium plasticity; some very fine to coarse grained sand, angular to subround; little granules to medium pebbles, subangular to subround; little clay; trace cobbles, subround; moist; strong cementation		
290									
291									
292									
293								(292.0 - 297.0') Drill rods chattering	
294	60			Topock - Weathered Bedrock - conglomerate	GM		(293.0 - 295.0') Topock - Weathered Bedrock - conglomerate; Silty gravel (GM); reddish brown (2.5YR 4/4); medium pebbles to very large pebbles, subangular to subround; little very fine to coarse grained sand, angular to subround; little silt; little clay; trace cobbles, subangular to subround; dry		
295									
296				Topock - Weathered Bedrock - conglomerate	ML		(295.0 - 298.0') Topock - Weathered Bedrock - conglomerate; Gravely elastic silt with sand (ML); reddish brown (2.5YR 4/4); low plasticity; some granules to large pebbles, angular to subround; little very fine to coarse grained sand, angular to subround; little clay; moist		
297									
298	120							(297.0 - 301.0') Rough drilling	(297.0 - 307.0') 200 gal of water used
299				Topock - Weathered Bedrock - conglomerate	SM		(298.0 - 299.5') Topock - Weathered Bedrock - conglomerate; Silty sand with gravel (SM); brown (7.5YR 5/4); fine grained to very coarse grained, angular to subround; little granules to small pebbles, subangular to subround; little silt; little clay; moist to wet		
300					GM		(299.5 - 301.5') Topock - Weathered Bedrock - conglomerate; Silty		

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started: 01/04/2019	Surface Elevation: N/A	Boring No.: MW-Bd
Date Completed: 03/05/2019	Northing (NAD83): N/A	
Drilling Co.: Cascade	Easting (NAD83): N/A	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 357 ft bgs	Project: Final GW Remedy Phase I
Drill Rig Type: Terrasonic track mount	Borehole Diameter: 6-12 inches	Location: PG&E Topock, Needles, California
Driller Name: Nick Petrone	Depth to First Water: 21 ft bgs	
Drilling Asst: T. Alymer/ J. Candelaria	Sampling Method: 4 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger: G. Willford / C. Bonessi	Sampling Interval: Continuous	
Editor: Sean McGrane	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
301	120			Topock - Weathered Bedrock - conglomerate	GM		gravel with sand (GM); yellowish red (5YR 4/6); granules to very large pebbles, subangular to round; little fine to very coarse grained sand, angular to subround; little silt; trace cobbles, angular to round; trace clay; wet	(297.0 - 301.0') Rough drilling	(297.0 - 307.0') 200 gal of water used
302							(301.5 - 313.5') Topock - Weathered Bedrock - conglomerate; Sandy elastic silt with gravel (MH); yellowish red (5YR 4/6); high plasticity; some granules to large pebbles, angular to subround; some cobbles, subangular to subround; some very fine to very coarse grained sand, angular to subround; little clay; moist; moderate cementation; gravel primarily composed of metadiorite.		
303									
304									
305									
306	180			Topock - Weathered Bedrock - conglomerate	MH				(307.0 - 322.0') 400 gal of water used
307									
308									
309									
310									
311									
312									
313									
314									
315									
316									
317				Topock - Weathered Bedrock - conglomerate	SM		(313.5 - 320.0') Topock - Weathered Bedrock - conglomerate; Silty sand with gravel (SM); yellowish red / light brown (5YR 5/6); fine grained to very coarse grained, angular to subround; little granules to large pebbles, subangular to subround; little silt; little clay; trace cobbles, subangular to subround		
318			MW-B-VAS-317-322 (<0.17 U ppb) 2/21/2019 11:00						
319									
320									


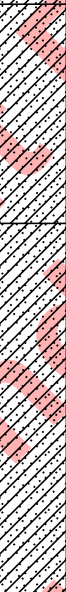
Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	01/04/2019	Surface Elevation:	N/A	Boring No.: MW-Bd	
Date Completed:	03/05/2019	Northing (NAD83):	N/A		
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	357 ft bgs	Project:	Final GW Remedy Phase I
Drill Rig Type:	Terrasonic track mount	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Nick Petrone	Depth to First Water:	21 ft bgs		
Drilling Asst:	T. Alymer/ J. Candelaria	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	G. Willford / C. Bonessi	Sampling Interval:	Continuous		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
321	180		MW-B-VAS-317-322 (<0.17 U ppb) 2/21/2019 11:00	Topock - Weathered Bedrock - conglomerate	ML		(320.0 - 322.0') Topock - Weathered Bedrock - conglomerate; Sandy silt with gravel (ML); reddish brown (2.5YR 4/4); medium plasticity; some very fine to coarse grained sand, angular to subround; little granules to medium pebbles, subangular to subround; little clay; trace cobbles, subround; moist; strong cementation		(307.0 - 322.0') 400 gal of water used
322							(322.0 - 337.0') Topock - Weathered Bedrock - conglomerate; Gravelly silt with sand (ML); reddish brown (2.5YR 4/4); low plasticity; little granules to medium pebbles, subangular to subround; little very fine to coarse grained sand, angular to subround; little clay; trace cobbles, subround; moist	(322.0 - 335.5') tight hard drilling	(322.0 - 337.0') 300 gal of water used
323									
324									
325									
326									
327									
328							(328'); 4-6" dry layer		
329	180			Topock - Weathered Bedrock - conglomerate	ML				
330									
331							(331'); 4-6" dry layer		
332									
333							(333'); 4-6" dry layer		
334									
335							(335'); 4-6" dry layer		
336								(335.5 - 337.0') Soft drilling	
337									
338	120			Topock - Weathered Bedrock - conglomerate	SC		(337.0 - 344.0') Topock - Weathered Bedrock - conglomerate; Clayey sand with gravel (SC); red (2.5YR 4/6) to reddish brown (2.5YR 4/4); very fine grained to very coarse grained, subangular to subround; some clay; little granules to medium pebbles, subangular to subround; little silt; trace cobbles, subround; dry to moist; strong cementation		(337.0 - 347.0') No water used
339									
340									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval



Date Started: 01/04/2019	Surface Elevation: N/A	Boring No.: MW-Bd
Date Completed: 03/05/2019	Northing (NAD83): N/A	
Drilling Co.: Cascade	Easting (NAD83): N/A	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 357 ft bgs	Project: Final GW Remedy Phase I
Drill Rig Type: Terrasonic track mount	Borehole Diameter: 6-12 inches	Location: PG&E Topock, Needles, California
Driller Name: Nick Petrone	Depth to First Water: 21 ft bgs	
Drilling Asst: T. Alymer/ J. Candelaria	Sampling Method: 4 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger: G. Willford / C. Bonessi	Sampling Interval: Continuous	
Editor: Sean McGrane	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
341	120		MW-B-VAS-339-344 (<0.33 U ppb) 2/27/2019 12:28	Topock - Weathered Bedrock - conglomerate	SC		(344.0 - 347.0') Topock - Weathered Bedrock - conglomerate; Clayey sand (SC); reddish brown(2.5YR 4/3); very fine grained to fine grained, subangular to subround; little clay; trace silt; moist to dry; moderate cementation; clay and sand are interbedded		(337.0 - 347.0') No water used
342									
343									
344									
345	108		MW-B-VAS-352-357 (<0.33 U ppb) 2/28/2019 15:05	Topock - Weathered Bedrock - conglomerate	SC		(347.0 - 356.0') Topock - Weathered Bedrock - conglomerate; Clayey sand with gravel (SC); reddish brown (2.5YR 4/4) to reddish brown(2.5YR 4/3); very fine grained to very coarse grained, subangular to subround; some granules to very large pebbles, angular to subround; little silt; little clay; dry to moist; moderate cementation	(347.0 - 356.0') Rough drilling	(347.0 - 357.0') 400 gal of water used
346									
347									
348									
349									
350									
351									
352									
353									
354									
355									
356									
357							(356.0 - 357.0') Topock - Weathered Bedrock - conglomerate; Clayey sand (SC); reddish brown(2.5YR 4/3); very fine grained to medium grained, subangular to subround; little clay; trace small to medium pebbles, subangular to subround; trace silt; moist; weak cementation	(356.0 - 357.0') Soft drilling	
358							End of Boring at 357.0' bgs.		
359									
360									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

SOIL BORING LOG PG&E TOPOCK C:\USERS\MCGRANE\DOCUMENTS\PG&E TOPOCK\DRIFT BORING LOGS\GINT FILES\06 04 19\TOPOCK DATA TEMPLATE FOR FLOG.GDT 06/04/19 17:24

Date Started: 03/13/2019	Surface Elevation: N/A	Boring No.: MW-Bs
Date Completed: 03/16/2019	Northing (NAD83): N/A	
Drilling Co.: Cascade	Easting (NAD83): N/A	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 121 ft bgs	Project: Final GW Remedy Phase I
Drill Rig Type: Borat Longyear Track Mount	Borehole Diameter: 10-12 inches	Location: PG&E Topock, Needles, California
Driller Name: Tyler Alymer	Depth to First Water: 21 ft bgs	
Drilling Asst: R. West/J. Candelaria	Sampling Method: 8 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger: Chris Bonessi	Sampling Interval: Screen intervals	
Editor: Michael Andrews	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid								
1	84	No sieve samples collected					(0.0 - 17.0') No recovery (NR); No recovery, did not collect cores, see MW-Bd log for lithology		(0.0 - 121.0') No water used								
2																	
3																	
4																	
5																	
6																	
7																	
8	120				NR												
9																	
10																	
11																	
12																	
13																	
14																	
15																	
16																	
17																	
18	120				Topock - Fluvial Deposits	SM		(17.0 - 19.0') Topock - Fluvial Deposits; Silty sand with gravel (SM); brown (10YR 5/3); very fine grained to very coarse grained, angular to subround; some small to very large pebbles, angular to subround; little silt; trace cobbles, subangular to subround; trace clay; dry									
19												Topock - Fluvial Deposits	GP		(19.0 - 19.5') Topock - Fluvial Deposits; Poorly graded gravel (GP); (GLE2 6/1); small cobbles to large cobbles, angular; trace very fine to medium grained sand, angular to subangular; trace silt; dry; trace		
20																	

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, water levels and VAS samples collected from MW-Bd

Date Started: 03/13/2019	Surface Elevation: N/A	Boring No.: MW-Bs
Date Completed: 03/16/2019	Northing (NAD83): N/A	
Drilling Co.: Cascade	Easting (NAD83): N/A	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 121 ft bgs	Project: Final GW Remedy Phase I
Drill Rig Type: Borat Longyear Track Mount	Borehole Diameter: 10-12 inches	Location: PG&E Topock, Needles, California
Driller Name: Tyler Alymer	Depth to First Water: 21 ft bgs	
Drilling Asst: R. West/J. Candelaria	Sampling Method: 8 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger: Chris Bonessi	Sampling Interval: Screen intervals	
Editor: Michael Andrews	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
21	120			Topock - Fluvial Deposits	SM		boulder composed of metadiorite (19.5 - 21.0') Topock - Fluvial Deposits; Silty sand with gravel (SM); brown (10YR 5/3); very fine grained to very coarse grained, angular to subround; some small to very large pebbles, angular to subround; little silt; trace cobbles, subangular to subround; trace clay; dry	(22.0') Approximate depth to water table	(0.0 - 121.0') No water used
22				Topock - Fluvial Deposits	SP-SM		(21.0 - 25.0') Topock - Fluvial Deposits; Poorly graded sand with silt and gravel (SP-SM); dark gray (10YR 4/1); very fine grained to very coarse grained, angular to subround; some granules to very large pebbles, angular to subround; little cobbles, subangular to subround; little silt; trace clay; dry to wet		
23				Topock - Alluvium Deposits	CH		(25.0 - 27.0') Topock - Alluvium Deposits; Fat clay with gravel (CH); yellowish red / light brown (5YR 5/6) and dark gray (10YR 4/1); high plasticity; little small to large pebbles, subangular to subround; little very fine to coarse grained sand, subangular to subround; little silt; trace cobbles, subangular to subround; and clay lens; wet		
24							(26.5') trace silt; medium stiff; decrease in pebbles, increase in clay present		
25	120	No sieve samples collected	MW-B-VAS-27-32 (7.7 J ppb) 1/6/2019 12:50	Topock - Alluvium Deposits	SP-SM		(27.0 - 34.0') Topock - Alluvium Deposits; Poorly graded sand with silt and gravel (SP-SM); yellowish brown / moderate yellowish brown (10YR 5/4); very fine grained to very coarse grained, angular to subround; some small to very large pebbles, angular to subround; little silt; trace cobbles, subangular to subround; wet	(27.0 - 37.0') Lost soil core in hole	
26				Topock - Alluvium Deposits	SM		(34.0 - 37.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); yellowish brown / moderate yellowish brown (10YR 5/4); very fine grained to very coarse grained, angular to subround; some small to very large pebbles, angular to subround; little silt; trace cobbles, subangular to subround; wet		
27							(37.0 - 97.0') No recovery (NR); No recovery, did not collect cores, see MW-Bd log for lithology		
28					NR			(37.0 - 67.0') Lost clean out run cores throughout interval, loose material	

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, water levels and VAS samples collected from MW-Bd

Date Started: 03/13/2019	Surface Elevation: N/A	Boring No.: MW-Bs
Date Completed: 03/16/2019	Northing (NAD83): N/A	
Drilling Co.: Cascade	Easting (NAD83): N/A	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 121 ft bgs	Project: Final GW Remedy Phase I
Drill Rig Type: Borat Longyear Track Mount	Borehole Diameter: 10-12 inches	Location: PG&E Topock, Needles, California
Driller Name: Tyler Alymer	Depth to First Water: 21 ft bgs	
Drilling Asst: R. West/J. Candelaria	Sampling Method: 8 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger: Chris Bonessi	Sampling Interval: Screen intervals	
Editor: Michael Andrews	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
41	120	No sieve samples collected	MW-B-VAS-47-52 (<0.17 U ppb) 1/9/2019 10:15	NR				(37.0 - 67.0') Lost clean out run cores throughout interval, loose material	(0.0 - 121.0') No water used
42									
43									
44									
45									
46	240	No sieve samples collected	MW-B-VAS-47-52 (<0.17 U ppb) 1/9/2019 10:15	NR					
47									
48									
49									
50									
51									
52									
53									
54									
55									
56									
57									
58									
59									
60									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, water levels and VAS samples collected from MW-Bd

Date Started: 03/13/2019	Surface Elevation: N/A	Boring No.: MW-Bs
Date Completed: 03/16/2019	Northing (NAD83): N/A	
Drilling Co.: Cascade	Easting (NAD83): N/A	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 121 ft bgs	Project: Final GW Remedy Phase I
Drill Rig Type: Borat Longyear Track Mount	Borehole Diameter: 10-12 inches	Location: PG&E Topock, Needles, California
Driller Name: Tyler Alymer	Depth to First Water: 21 ft bgs	
Drilling Asst: R. West/J. Candelaria	Sampling Method: 8 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger: Chris Bonessi	Sampling Interval: Screen intervals	
Editor: Michael Andrews	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
61								(37.0 - 67.0') Lost clean out run cores throughout interval, loose material	(0.0 - 121.0') No water used
62									
63									
64	240								
65									
66									
67									
68									
69									
70		No sieve samples collected	MW-B-VAS-67-72 (<0.17 U ppb) 1/9/2019 14:55		NR				
71									
72									
73									
74	216								
75									
76									
77									
78									
79									
80									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, water levels and VAS samples collected from MW-Bd

Date Started: 03/13/2019	Surface Elevation: N/A	Boring No.: MW-Bs
Date Completed: 03/16/2019	Northing (NAD83): N/A	
Drilling Co.: Cascade	Easting (NAD83): N/A	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 121 ft bgs	Project: Final GW Remedy Phase I
Drill Rig Type: Borat Longyear Track Mount	Borehole Diameter: 10-12 inches	Location: PG&E Topock, Needles, California
Driller Name: Tyler Alymer	Depth to First Water: 21 ft bgs	
Drilling Asst: R. West/J. Candelaria	Sampling Method: 8 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger: Chris Bonessi	Sampling Interval: Screen intervals	
Editor: Michael Andrews	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
81	216								(0.0 - 121.0') No water used
82									
83									
84									
85									
86	120	No sieve samples collected			NR				
87									
88									
89									
90									
91									
92									
93									
94									
95									
96	144			Topock - Alluvium Deposits	SM		(97.0 - 104.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 5/3); very fine grained to very coarse grained, angular to subround; some small to very large pebbles, subangular to subround; little silt; trace clay; wet; moderate cementation		
97									
98									
99									
100									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, water levels and VAS samples collected from MW-Bd

Date Started: 03/13/2019	Surface Elevation: N/A	Boring No.: MW-Bs
Date Completed: 03/16/2019	Northing (NAD83): N/A	
Drilling Co.: Cascade	Easting (NAD83): N/A	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 121 ft bgs	Project: Final GW Remedy Phase I
Drill Rig Type: Borat Longyear Track Mount	Borehole Diameter: 10-12 inches	Location: PG&E Topock, Needles, California
Driller Name: Tyler Alymer	Depth to First Water: 21 ft bgs	
Drilling Asst: R. West/J. Candelaria	Sampling Method: 8 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger: Chris Bonessi	Sampling Interval: Screen intervals	
Editor: Michael Andrews	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
101	144		MW-B-VAS-102-107 (<0.17 U ppb) 1/10/2019 13:15	Topock - Alluvium Deposits	SM		(104.0 - 107.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 4/3); very fine grained to very coarse grained, angular to subround; some small to very large pebbles, subangular to subround; some silt; trace clay; wet; moderate cementation		(0.0 - 121.0') No water used
102									
103									
104									
105	120	No sieve samples collected		Topock - Alluvium Deposits	SM		(107.0 - 109.0') Topock - Alluvium Deposits; Well graded sand with silt (SW-SM); (7.5R 5/3); medium grained to very coarse grained, angular to subangular; little silt; trace granules to medium pebbles, angular to subangular; wet	(107.0 - 117.0') Loose material, lost core, formation collapsed upon tripping out core barrel	
106									
107									
108				Topock - Alluvium Deposits	SW-SM				
109									
110				Topock - Alluvium Deposits	GW				
111									
112									
113	48			Topock - Alluvium Deposits	GM		(112.0 - 117.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); (7.5R 4/3); granules to very large pebbles, subangular to subround; some fine to very coarse grained sand, subangular to subround; some silt; wet		
114									
115									
116									
117									
118									
119									
120									
							(117.0 - 121.0'); No recovery, did not collect cores, see MW-Bd log for lithology		

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, water levels and VAS samples collected from MW-Bd

Boring Log


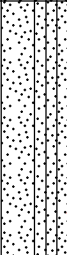



Sheet: 7 of 7

Date Started:	03/13/2019	Surface Elevation:	N/A	Boring No.: MW-Bs	
Date Completed:	03/16/2019	Northing (NAD83):	N/A		
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	121 ft bgs	Project:	Final GW Remedy Phase I
Drill Rig Type:	Borat Longyear Track Mount	Borehole Diameter:	10-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Tyler Alymer	Depth to First Water:	21 ft bgs		
Drilling Asst:	R. West/J. Candelaria	Sampling Method:	8 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	Chris Bonessi	Sampling Interval:	Screen intervals		
Editor:	Michael Andrews	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
121	48	No sieve samples collected					End of Boring at 121.0 'bgs.		(0.0 - 121.0') No water used
122									
123									
124									
125									
126									
127									
128									
129									
130									
131									
132									
133									
134									
135									
136									
137									
138									
139									
140									


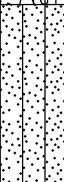
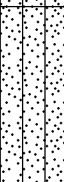

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, water levels and VAS samples collected from MW-Bd

Date Started:	11/02/2018	Surface Elevation:	501.1 ft amsl	Boring No.: <u>MW-E</u>	
Date Completed:	11/17/2018	Northing (NAD83):	2102331.3		
Drilling Co.:	Cascade	Easting (NAD83):	7615837.1	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	150 ft bgs	Project:	Final Groundwater Remedy Phase
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	4-12 inches	Location:	1
Driller Name:	Steve Vasquez	Depth to First Water:	47.9 ft bgs	PG&E Topock, Needles, California	
Drilling Asst:	N. Dominguez/C. Alvarez	Sampling Method:	4 inch X 10 ft Core Barrel	Project Number: RC000753.0051	
Logger:	Connor Mills	Sampling Interval:	Continuous		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
1	72	No sieve samples collected		Topock - Fluvial Deposits	SW-SM		(0.0 - 4.5') Topock - Fluvial Deposits; Well graded sand with silt and gravel (SW-SM); brown (7.5YR 4/3); fine grained to coarse grained, angular to subround; some small to very large pebbles, angular to subround; little silt; trace cobbles, angular to subrounded; dry		(0.0 - 27.0') No water used
2									
3									
4									
5	Topock - Fluvial Deposits			SP-SM		(4.5 - 8.0') Topock - Fluvial Deposits; Poorly graded sand with silt and gravel (SP-SM); brown (7.5YR 4/3); fine grained to medium grained, subangular to round; some small to very large pebbles, angular to subround; little silt; trace cobbles, angular to subangular; trace coarse grained sand, subangular to round; dry			
6									
7									
8									
9	Topock - Fluvial Deposits			GM		(8.0 - 12.5') Topock - Fluvial Deposits; Silty gravel with sand (GM); yellowish brown / moderate yellowish brown(10YR 5/4); granules to very large pebbles, angular to subround; some fine to coarse grained sand, subangular to round; some silt; trace cobbles, subround to round; dry			
10									
11									
12									
13	Topock - Fluvial Deposits			SM		(12.5 - 15.0') Topock - Fluvial Deposits; Silty sand (SM); yellowish brown / moderate yellowish brown(10YR 5/4); very fine grained to medium grained, angular to subround; little granule to large pebbles, angular to round; little silt; trace cobbles, subangular to subrounded; dry			
14									
15									
16									
17	Topock - Fluvial Deposits	GP-GM		(15.0 - 32.0') Topock - Fluvial Deposits; Poorly graded gravel with silt (GP-GM); light brownish gray / pale yellowish brown(10YR 6/2); granules to very large pebbles, angular to subangular; some cobbles, angular to subangular; little silt; trace boulders, angular to subround; trace fine to medium grained sand, angular to subrounded; dry; boulder 10 inch rock cores composed of metadiorite					
18									
19									
20									
	93.6							(15.0 - 26.0') Rough drilling, drilled like solid rock	

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	11/02/2018	Surface Elevation:	501.1 ft amsl	Boring No.: MW-E	
Date Completed:	11/17/2018	Northing (NAD83):	2102331.3		
Drilling Co.:	Cascade	Easting (NAD83):	7615837.1	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	150 ft bgs	Project:	Final Groundwater Remedy Phase
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	4-12 inches	Location:	1
Driller Name:	Steve Vasquez	Depth to First Water:	47.9 ft bgs	PG&E Topock, Needles, California	
Drilling Asst:	N. Dominguez/C. Alvarez	Sampling Method:	4 inch X 10 ft Core Barrel	Project Number: RC000753.0051	
Logger:	Connor Mills	Sampling Interval:	Continuous		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
21	93.6	No sieve samples collected		Topock - Fluvial Deposits	GP-GM			(15.0 - 26.0') Rough drilling, drilled like solid rock	(0.0 - 27.0') No water used
22									
23									
24									
25									
26	54			(26.0') Core barrel drifting during drilling advance 6-inch casing to stabilize the borehole to stop the core barrel from drifting	(27.0 - 37.0') 150 gal of water used				
27									
28									
29									
30									
31	51.6	(27.0 - 32.0') Rough drilling boulders causing core barrel to drill crooked							
32									
33									
34									
35									
36	48			Topock - Fluvial Deposits	SM		(32.0 - 34.5') Topock - Fluvial Deposits; Silty sand with gravel (SM); pale brown (10YR 6/3); very fine grained to medium grained, angular to subround; and granule to very large pebbles, angular to subround; little silt; trace cobbles, angular to subangular; dry		
37									
38									
39									
40									
				Topock - Fluvial Deposits	SM		(34.5 - 37.0') Topock - Fluvial Deposits; Silty sand with gravel (SM); light yellowish brown (10YR 6/4); fine grained to coarse grained, angular to round; and granules to small pebbles, angular to subangular; little cobbles, angular to subround; little silt; trace clay; dry		
				Topock - Fluvial Deposits	GM		(37.0 - 42.5') Topock - Fluvial Deposits; Silty gravel with sand (GM); light yellowish brown (10YR 6/4); granules to very large pebbles, angular to round; some fine to coarse grained sand, angular to round; some silt; trace cobbles, angular to subangular; trace boulders, subround; dry; boulder 10 inch rock core composed of basalt with yelliwish green olivine crystals and frothy texture	(37.0 - 117.0') No water used	

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SOIL BORING LOG PG&E TOPOCK C:\USERS\MCGRANE\DOCUMENTS\PG&E TOPOCK\DATABASE FOR PLOG.GPJ TOPOCK DATA TEMPLATE FOR PLOG.GDT 05/30/19 13:37

Date Started:	11/02/2018	Surface Elevation:	501.1 ft amsl	Boring No.: MW-E	
Date Completed:	11/17/2018	Northing (NAD83):	2102331.3		
Drilling Co.:	Cascade	Easting (NAD83):	7615837.1	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	150 ft bgs	Project:	Final Groundwater Remedy Phase
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	4-12 inches	Location:	1
Driller Name:	Steve Vasquez	Depth to First Water:	47.9 ft bgs	PG&E Topock, Needles, California	
Drilling Asst:	N. Dominguez/C. Alvarez	Sampling Method:	4 inch X 10 ft Core Barrel	Project Number: RC000753.0051	
Logger:	Connor Mills	Sampling Interval:	Continuous		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
41	48			Topock - Fluvial Deposits	GM				(37.0 - 117.0') No water used
42									
43				Topock - Alluvium Deposits	SM		(42.5 - 47.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); light yellowish brown (10YR 6/4); fine grained to coarse grained, angular to subround; some granules to very large pebbles, angular to subangular; little silt; trace clay; dry		
44									
45									
46									
47									
48				Topock - Alluvium Deposits	ML		(47.0 - 54.5') Topock - Alluvium Deposits; Silt with sand (ML); light brown (7.5YR 6/4); low plasticity; little fine to coarse grained sand, angular to subangular; little clay; trace granule to medium pebbles, angular to subround; moist	▼	
49									
50		No sieve samples collected							
51									
52	120								
53									
54			MW-E-VAS-52-57 (7000 ppb) 11/5/2018 17:40						
55				Topock - Alluvium Deposits	GM		(54.5 - 64.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); pale brown (10YR 6/3); granules to large pebbles, angular to subangular; some fine to medium grained sand, angular to subangular; some silt; trace clay; dry		
56									
57									
58	120			Topock - Alluvium Deposits	GM			(57.0') Core hot and dry	
59									
60									

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Date Started:	11/02/2018	Surface Elevation:	501.1 ft amsl	Boring No.: MW-E	
Date Completed:	11/17/2018	Northing (NAD83):	2102331.3		
Drilling Co.:	Cascade	Easting (NAD83):	7615837.1	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	150 ft bgs	Project:	Final Groundwater Remedy Phase
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	4-12 inches	Location:	1
Driller Name:	Steve Vasquez	Depth to First Water:	47.9 ft bgs	PG&E Topock, Needles, California	
Drilling Asst:	N. Dominguez/C. Alvarez	Sampling Method:	4 inch X 10 ft Core Barrel	Project Number: RC000753.0051	
Logger:	Connor Mills	Sampling Interval:	Continuous		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
61	120	No sieve samples collected		Topock - Alluvium Deposits	GM				(37.0 - 117.0') No water used
62									
63									
64									
65	Topock - Alluvium Deposits			ML		(64.0 - 67.0') Topock - Alluvium Deposits; Sandy silt (ML); reddish brown (5YR 5/4); no plasticity; some fine to coarse grained sand, subangular to subround; little granule to medium pebbles, angular to subangular; trace clay; moist			
66									
67	Topock - Alluvium Deposits			SM		(67.0 - 87.0') Topock - Alluvium Deposits; Silty sand (SM); reddish brown (5YR 5/4); very fine grained to coarse grained, angular to subround; some silt; little granule to large pebbles, angular to subangular; wet			
68									
69									
70									
71									
72									
73									
74									
75	108								
76									
77									
78									
79	102								
80									

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SOIL BORING LOG PG&E TOPOCK C:\USERS\SMCGRANE\DOCUMENTS\PG&E TOPOCK\DATABASE FOR LOGS\GINT FILES\05.30.19\TOPOCK DATABASE FOR PLOG.GPJ TOPOCK DATA TEMPLATE FOR PLOG.GDT 05/30/19 13:37

Date Started:	11/02/2018	Surface Elevation:	501.1 ft amsl	Boring No.: <u>MW-E</u>	
Date Completed:	11/17/2018	Northing (NAD83):	2102331.3		
Drilling Co.:	Cascade	Easting (NAD83):	7615837.1	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	150 ft bgs	Project:	Final Groundwater Remedy Phase
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	4-12 inches	Location:	1
Driller Name:	Steve Vasquez	Depth to First Water:	47.9 ft bgs	PG&E Topock, Needles, California	
Drilling Asst:	N. Dominguez/C. Alvarez	Sampling Method:	4 inch X 10 ft Core Barrel	Project Number: RC000753.0051	
Logger:	Connor Mills	Sampling Interval:	Continuous		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
81	102			Topock - Alluvium Deposits	SM				(37.0 - 117.0') No water used
82									
83									
84									
85	105.6	No sieve samples collected	MW-E-VAS-82-87.0 (200 ppb) 11/6/2018 10:12	Topock - Alluvium Deposits	ML		(87.0 - 94.5') Topock - Alluvium Deposits; Sandy silt (ML); reddish brown (5YR 5/4); low plasticity; some fine to coarse grained sand, angular to subangular; some clay; little granule to medium pebbles, angular to subangular; wet		
86									
87									
88									
89									
90									
91									
92									
93									
94									
95									
96									
97									
98									
99									
100									
	104.4			Topock - Alluvium Deposits	ML		(97.0 - 109.5') Topock - Alluvium Deposits; Silt with sand (ML); reddish brown (5YR 5/4); no plasticity; little granule to large pebbles, angular to subangular; little fine to coarse grained sand, angular to subround; wet		

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Date Started:	11/02/2018	Surface Elevation:	501.1 ft amsl	Boring No.: MW-E	
Date Completed:	11/17/2018	Northing (NAD83):	2102331.3		
Drilling Co.:	Cascade	Easting (NAD83):	7615837.1	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	150 ft bgs	Project:	Final Groundwater Remedy Phase
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	4-12 inches	Location:	1
Driller Name:	Steve Vasquez	Depth to First Water:	47.9 ft bgs	PG&E Topock, Needles, California	
Drilling Asst:	N. Dominguez/C. Alvarez	Sampling Method:	4 inch X 10 ft Core Barrel	Project Number: RC000753.0051	
Logger:	Connor Mills	Sampling Interval:	Continuous		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
101									(37.0 - 117.0') No water used
102									
103									
104	104.4								
105				Topock - Alluvium Deposits	ML				
106									
107									
108									
109									
110		No sieve samples collected					(109.5 - 118.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (5YR 5/4); fine grained to coarse grained, angular to subangular; and silt; little granule to large pebbles, angular to subangular; wet; some green staining observed in sections the core		
111									
112	102								
113				Topock - Alluvium Deposits	SM				
114			MW-E-VAS-112.0-117.0 (3100 ppb) 11/6/2018 15:22						
115									
116									
117									
118									(117.0 - 127.0') No water used
119	108			Topock - Alluvium Deposits	ML		(118.0 - 122.0') Topock - Alluvium Deposits; Sandy silt (ML); reddish brown (5YR 5/3); no plasticity; some fine to coarse grained sand, angular to subround; little granule to large pebbles, angular to subangular; moist; very weathered		
120									

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




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Date Started:	11/02/2018	Surface Elevation:	501.1 ft amsl	Boring No.: <u>MW-E</u>	
Date Completed:	11/17/2018	Northing (NAD83):	2102331.3		
Drilling Co.:	Cascade	Easting (NAD83):	7615837.1	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	150 ft bgs	Project:	Final Groundwater Remedy Phase
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	4-12 inches	Location:	1
Driller Name:	Steve Vasquez	Depth to First Water:	47.9 ft bgs	PG&E Topock, Needles, California	
Drilling Asst:	N. Dominguez/C. Alvarez	Sampling Method:	4 inch X 10 ft Core Barrel	Project Number: RC000753.0051	
Logger:	Connor Mills	Sampling Interval:	Continuous		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
121	108	No sieve samples collected		Topock - Alluvium Deposits	ML				(117.0 - 127.0') No water used
122				Topock - Alluvium Deposits	SM		(122.0 - 127.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); light reddish brown / light brown(5YR 6/4); very fine grained to coarse grained, angular to subround; and silt; little granule to large pebbles, angular to subangular; trace cobbles; wet; trace 1-4 inch large pebbles to small cobbles of metadiorite		
123									
124									
125									
126									
127			Topock - Weathered Bedrock - conglomerate	SM		(127.0 - 137.0') Topock - Weathered Bedrock - conglomerate; Silty sand (SM); reddish brown (5YR 5/4); very fine grained to coarse grained, angular to subround; some silt; little granule to large pebbles, angular to subangular; wet	(127.0 - 150.0') No water used		
128									
129									
130									
131									
132									
133									
134									
135	120								
136									
137									
138									
139									
140	114	MW-E-VAS-137-142 (7300 ppb) 11/7/2018 15:20	Topock - Weathered Bedrock - conglomerate	SM		(137.0 - 138.5') Topock - Weathered Bedrock - conglomerate; Silty sand (SM); reddish brown / moderate brown(5YR 4/4); fine grained to coarse grained, angular to subround; some silt; little granule to medium pebbles, angular to subangular; wet	(137.0') Rough drilling		
			Topock - Weathered Bedrock - conglomerate	ML		(138.5 - 139.5') Topock - Weathered Bedrock - conglomerate; Silt (ML); reddish brown / moderate brown(5YR 4/4); no plasticity; trace granule to medium pebbles, angular to subangular; trace fine grained sand, angular to subround; dry; very weathered bedrock, cemented			
				SM					

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Date Started:	11/02/2018	Surface Elevation:	501.1 ft amsl	Boring No.: <u>MW-E</u>
Date Completed:	11/17/2018	Northing (NAD83):	2102331.3	
Drilling Co.:	Cascade	Easting (NAD83):	7615837.1	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	150 ft bgs	Project: Final Groundwater Remedy Phase
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	4-12 inches	Location: 1
Driller Name:	Steve Vasquez	Depth to First Water:	47.9 ft bgs	PG&E Topock, Needles, California
Drilling Asst:	N. Dominguez/C. Alvarez	Sampling Method:	4 inch X 10 ft Core Barrel	Project Number: RC000753.0051
Logger:	Connor Mills	Sampling Interval:	Continuous	
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
141	114	No sieve samples collected	MW-E-VAS-137-142 (7300 ppb) 11/7/2018 15:20	Topock - Weathered Bedrock - conglomerate	SM		(139.5 - 142.0') Topock - Weathered Bedrock - conglomerate; Silty sand (SM); reddish brown (5YR 5/4); fine grained to coarse grained, angular to subangular; some silt; little granule to medium pebbles, angular to subangular; wet	(142.0') Rough drilling	(127.0 - 150.0') No water used
142					(142.0 - 150.0') Topock - Competent Bedrock - conglomerate; brown (7.5YR 5/4); dry, strong cementation; hard, friable				
143									
144									
145									
146									
147	36		Topock - Competent Bedrock - conglomerate						
148									
149									
150									

End of Boring at 150.0 'bgs.
















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Date Started: 11/18/2018	Surface Elevation: 501.1 ft amsl	Well ID: MW-E-70, MW-E-142
Date Completed: 04/02/2019	Shallow Well Elevation: 501.0 ft amsl	
Drilling Co.: Cascade	Deep Well Elevation: 500.9 ft amsl	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): 2102331.3	Project: Final Groundwater Remedy Phase
Driller Name: Steve Vasquez	Easting (NAD83): 7615837.1	Location: 1
Drilling Asst: N. Dominguez/C. Alvarez	Borehole Diameter: 4-12 inches	PG&E Topock, Needles, California
Logger: Connor Mills	Water Level Start: 47.9 ft bgs	Project Number: RC000753.0051
Editor: Sean McGrane	Development End Date: 12/14/2018	
Total Depth: 150 ft bgs	Well Completion: <input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction		Calculated Material Volumes	Material Volumes Installed
1		Topock - Fluvial Deposits	SW-SM		(0.0 - 1.0') Concrete Pad			(0.0 - 1.0') 12 bags Note: 3.5 x 3.5 ft concrete pad with 18" dia lockable vault, King Kon-Crete 4000 PSI
2					(1.0 - 2.0') Cement	(0.5 - 122.0') 2" PVC Sch 40 Casing		(1.0 - 2.0') 8 bags Note: King Kon-Crete 4000 PSI
3					(2.0 - 4.5') Portland Cement 5% Bentonite	(0.0 - 6.0') 12" Borehole	(2.0 - 4.5') 13.9 gallons	(2.0 - 4.5') 12 gallons (-14%) Note: Top off grout with Type I,II, and V and Hydrogel on 4/1/19.
4					(0.4 - 50.0') 2" PVC Sch 40 Casing			
5		Topock - Fluvial Deposits	SP-SM					
6								
7								
8		Topock - Fluvial Deposits	GM					
9								
10								
11								
12		Topock - Fluvial Deposits	SM					
13								
14		Topock - Fluvial Deposits	GP-GM					
15								
16								
17								
18								
19								
20								

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, blue water table symbol represents depth to water measured during the first VAS interval

Date Started: 11/18/2018	Surface Elevation: 501.1 ft amsl	Well ID: MW-E-70, MW-E-142
Date Completed: 04/02/2019	Shallow Well Elevation: 501.0 ft amsl	
Drilling Co.: Cascade	Deep Well Elevation: 500.9 ft amsl	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): 2102331.3	Project: Final Groundwater Remedy Phase
Driller Name: Steve Vasquez	Easting (NAD83): 7615837.1	Location: 1
Drilling Asst: N. Dominguez/C. Alvarez	Borehole Diameter: 4-12 inches	PG&E Topock, Needles, California
Logger: Connor Mills	Water Level Start: 47.9 ft bgs	Project Number: RC000753.0051
Editor: Sean McGrane	Development End Date: 12/14/2018	
Total Depth: 150 ft bgs	Well Completion: <input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction			Calculated Material Volumes	Material Volumes Installed	
21		Topock - Fluvial Deposits	GP-GM		(0.4 - 50.0') 2" PVC Sch 40 Casing		(0.5 - 122.0') 2" PVC Sch 40 Casing			
22										
23										
24										
25										
26										
27										
28										
29										
30										
31		Topock - Fluvial Deposits	SM		(4.5 - 46.0') Portland Cement 5% Bentonite		(6.0 - 144.0') 10" Borehole		(4.5 - 46.0') 190 gallons (-10%) Note: Used Type I,II, and V and Hydrogel. Mixed 5.5 batches of grout total.	
32					(31.5 - 32.5') Centralizer					
33										
34		Topock - Fluvial Deposits	SM							
35										
36		Topock - Fluvial Deposits	SM							
37										
38		Topock - Fluvial Deposits	GM							
39										
40										


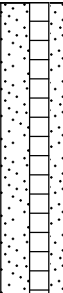




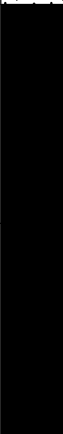
Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, blue water table symbol represents depth to water measured during the first VAS interval

Date Started: 11/18/2018	Surface Elevation: 501.1 ft amsl	Well ID: MW-E-70, MW-E-142
Date Completed: 04/02/2019	Shallow Well Elevation: 501.0 ft amsl	
Drilling Co.: Cascade	Deep Well Elevation: 500.9 ft amsl	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): 2102331.3	Project: Final Groundwater Remedy Phase
Driller Name: Steve Vasquez	Easting (NAD83): 7615837.1	Location: 1
Drilling Asst: N. Dominguez/C. Alvarez	Borehole Diameter: 4-12 inches	PG&E Topock, Needles, California
Logger: Connor Mills	Water Level Start: 47.9 ft bgs	Project Number: RC000753.0051
Editor: Sean McGrane	Development End Date: 12/14/2018	
Total Depth: 150 ft bgs	Well Completion: <input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
41		Topock - Fluvial Deposits	GM		(0.4 - 50.0') 2" PVC Sch 40 Casing		
42							
43		Topock - Alluvium Deposits	SM		(4.5 - 46.0') Portland Cement 5% Bentonite	(4.5 - 46.0') 212.2 gallons	(4.5 - 46.0') 190 gallons (-10%) Note: Used Type I, II, and V and Hydrogel. Mixed 5.5 batches of grout total.
44							
45							
46							
47					(46.0 - 48.0') Bentonite seal chips	(46.0 - 48.0') 1.63 bags	(46.0 - 48.0') 2.5 bags (53%) Note: Puregold Medium Chips
48							
49		Topock - Alluvium Deposits	ML		(50.0 - 70.0') 2" Sch 40 PVC (20-slot) Screen		
50						(6.0 - 144.0') 10" Borehole	
51							
52							
53							
54	MW-E-VAS-52-57 (7000 ppb) 11/5/2018 17:40				(48.0 - 74.0') Cemex #3 MESH (8x10)	(48.0 - 74.0') 29.3 bags	(48.0 - 74.0') 45 bags (54%) Note: Lapis Lustre Sand
55		Topock - Alluvium Deposits	GM				
56							
57							
58							
59							
60							

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Date Started: 11/18/2018	Surface Elevation: 501.1 ft amsl	Well ID: MW-E-70, MW-E-142
Date Completed: 04/02/2019	Shallow Well Elevation: 501.0 ft amsl	
Drilling Co.: Cascade	Deep Well Elevation: 500.9 ft amsl	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): 2102331.3	Project: Final Groundwater Remedy Phase
Driller Name: Steve Vasquez	Easting (NAD83): 7615837.1	Location: 1
Drilling Asst: N. Dominguez/C. Alvarez	Borehole Diameter: 4-12 inches	PG&E Topock, Needles, California
Logger: Connor Mills	Water Level Start: 47.9 ft bgs	Project Number: RC000753.0051
Editor: Sean McGrane	Development End Date: 12/14/2018	
Total Depth: 150 ft bgs	Well Completion: <input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction		Calculated Material Volumes	Material Volumes Installed			
61		Topock - Alluvium Deposits	GM		(50.0 - 70.0') 2" Sch 40 PVC (20-slot) Screen		(0.5 - 122.0') 2" PVC Sch 40 Casing				
62											
63											
64											
65		Topock - Alluvium Deposits	ML								
66											
67		Topock - Alluvium Deposits	SM		(48.0 - 74.0') Cemex #3 MESH (8x10)		(6.0 - 144.0') 10" Borehole				
68											
69											
70											
71	(70.5 - 71.5') Centralizer										
72	(70.0 - 72.3') Sump and End Cap										
73											
74											
75											
76											
77		(74.0 - 120.0') Bentonite seal pellets									
78											
79											
80											

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Date Started: 11/18/2018	Surface Elevation: 501.1 ft amsl	Well ID: MW-E-70, MW-E-142
Date Completed: 04/02/2019	Shallow Well Elevation: 501.0 ft amsl	
Drilling Co.: Cascade	Deep Well Elevation: 500.9 ft amsl	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): 2102331.3	Project: Final Groundwater Remedy Phase
Driller Name: Steve Vasquez	Easting (NAD83): 7615837.1	Location: 1
Drilling Asst: N. Dominguez/C. Alvarez	Borehole Diameter: 4-12 inches	PG&E Topock, Needles, California
Logger: Connor Mills	Water Level Start: 47.9 ft bgs	Project Number: RC000753.0051
Editor: Sean McGrane	Development End Date: 12/14/2018	
Total Depth: 150 ft bgs	Well Completion: <input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
81					(0.5 - 122.0') 2" PVC Sch 40 Casing		
82							
83							
84	MW-E-VAS-82-87.0 (200 ppb) 11/6/2018 10:12	Topock - Alluvium Deposits	SM				
85							
86							
87							
88							
89							
90		Topock - Alluvium Deposits	ML		(74.0 - 120.0') Bentonite seal pellets	(6.0 - 144.0') 10" Borehole	(74.0 - 120.0') 51 bags
91							
92							
93							
94							
95		Topock - Alluvium Deposits	SM				
96							
97							
98		Topock - Alluvium Deposits	ML				
99							
100							

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Date Started: 11/18/2018	Surface Elevation: 501.1 ft amsl	Well ID: MW-E-70, MW-E-142
Date Completed: 04/02/2019	Shallow Well Elevation: 501.0 ft amsl	
Drilling Co.: Cascade	Deep Well Elevation: 500.9 ft amsl	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): 2102331.3	Project: Final Groundwater Remedy Phase
Driller Name: Steve Vasquez	Easting (NAD83): 7615837.1	Location: 1
Drilling Asst: N. Dominguez/C. Alvarez	Borehole Diameter: 4-12 inches	PG&E Topock, Needles, California
Logger: Connor Mills	Water Level Start: 47.9 ft bgs	Project Number: RC000753.0051
Editor: Sean McGrane	Development End Date: 12/14/2018	
Total Depth: 150 ft bgs	Well Completion: <input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
101					(0.5 - 122.0') 2" PVC Sch 40 Casing		
102							
103							
104							
105		Topock - Alluvium Deposits	ML				
106							
107							
108							
109							
110					(74.0 - 120.0') Bentonite seal pellets		
111					(6.0 - 144.0') 10" Borehole	(74.0 - 120.0') 51 bags	(74.0 - 120.0') 49 bags (-4%) Note: Pel Plug Pellets (TR30) 3/8"
112							
113							
114	MW-E-VAS-112.0-117.0 (3100 ppb) 11/6/2018 15:22	Topock - Alluvium Deposits	SM				
115							
116							
117							
118							
119		Topock - Alluvium Deposits	ML				
120							

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Date Started: 11/18/2018	Surface Elevation: 501.1 ft amsl	Well ID: MW-E-70, MW-E-142
Date Completed: 04/02/2019	Shallow Well Elevation: 501.0 ft amsl	
Drilling Co.: Cascade	Deep Well Elevation: 500.9 ft amsl	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): 2102331.3	Project: Final Groundwater Remedy Phase
Driller Name: Steve Vasquez	Easting (NAD83): 7615837.1	Location: 1
Drilling Asst: N. Dominguez/C. Alvarez	Borehole Diameter: 4-12 inches	PG&E Topock, Needles, California
Logger: Connor Mills	Water Level Start: 47.9 ft bgs	Project Number: RC000753.0051
Editor: Sean McGrane	Development End Date: 12/14/2018	
Total Depth: 150 ft bgs	Well Completion: <input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
121		Topock - Alluvium Deposits	ML		(120.5 - 121.5') Centralizer		
122							
123							
124		Topock - Alluvium Deposits	SM				
125							
126							
127							
128							
129							
130					(120.0 - 144.0') Cemex #3 MESH (8x10)		
131							
132		Topock - Weathered Bedrock - conglomerate	SM				
133							
134							
135							
136							
137							
138	MW-E-VAS-137-142 (7300 ppb) 11/7/2018 15:20	Topock - Weathered Bedrock - conglomerate	SM				
139		Topock - Weathered Bedrock - conglomerate	ML				
140			SM				
					(0.5 - 122.0') 2" PVC Sch 40 Casing		
					(122.0 - 142.0') 2" Sch 40 PVC (20-slot) Screen		
					(6.0 - 144.0') 10" Borehole	(120.0 - 144.0') 29.3 bags	(120.0 - 144.0') 26 bags (-11%) Note: Lapis Lustre Sand

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Date Started: 11/18/2018	Surface Elevation: 501.1 ft amsl	Well ID: MW-E-70, MW-E-142
Date Completed: 04/02/2019	Shallow Well Elevation: 501.0 ft amsl	
Drilling Co.: Cascade	Deep Well Elevation: 500.9 ft amsl	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): 2102331.3	Project: Final Groundwater Remedy Phase
Driller Name: Steve Vasquez	Easting (NAD83): 7615837.1	Location: 1
Drilling Asst: N. Dominguez/C. Alvarez	Borehole Diameter: 4-12 inches	PG&E Topock, Needles, California
Logger: Connor Mills	Water Level Start: 47.9 ft bgs	Project Number: RC000753.0051
Editor: Sean McGrane	Development End Date: 12/14/2018	
Total Depth: 150 ft bgs	Well Completion: <input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
141	MW-E-VAS-137-142 (7300 ppb) 11/7/2018 15:20	Topock - Weathered Bedrock - conglomerate	SM		(122.0 - 142.0') 2" Sch 40 PVC (20-slot) Screen		
142					(120.0 - 144.0') Cemex #3 MESH (8x10)	(120.0 - 144.0') 29.3 bags	(120.0 - 144.0') 26 bags (-11%) Note: Lapis Lustre Sand
143							
144							
145							
146		Topock - Competent Bedrock - conglomerate					
147					(144.0 - 150.0') Bentonite seal chips	(144.0 - 150.0') 1.1 bags	(144.0 - 150.0') 1.5 bags (36%) Note: Puregold Medium Chips
148							
149							
150							
151					End of Boring at 150.0' bgs.		
152							
153							
154							
155							
156							
157							
158							
159							
160							

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Date Started:	01/03/2019	Surface Elevation:	N/A	Boring No.: MW-F
Date Completed:	01/09/2019	Northing (NAD83):	N/A	
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	131 ft bgs	Project: Final GW Remedy Phase I
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	4-12 inches	Location: PG&E Topock, Needles, California
Driller Name:	Steve Vasquez	Depth to First Water:	47.9 ft bgs	
Drilling Asst:	L. Amaya/ O. Florez	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger:	Michael Andrews	Sampling Interval:	Continuous	
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
1							(0.0 - 5.0') (NR); No recovery airknifed for utility clearance.		(0.0 - 97.5') No water used
2									
3									
4									
5									
6				Topock - Alluvium Deposits	GW-GM		(5.0 - 7.5') Topock - Alluvium Deposits; Well graded gravel with silt and sand (GW-GM); brown (7.5YR 4/3); granules to very large pebbles, angular to subround; some very fine to very coarse grained sand, angular to subangular; little silt; trace cobbles, angular to subround; dry		
7									
8									
9									
10									
11									
12	112.8			Topock - Alluvium Deposits	SW-SM		(7.5 - 17.0') Topock - Alluvium Deposits; Well graded sand with silt and gravel (SW-SM); brown (7.5YR 4/3); fine grained to coarse grained, angular to subround; and granules to very large pebbles, angular to subround; trace cobbles, angular to subangular; trace silt; trace clay; dry to moist; iron oxide staining; areas with some increasing and decreasing granule to pebbles and areas with more oxide staining (10.3'); dark brown/ black 1" layer, possibly charcoal, coal or graphite		
13									
14									
15									
16									
17									
18	114			Topock - Alluvium Deposits	SW-SM		(17.0 - 22.0') Topock - Alluvium Deposits; Well graded sand with silt and gravel (SW-SM); brown (7.5YR 4/4); fine grained to very coarse grained, angular to subround; some granules to large pebbles, angular to subangular; trace silt; trace clay; trace mica; dry to moist; iron oxide staining		
19									
20									

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Date Started:	01/03/2019	Surface Elevation:	N/A	Boring No.: MW-F
Date Completed:	01/09/2019	Northing (NAD83):	N/A	
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	131 ft bgs	Project: Final GW Remedy Phase I
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	4-12 inches	Location: PG&E Topock, Needles, California
Driller Name:	Steve Vasquez	Depth to First Water:	47.9 ft bgs	
Drilling Asst:	L. Amaya/ O. Florez	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger:	Michael Andrews	Sampling Interval:	Continuous	
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
21	114			Topock - Alluvium Deposits	SW-SM		(22.0 - 30.5') Topock - Alluvium Deposits; Well graded sand with silt (SW-SM); brown (7.5YR 4/3); fine grained to very coarse grained, angular to subangular; little granules to large pebbles, angular to subangular; trace silt; trace clay; trace mica; dry to moist	(21.0 - 31.0') Rough drilling	(0.0 - 97.5') No water used
22									
23									
24									
25	120			Topock - Alluvium Deposits	SW-SM		(30.5 - 37.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); (7.5R 4/3); very fine grained to very coarse grained, angular to subround; some granules to large pebbles, angular to subangular; trace cobbles, angular; trace silt; trace clay; iron oxide staining		
26									
27									
28									
29	72			Topock - Alluvium Deposits	SM		(37.0 - 46.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); (7.5R 4/3); very fine grained to very coarse grained, angular to subangular; and granules to very large pebbles, angular to subangular; little silt; trace cobbles, angular to subangular; trace clay; dry to moist; weak cementation		
30									
31									
32									
33	72			Topock - Alluvium Deposits	SM		(37.0 - 46.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); (7.5R 4/3); very fine grained to very coarse grained, angular to subangular; and granules to very large pebbles, angular to subangular; little silt; trace cobbles, angular to subangular; trace clay; dry to moist; weak cementation		
34									
35									
36									
37	72			Topock - Alluvium Deposits	SM		(37.0 - 46.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); (7.5R 4/3); very fine grained to very coarse grained, angular to subangular; and granules to very large pebbles, angular to subangular; little silt; trace cobbles, angular to subangular; trace clay; dry to moist; weak cementation		
38									
39									
40									

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Date Started:	01/03/2019	Surface Elevation:	N/A	Boring No.: MW-F
Date Completed:	01/09/2019	Northing (NAD83):	N/A	
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	131 ft bgs	Project: Final GW Remedy Phase I
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	4-12 inches	Location: PG&E Topock, Needles, California
Driller Name:	Steve Vasquez	Depth to First Water:	47.9 ft bgs	
Drilling Asst:	L. Amaya/ O. Florez	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger:	Michael Andrews	Sampling Interval:	Continuous	
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
41	72			Topock - Alluvium Deposits	SM				(0.0 - 97.5') No water used
42									
43								(42.0 - 45.0') Drill rods chattering	
44	48			Topock - Alluvium Deposits	SM				
45									
46									
47				Topock - Alluvium Deposits	SM		(46.0 - 48.5') Topock - Alluvium Deposits; Silty sand (SM); brown (7.5YR 4/3); fine grained to very coarse grained, angular to round; little granules to large pebbles, angular to subangular; little silt; trace clay; trace mica; moist to wet		
48									
49									
50	120	MW-F-SS-47-52 1/8/2019 14:48		Topock - Alluvium Deposits	SM		(48.5 - 52.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (5YR 4/3); very fine grained to very coarse grained, angular to subround; some granules to large pebbles, angular to subangular; some silt; trace clay; trace mica; dry to moist		
51									
52									
53				Topock - Alluvium Deposits	SM		(52.0 - 58.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); dark reddish brown (5YR 3/3); fine grained to very coarse grained, angular to subround; some silt; little small to large pebbles, angular to subangular; wet		(52.0') Approximate depth to water table
54									
55									
56	60	MW-F-SS-52-57 1/8/2019 14:48	MW-F-VAS-52-57 (2500 ppb) 1/6/2019 11:32	Topock - Alluvium Deposits	SM				
57									
58									
59		MW-F-SS-57-62 1/8/2019 14:58		Topock - Alluvium Deposits	SM		(58.0 - 61.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (5YR 4/3); very fine grained to very coarse grained, angular to subround; some silt; little granules to large pebbles, angular to subangular; little clay; trace mica; dry to moist; weak cementation		(58.0 - 61.0') Core dry
60									

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Date Started:	01/03/2019	Surface Elevation:	N/A	Boring No.: MW-F
Date Completed:	01/09/2019	Northing (NAD83):	N/A	
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	131 ft bgs	Project: Final GW Remedy Phase I
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	4-12 inches	Location: PG&E Topock, Needles, California
Driller Name:	Steve Vasquez	Depth to First Water:	47.9 ft bgs	
Drilling Asst:	L. Amaya/ O. Florez	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger:	Michael Andrews	Sampling Interval:	Continuous	
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
61	60	MW-F-SS-57-62 1/8/2019 14:58		Topock - Alluvium Deposits	SM			(58.0 - 61.0') Core dry	(0.0 - 97.5') No water used
62							(61.0 - 69.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); dark reddish brown (5YR 3/3); very fine grained to very coarse grained, angular to subround; some silt; little granules to very large pebbles, angular to subangular; wet		
63									
64	60	MW-F-SS-62-67 1/8/2019 15:04		Topock - Alluvium Deposits	SM			(65.0 - 68.0') Drill rods chattering	
65									
66									
67									
68									
69		MW-F-SS-67-72 1/8/2019 15:08					(69.5 - 82.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (5YR 4/3); fine grained to very coarse grained, subangular to round; some silt; little granules to large pebbles, angular to subangular; wet		
70									
71									
72	100.8								
73									
74		MW-F-SS-72-77 1/8/2019 15:10		Topock - Alluvium Deposits	SM		(74'); some granules to very large pebbles, angular to subangular; trace cobbles, angular to subround; decrease in sand		
75									
76									
77									
78	60	MW-F-SS-77-82 1/8/2019 15:12							
79									
80									

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Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	01/03/2019	Surface Elevation:	N/A	Boring No.: MW-F
Date Completed:	01/09/2019	Northing (NAD83):	N/A	
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	131 ft bgs	Project: Final GW Remedy Phase I
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	4-12 inches	Location: PG&E Topock, Needles, California
Driller Name:	Steve Vasquez	Depth to First Water:	47.9 ft bgs	
Drilling Asst:	L. Amaya/ O. Florez	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger:	Michael Andrews	Sampling Interval:	Continuous	
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
101		MW-F-SS-97-102 1/8/2019 15:22	MW-F-VAS-102-107 (1800 ppb) 1/7/2019 12:15	Topock - Alluvium Deposits	SM		angular to subangular; little silt; trace clay; trace mica; wet to moist		(97.5 - 107.5') 250 gal of water used
102									
103	120						(102.0 - 111.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); dark brown (7.5YR 3/2); very fine grained to coarse grained, angular to round; some silt; little granules to large pebbles, angular to subangular; little clay; dry to moist; moderate cementation	(102.0 - 111.0') Dry	
104		MW-F-SS-102-107 1/8/2019 15:24							
105									
106				Topock - Alluvium Deposits	SM			(105.3 - 107.5') Sluff settled out of water column, material too wet and fine to remove with core barrel have to flush casing	
107								(107.0 - 111.0') Drill rods chattering	(107.5 - 131.0') No used
108	48								
109		MW-F-SS-107-112 1/8/2019 15:26							
110									
111									
112							(111.0 - 118.0') Topock - Alluvium Deposits; Sandy silt with gravel (ML); dark reddish brown / moderate brown(5YR 3/4); low plasticity; some very fine to very coarse grained sand, angular to round; little granules to large pebbles, angular to subangular; wet	(111.0 - 117.0') Soft drilling	
113									
114	72	MW-F-SS-112-117 1/8/2019 15:29	MW-F-VAS-112-117 (740 ppb) 1/8/2019 10:07	Topock - Alluvium Deposits	ML				
115									
116									
117									
118	120	MW-F-SS-117-122 1/8/2019 15:32		Topock - Alluvium Deposits	GM		(118.0 - 120.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); dark reddish brown / moderate brown(5YR 3/4); granules to very large pebbles, subangular to round; some very fine to very coarse grained sand, subangular to round; little silt; trace cobbles, angular to subangular; trace clay; trace mica; wet		
119									
120									

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Date Started:	01/03/2019	Surface Elevation:	N/A	Boring No.: MW-F
Date Completed:	01/09/2019	Northing (NAD83):	N/A	
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	131 ft bgs	Project: Final GW Remedy Phase I
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	4-12 inches	Location: PG&E Topock, Needles, California
Driller Name:	Steve Vasquez	Depth to First Water:	47.9 ft bgs	
Drilling Asst:	L. Amaya/ O. Florez	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger:	Michael Andrews	Sampling Interval:	Continuous	
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
121		MW-F-SS-117-122 1/8/2019 15:32		Topock - Weathered Bedrock - conglomerate	SM		(120.0 - 122.0') Topock - Weathered Bedrock - conglomerate; Silty sand (SM); dark reddish brown (2.5YR 3/4); very fine grained to very coarse grained, subangular to round; some silt; little granules to large pebbles, angular to subangular; trace mica; moist to wet		(107.5 - 131.0') No used
122									
123	120								
124									
125									
126									
127				Topock - Competent Bedrock - conglomerate	SM		(122.0 - 131.0') Topock - Competent Bedrock - conglomerate; Silty sand with gravel (SM); dark reddish brown (2.5YR 3/4); very fine grained to very coarse grained, angular to subround; some granules to very large pebbles, angular to subangular; some silt; little clay; dry; moderate cementation; portions of core are friable	(122.0 - 127.0') Drill rods chattering (122.0 - 131.0') Dry	
128									
129	48								
130									
131									
End of Boring at 131.0' bgs.									
132									
133									
134									
135									
136									
137									
138									
139									
140									

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Date Started: 01/10/2019	Surface Elevation: N/A	Well ID: MW-F-58, MW-F-102
Date Completed:	Shallow Well Elevation: N/A	
Drilling Co.: Cascade	Deep Well Elevation: N/A	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): N/A	Project: Final GW Remedy Phase I
Driller Name: Steve Vasquez	Easting (NAD83): N/A	Location: PG&E Topock, Needles, California
Drilling Asst: L. Amaya/ O. Florez	Borehole Diameter: 4-12 inches	
Logger: Michael Andrews	Water Level Start: 47.9 ft bgs	Project Number: RC000753.0051
Editor: Sean McGrane	Development End Date: 2/28/2019	
Total Depth: 131 ft bgs	Well Completion: <input type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
1					(0.0 - 48.0') 2" PVC Sch 40 Casing		
2							
3			NR				
4					(2.0 - 5.5') Portland Cement 6% Bentonite		(2.0 - 5.5') 8 gallons (%) Note: Topped of with Type I, II, and V with Hydrogel 4.1.19.
5							
6		Topock - Alluvium Deposits	GW-GM				
7							
8							
9							
10							
11							
12		Topock - Alluvium Deposits	SW-SM				
13					(5.5 - 37.0') Portland Cement 6% Bentonite		
14							
15							
16							
17							
18							
19		Topock - Alluvium Deposits	SW-SM				
20					(19.0 - 20.0') Centralizer		
					(- 92.0') 2" PVC Sch 40 Casing		
					(0.0 - 5.0') 12" Borehole		
					(5.0 - 108.0') 10" Borehole	(5.5 - 37.0') 164.4 gallons	(5.5 - 37.0') 160 gallons (-3%) Note: Type I, II, and V with Hydrogel

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Date Started: 01/10/2019	Surface Elevation: N/A	Well ID: MW-F-58, MW-F-102
Date Completed:	Shallow Well Elevation: N/A	
Drilling Co.: Cascade	Deep Well Elevation: N/A	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): N/A	Project: Final GW Remedy Phase I
Driller Name: Steve Vasquez	Easting (NAD83): N/A	Location: PG&E Topock, Needles, California
Drilling Asst: L. Amaya/ O. Florez	Borehole Diameter: 4-12 inches	
Logger: Michael Andrews	Water Level Start: 47.9 ft bgs	Project Number: RC000753.0051
Editor: Sean McGrane	Development End Date: 2/28/2019	
Total Depth: 131 ft bgs	Well Completion: <input type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
21		Topock - Alluvium Deposits	SW-SM		(0.0 - 48.0') 2" PVC Sch 40 Casing		
22							
23							
24							
25							
26		Topock - Alluvium Deposits	SW-SM				
27							
28							
29					(5.5 - 37.0') Portland Cement 6% Bentonite	(5.5 - 37.0') 164.4 gallons	(5.5 - 37.0') 160 gallons (-3%) Note: Type I, II, and V with Hydrogel
30							
31					(5.0 - 108.0') 10" Borehole		
32							
33		Topock - Alluvium Deposits	SM				
34							
35							
36							
37							
38		Topock - Alluvium Deposits	SM		(37.0 - 46.0') Bentonite seal chips	(37.0 - 46.0') 7.33 bags	(37.0 - 46.0') 6 bags (-18%) Note: Puregold Medium Chips, changed depth of bentonite seal to 37 ft bgs reduce open borehole space with casing at correct height for water to displace during grouting.
39							
40							

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Date Started: 01/10/2019	Surface Elevation: N/A	Well ID: MW-F-58, MW-F-102
Date Completed:	Shallow Well Elevation: N/A	
Drilling Co.: Cascade	Deep Well Elevation: N/A	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): N/A	Project: Final GW Remedy Phase I
Driller Name: Steve Vasquez	Easting (NAD83): N/A	Location: PG&E Topock, Needles, California
Drilling Asst: L. Amaya/ O. Florez	Borehole Diameter: 4-12 inches	
Logger: Michael Andrews	Water Level Start: 47.9 ft bgs	Project Number: RC000753.0051
Editor: Sean McGrane	Development End Date: 2/28/2019	
Total Depth: 131 ft bgs	Well Completion: <input type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed	
41	MW-F-VAS-52-57 (2500 ppb) 1/6/2019 11:32	Topock - Alluvium Deposits	SM		(0.0 - 48.0') 2" PVC Sch 40 Casing		(37.0 - 46.0') 6 bags (-18%) Note: Puregold Medium Chips, changed depth of bentonite seal to 37 ft bgs reduce open borehole space with casing at correct height for water to displace during grouting.	
42					(37.0 - 46.0') Bentonite seal chips			(- 92.0') 2" PVC Sch 40 Casing
43								
44								
45		Topock - Alluvium Deposits	SM					
46								
47								
48		Topock - Alluvium Deposits	SM			(48.0 - 58.0') 2" Sch 40 PVC (20-slot) Screen		
49								
50								
51								
52		Topock - Alluvium Deposits	SM			(5.0 - 108.0') 10" Borehole		
53								
54								
55								
56		Topock - Alluvium Deposits	SM			(46.0 - 62.0') Cemex #3 MESH (8x10)	(46.0 - 62.0') 17.59 bags	(46.0 - 62.0') 19.75 bags (12%) Note: Lapis Lustre Sand
57								
58								
59								
60	Topock - Alluvium Deposits	SM			(59.0 - 60.0') Centralizer			

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Date Started: 01/10/2019	Surface Elevation: N/A	Well ID: MW-F-58, MW-F-102
Date Completed:	Shallow Well Elevation: N/A	
Drilling Co.: Cascade	Deep Well Elevation: N/A	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): N/A	Project: Final GW Remedy Phase I
Driller Name: Steve Vasquez	Easting (NAD83): N/A	Location: PG&E Topock, Needles, California
Drilling Asst: L. Amaya/ O. Florez	Borehole Diameter: 4-12 inches	
Logger: Michael Andrews	Water Level Start: 47.9 ft bgs	Project Number: RC000753.0051
Editor: Sean McGrane	Development End Date: 2/28/2019	
Total Depth: 131 ft bgs	Well Completion: <input type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
61		Topock - Alluvium Deposits	SM		(58.0 - 60.5') Sump and End Cap (46.0 - 62.0') Cemex #3 MESH (8x10)	(46.0 - 62.0') 17.59 bags	(46.0 - 62.0') 19.75 bags (12%) Note: Lapis Lustre Sand
62							
63							
64							
65		Topock - Alluvium Deposits	SM				
66							
67							
68							
69							
70					(5.0 - 108.0') 10" Borehole		
71					(62.0 - 90.0') Bentonite seal pellets	(62.0 - 90.0') 30.96 buckets	(62.0 - 90.0') 25.8 buckets (-17%) Note: Pel Plug Pellets (TR30) 3/8"
72							
73							
74							
75		Topock - Alluvium Deposits	SM				
76							
77							
78							
79							
80							

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Date Started: 01/10/2019	Surface Elevation: N/A	Well ID: MW-F-58, MW-F-102
Date Completed:	Shallow Well Elevation: N/A	
Drilling Co.: Cascade	Deep Well Elevation: N/A	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): N/A	Project: Final GW Remedy Phase I
Driller Name: Steve Vasquez	Easting (NAD83): N/A	Location: PG&E Topock, Needles, California
Drilling Asst: L. Amaya/ O. Florez	Borehole Diameter: 4-12 inches	
Logger: Michael Andrews	Water Level Start: 47.9 ft bgs	Project Number: RC000753.0051
Editor: Sean McGrane	Development End Date: 2/28/2019	
Total Depth: 131 ft bgs	Well Completion: <input type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
81		Topock - Alluvium Deposits	SM		(- 92.0') 2" PVC Sch 40 Casing		
82							
83							
84	MW-F-VAS-82-87 (110 ppb) 1/7/2019 09:05	Topock - Alluvium Deposits	SW-SM		(62.0 - 90.0') Bentonite seal pellets	(62.0 - 90.0') 30.96 buckets	(62.0 - 90.0') 25.8 buckets (-17%) Note: Pel Plug Pellets (TR30) 3/8"
85							
86							
87							
88		Topock - Alluvium Deposits	SM				
89							
90					(5.0 - 108.0') 10" Borehole		
91		Topock - Alluvium Deposits	SM				
92					(92.0 - 102.0') 2" Sch 40 PVC (20-slot) Screen		
93							
94							
95					(90.0 - 105.3') Cemex #3 MESH (8x10)	(90.0 - 105.3') 19.55 bags	(90.0 - 105.3') 19 bags (-3%) Note: Lapis Lustre Sand
96							
97		Topock - Alluvium Deposits	SM				
98	MW-F-VAS-102-107 (1800 ppb) 1/7/2019 12:15						
99		Topock - Alluvium Deposits	SM				
100							

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Date Started: 01/10/2019	Surface Elevation: N/A	Well ID: MW-F-58, MW-F-102
Date Completed:	Shallow Well Elevation: N/A	
Drilling Co.: Cascade	Deep Well Elevation: N/A	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): N/A	Project: Final GW Remedy Phase I
Driller Name: Steve Vasquez	Easting (NAD83): N/A	Location: PG&E Topock, Needles, California
Drilling Asst: L. Amaya/ O. Florez	Borehole Diameter: 4-12 inches	
Logger: Michael Andrews	Water Level Start: 47.9 ft bgs	Project Number: RC000753.0051
Editor: Sean McGrane	Development End Date: 2/28/2019	
Total Depth: 131 ft bgs	Well Completion: <input type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
101	MW-F-VAS-102-107 (1800 ppb) 1/7/2019 12:15	Topock - Alluvium Deposits	SM		(92.0 - 102.0') 2" Sch 40 PVC (20-slot) Screen		
102							
103					(90.0 - 105.3') Cemex #3 MESH (8x10)	(90.0 - 105.3') 19.55 bags	(90.0 - 105.3') 19 bags (-3%) Note: Lapis Lustre Sand
104					(103.0 - 104.0') Centralizer		
105					(5.0 - 108.0') 10" Borehole (102.0 - 104.8') Sump and End Cap		
106		Topock - Alluvium Deposits	SM				
107							
108							
109							
110							
111							
112							
113							
114	MW-F-VAS-112-117 (740 ppb) 1/8/2019 10:07	Topock - Alluvium Deposits	ML		(107.5 - 124.0') Bentonite seal chips	(107.5 - 124.0') 6.68	(107.5 - 124.0') 5 (-25%) Note: Puregold Medium Chips, volume used less than the calculation because not chipped to 106 as planned due to sluff.
115					(108.0 - 124.0') 7" Borehole		
116							
117							
118							
119		Topock - Alluvium Deposits	GM				
120							

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Date Started: 01/10/2019	Surface Elevation: N/A	Well ID: MW-F-58, MW-F-102
Date Completed:	Shallow Well Elevation: N/A	
Drilling Co.: Cascade	Deep Well Elevation: N/A	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): N/A	Project: Final GW Remedy Phase I
Driller Name: Steve Vasquez	Easting (NAD83): N/A	Location: PG&E Topock, Needles, California
Drilling Asst: L. Amaya/ O. Florez	Borehole Diameter: 4-12 inches	
Logger: Michael Andrews	Water Level Start: 47.9 ft bgs	Project Number: RC000753.0051
Editor: Sean McGrane	Development End Date: 2/28/2019	
Total Depth: 131 ft bgs	Well Completion: <input type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
121		Topock - Weathered Bedrock - conglomerate	SM				
122					(107.5 - 124.0') Bentonite seal chips	(108.0 - 124.0') 7" Borehole	(107.5 - 124.0') 6.68
123							
124							
125							
126		Topock - Competent Bedrock - conglomerate	SM				
127							
128					(124.0 - 131.0') Bentonite seal chips	(124.0 - 131.0') 6" Borehole	(124.0 - 131.0') 1.91 bags
129							
130							
131							
132					End of Boring at 131.0' bgs.		
133							
134							
135							
136							
137							
138							
139							
140							

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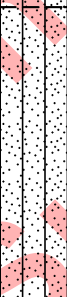
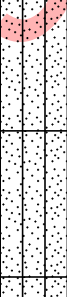


WELL CONSTRUCTION DETAILS_PG&E TOPOCK TOPOCK DRAFT BORING LOGS\GINT FILES\06.06.19\TOPOCK DATABASE FOR PLOG.GPJ TOPOCK DATA TEMPLATE FOR PLOG.GDT 06/06/19 12:57

Date Started: <u>02/13/2019</u>	Surface Elevation: <u>N/A</u>	Boring No.: <u>MW-G</u>
Date Completed: <u>02/17/2019</u>	Northing (NAD83): <u>N/A</u>	
Drilling Co.: <u>Cascade</u>	Easting (NAD83): <u>N/A</u>	Client: <u>PG&E</u>
Drilling Method: <u>Sonic Drilling</u>	Total Depth: <u>87 ft bgs</u>	Project: <u>Final GW Remedy Phase I</u>
Drill Rig Type: <u>Prosonic Truck Mount</u>	Borehole Diameter: <u>10-12 inches</u>	Location: <u>PG&E Topock, Needles, California</u>
Driller Name: <u>Steve Vasquez</u>	Depth to First Water: <u>50 ft bgs</u>	
Drilling Asst: <u>L. Amaya/ O. Flores</u>	Sampling Method: <u>4 inch x 10 ft Core Barrel</u>	Project Number: <u>RC000753.0051</u>
Logger: <u>Sean McGrane</u>	Sampling Interval: <u>Continuous</u>	
Editor: <u>Craig Prunier</u>	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
1	48			Topock - Fill	NR		(0.0 - 4.0') Topock - Fill; No recovery (NR); Hand cleared for utility clearance cuttings not logged		(0.0 - 72.0') 50 gal of water used
2									
3									
4									
5	120			Topock - Fill	SW-SM		(4.0 - 8.5') Topock - Fill; Well graded sand with silt and gravel (SW-SM); brown (7.5YR 4/3); very fine grained to very coarse grained, angular to subround; little granules to large pebbles, angular to subangular; little silt; little clay; coarser clasts composed of metadiorite; dry		
6									
7									
8							(7.75'); some granules to very large pebbles, angular to subangular		
9				Topock - Fill	SC		(8.5 - 15.5') Topock - Fill; Clayey sand with gravel (SC); (5YR4/3); very fine grained to very coarse grained, angular to subangular; little granules to very large pebbles, angular to subangular; little silt; little clay; coarser clasts composed of metadiorite; dry		
10									
11							(10.5'); trace cobbles, subangular; iron oxide staining		
12							(11'); some granules to very large pebbles, angular to subangular		
13									
14									
15									
16				Topock - Fill	SC		(15.5 - 18.0') Topock - Fill; Clayey sand with gravel (SC); reddish brown / moderate brown (5YR 4/4) and reddish brown (5YR 5/4); very fine grained to very coarse grained, angular to subangular; some granules to very large pebbles, angular to subangular; little silt; little clay; trace cobbles, subangular; some coarser clast composed of conglomerate; little coarser clasts composed of metadiorite; dry	(15.0 - 17.0') Lost 2 ft of down the hole	
17									
18	84			Topock - Alluvium Deposits	ML		(18.0 - 18.5') Topock - Alluvium Deposits; Sandy silt with gravel (ML); low plasticity; some very fine to very coarse grained sand, angular to subround; little granules to large pebbles, angular to subangular; little clay; coarser clasts composed of metadiorite; moist	(17.0 - 24.0') Recovered 15 to 18 ft. bgs, 18 to 24 ft. fell out of core barrel, ran 6 inch casing to 18 ft. and recovered 6 ft. of drill run 3, total recovery 7 ft.	(18.0 - 18.5') 5 gal of water used
19				Topock - Alluvium Deposits	SC		(18.5 - 24.0') Topock - Alluvium Deposits; Clayey sand with gravel (SC); brown (7.5YR 4/3); very fine grained to very coarse grained, angular to subround; some granules to large pebbles, angular to		
20									

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Date Started: 02/13/2019	Surface Elevation: N/A	Boring No.: MW-G
Date Completed: 02/17/2019	Northing (NAD83): N/A	
Drilling Co.: Cascade	Easting (NAD83): N/A	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 87 ft bgs	Project: Final GW Remedy Phase I
Drill Rig Type: Prosonic Truck Mount	Borehole Diameter: 10-12 inches	Location: PG&E Topock, Needles, California
Driller Name: Steve Vasquez	Depth to First Water: 50 ft bgs	
Drilling Asst: L. Amaya/ O. Flores	Sampling Method: 4 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger: Sean McGrane	Sampling Interval: Continuous	
Editor: Craig Prunier	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
21	84			Topock - Alluvium Deposits	SC		subangular; little silt; little clay; coarser clasts composed of metadiorite; dry	(17.0 - 24.0') Recovered 15 to 18 ft. bgs, 18 to 24 ft. fell out of core barrel, ran 6 inch casing to 18 ft. and recovered 6 ft. of drill run 3, total recovery 7 ft.	(0.0 - 72.0') 50 gal of water used
22							(21'); trace cobbles, angular to subangular		
23							(22'); no cobbles		
24									
25	78			Topock - Alluvium Deposits	SM		(24.0 - 25.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 4/3); very fine grained to very coarse grained, angular to subround; little granules to large pebbles, angular to subangular; little silt; little clay; coarser clasts composed of metadiorite; trace mica; dry		
26				Topock - Alluvium Deposits	SM		(25.0 - 29.3') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 5/4); very fine grained to very coarse grained, angular to subangular; some granules to very large pebbles, angular to subangular; little silt; trace clay; coarser clast composed of conglomerate; coarser clasts composed of metadiorite; dry		
27									
28									
29	84			Topock - Alluvium Deposits	SM		(29.3 - 35.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (5YR 5/4); very fine grained to very coarse grained, angular to subround; little granules to large pebbles, angular to subround; little silt; little clay; coarser clast composed of conglomerate; coarser clasts composed of metadiorite; dry	(30.0 - 37.0') Top 0.5 ft of core slough.	
30							(30'); trace clay; increase in sand		
31									
32									
33	78			Topock - Alluvium Deposits	SM		(33.25'); some granules to very large pebbles, angular to subround; trace cobbles, subangular; no clay		
34									
35									
36									
37	84			Topock - Alluvium Deposits	SM		(35.0 - 37.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); (7.5R 5/4); very fine grained to very coarse grained, angular to subround; some granules to very large pebbles, angular to subround; some silt; trace cobbles, subround; trace clay; coarser clast composed of conglomerate; dry		
38				Topock - Alluvium Deposits	SM		(37.0 - 43.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (5YR 4/3); very fine grained to very coarse grained, angular to subround; some granules to very large pebbles, angular to subround; little silt; trace clay; coarser clasts composed of metadiorite; coarser clast composed of conglomerate; dry		
39									
40									

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Date Started: 02/13/2019	Surface Elevation: N/A	Boring No.: MW-G
Date Completed: 02/17/2019	Northing (NAD83): N/A	
Drilling Co.: Cascade	Easting (NAD83): N/A	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 87 ft bgs	Project: Final GW Remedy Phase I
Drill Rig Type: Prosonic Truck Mount	Borehole Diameter: 10-12 inches	Location: PG&E Topock, Needles, California
Driller Name: Steve Vasquez	Depth to First Water: 50 ft bgs	
Drilling Asst: L. Amaya/ O. Flores	Sampling Method: 4 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger: Sean McGrane	Sampling Interval: Continuous	
Editor: Craig Prunier	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
41	78			Topock - Alluvium Deposits	SM			(37.0 - 43.0') Top 0.5 ft. of core is slough	(0.0 - 72.0') 50 gal of water used
42									
43									
44							(43.0 - 48.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (5YR 4/3); very fine grained to very coarse grained, angular to subround; some granules to very large pebbles, angular to subangular; little silt; trace clay; coarser clasts composed of metadiorite; dry		
45	48			Topock - Alluvium Deposits	SM				
46									
47							(47'); trace cobbles, subangular; moist to wet	(47.0 - 50.0') Vadose zone moist to wet	
48									
49		MW-G-SS-47.0-52.0 2/16/2019 15:55					(48.0 - 55.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (5YR 4/3); very fine grained to very coarse grained, subangular to round; some silt; little granules to large pebbles, angular to subround; trace cobbles, subangular; trace clay; coarser clasts composed of metadiorite; moist to wet		
50	78						(50'); wet; no cobbles		
51				Topock - Alluvium Deposits	SM			(50.0') Approximate depth to water table	
52									
53									
54		MW-G-SS-52.0-57.0 2/16/2019 16:00	MW-G-VAS-52.0-57.0 (680 ppb) 2/13/2019 16:28						
55	48								
56				Topock - Alluvium Deposits	SM		(55.0 - 57.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown / moderate brown (5YR 4/4); very fine grained to very coarse grained, angular to subround; some granules to very large pebbles, angular to subround; little silt; little clay; coarser clasts composed of metadiorite; wet		
57									
58				Topock - Alluvium Deposits	ML		(57.0 - 57.8') Topock - Alluvium Deposits; Sandy silt (ML); yellowish red / light brown (5YR 5/6); medium plasticity; little granules to medium pebbles, angular; little very fine to very coarse grained sand, angular to subangular; little clay; wet; very stiff	(57.0 - 67.0') Rough drilling, drilled like rock, core was hot with moist to dry sediments	
59	120	MW-G-SS-57.0-62.0 2/16/2019 16:05		Topock - Alluvium Deposits	ML		(57.8 - 62.0') Topock - Alluvium Deposits; Sandy silt (ML); yellowish red (5YR 4/6); low plasticity; and very fine to very coarse grained sand, angular to subround; little granules to large pebbles, angular to subround; little clay; dry to moist; hard; weak cementation		
60									

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Date Started: <u>02/13/2019</u>	Surface Elevation: <u>N/A</u>	Boring No.: <u>MW-G</u>
Date Completed: <u>02/17/2019</u>	Northing (NAD83): <u>N/A</u>	
Drilling Co.: <u>Cascade</u>	Easting (NAD83): <u>N/A</u>	Client: <u>PG&E</u>
Drilling Method: <u>Sonic Drilling</u>	Total Depth: <u>87 ft bgs</u>	Project: <u>Final GW Remedy Phase I</u>
Drill Rig Type: <u>Prosonic Truck Mount</u>	Borehole Diameter: <u>10-12 inches</u>	Location: <u>PG&E Topock, Needles, California</u>
Driller Name: <u>Steve Vasquez</u>	Depth to First Water: <u>50 ft bgs</u>	
Drilling Asst: <u>L. Amaya/ O. Flores</u>	Sampling Method: <u>4 inch x 10 ft Core Barrel</u>	Project Number: <u>RC000753.0051</u>
Logger: <u>Sean McGrane</u>	Sampling Interval: <u>Continuous</u>	
Editor: <u>Craig Prunier</u>	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
61	120	MW-G-SS-57.0-62.0 2/16/2019 16:05		Topock - Alluvium Deposits	ML			(57.0 - 67.0') Rough drilling, drilled like rock, core was hot with moist to dry sediments	(0.0 - 72.0') 50 gal of water used
62									
63									
64	120	MW-G-SS-62.0-67.0 2/16/2019 16:10		Topock - Alluvium Deposits	ML		(62.0 - 64.5') Topock - Alluvium Deposits; Sandy silt with gravel (ML); reddish brown / moderate brown (5YR 4/4); low plasticity; some very fine to very coarse grained sand, angular to subround; little granules to large pebbles, angular to subround; little clay; coarser clasts composed of metadiorite; dry; hard; weak cementation		
65									
66									
67	60	MW-G-SS-67.0-72.0 2/16/2019 16:15	MW-G-VAS-67.0-72.0 (920 ppb) 2/14/2019 16:42	Topock - Alluvium Deposits	CL		(64.5 - 67.0') Topock - Alluvium Deposits; Sandy lean clay with gravel (CL); brown (7.5YR 4/3); medium plasticity; some very fine to very coarse grained sand, angular to subround; little granules to very large pebbles, angular to subround; little silt; moist; soft	(67.0 - 69.5') Wet zone that might produce water, attempt to collect sample	(69.5 - 72.0') Drilled like rock core hot and dry
68				Topock - Alluvium Deposits	ML		(67.0 - 67.8') Topock - Alluvium Deposits; Sandy silt (ML); reddish brown (5YR 5/4); low plasticity; some very fine to very coarse grained sand, angular to subround; little granules to very large pebbles, angular to round; little clay; trace cobbles, angular; coarser clasts composed of metadiorite; moist; very stiff		
69				Topock - Alluvium Deposits	SM		(67.8 - 69.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 4/3); very fine grained to very coarse grained, angular to subround; some silt; little granules to large pebbles, angular to subround; little clay; wet		
70	120	MW-G-SS-72.0-77.0 2/17/2019 16:15					(69.0 - 76.0') Topock - Alluvium Deposits; Sandy silt (ML); reddish brown (5YR 5/4); low plasticity; some very fine to very coarse grained sand, angular to subround; little granules to very large pebbles, angular to round; little clay; coarser clasts composed of metadiorite; moist; very stiff	(72.0 - 86.0') Used water to flush fines out of casing for well install	(72.0 - 86.0') 600 gal of water used
71							(69.5') trace cobbles, subangular to subround; coarser clast composed of conglomerate; dry; weak cementation		
72							(72') moist to wet; weak cementation		
73	120	MW-G-SS-72.0-77.0 2/17/2019 16:15		Topock - Alluvium Deposits	ML				
74									
75									
76	120	MW-G-SS-72.0-77.0 2/17/2019 16:15		Topock - Alluvium Deposits	SM		(76.0 - 77.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown / moderate brown (5YR 4/4); very fine grained to very coarse grained, angular to subround; little granules to large pebbles, angular to subangular; little silt; little clay; coarser clasts composed of metadiorite; wet		
77									
78									
79	120	MW-G-SS-72.0-77.0 2/17/2019 16:15	MW-G-VAS-77.0-82.0 (600 ppb) 2/15/2019 12:12	Topock - Alluvium Deposits	SM		(77.5 - 79.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (2.5YR 4/4); very fine grained to very coarse grained, angular to subround; little granules to very large pebbles, angular to subangular; little silt; coarser clasts composed of metadiorite; wet		
80							(79.5 - 81.0') Topock - Alluvium Deposits; Silty sand with gravel (SM);		

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Date Started:	02/13/2019	Surface Elevation:	N/A	Boring No.: MW-G	
Date Completed:	02/17/2019	Northing (NAD83):	N/A		
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	87 ft bgs	Project:	Final GW Remedy Phase I
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	10-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Steve Vasquez	Depth to First Water:	50 ft bgs		
Drilling Asst:	L. Amaya/ O. Flores	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	Sean McGrane	Sampling Interval:	Continuous		
Editor:	Craig Prunier	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
81	120	MW-G-SS-72.0-77.0 2/17/2019 16:15	MW-G-VAS-77.0-82.0 (600 ppb) 2/15/2019 12:12	Topock - Alluvium Deposits	SM		reddish brown (2.5YR 4/4); very fine grained to very coarse grained; some granules to large pebbles, angular to subround; some silt; trace clay; coarser clasts composed of metadiorite; wet	(72.0 - 86.0') Used water to flush fines out of casing for well install	(72.0 - 86.0') 600 gal of water used
82				Topock - Weathered Bedrock - conglomerate	SM		(81.0 - 82.0') Topock - Weathered Bedrock - conglomerate; Silty sand with gravel (SM); reddish brown (2.5YR 4/4); very fine grained to very coarse grained, angular to subround; some granules to large pebbles, angular to subround; little silt; little clay; trace cobbles, subangular; moist		
83							(82.0 - 87.0') Topock - Competent Bedrock - conglomerate; reddish brown (2.5YR 4/4); dry; weak cementation; friable	(83.0 - 87.0') Core barrel was getting hung up in hole, possible indication of bedrock	
84	60			Topock - Competent Bedrock - conglomerate					
85									
86									
87							End of Boring at 87.0' bgs.		
88									
89									
90									
91									
92									
93									
94									
95									
96									
97									
98									
99									
100									

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Date Started: 02/17/2019	Surface Elevation: N/A	Well ID: MW-G-57, MW-G-82
Date Completed:	Shallow Well Elevation: N/A	
Drilling Co.: Cascade	Deep Well Elevation: N/A	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): N/A	Project: Final GW Remedy Phase I
Driller Name: Steve Vasquez	Easting (NAD83): N/A	Location: PG&E Topock, Needles, California
Drilling Asst: L. Amaya/ O. Flores	Borehole Diameter: 10-12 inches	
Logger: Sean McGrane	Water Level Start: 50 ft bgs	Project Number: RC000753.0051
Editor: Craig Prunier	Development End Date: 3/2/2019	
Total Depth: 87 ft bgs	Well Completion: <input type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
1					(0.0 - 47.4') 2" PVC Sch 40 Casing		
2		Topock - Fill	NR				
3							
4							
5		Topock - Fill	SW-SM		(0.0 - 13.0') Portland Cement 5% Bentonite		
6							
7						(0.0 - 13.0') 50 gallons	(0.0 - 13.0') 55 gallons (10%) Note: Used Type I, II, and V and Hydrogel. Mixed 5.5 batches of grout total.
8							
9							
10		Topock - Fill	SC				
11							
12							
13							
14							
15							
16		Topock - Fill	SC		(13.0 - 41.3') Portland Cement 5% Bentonite		
17						(13.0 - 41.3') 164 gallons	(13.0 - 41.3') 165 gallons (1%) Note: Used Type I, II, and V and Hydrogel. Mixed 5.5 batches of grout total.
18		Topock - Alluvium Deposits	ML		(17.5 - 18.5') Centralizer		
19		Topock - Alluvium Deposits	SC				
20							

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Date Started: 02/17/2019	Surface Elevation: N/A	Well ID: MW-G-57, MW-G-82
Date Completed:	Shallow Well Elevation: N/A	
Drilling Co.: Cascade	Deep Well Elevation: N/A	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): N/A	Project: Final GW Remedy Phase I
Driller Name: Steve Vasquez	Easting (NAD83): N/A	Location: PG&E Topock, Needles, California
Drilling Asst: L. Amaya/ O. Flores	Borehole Diameter: 10-12 inches	
Logger: Sean McGrane	Water Level Start: 50 ft bgs	Project Number: RC000753.0051
Editor: Craig Prunier	Development End Date: 3/2/2019	
Total Depth: 87 ft bgs	Well Completion: <input type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
21		Topock - Alluvium Deposits	SC		(0.0 - 47.4') 2" PVC Sch 40 Casing		
22							
23							
24		Topock - Alluvium Deposits	SM				
25							
26		Topock - Alluvium Deposits	SM				
27							
28							
29							
30					(13.0 - 41.3') Portland Cement 5% Bentonite		
31		Topock - Alluvium Deposits	SM			(13.0 - 41.3') 164 gallons	(13.0 - 41.3') 165 gallons (1%) Note: Used Type I, II, and V and Hydrogel. Mixed 5.5 batches of grout total.
32							
33							
34							
35		Topock - Alluvium Deposits	SM				
36							
37							
38		Topock - Alluvium Deposits	SM				
39							
40							

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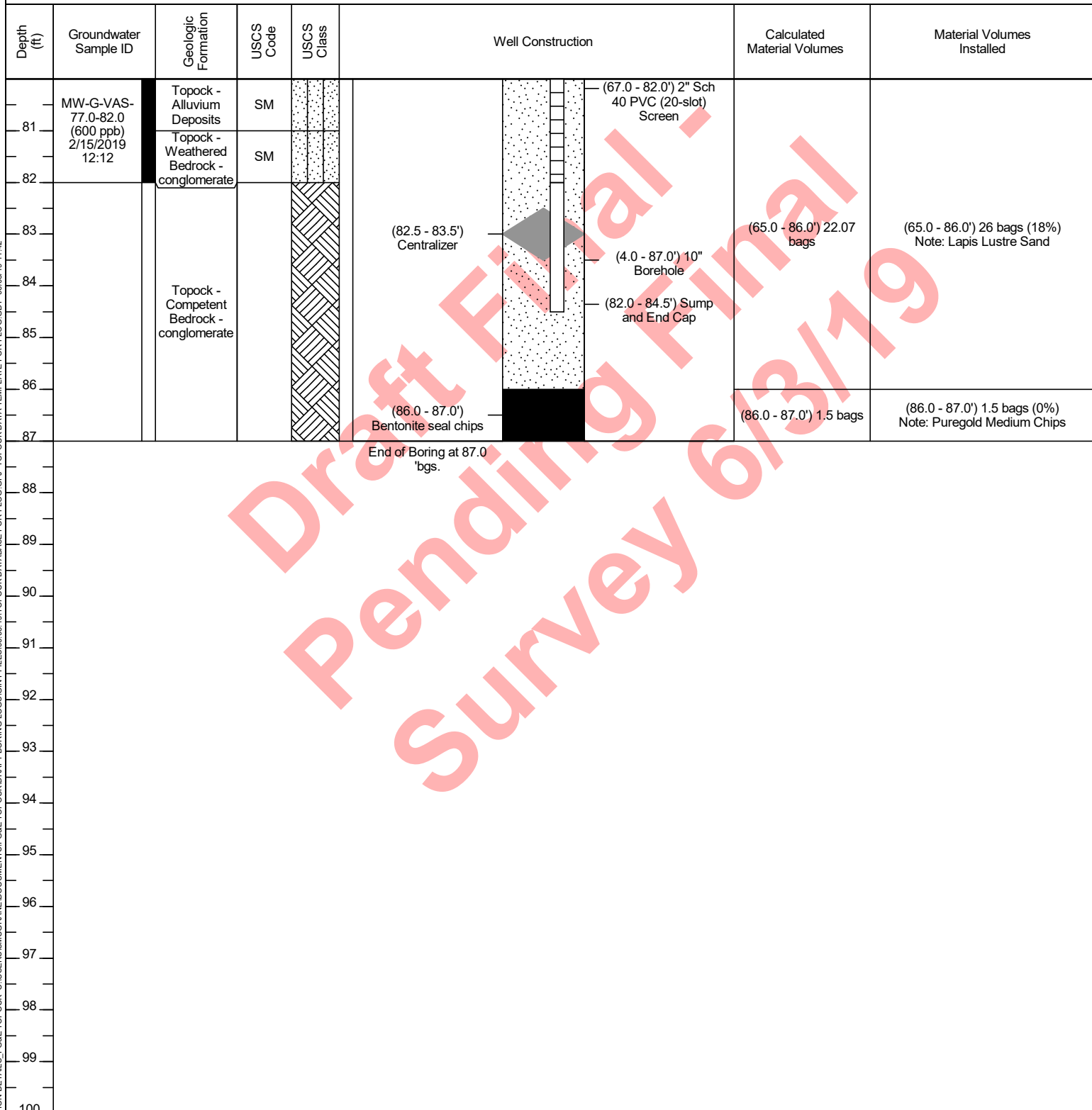
Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started: 02/17/2019	Surface Elevation: N/A	Well ID: MW-G-57, MW-G-82
Date Completed:	Shallow Well Elevation: N/A	
Drilling Co.: Cascade	Deep Well Elevation: N/A	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): N/A	Project: Final GW Remedy Phase I
Driller Name: Steve Vasquez	Easting (NAD83): N/A	Location: PG&E Topock, Needles, California
Drilling Asst: L. Amaya/ O. Flores	Borehole Diameter: 10-12 inches	
Logger: Sean McGrane	Water Level Start: 50 ft bgs	Project Number: RC000753.0051
Editor: Craig Prunier	Development End Date: 3/2/2019	
Total Depth: 87 ft bgs	Well Completion: <input type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
61		Topock - Alluvium Deposits	ML		and End Cap (45.0 - 61.0') Cemex #3 MESH (8x10)	(45.0 - 61.0') 15.05 bags	(45.0 - 61.0') 18 bags (20%) Note: Lapis Lustre Sand
62							
63		Topock - Alluvium Deposits	ML		(61.0 - 65.0') Bentonite seal pellets	(61.0 - 65.0') 3.81 buckets	(61.0 - 65.0') 4 buckets (5%) Note: Pel Plug Pellets (TR30) 3/8"
64							
65		Topock - Alluvium Deposits	CL				
66							
67		Topock - Alluvium Deposits	ML				
68		Topock - Alluvium Deposits	SM		(67.0 - 82.0') 2" Sch 40 PVC (20-slot) Screen		
69	MW-G-VAS-67.0-72.0 (920 ppb) 2/14/2019 16:42						
70					(4.0 - 87.0') 10" Borehole		
71							
72		Topock - Alluvium Deposits	ML		(65.0 - 86.0') Cemex #3 MESH (8x10)	(65.0 - 86.0') 22.07 bags	(65.0 - 86.0') 26 bags (18%) Note: Lapis Lustre Sand
73							
74							
75							
76							
77		Topock - Alluvium Deposits	SM				
78	MW-G-VAS-77.0-82.0 (600 ppb) 2/15/2019 12:12	Topock - Alluvium Deposits	SM				
79							
80			SM				

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Date Started: <u>02/17/2019</u>	Surface Elevation: <u>N/A</u>	Well ID: MW-G-57, MW-G-82
Date Completed: _____	Shallow Well Elevation: <u>N/A</u>	
Drilling Co.: <u>Cascade</u>	Deep Well Elevation: <u>N/A</u>	Client: <u>PG&E</u>
Drilling Method: <u>Sonic Drilling</u>	Northing (NAD83): <u>N/A</u>	Project: <u>Final GW Remedy Phase I</u>
Driller Name: <u>Steve Vasquez</u>	Easting (NAD83): <u>N/A</u>	Location: <u>PG&E Topock, Needles, California</u>
Drilling Asst: <u>L. Amaya/ O. Flores</u>	Borehole Diameter: <u>10-12 inches</u>	
Logger: <u>Sean McGrane</u>	Water Level Start: <u>50 ft bgs</u>	Project Number: <u>RC000753.0051</u>
Editor: <u>Craig Prunier</u>	Development End Date: <u>3/2/2019</u>	
Total Depth: <u>87 ft bgs</u>	Well Completion: <input type="checkbox"/> Flush <input type="checkbox"/> Stick-up	










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Date Started: 04/10/2019	Surface Elevation: 587.7 ft amsl	Boring No.: MW-U
Date Completed: 05/10/2019	Northing (NAD83): 2101958.7	
Drilling Co.: Cascade	Easting (NAD83): 7613300.8	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 327 ft bgs	Project: Final GW Remedy Phase I
Drill Rig Type: Prosonic Truck Mount	Borehole Diameter: 6-12 inches	Location: PG&E Topock, Needles, California
Driller Name: Eddie Ramos	Depth to First Water: 131.45 ft bgs	
Drilling Asst: L. Amaya/ O. Flores	Sampling Method: 4 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger: Grant Willford	Sampling Interval: Continuous	
Editor: Sean McGrane	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
1	36			Topock - Fill	SM		(0.0 - 3.0') Topock - Fill; Silty sand with gravel (SM); brown (10YR 5/3); very fine grained to very coarse grained, angular to subround; some granules to large pebbles, angular to subround; little silt; little clay; trace cobbles, angular, small cobbles; dry; gravel composed of mixed lithology, possible highway fill		
2									
3									
4	0				NR		(3.0 - 7.0') (NR); No recovery see "Drilling Notes" for reason	(3.0 - 7.0') Loose material fell out of core barrel	
5									
6									
7									
8									
9									
10									
11									
12	120			Topock - Fill	SM		(7.0 - 14.5') Topock - Fill; Silty sand with gravel (SM); grayish brown (10YR 5/2) with brown (10YR 5/3); very fine grained to very coarse grained, angular to subangular; some granules to medium pebbles, angular to subangular; little silt; little clay; dry; gravel composed of mixed lithology, possible highway fill	(7.0 - 17.0') Soft drilling	
13									
14									
15									
16									
17									
18	72			Topock - Alluvium Deposits	SM		(14.5 - 22.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 4/4) some brown (10YR 5/3); very fine grained to very coarse grained, angular to subangular; some granules to medium pebbles, angular to subangular; little silt; little clay; dry; gravel composed of mixed lithology	(17.0 - 27.0') Soft drilling	
19									
20									

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Date Started:	<u>04/10/2019</u>	Surface Elevation:	<u>587.7 ft amsl</u>	Boring No.: <u>MW-U</u>	
Date Completed:	<u>05/10/2019</u>	Northing (NAD83):	<u>2101958.7</u>		
Drilling Co.:	<u>Cascade</u>	Easting (NAD83):	<u>7613300.8</u>	Client:	<u>PG&E</u>
Drilling Method:	<u>Sonic Drilling</u>	Total Depth:	<u>327 ft bgs</u>	Project:	<u>Final GW Remedy Phase I</u>
Drill Rig Type:	<u>Prosonic Truck Mount</u>	Borehole Diameter:	<u>6-12 inches</u>	Location:	<u>PG&E Topock, Needles, California</u>
Driller Name:	<u>Eddie Ramos</u>	Depth to First Water:	<u>131.45 ft bgs</u>		
Drilling Asst:	<u>L. Amaya/ O. Flores</u>	Sampling Method:	<u>4 inch x 10 ft Core Barrel</u>	Project Number:	<u>RC000753.0051</u>
Logger:	<u>Grant Willford</u>	Sampling Interval:	<u>Continuous</u>		
Editor:	<u>Sean McGrane</u>	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
21	72	No Sieve Samples Collected		Topock - Alluvium Deposits	SM			(17.0 - 27.0') Soft drilling	
22				Topock - Alluvium Deposits	GP		(22.0 - 22.5') Topock - Alluvium Deposits; Well graded gravel (GP); (GLEY1 8/) with (GLEY2 7/1); granite boulder, angular to subangular		
23				Topock - Alluvium Deposits	SM		(22.5 - 26.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); pale brown (10YR 6/3); very fine grained to very coarse grained, angular to subround; some granules to very large pebbles, angular to subround; little silt; trace cobbles, angular, small to large cobbles; trace clay; dry; gravel composed of mixed lithology		
24									
25									
26	48			Topock - Alluvium Deposits	GM		(26.0 - 27.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); pale brown (10YR 6/3); granules to large cobbles, angular to subround; some very fine to very coarse grained sand, angular to subround; little silt; little clay; dry; gravel composed of mixed lithology, mainly metadiorite		
27				NR		(27.0 - 36.0') (NR); No recovery see "Drilling Notes" for reason			
28									
29									
30									
31									
32									
33	12	Topock - Alluvium Deposits	SM		(36.0 - 37.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); pale brown (10YR 6/3); very fine grained to very coarse grained, angular to subround; little granules to medium pebbles, angular to subround; little silt; little clay; dry; weak cementation; gravel composed of mixed lithology				
34									
35									
36	120	Topock - Alluvium Deposits	GM		(37.0 - 47.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); pale brown (10YR 6/3); granules to large pebbles, angular to subround; some very fine to very coarse grained sand, angular to subround; little silt; little clay; dry; gravel composed of mixed lithology, gravel main grain size granules to small pebbles				
37									
38									
39									
40									

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Date Started: <u>04/10/2019</u>	Surface Elevation: <u>587.7 ft amsl</u>	Boring No.: <u>MW-U</u>
Date Completed: <u>05/10/2019</u>	Northing (NAD83): <u>2101958.7</u>	
Drilling Co.: <u>Cascade</u>	Easting (NAD83): <u>7613300.8</u>	Client: <u>PG&E</u>
Drilling Method: <u>Sonic Drilling</u>	Total Depth: <u>327 ft bgs</u>	Project: <u>Final GW Remedy Phase I</u>
Drill Rig Type: <u>Prosonic Truck Mount</u>	Borehole Diameter: <u>6-12 inches</u>	Location: <u>PG&E Topock, Needles, California</u>
Driller Name: <u>Eddie Ramos</u>	Depth to First Water: <u>131.45 ft bgs</u>	
Drilling Asst: <u>L. Amaya/ O. Flores</u>	Sampling Method: <u>4 inch x 10 ft Core Barrel</u>	Project Number: <u>RC000753.0051</u>
Logger: <u>Grant Willford</u>	Sampling Interval: <u>Continuous</u>	
Editor: <u>Sean McGrane</u>	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
41	120			Topock - Alluvium Deposits	GM				
42									
43									
44									
45									
46	108	No Sieve Samples Collected		Topock - Alluvium Deposits	SM		(47.0 - 55.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); light brown (7.5YR 6/4) some pale brown (10YR 6/3); very fine grained to very coarse grained, angular to subround; some granules to very large pebbles, angular to subround; little silt; little clay; dry; gravel composed of mixed lithology	(47.0 - 56.0') Rough drilling	
47									
48									
49									
50									
51									
52									
53									
54									
55									
56	96			Topock - Alluvium Deposits	GM		(55.0 - 63.5') Topock - Alluvium Deposits; Silty gravel with sand (GM); light brown (7.5YR 6/3); granules to small cobbles, angular to subangular; little very fine to very coarse grained sand, angular to subangular; little silt; little clay; dry; iron oxide staining; gravel composed of mixed lithology, red staining on metadiorite clasts	(56.0 - 87.0') Rough drilling	
57									
58									
59									
60									






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Date Started:	04/10/2019	Surface Elevation:	587.7 ft amsl	Boring No.: MW-U	
Date Completed:	05/10/2019	Northing (NAD83):	2101958.7		
Drilling Co.:	Cascade	Easting (NAD83):	7613300.8	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	327 ft bgs	Project:	Final GW Remedy Phase I
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Eddie Ramos	Depth to First Water:	131.45 ft bgs		
Drilling Asst:	L. Amaya/ O. Flores	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	Grant Willford	Sampling Interval:	Continuous		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
61	96			Topock - Alluvium Deposits	GM			(56.0 - 87.0') Rough drilling	
62									
63									
64	36			Topock - Alluvium Deposits	GP		(63.5 - 63.8') Topock - Alluvium Deposits; Poorly graded gravel (GP); pale brown (10YR 6/3) and (10YR 2.5/1); large pebbles to small cobbles, angular to subround; little medium to very coarse grained sand, angular to subround; trace silt; dry; iron oxide staining; gravel seam of metadiorite, reddish-yellow staining on gravel		
65									
66									
67				Topock - Alluvium Deposits	GM		(63.8 - 70.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); brown (7.5YR 5/4) some pale brown (10YR 6/3); granules to small cobbles, angular to subround; some very fine to very coarse grained sand, angular to subangular; little silt; little clay; dry; gravel composed of mixed lithology, gravel clasts are weathered to competent		
68									
69									
70		No Sieve Samples Collected							
71									
72									
73	108								
74									
75									
76				Topock - Alluvium Deposits	SM		(70.0 - 82.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); light brown (7.5YR 6/4); very fine grained to very coarse grained, angular to subround; some small to large pebbles, subangular to subround; little silt; little clay; dry; weak cementation		
77									
78									
79	114								
80									





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Date Started: <u>04/10/2019</u>	Surface Elevation: <u>587.7 ft amsl</u>	Boring No.: <u>MW-U</u>
Date Completed: <u>05/10/2019</u>	Northing (NAD83): <u>2101958.7</u>	
Drilling Co.: <u>Cascade</u>	Easting (NAD83): <u>7613300.8</u>	Client: <u>PG&E</u>
Drilling Method: <u>Sonic Drilling</u>	Total Depth: <u>327 ft bgs</u>	Project: <u>Final GW Remedy Phase I</u>
Drill Rig Type: <u>Prosonic Truck Mount</u>	Borehole Diameter: <u>6-12 inches</u>	Location: <u>PG&E Topock, Needles, California</u>
Driller Name: <u>Eddie Ramos</u>	Depth to First Water: <u>131.45 ft bgs</u>	
Drilling Asst: <u>L. Amaya/ O. Flores</u>	Sampling Method: <u>4 inch x 10 ft Core Barrel</u>	Project Number: <u>RC000753.0051</u>
Logger: <u>Grant Willford</u>	Sampling Interval: <u>Continuous</u>	
Editor: <u>Sean McGrane</u>	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
81	114			Topock - Alluvium Deposits	SM			(56.0 - 87.0') Rough drilling	
82				Topock - Alluvium Deposits	SM		(82.0 - 87.0') Topock - Alluvium Deposits; Silty sand (SM); pinkish gray (7.5YR 6/2) little pale brown (10YR 6/3); very fine grained to very coarse grained, angular to subround; little granules to large pebbles, angular to subround; little silt; little clay; dry; iron oxide staining; sand and gravel composed of mixed lithology, trace red staining on gravel clasts		
83									
84									
85									
86	90	No Sieve Samples Collected		Topock - Alluvium Deposits	GM		(87.0 - 93.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); pinkish gray (7.5YR 6/2); granules to small cobbles, angular to subangular; some very fine to very coarse grained sand, angular to subround; some silt; little clay; dry; iron oxide staining; gravel composed of mixed lithology, trace red staining on some of the gravel clasts	(87.0 - 117.0') Rough drilling	
88									
89									
90									
91									
92				Topock - Alluvium Deposits	SM		(93.0 - 98.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); pinkish gray (7.5YR 6/2); very fine grained to very coarse grained, angular to subround; some small to large pebbles, angular to subangular; little silt; little clay; dry; weak cementation; gravel composed of mixed lithology		
93									
94									
95									
96									
97	132			Topock - Alluvium Deposits	GM		(98.0 - 107.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); pinkish gray (7.5YR 6/2) and light brown (7.5YR 6/4); granules to small cobbles, angular to subangular; some very fine to very coarse grained sand, angular to subround; some silt; little clay; dry; moderate cementation; gravel composed of mixed lithology	(97.0 - 267.0') 2000 gal of water used	
98									
99									
100									

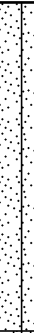


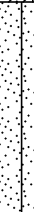
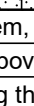
Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started: <u>04/10/2019</u>	Surface Elevation: <u>587.7 ft amsl</u>	Boring No.: <u>MW-U</u>
Date Completed: <u>05/10/2019</u>	Northing (NAD83): <u>2101958.7</u>	
Drilling Co.: <u>Cascade</u>	Easting (NAD83): <u>7613300.8</u>	Client: <u>PG&E</u>
Drilling Method: <u>Sonic Drilling</u>	Total Depth: <u>327 ft bgs</u>	Project: <u>Final GW Remedy Phase I</u>
Drill Rig Type: <u>Prosonic Truck Mount</u>	Borehole Diameter: <u>6-12 inches</u>	Location: <u>PG&E Topock, Needles, California</u>
Driller Name: <u>Eddie Ramos</u>	Depth to First Water: <u>131.45 ft bgs</u>	
Drilling Asst: <u>L. Amaya/ O. Flores</u>	Sampling Method: <u>4 inch x 10 ft Core Barrel</u>	Project Number: <u>RC000753.0051</u>
Logger: <u>Grant Willford</u>	Sampling Interval: <u>Continuous</u>	
Editor: <u>Sean McGrane</u>	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
101	132	No Sieve Samples Collected		Topock - Alluvium Deposits	GM			(87.0 - 117.0') Rough drilling	(97.0 - 267.0') 2000 gal of water used
102									
103									
104									
105									
106									
107									
108				Topock - Alluvium Deposits	SM		(107.0 - 114.2') Topock - Alluvium Deposits; Silty sand with gravel (SM); light brown (7.5YR 6/4) some pinkish gray (7.5YR 6/2); very fine grained to very coarse grained, angular to subround; some granules to very large pebbles, angular to subround; little silt; little clay; trace cobbles, angular to subangular, small cobbles; dry; iron oxide staining; gravel composed of mixed lithology some red staining on gravel clasts		
109									
110									
111									
112									
113				Topock - Alluvium Deposits	ML		(114.2 - 117.0') Topock - Alluvium Deposits; Sandy silt with gravel (ML); dark grayish brown / dark yellowish brown(10YR 4/2); low plasticity, no dilatancy; some very fine to very coarse grained sand, angular to subround; little granules to very large pebbles, angular to subround; little clay; dry; when moist soil has low-very low plasticity, gravel composed of mixed lithology		
114									
115									
116									
117									
118	120		Topock - Alluvium Deposits	SM		(117.0 - 124.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); light brown (7.5YR 6/4) some pinkish gray (7.5YR 6/2); very fine grained to very coarse grained, angular to subround; some granules to very large pebbles, angular to subround; little silt; little clay; trace cobbles, angular to subangular, small cobbles; dry; iron oxide staining; gravel composed of mixed lithology, some red staining on gravel clasts			
119									
120									

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Date Started: <u>04/10/2019</u>	Surface Elevation: <u>587.7 ft amsl</u>	Boring No.: <u>MW-U</u>
Date Completed: <u>05/10/2019</u>	Northing (NAD83): <u>2101958.7</u>	
Drilling Co.: <u>Cascade</u>	Easting (NAD83): <u>7613300.8</u>	Client: <u>PG&E</u>
Drilling Method: <u>Sonic Drilling</u>	Total Depth: <u>327 ft bgs</u>	Project: <u>Final GW Remedy Phase I</u>
Drill Rig Type: <u>Prosonic Truck Mount</u>	Borehole Diameter: <u>6-12 inches</u>	Location: <u>PG&E Topock, Needles, California</u>
Driller Name: <u>Eddie Ramos</u>	Depth to First Water: <u>131.45 ft bgs</u>	
Drilling Asst: <u>L. Amaya/ O. Flores</u>	Sampling Method: <u>4 inch x 10 ft Core Barrel</u>	Project Number: <u>RC000753.0051</u>
Logger: <u>Grant Willford</u>	Sampling Interval: <u>Continuous</u>	
Editor: <u>Sean McGrane</u>	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
121	120			Topock - Alluvium Deposits	SM			(116.0 - 132.0') Driller noted material is getting compressed in core barrel (117.0 - 127.0') Soft drilling (117.0 - 127.0') Soft drilling	(97.0 - 267.0') 2000 gal of water used
122									
123									
124									
125	36	No Sieve Samples Collected		Topock - Alluvium Deposits	GM		(124.5 - 132.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); pinkish gray (7.5YR 6/2) and light brown (7.5YR 6/4); granules to small cobbles, angular to subround; some very fine to very coarse grained sand, angular to subround; some silt; little clay; dry; moderate cementation; iron oxide staining; gravel composed of mixed lithology, some red staining on gravel clasts	(127.0 - 132.0') Rough drilling	
126									
127									
128									
129	60			Topock - Alluvium Deposits	SM		(132.0 - 137.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 4/2) some light gray (7.5YR 7/1); very fine grained to very coarse grained, angular to subround; some granules to very large pebbles, angular to subangular; little silt; little clay; trace cobbles, angular, small cobbles; dry to moist	(132.0 - 137.0') Rough drilling	
130									
131									
132									
133				Topock - Alluvium Deposits	SM		(136.5') wet	(136.5') Approximate depth to water table	
134									
135									
136									
137			MW-U-VAS-137-142 (1.4 ppb) 4/12/2019 11:30	Topock - Alluvium Deposits	SM		(137.0 - 141.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 5/2) some light gray (7.5YR 7/1); very fine grained to very coarse grained, angular to subangular; little granules to large pebbles, angular to subround; little silt; little clay; wet; gravel composed of mixed lithology		
138									
139									
140									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	04/10/2019	Surface Elevation:	587.7 ft amsl	Boring No.: <u>MW-U</u>	
Date Completed:	05/10/2019	Northing (NAD83):	2101958.7		
Drilling Co.:	Cascade	Easting (NAD83):	7613300.8	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	327 ft bgs	Project:	Final GW Remedy Phase I
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Eddie Ramos	Depth to First Water:	131.45 ft bgs		
Drilling Asst:	L. Amaya/ O. Flores	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	Grant Willford	Sampling Interval:	Continuous		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
141			MW-U-VAS-137-142 (1.4 ppb) 4/12/2019 11:30	Topock - Alluvium Deposits	SM				(97.0 - 267.0') 2000 gal of water used
142				Topock - Alluvium Deposits	GM		(141.5 - 142.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); greenish gray (5GY 6/1) some brown (7.5YR 5/2); large pebbles to small cobbles, angular to subangular; little medium to very coarse grained sand, angular to subangular; little silt; trace clay; wet; iron oxide staining; gravel composed of metadiorite, some red staining on gravel clasts		
143				Topock - Alluvium Deposits	SM		(142.0 - 146.0') Topock - Alluvium Deposits; Silty sand (SM); brown (7.5YR 5/2) some pinkish gray (7.5YR 6/2); very fine grained to very coarse grained, angular to subround; little granules to large pebbles, subangular to subround; little silt; trace cobbles, subangular, small cobbles; trace clay; wet; homogeneous		
144									
145									
146									
147				Topock - Alluvium Deposits	SM		(146.0 - 149.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 5/2); very fine grained to very coarse grained, angular to subround; some granules to very large pebbles, angular to subround; some silt; little clay; trace cobbles, angular, small cobbles; moist; weak cementation; iron oxide staining; gravel composed of mixed lithology, some red staining on metadiorite gravel clasts		
148									
149				Topock - Alluvium Deposits	ML		(149.0 - 153.5') Topock - Alluvium Deposits; Gravelly silt with sand (ML); brown (7.5YR 5/2); medium plasticity, no dilatancy; little granules to very large pebbles, angular to subround; little very fine to very coarse grained sand, angular to subround; trace cobbles, angular, small cobbles; moist; weak cementation; iron oxide staining; core was slightly moist; not dry but had low moisture content, low to medium plasticity, gravel composed of mixed lithology, mostly metadiorite, some red staining on gravel clasts	(150.0 - 157.0') Rough drilling	
150	180	No Sieve Samples Collected							
151									
152									
153									
154				Topock - Alluvium Deposits	SM		(153.5 - 157.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 5/2) some pinkish gray (7.5YR 6/2); very fine grained to very coarse grained, angular to subround; little granules to very large pebbles, subangular to subround; little silt; trace cobbles, subangular, small cobbles; trace clay; wet; homogeneous; iron oxide staining; gravel composed of mixed lithology, mostly metadiorite		
155									
156									
157									
158	120			Topock - Alluvium Deposits	SM		(157.0 - 166.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 5/2) some light reddish brown / light brown (5YR 6/4); very fine grained to very coarse grained, angular to subround; some granules to very large pebbles, angular to subround; little silt; trace clay; wet; iron oxide staining; sand and gravel composed of mixed lithology, mainly metadiorite, some red staining on gravel clasts	(157.0 - 177.0') Soft drilling	
159									
160									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started: 04/10/2019	Surface Elevation: 587.7 ft amsl	Boring No.: MW-U
Date Completed: 05/10/2019	Northing (NAD83): 2101958.7	
Drilling Co.: Cascade	Easting (NAD83): 7613300.8	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 327 ft bgs	Project: Final GW Remedy Phase I
Drill Rig Type: Prosonic Truck Mount	Borehole Diameter: 6-12 inches	Location: PG&E Topock, Needles, California
Driller Name: Eddie Ramos	Depth to First Water: 131.45 ft bgs	Project Number: RC000753.0051
Drilling Asst: L. Amaya/ O. Flores	Sampling Method: 4 inch x 10 ft Core Barrel	
Logger: Grant Willford	Sampling Interval: Continuous	
Editor: Sean McGrane	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
161	120			Topock - Alluvium Deposits	SM			(157.0 - 177.0') Soft drilling	(97.0 - 267.0') 2000 gal of water used
162									
163									
164									
165									
166	120	No Sieve Samples Collected		Topock - Alluvium Deposits	GM		(166.0 - 167.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); greenish gray (5GY 6/1) some red (2.5YR 4/8); large pebbles to large cobbles, angular to subangular; little medium to very coarse grained sand, angular to subangular; little silt; trace clay; dry to moist; iron oxide staining; gravel composed of meta-diorite, some red staining on gravel clasts, possible metadiorite boulder		
167				Topock - Alluvium Deposits	SM		(167.0 - 181.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); light reddish brown / light brown(5YR 6/4) some pinkish gray (7.5YR 6/2); very fine grained to very coarse grained, angular to subround; little granules to very large pebbles, angular to subround; little silt; wet; iron oxide staining; gravel composed of mixed lithology, mostly metadiorite, some red staining on gravel clasts		
168									
169									
170									
171									
172									
173									
174									
175									
176									
177									
178									
179									
180									





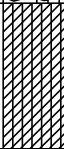


Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started: 04/10/2019	Surface Elevation: 587.7 ft amsl	Boring No.: MW-U
Date Completed: 05/10/2019	Northing (NAD83): 2101958.7	
Drilling Co.: Cascade	Easting (NAD83): 7613300.8	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 327 ft bgs	Project: Final GW Remedy Phase I
Drill Rig Type: Prosonic Truck Mount	Borehole Diameter: 6-12 inches	Location: PG&E Topock, Needles, California
Driller Name: Eddie Ramos	Depth to First Water: 131.45 ft bgs	
Drilling Asst: L. Amaya/ O. Flores	Sampling Method: 4 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger: Grant Willford	Sampling Interval: Continuous	
Editor: Sean McGrane	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
181				Topock - Alluvium Deposits	SM				(97.0 - 267.0') 2000 gal of water used
182							(181.5 - 187.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); light reddish brown (5YR 6/3); very fine grained to very coarse grained, angular to subround; some granules to very large pebbles, angular to subround; little cobbles, angular to subangular, small cobbles; little silt; wet		
183			MW-U-VAS-181-186 (0.112 J ppb) 4/13/2019 12:00	Topock - Alluvium Deposits	SM				
184									
185									
186									
187									
188							(187.0 - 201.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish yellow (5YR 6/6) with light brown (7.5YR 6/4); very fine grained to very coarse grained, angular to subround; little small to large pebbles, subangular to subround; little silt; trace cobbles, subangular, small cobbles; wet; iron oxide staining; gravel clasts predominantly metadiorite with some red staining	(187.0 - 227.0') Soft drilling	
189									
190		No Sieve Samples Collected							
191									
192									
193									
194	240			Topock - Alluvium Deposits	SM				
195									
196									
197									
198									
199									
200									




Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	04/10/2019	Surface Elevation:	587.7 ft amsl	Boring No.: <u>MW-U</u>	
Date Completed:	05/10/2019	Northing (NAD83):	2101958.7		
Drilling Co.:	Cascade	Easting (NAD83):	7613300.8	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	327 ft bgs	Project:	Final GW Remedy Phase I
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Eddie Ramos	Depth to First Water:	131.45 ft bgs		
Drilling Asst:	L. Amaya/ O. Flores	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	Grant Willford	Sampling Interval:	Continuous		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
201	240	No Sieve Samples Collected		Topock - Alluvium Deposits	SM			(187.0 - 227.0') Soft drilling	(97.0 - 267.0') 2000 gal of water used
202				Topock - Alluvium Deposits	CL-ML		(201.0 - 206.0') Topock - Alluvium Deposits; Silty gravel with sand (CL-ML); light reddish brown / light brown(5YR 6/4) with pinkish gray / grayish orange pink(5YR 7/2); low plasticity, no dilatency; some granules to very large pebbles, angular to subangular; some clay; little very fine to coarse grained sand, angular to subround; moist; soft to medium stiff; moderate cementation; gravel composed of mostly metadiorite, low-medium plasticity		
203									
204									
205									
206	120			Topock - Alluvium Deposits	SM		(206.0 - 210.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); light reddish brown (5YR 6/3) and brown (7.5YR 5/4); very fine grained to very coarse grained, angular to subround; some granules to very large pebbles, angular to subround; little cobbles, angular to subangular, small cobbles; little silt; wet		
207									
208									
209									
210	120			Topock - Alluvium Deposits	GP-GM		(210.0 - 212.0') Topock - Alluvium Deposits; Poorly graded gravel with silt and sand (GP-GM); reddish brown (5YR 5/4); medium pebbles to small cobbles, angular to subangular; little very fine to very coarse grained sand, angular to subangular; little silt; moist; iron oxide staining		
211									
212									
213									
214	120	Topock - Alluvium Deposits	CL-ML		(212.0 - 214.0') Topock - Alluvium Deposits; Sandy lean clay with gravel (CL-ML); pinkish gray (7.5YR 6/2) some reddish brown (5YR 5/4); medium plasticity, no dilatency; some very fine to very coarse grained sand, angular to subround; some silt; little granules to large pebbles, subangular to subround; moist; medium stiff; weak cementation				
215									
216									
217									
218	120	Topock - Alluvium Deposits	GM		(214.0 - 217.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); light reddish brown / light brown(5YR 6/4); granules to small cobbles, angular to subround; some very fine to very coarse grained sand, angular to subround; some silt; little clay; moist to dry; moderate cementation; iron oxide staining				
219									
220									
221									
222	120	Topock - Alluvium Deposits	SC		(217.0 - 227.0') Topock - Alluvium Deposits; Clayey sand with gravel (SC); reddish brown (5YR 5/4) little reddish brown(2.5YR 4/3); very fine grained to very coarse grained, angular to subround; little granules to very large pebbles, angular to subround; little silt; little clay; trace cobbles, angular to subangular, small cobbles; wet; moderate cementation; iron oxide staining; gravel composed mostly of metadiorite, some red staining on gravel clasts				
223									
224									
225									





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Date Started: 04/10/2019	Surface Elevation: 587.7 ft amsl	Boring No.: MW-U
Date Completed: 05/10/2019	Northing (NAD83): 2101958.7	
Drilling Co.: Cascade	Easting (NAD83): 7613300.8	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 327 ft bgs	Project: Final GW Remedy Phase I
Drill Rig Type: Prosonic Truck Mount	Borehole Diameter: 6-12 inches	Location: PG&E Topock, Needles, California
Driller Name: Eddie Ramos	Depth to First Water: 131.45 ft bgs	
Drilling Asst: L. Amaya/ O. Flores	Sampling Method: 4 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger: Grant Willford	Sampling Interval: Continuous	
Editor: Sean McGrane	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
221	120		MW-U-VAS-222-227 (<0.033 U ppb) 4/14/2019 14:05	Topock - Alluvium Deposits	SC			(187.0 - 227.0') Soft drilling	(97.0 - 267.0') 2000 gal of water used
222									
223									
224									
225									
226									
227	120	No Sieve Samples Collected		Topock - Alluvium Deposits	GM		(227.0 - 238.5') Topock - Alluvium Deposits; Silty gravel with sand (GM); reddish brown (5YR 5/4); granules to small cobbles, angular to subround; some very fine to very coarse grained sand, subangular to subround; little silt; trace cobbles, angular to subangular, small cobbles; trace clay; wet; iron oxide staining; gravel composed mostly of metadiorite, some red staining on gravel clasts		
228									
229									
230									
231									
232									
233									
234									
235									
236									
237	240			Topock - Alluvium Deposits	SM		(238.5 - 250.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (5YR 5/4); very fine grained to very coarse grained, angular to subround; little granules to very large pebbles, angular to subround; little silt; little clay; trace cobbles, subangular, small cobbles; wet; iron oxide staining; gravel composed of mostly		
238									
239									
240									


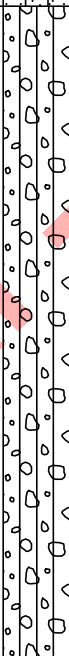

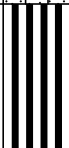
Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	04/10/2019	Surface Elevation:	587.7 ft amsl	Boring No.: MW-U	
Date Completed:	05/10/2019	Northing (NAD83):	2101958.7		
Drilling Co.:	Cascade	Easting (NAD83):	7613300.8	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	327 ft bgs	Project:	Final GW Remedy Phase I
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Eddie Ramos	Depth to First Water:	131.45 ft bgs		
Drilling Asst:	L. Amaya/ O. Flores	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	Grant Willford	Sampling Interval:	Continuous		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
241	240	No Sieve Samples Collected		Topock - Alluvium Deposits	SM		metadiorite, some red staining on gravel clasts	(237.0 - 257.0') Core barrel became locked up after drilling 237 ftbgs to 257 ft bgs. To free up the core barrel Cascade had to flush water in while advancing the 6" outer casing to free up the core barrel. While flushing in the 6" casing the casing became sandlocked. Drillers had to retreat casing to 97' bgs and re-advance casing to 257 ' bgs to free up the core barrel.	(97.0 - 267.0') 2000 gal of water used
242									
243									
244									
245									
246									
247									
248									
249									
250									
251			Topock - Alluvium Deposits	CL-ML		(250.0 - 253.5') Topock - Alluvium Deposits; Sandy silt with gravel (CL-ML); light brown (7.5YR 6/3); low plasticity, no dilatency; some very fine to coarse grained sand, angular to subround; some clay; little granules to medium pebbles, subangular to subround; wet to moist; very soft to soft; weak cementation; gravel composed of mixed lithology, mostly metadiorite			
252									
253									
254			Topock - Alluvium Deposits	SM		(253.5 - 257.0') Topock - Alluvium Deposits; Silty sand (SM); light brownish gray / pale yellowish brown(10YR 6/2); very fine grained to very coarse grained, angular to subround; little granules to large pebbles, subangular to subround; little silt; little clay; wet to moist; weak cementation; gravel composed of mixed lithology			
255									
256									
257									
258	120		MW-U-VAS-257-262 (0.0896 J ppb) 4/16/2019 14:05	Topock - Alluvium Deposits	SM		(257.0 - 264.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (5YR 5/4) some reddish yellow (5YR 6/8); very fine grained to very coarse grained, angular to subround; little granules to very large pebbles, angular to subround; little silt; little clay; trace cobbles, subangular, small cobbles; wet; iron oxide staining; gravel composed of mostly metadiorite, some red staining on gravel clasts	(257.0 - 267.0') Soft drilling	
259									
260									

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Date Started: <u>04/10/2019</u>	Surface Elevation: <u>587.7 ft amsl</u>	Boring No.: <u>MW-U</u>
Date Completed: <u>05/10/2019</u>	Northing (NAD83): <u>2101958.7</u>	
Drilling Co.: <u>Cascade</u>	Easting (NAD83): <u>7613300.8</u>	Client: <u>PG&E</u>
Drilling Method: <u>Sonic Drilling</u>	Total Depth: <u>327 ft bgs</u>	Project: <u>Final GW Remedy Phase I</u>
Drill Rig Type: <u>Prosonic Truck Mount</u>	Borehole Diameter: <u>6-12 inches</u>	Location: <u>PG&E Topock, Needles, California</u>
Driller Name: <u>Eddie Ramos</u>	Depth to First Water: <u>131.45 ft bgs</u>	
Drilling Asst: <u>L. Amaya/ O. Flores</u>	Sampling Method: <u>4 inch x 10 ft Core Barrel</u>	Project Number: <u>RC000753.0051</u>
Logger: <u>Grant Willford</u>	Sampling Interval: <u>Continuous</u>	
Editor: <u>Sean McGrane</u>	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid	
261	120	No Sieve Samples Collected	MW-U-VAS-257-262 (0.0896 J ppb) 4/16/2019 14:05	Topock - Alluvium Deposits	SM			(257.0 - 267.0') Soft drilling	(97.0 - 267.0') 2000 gal of water used	
262										
263										
264										
265	120				Topock - Alluvium Deposits	ML		(264.0 - 273.0') Topock - Alluvium Deposits; Gravelly silt with sand (ML); reddish brown (5YR 5/4); low plasticity, no dilatancy; some granules to very large pebbles, angular to subangular; little very fine to very coarse grained sand, angular to subround; little clay; trace cobbles, angular, small cobbles; moist; stiff; moderate cementation; iron oxide staining; gravel composed of mixed lithology, mostly metadiorite, some red staining on gravel clasts	(267.0 - 295.0') Soft drilling	
266										
267										
268										
269										
270										
271										
272										
273				Topock - Alluvium Deposits	SM		(273.0 - 277.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); dark reddish brown / moderate brown(5YR 3/4) some red (2.5YR 5/6); very fine grained to very coarse grained, angular to subround; some granules to very large pebbles, angular to subround; little silt; wet; weak cementation; iron oxide staining; gravel composed of mixed lithology, mostly metadiorite, some red staining on gravel clasts, very saturated 273-275 ft bgs			
274										
275										
276										
277										
278										
279				Topock - Alluvium Deposits	MH		(277.0 - 279.0') Topock - Alluvium Deposits; Sandy elastic silt with gravel (MH); red (2.5YR 5/6); medium plasticity, no dilatancy; little granules to medium pebbles, angular to subangular; little very fine to coarse grained sand, angular to subround; little clay; moist; stiff; strong cementation; iron oxide staining; medium to high plasticity			
280										

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started: 04/10/2019	Surface Elevation: 587.7 ft amsl	Boring No.: MW-U
Date Completed: 05/10/2019	Northing (NAD83): 2101958.7	
Drilling Co.: Cascade	Easting (NAD83): 7613300.8	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 327 ft bgs	Project: Final GW Remedy Phase I
Drill Rig Type: Prosonic Truck Mount	Borehole Diameter: 6-12 inches	Location: PG&E Topock, Needles, California
Driller Name: Eddie Ramos	Depth to First Water: 131.45 ft bgs	
Drilling Asst: L. Amaya/ O. Flores	Sampling Method: 4 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger: Grant Willford	Sampling Interval: Continuous	
Editor: Sean McGrane	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
281				Topock - Alluvium Deposits	ML		very coarse grained sand, angular to subround; little clay; trace cobbles, angular, small cobbles; moist; stiff; moderate cementation; iron oxide staining; gravel composed of mixed lithology, mostly metadiorite, some red staining on gravel clasts	(267.0 - 295.0') Soft drilling	
282									
283									
284									
285				Topock - Alluvium Deposits	SM		(285.0 - 287.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (5YR 5/4) with light brown (7.5YR 6/3); very fine grained to very coarse grained, angular to subround; some granules to very large pebbles, angular to subround; little silt; wet to moist; moderate cementation; iron oxide staining; gravel composed of mixed lithology, mostly metadiorite, some red staining on gravel clasts		
286									
287									
288				Topock - Alluvium Deposits	SM		(287.0 - 291.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); red (2.5YR 5/6) with reddish brown (5YR 5/3); very fine grained to very coarse grained, angular to subround; some granules to very large pebbles, angular to subround; little silt; wet; weak cementation; iron oxide staining; gravel composed of mixed lithology, mostly metadiorite, some red staining on gravel clasts		
289									
290									
291									
292	120			Topock - Alluvium Deposits	ML		(291.0 - 295.0') Topock - Alluvium Deposits; Gravelly silt with sand (ML); reddish brown (5YR 5/4) with red (2.5YR 5/6); low plasticity, no dilatancy; some granules to very large pebbles, angular to subangular; little very fine to very coarse grained sand, angular to subround; little clay; trace cobbles, angular, small cobbles; moist to dry; medium stiff to very stiff; strong cementation; iron oxide staining; gravel composed of mixed lithology, mostly metadiorite, some red staining on gravel clasts		
293									
294									
295									
296				Topock - Alluvium Deposits	GM		(295.0 - 297.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); red (2.5YR 5/6) some pinkish gray / grayish orange pink (5YR 7/2); granules to very large pebbles, angular to subangular; low plasticity; some very fine to very coarse grained sand, angular to subround; little silt; little clay; dry; strong cementation; iron oxide staining	(295.0 - 297.0') Rough drilling	
297									
298	120			Topock - Alluvium Deposits	MH		(297.0 - 303.0') Topock - Alluvium Deposits; Sandy elastic silt with gravel (MH); red (2.5YR 5/6) some reddish brown (5YR 5/4); medium plasticity, no dilatancy; little granules to medium pebbles, angular to subangular; little very fine to coarse grained sand, angular to subround; little clay; trace cobbles, angular, small to large cobbles; moist; soft to medium stiff; strong cementation; iron oxide staining; medium to high plasticity, trace angular cobbles of weathered metadiorite or possibly basalt (aphanitic)	(297.0 - 307.0') Soft drilling	
299									
300									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	04/10/2019	Surface Elevation:	587.7 ft amsl	Boring No.: MW-U	
Date Completed:	05/10/2019	Northing (NAD83):	2101958.7		
Drilling Co.:	Cascade	Easting (NAD83):	7613300.8	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	327 ft bgs	Project:	Final GW Remedy Phase I
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Eddie Ramos	Depth to First Water:	131.45 ft bgs		
Drilling Asst:	L. Amaya/ O. Flores	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	Grant Willford	Sampling Interval:	Continuous		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
301	120			Topock - Alluvium Deposits	MH			(297.0 - 307.0') Soft drilling	
302									
303									
304				Topock - Alluvium Deposits	SM		(303.0 - 307.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); dark reddish brown / moderate brown(5YR 3/4) some red (2.5YR 5/6); very fine grained to very coarse grained, angular to subround; some granules to very large pebbles, angular to subround; little silt; wet to moist; weak cementation; iron oxide staining; gravel composed of mixed lithology, mostly metadiorite, some red staining on gravel clasts		
305									
306	120	No Sieve Samples Collected							
307									
308									
309									
310				Topock - Alluvium Deposits	SC		(307.0 - 315.0') Topock - Alluvium Deposits; Clayey sand with gravel (SC); reddish yellow (5YR 6/8) some pinkish gray / grayish orange pink(5YR 7/2); very fine grained to very coarse grained, angular to subangular; some granules to large pebbles, angular to subangular; little silt; little clay; trace cobbles, angular, small cobbles; wet to moist; weak cementation; iron oxide staining; gravel composed of mixed lithology mostly metadiorite, some red staining on gravel clasts	(307.0 - 315.5') Soft drilling	
311									
312									
313									
314									
315									
316				Topock - Alluvium Deposits	CL-ML		(315.0 - 317.0') Topock - Alluvium Deposits; Sandy elastic silt with gravel (CL-ML); red (2.5YR 5/6) some reddish brown (5YR 5/3); high plasticity, no dilatancy; some granules to large pebbles, angular to subangular; some clay; little very fine to very coarse grained sand, angular to subround; moist; medium stiff to very stiff; strong cementation	(315.5 - 317.0') Rough drilling	
317	60		MW-U-VAS-317-322 (<0.17 U) 4/24/2019 11:05						
318				Topock - Alluvium Deposits	ML		(317.0 - 323.0') Topock - Alluvium Deposits; Gravelly silt with sand (ML); red (2.5YR 4/8) some pinkish gray(5YR 6/2); low plasticity, no dilatancy; little granules to very large pebbles, angular to round; little very fine to very coarse grained sand, angular to subround; little clay; trace cobbles, angular to subround, small cobbles; moist; stiff to hard; iron oxide staining; gravel composed of mixed lithology mostly metadiorite, some red staining on gravel clasts, some greenish gray in core (GLEY 1 6/2)	(317.0 - 322.0') Soft drilling	
319									
320									

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Date Started: <u>04/10/2019</u>	Surface Elevation: <u>587.7 ft amsl</u>	Boring No.: <u>MW-U</u>
Date Completed: <u>05/10/2019</u>	Northing (NAD83): <u>2101958.7</u>	
Drilling Co.: <u>Cascade</u>	Easting (NAD83): <u>7613300.8</u>	Client: <u>PG&E</u>
Drilling Method: <u>Sonic Drilling</u>	Total Depth: <u>327 ft bgs</u>	Project: <u>Final GW Remedy Phase I</u>
Drill Rig Type: <u>Prosonic Truck Mount</u>	Borehole Diameter: <u>6-12 inches</u>	Location: <u>PG&E Topock, Needles, California</u>
Driller Name: <u>Eddie Ramos</u>	Depth to First Water: <u>131.45 ft bgs</u>	
Drilling Asst: <u>L. Amaya/ O. Flores</u>	Sampling Method: <u>4 inch x 10 ft Core Barrel</u>	Project Number: <u>RC000753.0051</u>
Logger: <u>Grant Willford</u>	Sampling Interval: <u>Continuous</u>	
Editor: <u>Sean McGrane</u>	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
321	60		MW-U-VAS-317-322 (<0.17 U) 4/24/2019 11:05	Topock - Alluvium Deposits	ML			(317.0 - 322.0') Soft drilling	
322								(322.0 - 327.0') Rough drilling	
323		No Sieve Samples Collected							
324	60			Topock - Competent Bedrock - conglomerate			(323.0 - 326.7') Topock - Competent Bedrock - conglomerate; light red (2.5YR 6/8) some red (10R 4/8); moist to dry; moderate cementation; Friable, highly fractured		
325									
326									
327				Topock - Bedrock - metadiorite			(326.7 - 327.0') Topock - Bedrock - metadiorite; Hard, Highly fractured and pulverized rock		
328							End of Boring at 327.0' bgs.		
329									
330									
331									
332									
333									
334									
335									
336									
337									
338									
339									
340									

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Date Started: 04/10/2019	Surface Elevation: 587.7 ft amsl	Well ID: MW-U-183, MW-U-273
Date Completed: 05/10/2019	Shallow Well Elevation: 587.5 ft amsl	
Drilling Co.: Cascade	Deep Well Elevation: 587.7 ft amsl	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): 2101958.7	Project: Final GW Remedy Phase I
Driller Name: Eddie Ramos	Easting (NAD83): 7613300.8	Location: PG&E Topock, Needles, California
Drilling Asst: L. Amaya/ O. Flores	Borehole Diameter: 6-12 inches	
Logger: Grant Willford	Water Level Start: 131.45 ft bgs	Project Number: RC000753.0051
Editor: Sean McGrane	Development End Date: 5/10/2019	
Total Depth: 327 ft bgs	Well Completion: <input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
1		Topock - Fill	SM		(0.0 - 1.0') Concrete Pad		(0.0 - 1.0') 7 bags Note: 2.5 x 2.5 ft concrete pad with 18 dia lockable vault, King Kon-Crete 4000 PSI
2					(0.6 - 163.2') 2" PVC Sch 80 Casing		
3					(0.0 - 4.0') 12" Borehole		
4							
5			NR				
6							
7							
8							
9							
10							
11		Topock - Fill	SM		(1.0 - 135.0') Portland Cement 6% Bentonite	(1.0 - 135.0') 512.6 gallons	(1.0 - 135.0') 1250 gallons (144%) Note: Type I, II and V and Benseal
12					(4.0 - 276.0') 10" Borehole		
13							
14							
15							
16							
17		Topock - Alluvium Deposits	SM				
18							
19							
20							









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Date Started: 04/10/2019	Surface Elevation: 587.7 ft amsl	Well ID: MW-U-183, MW-U-273
Date Completed: 05/10/2019	Shallow Well Elevation: 587.5 ft amsl	
Drilling Co.: Cascade	Deep Well Elevation: 587.7 ft amsl	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): 2101958.7	Project: Final GW Remedy Phase I
Driller Name: Eddie Ramos	Easting (NAD83): 7613300.8	Location: PG&E Topock, Needles, California
Drilling Asst: L. Amaya/ O. Flores	Borehole Diameter: 6-12 inches	
Logger: Grant Willford	Water Level Start: 131.45 ft bgs	Project Number: RC000753.0051
Editor: Sean McGrane	Development End Date: 5/10/2019	
Total Depth: 327 ft bgs	Well Completion: <input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
21		Topock - Alluvium Deposits	SM		(0.6 - 163.2') 2" PVC Sch 80 Casing		
22		Topock - Alluvium Deposits	GP				
23							
24		Topock - Alluvium Deposits	SM				
25							
26		Topock - Alluvium Deposits	GM				
27							
28							
29							
30					(1.0 - 135.0') Portland Cement 6% Bentonite	(4.0 - 276.0') 10" Borehole	(1.0 - 135.0') 512.6 gallons
31							
32			NR				
33					(32.5 - 33.5') Centralizer		
34							
35							
36							
37		Topock - Alluvium Deposits	SM				
38							
39		Topock - Alluvium Deposits	GM				
40							

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Date Started: 04/10/2019	Surface Elevation: 587.7 ft amsl	Well ID: MW-U-183, MW-U-273
Date Completed: 05/10/2019	Shallow Well Elevation: 587.5 ft amsl	
Drilling Co.: Cascade	Deep Well Elevation: 587.7 ft amsl	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): 2101958.7	Project: Final GW Remedy Phase I
Driller Name: Eddie Ramos	Easting (NAD83): 7613300.8	Location: PG&E Topock, Needles, California
Drilling Asst: L. Amaya/ O. Flores	Borehole Diameter: 6-12 inches	
Logger: Grant Willford	Water Level Start: 131.45 ft bgs	Project Number: RC000753.0051
Editor: Sean McGrane	Development End Date: 5/10/2019	
Total Depth: 327 ft bgs	Well Completion: <input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction		Calculated Material Volumes	Material Volumes Installed
41		Topock - Alluvium Deposits	GM		(0.6 - 163.2') 2" PVC Sch 80 Casing		(0.5 - 253.2') 2" PVC Sch 80 Casing	
42								
43								
44								
45								
46		Topock - Alluvium Deposits	SM		(1.0 - 135.0') Portland Cement 6% Bentonite		(4.0 - 276.0') 10" Borehole	(1.0 - 135.0') 512.6 gallons
47								
48								
49								
50								
51		Topock - Alluvium Deposits	GM					(1.0 - 135.0') 1250 gallons (144%) Note: Type I, II and V and Benseal
52								
53								
54								
55								
56		Topock - Alluvium Deposits	GM					
57								
58								
59								
60								

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started: 04/10/2019	Surface Elevation: 587.7 ft amsl	Well ID: MW-U-183, MW-U-273
Date Completed: 05/10/2019	Shallow Well Elevation: 587.5 ft amsl	
Drilling Co.: Cascade	Deep Well Elevation: 587.7 ft amsl	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): 2101958.7	Project: Final GW Remedy Phase I
Driller Name: Eddie Ramos	Easting (NAD83): 7613300.8	Location: PG&E Topock, Needles, California
Drilling Asst: L. Amaya/ O. Flores	Borehole Diameter: 6-12 inches	
Logger: Grant Willford	Water Level Start: 131.45 ft bgs	Project Number: RC000753.0051
Editor: Sean McGrane	Development End Date: 5/10/2019	
Total Depth: 327 ft bgs	Well Completion: <input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
61		Topock - Alluvium Deposits	GM		(0.6 - 163.2') 2" PVC Sch 80 Casing		
62							
63							
64		Topock - Alluvium Deposits	GP				
65							
66							
67		Topock - Alluvium Deposits	GM				
68							
69							
70					(1.0 - 135.0') Portland Cement 6% Bentonite	(4.0 - 276.0') 10" Borehole	(1.0 - 135.0') 512.6 gallons
71							(1.0 - 135.0') 1250 gallons (144%) Note: Type I, II and V and Benseal
72							
73							
74							
75		Topock - Alluvium Deposits	SM				
76							
77							
78							
79							
80							







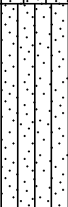


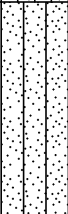


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Date Started: 04/10/2019	Surface Elevation: 587.7 ft amsl	Well ID: MW-U-183, MW-U-273
Date Completed: 05/10/2019	Shallow Well Elevation: 587.5 ft amsl	
Drilling Co.: Cascade	Deep Well Elevation: 587.7 ft amsl	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): 2101958.7	Project: Final GW Remedy Phase I
Driller Name: Eddie Ramos	Easting (NAD83): 7613300.8	Location: PG&E Topock, Needles, California
Drilling Asst: L. Amaya/ O. Flores	Borehole Diameter: 6-12 inches	
Logger: Grant Willford	Water Level Start: 131.45 ft bgs	Project Number: RC000753.0051
Editor: Sean McGrane	Development End Date: 5/10/2019	
Total Depth: 327 ft bgs	Well Completion: <input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction		Calculated Material Volumes	Material Volumes Installed
81		Topock - Alluvium Deposits	SM		(0.6 - 163.2') 2" PVC Sch 80 Casing	(0.5 - 253.2') 2" PVC Sch 80 Casing		
82								
83		Topock - Alluvium Deposits	SM		(82.5 - 83.5') Centralizer			
84								
85								
86								
87								
88		Topock - Alluvium Deposits	GM		(1.0 - 135.0') Portland Cement 6% Bentonite	(4.0 - 276.0') 10" Borehole	(1.0 - 135.0') 512.6 gallons	(1.0 - 135.0') 1250 gallons (144%) Note: Type I, II and V and Benseal
89								
90								
91								
92		Topock - Alluvium Deposits	SM					
93								
94								
95								
96								
97								
98								
99		Topock - Alluvium Deposits	GM					
100								

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Date Started:	<u>04/10/2019</u>	Surface Elevation:	<u>587.7 ft amsl</u>	Well ID: MW-U-183, MW-U-273	
Date Completed:	<u>05/10/2019</u>	Shallow Well Elevation:	<u>587.5 ft amsl</u>		
Drilling Co.:	<u>Cascade</u>	Deep Well Elevation:	<u>587.7 ft amsl</u>	Client:	<u>PG&E</u>
Drilling Method:	<u>Sonic Drilling</u>	Northing (NAD83):	<u>2101958.7</u>	Project:	<u>Final GW Remedy Phase I</u>
Driller Name:	<u>Eddie Ramos</u>	Easting (NAD83):	<u>7613300.8</u>	Location:	<u>PG&E Topock, Needles, California</u>
Drilling Asst:	<u>L. Amaya/ O. Flores</u>	Borehole Diameter:	<u>6-12 inches</u>		
Logger:	<u>Grant Willford</u>	Water Level Start:	<u>131.45 ft bgs</u>	Project Number:	<u>RC000753.0051</u>
Editor:	<u>Sean McGrane</u>	Development End Date:	<u>5/10/2019</u>		
Total Depth:	<u>327 ft bgs</u>	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up		

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction			Calculated Material Volumes	Material Volumes Installed	
101		Topock - Alluvium Deposits	GM		(0.6 - 163.2') 2" PVC Sch 80 Casing			(0.5 - 253.2') 2" PVC Sch 80 Casing	(1.0 - 135.0') 512.6 gallons	(1.0 - 135.0') 1250 gallons (144%) Note: Type I, II and V and Benseal
102										
103										
104										
105										
106		Topock - Alluvium Deposits	SM		(1.0 - 135.0') Portland Cement 6% Bentonite			(4.0 - 276.0') 10" Borehole		
107										
108										
109										
110										
111										
112										
113	Topock - Alluvium Deposits	ML								
114										
115										
116	Topock - Alluvium Deposits	SM								
117										
118										
119										
120										

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Date Started: 04/10/2019	Surface Elevation: 587.7 ft amsl	Well ID: MW-U-183, MW-U-273
Date Completed: 05/10/2019	Shallow Well Elevation: 587.5 ft amsl	
Drilling Co.: Cascade	Deep Well Elevation: 587.7 ft amsl	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): 2101958.7	Project: Final GW Remedy Phase I
Driller Name: Eddie Ramos	Easting (NAD83): 7613300.8	Location: PG&E Topock, Needles, California
Drilling Asst: L. Amaya/ O. Flores	Borehole Diameter: 6-12 inches	
Logger: Grant Willford	Water Level Start: 131.45 ft bgs	Project Number: RC000753.0051
Editor: Sean McGrane	Development End Date: 5/10/2019	
Total Depth: 327 ft bgs	Well Completion: <input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
121		Topock - Alluvium Deposits	SM		(0.6 - 163.2') 2" PVC Sch 80 Casing		
122							
123							
124							
125		Topock - Alluvium Deposits	GM		(1.0 - 135.0') Portland Cement 6% Bentonite	(1.0 - 135.0') 512.6 gallons	(1.0 - 135.0') 1250 gallons (144%) Note: Type I, II and V and Benseal
126							
127							
128							
129							
130							
131							
132							
133		Topock - Alluvium Deposits	SM		(132.5 - 133.5') Centralizer		
134							
135							
136							
137							
138	MW-U-VAS-137-142 (1.4 ppb) 4/12/2019 11:30	Topock - Alluvium Deposits	SM		(135.0 - 157.0') Bentonite seal chips	(135.0 - 157.0') 13.9 bags	(135.0 - 157.0') 13 bags (-6%) Note: Puregold Medium Chips
139							
140							

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Date Started: <u>04/10/2019</u>	Surface Elevation: <u>587.7 ft amsl</u>	Well ID: MW-U-183, MW-U-273
Date Completed: <u>05/10/2019</u>	Shallow Well Elevation: <u>587.5 ft amsl</u>	
Drilling Co.: <u>Cascade</u>	Deep Well Elevation: <u>587.7 ft amsl</u>	Client: <u>PG&E</u>
Drilling Method: <u>Sonic Drilling</u>	Northing (NAD83): <u>2101958.7</u>	Project: <u>Final GW Remedy Phase I</u>
Driller Name: <u>Eddie Ramos</u>	Easting (NAD83): <u>7613300.8</u>	Location: <u>PG&E Topock, Needles, California</u>
Drilling Asst: <u>L. Amaya/ O. Flores</u>	Borehole Diameter: <u>6-12 inches</u>	
Logger: <u>Grant Willford</u>	Water Level Start: <u>131.45 ft bgs</u>	Project Number: <u>RC000753.0051</u>
Editor: <u>Sean McGrane</u>	Development End Date: <u>5/10/2019</u>	
Total Depth: <u>327 ft bgs</u>	Well Completion: <input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
141	MW-U-VAS-137-142 (1.4 ppb) 4/12/2019 11:30	Topock - Alluvium Deposits	SM		(0.6 - 163.2') 2" PVC Sch 80 Casing		
142		Topock - Alluvium Deposits	GM		(0.5 - 253.2') 2" PVC Sch 80 Casing		
143							
144		Topock - Alluvium Deposits	SM				
145							
146							
147		Topock - Alluvium Deposits	SM				
148							
149					(135.0 - 157.0') Bentonite seal chips	(135.0 - 157.0') 13.9 bags	(135.0 - 157.0') 13 bags (-6%) Note: Puregold Medium Chips
150							
151		Topock - Alluvium Deposits	ML		(4.0 - 276.0') 10" Borehole		
152							
153							
154							
155		Topock - Alluvium Deposits	SM				
156							
157							
158		Topock - Alluvium Deposits	SM		(157.0 - 187.0') Cemex #3 MESH (8x10)	(157.0 - 187.0') 29.2 bags	(157.0 - 187.0') 43 bags (47%) Note: Lapis Lustre Sand
159							
160							

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Date Started: <u>04/10/2019</u>	Surface Elevation: <u>587.7 ft amsl</u>	Well ID: MW-U-183, MW-U-273
Date Completed: <u>05/10/2019</u>	Shallow Well Elevation: <u>587.5 ft amsl</u>	
Drilling Co.: <u>Cascade</u>	Deep Well Elevation: <u>587.7 ft amsl</u>	Client: <u>PG&E</u>
Drilling Method: <u>Sonic Drilling</u>	Northing (NAD83): <u>2101958.7</u>	Project: <u>Final GW Remedy Phase I</u>
Driller Name: <u>Eddie Ramos</u>	Easting (NAD83): <u>7613300.8</u>	Location: <u>PG&E Topock, Needles, California</u>
Drilling Asst: <u>L. Amaya/ O. Flores</u>	Borehole Diameter: <u>6-12 inches</u>	
Logger: <u>Grant Willford</u>	Water Level Start: <u>131.45 ft bgs</u>	Project Number: <u>RC000753.0051</u>
Editor: <u>Sean McGrane</u>	Development End Date: <u>5/10/2019</u>	
Total Depth: <u>327 ft bgs</u>	Well Completion: <input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction			Calculated Material Volumes	Material Volumes Installed
161		Topock - Alluvium Deposits	SM		(0.6 - 163.2') 2" PVC Sch 80 Casing		(0.5 - 253.2') 2" PVC Sch 80 Casing		
162									
163									
164									
165		Topock - Alluvium Deposits	GM		(163.2 - 183.2') 2" Sch 80 PVC (20-slot) Screen		(157.0 - 187.0') 10" Borehole		
166									
167		Topock - Alluvium Deposits	SM		(157.0 - 187.0') Cemex #3 MESH (8x10)		(4.0 - 276.0') 10" Borehole		
168									
169									
170									
171									
172									
173									
174									
175									
176									
177									
178									
179									
180									

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Date Started: <u>04/10/2019</u>	Surface Elevation: <u>587.7 ft amsl</u>	Well ID: MW-U-183, MW-U-273
Date Completed: <u>05/10/2019</u>	Shallow Well Elevation: <u>587.5 ft amsl</u>	
Drilling Co.: <u>Cascade</u>	Deep Well Elevation: <u>587.7 ft amsl</u>	Client: <u>PG&E</u>
Drilling Method: <u>Sonic Drilling</u>	Northing (NAD83): <u>2101958.7</u>	Project: <u>Final GW Remedy Phase I</u>
Driller Name: <u>Eddie Ramos</u>	Easting (NAD83): <u>7613300.8</u>	Location: <u>PG&E Topock, Needles, California</u>
Drilling Asst: <u>L. Amaya/ O. Flores</u>	Borehole Diameter: <u>6-12 inches</u>	
Logger: <u>Grant Willford</u>	Water Level Start: <u>131.45 ft bgs</u>	Project Number: <u>RC000753.0051</u>
Editor: <u>Sean McGrane</u>	Development End Date: <u>5/10/2019</u>	
Total Depth: <u>327 ft bgs</u>	Well Completion: <input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
181	MW-U-VAS-181-186 (0.112 J ppb) 4/13/2019 12:00	Topock - Alluvium Deposits	SM		(163.2 - 183.2') 2" Sch 80 PVC (20-slot) Screen		
182							
183							
184		Topock - Alluvium Deposits	SM		(157.0 - 187.0') Cemex #3 MESH (8x10) (183.7 - 184.7') Centralizer	(157.0 - 187.0') 29.2 bags	(157.0 - 187.0') 43 bags (47%) Note: Lapis Lustre Sand
185					(183.2 - 185.6') Sump and End Cap		
186							
187							
188							
189							
190							
191							
192							
193							
194		Topock - Alluvium Deposits	SM		(187.0 - 247.0') Bentonite seal pellets	(187.0 - 247.0') 50.1 buckets	(187.0 - 247.0') 66.8 buckets (33%) Note: Pel-Plug (TR30) 3/8" x 1/2"
195							
196							
197							
198							
199							
200							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started: 04/10/2019	Surface Elevation: 587.7 ft amsl	Well ID: MW-U-183, MW-U-273
Date Completed: 05/10/2019	Shallow Well Elevation: 587.5 ft amsl	
Drilling Co.: Cascade	Deep Well Elevation: 587.7 ft amsl	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): 2101958.7	Project: Final GW Remedy Phase I
Driller Name: Eddie Ramos	Easting (NAD83): 7613300.8	Location: PG&E Topock, Needles, California
Drilling Asst: L. Amaya/ O. Flores	Borehole Diameter: 6-12 inches	
Logger: Grant Willford	Water Level Start: 131.45 ft bgs	Project Number: RC000753.0051
Editor: Sean McGrane	Development End Date: 5/10/2019	
Total Depth: 327 ft bgs	Well Completion: <input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
201		Topock - Alluvium Deposits	SM		(0.5 - 253.2') 2" PVC Sch 80 Casing		
202							
203		Topock - Alluvium Deposits	CL-ML				
204							
205							
206							
207		Topock - Alluvium Deposits	SM				
208							
209							
210		Topock - Alluvium Deposits	GP-GM		(187.0 - 247.0') Bentonite seal pellets	(4.0 - 276.0') 10" Borehole	(187.0 - 247.0') 50.1 buckets
211							(187.0 - 247.0') 66.8 buckets (33%) Note: Pel-Plug (TR30) 3/8" x 1/2"
212		Topock - Alluvium Deposits	CL-ML				
213							
214		Topock - Alluvium Deposits	GM				
215							
216							
217		Topock - Alluvium Deposits	SC				
218							
219							
220							

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Date Started: 04/10/2019	Surface Elevation: 587.7 ft amsl	Well ID: MW-U-183, MW-U-273
Date Completed: 05/10/2019	Shallow Well Elevation: 587.5 ft amsl	
Drilling Co.: Cascade	Deep Well Elevation: 587.7 ft amsl	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): 2101958.7	Project: Final GW Remedy Phase I
Driller Name: Eddie Ramos	Easting (NAD83): 7613300.8	Location: PG&E Topock, Needles, California
Drilling Asst: L. Amaya/ O. Flores	Borehole Diameter: 6-12 inches	
Logger: Grant Willford	Water Level Start: 131.45 ft bgs	Project Number: RC000753.0051
Editor: Sean McGrane	Development End Date: 5/10/2019	
Total Depth: 327 ft bgs	Well Completion: <input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
221					(0.5 - 253.2') 2" PVC Sch 80 Casing		
222							
223							
224	MW-U-VAS-222-227 (<0.033 U ppb) 4/14/2019 14:05	Topock - Alluvium Deposits	SC				
225							
226							
227							
228					(227.5 - 228.5') Centralizer		
229							
230					(187.0 - 247.0') Bentonite seal pellets	(4.0 - 276.0') 10" Borehole	(187.0 - 247.0') 50.1 buckets
231							(187.0 - 247.0') 66.8 buckets (33%) Note: Pel-Plug (TR30) 3/8" x 1/2"
232							
233		Topock - Alluvium Deposits	GM				
234							
235							
236							
237							
238							
239		Topock - Alluvium Deposits	SM				
240							

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Date Started: 04/10/2019	Surface Elevation: 587.7 ft amsl	Well ID: MW-U-183, MW-U-273
Date Completed: 05/10/2019	Shallow Well Elevation: 587.5 ft amsl	
Drilling Co.: Cascade	Deep Well Elevation: 587.7 ft amsl	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): 2101958.7	Project: Final GW Remedy Phase I
Driller Name: Eddie Ramos	Easting (NAD83): 7613300.8	Location: PG&E Topock, Needles, California
Drilling Asst: L. Amaya/ O. Flores	Borehole Diameter: 6-12 inches	
Logger: Grant Willford	Water Level Start: 131.45 ft bgs	Project Number: RC000753.0051
Editor: Sean McGrane	Development End Date: 5/10/2019	
Total Depth: 327 ft bgs	Well Completion: <input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
241					(0.5 - 253.2') 2" PVC Sch 80 Casing		
242							
243							
244					(187.0 - 247.0') Bentonite seal pellets	(187.0 - 247.0') 50.1 buckets	(187.0 - 247.0') 66.8 buckets (33%) Note: Pel-Plug (TR30) 3/8" x 1/2"
245		Topock - Alluvium Deposits	SM				
246							
247							
248							
249							
250							
251		Topock - Alluvium Deposits	CL-ML		(4.0 - 276.0') 10" Borehole		
252							
253					(247.0 - 276.0') Cemex #3 MESH (8x10)		
254					(253.2 - 273.2') 2" Sch 80 PVC (20-slot) Screen	(247.0 - 276.0') 30.1 bags	(247.0 - 276.0') 37.25 bags (24%) Note: Lapis Lustre Sand
255		Topock - Alluvium Deposits	SM				
256							
257							
258	MW-U-VAS-257-262 (0.0896 J ppb) 4/16/2019 14:05	Topock - Alluvium Deposits	SM				
259							
260							

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Date Started: 04/10/2019	Surface Elevation: 587.7 ft amsl	Well ID: MW-U-183, MW-U-273
Date Completed: 05/10/2019	Shallow Well Elevation: 587.5 ft amsl	
Drilling Co.: Cascade	Deep Well Elevation: 587.7 ft amsl	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): 2101958.7	Project: Final GW Remedy Phase I
Driller Name: Eddie Ramos	Easting (NAD83): 7613300.8	Location: PG&E Topock, Needles, California
Drilling Asst: L. Amaya/ O. Flores	Borehole Diameter: 6-12 inches	
Logger: Grant Willford	Water Level Start: 131.45 ft bgs	Project Number: RC000753.0051
Editor: Sean McGrane	Development End Date: 5/10/2019	
Total Depth: 327 ft bgs	Well Completion: <input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction		Calculated Material Volumes	Material Volumes Installed
261	MW-U-VAS-257-262 (0.0896 J ppb) 4/16/2019 14:05	Topock - Alluvium Deposits	SM			(253.2 - 273.2') 2" Sch 80 PVC (20-slot) Screen	(247.0 - 276.0') 30.1 bags	(247.0 - 276.0') 37.25 bags (24%) Note: Lapis Lustre Sand
262								
263								
264								
265		Topock - Alluvium Deposits	ML			(247.0 - 276.0') Cemex #3 MESH (8x10)	(4.0 - 276.0') 10" Borehole	
266								
267								
268								
269								
270		Topock - Alluvium Deposits	SM			(273.7 - 274.7') Centralizer	(273.2 - 275.6') Sump and End Cap	
271								
272								
273								
274		Topock - Alluvium Deposits	MH			(276.0 - 327.0') Bentonite seal chips	(276.0 - 327.0') 6" Borehole	
275								
276		Topock - Alluvium Deposits	ML			(276.0 - 327.0') Bentonite seal chips	(276.0 - 327.0') 6" Borehole	
277								
278								
279								
280								

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Date Started: 04/10/2019	Surface Elevation: 587.7 ft amsl	Well ID: MW-U-183, MW-U-273
Date Completed: 05/10/2019	Shallow Well Elevation: 587.5 ft amsl	
Drilling Co.: Cascade	Deep Well Elevation: 587.7 ft amsl	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): 2101958.7	Project: Final GW Remedy Phase I
Driller Name: Eddie Ramos	Easting (NAD83): 7613300.8	Location: PG&E Topock, Needles, California
Drilling Asst: L. Amaya/ O. Flores	Borehole Diameter: 6-12 inches	
Logger: Grant Willford	Water Level Start: 131.45 ft bgs	Project Number: RC000753.0051
Editor: Sean McGrane	Development End Date: 5/10/2019	
Total Depth: 327 ft bgs	Well Completion: <input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
281							
282		Topock - Alluvium Deposits	ML				
283							
284							
285		Topock - Alluvium Deposits	SM				
286							
287							
288		Topock - Alluvium Deposits	SM				
289	MW-U-VAS-287-292 (<0.033 U ppb) 4/17/2019 14:50						
290					(276.0 - 327.0') Bentonite seal chips	(276.0 - 327.0') 6" Borehole	(276.0 - 327.0') 13.9 bags
291							(276.0 - 327.0') 22 bags (58%) Note: Puregold Medium Chips
292							
293		Topock - Alluvium Deposits	ML				
294							
295							
296		Topock - Alluvium Deposits	GM				
297							
298		Topock - Alluvium Deposits	MH				
299							
300							

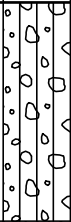

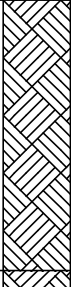

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started: 04/10/2019	Surface Elevation: 587.7 ft amsl	Well ID: MW-U-183, MW-U-273
Date Completed: 05/10/2019	Shallow Well Elevation: 587.5 ft amsl	
Drilling Co.: Cascade	Deep Well Elevation: 587.7 ft amsl	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): 2101958.7	Project: Final GW Remedy Phase I
Driller Name: Eddie Ramos	Easting (NAD83): 7613300.8	Location: PG&E Topock, Needles, California
Drilling Asst: L. Amaya/ O. Flores	Borehole Diameter: 6-12 inches	
Logger: Grant Willford	Water Level Start: 131.45 ft bgs	Project Number: RC000753.0051
Editor: Sean McGrane	Development End Date: 5/10/2019	
Total Depth: 327 ft bgs	Well Completion: <input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
301		Topock - Alluvium Deposits	MH				
302							
303							
304		Topock - Alluvium Deposits	SM				
305							
306							
307							
308							
309							
310		Topock - Alluvium Deposits	SC		(276.0 - 327.0') Bentonite seal chips	(276.0 - 327.0') 6" Borehole	(276.0 - 327.0') 13.9 bags
311							
312							
313							
314							
315							
316		Topock - Alluvium Deposits	CL-ML				
317							
318	MW-U-VAS-317-322 (<0.17 U) 4/24/2019 11:05	Topock - Alluvium Deposits	ML				
319							
320							


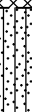

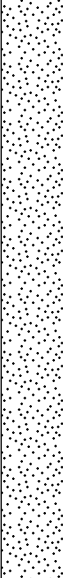
Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started: 04/10/2019	Surface Elevation: 587.7 ft amsl	Well ID: MW-U-183, MW-U-273
Date Completed: 05/10/2019	Shallow Well Elevation: 587.5 ft amsl	
Drilling Co.: Cascade	Deep Well Elevation: 587.7 ft amsl	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): 2101958.7	Project: Final GW Remedy Phase I
Driller Name: Eddie Ramos	Easting (NAD83): 7613300.8	Location: PG&E Topock, Needles, California
Drilling Asst: L. Amaya/ O. Flores	Borehole Diameter: 6-12 inches	
Logger: Grant Willford	Water Level Start: 131.45 ft bgs	Project Number: RC000753.0051
Editor: Sean McGrane	Development End Date: 5/10/2019	
Total Depth: 327 ft bgs	Well Completion: <input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
321	MW-U-VAS-317-322 (<0.17 U) 4/24/2019 11:05	Topock - Alluvium Deposits	ML				
322							
323		Topock - Competent Bedrock - conglomerate			(276.0 - 327.0') Bentonite seal chips	(276.0 - 327.0') 6" Borehole	(276.0 - 327.0') 13.9 bags
324							
325							
326							
327		Topock - Bedrock - metadiorite			End of Boring at 327.0 'bgs.		(276.0 - 327.0') 22 bags (58%) Note: Puregold Medium Chips
328							
329							
330							
331							
332							
333							
334							
335							
336							
337							
338							
339							
340							


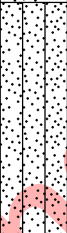


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Date Started:	03/27/2019	Surface Elevation:	459.5 ft amsl	Boring No.: <u>MW-W</u>	
Date Completed:	03/28/2019	Northing (NAD83):	2101904.2		
Drilling Co.:	Cascade	Easting (NAD83):	7616366.1	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	43 ft bgs	Project:	Final Groundwater Remedy Phase
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	6-10 inches	Location:	1
Driller Name:	Steve Vasquez	Depth to First Water:	4.83 ft bgs	PG&E Topock, Needles, California	
Drilling Asst:	L. Amaya/ O. Flores	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number: RC000753.0051	
Logger:	Gantt Jeffers	Sampling Interval:	Continuous		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
1	60			Topock - Fill			(0.0 - 5.0') Topock - Fill; Hand augered for utility clearance.	(0.0 - 5.0') Hand augered for utility clearance	(0.0 - 12.0') 50 gal of water used
2									
3									
4									
5	24			Topock - Fluvial Deposits	SP-SM		(5.0 - 6.5') Topock - Fluvial Deposits; Poorly graded sand with silt (SP-SM); brown (7.5YR 5/4); very fine grained to fine grained, subangular to subround; little silt; trace granules to small pebbles, round; trace cobbles, round; trace mica; moist to wet; larger clasts consist of granodiarites	(5.0 - 12.0') Soft drilling (5.0') Approximate depth to water table	
6									
7	60	No Sieve Samples Collected	MW-W- VAS-7-12 (<0.17 U) 3/27/2019 16:55	Topock - Fluvial Deposits			(6.5 - 26.0') Topock - Fluvial Deposits; Poorly graded sand (SP); brown (10YR 5/3); very fine grained to fine grained, subangular to subround; little mica; moist to wet; iron oxide staining		
8									
9									
10									
11									
12	156			Topock - Fluvial Deposits	SP		(8') Topock - Fluvial Deposits; very fine grained to medium grained; no iron oxide staining	(12.0 - 27.0') Soft drilling, compaction of sands, casing was settling in sands when sample screen was being set for 7 to 12 ft interval	(12.0 - 27.0') 50 gal of water used
13									
14									
15									
16									
17									
18									
19									
20									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	03/27/2019	Surface Elevation:	459.5 ft amsl	Boring No.: <u>MW-W</u>	
Date Completed:	03/28/2019	Northing (NAD83):	2101904.2		
Drilling Co.:	Cascade	Easting (NAD83):	7616366.1	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	43 ft bgs	Project:	Final Groundwater Remedy Phase
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	6-10 inches	Location:	1
Driller Name:	Steve Vasquez	Depth to First Water:	4.83 ft bgs	PG&E Topock, Needles, California	
Drilling Asst:	L. Amaya/ O. Flores	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number: RC000753.0051	
Logger:	Gantt Jeffers	Sampling Interval:	Continuous		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
21	156		MW-W-VAS-22-27 (0.266 J ppb) 3/28/2019 13:00	Topock - Fluvial Deposits Topock - Fluvial Deposits Topock - Fluvial Deposits	SP			(12.0 - 27.0') Soft drilling, compaction of sands, casing was settling in sands when sample screen was being set for 7 to 12 ft interval	(12.0 - 27.0') 50 gal of water used
22									
23									
24									
25									
26	60	No Sieve Samples Collected		Topock - Fluvial Deposits	SM		(26.0 - 29.2') Topock - Fluvial Deposits; Silty sand (SM); grayish brown (2.5Y 5/2); very fine grained to fine grained, subangular to subround; little silt; little mica; little organics; wet		(27.0 - 43.0') No water used
27									
28									
29									
30									
31	24			Topock - Weathered Bedrock - conglomerate	SM		(29.2 - 31.0') Topock - Weathered Bedrock - conglomerate; Silty sand with gravel (SM); reddish brown (2.5YR 4/4); very fine grained to coarse grained, angular to subround; and silt; little granules to very large pebbles, angular to subangular; trace very coarse grained sand; trace mica; wet; larger clast consist of metadiorite and granodiorites.		
32									
33									
34									
35									
36	72			Topock - Competent Bedrock - conglomerate			(31.0 - 43.0') Topock - Competent Bedrock - conglomerate; dark reddish brown (2.5YR 3/4); dry; moderate cementation; friable	(31.0 - 34.0') Rough drilling	(34.0 - 40.0') Core was hot
37									
38									
39									
40									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	03/27/2019	Surface Elevation:	459.5 ft amsl	Boring No.: MW-W	
Date Completed:	03/28/2019	Northing (NAD83):	2101904.2		
Drilling Co.:	Cascade	Easting (NAD83):	7616366.1	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	43 ft bgs	Project:	Final Groundwater Remedy Phase
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	6-10 inches	Location:	1
Driller Name:	Steve Vasquez	Depth to First Water:	4.83 ft bgs	PG&E Topock, Needles, California	
Drilling Asst:	L. Amaya/ O. Flores	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number: RC000753.0051	
Logger:	Gantt Jeffers	Sampling Interval:	Continuous		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
41	36	No Sieve Samples Collected		Topock - Competent Bedrock - conglomerate					(27.0 - 43.0') No water used
42									
43									
44							End of Boring at 43.0' bgs.		
45									
46									
47									
48									
49									
50									
51									
52									
53									
54									
55									
56									
57									
58									
59									
60									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	<u>12/02/2018</u>	Surface Elevation:	<u>480.8 ft amsl</u>	Boring No.: <u>IRZ-9 Pilot</u>
Date Completed:	<u>01/03/2019</u>	Northing (NAD83):	<u>2103560.0</u>	
Drilling Co.:	<u>Cascade</u>	Easting (NAD83):	<u>7615565.9</u>	Client: <u>PG&E</u>
Drilling Method:	<u>Sonic Drilling</u>	Total Depth:	<u>317 ft bgs</u>	Project: <u>Final GW Remedy Phase I</u>
Drill Rig Type:	<u>Borat Longyear Track Mount</u>	Borehole Diameter:	<u>6-12 inches</u>	Location: <u>PG&E Topock, Needles, California</u>
Driller Name:	<u>Nick Petrone</u>	Depth to First Water:	<u>24.84 ft bgs</u>	
Drilling Asst:	<u>T. Aylmer/J. Candelaria</u>	Sampling Method:	<u>4 inch x 10 ft Core Barrel</u>	Project Number: <u>RC000753.0051</u>
Logger:	<u>A. Garcia / G. Willford</u>	Sampling Interval:	<u>Continuous</u>	
Editor:	<u>Sean McGrane</u>	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
1							(0.0 - 9.5') Topock - Fluvial Deposits; Poorly graded sand with silt (SP-SM); pale yellow (2.5Y 8/3); very fine grained to fine grained, subangular to subround; little silt; dry; no staining		(0.0 - 281.0') No water used
2	0								
3									
4									
5				Topock - Fluvial Deposits	SP-SM				
6	6								
7									
8									
9									
10	54			Topock - Fluvial Deposits	SM		(9.5 - 12.0') Topock - Fluvial Deposits; Silty sand with gravel (SM); dark brown (7.5YR 3/4); very fine grained to fine grained, angular to subround; some granule to small pebbles, subangular to subround; dry; no staining		
11									
12									
13				Topock - Alluvium Deposits	SM		(12.0 - 19.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); strong brown (7.5YR 4/6); very fine grained to coarse grained, subangular to subround; some granule to small pebbles, subangular to subround; dry to moist; no staining		
14	42								
15									
16									
17									
18									
19	96								
20				Topock - Alluvium Deposits	SM		(19.0 - 25.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); strong brown (7.5YR 4/6); fine grained to very coarse grained, angular to subround; some small to large pebbles,		

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	<u>12/02/2018</u>	Surface Elevation:	<u>480.8 ft amsl</u>	Boring No.: <u>IRZ-9 Pilot</u>	
Date Completed:	<u>01/03/2019</u>	Northing (NAD83):	<u>2103560.0</u>		
Drilling Co.:	<u>Cascade</u>	Easting (NAD83):	<u>7615565.9</u>	Client:	<u>PG&E</u>
Drilling Method:	<u>Sonic Drilling</u>	Total Depth:	<u>317 ft bgs</u>	Project:	<u>Final GW Remedy Phase I</u>
Drill Rig Type:	<u>Borat Longyear Track Mount</u>	Borehole Diameter:	<u>6-12 inches</u>	Location:	<u>PG&E Topock, Needles, California</u>
Driller Name:	<u>Nick Petrone</u>	Depth to First Water:	<u>24.84 ft bgs</u>		
Drilling Asst:	<u>T. Aylmer/J. Candelaria</u>	Sampling Method:	<u>4 inch x 10 ft Core Barrel</u>	Project Number:	<u>RC000753.0051</u>
Logger:	<u>A. Garcia / G. Willford</u>	Sampling Interval:	<u>Continuous</u>		
Editor:	<u>Sean McGrane</u>	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
21	96	IRZ-9-SS-22-27 12/19/2018 11:02		Topock - Alluvium Deposits	SM		subangular to subround; moist; no staining	(25.0') Approximate depth of water table	(0.0 - 281.0') No water used
22									
23				Topock - Alluvium Deposits	SM		(25.0 - 34.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 5/4); fine grained to very coarse grained, subangular to subround; little granule to small pebbles, subangular to subround; wet; no staining		
24									
25	60	IRZ-9-SS-27-32 12/19/2018 11:20	IRZ-9-VAS-27-32 (120 ppb) 12/4/2018 11:55	Topock - Alluvium Deposits	SM			(32.0') Drill stem bolts sheared off when commencing drilling after VAS collection from 27-32' bgs	
26									
27				Topock - Alluvium Deposits	ML				
28									
29	204	IRZ-9-SS-32-37 12/19/2018 11:50		Topock - Alluvium Deposits	ML		(34.0 - 40.0') Topock - Alluvium Deposits; Gravelly silt with sand (ML); brown (7.5YR 5/4); low plasticity; some granules to very large pebbles, subangular to subround; little very fine to coarse grained sand, angular to subround; trace cobbles, angular to subangular; moist		
30									
31				Topock - Alluvium Deposits	ML				
32									
33		IRZ-9-SS-37-42 12/19/2018 12:00		Topock - Alluvium Deposits	ML				
34									
35				Topock - Alluvium Deposits	ML				
36									
37				Topock - Alluvium Deposits	ML				
38									
39				Topock - Alluvium Deposits	ML				
40									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	<u>12/02/2018</u>	Surface Elevation:	<u>480.8 ft amsl</u>	Boring No.: <u>IRZ-9 Pilot</u>
Date Completed:	<u>01/03/2019</u>	Northing (NAD83):	<u>2103560.0</u>	
Drilling Co.:	<u>Cascade</u>	Easting (NAD83):	<u>7615565.9</u>	Client: <u>PG&E</u>
Drilling Method:	<u>Sonic Drilling</u>	Total Depth:	<u>317 ft bgs</u>	Project: <u>Final GW Remedy Phase I</u>
Drill Rig Type:	<u>Borat Longyear Track Mount</u>	Borehole Diameter:	<u>6-12 inches</u>	Location: <u>PG&E Topock, Needles, California</u>
Driller Name:	<u>Nick Petrone</u>	Depth to First Water:	<u>24.84 ft bgs</u>	
Drilling Asst:	<u>T. Aylmer/J. Candelaria</u>	Sampling Method:	<u>4 inch x 10 ft Core Barrel</u>	Project Number: <u>RC000753.0051</u>
Logger:	<u>A. Garcia / G. Willford</u>	Sampling Interval:	<u>Continuous</u>	
Editor:	<u>Sean McGrane</u>	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
41	204	IRZ-9-SS-37-42 12/19/2018 12:00		Topock - Alluvium Deposits	SM		(40.0 - 43.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); light brown (7.5YR 6/4); very fine grained to very coarse grained, subangular to subround; some granule to small pebbles, angular to subround; little silt; wet; no staining		(0.0 - 281.0') No water used
42									
43		IRZ-9-SS-42-47 12/19/2018 12:02		Topock - Alluvium Deposits	SM		(43.0 - 48.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); light brown (7.5YR 6/4); fine grained to very coarse grained, angular to subround; some granules to large pebbles, subangular to subround; little silt; moist; no staining		
44									
45									
46									
47		IRZ-9-SS-47-52 12/19/2018 12:10		IRZ-9-VAS-47-52 (<0.033 U ppb) 12/4/2018 10:00	Topock - Alluvium Deposits	SM			
48									
49	Topock - Alluvium Deposits		GM			(50.0 - 54.5') Topock - Alluvium Deposits; Silty gravel with sand (GM); light brown (7.5YR 6/4); granules to very large pebbles, angular to subround; some very fine to very coarse grained sand, angular to subround; some silt; trace cobbles, angular to subround			
50									
51									
52	54	IRZ-9-SS-52-57 12/19/2018 12:15		Topock - Alluvium Deposits	GM		(54.5 - 68.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 5/4); fine grained to very coarse grained, subangular to subround; little medium to large pebbles, subangular to subround; little silt; moist to wet		
53									
54				Topock - Alluvium Deposits	SM				
55									
56									
57									
58		102		IRZ-9-SS-57-62 12/19/2018 12:17		Topock - Alluvium Deposits	SM		
59									
60									

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Date Started:	<u>12/02/2018</u>	Surface Elevation:	<u>480.8 ft amsl</u>	Boring No.: <u>IRZ-9 Pilot</u>
Date Completed:	<u>01/03/2019</u>	Northing (NAD83):	<u>2103560.0</u>	
Drilling Co.:	<u>Cascade</u>	Easting (NAD83):	<u>7615565.9</u>	Client: <u>PG&E</u>
Drilling Method:	<u>Sonic Drilling</u>	Total Depth:	<u>317 ft bgs</u>	Project: <u>Final GW Remedy Phase I</u>
Drill Rig Type:	<u>Borat Longyear Track Mount</u>	Borehole Diameter:	<u>6-12 inches</u>	Location: <u>PG&E Topock, Needles, California</u>
Driller Name:	<u>Nick Petrone</u>	Depth to First Water:	<u>24.84 ft bgs</u>	
Drilling Asst:	<u>T. Aylmer/J. Candelaria</u>	Sampling Method:	<u>4 inch x 10 ft Core Barrel</u>	Project Number: <u>RC000753.0051</u>
Logger:	<u>A. Garcia / G. Willford</u>	Sampling Interval:	<u>Continuous</u>	
Editor:	<u>Sean McGrane</u>	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
61		IRZ-9-SS-57-62 12/19/2018 12:17							(0.0 - 281.0') No water used
62									
63	102								
64		IRZ-9-SS-62-67 12/19/2018 12:14	IRZ-9-VAS-62-67 (<0.033 U ppb) 12/4/2018 13:05	Topock - Alluvium Deposits	SM				
65									
66									
67									
68									
69		IRZ-9-SS-67-72 12/19/2018 12:40					(68.0 - 77.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); dark brown (10YR 3/3); very fine grained to coarse grained, subangular to subround; some small to large pebbles, angular to subround; some silt; moist to wet		
70									
71									
72	108								
73				Topock - Alluvium Deposits	SM				
74		IRZ-9-SS-72-77 12/19/2018 13:05							
75									
76									
77									
78	108	IRZ-9-SS-77-82 12/20/2018 09:33		Topock - Alluvium Deposits	SM		(77.0 - 85.0') Topock - Alluvium Deposits; Silty sand (SM); reddish brown(2.5YR 4/3); medium grained to coarse grained, subangular to subround; little silt; trace granule to small pebbles, subangular to subround; moist to wet		
79									
80							(79') reddish brown (2.5YR 4/4); very fine grained to fine grained, subangular to subround		

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Date Started:	<u>12/02/2018</u>	Surface Elevation:	<u>480.8 ft amsl</u>	Boring No.: <u>IRZ-9 Pilot</u>
Date Completed:	<u>01/03/2019</u>	Northing (NAD83):	<u>2103560.0</u>	
Drilling Co.:	<u>Cascade</u>	Easting (NAD83):	<u>7615565.9</u>	Client: <u>PG&E</u>
Drilling Method:	<u>Sonic Drilling</u>	Total Depth:	<u>317 ft bgs</u>	Project: <u>Final GW Remedy Phase I</u>
Drill Rig Type:	<u>Borat Longyear Track Mount</u>	Borehole Diameter:	<u>6-12 inches</u>	Location: <u>PG&E Topock, Needles, California</u>
Driller Name:	<u>Nick Petrone</u>	Depth to First Water:	<u>24.84 ft bgs</u>	
Drilling Asst:	<u>T. Aylmer/J. Candelaria</u>	Sampling Method:	<u>4 inch x 10 ft Core Barrel</u>	Project Number: <u>RC000753.0051</u>
Logger:	<u>A. Garcia / G. Willford</u>	Sampling Interval:	<u>Continuous</u>	
Editor:	<u>Sean McGrane</u>	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
81	108	IRZ-9-SS-77-82 12/20/2018 09:33		Topock - Alluvium Deposits	SM				(0.0 - 281.0') No water used
82									
83									
84		IRZ-9-SS-82-87 12/20/2018 09:36							
85	96			Topock - Alluvium Deposits	SM		(85.0 - 86.0') Topock - Alluvium Deposits; Silty sand (SM); light reddish gray(2.5YR 7/1); very fine grained to fine grained, subangular to subround; little silt; dry to moist		
86									
87									
88		IRZ-9-SS-87-92 12/20/2018 09:43							
89	108			Topock - Alluvium Deposits	SM		(86.0 - 107.0') Topock - Alluvium Deposits; Silty sand (SM); pinkish gray(5YR 6/2); very fine grained to fine grained, subangular to subround; little silt; trace granule to small pebbles, subangular to subround; moist to wet		
90									
91									
92									
93	108								
94		IRZ-9-SS-92-97 12/20/2018 09:48							
95									
96									
97	108								
98		IRZ-9-SS-97-102 12/20/2018 09:53							
99									
100									

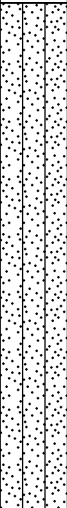



Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	12/02/2018	Surface Elevation:	480.8 ft amsl	Boring No.: IRZ-9 Pilot	
Date Completed:	01/03/2019	Northing (NAD83):	2103560.0		
Drilling Co.:	Cascade	Easting (NAD83):	7615565.9	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	317 ft bgs	Project:	Final GW Remedy Phase I
Drill Rig Type:	Borat Longyear Track Mount	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Nick Petrone	Depth to First Water:	24.84 ft bgs		
Drilling Asst:	T. Aylmer/J. Candelaria	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	A. Garcia / G. Willford	Sampling Interval:	Continuous		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
101		IRZ-9-SS-97-102 12/20/2018 09:53							(0.0 - 281.0') No water used
102							(102') pale red (2.5YR 6/2)		
103	108			Topock - Alluvium Deposits	SM				
104		IRZ-9-SS-102-107 12/20/2018 09:55	IRZ-9-VAS-102-109 (<0.17 U ppb) 12/6/2018 10:10						
105									
106									
107									
108							(107.0 - 127.0') Topock - Alluvium Deposits; Silty sand (SM); pinkish gray(5YR 6/2); fine grained to coarse grained, subangular to subround; little silt; trace granule to large pebbles, subangular to subround; moist to wet; with interbedded gravel seams 3-5" thick sparingly throughout interval		
109		IRZ-9-SS-107-112 12/20/2018 10:08							
110									
111									
112	102			Topock - Alluvium Deposits	SM				
113									
114		IRZ-9-SS-112-117 12/20/2018 10:10							
115									
116									
117									
118	108	IRZ-9-SS-117-122 12/20/2018 10:12							
119									
120									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	<u>12/02/2018</u>	Surface Elevation:	<u>480.8 ft amsl</u>	Boring No.: <u>IRZ-9 Pilot</u>
Date Completed:	<u>01/03/2019</u>	Northing (NAD83):	<u>2103560.0</u>	
Drilling Co.:	<u>Cascade</u>	Easting (NAD83):	<u>7615565.9</u>	Client: <u>PG&E</u>
Drilling Method:	<u>Sonic Drilling</u>	Total Depth:	<u>317 ft bgs</u>	Project: <u>Final GW Remedy Phase I</u>
Drill Rig Type:	<u>Borat Longyear Track Mount</u>	Borehole Diameter:	<u>6-12 inches</u>	Location: <u>PG&E Topock, Needles, California</u>
Driller Name:	<u>Nick Petrone</u>	Depth to First Water:	<u>24.84 ft bgs</u>	
Drilling Asst:	<u>T. Aylmer/J. Candelaria</u>	Sampling Method:	<u>4 inch x 10 ft Core Barrel</u>	Project Number: <u>RC000753.0051</u>
Logger:	<u>A. Garcia / G. Willford</u>	Sampling Interval:	<u>Continuous</u>	
Editor:	<u>Sean McGrane</u>	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
121	108	IRZ-9-SS-117-122 12/20/2018 10:12		Topock - Alluvium Deposits	SM				(0.0 - 281.0') No water used
122									
123									
124									
125	102	IRZ-9-SS-122-127 1/4/2019 08:00		Topock - Alluvium Deposits	SM		(127.0 - 147.0') Topock - Alluvium Deposits; Silty sand (SM); weak red (10R 4/4); medium grained to coarse grained, subangular to subround; little silt; trace granule to medium pebbles, subangular to subround; moist to wet; with interbedded gravel seams 3-5" thick sparingly through interval		
126									
127									
128									
129									
130									
131									
132									
133									
134									
135	108	IRZ-9-SS-127-132 12/20/2018 10:17		Topock - Alluvium Deposits	SM				
136									
137									
138									
139	108	IRZ-9-SS-132-137 12/20/2018 10:20		Topock - Alluvium Deposits	SM				
140		IRZ-9-SS-137-142 12/20/2018 10:22							

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SOIL BORING LOG: PG&E TOPOCK C:\USERS\SMCGRANE\DOCUMENTS\PG&E TOPOCK\DATABASE FOR PLOG.GPJ TOPOCK DATA TEMPLATE FOR PLOG.GDT 06/06/19 14:18

Date Started:	<u>12/02/2018</u>	Surface Elevation:	<u>480.8 ft amsl</u>	Boring No.: <u>IRZ-9 Pilot</u>
Date Completed:	<u>01/03/2019</u>	Northing (NAD83):	<u>2103560.0</u>	
Drilling Co.:	<u>Cascade</u>	Easting (NAD83):	<u>7615565.9</u>	Client: <u>PG&E</u>
Drilling Method:	<u>Sonic Drilling</u>	Total Depth:	<u>317 ft bgs</u>	Project: <u>Final GW Remedy Phase I</u>
Drill Rig Type:	<u>Borat Longyear Track Mount</u>	Borehole Diameter:	<u>6-12 inches</u>	Location: <u>PG&E Topock, Needles, California</u>
Driller Name:	<u>Nick Petrone</u>	Depth to First Water:	<u>24.84 ft bgs</u>	
Drilling Asst:	<u>T. Aylmer/J. Candelaria</u>	Sampling Method:	<u>4 inch x 10 ft Core Barrel</u>	Project Number: <u>RC000753.0051</u>
Logger:	<u>A. Garcia / G. Willford</u>	Sampling Interval:	<u>Continuous</u>	
Editor:	<u>Sean McGrane</u>	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
141	108	IRZ-9-SS-137-142 12/20/2018 10:22		Topock - Alluvium Deposits	SM				

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Date Started:	12/02/2018	Surface Elevation:	480.8 ft amsl	Boring No.: <u>IRZ-9 Pilot</u>	
Date Completed:	01/03/2019	Northing (NAD83):	2103560.0		
Drilling Co.:	Cascade	Easting (NAD83):	7615565.9	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	317 ft bgs	Project:	Final GW Remedy Phase I
Drill Rig Type:	Borat Longyear Track Mount	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Nick Petrone	Depth to First Water:	24.84 ft bgs		
Drilling Asst:	T. Aylmer/J. Candelaria	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	A. Garcia / G. Willford	Sampling Interval:	Continuous		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
161		IRZ-9-SS-157-162 12/20/2018 10:50							(0.0 - 281.0') No water used
162									
163	180								
164		IRZ-9-SS-162-167 12/20/2018 10:53							
165									
166									
167									
168									
169		IRZ-9-SS-167-172 12/20/2018 10:57							
170				Topock - Alluvium Deposits	SM				
171									
172	120								
173									
174		IRZ-9-SS-172-177 12/20/2018 10:59							
175									
176									
177									
178	120	IRZ-9-SS-177-182 12/20/2018 11:02							
179									
180									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	<u>12/02/2018</u>	Surface Elevation:	<u>480.8 ft amsl</u>	Boring No.: <u>IRZ-9 Pilot</u>	
Date Completed:	<u>01/03/2019</u>	Northing (NAD83):	<u>2103560.0</u>		
Drilling Co.:	<u>Cascade</u>	Easting (NAD83):	<u>7615565.9</u>	Client:	<u>PG&E</u>
Drilling Method:	<u>Sonic Drilling</u>	Total Depth:	<u>317 ft bgs</u>	Project:	<u>Final GW Remedy Phase I</u>
Drill Rig Type:	<u>Borat Longyear Track Mount</u>	Borehole Diameter:	<u>6-12 inches</u>	Location:	<u>PG&E Topock, Needles, California</u>
Driller Name:	<u>Nick Petrone</u>	Depth to First Water:	<u>24.84 ft bgs</u>		
Drilling Asst:	<u>T. Aylmer/J. Candelaria</u>	Sampling Method:	<u>4 inch x 10 ft Core Barrel</u>	Project Number:	<u>RC000753.0051</u>
Logger:	<u>A. Garcia / G. Willford</u>	Sampling Interval:	<u>Continuous</u>		
Editor:	<u>Sean McGrane</u>	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
181		IRZ-9-SS-177-182 12/20/2018 11:02		Topock - Alluvium Deposits	SM				(0.0 - 281.0') No water used
182									
183	120						(182.0 - 186.0') Topock - Alluvium Deposits; Silty sand (SM); reddish gray / pale brown(5YR 5/2); fine grained to coarse grained, angular to subround; some silt; trace granule to medium pebble; trace cobbles; trace clay; moist to wet; sand composed of conglomerate and metadiorite		
184		IRZ-9-SS-182-187 12/20/2018 11:07	IRZ-9-VAS-182-187 (<0.17 U ppb) 12/11/2018 13:03	Topock - Alluvium Deposits	SM				
185									
186									
187				Topock - Alluvium Deposits	SM		(186.0 - 187.0') Topock - Alluvium Deposits; Silty sand (SM); weak red (10R 4/3); fine grained to very coarse grained, subangular to subround; some silt; little granule to medium pebble, subangular to subround; little clay; trace cobbles, subround; moist		
188									
189		IRZ-9-SS-187-192 12/20/2018 11:16					(187.0 - 196.5') Topock - Alluvium Deposits; Silty gravel with sand (GM); dark reddish brown(2.5YR 3/3); small pebbles to small cobbles, angular; some small to large pebble, angular; some silt; little very coarse grained sand, angular; trace cobbles, angular; trace clay; moist to dry; moderate cementation; gravel composed of metadiorite	(187.0 - 197.0') Drill rods chattering	
190	120								
191									
192				Topock - Alluvium Deposits	GM				
193									
194		IRZ-9-SS-192-197 12/20/2018 11:22							
195									
196									
197				Topock - Alluvium Deposits	GP		(196.5 - 197.0') Topock - Alluvium Deposits; Poorly graded gravel (GP); very pale brown (10YR 8/3); granules to very large pebbles, angular; little fine to very coarse grained sand, angular; little silt; trace boulders; dry; boulder metadiorite	(196.5') Possible bedrock	
198	120	IRZ-9-SS-197-202 12/20/2018 11:28		Topock - Alluvium Deposits	SM		(197.0 - 207.0') Topock - Alluvium Deposits; Silty sand (SM); dark reddish brown (2.5YR 3/4); fine grained to very coarse grained, subangular to subround; some silt; trace small to medium pebble, subround; trace clay; moist	(197.0 - 202.0') Rough drilling	
199									
200									

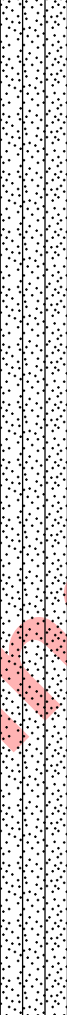
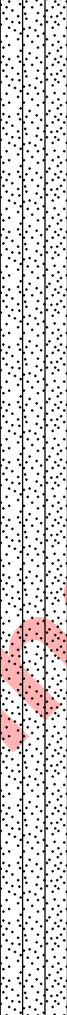
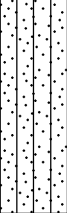
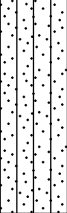

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Date Started:	<u>12/02/2018</u>	Surface Elevation:	<u>480.8 ft amsl</u>	Boring No.: <u>IRZ-9 Pilot</u>
Date Completed:	<u>01/03/2019</u>	Northing (NAD83):	<u>2103560.0</u>	
Drilling Co.:	<u>Cascade</u>	Easting (NAD83):	<u>7615565.9</u>	Client: <u>PG&E</u>
Drilling Method:	<u>Sonic Drilling</u>	Total Depth:	<u>317 ft bgs</u>	Project: <u>Final GW Remedy Phase I</u>
Drill Rig Type:	<u>Borat Longyear Track Mount</u>	Borehole Diameter:	<u>6-12 inches</u>	Location: <u>PG&E Topock, Needles, California</u>
Driller Name:	<u>Nick Petrone</u>	Depth to First Water:	<u>24.84 ft bgs</u>	
Drilling Asst:	<u>T. Aylmer/J. Candelaria</u>	Sampling Method:	<u>4 inch x 10 ft Core Barrel</u>	Project Number: <u>RC000753.0051</u>
Logger:	<u>A. Garcia / G. Willford</u>	Sampling Interval:	<u>Continuous</u>	
Editor:	<u>Sean McGrane</u>	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
201	120	IRZ-9-SS-197-202 12/20/2018 11:28		Topock - Alluvium Deposits	SM			(197.0 - 202.0') Rough drilling	(0.0 - 281.0') No water used
202									
203									
204									
205		IRZ-9-SS-202-207 12/20/2018 11:30							
206	120			Topock - Alluvium Deposits	SM		(207.0 - 213.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); dark reddish brown(2.5YR 3/3); very fine grained to very coarse grained, angular to subround; some silt; little granule to large pebble, subangular to subround; trace cobbles, subround; trace clay; moist		
207									
208									
209		IRZ-9-SS-207-212 12/20/2018 11:32	IRZ-9-VAS-207-212 (<0.17 U ppb) 12/13/2018 10:55						
210									
211									
212									
213									
214		IRZ-9-SS-212-217 12/20/2018 11:35	--no sample-- (Interval did not produce.) 12/12/2018 10:15						
215									
216	120			Topock - Alluvium Deposits	ML		(213.0 - 220.0') Topock - Alluvium Deposits; Sandy silt (ML); dark reddish brown (2.5YR 3/4); low plasticity; some very fine to medium grained sand, angular to subround; little granule to medium pebble, subangular to subround; little clay; moist		
217									
218		IRZ-9-SS-217-222 12/20/2018 11:38							
219									
220									

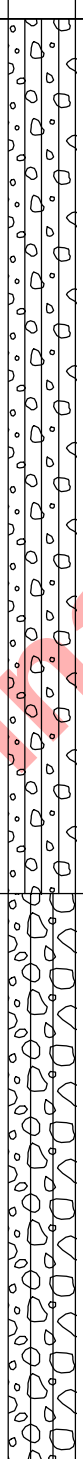
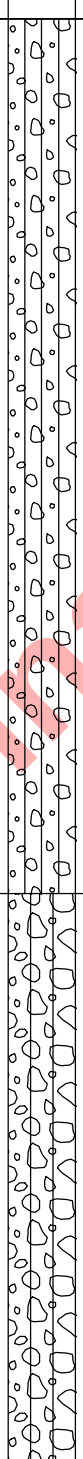
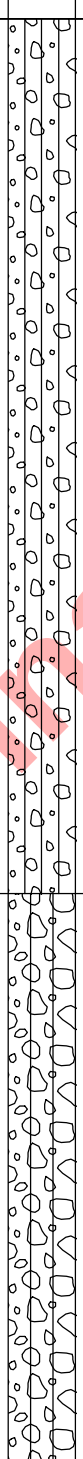
Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	<u>12/02/2018</u>	Surface Elevation:	<u>480.8 ft amsl</u>	Boring No.: <u>IRZ-9 Pilot</u>	
Date Completed:	<u>01/03/2019</u>	Northing (NAD83):	<u>2103560.0</u>		
Drilling Co.:	<u>Cascade</u>	Easting (NAD83):	<u>7615565.9</u>	Client:	<u>PG&E</u>
Drilling Method:	<u>Sonic Drilling</u>	Total Depth:	<u>317 ft bgs</u>	Project:	<u>Final GW Remedy Phase I</u>
Drill Rig Type:	<u>Borat Longyear Track Mount</u>	Borehole Diameter:	<u>6-12 inches</u>	Location:	<u>PG&E Topock, Needles, California</u>
Driller Name:	<u>Nick Petrone</u>	Depth to First Water:	<u>24.84 ft bgs</u>		
Drilling Asst:	<u>T. Aylmer/J. Candelaria</u>	Sampling Method:	<u>4 inch x 10 ft Core Barrel</u>	Project Number:	<u>RC000753.0051</u>
Logger:	<u>A. Garcia / G. Willford</u>	Sampling Interval:	<u>Continuous</u>		
Editor:	<u>Sean McGrane</u>	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
221	120	IRZ-9-SS-217-222 12/20/2018 11:38		Topock - Alluvium Deposits	SM		(220.0 - 234.0') Topock - Alluvium Deposits; Silty sand (SM); dark reddish brown (2.5YR 2.5/4); fine grained to very coarse grained, angular to subround; and silt; little granule to medium pebble, subround; trace cobbles, subround; trace clay; moist to wet; gravel composed of mixed lithology		(0.0 - 281.0') No water used
222									
223									
224									
225									
226	120	IRZ-9-SS-222-227 12/20/2018 11:20		Topock - Alluvium Deposits	SM				
227									
228									
229									
230									
231	120	IRZ-9-SS-227-232 12/20/2018 11:17		Topock - Alluvium Deposits	ML		(234.0 - 237.0') Topock - Alluvium Deposits; Sandy silt with gravel (ML); reddish brown(2.5YR 4/3); low plasticity; some very fine to coarse grained sand, angular to subround; little granule to medium pebble, subround; trace clay; moist		
232									
233									
234									
235									
236	120	IRZ-9-SS-232-237 12/20/2018 11:13	IRZ-9-VAS-232-237 (<0.17 U ppb) 12/13/2018 15:48	Topock - Alluvium Deposits	ML				
237									
238									
239									
240									
		IRZ-9-SS-237-242 12/20/2018 11:11		Topock - Alluvium Deposits	ML		(237.0 - 252.0') Topock - Alluvium Deposits; Gravelly silt with sand (ML); reddish brown (5YR 4/3); medium plasticity; some granule to large pebble, subangular to subround; little very fine to coarse grained sand, angular to subround; trace clay; moist; gravel composed of mixed lithology		






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Date Started:	<u>12/02/2018</u>	Surface Elevation:	<u>480.8 ft amsl</u>	Boring No.: <u>IRZ-9 Pilot</u>
Date Completed:	<u>01/03/2019</u>	Northing (NAD83):	<u>2103560.0</u>	
Drilling Co.:	<u>Cascade</u>	Easting (NAD83):	<u>7615565.9</u>	Client: <u>PG&E</u>
Drilling Method:	<u>Sonic Drilling</u>	Total Depth:	<u>317 ft bgs</u>	Project: <u>Final GW Remedy Phase I</u>
Drill Rig Type:	<u>Borat Longyear Track Mount</u>	Borehole Diameter:	<u>6-12 inches</u>	Location: <u>PG&E Topock, Needles, California</u>
Driller Name:	<u>Nick Petrone</u>	Depth to First Water:	<u>24.84 ft bgs</u>	
Drilling Asst:	<u>T. Aylmer/J. Candelaria</u>	Sampling Method:	<u>4 inch x 10 ft Core Barrel</u>	Project Number: <u>RC000753.0051</u>
Logger:	<u>A. Garcia / G. Willford</u>	Sampling Interval:	<u>Continuous</u>	
Editor:	<u>Sean McGrane</u>	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
241	120	IRZ-9-SS-237-242 12/20/2018 11:11		Topock - Alluvium Deposits	ML				(0.0 - 281.0') No water used
242									
243									
244									
245	86.4	IRZ-9-SS-242-247 12/20/2018 11:05		Topock - Alluvium Deposits	ML				
246									
247									
248									
249									
250		IRZ-9-SS-247-252 12/20/2018 10:55							
251									
252									
253	78			Topock - Alluvium Deposits	GM		(252.0 - 266.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); reddish brown / moderate brown(5YR 4/4); granules to very large pebbles, angular to subround; some silt; little cobbles, angular; little very fine to very coarse grained sand, angular to subround; trace clay; moist to dry; moderate cementation; gravel composed of mixed lithology		(254.5 - 261.0') Rough drilling
254									
255		IRZ-9-SS-252-257 12/20/2018 10:37							
256									
257									
258									
259									
260		IRZ-9-SS-257-262 12/20/2018 10:33							







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Date Started:	<u>12/02/2018</u>	Surface Elevation:	<u>480.8 ft amsl</u>	Boring No.: <u>IRZ-9 Pilot</u>
Date Completed:	<u>01/03/2019</u>	Northing (NAD83):	<u>2103560.0</u>	
Drilling Co.:	<u>Cascade</u>	Easting (NAD83):	<u>7615565.9</u>	Client: <u>PG&E</u>
Drilling Method:	<u>Sonic Drilling</u>	Total Depth:	<u>317 ft bgs</u>	Project: <u>Final GW Remedy Phase I</u>
Drill Rig Type:	<u>Borat Longyear Track Mount</u>	Borehole Diameter:	<u>6-12 inches</u>	Location: <u>PG&E Topock, Needles, California</u>
Driller Name:	<u>Nick Petrone</u>	Depth to First Water:	<u>24.84 ft bgs</u>	
Drilling Asst:	<u>T. Aylmer/J. Candelaria</u>	Sampling Method:	<u>4 inch x 10 ft Core Barrel</u>	Project Number: <u>RC000753.0051</u>
Logger:	<u>A. Garcia / G. Willford</u>	Sampling Interval:	<u>Continuous</u>	
Editor:	<u>Sean McGrane</u>	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
261	78	IRZ-9-SS-257-262 12/20/2018 10:33		Topock - Alluvium Deposits	GM		(261'); some silt; little clay; moist to dry; strong cementation; decrease in sand, gravel composed of mixed lithology, large cobbles of metadiorite	(254.5 - 261.0') Rough drilling	(0.0 - 281.0') No water used
262			(261.0 - 266.0') Rough drilling						
263									
264	60	IRZ-9-SS-262-267 12/20/2018 10:29							
265			IRZ-9-VAS-264-269 (<0.17 U ppb) 12/15/2018 09:15				(266.0 - 268.0') Topock - Alluvium Deposits; Gravelly elastic silt with sand (ML/MH); reddish brown (5YR 5/4); medium plasticity; some granule to medium pebble, angular to subround; little very fine to medium grained sand, subangular to subround; moist; moderate cementation	(267.0 - 273.0') Rough drilling	
266									
267									
268									
269		IRZ-9-SS-267-272 12/20/2018 10:24		Topock - Alluvium Deposits	GM		(268.0 - 273.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); reddish brown / moderate brown(5YR 4/4); granules to very large pebbles, angular to subround; some silt; little cobbles, angular; little very fine to medium grained sand, subangular to subround; little clay; moist to dry; strong cementation; gravel composed of mixed lithology, large cobbles of metadiorite		
270	72								
271									
272									
273				Topock - Alluvium Deposits	ML		(273.0 - 277.0') Topock - Alluvium Deposits; Gravelly silt with sand (ML); reddish brown (2.5YR 5/4); some granule to large pebble, subangular to subround; little fine to medium grained sand, subangular to subround; trace cobbles; trace clay; moist to dry	(273.0 - 281.0') Rough drilling	
274		IRZ-9-SS-272-277 12/20/2018 10:22							
275									
276									
277	96		IRZ-9-VAS-276-281 (<0.17 U ppb) 12/16/2018 09:15	Topock - Alluvium Deposits	GM		(277.0 - 281.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); reddish brown (2.5YR 4/4); granules to very large pebbles, angular to subround; some very fine to very coarse grained sand, angular to subround; some silt; trace cobbles, angular to subround; trace clay; dry; strong cementation		
278		IRZ-9-SS-277-282 12/20/2018 10:20							
279									
280									



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Date Started:	<u>12/02/2018</u>	Surface Elevation:	<u>480.8 ft amsl</u>	Boring No.: <u>IRZ-9 Pilot</u>	
Date Completed:	<u>01/03/2019</u>	Northing (NAD83):	<u>2103560.0</u>		
Drilling Co.:	<u>Cascade</u>	Easting (NAD83):	<u>7615565.9</u>	Client:	<u>PG&E</u>
Drilling Method:	<u>Sonic Drilling</u>	Total Depth:	<u>317 ft bgs</u>	Project:	<u>Final GW Remedy Phase I</u>
Drill Rig Type:	<u>Borat Longyear Track Mount</u>	Borehole Diameter:	<u>6-12 inches</u>	Location:	<u>PG&E Topock, Needles, California</u>
Driller Name:	<u>Nick Petrone</u>	Depth to First Water:	<u>24.84 ft bgs</u>		
Drilling Asst:	<u>T. Aylmer/J. Candelaria</u>	Sampling Method:	<u>4 inch x 10 ft Core Barrel</u>	Project Number:	<u>RC000753.0051</u>
Logger:	<u>A. Garcia / G. Willford</u>	Sampling Interval:	<u>Continuous</u>		
Editor:	<u>Sean McGrane</u>	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
281	96	IRZ-9-SS-277-282 12/20/2018 10:20		Topock - Alluvium Deposits	GM		(281.0 - 285.5') Topock - Alluvium Deposits; (NR); Drilled with water, no recovery	(273.0 - 281.0') Rough drilling	(0.0 - 281.0') No water used
282								(281.0 - 287.0') Attempted to drill using water this run to collect solid rock core resulted in poor recovery	(281.0 - 287.0') 50 gal of water used
283									
284	18			Topock - Alluvium Deposits	NR				
285									
286				Topock - Alluvium Deposits	GM		(285.5 - 287.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); reddish brown (2.5YR 4/4); granules to large pebbles, angular to subround; some very fine to very coarse grained sand, angular to subround; little silt; wet; iron oxide staining		
287									
288									
289									
290		IRZ-9-SS-287-292 12/20/2018 10:17		Topock - Alluvium Deposits	ML		(287.0 - 293.5') Topock - Alluvium Deposits; Gravelly silt with sand (ML); reddish brown (2.5YR 4/3); medium plasticity; some granule to large pebble, subangular to subround; little very fine to medium grained sand, subangular to subround; trace clay; moist		(287.0 - 317.0') No water used
291									
292	120								
293								(292.0 - 297.0') Collected sample after attempting to collect sample from 312 to 317, pulled casing back up.	
294									
295		IRZ-9-SS-292-297 12/20/2018 10:05	IRZ-9-VAS-292-297 (<0.17 U ppb) 12/18/2018 14:55	Topock - Alluvium Deposits	GM		(293.5 - 297.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); reddish brown (2.5YR 4/3); granules to large pebbles, angular to subround; some very fine to coarse grained sand, angular to subround; some silt; trace cobbles, angular to subround; trace clay; moist		
296									
297									
298	120			Topock - Weathered Bedrock - conglomerate	GM		(297.0 - 307.0') Topock - Weathered Bedrock - conglomerate; Silty gravel with sand (GM); reddish brown (2.5YR 4/3); granules to very large pebbles, angular to round; some silt; little very fine to medium grained sand, angular to subround; trace cobbles, angular to round; trace clay; moist; strong cementation; iron oxide staining; gravel composed of mixed lithology, some gravels have red staining on them	(297.0 - 307.0') Drill rods chattering, tight formation	
299									
300									

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Date Started:	<u>12/02/2018</u>	Surface Elevation:	<u>480.8 ft amsl</u>	Boring No.: <u>IRZ-9 Pilot</u>
Date Completed:	<u>01/03/2019</u>	Northing (NAD83):	<u>2103560.0</u>	
Drilling Co.:	<u>Cascade</u>	Easting (NAD83):	<u>7615565.9</u>	Client: <u>PG&E</u>
Drilling Method:	<u>Sonic Drilling</u>	Total Depth:	<u>317 ft bgs</u>	Project: <u>Final GW Remedy Phase I</u>
Drill Rig Type:	<u>Borat Longyear Track Mount</u>	Borehole Diameter:	<u>6-12 inches</u>	Location: <u>PG&E Topock, Needles, California</u>
Driller Name:	<u>Nick Petrone</u>	Depth to First Water:	<u>24.84 ft bgs</u>	
Drilling Asst:	<u>T. Aylmer/J. Candelaria</u>	Sampling Method:	<u>4 inch x 10 ft Core Barrel</u>	Project Number: <u>RC000753.0051</u>
Logger:	<u>A. Garcia / G. Willford</u>	Sampling Interval:	<u>Continuous</u>	
Editor:	<u>Sean McGrane</u>	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
301	120			Topock - Weathered Bedrock - conglomerate	GM			(297.0 - 307.0') Drill rods chattering, tight formation	(287.0 - 317.0') No water used
302									
303									
304									
305									
306									
307	120			Topock - Weathered Bedrock - conglomerate	MH		(307.0 - 311.0') Topock - Weathered Bedrock - conglomerate; Gravelly elastic silt (MH); reddish brown (2.5YR 4/4)(5YR); high plasticity; some granule to large pebble, subangular to subround; little very fine to medium grained sand, angular to subround; trace clay; moist; moderate cementation; gravel composed of mixed litholgy	(307.0 - 317.0') Tight formation	
308									
309									
310									
311									
312									
313									
314									
315									
316									
317									
318							End of Boring at 317.0 'bgs.		
319									
320									

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Date Started:	12/02/2018	Surface Elevation:	480.8 ft amsl	Well ID: IRZ-9 Pilot
Date Completed:	01/03/2019	Northing (NAD83):	2103560.0	
Drilling Co.:	Cascade	Easting (NAD83):	7615565.9	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	317 ft bgs	Project: Final GW Remedy Phase I
Driller Name:	Nick Petrone	Borehole Diameter:	6-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	T. Aylmer/J. Candelaria	Depth to First Water:	24.84 ft bgs	
Logger:	A. Garcia / G. Willford	Editor:	Sean McGrane	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction		Calculated Material Volumes	Material Volumes Installed	
1		Topock - Fluvial Deposits	SP-SM		(0.0 - 0.5') Steel plate with BMPs				
2									
3					(0.5 - 5.0') Plastering Sand	(0.5 - 5.0') 5 bags	(0.5 - 5.0') 5 bags (0%) Note: Wildcat Washed		
4									
5		Topock - Fluvial Deposits	SM			(0.0 - 8.0') 12" Borehole			
6									
7									
8									
9		Topock - Alluvium Deposits	SM		(5.0 - 287.0') Pea Gravel	(8.0 - 17.0') 6" Borehole	(5.0 - 287.0') 121.6 bags	(5.0 - 287.0') 120 bags (-1%) Note: Cal-silica 3/8" x 1/4"	
10									
11									
12									
13		Topock - Alluvium Deposits	SM			(17.0 - 57.0') 6" Borehole			
14									
15									
16									
17		Topock - Alluvium Deposits	SM						
18									
19									
20									

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Date Started:	12/02/2018	Surface Elevation:	480.8 ft amsl	Well ID: IRZ-9 Pilot
Date Completed:	01/03/2019	Northing (NAD83):	2103560.0	
Drilling Co.:	Cascade	Easting (NAD83):	7615565.9	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	317 ft bgs	Project: Final GW Remedy Phase I
Driller Name:	Nick Petrone	Borehole Diameter:	6-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	T. Aylmer/J. Candelaria	Depth to First Water:	24.84 ft bgs	
Logger:	A. Garcia / G. Willford	Editor:	Sean McGrane	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
21							
22							
23		Topock - Alluvium Deposits	SM				
24							
25							
26							
27							
28							
29	IRZ-9-VAS-27-32 (120 ppb) 12/4/2018 11:55	Topock - Alluvium Deposits	SM				
30					(5.0 - 287.0') Pea Gravel	(17.0 - 57.0') 6" Borehole	(5.0 - 287.0') 121.6 bags
31							(5.0 - 287.0') 120 bags (-1%) Note: Cal-silica 3/8" x 1/4"
32							
33							
34							
35							
36							
37		Topock - Alluvium Deposits	ML				
38							
39							
40							

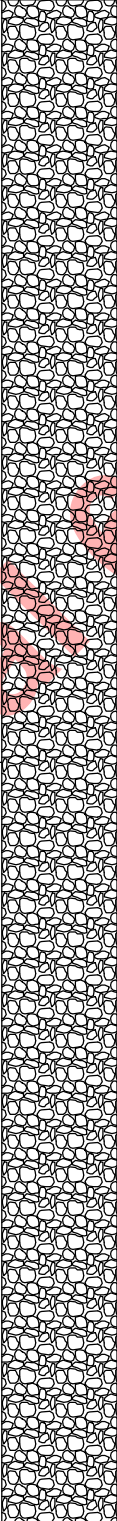
Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started:	12/02/2018	Surface Elevation:	480.8 ft amsl	Well ID: IRZ-9 Pilot
Date Completed:	01/03/2019	Northing (NAD83):	2103560.0	
Drilling Co.:	Cascade	Easting (NAD83):	7615565.9	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	317 ft bgs	Project: Final GW Remedy Phase I
Driller Name:	Nick Petrone	Borehole Diameter:	6-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	T. Aylmer/J. Candelaria	Depth to First Water:	24.84 ft bgs	
Logger:	A. Garcia / G. Willford	Editor:	Sean McGrane	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
41		Topock - Alluvium Deposits	SM				
42							
43							
44							
45		Topock - Alluvium Deposits	SM				
46							
47							
48							
49	IRZ-9-VAS-47-52 (<0.033 U ppb) 12/4/2018 10:00	Topock - Alluvium Deposits	SM		(17.0 - 57.0') 6" Borehole		
50					(5.0 - 287.0') Pea Gravel	(5.0 - 287.0') 121.6 bags	(5.0 - 287.0') 120 bags (-1%) Note: Cal-silica 3/8" x 1/4"
51							
52		Topock - Alluvium Deposits	GM				
53							
54							
55							
56							
57		Topock - Alluvium Deposits	SM				
58					(57.0 - 107.0') 6" Borehole		
59							
60							

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Date Started:	12/02/2018	Surface Elevation:	480.8 ft amsl	Well ID: IRZ-9 Pilot
Date Completed:	01/03/2019	Northing (NAD83):	2103560.0	
Drilling Co.:	Cascade	Easting (NAD83):	7615565.9	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	317 ft bgs	Project: Final GW Remedy Phase I
Driller Name:	Nick Petrone	Borehole Diameter:	6-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	T. Aylmer/J. Candelaria	Depth to First Water:	24.84 ft bgs	
Logger:	A. Garcia / G. Willford	Editor:	Sean McGrane	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
61	IRZ-9-VAS-62-67 (<0.033 U ppb) 12/4/2018 13:05	Topock - Alluvium Deposits	SM				
62							
63							
64							
65							
66							
67							
68		Topock - Alluvium Deposits	SM		(5.0 - 287.0') Pea Gravel	(57.0 - 107.0') 6" Borehole	(5.0 - 287.0') 121.6 bags
69							
70							
71							
72							
73							
74							
75							
76							
77							
78							
79							
80							

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Date Started:	12/02/2018	Surface Elevation:	480.8 ft amsl	Well ID: IRZ-9 Pilot
Date Completed:	01/03/2019	Northing (NAD83):	2103560.0	
Drilling Co.:	Cascade	Easting (NAD83):	7615565.9	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	317 ft bgs	Project: Final GW Remedy Phase I
Driller Name:	Nick Petrone	Borehole Diameter:	6-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	T. Aylmer/J. Candelaria	Depth to First Water:	24.84 ft bgs	
Logger:	A. Garcia / G. Willford	Editor:	Sean McGrane	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
81		Topock - Alluvium Deposits	SM				
82							
83							
84							
85		Topock - Alluvium Deposits	SM				
86							
87							
88							
89							
90					(5.0 - 287.0') Pea Gravel	(57.0 - 107.0') 6" Borehole	(5.0 - 287.0') 121.6 bags
91							(5.0 - 287.0') 120 bags (-1%) Note: Cal-silica 3/8" x 1/4"
92							
93		Topock - Alluvium Deposits	SM				
94							
95							
96							
97							
98							
99							
100							

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Date Started:	12/02/2018	Surface Elevation:	480.8 ft amsl	Well ID: IRZ-9 Pilot
Date Completed:	01/03/2019	Northing (NAD83):	2103560.0	
Drilling Co.:	Cascade	Easting (NAD83):	7615565.9	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	317 ft bgs	Project: Final GW Remedy Phase I
Driller Name:	Nick Petrone	Borehole Diameter:	6-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	T. Aylmer/J. Candelaria	Depth to First Water:	24.84 ft bgs	
Logger:	A. Garcia / G. Willford	Editor:	Sean McGrane	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
101							
102							
103							
104	IRZ-9-VAS-102-109 (<0.17 U ppb) 12/6/2018 10:10	Topock - Alluvium Deposits	SM		(57.0 - 107.0') 6" Borehole		
105							
106							
107							
108							
109							
110					(5.0 - 287.0') Pea Gravel	(5.0 - 287.0') 121.6 bags	(5.0 - 287.0') 120 bags (-1%) Note: Cal-silica 3/8" x 1/4"
111							
112							
113		Topock - Alluvium Deposits	SM		(107.0 - 147.0') 6" Borehole		
114							
115							
116							
117							
118							
119							
120							

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Date Started:	12/02/2018	Surface Elevation:	480.8 ft amsl	Well ID: IRZ-9 Pilot
Date Completed:	01/03/2019	Northing (NAD83):	2103560.0	
Drilling Co.:	Cascade	Easting (NAD83):	7615565.9	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	317 ft bgs	Project: Final GW Remedy Phase I
Driller Name:	Nick Petrone	Borehole Diameter:	6-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	T. Aylmer/J. Candelaria	Depth to First Water:	24.84 ft bgs	
Logger:	A. Garcia / G. Willford	Editor:	Sean McGrane	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
121		Topock - Alluvium Deposits	SM			(5.0 - 287.0') 121.6 bags	(5.0 - 287.0') 120 bags (-1%) Note: Cal-silica 3/8" x 1/4"
122							
123							
124							
125							
126		Topock - Alluvium Deposits	SM			(5.0 - 287.0') 121.6 bags	(5.0 - 287.0') 120 bags (-1%) Note: Cal-silica 3/8" x 1/4"
127							
128							
129							
130							
131							
132							
133							
134							
135							
136							
137							
138							
139							
140							

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Date Started:	12/02/2018	Surface Elevation:	480.8 ft amsl	Well ID: IRZ-9 Pilot
Date Completed:	01/03/2019	Northing (NAD83):	2103560.0	
Drilling Co.:	Cascade	Easting (NAD83):	7615565.9	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	317 ft bgs	Project: Final GW Remedy Phase I
Driller Name:	Nick Petrone	Borehole Diameter:	6-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	T. Aylmer/J. Candelaria	Depth to First Water:	24.84 ft bgs	
Logger:	A. Garcia / G. Willford	Editor:	Sean McGrane	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
141							
142							
143							
144	IRZ-9-VAS-142-147 (<0.17 U ppb) 12/5/2018 15:40	Topock - Alluvium Deposits	SM		(107.0 - 147.0') 6" Borehole		
145							
146							
147							
148		Topock - Alluvium Deposits	NR				
149							
150					(5.0 - 287.0') Pea Gravel	(5.0 - 287.0') 121.6 bags	(5.0 - 287.0') 120 bags (-1%) Note: Cal-silica 3/8" x 1/4"
151							
152							
153							
154					(147.0 - 187.0') 6" Borehole		
155		Topock - Alluvium Deposits	SM				
156							
157							
158							
159							
160							

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Date Started:	12/02/2018	Surface Elevation:	480.8 ft amsl	Well ID: IRZ-9 Pilot
Date Completed:	01/03/2019	Northing (NAD83):	2103560.0	
Drilling Co.:	Cascade	Easting (NAD83):	7615565.9	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	317 ft bgs	Project: Final GW Remedy Phase I
Driller Name:	Nick Petrone	Borehole Diameter:	6-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	T. Aylmer/J. Candelaria	Depth to First Water:	24.84 ft bgs	
Logger:	A. Garcia / G. Willford	Editor:	Sean McGrane	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
161							
162							
163							
164							
165							
166							
167							
168							
169							
170		Topock - Alluvium Deposits	SM		(5.0 - 287.0') Pea Gravel (147.0 - 187.0') 6" Borehole	(5.0 - 287.0') 121.6 bags	(5.0 - 287.0') 120 bags (-1%) Note: Cal-silica 3/8" x 1/4"
171							
172							
173							
174							
175							
176							
177							
178							
179							
180							

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Date Started:	12/02/2018	Surface Elevation:	480.8 ft amsl	Well ID: IRZ-9 Pilot
Date Completed:	01/03/2019	Northing (NAD83):	2103560.0	
Drilling Co.:	Cascade	Easting (NAD83):	7615565.9	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	317 ft bgs	Project: Final GW Remedy Phase I
Driller Name:	Nick Petrone	Borehole Diameter:	6-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	T. Aylmer/J. Candelaria	Depth to First Water:	24.84 ft bgs	
Logger:	A. Garcia / G. Willford	Editor:	Sean McGrane	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
181		Topock - Alluvium Deposits	SM				
182							
183							
184	IRZ-9-VAS-182-187 (<0.17 U ppb) 12/11/2018 13:03	Topock - Alluvium Deposits	SM		(147.0 - 187.0') 6" Borehole		
185							
186		Topock - Alluvium Deposits	SM				
187							
188							
189							
190					(5.0 - 287.0') Pea Gravel	(5.0 - 287.0') 121.6 bags	(5.0 - 287.0') 120 bags (-1%) Note: Cal-silica 3/8" x 1/4"
191		Topock - Alluvium Deposits	GM				
192							
193							
194							
195							
196							
197		Topock - Alluvium Deposits	GP				
198							
199		Topock - Alluvium Deposits	SM				
200							

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Date Started:	12/02/2018	Surface Elevation:	480.8 ft amsl	Well ID: IRZ-9 Pilot
Date Completed:	01/03/2019	Northing (NAD83):	2103560.0	
Drilling Co.:	Cascade	Easting (NAD83):	7615565.9	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	317 ft bgs	Project: Final GW Remedy Phase I
Driller Name:	Nick Petrone	Borehole Diameter:	6-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	T. Aylmer/J. Candelaria	Depth to First Water:	24.84 ft bgs	
Logger:	A. Garcia / G. Willford	Editor:	Sean McGrane	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
201							
202							
203							
204		Topock - Alluvium Deposits	SM				
205							
206							
207							
208							
209	IRZ-9-VAS-207-212 (<0.17 U ppb) 12/13/2018 10:55	Topock - Alluvium Deposits	SM		(5.0 - 287.0') Pea Gravel	(5.0 - 287.0') 121.6 bags	(5.0 - 287.0') 120 bags (-1%) Note: Cal-silica 3/8" x 1/4"
210							
211							
212							
213							
214	--no sample-- (Interval did not produce.) 12/12/2018 10:15						
215							
216		Topock - Alluvium Deposits	ML				
217							
218					(217.0 - 247.0') 4" Borehole		
219							
220							


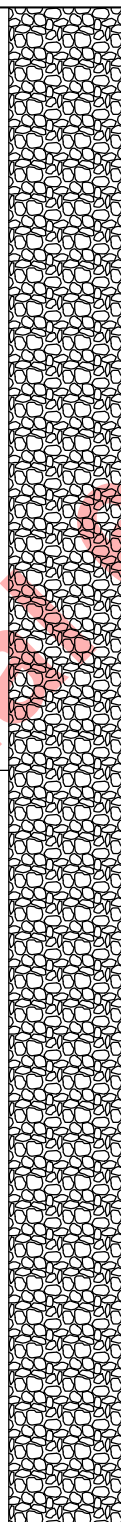

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Date Started:	12/02/2018	Surface Elevation:	480.8 ft amsl	Well ID: IRZ-9 Pilot
Date Completed:	01/03/2019	Northing (NAD83):	2103560.0	
Drilling Co.:	Cascade	Easting (NAD83):	7615565.9	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	317 ft bgs	Project: Final GW Remedy Phase I
Driller Name:	Nick Petrone	Borehole Diameter:	6-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	T. Aylmer/J. Candelaria	Depth to First Water:	24.84 ft bgs	
Logger:	A. Garcia / G. Willford	Editor:	Sean McGrane	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
221							
222							
223							
224							
225							
226							
227		Topock - Alluvium Deposits	SM				
228							
229							
230					(5.0 - 287.0') Pea Gravel	(217.0 - 247.0') 4" Borehole	(5.0 - 287.0') 121.6 bags
231							(5.0 - 287.0') 120 bags (-1%) Note: Cal-silica 3/8" x 1/4"
232							
233							
234	IRZ-9-VAS-232-237 (<0.17 U ppb) 12/13/2018 15:48						
235		Topock - Alluvium Deposits	ML				
236							
237							
238		Topock - Alluvium Deposits	ML				
239							
240							

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Drilling Co.:	Cascade	Easting (NAD83):	7615565.9	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	317 ft bgs	Project: Final GW Remedy Phase I
Driller Name:	Nick Petrone	Borehole Diameter:	6-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	T. Aylmer/J. Candelaria	Depth to First Water:	24.84 ft bgs	
Logger:	A. Garcia / G. Willford	Editor:	Sean McGrane	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction		Calculated Material Volumes	Material Volumes Installed
241		Topock - Alluvium Deposits	ML			(217.0 - 247.0') 4" Borehole		
242								
243								
244								
245								
246								
247								
248		Topock - Alluvium Deposits	GM			(5.0 - 287.0') Pea Gravel	(5.0 - 287.0') 121.6 bags	(5.0 - 287.0') 120 bags (-1%) Note: Cal-silica 3/8" x 1/4"
249								
250								
251								
252								
253								
254								
255								
256								
257								
258								
259								
260								

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started:	12/02/2018	Surface Elevation:	480.8 ft amsl	Well ID: IRZ-9 Pilot
Date Completed:	01/03/2019	Northing (NAD83):	2103560.0	
Drilling Co.:	Cascade	Easting (NAD83):	7615565.9	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	317 ft bgs	Project: Final GW Remedy Phase I
Driller Name:	Nick Petrone	Borehole Diameter:	6-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	T. Aylmer/J. Candelaria	Depth to First Water:	24.84 ft bgs	
Logger:	A. Garcia / G. Willford	Editor:	Sean McGrane	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
261							
262							
263		Topock - Alluvium Deposits	GM				
264							
265	IRZ-9-VAS-264-269 (<0.17 U ppb) 12/15/2018 09:15						
266							
267		Topock - Alluvium Deposits	ML/MH				
268							
269							
270		Topock - Alluvium Deposits	GM		(5.0 - 287.0') Pea Gravel	(5.0 - 287.0') 121.6 bags	(5.0 - 287.0') 120 bags (-1%) Note: Cal-silica 3/8" x 1/4"
271							
272							
273							
274							
275		Topock - Alluvium Deposits	ML				
276							
277							
278	IRZ-9-VAS-276-281 (<0.17 U ppb) 12/16/2018 09:15						
279		Topock - Alluvium Deposits	GM				
280							

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Date Started:	12/02/2018	Surface Elevation:	480.8 ft amsl	Well ID: IRZ-9 Pilot
Date Completed:	01/03/2019	Northing (NAD83):	2103560.0	
Drilling Co.:	Cascade	Easting (NAD83):	7615565.9	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	317 ft bgs	Project: Final GW Remedy Phase I
Driller Name:	Nick Petrone	Borehole Diameter:	6-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	T. Aylmer/J. Candelaria	Depth to First Water:	24.84 ft bgs	
Logger:	A. Garcia / G. Willford	Editor:	Sean McGrane	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
281		Topock - Alluvium Deposits	GM				
282							
283		Topock - Alluvium Deposits	NR				
284					(5.0 - 287.0') Pea Gravel	(5.0 - 287.0') 121.6 bags	(5.0 - 287.0') 120 bags (-1%) Note: Cal-silica 3/8" x 1/4"
285							
286		Topock - Alluvium Deposits	GM				
287							
288							
289		Topock - Alluvium Deposits	ML				
290							
291							
292					(287.0 - 297.0') Filter Pack (#2/12 Sand)	(287.0 - 297.0') 4.2 bags	(287.0 - 297.0') 6 bags (43%) Note: Lapis Lustre Sand
293							
294	IRZ-9-VAS-292-297 (<0.17 U ppb) 12/18/2018 14:55	Topock - Alluvium Deposits	GM				
295							
296							
297							
298		Topock - Weathered Bedrock - conglomerate	GM		(297.0 - 317.0') Bentonite seal chips	(297.0 - 317.0') 5.8 bags	(297.0 - 317.0') 75 bags (1193%) Note: Pure Gold Medium Chips
299							
300							

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Date Started:	12/02/2018	Surface Elevation:	480.8 ft amsl	Well ID: IRZ-9 Pilot
Date Completed:	01/03/2019	Northing (NAD83):	2103560.0	
Drilling Co.:	Cascade	Easting (NAD83):	7615565.9	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	317 ft bgs	Project: Final GW Remedy Phase I
Driller Name:	Nick Petrone	Borehole Diameter:	6-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	T. Aylmer/J. Candelaria	Depth to First Water:	24.84 ft bgs	
Logger:	A. Garcia / G. Willford	Editor:	Sean McGrane	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
301							
302							
303		Topock - Weathered Bedrock - conglomerate	GM				
304							
305							
306							
307							
308		Topock - Weathered Bedrock - conglomerate	MH		(297.0 - 317.0') Bentonite seal chips	(297.0 - 317.0') 5.8 bags	(297.0 - 317.0') 75 bags (1193%) Note: Pure Gold Medium Chips
309							
310							
311							
312							
313							
314	--no sample-- (Interval did not produce.) 12/18/2018 10:15	Topock - Weathered Bedrock - conglomerate	GM				
315							
316							
317							
318							
319							
320							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started:	11/16/2018	Surface Elevation:	481.5 ft amsl	Boring No.: IRZ-13 Pilot	
Date Completed:	12/01/2018	Northing (NAD83):	2103309.6		
Drilling Co.:	Cascade	Easting (NAD83):	7615707.4	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	243 ft bgs	Project:	Final Groundwater Remedy Phase
Drill Rig Type:	Borat Longyear Track Mount	Borehole Diameter:	6-12 inches	Location:	1
Driller Name:	Nick Petrone	Depth to First Water:	27.6 ft bgs	PG&E Topock, Needles, California	
Drilling Asst:	T. Aylmer/J. Candelaria	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number: RC000753.0051	
Logger:	A. Garcia/G. Jeffers	Sampling Interval:	Continuous		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
1	24						(0.0 - 16.5') Topock - Fill; Poorly graded sand with silt (SP); dark yellowish brown (10YR 4/4); very fine grained to fine grained, subangular to round; trace granule to small pebbles, subangular to round; trace silt; dry		(0.0 - 243.0') No water used
2									
3									
4	24							(2.0 - 5.0') Poor recovery due to compaction of sands in sample bag	
5									
6	27								
7									
8				Topock - Fill	SP				
9									
10									
11									
12	102								
13									
14									
15									
16									
17							(16.5 - 24.5') Topock - Fill; Silty sand (SM); strong brown (7.5YR 4/6); very fine grained to fine grained, subangular to round; and silt; little granule to small pebbles, subangular to round; moist		
18				Topock - Fill	SM				
19	108								
20									

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Date Started:	11/16/2018	Surface Elevation:	481.5 ft amsl	Boring No.: IRZ-13 Pilot	
Date Completed:	12/01/2018	Northing (NAD83):	2103309.6		
Drilling Co.:	Cascade	Easting (NAD83):	7615707.4	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	243 ft bgs	Project:	Final Groundwater Remedy Phase
Drill Rig Type:	Borat Longyear Track Mount	Borehole Diameter:	6-12 inches	Location:	1
Driller Name:	Nick Petrone	Depth to First Water:	27.6 ft bgs	PG&E Topock, Needles, California	
Drilling Asst:	T. Aylmer/J. Candelaria	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number: RC000753.0051	
Logger:	A. Garcia/G. Jeffers	Sampling Interval:	Continuous		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
21	108			Topock - Fill	SM				(0.0 - 243.0') No water used
22									
23									
24									
25				Topock - Alluvium Deposits	SM		(24.5 - 27.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); pale red (10R 6/2); very fine grained to very coarse grained, subangular; and silt; little granule to small pebbles, subangular to round; wet	(27.0') Approximate depth of water table	
26									
27			Topock - Alluvium Deposits	SM		(27.0 - 44.5') Topock - Alluvium Deposits; Silty sand (SM); pale brown (10YR 6/3); very fine grained to very coarse grained, subangular to round; some silt; little granule to small pebbles, subangular to round; moist			
28	IRZ-13-SS-25-30 12/2/2018 14:00								
29									
30	54								
31				Topock - Alluvium Deposits	SM				
32		IRZ-13-SS-30-35 12/2/2018 13:45							
33									
34									
35	54		IRZ-13-VAS-32-37 (220 ppb) 11/17/2018 15:00						
36									
37									
38		IRZ-13-SS-35-40 12/1/2018 09:00							
39	336								
40									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	11/16/2018	Surface Elevation:	481.5 ft amsl	Boring No.: IRZ-13 Pilot	
Date Completed:	12/01/2018	Northing (NAD83):	2103309.6		
Drilling Co.:	Cascade	Easting (NAD83):	7615707.4	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	243 ft bgs	Project:	Final Groundwater Remedy Phase
Drill Rig Type:	Borat Longyear Track Mount	Borehole Diameter:	6-12 inches	Location:	1
Driller Name:	Nick Petrone	Depth to First Water:	27.6 ft bgs	PG&E Topock, Needles, California	
Drilling Asst:	T. Aylmer/J. Candelaria	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number: RC000753.0051	
Logger:	A. Garcia/G. Jeffers	Sampling Interval:	Continuous		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
41									(0.0 - 243.0') No water used
42		IRZ-13-SS-40-45 12/1/2018 09:15		Topock - Alluvium Deposits	SM				
43									
44									
45				Topock - Alluvium Deposits	SM		(44.5 - 46.0') Topock - Alluvium Deposits; Sandy silt with gravel (SM); brown (10YR 4/3); very fine grained to very coarse grained, subangular to round; some small to large pebbles, subangular; some silt; moist		
46									
47		IRZ-13-SS-45-50 12/1/2018 09:30		Topock - Alluvium Deposits	ML		(46.0 - 47.0') Topock - Alluvium Deposits; Sandy silt (ML); brown (10YR 4/3); and very fine to fine grained sand, subangular; moist; iron oxide staining		
48									
49									
50	336			Topock - Alluvium Deposits	SM		(47.0 - 53.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); pink (7.5YR 7/4); very fine grained to very coarse grained, subangular to round; some granule to small pebbles, subangular to round; some silt; wet		
51									
52		IRZ-13-SS-50-55 12/1/2018 10:10							
53									
54									
55				Topock - Alluvium Deposits	SM		(53.0 - 57.0') Topock - Alluvium Deposits; Silty sand (SM); light red (2.5YR 6/6); very fine grained to very coarse grained, subangular; little silt; trace granule to small pebbles, subangular; moist		
56									
57		IRZ-13-SS-55-60 12/1/2018 10:15							
58			IRZ-13-VAS-57-62 (<0.17 U ppb) 11/18/2018 11:50	Topock - Alluvium Deposits	SM		(57.0 - 64.5') Topock - Alluvium Deposits; Silty sand (SM); pinkish gray / grayish orange pink(5YR 7/2); very fine grained to very coarse grained, subangular to round; some silt; trace granule to small pebbles, subangular to round; wet		
59									
60									

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Date Started:	11/16/2018	Surface Elevation:	481.5 ft amsl	Boring No.: IRZ-13 Pilot	
Date Completed:	12/01/2018	Northing (NAD83):	2103309.6		
Drilling Co.:	Cascade	Easting (NAD83):	7615707.4	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	243 ft bgs	Project:	Final Groundwater Remedy Phase
Drill Rig Type:	Borat Longyear Track Mount	Borehole Diameter:	6-12 inches	Location:	1
Driller Name:	Nick Petrone	Depth to First Water:	27.6 ft bgs	PG&E Topock, Needles, California	
Drilling Asst:	T. Aylmer/J. Candelaria	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number: RC000753.0051	
Logger:	A. Garcia/G. Jeffers	Sampling Interval:	Continuous		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
61			IRZ-13-VAS-57-62 (<0.17 U ppb) 11/18/2018 11:50						(0.0 - 243.0') No water used
62		IRZ-13-SS-60-65 12/1/2018 10:30		Topock - Alluvium Deposits	SM				
63	336								
64									
65							(64.5 - 67.0') Topock - Alluvium Deposits; Silty sand (SM); pale yellow (2.5Y 7/4); very fine grained to very coarse grained, subangular to round; and silt; trace granule to small pebbles, subangular to round; moist		
66				Topock - Alluvium Deposits	SM				
67		IRZ-13-SS-65-70 12/1/2018 10:45					(67.0 - 77.0') Topock - Alluvium Deposits; Silty sand (SM); pink (5YR 7/3); very fine grained to very coarse grained, subangular to round; and silt; trace granule to small pebbles, subangular to round; moist		
68									
69									
70									
71									
72		IRZ-13-SS-70-75 12/1/2018 11:00		Topock - Alluvium Deposits	SM				
73	336								
74									
75									
76									
77		IRZ-13-SS-75-80 12/1/2018 11:30					(77.0 - 87.5') Topock - Alluvium Deposits; Silty sand (SM); very pale brown (10YR 7/3); very fine grained to very coarse grained, subangular to round; some silt; trace granule to small pebbles, subangular; moist		
78				Topock - Alluvium Deposits	SM				
79									
80									

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




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Date Started:	11/16/2018	Surface Elevation:	481.5 ft amsl	Boring No.: IRZ-13 Pilot	
Date Completed:	12/01/2018	Northing (NAD83):	2103309.6		
Drilling Co.:	Cascade	Easting (NAD83):	7615707.4	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	243 ft bgs	Project:	Final Groundwater Remedy Phase
Drill Rig Type:	Borat Longyear Track Mount	Borehole Diameter:	6-12 inches	Location:	1
Driller Name:	Nick Petrone	Depth to First Water:	27.6 ft bgs	PG&E Topock, Needles, California	
Drilling Asst:	T. Aylmer/J. Candelaria	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number: RC000753.0051	
Logger:	A. Garcia/G. Jeffers	Sampling Interval:	Continuous		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
81									(0.0 - 243.0') No water used
82									
83		IRZ-13-SS-80-85 12/1/2018 11:50		Topock - Alluvium Deposits	SM				
84									
85									
86									
87		IRZ-13-SS-85-90 12/6/2018 12:00		Topock - Alluvium Deposits			(87') Topock - Alluvium Deposits; pink (5YR 7/4)		
88	336						(87.5 - 97.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); light reddish brown(2.5YR 7/3); granules to small pebbles, subangular to round; some very fine to very coarse grained sand, subangular; some silt; moist		
89									
90									
91									
92		IRZ-13-SS-90-95 12/1/2018 12:10		Topock - Alluvium Deposits	GM				
93									
94									
95									
96									
97									
98	120	IRZ-13-SS-95-100 12/1/2018 12:30		Topock - Alluvium Deposits	GP-GM		(97.0 - 99.0') Topock - Alluvium Deposits; Poorly graded gravel with silt (GP-GM); light reddish brown / light brown(5YR 6/4); granules to small pebbles, subangular to round; some very fine to very coarse grained sand, subangular; little silt; moist		
99									
100				Topock - Alluvium Deposits	SM		(99.0 - 107.0') Topock - Alluvium Deposits; Silty sand (SM); light reddish brown / light brown(5YR 6/4); very fine grained to very coarse grained, subangular to round; some silt; trace granule to		

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	11/16/2018	Surface Elevation:	481.5 ft amsl	Boring No.: <u>IRZ-13 Pilot</u>	
Date Completed:	12/01/2018	Northing (NAD83):	2103309.6		
Drilling Co.:	Cascade	Easting (NAD83):	7615707.4	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	243 ft bgs	Project:	Final Groundwater Remedy Phase
Drill Rig Type:	Borat Longyear Track Mount	Borehole Diameter:	6-12 inches	Location:	1
Driller Name:	Nick Petrone	Depth to First Water:	27.6 ft bgs	PG&E Topock, Needles, California	
Drilling Asst:	T. Aylmer/J. Candelaria	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number: RC000753.0051	
Logger:	A. Garcia/G. Jeffers	Sampling Interval:	Continuous		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
101	120	IRZ-13-SS-100-105 12/1/2018 12:40	IRZ-13-VAS-102-107 (<0.17 U ppb) 11/19/2018 09:30	Topock - Alluvium Deposits	SM		small pebbles, subangular to round; moist		(0.0 - 243.0') No water used
102									
103									
104									
105									
106	324	IRZ-13-SS-105-110 12/1/2018 12:50		Topock - Alluvium Deposits	ML		(107.0 - 109.5') Topock - Alluvium Deposits; Sandy silt with gravel (ML); brown (10YR 4/3); low plasticity; some very fine to very coarse grained sand, angular to subangular; little granule to very large pebbles, angular; wet; very stiff		
108									
109									
110									
111									
112		IRZ-13-SS-110-115 12/1/2018 13:05		Topock - Alluvium Deposits	SM		(109.5 - 112.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); dark yellowish brown (10YR 4/4); very fine grained to very coarse grained, subangular to subround; little granule to small pebbles, subangular to round; little silt; wet		
113									
114									
115									
116									
117		IRZ-13-SS-115-120 12/1/2018 13:15		Topock - Alluvium Deposits	GM		(112.0 - 114.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); olive brown (2.5Y 4/3); granules to large pebbles, subangular to round; some very fine to very coarse grained sand, angular to subangular; some silt; wet		
118									
119									
120									
				Topock - Alluvium Deposits	SM		(114.0 - 117.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown / moderate brown(5YR 4/4); very fine grained to very coarse grained, angular to subangular; some granule to very large pebbles, angular; little silt; trace cobbles, angular; wet		
				Topock - Alluvium Deposits	SM		(117.0 - 123.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (5YR 4/3); very fine grained to very coarse grained, angular to subangular; some granules to very large pebbles, angular to subangular; some silt; wet; weak cementation; 4" lens of green metadiorite		

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Date Started:	11/16/2018	Surface Elevation:	481.5 ft amsl	Boring No.: <u>IRZ-13 Pilot</u>	
Date Completed:	12/01/2018	Northing (NAD83):	2103309.6		
Drilling Co.:	Cascade	Easting (NAD83):	7615707.4	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	243 ft bgs	Project:	Final Groundwater Remedy Phase
Drill Rig Type:	Borat Longyear Track Mount	Borehole Diameter:	6-12 inches	Location:	1
Driller Name:	Nick Petrone	Depth to First Water:	27.6 ft bgs	PG&E Topock, Needles, California	
Drilling Asst:	T. Aylmer/J. Candelaria	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number: RC000753.0051	
Logger:	A. Garcia/G. Jeffers	Sampling Interval:	Continuous		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
121				Topock - Alluvium Deposits	SM				(0.0 - 243.0') No water used
122									
123		IRZ-13-SS-120-125 12/1/2018 14:35		Topock - Alluvium Deposits	SM		(123.0 - 126.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown / moderate brown(5YR 4/4); very fine grained to very coarse grained, angular to subangular; and granules to very large pebbles, angular to subangular; little silt; trace mica; wet; weak cementation; 4" lens of silty gravel with sand		
124									
125									
126									
127		IRZ-13-SS-125-130 12/1/2018 14:45		Topock - Alluvium Deposits	SM		(126.0 - 132.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown / moderate brown(5YR 4/4); very fine grained to very coarse grained, angular to subangular; some granules to very large pebbles, angular to subangular; some silt; little mica; wet; weak cementation (127'); little silt		
128									
129	324						(128'); some silt; little granules to very large pebbles, angular to subangular; trace mica (128.5'); some granules to very large pebbles, angular to subangular; little silt; trace cobbles, angular		
130									
131									
132		IRZ-13-SS-130-135 12/1/2018 08:30		Topock - Alluvium Deposits	GM		(132.0 - 133.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); reddish brown / moderate brown(5YR 4/4); granules to very large pebbles, angular to subround; some very fine to very coarse grained sand, angular to subround; some silt; trace mica; wet		
133									
134				Topock - Alluvium Deposits	SM		(133.0 - 137.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown / moderate brown(5YR 4/4); very fine grained to very coarse grained, angular to subround; some granules to very large pebbles, angular to subangular; little silt; trace caliche; wet		
135									
136									
137		IRZ-13-SS-135-140 12/2/2018 08:45		Topock - Alluvium Deposits	ML		(137.0 - 142.5') Topock - Alluvium Deposits; Sandy silt with gravel (ML); reddish brown / moderate brown(5YR 4/4); medium plasticity; some medium to large pebbles, angular; some very fine to very coarse grained sand, angular to subround; trace clay; moist; hard; moderate cementation		
138	108								
139									
140									

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Date Started:	11/16/2018	Surface Elevation:	481.5 ft amsl	Boring No.: <u>IRZ-13 Pilot</u>	
Date Completed:	12/01/2018	Northing (NAD83):	2103309.6		
Drilling Co.:	Cascade	Easting (NAD83):	7615707.4	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	243 ft bgs	Project:	Final Groundwater Remedy Phase
Drill Rig Type:	Borat Longyear Track Mount	Borehole Diameter:	6-12 inches	Location:	1
Driller Name:	Nick Petrone	Depth to First Water:	27.6 ft bgs	PG&E Topock, Needles, California	
Drilling Asst:	T. Aylmer/J. Candelaria	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number: RC000753.0051	
Logger:	A. Garcia/G. Jeffers	Sampling Interval:	Continuous		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
141	108	IRZ-13-SS-140-145 12/2/2018 08:55		Topock - Alluvium Deposits	ML				(0.0 - 243.0') No water used
142									
143		IRZ-13-VAS-142-147 (<0.17 U ppb) 11/19/2018 14:35		Topock - Alluvium Deposits	SM		(142.5 - 147.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown / moderate brown(5YR 4/4); very fine grained to very coarse grained, subangular to subround; some granules to very large pebbles, angular to subangular; some silt; trace caliche; wet		
144									
145	324	IRZ-13-SS-145-150 12/2/2018 09:15		Topock - Alluvium Deposits	GM		(146'); little silt; increase in gravel		
146									
147									
148									
149		IRZ-13-SS-150-155 12/2/2018 09:20		Topock - Alluvium Deposits	ML		(147.0 - 149.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); reddish brown / moderate brown(5YR 4/4); granules to medium pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subround; some silt; trace large to very large pebbles, angular to subangular; wet		
150				Topock - Alluvium Deposits	SM		(149.0 - 150.0') Topock - Alluvium Deposits; Sandy silt with gravel (ML); reddish brown / moderate brown(5YR 4/4); medium plasticity; some very fine to very coarse grained sand, angular to subangular; little granule to very large pebbles, angular; moist; hard; weak cementation		
151				Topock - Alluvium Deposits	SM		(150.0 - 152.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown / moderate brown(5YR 4/4); very fine grained to very coarse grained, angular to subround; some granules to very large pebbles, angular to subangular; some silt; wet		
152									
153		IRZ-13-SS-155-160 12/2/2018 16:56		Topock - Alluvium Deposits	GM		(152.0 - 155.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); reddish brown / moderate brown(5YR 4/4); granules to very large pebbles, subangular; some very fine to very coarse grained sand, angular to subround; some silt		
154									
155									
156				Topock - Alluvium Deposits	SM		(155.0 - 161.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown / moderate brown(5YR 4/4); very fine grained to very coarse grained, angular to subround; some granules to very large pebbles, angular to subangular; some silt; trace mica; moist		
157									
158									
159									
160									

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Date Started:	11/16/2018	Surface Elevation:	481.5 ft amsl	Boring No.: IRZ-13 Pilot	
Date Completed:	12/01/2018	Northing (NAD83):	2103309.6		
Drilling Co.:	Cascade	Easting (NAD83):	7615707.4	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	243 ft bgs	Project:	Final Groundwater Remedy Phase
Drill Rig Type:	Borat Longyear Track Mount	Borehole Diameter:	6-12 inches	Location:	1
Driller Name:	Nick Petrone	Depth to First Water:	27.6 ft bgs	PG&E Topock, Needles, California	
Drilling Asst:	T. Aylmer/J. Candelaria	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number: RC000753.0051	
Logger:	A. Garcia/G. Jeffers	Sampling Interval:	Continuous		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
161				Topock - Alluvium Deposits	SM				(0.0 - 243.0') No water used
162		IRZ-13-SS-160-165 12/2/2018 09:40					(161.0 - 171.0') Topock - Alluvium Deposits; Sandy silt with gravel (ML); reddish brown / moderate brown(5YR 4/4); low plasticity; some granules to very large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subround; moist		
163									
164									
165									
166				Topock - Alluvium Deposits	ML				
167		IRZ-13-SS-165-170 12/2/2018 09:50							
168									
169	324								
170									
171									
172		IRZ-13-SS-170-175 12/2/2018 10:00		Topock - Alluvium Deposits	SM		(171.0 - 176.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); yellowish red / light brown(5YR 5/6); very fine grained to very coarse grained, angular to subround; some granules to very large pebbles, subangular to subround; some silt; moist		
173									
174									
175									
176									
177		IRZ-13-SS-175-180 12/2/2018 10:10		Topock - Alluvium Deposits	SM		(176.0 - 187.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); yellowish red / light brown(5YR 5/6); very fine grained to very coarse grained, angular to subround; some granules to very large pebbles, angular to subangular; some silt; moist; gravel layer 6" thick		
178									
179									
180									

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Date Started:	11/16/2018	Surface Elevation:	481.5 ft amsl	Boring No.: <u>IRZ-13 Pilot</u>	
Date Completed:	12/01/2018	Northing (NAD83):	2103309.6		
Drilling Co.:	Cascade	Easting (NAD83):	7615707.4	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	243 ft bgs	Project:	Final Groundwater Remedy Phase
Drill Rig Type:	Borat Longyear Track Mount	Borehole Diameter:	6-12 inches	Location:	1
Driller Name:	Nick Petrone	Depth to First Water:	27.6 ft bgs	PG&E Topock, Needles, California	
Drilling Asst:	T. Aylmer/J. Candelaria	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number: RC000753.0051	
Logger:	A. Garcia/G. Jeffers	Sampling Interval:	Continuous		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
181							(181'); little granules to very large pebbles, angular to subangular; increase in sand		(0.0 - 243.0') No water used
182		IRZ-13-SS-180-185 12/2/2018 15:07	IRZ-13-VAS-180-185 (190 ppb) 11/27/2018 12:35	Topock - Alluvium Deposits	SM				
183									
184									
185									
186									
187		IRZ-13-SS-185-190 12/2/2018 10:15					(187.0 - 197.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown / moderate brown(5YR 4/4); very fine grained to very coarse grained, angular to subangular; some granules to very large pebbles, subangular to subround; some silt; moist		
188									
189									
190									
191							(190'); and granules to very large pebbles, angular to subangular; little silt; increase in sand		
192	108	IRZ-13-SS-190-195 12/2/2018 10:20		Topock - Alluvium Deposits	SM		(192'); saturated	(192.0 - 197.0') Saturated sands	
193							(193'); some granules to very large pebbles, angular to subangular; little silt; little mica; increase in sand		
194									
195									
196									
197		IRZ-13-SS-195-200 12/2/2018 10:30	IRZ-13-VAS-197-202 (<0.83 ppb) 11/28/2018 09:15	Topock - Alluvium Deposits	SM		(197.0 - 202.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); weak red / pale reddish brown(10R 5/4); very fine grained to coarse grained, angular to subround; some granule to small pebbles, subangular to subround; some silt; trace boulders; trace mica; coarser clast composed of conglomerate; saturated	(197.0 - 202.0') Observed coarser very saturated zone	
198	108								
199									
200									

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Date Started:	11/16/2018	Surface Elevation:	481.5 ft amsl	Boring No.: IRZ-13 Pilot	
Date Completed:	12/01/2018	Northing (NAD83):	2103309.6		
Drilling Co.:	Cascade	Easting (NAD83):	7615707.4	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	243 ft bgs	Project:	Final Groundwater Remedy Phase
Drill Rig Type:	Borat Longyear Track Mount	Borehole Diameter:	6-12 inches	Location:	1
Driller Name:	Nick Petrone	Depth to First Water:	27.6 ft bgs	PG&E Topock, Needles, California	
Drilling Asst:	T. Aylmer/J. Candelaria	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number: RC000753.0051	
Logger:	A. Garcia/G. Jeffers	Sampling Interval:	Continuous		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
201			IRZ-13-VAS-197-202 (<0.83 ppb) 11/28/2018 09:15	Topock - Alluvium Deposits	SM		(200'); conglomerate boulder	(197.0 - 202.0') Observed coarser very saturated zone	(0.0 - 243.0') No water used
202		IRZ-13-SS-200-205 12/2/2018 10:35					(201'); 6" gravel layer		
203	108								
204									
205									
206				Topock - Alluvium Deposits	SM		(202.0 - 209.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); light reddish brown / light brown(5YR 6/4); very fine grained to very coarse grained, angular to subangular; some silt; little granules to medium pebbles, angular to subangular; trace mica; moist		
207		IRZ-13-SS-205-210 12/2/2018 10:40							
208									
209									
210									
211							(209.5 - 224.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); red (2.5YR 4/8); very fine grained to very coarse grained, angular to subangular; some granules to very large pebbles, angular to subangular; some silt; trace cobbles, angular; little mica; moist; weak cementation		
212	108	IRZ-13-SS-210-215 12/2/2018 10:45							
213									
214									
215				Topock - Alluvium Deposits	SM				
216									
217		IRZ-13-SS-215-220 12/2/2018 11:00					(216'); 6" layer of metadiorite gravel		
218	108								
219									
220									



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Date Started:	11/16/2018	Surface Elevation:	481.5 ft amsl	Boring No.: <u>IRZ-13 Pilot</u>	
Date Completed:	12/01/2018	Northing (NAD83):	2103309.6		
Drilling Co.:	Cascade	Easting (NAD83):	7615707.4	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	243 ft bgs	Project:	Final Groundwater Remedy Phase
Drill Rig Type:	Borat Longyear Track Mount	Borehole Diameter:	6-12 inches	Location:	1
Driller Name:	Nick Petrone	Depth to First Water:	27.6 ft bgs	PG&E Topock, Needles, California	
Drilling Asst:	T. Aylmer/J. Candelaria	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number: RC000753.0051	
Logger:	A. Garcia/G. Jeffers	Sampling Interval:	Continuous		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
221	108	IRZ-13-SS-220-225 12/2/2018 11:15		Topock - Alluvium Deposits	SM		(223'); 12" layer of metadiorite gravel		(0.0 - 243.0') No water used
222									
223									
224									
225	108	IRZ-13-VAS-224-229 (<0.83 ppb) 11/28/2018 16:00		Topock - Weathered Bedrock - conglomerate	SM		(224.5 - 227.0') Topock - Weathered Bedrock - conglomerate; Silty sand with gravel (SM); red (2.5YR 4/6); very fine grained to very coarse grained, angular to subangular; some granules to very large pebbles, angular to subangular; some silt; trace cobbles, angular to subangular; little mica; wet; weak cementation		(227.0') Saturated zone at bottom of 217 to 227 f. bgs run
226									
227									
228									
229	108	IRZ-13-SS-225-230 12/2/2018 11:30		Topock - Weathered Bedrock - conglomerate	ML		(227.0 - 237.0') Topock - Weathered Bedrock - conglomerate; Sandy silt with gravel (ML); red (2.5YR 5/8); low plasticity; some very fine to very coarse grained sand, angular to subangular; little granules to large pebbles, angular to subangular; dry to moist; weak cementation		(237.0 - 243.0') Driller stops advancement of 10 foot run at 243 feet bgs core barrel plugged up preventing smooth advancement
230									
231									
232									
233	72	IRZ-13-VAS-237-242 (<0.17 U ppb) 11/29/2018 13:20		Topock - Weathered Bedrock - conglomerate	SM		(237.0 - 242.0') Topock - Weathered Bedrock - conglomerate; Silty sand with gravel (SM); red (2.5YR 4/8); very fine grained to very coarse grained, angular to subangular; some silt; little granules to very large pebbles, angular to subangular; little mica; moist		
234									
235									
236									
237	72	IRZ-13-VAS-237-242 (<0.17 U ppb) 11/29/2018 13:20		Topock - Weathered Bedrock - conglomerate	SM		(237.0 - 242.0') Topock - Weathered Bedrock - conglomerate; Silty sand with gravel (SM); red (2.5YR 4/8); very fine grained to very coarse grained, angular to subangular; some silt; little granules to very large pebbles, angular to subangular; little mica; moist		
238									
239									
240									

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Date Started:	11/16/2018	Surface Elevation:	481.5 ft amsl	Boring No.: IRZ-13 Pilot	
Date Completed:	12/01/2018	Northing (NAD83):	2103309.6		
Drilling Co.:	Cascade	Easting (NAD83):	7615707.4	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	243 ft bgs	Project:	Final Groundwater Remedy Phase
Drill Rig Type:	Borat Longyear Track Mount	Borehole Diameter:	6-12 inches	Location:	1
Driller Name:	Nick Petrone	Depth to First Water:	27.6 ft bgs	PG&E Topock, Needles, California	
Drilling Asst:	T. Aylmer/J. Candelaria	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number: RC000753.0051	
Logger:	A. Garcia/G. Jeffers	Sampling Interval:	Continuous		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
241	72		IRZ-13-VAS-237-242 (<0.17 U ppb) 11/29/2018 13:20	Topock - Weathered Bedrock - conglomerate	SM			(237.0 - 243.0') Driller stops advancement of 10 foot run at 243 feet bgs core barrel plugged up preventing smooth advancement	(0.0 - 243.0') No water used
242				Topock - Competent Bedrock - conglomerate			(242.0 - 243.0') Topock - Competent Bedrock - conglomerate; red (10R 5/8); dry; moderate cementation; friable		
243							End of Boring at 243.0' bgs.		
244									
245									
246									
247									
248									
249									
250									
251									
252									
253									
254									
255									
256									
257									
258									
259									
260									

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SOIL BORING LOG PG&E TOPOCK C:\USERS\SMCGRANE\DOCUMENTS\PG&E TOPOCK\DRAFT BORING LOGS\GINT FILES\06.02.19\TOPOCK DATABASE FOR PLOG.GPJ TOPOCK DATA TEMPLATE FOR PLOG.GDT 06/02/19 13:59

Date Started:	11/16/2018	Surface Elevation:	481.5 ft amsl	Well ID: IRZ-13 Pilot
Date Completed:	12/01/2018	Northing (NAD83):	2103309.6	
Drilling Co.:	Cascade	Easting (NAD83):	7615707.4	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	243 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Nick Petrone	Borehole Diameter:	6-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	T. Aylmer/J. Candelaria	Depth to First Water:	27.6 ft bgs	
Logger:	A. Garcia/G. Jeffers	Editor:	Sean McGrane	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
1					(0.0 - 0.5') Temporary Steel Plate with BMP	(0.0 - 0.5') 1	(0.0 - 0.5') 1 (0%)
2					(0.5 - 5.0') Plastering Sand	(0.5 - 5.0') 9.9 bags	(0.5 - 5.0') 5 bags (-49%) Note: Wildcat Washed, loose dredge sands collapsed during removal of 12 inch conductor casing resulting in less bags need to backfill
3					(0.0 - 8.0') 12" Borehole		
4							
5							
6							
7							
8		Topock - Fill	SP				
9							
10							
11							
12							
13					(5.0 - 217.0') Cemex # 2/12 Mesh (16x30)	(5.0 - 217.0') 93.6 bags	(5.0 - 217.0') 100 bags (7%) Note: Lapis Lustre Sand
14					(8.0 - 243.0') 6" Borehole		
15							
16							
17							
18		Topock - Fill	SM				
19							
20							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started:	11/16/2018	Surface Elevation:	481.5 ft amsl	Well ID: IRZ-13 Pilot
Date Completed:	12/01/2018	Northing (NAD83):	2103309.6	
Drilling Co.:	Cascade	Easting (NAD83):	7615707.4	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	243 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Nick Petrone	Borehole Diameter:	6-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	T. Aylmer/J. Candelaria	Depth to First Water:	27.6 ft bgs	
Logger:	A. Garcia/G. Jeffers	Editor:	Sean McGrane	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
21							
22		Topock - Fill	SM				
23							
24							
25		Topock - Alluvium Deposits	SM				
26							
27							
28							
29							
30					(5.0 - 217.0') Cemex # 2/12 Mesh (16x30)	(8.0 - 243.0') 6" Borehole	(5.0 - 217.0') 93.6 bags
31							(5.0 - 217.0') 100 bags (7%) Note: Lapis Lustre Sand
32							
33							
34	IRZ-13-VAS-32-37 (220 ppb) 11/17/2018 15:00	Topock - Alluvium Deposits	SM				
35							
36							
37							
38							
39							
40							

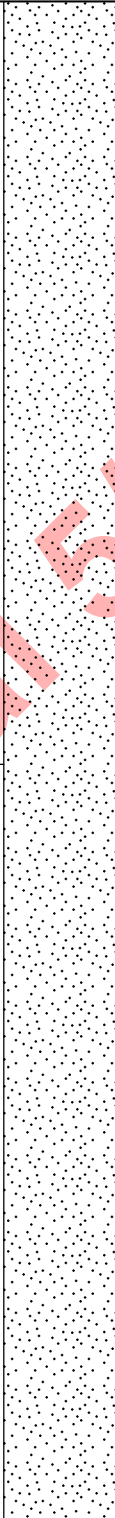
Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started:	11/16/2018	Surface Elevation:	481.5 ft amsl	Well ID: IRZ-13 Pilot
Date Completed:	12/01/2018	Northing (NAD83):	2103309.6	
Drilling Co.:	Cascade	Easting (NAD83):	7615707.4	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	243 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Nick Petrone	Borehole Diameter:	6-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	T. Aylmer/J. Candelaria	Depth to First Water:	27.6 ft bgs	
Logger:	A. Garcia/G. Jeffers	Editor:	Sean McGrane	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction		Calculated Material Volumes	Material Volumes Installed
41								
42		Topock - Alluvium Deposits	SM					
43								
44								
45		Topock - Alluvium Deposits	SM					
46								
47		Topock - Alluvium Deposits	ML					
48								
49								
50		Topock - Alluvium Deposits	SM		(5.0 - 217.0') Cemex # 2/12 Mesh (16x30)	(8.0 - 243.0') 6" Borehole	(5.0 - 217.0') 93.6 bags	(5.0 - 217.0') 100 bags (7%) Note: Lapis Lustre Sand
51								
52								
53								
54								
55		Topock - Alluvium Deposits	SM					
56								
57								
58	IRZ-13-VAS-57-62 (<0.17 U ppb) 11/18/2018 11:50	Topock - Alluvium Deposits	SM					
59								
60								

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started:	11/16/2018	Surface Elevation:	481.5 ft amsl	Well ID: IRZ-13 Pilot
Date Completed:	12/01/2018	Northing (NAD83):	2103309.6	
Drilling Co.:	Cascade	Easting (NAD83):	7615707.4	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	243 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Nick Petrone	Borehole Diameter:	6-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	T. Aylmer/J. Candelaria	Depth to First Water:	27.6 ft bgs	
Logger:	A. Garcia/G. Jeffers	Editor:	Sean McGrane	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction			Calculated Material Volumes	Material Volumes Installed
61	IRZ-13-VAS-57-62 (<0.17 U ppb) 11/18/2018 11:50	Topock - Alluvium Deposits	SM			(8.0 - 243.0') 6" Borehole	(5.0 - 217.0') 93.6 bags	(5.0 - 217.0') 100 bags (7%) Note: Lapis Lustre Sand	
62									
63									
64									
65		Topock - Alluvium Deposits	SM						
66									
67									
68									
69		Topock - Alluvium Deposits	SM						
70									
71									
72									
73									
74									
75									
76									
77		Topock - Alluvium Deposits	SM						
78									
79									
80									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started:	11/16/2018	Surface Elevation:	481.5 ft amsl	Well ID: IRZ-13 Pilot
Date Completed:	12/01/2018	Northing (NAD83):	2103309.6	
Drilling Co.:	Cascade	Easting (NAD83):	7615707.4	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	243 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Nick Petrone	Borehole Diameter:	6-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	T. Aylmer/J. Candelaria	Depth to First Water:	27.6 ft bgs	
Logger:	A. Garcia/G. Jeffers	Editor:	Sean McGrane	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
81							
82							
83							
84		Topock - Alluvium Deposits	SM				
85							
86							
87		Topock - Alluvium Deposits					
88							
89							
90					(5.0 - 217.0') Cemex # 2/12 Mesh (16x30)		
91							
92		Topock - Alluvium Deposits	GM				
93							
94							
95							
96							
97							
98		Topock - Alluvium Deposits	GP-GM				
99							
100		Topock - Alluvium Deposits	SM				

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Date Started:	11/16/2018	Surface Elevation:	481.5 ft amsl	Well ID: IRZ-13 Pilot
Date Completed:	12/01/2018	Northing (NAD83):	2103309.6	
Drilling Co.:	Cascade	Easting (NAD83):	7615707.4	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	243 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Nick Petrone	Borehole Diameter:	6-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	T. Aylmer/J. Candelaria	Depth to First Water:	27.6 ft bgs	
Logger:	A. Garcia/G. Jeffers	Editor:	Sean McGrane	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
101							
102							
103							
104	IRZ-13-VAS-102-107 (<0.17 U ppb) 11/19/2018 09:30	Topock - Alluvium Deposits	SM				
105							
106							
107							
108		Topock - Alluvium Deposits	ML				
109							
110		Topock - Alluvium Deposits	SM		(5.0 - 217.0') Cemex # 2/12 Mesh (16x30)	(8.0 - 243.0') 6" Borehole	(5.0 - 217.0') 93.6 bags
111							
112		Topock - Alluvium Deposits	SM				
113		Topock - Alluvium Deposits	GM				
114							
115		Topock - Alluvium Deposits	SM				
116							
117							
118		Topock - Alluvium Deposits	SM				
119							
120							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started:	11/16/2018	Surface Elevation:	481.5 ft amsl	Well ID: IRZ-13 Pilot
Date Completed:	12/01/2018	Northing (NAD83):	2103309.6	
Drilling Co.:	Cascade	Easting (NAD83):	7615707.4	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	243 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Nick Petrone	Borehole Diameter:	6-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	T. Aylmer/J. Candelaria	Depth to First Water:	27.6 ft bgs	
Logger:	A. Garcia/G. Jeffers	Editor:	Sean McGrane	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
121		Topock - Alluvium Deposits	SM				
122							
123							
124		Topock - Alluvium Deposits	SM				
125							
126							
127							
128							
129		Topock - Alluvium Deposits	SM				
130					(5.0 - 217.0') Cemex # 2/12 Mesh (16x30)		
131							
132							
133		Topock - Alluvium Deposits	GM				
134							
135		Topock - Alluvium Deposits	SM				
136							
137							
138							
139		Topock - Alluvium Deposits	ML				
140							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started:	11/16/2018	Surface Elevation:	481.5 ft amsl	Well ID: IRZ-13 Pilot
Date Completed:	12/01/2018	Northing (NAD83):	2103309.6	
Drilling Co.:	Cascade	Easting (NAD83):	7615707.4	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	243 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Nick Petrone	Borehole Diameter:	6-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	T. Aylmer/J. Candelaria	Depth to First Water:	27.6 ft bgs	
Logger:	A. Garcia/G. Jeffers	Editor:	Sean McGrane	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
141		Topock - Alluvium Deposits	ML				
142							
143							
144	IRZ-13-VAS-142-147 (<0.17 U ppb) 11/19/2018 14:35	Topock - Alluvium Deposits	SM				
145							
146							
147							
148		Topock - Alluvium Deposits	GM				
149							
150		Topock - Alluvium Deposits	ML		(5.0 - 217.0') Cemex # 2/12 Mesh (16x30)	(8.0 - 243.0') 6" Borehole	(5.0 - 217.0') 93.6 bags
151		Topock - Alluvium Deposits	SM				(5.0 - 217.0') 100 bags (7%) Note: Lapis Lustre Sand
152							
153		Topock - Alluvium Deposits	GM				
154							
155							
156							
157		Topock - Alluvium Deposits	SM				
158							
159							
160							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started:	11/16/2018	Surface Elevation:	481.5 ft amsl	Well ID: IRZ-13 Pilot
Date Completed:	12/01/2018	Northing (NAD83):	2103309.6	
Drilling Co.:	Cascade	Easting (NAD83):	7615707.4	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	243 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Nick Petrone	Borehole Diameter:	6-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	T. Aylmer/J. Candelaria	Depth to First Water:	27.6 ft bgs	
Logger:	A. Garcia/G. Jeffers	Editor:	Sean McGrane	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
161		Topock - Alluvium Deposits	SM				
162							
163							
164							
165							
166		Topock - Alluvium Deposits	ML				
167							
168							
169							
170					(5.0 - 217.0') Cemex # 2/12 Mesh (16x30)	(8.0 - 243.0') 6" Borehole	(5.0 - 217.0') 93.6 bags
171							(5.0 - 217.0') 100 bags (7%) Note: Lapis Lustre Sand
172							
173		Topock - Alluvium Deposits	SM				
174							
175							
176							
177							
178		Topock - Alluvium Deposits	SM				
179							
180							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started:	11/16/2018	Surface Elevation:	481.5 ft amsl	Well ID: IRZ-13 Pilot
Date Completed:	12/01/2018	Northing (NAD83):	2103309.6	
Drilling Co.:	Cascade	Easting (NAD83):	7615707.4	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	243 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Nick Petrone	Borehole Diameter:	6-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	T. Aylmer/J. Candelaria	Depth to First Water:	27.6 ft bgs	
Logger:	A. Garcia/G. Jeffers	Editor:	Sean McGrane	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
181	IRZ-13-VAS-180-185 (190 ppb) 11/27/2018 12:35	Topock - Alluvium Deposits	SM				
182							
183							
184							
185							
186		Topock - Alluvium Deposits	SM		(5.0 - 217.0') Cemex # 2/12 Mesh (16x30)	(8.0 - 243.0') 6" Borehole	(5.0 - 217.0') 93.6 bags
187							
188							
189							
190							
191							
192							
193							
194							
195							
196		Topock - Alluvium Deposits	SM				
197							
198							
199							
200							
	IRZ-13-VAS-197-202 (<0.83 ppb) 11/28/2018 09:15	Topock - Alluvium Deposits	SM				

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started:	11/16/2018	Surface Elevation:	481.5 ft amsl	Well ID: IRZ-13 Pilot
Date Completed:	12/01/2018	Northing (NAD83):	2103309.6	
Drilling Co.:	Cascade	Easting (NAD83):	7615707.4	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	243 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Nick Petrone	Borehole Diameter:	6-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	T. Aylmer/J. Candelaria	Depth to First Water:	27.6 ft bgs	
Logger:	A. Garcia/G. Jeffers	Editor:	Sean McGrane	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
201	IRZ-13-VAS-197-202 (<0.83 ppb) 11/28/2018 09:15	Topock - Alluvium Deposits	SM				
202							
203							
204							
205							
206		Topock - Alluvium Deposits	SM				
207							
208							
209					(5.0 - 217.0') Cemex # 2/12 Mesh (16x30)	(5.0 - 217.0') 93.6 bags	(5.0 - 217.0') 100 bags (7%) Note: Lapis Lustre Sand
210							
211							
212							
213							
214							
215		Topock - Alluvium Deposits	SM				
216							
217							
218							
219							
220					(217.0 - 227.0') Plastering Sand	(217.0 - 227.0') 2.8 bags	(217.0 - 227.0') 4 bags (43%) Note: Wildcat Washed

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started:	11/16/2018	Surface Elevation:	481.5 ft amsl	Well ID: IRZ-13 Pilot
Date Completed:	12/01/2018	Northing (NAD83):	2103309.6	
Drilling Co.:	Cascade	Easting (NAD83):	7615707.4	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	243 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Nick Petrone	Borehole Diameter:	6-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	T. Aylmer/J. Candelaria	Depth to First Water:	27.6 ft bgs	
Logger:	A. Garcia/G. Jeffers	Editor:	Sean McGrane	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
221							
222							
223		Topock - Alluvium Deposits	SM		(217.0 - 227.0') Plastering Sand	(217.0 - 227.0') 2.8 bags	(217.0 - 227.0') 4 bags (43%) Note: Wildcat Washed
224							
225	IRZ-13-VAS-224-229 (<0.83 ppb) 11/28/2018 16:00	Topock - Weathered Bedrock - conglomerate	SM				
226							
227							
228							
229							
230					(227.0 - 233.0') Bentonite seal chips	(8.0 - 243.0') 6" Borehole	(227.0 - 233.0') 1.7 bags
231							
232		Topock - Weathered Bedrock - conglomerate	ML				
233							
234							
235							
236							
237					(233.0 - 243.0') Neat Portland Cement	(233.0 - 243.0') 15.7 gallons	(233.0 - 243.0') 20 gallons (27%) Note: Type I, II and V, grouted to 228 ft in casing, let set up over night and cleaned out casing to 233 ft. bgs.
238							
239	IRZ-13-VAS-237-242 (<0.17 U ppb) 11/29/2018 13:20	Topock - Weathered Bedrock - conglomerate	SM				
240							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started:	11/16/2018	Surface Elevation:	481.5 ft amsl	Well ID: IRZ-13 Pilot
Date Completed:	12/01/2018	Northing (NAD83):	2103309.6	
Drilling Co.:	Cascade	Easting (NAD83):	7615707.4	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	243 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Nick Petrone	Borehole Diameter:	6-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	T. Aylmer/J. Candelaria	Depth to First Water:	27.6 ft bgs	
Logger:	A. Garcia/G. Jeffers	Editor:	Sean McGrane	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction		Calculated Material Volumes	Material Volumes Installed
241	IRZ-13-VAS-237-242 (<0.17 U ppb) 11/29/2018 13:20	Topock - Weathered Bedrock - conglomerate	SM		(233.0 - 243.0') Neat Portland Cement	(8.0 - 243.0') 6" Borehole	(233.0 - 243.0') 15.7 gallons	(233.0 - 243.0') 20 gallons (27%) Note: Type I, II and V, grouted to 228 ft in casing, let set up over night and cleaned out casing to 233 ft. bgs.
242		Topock - Competent Bedrock - conglomerate						
243								

Final 5/24/19

244
245
246
247
248
249
250
251
252
253
254
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256
257
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260

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started:	10/31/2018	Surface Elevation:	480.5 ft amsl	Boring No.: IRZ-15 Pilot	
Date Completed:	11/15/2018	Northing (NAD83):	2103151.6		
Drilling Co.:	Cascade	Easting (NAD83):	7615773.1	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	257 ft bgs	Project:	Final Groundwater Remedy Phase
Drill Rig Type:	Borat Longyear Track Mount	Borehole Diameter:	6-12 inches	Location:	1
Driller Name:	Nick Petrone	Depth to First Water:	26.02 ft bgs	PG&E Topock, Needles, California	
Drilling Asst:	T. Aylmer/J. Candelaria	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number: RC000753.0051	
Logger:	A. Garcia / C. Mills	Sampling Interval:	Continuous		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
1	0				NR		(0.0 - 2.0') (NR); No Recovery lost during hand clearance		(0.0 - 257.0') No water used
2									
3									
4									
5	60			Topock - Fill	SP		(2.0 - 7.0') Topock - Fill; Poorly graded sand (SP); yellowish brown / moderate yellowish brown(10YR 5/4); very fine grained to medium grained, angular to round; little coarse to very coarse grained sand, angular to round; trace granule to small pebbles, subround; trace silt; trace clay; dry		
6									
7									
8									
9									
10									
11									
12				Topock - Fill	SP		(7.0 - 17.0') Topock - Fill; Poorly graded sand (SP); brown (10YR 4/3); very fine grained to medium grained, angular to round; little coarse to very coarse grained sand, angular to round; trace granule to small pebbles, subround; trace silt; trace clay; dry		
13	120								
14									
15									
16									
17									
18	78			Topock - Alluvium Deposits	SM		(17.0 - 22.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); dark yellowish brown (10YR 4/4); very fine grained to very coarse grained, angular to subangular; some granule to large pebble, angular to subangular; some very fine to very coarse grained sand, angular to subround; some silt; trace clay; dry	(17.0 - 27.0') Core barrel and sediments were hot	
19									
20									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

SOIL BORING LOG PG&E TOPOCK C:\USERS\MCGRANE\DOCUMENTS\PG&E TOPOCK\DATABASE FOR PLOG.GPJ TOPOCK DATA TEMPLATE FOR PLOG.GDT 06/02/19 14:27

Date Started:	10/31/2018	Surface Elevation:	480.5 ft amsl	Boring No.: IRZ-15 Pilot	
Date Completed:	11/15/2018	Northing (NAD83):	2103151.6		
Drilling Co.:	Cascade	Easting (NAD83):	7615773.1	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	257 ft bgs	Project:	Final Groundwater Remedy Phase
Drill Rig Type:	Borat Longyear Track Mount	Borehole Diameter:	6-12 inches	Location:	1
Driller Name:	Nick Petrone	Depth to First Water:	26.02 ft bgs	PG&E Topock, Needles, California	
Drilling Asst:	T. Aylmer/J. Candelaria	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number: RC000753.0051	
Logger:	A. Garcia / C.Mills	Sampling Interval:	Continuous		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
21	78			Topock - Alluvium Deposits	SM			(17.0 - 27.0') Core barrel and sediments were hot	(0.0 - 257.0') No water used
22									
23					Topock - Alluvium Deposits	GW-GM	(22.5 - 23.5') Topock - Alluvium Deposits; Well graded gravel with silt and sand (GW-GM); (10Y 3/2)(7.5YR); granules to large pebbles, angular to subangular; little very fine to very coarse grained sand, angular; little silt; trace granule to small pebbles, subangular; moist		
24							(23.5 - 27.0') (NR); No recovery core barrel was hot and melted the sample bag part of the core fell through the rig deck into the hopper.		
25					NR				
26									
27		IRZ-15-SS-25-30 11/14/2018 11:55		Topock - Alluvium Deposits	ML		(27.0 - 29.5') Topock - Alluvium Deposits; Gravelly silt with sand (ML); brown (10YR 4/3); medium plasticity; little granules to very large pebbles, angular to subangular; little very fine to very coarse grained sand, angular to subangular; trace clay; wet	(27.0') Approximate depth of water table	
28									
29									
30									
31							(29.5 - 47.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); brown (10YR 5/3); granules to medium pebbles, angular to subangular; and silt; little very fine to very coarse grained sand, subangular to round; trace large pebbles, angular to subangular; wet		
32	120	IRZ-15-SS-30-35 11/14/2018 12:03							
33									
34			IRZ-15-VAS-32-37 (13 ppb) 11/1/2018 13:00	Topock - Alluvium Deposits	GM				
35									
36									
37		IRZ-15-SS-35-40 11/14/2018 12:15							
38	300								
39									
40									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

SOIL BORING LOG PG&E TOPOCK C:\USERS\SMCGRANE\DOCUMENTS\PG&E TOPOCK\DATABASE FOR PLOG.GPJ TOPOCK DATA TEMPLATE FOR PLOG.GDT 06/02/19 14:27

Date Started:	<u>10/31/2018</u>	Surface Elevation:	<u>480.5 ft amsl</u>	Boring No.: <u>IRZ-15 Pilot</u>	
Date Completed:	<u>11/15/2018</u>	Northing (NAD83):	<u>2103151.6</u>		
Drilling Co.:	<u>Cascade</u>	Easting (NAD83):	<u>7615773.1</u>	Client:	<u>PG&E</u>
Drilling Method:	<u>Sonic Drilling</u>	Total Depth:	<u>257 ft bgs</u>	Project:	<u>Final Groundwater Remedy Phase</u>
Drill Rig Type:	<u>Borat Longyear Track Mount</u>	Borehole Diameter:	<u>6-12 inches</u>	Location:	<u>1</u>
Driller Name:	<u>Nick Petrone</u>	Depth to First Water:	<u>26.02 ft bgs</u>	<u>PG&E Topock, Needles, California</u>	
Drilling Asst:	<u>T. Aylmer/J. Candelaria</u>	Sampling Method:	<u>4 inch x 10 ft Core Barrel</u>	Project Number: <u>RC000753.0051</u>	
Logger:	<u>A. Garcia / C.Mills</u>	Sampling Interval:	<u>Continuous</u>		
Editor:	<u>Sean McGrane</u>	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
41									(0.0 - 257.0') No water used
42		IRZ-15-SS-40-45 11/14/2018 12:24		Topock - Alluvium Deposits	GM				
43									
44									
45									
46									
47		IRZ-15-SS-45-50 11/14/2018 12:43							
48							(47.0 - 57.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); grayish brown (10YR 5/2); granules to medium pebbles, angular to subangular; some very fine to very coarse grained sand, subangular to rounded; little large to very large pebbles, angular to subangular; little silt; trace cobbles, subangular; wet		
49									
50	300								
51									
52		IRZ-15-SS-50-55 11/14/2018 13:23		Topock - Alluvium Deposits	GM				
53									
54									
55									
56									
57		IRZ-15-SS-55-60 11/14/2018 13:32							
58							(57.0 - 69.5') Topock - Alluvium Deposits; Silty gravel with sand (GM); brown (7.5YR 5/3) and reddish brown (5YR 5/3); granules to medium pebbles, angular to subangular; some very fine to very coarse grained sand, subangular to round; little large to very large pebbles, angular to subangular; little silt; trace cobbles, subangular; wet		
59									
60									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	<u>10/31/2018</u>	Surface Elevation:	<u>480.5 ft amsl</u>	Boring No.: <u>IRZ-15 Pilot</u>	
Date Completed:	<u>11/15/2018</u>	Northing (NAD83):	<u>2103151.6</u>		
Drilling Co.:	<u>Cascade</u>	Easting (NAD83):	<u>7615773.1</u>	Client:	<u>PG&E</u>
Drilling Method:	<u>Sonic Drilling</u>	Total Depth:	<u>257 ft bgs</u>	Project:	<u>Final Groundwater Remedy Phase</u>
Drill Rig Type:	<u>Borat Longyear Track Mount</u>	Borehole Diameter:	<u>6-12 inches</u>	Location:	<u>1</u>
Driller Name:	<u>Nick Petrone</u>	Depth to First Water:	<u>26.02 ft bgs</u>	<u>PG&E Topock, Needles, California</u>	
Drilling Asst:	<u>T. Aylmer/J. Candelaria</u>	Sampling Method:	<u>4 inch x 10 ft Core Barrel</u>	Project Number:	<u>RC000753.0051</u>
Logger:	<u>A. Garcia / C.Mills</u>	Sampling Interval:	<u>Continuous</u>		
Editor:	<u>Sean McGrane</u>	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
61									(0.0 - 257.0') No water used
62		IRZ-15-SS-60-65 11/14/2018 15:58							
63	300								
64			IRZ-15-VAS-62-67 (0.459 J ppb) 11/2/2018 12:30	Topock - Alluvium Deposits	GM				
65									
66									
67		IRZ-15-SS-65-70 11/15/2018 09:30							
68									
69									
70							(69.5 - 74.5') Topock - Alluvium Deposits; Well graded gravel with silt and sand (GW-GM); brown (7.5YR 4/3); granules to large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subangular; little silt; trace very large pebbles, angular; trace cobbles, subangular; wet		
71									
72	96	IRZ-15-SS-70-75 11/15/2018 09:40		Topock - Alluvium Deposits	GW-GM				
73									
74									
75							(74.5 - 87.0') Topock - Alluvium Deposits; Well graded sand with silt and gravel (SW-SM); brown (7.5YR 4/3); very fine grained to very coarse grained, angular to subround; and granules to very large pebbles, angular to subangular; little silt; wet		
76									
77		IRZ-15-SS-75-80 11/15/2018 09:45		Topock - Alluvium Deposits	SW-SM				
78	108								
79									
80									

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Date Started: 10/31/2018	Surface Elevation: 480.5 ft amsl	Boring No.: IRZ-15 Pilot
Date Completed: 11/15/2018	Northing (NAD83): 2103151.6	
Drilling Co.: Cascade	Easting (NAD83): 7615773.1	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 257 ft bgs	Project: Final Groundwater Remedy Phase
Drill Rig Type: Borat Longyear Track Mount	Borehole Diameter: 6-12 inches	Location: 1
Driller Name: Nick Petrone	Depth to First Water: 26.02 ft bgs	PG&E Topock, Needles, California
Drilling Asst: T. Aylmer/J. Candelaria	Sampling Method: 4 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger: A. Garcia / C. Mills	Sampling Interval: Continuous	
Editor: Sean McGrane	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
81	108	IRZ-15-SS-80-85 11/15/2018 09:50		Topock - Alluvium Deposits	SW-SM				(0.0 - 257.0') No water used
82									
83									
84									
85	96	IRZ-15-SS-85-90 11/15/2018 09:58		Topock - Alluvium Deposits	GM		(87.0 - 97.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); brown (7.5YR 4/3); granules to large pebbles, angular to subangular; some silt; little very fine to very coarse grained sand, angular to subround; trace very large pebbles, angular; trace clay; wet		
86									
87									
88									
89	96	IRZ-15-SS-90-95 11/15/2018 10:05		Topock - Alluvium Deposits	GM				
90									
91									
92									
93	96	IRZ-15-SS-95-100 11/15/2018 10:15		Topock - Alluvium Deposits	SM		(97.0 - 104.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (2.5YR 4/4); very fine grained to very coarse grained, angular to subangular; and granules to very large pebbles, angular; little silt; trace cobbles, angular; wet		
94									
95									
96									
97	96								
98									
99									
100									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

SOIL BORING LOG: PG&E TOPOCK C:\USERS\MCGRANE\DOCUMENTS\PG&E TOPOCK\DATABASE FOR PLOG.GPJ TOPOCK DATA TEMPLATE FOR PLOG.GDT 06/02/19 14:27

Date Started:	<u>10/31/2018</u>	Surface Elevation:	<u>480.5 ft amsl</u>	Boring No.: <u>IRZ-15 Pilot</u>	
Date Completed:	<u>11/15/2018</u>	Northing (NAD83):	<u>2103151.6</u>		
Drilling Co.:	<u>Cascade</u>	Easting (NAD83):	<u>7615773.1</u>	Client:	<u>PG&E</u>
Drilling Method:	<u>Sonic Drilling</u>	Total Depth:	<u>257 ft bgs</u>	Project:	<u>Final Groundwater Remedy Phase</u>
Drill Rig Type:	<u>Borat Longyear Track Mount</u>	Borehole Diameter:	<u>6-12 inches</u>	Location:	<u>1</u>
Driller Name:	<u>Nick Petrone</u>	Depth to First Water:	<u>26.02 ft bgs</u>	<u>PG&E Topock, Needles, California</u>	
Drilling Asst:	<u>T. Aylmer/J. Candelaria</u>	Sampling Method:	<u>4 inch x 10 ft Core Barrel</u>	Project Number: <u>RC000753.0051</u>	
Logger:	<u>A. Garcia / C.Mills</u>	Sampling Interval:	<u>Continuous</u>		
Editor:	<u>Sean McGrane</u>	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
101	96	IRZ-15-SS-100-105 12/6/2018 10:25		Topock - Alluvium Deposits	SM				(0.0 - 257.0') No water used
102									
103									
104									
105		IRZ-15-VAS-102-107 (< 0.17 U ppb) 11/3/2018 16:15	Topock - Alluvium Deposits	SM		(104.5 - 106.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown / moderate brown(5YR 4/4); very fine grained to very coarse grained, angular to subangular; some granules to very large pebble, angular; some silt; trace cobbles, angular; wet			
106									
107									
108									
109	300	IRZ-15-SS-105-110 11/15/2018 11:00		Topock - Alluvium Deposits	ML		(106.5 - 116.0') Topock - Alluvium Deposits; Sandy silt with gravel (ML); reddish brown / moderate brown(5YR 4/4); medium plasticity; some granules to very large pebble, angular to subangular; some very fine to very coarse grained sand, angular to subangular; wet; weak cementation		
110									
111									
112									
113		IRZ-15-SS-110-115 11/15/2018 11:20		Topock - Alluvium Deposits	ML				
114									
115									
116									
117				Topock - Alluvium Deposits	GM		(116.0 - 117.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); reddish brown / moderate brown(5YR 4/4); granules to very large pebbles, angular to subangular; and silt; little very fine to very coarse grained sand, angular to subangular; wet; weak cementation		
118									
119									
120									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	<u>10/31/2018</u>	Surface Elevation:	<u>480.5 ft amsl</u>	Boring No.: <u>IRZ-15 Pilot</u>	
Date Completed:	<u>11/15/2018</u>	Northing (NAD83):	<u>2103151.6</u>		
Drilling Co.:	<u>Cascade</u>	Easting (NAD83):	<u>7615773.1</u>	Client:	<u>PG&E</u>
Drilling Method:	<u>Sonic Drilling</u>	Total Depth:	<u>257 ft bgs</u>	Project:	<u>Final Groundwater Remedy Phase</u>
Drill Rig Type:	<u>Borat Longyear Track Mount</u>	Borehole Diameter:	<u>6-12 inches</u>	Location:	<u>1</u>
Driller Name:	<u>Nick Petrone</u>	Depth to First Water:	<u>26.02 ft bgs</u>	<u>PG&E Topock, Needles, California</u>	
Drilling Asst:	<u>T. Aylmer/J. Candelaria</u>	Sampling Method:	<u>4 inch x 10 ft Core Barrel</u>	Project Number:	<u>RC000753.0051</u>
Logger:	<u>A. Garcia / C.Mills</u>	Sampling Interval:	<u>Continuous</u>		
Editor:	<u>Sean McGrane</u>	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
121				Topock - Alluvium Deposits	GM		(120.0 - 121.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); reddish brown / moderate brown(5YR 4/4); granules to very large pebbles, angular to subangular; some silt; little very fine to very coarse grained sand, angular to subangular; wet		(0.0 - 257.0') No water used
122							(121.0 - 127.0') Topock - Alluvium Deposits; Gravelly silt with sand (ML); reddish brown / moderate brown(5YR 4/4); medium plasticity; some granules to very large pebble, angular to subangular; little very fine to very coarse grained sand, angular to subangular; wet; weak cementation		
123				Topock - Alluvium Deposits	ML				
124									
125									
126									
127									
128							(127.0 - 137.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); reddish brown / moderate brown(5YR 4/4); granules to very large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subangular; some silt; wet; weak cementation; pebbles composed of metadiorite		
129	300								
130									
131									
132				Topock - Alluvium Deposits	GM				
133									
134			IRZ-15-VAS-132-137 (< 0.17 U ppb) 11/4/2018 12:40						
135									
136									
137									
138	96			Topock - Alluvium Deposits	ML		(137.0 - 139.5') Topock - Alluvium Deposits; Gravelly silt with sand (ML); reddish brown / moderate brown(5YR 4/4); low plasticity; some granules to very large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subangular; wet; weak cementation		
139									
140					SM		(139.5 - 144.5') Topock - Alluvium Deposits; Silty sand with gravel		

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Date Started:	<u>10/31/2018</u>	Surface Elevation:	<u>480.5 ft amsl</u>	Boring No.: <u>IRZ-15 Pilot</u>	
Date Completed:	<u>11/15/2018</u>	Northing (NAD83):	<u>2103151.6</u>		
Drilling Co.:	<u>Cascade</u>	Easting (NAD83):	<u>7615773.1</u>	Client:	<u>PG&E</u>
Drilling Method:	<u>Sonic Drilling</u>	Total Depth:	<u>257 ft bgs</u>	Project:	<u>Final Groundwater Remedy Phase</u>
Drill Rig Type:	<u>Borat Longyear Track Mount</u>	Borehole Diameter:	<u>6-12 inches</u>	Location:	<u>1</u>
Driller Name:	<u>Nick Petrone</u>	Depth to First Water:	<u>26.02 ft bgs</u>	<u>PG&E Topock, Needles, California</u>	
Drilling Asst:	<u>T. Aylmer/J. Candelaria</u>	Sampling Method:	<u>4 inch x 10 ft Core Barrel</u>	Project Number:	<u>RC000753.0051</u>
Logger:	<u>A. Garcia / C.Mills</u>	Sampling Interval:	<u>Continuous</u>		
Editor:	<u>Sean McGrane</u>	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
141	96	IRZ-15-SS-140-145 11/15/2018 11:25		Topock - Alluvium Deposits	SM		(SM); reddish brown (2.5YR 4/4); very fine grained to very coarse grained, angular to subangular; some granules to very large pebbles, angular; little silt; trace cobbles, angular; wet		(0.0 - 257.0') No water used
142									
143									
144									
145	96	IRZ-15-SS-145-150 11/15/2018 11:30		Topock - Alluvium Deposits	SM		(144.5 - 161.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (2.5YR 4/4); very fine grained to very coarse grained, angular to subangular; some granules to very large pebbles, angular; some silt; trace cobbles, angular; wet		
146									
147									
148							(147'); increase in granules and very large pebbles, decrease in silt		
149	96	IRZ-15-SS-150-150 11/15/2018 12:40		Topock - Alluvium Deposits	SM				
150									
151									
152									
153	96	IRZ-15-SS-155-160 11/15/2018 12:45		Topock - Alluvium Deposits	SM		(154.5'); decrease in silt, trace clay		
154									
155									
156									
157	96								
158									
159									
160									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval


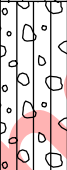
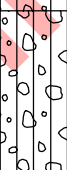
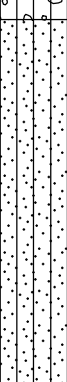
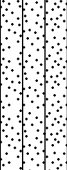
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Date Started:	<u>10/31/2018</u>	Surface Elevation:	<u>480.5 ft amsl</u>	Boring No.: <u>IRZ-15 Pilot</u>	
Date Completed:	<u>11/15/2018</u>	Northing (NAD83):	<u>2103151.6</u>		
Drilling Co.:	<u>Cascade</u>	Easting (NAD83):	<u>7615773.1</u>	Client:	<u>PG&E</u>
Drilling Method:	<u>Sonic Drilling</u>	Total Depth:	<u>257 ft bgs</u>	Project:	<u>Final Groundwater Remedy Phase</u>
Drill Rig Type:	<u>Borat Longyear Track Mount</u>	Borehole Diameter:	<u>6-12 inches</u>	Location:	<u>1</u>
Driller Name:	<u>Nick Petrone</u>	Depth to First Water:	<u>26.02 ft bgs</u>	<u>PG&E Topock, Needles, California</u>	
Drilling Asst:	<u>T. Aylmer/J. Candelaria</u>	Sampling Method:	<u>4 inch x 10 ft Core Barrel</u>	Project Number: <u>RC000753.0051</u>	
Logger:	<u>A. Garcia / C.Mills</u>	Sampling Interval:	<u>Continuous</u>		
Editor:	<u>Sean McGrane</u>	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
161	96	IRZ-15-SS-160-165 11/15/2018 12:50	IRZ-15-VAS-162-167 (3200 ppb) 11/5/2018 13:00	Topock - Alluvium Deposits	SM				(0.0 - 257.0') No water used
162				Topock - Alluvium Deposits	ML		(161.0 - 164.5') Topock - Alluvium Deposits; Gravelly silt with sand (ML); dark reddish brown(2.5YR 3/3); no plasticity; some granules to very large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subround; wet; weak cementation		
163									
164	114	IRZ-15-SS-165-170 11/15/2018 13:05		Topock - Alluvium Deposits	SM		(164.5 - 167.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (2.5YR 4/4); very fine grained to very coarse grained, angular to subangular; some granules to very large pebbles, angular; some silt; trace cobbles, angular; wet		
165									
166				Topock - Alluvium Deposits	SM		(167.0 - 172.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (2.5YR 4/4); very fine grained to very coarse grained, angular to subangular; some granules to very large pebbles, angular; some silt; trace cobbles, angular; trace clay; wet		
167	108	IRZ-15-SS-170-175 11/15/2018 13:15		Topock - Alluvium Deposits	SM				
168									
169				Topock - Alluvium Deposits	GM		(172.0 - 174.5') Topock - Alluvium Deposits; Silty gravel with sand (GM); reddish brown / moderate brown(5YR 4/4); granules to very large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subangular; some silt; wet; weak cementation		
170	108								
171				Topock - Alluvium Deposits	GM		(174.5 - 187.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); reddish brown / moderate brown(5YR 4/4); granules to very large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subangular; some silt; wet; weak cementation		
172									
173	108								
174				Topock - Alluvium Deposits	GM				
175									
176	108								
177				Topock - Alluvium Deposits	GM				
178									
179	108								
180									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	<u>10/31/2018</u>	Surface Elevation:	<u>480.5 ft amsl</u>	Boring No.: <u>IRZ-15 Pilot</u>	
Date Completed:	<u>11/15/2018</u>	Northing (NAD83):	<u>2103151.6</u>		
Drilling Co.:	<u>Cascade</u>	Easting (NAD83):	<u>7615773.1</u>	Client:	<u>PG&E</u>
Drilling Method:	<u>Sonic Drilling</u>	Total Depth:	<u>257 ft bgs</u>	Project:	<u>Final Groundwater Remedy Phase</u>
Drill Rig Type:	<u>Borat Longyear Track Mount</u>	Borehole Diameter:	<u>6-12 inches</u>	Location:	<u>1</u>
Driller Name:	<u>Nick Petrone</u>	Depth to First Water:	<u>26.02 ft bgs</u>	<u>PG&E Topock, Needles, California</u>	
Drilling Asst:	<u>T. Aylmer/J. Candelaria</u>	Sampling Method:	<u>4 inch x 10 ft Core Barrel</u>	Project Number: <u>RC000753.0051</u>	
Logger:	<u>A. Garcia / C.Mills</u>	Sampling Interval:	<u>Continuous</u>		
Editor:	<u>Sean McGrane</u>	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
181	108	IRZ-15-SS-180-185 11/15/2018 13:27	IRZ-15-VAS-182-187 (140 ppb) 11/6/2018 11:10	Topock - Alluvium Deposits	GM				(0.0 - 257.0') No water used
182									
183									
184									
185	108	IRZ-15-SS-185-190 11/15/2018 13:25		Topock - Alluvium Deposits	ML		(187.0 - 189.5') Topock - Alluvium Deposits; Gravelly silt with sand (ML); reddish brown (2.5YR 4/4); no plasticity; some granules to very large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subround; wet; weak cementation		
186									
187									
188									
189	108	IRZ-15-SS-190-195 11/15/2018 13:30		Topock - Alluvium Deposits	ML		(189.5 - 192.0') Topock - Alluvium Deposits; Gravelly silt with sand (ML); reddish brown (2.5YR 4/4); no plasticity; some granules to very large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subround; wet; weak cementation		
190									
191									
192									
193	108	IRZ-15-SS-195-200 11/15/2018 13:35		Topock - Alluvium Deposits	ML		(192.0 - 197.0') Topock - Alluvium Deposits; Sandy silt with gravel (ML); reddish brown (2.5YR 4/4); no plasticity; some granules to very large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subround; wet; weak cementation		
194									
195									
196									
197	108			Topock - Alluvium Deposits	SM		(197.0 - 200.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); dark reddish brown (2.5YR 3/4); very fine grained to very coarse grained, angular to subangular; some granules to very large pebbles, angular; some silt; trace cobbles, angular; trace clay; wet	(197.0 - 202.0') Interval is coarse grained and very saturated	
198									
199									
200									

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Date Started:	10/31/2018	Surface Elevation:	480.5 ft amsl	Boring No.: IRZ-15 Pilot	
Date Completed:	11/15/2018	Northing (NAD83):	2103151.6		
Drilling Co.:	Cascade	Easting (NAD83):	7615773.1	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	257 ft bgs	Project:	Final Groundwater Remedy Phase
Drill Rig Type:	Borat Longyear Track Mount	Borehole Diameter:	6-12 inches	Location:	1
Driller Name:	Nick Petrone	Depth to First Water:	26.02 ft bgs	PG&E Topock, Needles, California	
Drilling Asst:	T. Aylmer/J. Candelaria	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number: RC000753.0051	
Logger:	A. Garcia / C.Mills	Sampling Interval:	Continuous		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
201	108	IRZ-15-SS-200-205 11/15/2018 13:45		Topock - Alluvium Deposits	SM		(200.0 - 206.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (2.5YR 4/4); very fine grained to very coarse grained, angular to subangular; some granules to very large pebble, angular; some silt; trace cobbles, angular; trace clay; wet	(197.0 - 202.0') Interval is coarse grained and very saturated	(0.0 - 257.0') No water used
202									
203									
204									
205	108	IRZ-15-SS-205-210 11/15/2018 07:28		Topock - Alluvium Deposits	ML		(206.5 - 212.0') Topock - Alluvium Deposits; Sandy silt with gravel (ML); reddish brown (2.5YR 4/4); low plasticity; some very fine to very coarse grained sand, angular to subround; little granules to very large pebbles, angular to subangular; trace clay; wet; weak cementation		
206									
207									
208									
209	108	IRZ-15-SS-210-215 11/15/2018 14:00		Topock - Weathered Bedrock - conglomerate	ML		(212.0 - 232.0') Topock - Weathered Bedrock - conglomerate; Sandy silt with gravel (ML); red (2.5YR 4/6); medium plasticity; little granules to very large pebbles, angular to subangular; little very fine to very coarse grained sand, angular to subround; trace clay; wet; weak cementation		
210									
211									
212									
213	96	IRZ-15-SS-215-220 11/15/2018 14:05							
214									
215									
216									
217	96								
218									
219									
220									

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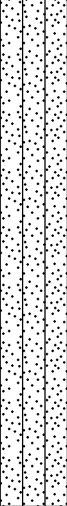


SOIL BORING LOG PG&E TOPOCK C:\USERS\MCGRANE\DOCUMENTS\PG&E TOPOCK\DATABASE FOR PLOG.GPJ TOPOCK DATA TEMPLATE FOR PLOG.GPJ 06/02/19 14:27

Date Started:	<u>10/31/2018</u>	Surface Elevation:	<u>480.5 ft amsl</u>	Boring No.: <u>IRZ-15 Pilot</u>	
Date Completed:	<u>11/15/2018</u>	Northing (NAD83):	<u>2103151.6</u>		
Drilling Co.:	<u>Cascade</u>	Easting (NAD83):	<u>7615773.1</u>	Client:	<u>PG&E</u>
Drilling Method:	<u>Sonic Drilling</u>	Total Depth:	<u>257 ft bgs</u>	Project:	<u>Final Groundwater Remedy Phase</u>
Drill Rig Type:	<u>Borat Longyear Track Mount</u>	Borehole Diameter:	<u>6-12 inches</u>	Location:	<u>1</u>
Driller Name:	<u>Nick Petrone</u>	Depth to First Water:	<u>26.02 ft bgs</u>	<u>PG&E Topock, Needles, California</u>	
Drilling Asst:	<u>T. Aylmer/J. Candelaria</u>	Sampling Method:	<u>4 inch x 10 ft Core Barrel</u>	Project Number: <u>RC000753.0051</u>	
Logger:	<u>A. Garcia / C.Mills</u>	Sampling Interval:	<u>Continuous</u>		
Editor:	<u>Sean McGrane</u>	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
221	96		IRZ-15-VAS-222-227 (< 0.17 U ppb) 12/4/2018 14:00	Topock - Weathered Bedrock - conglomerate	ML		(227.0 - 232.0'); some very fine to very coarse grained sand, angular to subround; little clay; wet; decrease in silt		(0.0 - 257.0') No water used
222									
223									
224									
225									
226	60								
227									
228									
229									
230									
231	60		IRZ-15-SS-232-237 11/15/2018 13:37	Topock - Weathered Bedrock - conglomerate	SM		(232.0 - 237.0') Topock - Weathered Bedrock - conglomerate; Silty sand with gravel (SM); red (2.5YR 4/6); very fine grained to very coarse grained, angular to subround; some granules to very large pebbles, angular; some silt; trace cobbles, angular; trace clay; moist		
232									
233									
234									
235									
236	108								
237									
238									
239									
240									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	10/31/2018	Surface Elevation:	480.5 ft amsl	Boring No.: IRZ-15 Pilot
Date Completed:	11/15/2018	Northing (NAD83):	2103151.6	
Drilling Co.:	Cascade	Easting (NAD83):	7615773.1	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	257 ft bgs	Project: Final Groundwater Remedy Phase
Drill Rig Type:	Borat Longyear Track Mount	Borehole Diameter:	6-12 inches	Location: 1
Driller Name:	Nick Petrone	Depth to First Water:	26.02 ft bgs	PG&E Topock, Needles, California
Drilling Asst:	T. Aylmer/J. Candelaria	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger:	A. Garcia / C. Mills	Sampling Interval:	Continuous	
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
241	108			Topock - Weathered Bedrock - conglomerate	SM				(0.0 - 257.0') No water used
242									
243									
244									
245									
246									
247	108			Topock - Weathered Bedrock - conglomerate	SM		(247.0 - 255.0') Topock - Weathered Bedrock - conglomerate; Silty sand with gravel (SM); red (2.5YR 4/6); very fine grained to medium grained, angular to subround; some granules to very large pebbles, angular; some silt; trace coarse to very coarse grained sand, subangular to round; trace clay; moist		
248									
249									
250									
251									
252									
253									
254									
255									
256									
257				Topock - Competent Bedrock - conglomerate			(255.0 - 257.0') Topock - Competent Bedrock - conglomerate; red (2.5YR 4/6); friable		
End of Boring at 257.0' bgs.									
258									
259									
260									

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Date Started:	10/31/2018	Surface Elevation:	480.5 ft amsl	Well ID: IRZ-15 Pilot
Date Completed:	11/15/2018	Northing (NAD83):	2103151.6	
Drilling Co.:	Cascade	Easting (NAD83):	7615773.1	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	257 ft bgs	Project: Final Groundwater Remedy Phase
Driller Name:	Nick Petrone	Borehole Diameter:	6-12 inches	Location: 1
Drilling Asst:	T. Aylmer/J. Candelaria	Depth to First Water:	26.02 ft bgs	PG&E Topock, Needles, California
Logger:	A. Garcia / C.Mills	Editor:	Sean McGrane	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
1			NR		(0.0 - 0.5') Temporary Steel Plate with BMP		
2					(0.5 - 4.0') Cemex #00 Mesh	(0.5 - 4.0') 7.9 bags	(0.5 - 4.0') 4 bags (-49%) Note: Lapis Lustre Sand, loose dredge sands collapsed during removal of 12 inch conductor casing resulting in less bags need to backfill
3							
4		Topock - Fill	SP				
5					(0.0 - 9.0') 12" Borehole		
6							
7							
8							
9							
10							
11							
12		Topock - Fill	SP		(4.0 - 227.0') Cemex #3 MESH (8x10)	(4.0 - 227.0') 97.6 bags	(4.0 - 227.0') 89 bags (-9%) Note: Lapis Lustre Sand
13							
14							
15					(9.0 - 257.0') 6" Borehole		
16							
17							
18		Topock - Alluvium Deposits	SM				
19							
20							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater,

ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol

represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during

drilling for the construction of the well.

Date Started:	10/31/2018	Surface Elevation:	480.5 ft amsl	Well ID: IRZ-15 Pilot
Date Completed:	11/15/2018	Northing (NAD83):	2103151.6	
Drilling Co.:	Cascade	Easting (NAD83):	7615773.1	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	257 ft bgs	Project: Final Groundwater Remedy Phase
Driller Name:	Nick Petrone	Borehole Diameter:	6-12 inches	Location: 1
Drilling Asst:	T. Aylmer/J. Candelaria	Depth to First Water:	26.02 ft bgs	PG&E Topock, Needles, California
Logger:	A. Garcia / C.Mills	Editor:	Sean McGrane	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
21		Topock - Alluvium Deposits	SM				
22							
23		Topock - Alluvium Deposits	GW-GM				
24							
25			NR				
26							
27							
28		Topock - Alluvium Deposits	ML				
29							
30					(4.0 - 227.0') Cemex #3 MESH (8x10)	(9.0 - 257.0') 6" Borehole	(4.0 - 227.0') 97.6 bags
31							(4.0 - 227.0') 89 bags (-9%) Note: Lapis Lustre Sand
32							
33							
34	IRZ-15-VAS-32-37 (13 ppb) 11/1/2018 13:00	Topock - Alluvium Deposits	GM				
35							
36							
37							
38							
39							
40							

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Date Started:	10/31/2018	Surface Elevation:	480.5 ft amsl	Well ID: IRZ-15 Pilot
Date Completed:	11/15/2018	Northing (NAD83):	2103151.6	
Drilling Co.:	Cascade	Easting (NAD83):	7615773.1	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	257 ft bgs	Project: Final Groundwater Remedy Phase
Driller Name:	Nick Petrone	Borehole Diameter:	6-12 inches	Location: 1
Drilling Asst:	T. Aylmer/J. Candelaria	Depth to First Water:	26.02 ft bgs	PG&E Topock, Needles, California
Logger:	A. Garcia / C.Mills	Editor:	Sean McGrane	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction		Calculated Material Volumes	Material Volumes Installed
41		Topock - Alluvium Deposits	GM					
42								
43								
44								
45								
46		Topock - Alluvium Deposits	GM					
47								
48								
49								
50								
51								
52								
53								
54								
55								
56		Topock - Alluvium Deposits	GM					
57								
58								
59								
60								

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started:	10/31/2018	Surface Elevation:	480.5 ft amsl	Well ID: IRZ-15 Pilot
Date Completed:	11/15/2018	Northing (NAD83):	2103151.6	
Drilling Co.:	Cascade	Easting (NAD83):	7615773.1	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	257 ft bgs	Project: Final Groundwater Remedy Phase
Driller Name:	Nick Petrone	Borehole Diameter:	6-12 inches	Location: 1
Drilling Asst:	T. Aylmer/J. Candelaria	Depth to First Water:	26.02 ft bgs	PG&E Topock, Needles, California
Logger:	A. Garcia / C.Mills	Editor:	Sean McGrane	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction		Calculated Material Volumes	Material Volumes Installed				
61	IRZ-15-VAS-62-67 (0.459 J ppb) 11/2/2018 12:30	Topock - Alluvium Deposits	GM				(4.0 - 227.0') 97.6 bags	(4.0 - 227.0') 89 bags (-9%) Note: Lapis Lustre Sand				
62												
63												
64												
65												
66												
67												
68		Topock - Alluvium Deposits	GW-GM				(4.0 - 227.0') 97.6 bags	(4.0 - 227.0') 89 bags (-9%) Note: Lapis Lustre Sand				
69												
70												
71												
72												
73		Topock - Alluvium Deposits	SW-SM									
74												
75												
76												
77												
78												
79												
80												

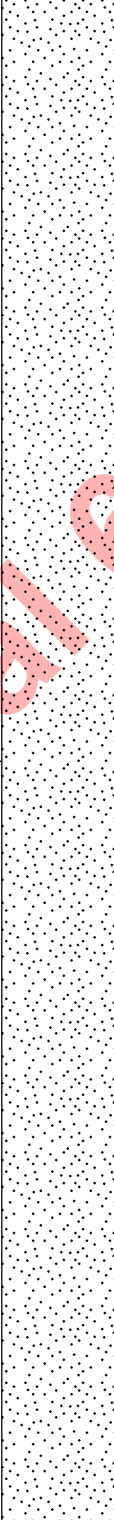
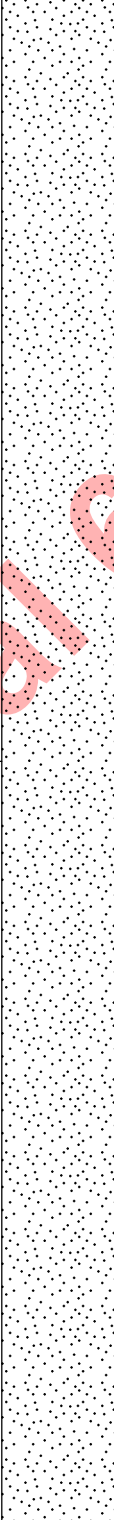
Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started:	10/31/2018	Surface Elevation:	480.5 ft amsl	Well ID: IRZ-15 Pilot
Date Completed:	11/15/2018	Northing (NAD83):	2103151.6	
Drilling Co.:	Cascade	Easting (NAD83):	7615773.1	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	257 ft bgs	Project: Final Groundwater Remedy Phase
Driller Name:	Nick Petrone	Borehole Diameter:	6-12 inches	Location: 1
Drilling Asst:	T. Aylmer/J. Candelaria	Depth to First Water:	26.02 ft bgs	PG&E Topock, Needles, California
Logger:	A. Garcia / C.Mills	Editor:	Sean McGrane	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
81		Topock - Alluvium Deposits	SW-SM				
82							
83							
84							
85							
86		Topock - Alluvium Deposits	GM		(4.0 - 227.0') Cemex #3 MESH (8x10)	(9.0 - 257.0') 6" Borehole	(4.0 - 227.0') 97.6 bags
87							
88							
89							
90							
91							
92							
93							
94							
95							
96		Topock - Alluvium Deposits	SM				(4.0 - 227.0') 89 bags (-9%) Note: Lapis Lustre Sand
97							
98							
99							
100							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started:	10/31/2018	Surface Elevation:	480.5 ft amsl	Well ID: IRZ-15 Pilot
Date Completed:	11/15/2018	Northing (NAD83):	2103151.6	
Drilling Co.:	Cascade	Easting (NAD83):	7615773.1	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	257 ft bgs	Project: Final Groundwater Remedy Phase
Driller Name:	Nick Petrone	Borehole Diameter:	6-12 inches	Location: 1
Drilling Asst:	T. Aylmer/J. Candelaria	Depth to First Water:	26.02 ft bgs	PG&E Topock, Needles, California
Logger:	A. Garcia / C.Mills	Editor:	Sean McGrane	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
101	IRZ-15-VAS-102-107 (< 0.17 U ppb) 11/3/2018 16:15	Topock - Alluvium Deposits	SM				
102		Topock - Alluvium Deposits	SM				
103		Topock - Alluvium Deposits	SM				
104		Topock - Alluvium Deposits	ML				
105							
106							
107							
108							
109							
110							
111							
112							
113							
114							
115							
116		Topock - Alluvium Deposits	GM				
117							
118		Topock - Alluvium Deposits	ML				
119							
120							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started:	10/31/2018	Surface Elevation:	480.5 ft amsl	Well ID: IRZ-15 Pilot
Date Completed:	11/15/2018	Northing (NAD83):	2103151.6	
Drilling Co.:	Cascade	Easting (NAD83):	7615773.1	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	257 ft bgs	Project: Final Groundwater Remedy Phase
Driller Name:	Nick Petrone	Borehole Diameter:	6-12 inches	Location: 1
Drilling Asst:	T. Aylmer/J. Candelaria	Depth to First Water:	26.02 ft bgs	PG&E Topock, Needles, California
Logger:	A. Garcia / C.Mills	Editor:	Sean McGrane	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction		Calculated Material Volumes	Material Volumes Installed
121	IRZ-15-VAS-132-137 (< 0.17 U ppb) 11/4/2018 12:40	Topock - Alluvium Deposits	GM		(4.0 - 227.0') Cemex #3 MESH (8x10)	(9.0 - 257.0') 6" Borehole	(4.0 - 227.0') 97.6 bags	(4.0 - 227.0') 89 bags (-9%) Note: Lapis Lustre Sand
122		Topock - Alluvium Deposits	ML					
123								
124								
125								
126		Topock - Alluvium Deposits	GM					
127								
128								
129								
130								
131		Topock - Alluvium Deposits	GM					
132								
133								
134								
135								
136		Topock - Alluvium Deposits	ML					
137								
138								
139								
140								
			SM					

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started:	10/31/2018	Surface Elevation:	480.5 ft amsl	Well ID: IRZ-15 Pilot
Date Completed:	11/15/2018	Northing (NAD83):	2103151.6	
Drilling Co.:	Cascade	Easting (NAD83):	7615773.1	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	257 ft bgs	Project: Final Groundwater Remedy Phase
Driller Name:	Nick Petrone	Borehole Diameter:	6-12 inches	Location: 1
Drilling Asst:	T. Aylmer/J. Candelaria	Depth to First Water:	26.02 ft bgs	PG&E Topock, Needles, California
Logger:	A. Garcia / C.Mills	Editor:	Sean McGrane	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
141		Topock - Alluvium Deposits	SM				
142							
143							
144							
145		Topock - Alluvium Deposits	SM		(4.0 - 227.0') Cemex #3 MESH (8x10)	(9.0 - 257.0') 6" Borehole	(4.0 - 227.0') 97.6 bags
146							
147							
148							
149							
150							
151							
152							
153							
154							
155							
156							
157							
158							
159							
160							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

TEMP ABANDONMENT LOG PG&E TOPOCK C:\USERS\MCGRANE\DOCUMENTS\PG&E TOPOCK\DRIFT BORING LOGS\GINT FILES\06.02.19\TOPOCK DATABASE FOR PLOG.GPJ TOPOCK DATA TEMPLATE FOR PLOG.GDT 06/02/19 14:29

Date Started:	10/31/2018	Surface Elevation:	480.5 ft amsl	Well ID: IRZ-15 Pilot
Date Completed:	11/15/2018	Northing (NAD83):	2103151.6	
Drilling Co.:	Cascade	Easting (NAD83):	7615773.1	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	257 ft bgs	Project: Final Groundwater Remedy Phase
Driller Name:	Nick Petrone	Borehole Diameter:	6-12 inches	Location: 1
Drilling Asst:	T. Aylmer/J. Candelaria	Depth to First Water:	26.02 ft bgs	PG&E Topock, Needles, California
Logger:	A. Garcia / C.Mills	Editor:	Sean McGrane	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction		Calculated Material Volumes	Material Volumes Installed
161	IRZ-15-VAS-162-167 (3200 ppb) 11/5/2018 13:00	Topock - Alluvium Deposits	SM					
162		Topock - Alluvium Deposits	ML					
163		Topock - Alluvium Deposits	SM					
164		Topock - Alluvium Deposits	SM		(4.0 - 227.0') Cemex #3 MESH (8x10)	(9.0 - 257.0') 6" Borehole	(4.0 - 227.0') 97.6 bags	(4.0 - 227.0') 89 bags (-9%) Note: Lapis Lustre Sand
165		Topock - Alluvium Deposits	SM					
166		Topock - Alluvium Deposits	SM					
167		Topock - Alluvium Deposits	SM					
168		Topock - Alluvium Deposits	SM					
169		Topock - Alluvium Deposits	SM					
170		Topock - Alluvium Deposits	GM					
171		Topock - Alluvium Deposits	GM					
172		Topock - Alluvium Deposits	GM					
173		Topock - Alluvium Deposits	GM					
174		Topock - Alluvium Deposits	GM					
175		Topock - Alluvium Deposits	GM					
176		Topock - Alluvium Deposits	GM					
177		Topock - Alluvium Deposits	GM					
178		Topock - Alluvium Deposits	GM					
179		Topock - Alluvium Deposits	GM					
180		Topock - Alluvium Deposits	GM					

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol

represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during

drilling for the construction of the well.

Date Started:	10/31/2018	Surface Elevation:	480.5 ft amsl	Well ID: IRZ-15 Pilot
Date Completed:	11/15/2018	Northing (NAD83):	2103151.6	
Drilling Co.:	Cascade	Easting (NAD83):	7615773.1	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	257 ft bgs	Project: Final Groundwater Remedy Phase
Driller Name:	Nick Petrone	Borehole Diameter:	6-12 inches	Location: 1
Drilling Asst:	T. Aylmer/J. Candelaria	Depth to First Water:	26.02 ft bgs	PG&E Topock, Needles, California
Logger:	A. Garcia / C.Mills	Editor:	Sean McGrane	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction		Calculated Material Volumes	Material Volumes Installed					
181	IRZ-15-VAS-182-187 (140 ppb) 11/6/2018 11:10	Topock - Alluvium Deposits	GM				(4.0 - 227.0') 97.6 bags	(4.0 - 227.0') 89 bags (-9%) Note: Lapis Lustre Sand					
182													
183													
184													
185													
186		Topock - Alluvium Deposits	ML				(4.0 - 227.0') 97.6 bags	(4.0 - 227.0') 89 bags (-9%) Note: Lapis Lustre Sand					
187													
188		Topock - Alluvium Deposits	ML										
189													
190		Topock - Alluvium Deposits	ML										
191													
192		Topock - Alluvium Deposits	ML										
193													
194													
195													
196		Topock - Alluvium Deposits	SM										
197													
198													
199													
200													

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started:	10/31/2018	Surface Elevation:	480.5 ft amsl	Well ID: IRZ-15 Pilot
Date Completed:	11/15/2018	Northing (NAD83):	2103151.6	
Drilling Co.:	Cascade	Easting (NAD83):	7615773.1	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	257 ft bgs	Project: Final Groundwater Remedy Phase
Driller Name:	Nick Petrone	Borehole Diameter:	6-12 inches	Location: 1
Drilling Asst:	T. Aylmer/J. Candelaria	Depth to First Water:	26.02 ft bgs	PG&E Topock, Needles, California
Logger:	A. Garcia / C.Mills	Editor:	Sean McGrane	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
201		Topock - Alluvium Deposits	SM				
202							
203							
204							
205							
206		Topock - Alluvium Deposits	ML		(4.0 - 227.0') Cemex #3 MESH (8x10)	(9.0 - 257.0') 6" Borehole	(4.0 - 227.0') 97.6 bags
207							
208							
209							
210							
211		Topock - Weathered Bedrock - conglomerate	ML				(4.0 - 227.0') 89 bags (-9%) Note: Lapis Lustre Sand
212							
213							
214							
215							
216							
217							
218							
219							
220							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

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Date Started:	10/31/2018	Surface Elevation:	480.5 ft amsl	Well ID: IRZ-15 Pilot
Date Completed:	11/15/2018	Northing (NAD83):	2103151.6	
Drilling Co.:	Cascade	Easting (NAD83):	7615773.1	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	257 ft bgs	Project: Final Groundwater Remedy Phase
Driller Name:	Nick Petrone	Borehole Diameter:	6-12 inches	Location: 1
Drilling Asst:	T. Aylmer/J. Candelaria	Depth to First Water:	26.02 ft bgs	PG&E Topock, Needles, California
Logger:	A. Garcia / C.Mills	Editor:	Sean McGrane	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
221	IRZ-15-VAS-222-227 (< 0.17 U ppb) 12/4/2018 14:00	Topock - Weathered Bedrock - conglomerate	ML		(4.0 - 227.0') Cemex #3 MESH (8x10)	(4.0 - 227.0') 97.6 bags	(4.0 - 227.0') 89 bags (-9%) Note: Lapis Lustre Sand
222							
223							
224							
225							
226					(227.0 - 232.0') Plastering Sand	(227.0 - 232.0') 1.4 bags	(227.0 - 232.0') 3 bags (114%) Note: Wildcat Washed
227							
228							
229							
230							
231		Topock - Weathered Bedrock - conglomerate	SM		(9.0 - 257.0') 6" Borehole	(232.0 - 247.0') 4.4 bags	(232.0 - 247.0') 6 bags (36%) Note: Pure Gold Medium Chips, After placement of 6 bags of bentonite chips and tagged at 238 ft, the bentonite expanded to 202 ft. bgs in the casing, the over chipped portion was cleaned out of the casing to 232 ft bgs
232							
233							
234							
235							
236		Topock - Weathered Bedrock - conglomerate	SM		(232.0 - 247.0') Bentonite seal chips		
237							
238							
239							
240							

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Date Started:	10/31/2018	Surface Elevation:	480.5 ft amsl	Well ID: IRZ-15 Pilot
Date Completed:	11/15/2018	Northing (NAD83):	2103151.6	
Drilling Co.:	Cascade	Easting (NAD83):	7615773.1	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	257 ft bgs	Project: Final Groundwater Remedy Phase
Driller Name:	Nick Petrone	Borehole Diameter:	6-12 inches	Location: 1
Drilling Asst:	T. Aylmer/J. Candelaria	Depth to First Water:	26.02 ft bgs	PG&E Topock, Needles, California
Logger:	A. Garcia / C.Mills	Editor:	Sean McGrane	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
241		Topock - Weathered Bedrock - conglomerate	SM		(232.0 - 247.0') Bentonite seal chips	(232.0 - 247.0') 4.4 bags	(232.0 - 247.0') 6 bags (36%) Note: Pure Gold Medium Chips, After placement of 6 bags of bentonite chips and tagged at 238 ft, the bentonite expanded to 202 ft. bgs in the casing, the over chipped portion was cleaned out of the casing to 232 ft bgs
242							
243							
244							
245							
246		Topock - Weathered Bedrock - conglomerate	SM		(247.0 - 257.0') Neat Portland Cement	(247.0 - 257.0') 15.7 gallons	(247.0 - 257.0') 35 gallons (123%) Note: Type I, II and V
247							
248							
249							
250							
251		Topock - Competent Bedrock - conglomerate			(9.0 - 257.0') 6" Borehole		
252							
253							
254							
255							
256							
257							
258							
259							
260							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started: <u>02/19/2019</u>	Surface Elevation: <u>480.0 ft amsl</u>	Boring No.: <u>IRZ-16 Pilot</u>
Date Completed: <u>03/07/2019</u>	Northing (NAD83): <u>2103041.4</u>	
Drilling Co.: <u>Cascade</u>	Easting (NAD83): <u>7615824.1</u>	Client: <u>PG&E</u>
Drilling Method: <u>Sonic Drilling</u>	Total Depth: <u>207 ft bgs</u>	Project: <u>Final GW Remedy Phase I</u>
Drill Rig Type: <u>Prosonic Truck Mount</u>	Borehole Diameter: <u>6-12 inches</u>	Location: <u>PG&E Topock, Needles, California</u>
Driller Name: <u>Steve Vasquez</u>	Depth to First Water: <u>26 ft bgs</u>	
Drilling Asst: <u>L. Amaya/ O. Flores</u>	Sampling Method: <u>4 inch x 10 ft Core Barrel</u>	Project Number: <u>RC000753.0051</u>
Logger: <u>Sean McGrane</u>	Sampling Interval: <u>Continuous</u>	
Editor: <u>Michael Andrews</u>	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
1				Topock - Fill	NR		(0.0 - 2.0') Topock - Fill; No recovery (NR); No recovery dredge sands sloughed in during advancement of 12 inch conductor casing	(0.0 - 7.0') Loose dredge sands falling out of core barrel causing poor recovery	
2				Topock - Fill	SP		(2.0 - 3.2') Topock - Fill; Poorly graded sand (SP); brown (10YR 5/3); very fine grained to medium grained, subround to round; trace silt; trace clay; dry		
3									
4									
5	14.4			Topock - Fill	NR		(3.2 - 7.0') Topock - Fill; (NR); No recovery loose dredge sands falling out of core barrel could not provide core with accurate depths		
6									
7									
8							(7.0 - 17.0') Topock - Fill; No recovery (NR); No recovery loose dredge sands falling out of core barrel and sloughing into hole, could not provide core with accurate depths	(7.0 - 17.0') Loose dredge sands continuously fell out of core barrel	
9									
10									
11									
12	0			Topock - Fill	NR				
13									
14									
15									
16									
17									
18	54			Topock - Fill	NR		(17.0 - 22.5') Topock - Fill; No recovery (NR); No recovery unclear at what depth core sample was lost. Based on drilling native material at bottom of core started at approximately 26 ft bgs and is representative	(17.0 - 27.0') Poor recovery maybe due to compaction of loose dredge sands, drilling change at approximately 25 ft. bgs	
19									
20									







Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started: <u>02/19/2019</u>	Surface Elevation: <u>480.0 ft amsl</u>	Boring No.: <u>IRZ-16 Pilot</u>
Date Completed: <u>03/07/2019</u>	Northing (NAD83): <u>2103041.4</u>	
Drilling Co.: <u>Cascade</u>	Easting (NAD83): <u>7615824.1</u>	Client: <u>PG&E</u>
Drilling Method: <u>Sonic Drilling</u>	Total Depth: <u>207 ft bgs</u>	Project: <u>Final GW Remedy Phase I</u>
Drill Rig Type: <u>Prosonic Truck Mount</u>	Borehole Diameter: <u>6-12 inches</u>	Location: <u>PG&E Topock, Needles, California</u>
Driller Name: <u>Steve Vasquez</u>	Depth to First Water: <u>26 ft bgs</u>	
Drilling Asst: <u>L. Amaya/ O. Flores</u>	Sampling Method: <u>4 inch x 10 ft Core Barrel</u>	Project Number: <u>RC000753.0051</u>
Logger: <u>Sean McGrane</u>	Sampling Interval: <u>Continuous</u>	
Editor: <u>Michael Andrews</u>	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
21	54	IRZ-16-SS-22.0-27.0 3/7/2019 14:15		Topock - Fill	NR			(17.0 - 27.0') Poor recovery maybe due to compaction of loose dredge sands, drilling change at approximately 25 ft. bgs	
22									
23				Topock - Fill	SP		(22.5 - 26.0') Topock - Fill; Poorly graded sand (SP); brown (10YR 5/3); very fine grained to medium grained, subround to round; trace silt; trace clay; moist; contact depths unclear due to poor recovery, moisture due to water added during drilling (23.5'); dry		
24	60	IRZ-16-SS-27.0-32.0 3/7/2019 14:20	IRZ-16-VAS-27.0-32.0 (480 ppb) 2/20/2019 09:46	Topock - Alluvium Deposits	SM		(26.0 - 27.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 5/3); very fine grained to very coarse grained, angular to round; little granules to large pebbles, angular to subround; little silt; trace organics; moist to wet; organics in sit lens at top	(27.0') Approximate depth to water table	
25									
26									
27				Topock - Alluvium Deposits			(27.0 - 30.5') Topock - Alluvium Deposits; Silty sand with gravel brown (7.5YR 4/4); very fine grained to very coarse grained, angular to subround; some granules to very large pebbles, angular to subangular; little silt; coarser clasts composed of metadiorite; wet		
28									
29	300	IRZ-16-SS-32.0-37.0 3/7/2019 14:25		Topock - Alluvium Deposits	SC		(30.5 - 32.0') Topock - Alluvium Deposits; Clayey sand with gravel (SC); brown (7.5YR 4/3); very fine grained to very coarse grained, angular to subround; little granules to large pebbles, angular to subangular; little clay; trace silt; coarser clasts composed of metadiorite; wet		
30							(29.5'); increase in silt content		
31				Topock - Alluvium Deposits	GW-GM		(32.0 - 33.3') Topock - Alluvium Deposits; Well graded gravel with silt and sand (GW-GM); granules to large pebbles, angular to subround; some very fine to very coarse grained sand, angular to subround; little silt; trace clay; coarser clasts composed of metadiorite; wet		
32									
33				Topock - Alluvium Deposits	SM		(33.3 - 37.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 4/3); very fine grained to very coarse grained, angular to subround; some silt; little granules to very large pebbles, angular to subround; trace clay; coarser clasts composed of metadiorite; wet		
34									
35				Topock - Alluvium Deposits	ML		(37.0 - 39.0') Topock - Alluvium Deposits; Sandy silt (ML); brown (7.5YR 4/2); low plasticity; some very fine to very coarse grained sand, angular to subround; little granules to large pebbles, angular to subround; little clay; moist to wet		
36									
37	IRZ-16-SS-37.0-42.0 3/7/2019 14:30			Topock - Alluvium Deposits	SM		(39.0 - 39.5') Topock - Alluvium Deposits; Silty sand (SM); brown (7.5YR 4/2); very fine grained to very coarse grained, angular to subround; little granules to large pebbles, angular to subround; little		
38									
39				Topock - Alluvium Deposits	GW-GM				
40									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	02/19/2019	Surface Elevation:	480.0 ft amsl	Boring No.: IRZ-16 Pilot	
Date Completed:	03/07/2019	Northing (NAD83):	2103041.4		
Drilling Co.:	Cascade	Easting (NAD83):	7615824.1	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	207 ft bgs	Project:	Final GW Remedy Phase I
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Steve Vasquez	Depth to First Water:	26 ft bgs		
Drilling Asst:	L. Amaya/ O. Flores	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	Sean McGrane	Sampling Interval:	Continuous		
Editor:	Michael Andrews	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
41		IRZ-16-SS-37.0-42.0 3/7/2019 14:30		Topock - Alluvium Deposits	GW-GM		silt; trace clay; wet (39.5 - 41.3') Topock - Alluvium Deposits; Well graded gravel with silt and sand (GW-GM); brown (10YR 5/3); granules to large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subround; little silt; trace very large pebbles, angular; trace clay; coarser clasts composed of metadiorite; wet; dense		
42				Topock - Alluvium Deposits	SW-SM		(41.3 - 43.3') Topock - Alluvium Deposits; Well graded sand with silt and gravel (SW-SM); brown (7.5YR 4/4); very fine grained to very coarse grained, angular to subround; little granules to very large pebbles, angular to subangular; little silt; wet		
43									
44		IRZ-16-SS-42.0-47.0 3/7/2019 14:35					(43.3 - 54.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 5/3); very fine grained to very coarse grained, angular to subround; some granules to large pebbles, angular to subangular; little silt; coarser clasts composed of metadiorite; wet		
45									
46									
47									
48									
49	300	IRZ-16-SS-47.0-52.0 3/7/2019 14:40		Topock - Alluvium Deposits	SM				
50									
51									
52									
53									
54		IRZ-16-SS-52.0-57.0 3/7/2019 14:45							
55				Topock - Alluvium Deposits	SM		(54.5 - 57.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown / moderate brown (5YR 4/4); very fine grained to very coarse grained, angular to subround; some silt; little granules to very large pebbles, angular to subangular; trace cobbles, angular; trace clay; coarser clasts composed of metadiorite; wet (55.5'); little silt; increase in sand		
56									
57									
58	120	IRZ-16-SS-57.0-62.0 3/7/2019 14:50	IRZ-16-VAS-57.0-62.0 (<0.33 U ppb) 2/20/2019 14:36	Topock - Alluvium Deposits	SW-SM		(57.0 - 59.5') Topock - Alluvium Deposits; Well graded sand with silt and gravel (SW-SM); reddish brown (5YR 4/3); very fine grained to very coarse grained, angular to round; some granules to very large pebbles, angular to subround; little silt; coarser clasts composed of metadiorite; coarser clast composed of conglomerate; wet	(57.0 - 62.0') Adjusted sample interval based on geology, sandier zone with less fines	
59									
60					SM		(59.5 - 64.8') Topock - Alluvium Deposits; Silty sand with gravel (SM);		

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started: <u>02/19/2019</u>	Surface Elevation: <u>480.0 ft amsl</u>	Boring No.: <u>IRZ-16 Pilot</u>
Date Completed: <u>03/07/2019</u>	Northing (NAD83): <u>2103041.4</u>	
Drilling Co.: <u>Cascade</u>	Easting (NAD83): <u>7615824.1</u>	Client: <u>PG&E</u>
Drilling Method: <u>Sonic Drilling</u>	Total Depth: <u>207 ft bgs</u>	Project: <u>Final GW Remedy Phase I</u>
Drill Rig Type: <u>Prosonic Truck Mount</u>	Borehole Diameter: <u>6-12 inches</u>	Location: <u>PG&E Topock, Needles, California</u>
Driller Name: <u>Steve Vasquez</u>	Depth to First Water: <u>26 ft bgs</u>	
Drilling Asst: <u>L. Amaya/ O. Flores</u>	Sampling Method: <u>4 inch x 10 ft Core Barrel</u>	Project Number: <u>RC000753.0051</u>
Logger: <u>Sean McGrane</u>	Sampling Interval: <u>Continuous</u>	
Editor: <u>Michael Andrews</u>	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid			
61	120	IRZ-16-SS-57.0-62.0 3/7/2019 14:50	IRZ-16-VAS-57.0-62.0 (<0.33 U ppb) 2/20/2019 14:36	Topock - Alluvium Deposits	SM		brown (7.5YR 4/4) and reddish brown / moderate brown(5YR 4/4); very fine grained to very coarse grained; rapid dilatency; some granules to very large pebbles, angular to subround; little silt; trace cobbles, subangular; coarser clasts composed of metadiorite; coarser clast composed of conglomerate; wet	(57.0 - 62.0') Adjusted sample interval based on geology, sandier zone with less fines				
62												
63		IRZ-16-SS-62.0-67.0 3/7/2019 14:55			Topock - Alluvium Deposits	SM		(64.8 - 67.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (10YR 5/3); very fine grained to very coarse grained, angular to subround; some granules to large pebbles, angular to subangular; some silt; coarser clasts composed of metadiorite; wet				
64												
65							Topock - Alluvium Deposits	SM		(67.0 - 72.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 4/4); very fine grained to very coarse grained, angular to subround; little granules to very large pebbles, angular to subangular; little silt; coarser clasts composed of metadiorite; wet		
66												
67							Topock - Alluvium Deposits	SM		(72.0 - 73.0') Topock - Alluvium Deposits; Sandy silt with gravel (ML); strong brown (7.5YR 4/6); low plasticity; and very fine to very coarse grained sand, angular to subround; little granules to very large pebbles, angular to subangular; trace cobbles, angular; coarser clasts composed of metadiorite; moist to wet		
68												
69							Topock - Alluvium Deposits	SM		(73.0 - 79.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 4/4) with reddish brown / moderate brown(5YR 4/4); very fine grained to very coarse grained, angular to subround; some granules to very large pebbles, angular to subangular; little silt; trace cobbles, angular; coarser clasts composed of metadiorite; wet		
70												
71							Topock - Alluvium Deposits	ML		(75.5'); increase in silt, decrease in sand		
72												
73							Topock - Alluvium Deposits	SM		(79.0 - 80.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 4/4); some silt; little granules to very large pebbles, angular to subround; wet		
74												
75							Topock - Alluvium Deposits	SM				
76												
77							Topock - Alluvium Deposits	SM				
78												
79												
80												

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	<u>02/19/2019</u>	Surface Elevation:	<u>480.0 ft amsl</u>	Boring No.: <u>IRZ-16 Pilot</u>	
Date Completed:	<u>03/07/2019</u>	Northing (NAD83):	<u>2103041.4</u>		
Drilling Co.:	<u>Cascade</u>	Easting (NAD83):	<u>7615824.1</u>	Client:	<u>PG&E</u>
Drilling Method:	<u>Sonic Drilling</u>	Total Depth:	<u>207 ft bgs</u>	Project:	<u>Final GW Remedy Phase I</u>
Drill Rig Type:	<u>Prosonic Truck Mount</u>	Borehole Diameter:	<u>6-12 inches</u>	Location:	<u>PG&E Topock, Needles, California</u>
Driller Name:	<u>Steve Vasquez</u>	Depth to First Water:	<u>26 ft bgs</u>		
Drilling Asst:	<u>L. Amaya/ O. Flores</u>	Sampling Method:	<u>4 inch x 10 ft Core Barrel</u>	Project Number:	<u>RC000753.0051</u>
Logger:	<u>Sean McGrane</u>	Sampling Interval:	<u>Continuous</u>		
Editor:	<u>Michael Andrews</u>	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
81		IRZ-16-SS-77.0-82.0 3/7/2019 15:10		Topock - Alluvium Deposits	SW-SM		(80.5 - 82.3') Topock - Alluvium Deposits; Well graded sand with silt and gravel (SW-SM); brown (7.5YR 4/4); very fine grained to very coarse grained, angular to subround; some granules to very large pebbles, angular to subangular; little silt; coarser clasts composed of metadiorite; wet		
82				Topock - Alluvium Deposits	ML		(82.3 - 82.8') Topock - Alluvium Deposits; Sandy silt with gravel (ML); brown (7.5YR 4/3)red (2.5YR 4/6); low plasticity; some very fine to very coarse grained sand, angular to subangular; little granules to very large pebbles, angular to subround; coarser clasts composed of metadiorite; hard; iron oxide staining		
83				Topock - Alluvium Deposits	SW-SM		(82.8 - 83.8') Topock - Alluvium Deposits; Well graded sand with silt and gravel (SW-SM); brown (7.5YR 4/4); very fine grained to very coarse grained, angular to subround; some granules to very large pebbles, angular to subangular; little silt; coarser clasts composed of metadiorite; wet		
84	240	IRZ-16-SS-82.0-87.0 3/7/2019 15:15		Topock - Alluvium Deposits	SM		(83.8 - 87.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 4/4); very fine grained to very coarse grained, angular to round; some granules to very large pebbles, angular to subangular; some silt; coarser clasts composed of metadiorite; wet		
85									
86									
87									
88				Topock - Alluvium Deposits	ML		(87.0 - 88.8') Topock - Alluvium Deposits; Sandy silt with gravel (ML); brown (7.5YR 4/4); low plasticity; some granules to large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to round; trace clay; moist; hard	(87.0 - 107.0') Drilling was hard, formation tight, core came out hot and steaming moist to wet	
89		IRZ-16-SS-87.0-92.0 3/7/2019 15:20		Topock - Alluvium Deposits	ML		(88.8 - 89.8') Topock - Alluvium Deposits; Sandy silt (ML); brown (7.5YR 4/4); low plasticity; some very fine to very coarse grained sand, angular to subround; little granules to medium pebbles, angular to subangular; trace clay; moist; hard		
90									
91									
92									
93	240			Topock - Alluvium Deposits	ML		(89.8 - 96.0') Topock - Alluvium Deposits; Sandy silt with gravel (ML); brown (7.5YR 4/4); low plasticity; some granules to large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to round; trace clay; moist; hard		
94		IRZ-16-SS-92.0-97.0 3/7/2019 15:20							
95									
96				Topock - Alluvium Deposits	SM		(96.0 - 96.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 4/3); very fine grained to very coarse grained, angular to subround; some silt; little granules to large pebbles, angular to subangular; coarser clasts composed of metadiorite; dry	(96.0 - 96.5') Dry	
97									
98		IRZ-16-SS-97.0-102.0 3/7/2019 15:30		Topock - Alluvium Deposits	ML		(96.5 - 100.0') Topock - Alluvium Deposits; Sandy silt with gravel (ML); brown (7.5YR 4/4); low plasticity; some granules to large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to round; trace cobbles; trace clay; moist; hard		
99									
100									

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Date Started: 02/19/2019	Surface Elevation: 480.0 ft amsl	Boring No.: IRZ-16 Pilot
Date Completed: 03/07/2019	Northing (NAD83): 2103041.4	
Drilling Co.: Cascade	Easting (NAD83): 7615824.1	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 207 ft bgs	Project: Final GW Remedy Phase I
Drill Rig Type: Prosonic Truck Mount	Borehole Diameter: 6-12 inches	Location: PG&E Topock, Needles, California
Driller Name: Steve Vasquez	Depth to First Water: 26 ft bgs	
Drilling Asst: L. Amaya/ O. Flores	Sampling Method: 4 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger: Sean McGrane	Sampling Interval: Continuous	
Editor: Michael Andrews	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
101		IRZ-16-SS-97.0-102.0 3/7/2019 15:30		Topock - Alluvium Deposits	SM		(100.0 - 101.3') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 4/4); very fine grained to very coarse grained, angular to subround; some granules to very large pebbles, angular to subround; some silt; little clay; coarser clasts composed of metadiorite; moist to dry	(87.0 - 107.0') Drilling was hard, formation tight, core came out hot and steaming moist to wet	
102							(101.3 - 104.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 4/4); very fine grained to very coarse grained, angular to subround; little granules to large pebbles, angular to subangular; little silt; trace clay; moist to dry		
103				Topock - Alluvium Deposits	SM				
104	240	IRZ-16-SS-102.0-107.0 3/7/2019 15:35	IRZ-16-VAS-102.0-107.0 (<0.33 U ppb) 2/21/2019 11:51				(104.5 - 118.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown / moderate brown (5YR 4/4); very fine grained to very coarse grained, angular to round; some granules to medium pebbles, angular to subangular; some silt; coarser clasts composed of metadiorite; moist to wet		
105									
106									
107							(107'); some granules to very large pebbles, angular to subangular; little silt; coarser clasts composed of metadiorite, no clay; wet		
108									
109		IRZ-16-SS-107.0-112.0 3/7/2019 15:37					(109'); trace cobble		
110							(109.5'); no cobbles		
111				Topock - Alluvium Deposits	SM				
112									
113	240	IRZ-16-SS-112.0-117.0 3/7/2019 15:40							
114									
115									
116									
117									
118		IRZ-16-SS-117.0-122.0 3/7/2019 15:45							
119				Topock - Alluvium Deposits	ML		(118.0 - 121.5') Topock - Alluvium Deposits; Sandy silt with gravel (ML); reddish brown (2.5YR 4/4); low plasticity; some very fine to very coarse grained sand, angular to subround; little granules to very large pebbles, angular to subangular; trace cobbles; trace boulders, subangular; trace clay; coarser clasts composed of metadiorite; moist; very stiff		
120									

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Date Started:	02/19/2019	Surface Elevation:	480.0 ft amsl	Boring No.: IRZ-16 Pilot	
Date Completed:	03/07/2019	Northing (NAD83):	2103041.4		
Drilling Co.:	Cascade	Easting (NAD83):	7615824.1	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	207 ft bgs	Project:	Final GW Remedy Phase I
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Steve Vasquez	Depth to First Water:	26 ft bgs		
Drilling Asst:	L. Amaya/ O. Flores	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	Sean McGrane	Sampling Interval:	Continuous		
Editor:	Michael Andrews	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
121		IRZ-16-SS-117.0-122.0 3/7/2019 15:45		Topock - Alluvium Deposits	ML				
122							(121.5 - 132.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (2.5YR 4/4); very fine grained to very coarse grained, angular to round; some granules to very large pebbles, angular to subangular; some silt; coarser clasts composed of metadiorite; wet		
123	240								
124		IRZ-16-SS-122.0-127.0 3/7/2019 15:50		Topock - Alluvium Deposits	SM				
125									
126									
127							(127'); little silt; increase in sand		
128							(127.5'); some silt; wet		
129		IRZ-16-SS-127.0-132.0 3/7/2019 15:55					(129'); some silt; wet; increase in silt, decrease in sand		
130									
131									
132	120			Topock - Alluvium Deposits	ML		(132.0 - 133.0') Topock - Alluvium Deposits; Sandy silt with gravel (ML); brown (7.5YR 4/3); medium plasticity; some very fine to very coarse grained sand, angular to subround; little granules to large pebbles, angular to subangular; little clay; coarser clasts composed of metadiorite; wet; very stiff		
133				Topock - Alluvium Deposits	GM		(133.0 - 134.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); reddish brown (2.5YR 4/4); granules to very large pebbles, angular; some very fine to very coarse grained sand, angular to subround; trace cobbles, angular; coarser clasts composed of metadiorite; wet		
134		IRZ-16-SS-132.0-137.0 3/7/2019 13:00	IRZ-16-VAS-132.0-137.0 (<0.17 U ppb) 2/26/2019 13:38				(134.0 - 143.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (2.5YR 4/4); very fine grained to very coarse grained, angular to subround; little granules to very large pebbles, angular to subround; little silt; wet		
135									
136									
137				Topock - Alluvium Deposits	SM				
138	210	IRZ-16-SS-137.0-142.0 3/7/2019 13:05							
139									
140									

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Date Started:	02/19/2019	Surface Elevation:	480.0 ft amsl	Boring No.: IRZ-16 Pilot
Date Completed:	03/07/2019	Northing (NAD83):	2103041.4	
Drilling Co.:	Cascade	Easting (NAD83):	7615824.1	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	207 ft bgs	Project: Final GW Remedy Phase I
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	6-12 inches	Location: PG&E Topock, Needles, California
Driller Name:	Steve Vasquez	Depth to First Water:	26 ft bgs	
Drilling Asst:	L. Amaya/ O. Flores	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger:	Sean McGrane	Sampling Interval:	Continuous	
Editor:	Michael Andrews	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
141		IRZ-16-SS-137.0-142.0 3/7/2019 13:05		Topock - Alluvium Deposits	SM			(137.0 - 147.0') Soils were soft to drill through, core barrel was full, 144.5 to 147 ft. bgs sediments very wet, poor recovery may be due to soft wet soils expanding in bags,	
142									
143									
144		IRZ-16-SS-142.0-147.0 3/7/2019 13:10		Topock - Alluvium Deposits	ML		(143.0 - 144.3') Topock - Alluvium Deposits; Sandy silt (ML); reddish brown (2.5YR 4/4); low plasticity; some fine to very coarse grained sand, angular to subround; trace granules to large pebbles, angular to subangular; moist to wet		
145				Topock - Alluvium Deposits	SM		(144') trace cobbles, angular to subangular (144.3 - 145.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); olive brown (2.5Y 4/4); very fine grained to very coarse grained, angular to subround; some granules to very large pebbles, angular to subangular; little silt; wet		
146				Topock - Alluvium Deposits	ML		(145.5 - 147.8') Topock - Alluvium Deposits; Sandy silt (ML); reddish brown (2.5YR 4/4); medium plasticity; some very fine to very coarse grained sand, angular to subround; little granules to very large pebbles, angular to subangular; wet; very soft		
147									
148	210								
149		IRZ-16-SS-147.01-152.0 3/7/2019 13:15	IRZ-16-VAS-147.0-152.0 (<0.17 U ppb) 2/27/2019 10:45	Topock - Alluvium Deposits	SM		(147.8 - 155.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (2.5YR 4/4); very fine grained to very coarse grained, angular to subround; some silt; little granules to very large pebbles, angular to subangular; wet		
150							(149.5'); little silt; increase in sand		
151							(151'); trace clay; decrease in sand		
152							(152.5'); some granules to very large pebbles, angular to subangular; decrease in sand		
153									
154		IRZ-16-SS-152.0-157.0 3/7/2019 13:20					(155.5 - 162.8') Topock - Alluvium Deposits; Sandy silt with gravel (ML); reddish brown (2.5YR 4/4); low plasticity; some very fine to very coarse grained sand, angular to round; little granules to very large pebbles, angular to subangular; coarser clasts composed of metadiorite; moist to wet; very stiff		
155									
156									
157									
158		IRZ-16-SS-157.0-162.0 3/7/2019 13:25		Topock - Alluvium Deposits	ML		(158'); trace boulder		
159							(158.5'); no boulders		
160									

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Date Started:	02/19/2019	Surface Elevation:	480.0 ft amsl	Boring No.: IRZ-16 Pilot	
Date Completed:	03/07/2019	Northing (NAD83):	2103041.4		
Drilling Co.:	Cascade	Easting (NAD83):	7615824.1	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	207 ft bgs	Project:	Final GW Remedy Phase I
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Steve Vasquez	Depth to First Water:	26 ft bgs		
Drilling Asst:	L. Amaya/ O. Flores	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	Sean McGrane	Sampling Interval:	Continuous		
Editor:	Michael Andrews	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
161		IRZ-16-SS-157.0-162.0 3/7/2019 13:25		Topock - Alluvium Deposits	ML				
162									
163									
164		IRZ-16-SS-162.0-167.0 3/7/2019 13:30		Topock - Alluvium Deposits	SM		(162.8 - 169.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (2.5YR 4/4); very fine grained to very coarse grained, angular to subround; little granules to very large pebbles, angular to subangular; little silt; coarser clasts composed of metadiorite; wet		
165									
166									
167							(167'); increase in silt, decrease in sand		
168									
169									
170		IRZ-16-SS-167.0-172.0 3/7/2019 13:35		Topock - Alluvium Deposits	ML		(169.5 - 170.5') Topock - Alluvium Deposits; Sandy silt (ML); olive brown (2.5Y 4/4); low plasticity; some very fine to very coarse grained sand, angular to subround; little granules to medium pebbles, angular to subangular; wet; very stiff		
171									
172							(170.5 - 179.5') Topock - Alluvium Deposits; Well graded sand with silt and gravel (SW-SM); dark reddish brown (2.5YR 3/4); very fine grained to very coarse grained, angular to subangular; some granules to large pebbles, angular to subround; little silt; coarser clasts composed of metadiorite; wet		
173									
174		IRZ-16-SS-172.01-177.0 3/7/2019 13:45	IRZ-16-VAS-172.0-177.0 (110) 2/27/2019 16:26	Topock - Alluvium Deposits	SW-SM				
175									
176									
177									
178	210	IRZ-16-SS-177.0-182.0 3/7/2019 13:50						(177.0 - 187.0') Drilling through soils was soft, softer sediments compacted in core bag causing poor recovery, core barrel was full	
179									
180					ML		(179.5 - 182.0') Topock - Alluvium Deposits; Sandy silt with gravel		



Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started: <u>02/19/2019</u>	Surface Elevation: <u>480.0 ft amsl</u>	Boring No.: <u>IRZ-16 Pilot</u>
Date Completed: <u>03/07/2019</u>	Northing (NAD83): <u>2103041.4</u>	
Drilling Co.: <u>Cascade</u>	Easting (NAD83): <u>7615824.1</u>	Client: <u>PG&E</u>
Drilling Method: <u>Sonic Drilling</u>	Total Depth: <u>207 ft bgs</u>	Project: <u>Final GW Remedy Phase I</u>
Drill Rig Type: <u>Prosonic Truck Mount</u>	Borehole Diameter: <u>6-12 inches</u>	Location: <u>PG&E Topock, Needles, California</u>
Driller Name: <u>Steve Vasquez</u>	Depth to First Water: <u>26 ft bgs</u>	
Drilling Asst: <u>L. Amaya/ O. Flores</u>	Sampling Method: <u>4 inch x 10 ft Core Barrel</u>	Project Number: <u>RC000753.0051</u>
Logger: <u>Sean McGrane</u>	Sampling Interval: <u>Continuous</u>	
Editor: <u>Michael Andrews</u>	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
181		IRZ-16-SS-177.0-182.0 3/7/2019 13:50		Topock - Alluvium Deposits	ML		(ML); reddish brown (2.5YR 4/4); low plasticity; and very fine to very coarse grained sand, angular to subround; little granules to very large pebbles, angular to subround; coarser clasts composed of metadiorite; moist to wet	(177.0 - 187.0') Drilling through soils was soft, softer sediments compacted in core bag causing poor recovery, core barrel was full	
182									
183									
184		IRZ-16-SS-182.0-187.0 3/7/2019 16:26		Topock - Alluvium Deposits	SM		(182.0 - 187.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (2.5YR 4/4); very fine grained to very coarse grained; little granules to large pebbles, angular to subangular; little silt; wet		
185									
186									
187									
188				Topock - Alluvium Deposits	ML		(187.0 - 187.8') Topock - Alluvium Deposits; Sandy silt with gravel (ML); reddish brown (2.5YR 4/4); low plasticity; and very fine to very coarse grained sand, angular to subround; little granules to very large pebbles, angular to subround; trace cobbles, angular; coarser clasts composed of metadiorite; moist to wet; some metadiorite pebbles highly weathered	(187.0 - 197.0') Tight formation	
189	210	IRZ-16-SS-187.0-192.0 3/7/2019 13:55					(187.8 - 197.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (2.5YR 4/4); very fine grained to very coarse grained; little granules to very large pebbles, angular to subangular; little silt; wet		
190							(189.5'); some silt; trace cobbles, subangular; decrease in sand		
191									
192				Topock - Alluvium Deposits	SM		(192'); little silt; increase in sand		
193									
194		IRZ-16-VAS-192.0-197.0 (<0.17 U ppb) 2/28/2019 13:41							
195									
196									
197							(196.75') black (10YR 2/1); possible organics		
198	120			Topock - Alluvium Deposits	SW-SM		(197.0 - 198.3') Topock - Alluvium Deposits; Well graded sand with silt and gravel (SW-SM); very fine grained to very coarse grained, angular to subround; little granules to large pebbles, angular to subround; little silt; coarser clasts composed of metadiorite; wet		
199				Topock - Weathered Bedrock - conglomerate	ML		(198.3 - 204.5') Topock - Weathered Bedrock - conglomerate; Sandy silt with gravel (ML); reddish brown (2.5YR 4/4); low plasticity; some very fine to very coarse grained sand, angular to subround; little granules to large pebbles, angular to subround; trace clay; coarser clast composed of conglomerate; moist to wet; very stiff		
200									

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Date Started:	02/19/2019	Surface Elevation:	480.0 ft amsl	Boring No.: IRZ-16 Pilot	
Date Completed:	03/07/2019	Northing (NAD83):	2103041.4		
Drilling Co.:	Cascade	Easting (NAD83):	7615824.1	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	207 ft bgs	Project:	Final GW Remedy Phase I
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Steve Vasquez	Depth to First Water:	26 ft bgs		
Drilling Asst:	L. Amaya/ O. Flores	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	Sean McGrane	Sampling Interval:	Continuous		
Editor:	Michael Andrews	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
201	120			Topock - Weathered Bedrock - conglomerate	ML			(202.0 - 203.0') Rough drilling	
202									
203									
204									
205				Topock - Competent Bedrock - conglomerate			(204.5 - 207.0') Topock - Competent Bedrock - conglomerate; reddish brown (2.5YR 4/4); moist to dry; moderate cementation; friable	(203.0 - 207.0') Hard drilling	
206									
207	End of Boring at 207.0' bgs.								
208									
209									
210									
211									
212									
213									
214									
215									
216									
217									
218									
219									
220									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	02/19/2019	Surface Elevation:	480.0 ft amsl	Well ID: IRZ-16 Pilot
Date Completed:	03/07/2019	Northing (NAD83):	2103041.4	
Drilling Co.:	Cascade	Easting (NAD83):	7615824.1	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	207 ft bgs	Project: Final GW Remedy Phase I
Driller Name:	Steve Vasquez	Borehole Diameter:	6-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	L. Amaya/ O. Flores	Depth to First Water:	26 ft bgs	
Logger:	Sean McGrane	Editor:	Michael Andrews	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
1		Topock - Fill	NR		(0.0 - 0.5') Temporary Steel Plate with BMP		
2		Topock - Fill	SP		(0.5 - 5.0') Plastering Sand	(0.5 - 5.0') 7.9 bags	(0.5 - 5.0') 7 bags (-11%) Note: Wildcat Washed
3		Topock - Fill	NR				
4		Topock - Fill	NR				
5		Topock - Fill	NR				
6		Topock - Fill	NR				
7		Topock - Fill	NR				
8		Topock - Fill	NR				
9		Topock - Fill	NR				
10		Topock - Fill	NR				
11		Topock - Fill	NR				
12		Topock - Fill	NR				
13		Topock - Fill	NR		(5.0 - 182.0') Pea Gravel	(5.0 - 182.0') 78.8 bags	(5.0 - 182.0') 83 bags (5%) Note: Cal-Silica 1/4"x3/8"
14		Topock - Fill	NR				
15		Topock - Fill	NR				
16		Topock - Fill	NR				
17		Topock - Fill	NR				
18		Topock - Fill	NR				
19		Topock - Fill	NR				
20		Topock - Fill	NR				

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started:	02/19/2019	Surface Elevation:	480.0 ft amsl	Well ID: IRZ-16 Pilot
Date Completed:	03/07/2019	Northing (NAD83):	2103041.4	
Drilling Co.:	Cascade	Easting (NAD83):	7615824.1	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	207 ft bgs	Project: Final GW Remedy Phase I
Driller Name:	Steve Vasquez	Borehole Diameter:	6-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	L. Amaya/ O. Flores	Depth to First Water:	26 ft bgs	
Logger:	Sean McGrane	Editor:	Michael Andrews	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
21		Topock - Fill	NR				
22							
23		Topock - Fill	SP				
24							
25							
26		Topock - Alluvium Deposits	SM				
27							
28		Topock - Alluvium Deposits					
29							
30	IRZ-16-VAS-27.0-32.0 (480 ppb) 2/20/2019 09:46				(5.0 - 182.0') Pea Gravel	(9.0 - 207.0') 6" Borehole	(5.0 - 182.0') 78.8 bags
31		Topock - Alluvium Deposits	SC				(5.0 - 182.0') 83 bags (5%) Note: Cal-Silica 1/4"x3/8"
32							
33		Topock - Alluvium Deposits	GW-GM				
34							
35		Topock - Alluvium Deposits	SM				
36							
37							
38		Topock - Alluvium Deposits	ML				
39							
40		Topock - Alluvium Deposits	SM				
			GW-GM				

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started: 02/19/2019	Surface Elevation: 480.0 ft amsl	Well ID: IRZ-16 Pilot
Date Completed: 03/07/2019	Northing (NAD83): 2103041.4	
Drilling Co.: Cascade	Easting (NAD83): 7615824.1	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 207 ft bgs	Project: Final GW Remedy Phase I
Driller Name: Steve Vasquez	Borehole Diameter: 6-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst: L. Amaya/ O. Flores	Depth to First Water: 26 ft bgs	
Logger: Sean McGrane	Editor: Michael Andrews	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
41		Topock - Alluvium Deposits	GW-GM				
42		Topock - Alluvium Deposits	SW-SM				
43							
44							
45							
46							
47							
48							
49		Topock - Alluvium Deposits	SM				
50					(5.0 - 182.0') Pea Gravel	(9.0 - 207.0') 6" Borehole	(5.0 - 182.0') 78.8 bags
51							
52							
53							
54							
55							
56		Topock - Alluvium Deposits	SM				
57							
58	IRZ-16-VAS-57.0-62.0 (<0.33 U ppb) 2/20/2019 14:36	Topock - Alluvium Deposits	SW-SM				
59							
60			SM				

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started:	02/19/2019	Surface Elevation:	480.0 ft amsl	Well ID: IRZ-16 Pilot
Date Completed:	03/07/2019	Northing (NAD83):	2103041.4	
Drilling Co.:	Cascade	Easting (NAD83):	7615824.1	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	207 ft bgs	Project: Final GW Remedy Phase I
Driller Name:	Steve Vasquez	Borehole Diameter:	6-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	L. Amaya/ O. Flores	Depth to First Water:	26 ft bgs	
Logger:	Sean McGrane	Editor:	Michael Andrews	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
61	IRZ-16-VAS-57.0-62.0 (<0.33 U ppb) 2/20/2019 14:36						
62		Topock - Alluvium Deposits	SM				
63							
64							
65		Topock - Alluvium Deposits	SM				
66							
67							
68		Topock - Alluvium Deposits	SM				
69							
70					(5.0 - 182.0') Pea Gravel	(9.0 - 207.0') 6" Borehole	(5.0 - 182.0') 78.8 bags
71							
72		Topock - Alluvium Deposits	ML				
73							
74		Topock - Alluvium Deposits	SM				
75							
76							
77							
78							
79		Topock - Alluvium Deposits	SM				
80							

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Date Started:	02/19/2019	Surface Elevation:	480.0 ft amsl	Well ID: IRZ-16 Pilot
Date Completed:	03/07/2019	Northing (NAD83):	2103041.4	
Drilling Co.:	Cascade	Easting (NAD83):	7615824.1	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	207 ft bgs	Project: Final GW Remedy Phase I
Driller Name:	Steve Vasquez	Borehole Diameter:	6-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	L. Amaya/ O. Flores	Depth to First Water:	26 ft bgs	
Logger:	Sean McGrane	Editor:	Michael Andrews	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
81		Topock - Alluvium Deposits	SM				
82		Topock - Alluvium Deposits	SW-SM				
83		Topock - Alluvium Deposits	ML				
84		Topock - Alluvium Deposits	SW-SM				
85		Topock - Alluvium Deposits	SM				
86		Topock - Alluvium Deposits	SM				
87		Topock - Alluvium Deposits	ML				
88		Topock - Alluvium Deposits	ML				
89		Topock - Alluvium Deposits	ML				
90		Topock - Alluvium Deposits	ML		(5.0 - 182.0') Pea Gravel	(9.0 - 207.0') 6" Borehole	(5.0 - 182.0') 78.8 bags
91		Topock - Alluvium Deposits	ML				
92		Topock - Alluvium Deposits	ML				
93		Topock - Alluvium Deposits	ML				
94		Topock - Alluvium Deposits	ML				
95		Topock - Alluvium Deposits	ML				
96		Topock - Alluvium Deposits	SM				
97		Topock - Alluvium Deposits	ML				
98		Topock - Alluvium Deposits	ML				
99		Topock - Alluvium Deposits	ML				
100		Topock - Alluvium Deposits	ML				

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started:	02/19/2019	Surface Elevation:	480.0 ft amsl	Well ID: IRZ-16 Pilot
Date Completed:	03/07/2019	Northing (NAD83):	2103041.4	
Drilling Co.:	Cascade	Easting (NAD83):	7615824.1	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	207 ft bgs	Project: Final GW Remedy Phase I
Driller Name:	Steve Vasquez	Borehole Diameter:	6-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	L. Amaya/ O. Flores	Depth to First Water:	26 ft bgs	
Logger:	Sean McGrane	Editor:	Michael Andrews	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
101		Topock - Alluvium Deposits	SM				
102							
103		Topock - Alluvium Deposits	SM				
104	IRZ-16-VAS-102.0-107.0 (<0.33 U ppb) 2/21/2019 11:51						
105							
106							
107							
108							
109							
110					(5.0 - 182.0') Pea Gravel	(9.0 - 207.0') 6" Borehole	(5.0 - 182.0') 78.8 bags
111		Topock - Alluvium Deposits	SM				(5.0 - 182.0') 83 bags (5%) Note: Cal-Silica 1/4"x3/8"
112							
113							
114							
115							
116							
117							
118							
119		Topock - Alluvium Deposits	ML				
120							

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Date Started:	02/19/2019	Surface Elevation:	480.0 ft amsl	Well ID: IRZ-16 Pilot
Date Completed:	03/07/2019	Northing (NAD83):	2103041.4	
Drilling Co.:	Cascade	Easting (NAD83):	7615824.1	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	207 ft bgs	Project: Final GW Remedy Phase I
Driller Name:	Steve Vasquez	Borehole Diameter:	6-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	L. Amaya/ O. Flores	Depth to First Water:	26 ft bgs	
Logger:	Sean McGrane	Editor:	Michael Andrews	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
121		Topock - Alluvium Deposits	ML				
122							
123							
124							
125							
126							
127		Topock - Alluvium Deposits	SM				
128							
129							
130					(5.0 - 182.0') Pea Gravel	(9.0 - 207.0') 6" Borehole	(5.0 - 182.0') 78.8 bags
131							
132							
133		Topock - Alluvium Deposits	ML				
134	IRZ-16-VAS-132.0-137.0 (<0.17 U ppb) 2/26/2019 13:38	Topock - Alluvium Deposits	GM				
135							
136							
137		Topock - Alluvium Deposits	SM				
138							
139							
140							

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Date Started:	02/19/2019	Surface Elevation:	480.0 ft amsl	Well ID: IRZ-16 Pilot
Date Completed:	03/07/2019	Northing (NAD83):	2103041.4	
Drilling Co.:	Cascade	Easting (NAD83):	7615824.1	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	207 ft bgs	Project: Final GW Remedy Phase I
Driller Name:	Steve Vasquez	Borehole Diameter:	6-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	L. Amaya/ O. Flores	Depth to First Water:	26 ft bgs	
Logger:	Sean McGrane	Editor:	Michael Andrews	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
141		Topock - Alluvium Deposits	SM				
142							
143		Topock - Alluvium Deposits	ML				
144							
145		Topock - Alluvium Deposits	SM				
146							
147		Topock - Alluvium Deposits	ML				
148							
149	IRZ-16-VAS-147.0-152.0 (<0.17 U ppb) 2/27/2019 10:45						
150					(5.0 - 182.0') Pea Gravel	(9.0 - 207.0') 6" Borehole	(5.0 - 182.0') 78.8 bags
151							
152		Topock - Alluvium Deposits	SM				(5.0 - 182.0') 83 bags (5%) Note: Cal-Silica 1/4"x3/8"
153							
154							
155							
156							
157							
158		Topock - Alluvium Deposits	ML				
159							
160							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started:	02/19/2019	Surface Elevation:	480.0 ft amsl	Well ID: IRZ-16 Pilot
Date Completed:	03/07/2019	Northing (NAD83):	2103041.4	
Drilling Co.:	Cascade	Easting (NAD83):	7615824.1	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	207 ft bgs	Project: Final GW Remedy Phase I
Driller Name:	Steve Vasquez	Borehole Diameter:	6-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	L. Amaya/ O. Flores	Depth to First Water:	26 ft bgs	
Logger:	Sean McGrane	Editor:	Michael Andrews	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
161		Topock - Alluvium Deposits	ML				
162							
163							
164							
165							
166		Topock - Alluvium Deposits	SM				
167							
168							
169							
170		Topock - Alluvium Deposits	ML		(5.0 - 182.0') Pea Gravel	(9.0 - 207.0') 6" Borehole	(5.0 - 182.0') 78.8 bags
171							
172							
173							
174	IRZ-16-VAS-172.0-177.0 (110) 2/27/2019 16:26	Topock - Alluvium Deposits	SW-SM				
175							
176							
177							
178							
179							
180			ML				

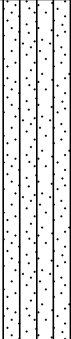
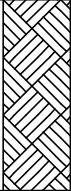
Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started:	02/19/2019	Surface Elevation:	480.0 ft amsl	Well ID: IRZ-16 Pilot
Date Completed:	03/07/2019	Northing (NAD83):	2103041.4	
Drilling Co.:	Cascade	Easting (NAD83):	7615824.1	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	207 ft bgs	Project: Final GW Remedy Phase I
Driller Name:	Steve Vasquez	Borehole Diameter:	6-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	L. Amaya/ O. Flores	Depth to First Water:	26 ft bgs	
Logger:	Sean McGrane	Editor:	Michael Andrews	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
181		Topock - Alluvium Deposits	ML		(5.0 - 182.0') Pea Gravel	(5.0 - 182.0') 78.8 bags	(5.0 - 182.0') 83 bags (5%) Note: Cal-Silica 1/4"x3/8"
182							
183		Topock - Alluvium Deposits	SM				
184							
185							
186							
187		Topock - Alluvium Deposits	ML		(182.0 - 192.0') Cemex #3 MESH (8x10)	(182.0 - 192.0') 4.2 bags	(182.0 - 192.0') 4 bags (-5%) Note: Lapis Lustre Sand
188							
189							
190							
191							
192		Topock - Alluvium Deposits	SM		(9.0 - 207.0') 6" Borehole		
193							
194	IRZ-16-VAS-192.0-197.0 (<0.17 U ppb) 2/28/2019 13:41						
195							
196					(192.0 - 207.0') Bentonite seal pack	(192.0 - 207.0') 4.4 bags	(192.0 - 207.0') 4 bags (-9%) Note: Puregold medium chips
197							
198		Topock - Alluvium Deposits	SW-SM				
199		Topock - Weathered Bedrock - conglomerate	ML				
200							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started: 02/19/2019	Surface Elevation: 480.0 ft amsl	Well ID: IRZ-16 Pilot
Date Completed: 03/07/2019	Northing (NAD83): 2103041.4	
Drilling Co.: Cascade	Easting (NAD83): 7615824.1	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 207 ft bgs	Project: Final GW Remedy Phase I
Driller Name: Steve Vasquez	Borehole Diameter: 6-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst: L. Amaya/ O. Flores	Depth to First Water: 26 ft bgs	
Logger: Sean McGrane	Editor: Michael Andrews	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction		Calculated Material Volumes	Material Volumes Installed
201		Topock - Weathered Bedrock - conglomerate	ML		(192.0 - 207.0') Bentonite seal pack	(9.0 - 207.0') 6" Borehole	(192.0 - 207.0') 4.4 bags	(192.0 - 207.0') 4 bags (-9%) Note: Puregold medium chips
202								
203								
204								
205		Topock - Competent Bedrock - conglomerate						
206								
207								
208								
209								
210								
211								
212								
213								
214								
215								
216								
217								
218								
219								
220								

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

TEMP ABANDONMENT LOG_PG&E_TOPOCK C:\USERS\SMCGRANE\DOCUMENTS\PG&E_TOPOCK\DATABASE FOR LOGGING FILES\06.03.19\TOPOCK DATA TEMPLATE FOR PLOG.GDT 06/03/19 08:23

Date Started:	03/02/2019	Surface Elevation:	480.3 ft amsl	Boring No.: IRZ-17 Pilot	
Date Completed:	03/13/2019	Northing (NAD83):	2103000.2		
Drilling Co.:	Cascade	Easting (NAD83):	7615871.3	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	227 ft bgs	Project:	Final GW Remedy Phase I
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Steve Vasquez	Depth to First Water:	26.55 ft bgs		
Drilling Asst:	O. Flores, L. Amaya	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	G Jeffers / J. Wanner	Sampling Interval:	Continuous		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
1							(0.0 - 19.5') (NR); No recovery loose dredge sands falling out of core barrel could not provide core will accurate depths.	(0.0 - 17.0') Due to loose dredge sand, little to no recovery, push 6" casing to try and get recovery, was not successful	(0.0 - 217.0') No water used
2									
3									
4									
5									
6									
7									
8									
9									
10	0				NR				
11									
12									
13									
14									
15									
16									
17									
18								(17.0 - 19.5') Loose dredge sands continuously fell out of core barrel	
19									
20	90			Topock - Fill	SP		(19.5 - 21.5') Topock - Fill; Poorly graded sand (SP); yellowish brown /		







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Date Started:	03/02/2019	Surface Elevation:	480.3 ft amsl	Boring No.: <u>IRZ-17 Pilot</u>
Date Completed:	03/13/2019	Northing (NAD83):	2103000.2	
Drilling Co.:	Cascade	Easting (NAD83):	7615871.3	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	227 ft bgs	Project: Final GW Remedy Phase I
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	6-12 inches	Location: PG&E Topock, Needles, California
Driller Name:	Steve Vasquez	Depth to First Water:	26.55 ft bgs	
Drilling Asst:	O. Flores, L. Amaya	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger:	G Jeffers / J. Wanner	Sampling Interval:	Continuous	
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
21				Topock - Fill	SP		moderate yellowish brown(10YR 5/4); very fine grained to fine grained, angular to subround; trace silt; little mica; dry to moist; no odor; no staining; moist at 20.5' bgs		(0.0 - 217.0') No water used
22				Topock - Fluvial Deposits	SM		(21.5 - 24.0') Topock - Fluvial Deposits; Silty sand with gravel (SM); dark yellowish brown (10YR 4/4); very fine grained to very coarse grained, subangular to round; some granules to very large pebbles, subangular to round; little silt; trace cobbles, subangular to subround; moist; no odor; no staining; larger clasts consist of sandstone, granodiorite and metadiorite. Higher gravel content at bottom 4" of soil bed.		
23									
24	90	IRZ-17-SS-22-27 3/7/2019 11:28		Topock - Fluvial Deposits	ML		(24.0 - 28.0') Topock - Fluvial Deposits; Sandy silt with gravel (ML); yellowish brown / moderate yellowish brown(10YR 5/4); no plasticity, slow dilatancy; some very fine to fine grained sand, subangular to subround; little granules to very large pebbles, subangular to round; trace cobbles, subround to round; trace mica; wet; medium stiff; no odor; no staining (26'); some granules to very large pebbles, subangular to round; trace fine to very coarse sand, 3" lense at 26' bgs of decrease in silt.	(24.0') Approximate depth of water table	
25									
26				Topock - Fluvial Deposits	ML				
27									
28				Topock - Fluvial Deposits	SM		(28.0 - 29.0') Topock - Fluvial Deposits; Silty sand with gravel (SM); yellowish brown / moderate yellowish brown(10YR 5/4); very fine grained to fine grained, subangular to round; and silt; little granules to very large pebbles, subangular to round; little mica; wet; no odor; no staining; trace med to very fine sand.	(27.0 - 32.0') Set temporary well screen, ~6" of water in screen, due to silt and clays, drilled an additional 5 ft to collect sample	
29	60	IRZ-17-SS-27-32 3/7/2019 11:33		Topock - Fluvial Deposits	ML		(29.0 - 30.0') Topock - Fluvial Deposits; Sandy silt with gravel (ML); yellowish brown / moderate yellowish brown(10YR 5/4); medium plasticity, slow dilatancy; some very fine to fine grained sand, subangular to subround; little granules to very large pebbles, subangular to round; trace mica; wet; medium stiff; no odor; no staining		
30				Topock - Fluvial Deposits	MH		(30.0 - 33.5') Topock - Fluvial Deposits; Elastic silt with sand (MH); yellowish brown / moderate yellowish brown(10YR 5/4); high plasticity, no dilatancy; little very fine grained sand, subangular to subround; trace granules to very large pebbles, subround to round; trace cobbles, round; trace clay; trace mica; wet; very soft; no odor; no staining; increase granules to very large pebbles at bottom of soil bed (4"), oxidized staining observed at bottom of bed.		
31									
32				Topock - Fluvial Deposits	SM		(33.5 - 35.5') Topock - Fluvial Deposits; Silty sand with gravel (SM); yellowish brown / moderate yellowish brown(10YR 5/4); very fine grained to very coarse grained, subangular to round; some silt; little granules to very large pebbles, subround to round; trace cobbles, round; trace clay; little mica; wet; no odor; iron oxide staining		
33	48	IRZ-17-SS-32-37 3/7/2019 11:36	IRZ-17-VAS-32-37 (67 ppb) 3/2/2019 13:14	Topock - Fluvial Deposits	SM				
34				Topock - Alluvium Deposits	SM		(35.5 - 38.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); yellowish brown / moderate yellowish brown(10YR 5/4); very fine grained to very coarse grained, angular to subangular; some granules to very large pebbles, angular to subangular; little silt; little mica; wet; no odor; no staining		
35									
36									
37									
38	240	IRZ-17-SS-36-42 3/7/2019 11:45		Topock - Alluvium Deposits	GM		(38.0 - 44.5') Topock - Alluvium Deposits; Silty gravel with sand (GM); reddish brown (5YR 4/3); granules to very large pebbles, angular to subround; some very fine to very coarse grained sand, angular to subround; little silt; trace mica; wet; no odor; no staining; larger clasts consist of granodiorite.		
39									
40									





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Date Started: <u>03/02/2019</u>	Surface Elevation: <u>480.3 ft amsl</u>	Boring No.: <u>IRZ-17 Pilot</u>
Date Completed: <u>03/13/2019</u>	Northing (NAD83): <u>2103000.2</u>	
Drilling Co.: <u>Cascade</u>	Easting (NAD83): <u>7615871.3</u>	Client: <u>PG&E</u>
Drilling Method: <u>Sonic Drilling</u>	Total Depth: <u>227 ft bgs</u>	Project: <u>Final GW Remedy Phase I</u>
Drill Rig Type: <u>Prosonic Truck Mount</u>	Borehole Diameter: <u>6-12 inches</u>	Location: <u>PG&E Topock, Needles, California</u>
Driller Name: <u>Steve Vasquez</u>	Depth to First Water: <u>26.55 ft bgs</u>	
Drilling Asst: <u>O. Flores, L. Amaya</u>	Sampling Method: <u>4 inch x 10 ft Core Barrel</u>	Project Number: <u>RC000753.0051</u>
Logger: <u>G Jeffers / J. Wanner</u>	Sampling Interval: <u>Continuous</u>	
Editor: <u>Sean McGrane</u>	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
41		IRZ-17-SS-36-42 3/7/2019 11:45		Topock - Alluvium Deposits	GM		(40'); Increase in granules to very large pebbles.		(0.0 - 217.0') No water used
42									
43									
44									
45		IRZ-17-SS-42-47 3/7/2019 11:50		Topock - Alluvium Deposits	SM		(44.5 - 53.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown / moderate brown (5YR 4/4); very fine grained to very coarse grained, angular to subangular; little granules to very large pebbles, angular to subangular; little silt; trace cobbles, angular; little mica; wet; no odor; no staining; larger clasts consist of granodiorite and metadiorite.		
46							(46.5'); some granules to very large pebbles, angular to subangular; decrease in sand and silt.		
47									
48									
49	240	IRZ-17-SS-47-52 3/7/2019 11:55					(49'); increase in silt, decrease in granules to very large pebbles.		
50							(49.5'); decrease in silt.		
51									
52									
53				Topock - Alluvium Deposits	SW		(53.0 - 54.0') Topock - Alluvium Deposits; Well graded sand with gravel (SW); brown (10YR 4/3); very fine grained to very coarse grained, angular to subround; little granules to very large pebbles, angular to subround; trace cobbles, subround; trace silt; little mica; wet; no odor; no staining; larger clasts consist of granodiorite, clasts coarsen downward.		
54		IRZ-17-SS-52-57 3/7/2019 12:10		Topock - Alluvium Deposits	SM		(54.0 - 57.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown / moderate brown (5YR 4/4); very fine grained to very coarse grained, subangular to subround; some granules to very large pebbles, angular to subround; little silt; little mica; wet; no odor; no staining; larger clasts consist of granodiorites.		
55									
56									
57									
58				Topock - Alluvium Deposits	SW-SM		(57.0 - 59.0') Topock - Alluvium Deposits; Well graded sand with silt and gravel (SW-SM); reddish brown (5YR 4/3); very fine grained to very coarse grained, angular to subround; some granules to very large pebbles, angular to subround; little silt; trace mica; wet; no odor; no staining; larger clasts consist of granodiorite.		
59	120	IRZ-17-SS-57-62 3/7/2019 12:25		Topock - Alluvium Deposits	ML		(59.0 - 59.5') Topock - Alluvium Deposits; Sandy silt with gravel (ML); reddish brown / moderate brown (5YR 4/4); low plasticity, no dilatancy; some very fine to very coarse grained sand, angular to subround; little		
60					SM				

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Date Started: <u>03/02/2019</u>	Surface Elevation: <u>480.3 ft amsl</u>	Boring No.: IRZ-17 Pilot
Date Completed: <u>03/13/2019</u>	Northing (NAD83): <u>2103000.2</u>	
Drilling Co.: <u>Cascade</u>	Easting (NAD83): <u>7615871.3</u>	Client: <u>PG&E</u>
Drilling Method: <u>Sonic Drilling</u>	Total Depth: <u>227 ft bgs</u>	Project: <u>Final GW Remedy Phase I</u>
Drill Rig Type: <u>Prosonic Truck Mount</u>	Borehole Diameter: <u>6-12 inches</u>	Location: <u>PG&E Topock, Needles, California</u>
Driller Name: <u>Steve Vasquez</u>	Depth to First Water: <u>26.55 ft bgs</u>	
Drilling Asst: <u>O. Flores, L. Amaya</u>	Sampling Method: <u>4 inch x 10 ft Core Barrel</u>	Project Number: <u>RC000753.0051</u>
Logger: <u>G Jeffers / J. Wanner</u>	Sampling Interval: <u>Continuous</u>	
Editor: <u>Sean McGrane</u>	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid			
61	120	IRZ-17-SS-57-62 3/7/2019 12:25		Topock - Alluvium Deposits	SM		granules to very large pebbles, angular to subangular; trace mica; wet; medium stiff to stiff; no odor; no staining (59.5 - 64.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown / moderate brown(5YR 4/4); very fine grained to very coarse grained, subangular to subround; some granules to very large pebbles, angular to subangular; some silt; little mica; wet; no odor; no staining; larger clasts consist of metadiorite and granodiorite. (60'); little silt; increase in sand. (61'); some silt; decrease in sand.		(0.0 - 217.0') No water used			
62												
63		IRZ-17-SS-62-67 3/7/2019 13:05	IRZ-17-VAS-62-67 (0.604 J ppb) 3/2/2019 15:50	Topock - Alluvium Deposits	GM		(64.0 - 65.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); reddish brown / moderate brown(5YR 4/4); granules to very large pebbles, angular to subangular; and very fine to very coarse grained sand, subangular to subround; little silt; little mica; wet; no odor; no staining					
64							(65.0 - 75.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (10YR 5/3); very fine grained to very coarse grained, angular to subround; some granules to very large pebbles, angular to subangular; little silt; trace mica; wet; no odor; weak cementation; no staining					
65				Topock - Alluvium Deposits	SM		(66') reddish brown / moderate brown(5YR 4/4); some silt; decrease in granules to very large pebbles, no cementation. (67'); little granules to very large pebbles, angular to subangular; increase in sand, increase in silt, weathered granules to very large pebbles observed.			(67.0 - 87.0') Core compaction observed. switch back to 10' runs.		
66	192	IRZ-17-SS-67-72 3/7/2019 13:12					(70.5'); some granules to very large pebbles, angular to subangular; weathered granules to very large pebbles observed.					
67												
68												
69		IRZ-17-SS-72-77 3/7/2019 13:25					(73.5'); little granules to very large pebbles, angular to subangular; increase in silt.					
70												
71												
72		IRZ-17-SS-77-82 3/7/2019 13:35		Topock - Alluvium Deposits	ML		(75.5 - 80.5') Topock - Alluvium Deposits; Sandy silt with gravel (ML); reddish brown (5YR 5/4); no plasticity, slow dilatancy; some granules to very large pebbles, angular to subangular; some very fine to very coarse grained sand, subangular to subround; trace mica; wet; stiff; no odor; no staining					
73												
74												
75												
76												
77												
78												
79												
80												

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Date Started: <u>03/02/2019</u>	Surface Elevation: <u>480.3 ft amsl</u>	Boring No.: IRZ-17 Pilot
Date Completed: <u>03/13/2019</u>	Northing (NAD83): <u>2103000.2</u>	
Drilling Co.: <u>Cascade</u>	Easting (NAD83): <u>7615871.3</u>	Client: <u>PG&E</u>
Drilling Method: <u>Sonic Drilling</u>	Total Depth: <u>227 ft bgs</u>	Project: <u>Final GW Remedy Phase I</u>
Drill Rig Type: <u>Prosonic Truck Mount</u>	Borehole Diameter: <u>6-12 inches</u>	Location: <u>PG&E Topock, Needles, California</u>
Driller Name: <u>Steve Vasquez</u>	Depth to First Water: <u>26.55 ft bgs</u>	
Drilling Asst: <u>O. Flores, L. Amaya</u>	Sampling Method: <u>4 inch x 10 ft Core Barrel</u>	Project Number: <u>RC000753.0051</u>
Logger: <u>G Jeffers / J. Wanner</u>	Sampling Interval: <u>Continuous</u>	
Editor: <u>Sean McGrane</u>	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
81	192	IRZ-17-SS-77-82 3/7/2019 13:35		Topock - Alluvium Deposits	SM		(80.5 - 82.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown / moderate brown(5YR 4/4); very fine grained to very coarse grained, angular to subround; some granules to very large pebbles, angular to subangular; some silt; trace mica; wet; no odor; no staining	(67.0 - 87.0') Core compaction observed. switch back to 10' runs.	(0.0 - 217.0') No water used
82									
83				Topock - Alluvium Deposits	ML		(82.0 - 85.5') Topock - Alluvium Deposits; Sandy silt with gravel (ML); reddish brown (5YR 5/4); no plasticity, no dilatency; some granules to very large pebbles, angular to subangular; some very fine to very coarse grained sand, subangular to subround; trace mica; wet; very stiff; no odor; weak cementation; iron oxide staining		
84									
85	120	IRZ-17-SS-82-87 3/7/2019 13:51							
86				Topock - Alluvium Deposits	SM		(85.5 - 88.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown / moderate brown(5YR 4/4) trace dusky red(5R 3/4); very fine grained to very coarse grained, angular to subround; some granules to very large pebbles, angular to subangular; some silt; trace mica; wet; no odor; iron oxide staining; crushed gravel fragments at bottom of formation.		
87									
88									
89	120	IRZ-17-SS-87-92 3/7/2019 14:01		Topock - Alluvium Deposits	ML		(88.0 - 96.5') Topock - Alluvium Deposits; Sandy silt with gravel (ML); reddish brown (5YR 5/4); no plasticity, no dilatency; some granules to very large pebbles, angular; some very fine to very coarse grained sand, angular to subround; trace mica; wet; very stiff; no odor		
90									
91									
92									
93	120	IRZ-17-SS-92-97 3/7/2019 14:07							
94				Topock - Alluvium Deposits	ML		(92'); moist; weak cementation; increase in granules to very large pebbles, decrease in sand.		
95									
96									
97	120	IRZ-17-SS-97-102 3/7/2019 14:12		Topock - Alluvium Deposits	SM		(96.5 - 119.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown / moderate brown(5YR 4/4); very fine grained to very coarse grained, angular to subround; some granules to very large pebbles, angular to subround; some silt; trace mica; wet; no odor; no staining		
98									
99									
100							(99.5'); little silt; increase in granules to very large pebbles.		

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Date Started:	03/02/2019	Surface Elevation:	480.3 ft amsl	Boring No.: IRZ-17 Pilot	
Date Completed:	03/13/2019	Northing (NAD83):	2103000.2		
Drilling Co.:	Cascade	Easting (NAD83):	7615871.3	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	227 ft bgs	Project:	Final GW Remedy Phase I
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Steve Vasquez	Depth to First Water:	26.55 ft bgs		
Drilling Asst:	O. Flores, L. Amaya	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	G Jeffers / J. Wanner	Sampling Interval:	Continuous		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
101		IRZ-17-SS-97-102 3/7/2019 14:12							(0.0 - 217.0') No water used
102							(102'); some silt; moderate cementation; decrease in sand and granules to very large pebbles.		
103	120						(103'); increase in sand and granules to very large pebbles, decrease in silt.		
104		IRZ-17-SS-102-107 3/7/2019 14:18	IRZ-17-VAS-102-107 (<0.17 U ppb) 3/3/2019 11:50						
105							(106'); decrease in sand, increase in granules to very large pebbles, silt nodules.		
106							(107'); increase slit, decrease in granules to very large pebbles.		
107									
108									
109		IRZ-17-SS-107-112 3/7/2019 14:22		Topock - Alluvium Deposits	SM		(108.5'); and granules to very large pebbles, angular to subround; little silt; decrease in silt.		
110							(109.5'); some silt; increase in silt, decrease in granules to very large pebbles.		
111									
112	120						(112') reddish brown / moderate brown(5YR 4/4) some dusky red(5R 3/4); increase silt, decrease granules to very large pebbles, trace weathered gravel, mottling.		
113									
114		IRZ-17-SS-112-117 3/7/2019 14:26							
115									
116									
117									
118	120	IRZ-17-SS-117-122 3/7/2019 14:31					(117') reddish brown / moderate brown(5YR 4/4); little silt; decrease in silt, increase sand, no mottling.		
119									
120				Topock - Alluvium Deposits	ML		(119.0 - 124.0') Topock - Alluvium Deposits; Sandy silt with gravel (ML); reddish brown / moderate brown(5YR 4/4) trace dusky red(5R 3/4); low plasticity, no dilatancy; some granules to very large pebbles,		

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started: 03/02/2019	Surface Elevation: 480.3 ft amsl	Boring No.: IRZ-17 Pilot
Date Completed: 03/13/2019	Northing (NAD83): 2103000.2	
Drilling Co.: Cascade	Easting (NAD83): 7615871.3	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 227 ft bgs	Project: Final GW Remedy Phase I
Drill Rig Type: Prosonic Truck Mount	Borehole Diameter: 6-12 inches	Location: PG&E Topock, Needles, California
Driller Name: Steve Vasquez	Depth to First Water: 26.55 ft bgs	
Drilling Asst: O. Flores, L. Amaya	Sampling Method: 4 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger: G Jeffers / J. Wanner	Sampling Interval: Continuous	
Editor: Sean McGrane	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
121	120	IRZ-17-SS-117-122 3/7/2019 14:31		Topock - Alluvium Deposits	ML		angular to subangular; some very fine to very coarse grained sand, angular to subround; wet; medium stiff to stiff; no odor; no staining; larger clasts consist of granodiorite and metadiorite. (120'); decrease in sand, increase in granules to very large pebbles.		(0.0 - 217.0') No water used
122							(122'); decrease silt, increase sand.		
123		IRZ-17-SS-122-127 3/7/2019 14:36		Topock - Alluvium Deposits	SM		(124.0 - 132.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 4/3) some (7.5R 4/6); very fine grained to very coarse grained, angular to subround; some granules to very large pebbles, angular to subround; little silt; trace mica; wet; no odor; no staining; larger clasts consist of quartzite, granodiorite, and metadiorite, weathered gravel observed.		
124							(126') reddish brown / moderate brown(5YR 4/4); some silt; decrease sand.		
125									
126									
127	120	IRZ-17-SS-127-132 3/7/2019 14:40		Topock - Alluvium Deposits	SM		(129.5 - 132.0'); little silt; increase sand.		
128									
129									
130									
131	120	IRZ-17-SS-132-137 3/7/2019 14:45		Topock - Alluvium Deposits	ML		(132.0 - 133.0') Topock - Alluvium Deposits; Sandy silt with gravel (ML); reddish brown / moderate brown(5YR 4/4); low plasticity, no dilatency; some granules to very large pebbles, angular to subround; some very fine to very coarse grained sand, angular to subround; trace cobbles, subangular to subround; wet; stiff; no odor; no staining; larger clasts consist of metadiorite.	(132.0 - 137.0') Sample collected during the installation of temporary backfill	
132							(133.0 - 136.5') Topock - Alluvium Deposits; Silty gravel with sand (GM); reddish brown / moderate brown(5YR 4/4); granules to very large pebbles, angular to subround; some very fine to very coarse grained sand, angular to subround; some silt; trace cobbles, subangular to subround; trace mica; wet; no odor; no staining; larger clasts consist of granite, granodiorite, and metadiorite, weathered granules to very large pebbles observed. 4" Silty sand with gravel lense at 134' bgs.		
133			IRZ-17-VAS-132-137 (<0.17 U ppb) 3/13/2019 12:05	Topock - Alluvium Deposits	GM				
134									
135	120	IRZ-17-SS-137-142 3/7/2019 14:47		Topock - Alluvium Deposits	SM		(136.5 - 156.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown / moderate brown(5YR 4/4); very fine grained to very coarse grained, angular to subround; some granules to very large pebbles, angular to subangular; some silt; trace mica; wet; no odor; no staining; larger clasts consist of metadiorite and granodiorite, trace weathered granules to very coarse pebbles. (137'); decrease granules to very large pebbles, increase sand.	(137.0 - 142.0') Sample collected during the installation of temporary backfill	
136									
137									
138			IRZ-17-VAS-137-142 (<0.17 U ppb) 3/12/2019 14:50						
139									
140									

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Date Started: 03/02/2019	Surface Elevation: 480.3 ft amsl	Boring No.: IRZ-17 Pilot
Date Completed: 03/13/2019	Northing (NAD83): 2103000.2	
Drilling Co.: Cascade	Easting (NAD83): 7615871.3	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 227 ft bgs	Project: Final GW Remedy Phase I
Drill Rig Type: Prosonic Truck Mount	Borehole Diameter: 6-12 inches	Location: PG&E Topock, Needles, California
Driller Name: Steve Vasquez	Depth to First Water: 26.55 ft bgs	
Drilling Asst: O. Flores, L. Amaya	Sampling Method: 4 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger: G Jeffers / J. Wanner	Sampling Interval: Continuous	
Editor: Sean McGrane	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
141		IRZ-17-SS-137-142 3/7/2019 14:47	IRZ-17-VAS-137-142 <0.17 U ppb 3/12/2019 14:50					(137.0 - 142.0') Sample collected during the installation of temporary backfill	(0.0 - 217.0') No water used
142							(142'); little silt; decrease in granules to very large pebbles, increase in sand.		
143	120								
144		IRZ-17-SS-142-147 3/7/2019 14:50	IRZ-17-VAS-142-147 (84 ppb) 3/4/2019 10:24						
145							(145'); some silt; decrease in sand.		
146									
147									
148				Topock - Alluvium Deposits	SM			(147.0 - 152.0') Sample collected during the installation of temporary backfill	
149		IRZ-17-SS-147-152 3/7/2019 14:53	IRZ-17-VAS-147-152 <0.33 U ppb 3/12/2019 11:05						
150									
151									
152	120						(152') dark grayish brown (2.5Y 4/2); decrease in sand, increase silt, some mottling.		
153							(153'); increase in sand, decrease silt, no moddling.		
154		IRZ-17-SS-152-157 3/7/2019 14:57	IRZ-17-SS-152-157 3/4/2019 12:00				(154.5'); 12-24 mm silt nodules.		
155									
156									
157							(156.5 - 160.5') Topock - Alluvium Deposits; Sandy silt with gravel (ML); reddish brown / moderate brown(5YR 4/4); low plasticity, no dilatency; some granules to very large pebbles, angular to subround; some very fine to very coarse grained sand, angular to subround; wet; stiff; no odor; no staining; larger clasts consist of granodiorite, metadiorite, and feldspars.		
158	120	IRZ-17-SS-157-162 3/7/2019 14:59		Topock - Alluvium Deposits	ML		(158'); moist; hard; weak cementation; decrease silt, increase sand.		
159							(158.5'); wet; very stiff; increase silt, no cementation.		
160									

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Date Started:	03/02/2019	Surface Elevation:	480.3 ft amsl	Boring No.: <u>IRZ-17 Pilot</u>
Date Completed:	03/13/2019	Northing (NAD83):	2103000.2	
Drilling Co.:	Cascade	Easting (NAD83):	7615871.3	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	227 ft bgs	Project: Final GW Remedy Phase I
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	6-12 inches	Location: PG&E Topock, Needles, California
Driller Name:	Steve Vasquez	Depth to First Water:	26.55 ft bgs	
Drilling Asst:	O. Flores, L. Amaya	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger:	G Jeffers / J. Wanner	Sampling Interval:	Continuous	
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
161		IRZ-17-SS-157-162 3/7/2019 14:59			ML				(0.0 - 217.0') No water used
162				Topock - Alluvium Deposits	SM		(160.5 - 162.5') Topock - Alluvium Deposits; Silty sand (SM); reddish brown / moderate brown(5YR 4/4); very fine grained to very coarse grained, angular to subangular; little granules to large pebbles, subangular to subround; little silt; trace mica; wet; no odor; no staining; 2-15 mm silt nodules, larger clasts consist of metadiorite.		
163				Topock - Alluvium Deposits	GM		(162.5 - 164.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); reddish brown / moderate brown(5YR 4/4); granules to very large pebbles, angular to subround; and very fine to very coarse grained sand, angular to subround; little silt; trace mica; wet; no odor; no staining; larger clasts consist of granodiorite and metadiorite.		
164		IRZ-17-SS-162-167 3/7/2019 15:01	IRZ-17-VAS-162-167 (<0.17 U ppb) 3/4/2019 17:01				(164.0 - 183.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown / moderate brown(5YR 4/4); very fine grained to very coarse grained, angular to subangular; little granules to large pebbles, angular to subround; little silt; trace mica; wet; no odor; no staining; larger clasts consist of metadiorite.		
165							(165.5'); some granules to large pebbles, angular to subround; decrease in sand, increase in silt.		
166									
167									
168									
169		IRZ-17-SS-167-172 3/7/2019 15:02							
170							(170') dark reddish brown (5YR 3/3); and granules to large pebbles, angular to subround; decrease in sand.		
171									
172				Topock - Alluvium Deposits	SM				
173							(173') dark reddish brown (5YR 3/3) and black (5YR 2.5/1); silt mottled.		
174		IRZ-17-SS-172-177 3/7/2019 15:04	IRZ-17-VAS-172-177 (<0.17 U ppb) 3/5/2019 15:20				(173.5') reddish brown / moderate brown(5YR 4/4); some granules to large pebbles, angular to subround; trace cobbles, subround; increase in sand, no mottling.		
175									
176									
177							(177'); some silt; trace clay; decrease in granules to very large pebbles and grain size, decrease sand.		
178		IRZ-17-SS-177-182 3/7/2019 15:05							
179							(178.5'); little silt; no clay, increase sand, trace weathered granules to very large pebbles.		
180							(179.5'); some silt; decrease in sand.		

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Date Started: <u>03/02/2019</u>	Surface Elevation: <u>480.3 ft amsl</u>	Boring No.: <u>IRZ-17 Pilot</u>
Date Completed: <u>03/13/2019</u>	Northing (NAD83): <u>2103000.2</u>	
Drilling Co.: <u>Cascade</u>	Easting (NAD83): <u>7615871.3</u>	Client: <u>PG&E</u>
Drilling Method: <u>Sonic Drilling</u>	Total Depth: <u>227 ft bgs</u>	Project: <u>Final GW Remedy Phase I</u>
Drill Rig Type: <u>Prosonic Truck Mount</u>	Borehole Diameter: <u>6-12 inches</u>	Location: <u>PG&E Topock, Needles, California</u>
Driller Name: <u>Steve Vasquez</u>	Depth to First Water: <u>26.55 ft bgs</u>	
Drilling Asst: <u>O. Flores, L. Amaya</u>	Sampling Method: <u>4 inch x 10 ft Core Barrel</u>	Project Number: <u>RC000753.0051</u>
Logger: <u>G Jeffers / J. Wanner</u>	Sampling Interval: <u>Continuous</u>	
Editor: <u>Sean McGrane</u>	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
181	120	IRZ-17-SS-177-182 3/7/2019 15:05		Topock - Alluvium Deposits	SM		(180.5'); little granules to large pebbles, angular to subround; increase sand.		(0.0 - 217.0') No water used
182		IRZ-17-SS-182-187 3/7/2019 15:06		Topock - Alluvium Deposits	ML		(183.0 - 185.5') Topock - Alluvium Deposits; Gravelly silt with sand (ML); yellowish red (5YR 4/6); low plasticity, no dilatency; some granules to very large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subround; trace mica; wet; stiff to very stiff; no odor; no staining; larger clasts consist of granodiorite and metadiorite.		
183									
184	Topock - Alluvium Deposits		SM						(185.5 - 187.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); yellowish red (5YR 4/6); medium grained to very coarse grained, angular to subangular; some silt; little small to large pebbles, angular to subangular; little mica; wet; no odor; no staining; larger clasts consist of metadiorite.
185									
186		60		IRZ-17-SS-187-192 3/7/2019 15:07	Topock - Alluvium Deposits	ML			
187									
188	60							Topock - Weathered Bedrock - conglomerate	SM
189									
190		60							
191									
192									
193	60		IRZ-17-VAS-197-202 (<0.17 U ppb) 3/6/2019 11:20						
194									
195									
196	60								
197									
198									
199	60								
200									

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Date Started: <u>03/02/2019</u>	Surface Elevation: <u>480.3 ft amsl</u>	Boring No.: IRZ-17 Pilot
Date Completed: <u>03/13/2019</u>	Northing (NAD83): <u>2103000.2</u>	
Drilling Co.: <u>Cascade</u>	Easting (NAD83): <u>7615871.3</u>	Client: <u>PG&E</u>
Drilling Method: <u>Sonic Drilling</u>	Total Depth: <u>227 ft bgs</u>	Project: <u>Final GW Remedy Phase I</u>
Drill Rig Type: <u>Prosonic Truck Mount</u>	Borehole Diameter: <u>6-12 inches</u>	Location: <u>PG&E Topock, Needles, California</u>
Driller Name: <u>Steve Vasquez</u>	Depth to First Water: <u>26.55 ft bgs</u>	
Drilling Asst: <u>O. Flores, L. Amaya</u>	Sampling Method: <u>4 inch x 10 ft Core Barrel</u>	Project Number: <u>RC000753.0051</u>
Logger: <u>G Jeffers / J. Wanner</u>	Sampling Interval: <u>Continuous</u>	
Editor: <u>Sean McGrane</u>	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
201	60		IRZ-17-VAS-197-202 (<0.17 U ppb) 3/6/2019 11:20						(0.0 - 217.0') No water used
202									
203				Topock - Weathered Bedrock - conglomerate	SM				
204									
205									
206									
207	120			Topock - Weathered Bedrock - conglomerate	ML		(206.5 - 209.5') Topock - Weathered Bedrock - conglomerate; Sandy silt with gravel (ML); red (2.5YR 4/6); low plasticity, no dilatancy; some granules to very large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subround; trace mica; wet; very stiff; no odor; weak cementation; no staining; larger clasts consist of metadiorite and granodiarite trace weathred granules to very large pebbles.		
208									
209									
210				Topock - Weathered Bedrock - conglomerate	SM		(209.5 - 213.0') Topock - Weathered Bedrock - conglomerate; Silty sand with gravel (SM); reddish brown (2.5YR 4/4); very fine grained to very coarse grained, subangular to subround; some granules to very large pebbles, angular to subangular; some silt; some mica; wet; no odor; no staining; trace weathered granules to very large pebbles.		
211									
212									
213								(212.0 - 222.0') Soft drilling	
214				Topock - Weathered Bedrock - conglomerate	ML		(213.0 - 215.5') Topock - Weathered Bedrock - conglomerate; Sandy silt with gravel (ML); red (2.5YR 4/6); low plasticity, no dilatancy; some granules to very large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subround; trace mica; wet; very stiff; no odor; no staining; larger clasts consist of metadiorite and granodiarite. trace weathred granules to very large pebbles.		
215									
216	120								
217							(215.5 - 227.0') Topock - Weathered Bedrock - conglomerate; Silty sand with gravel (SM); reddish brown (2.5YR 4/4); very fine grained to very coarse grained, subangular to subround; some granules to very large pebbles, angular to subangular; some silt; some mica; wet; no odor; no staining; trace weathered granules to very large pebbles.		
218			IRZ-17-VAS-217-222 (<0.17 U ppb) 3/6/2019 16:17	Topock - Weathered Bedrock - conglomerate	SM				
219									
220									

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Date Started:	03/02/2019	Surface Elevation:	480.3 ft amsl	Boring No.: IRZ-17 Pilot	
Date Completed:	03/13/2019	Northing (NAD83):	2103000.2		
Drilling Co.:	Cascade	Easting (NAD83):	7615871.3	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	227 ft bgs	Project:	Final GW Remedy Phase I
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Steve Vasquez	Depth to First Water:	26.55 ft bgs		
Drilling Asst:	O. Flores, L. Amaya	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	G Jeffers / J. Wanner	Sampling Interval:	Continuous		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
221	120		IRZ-17-VAS-217-222 (<0.17 U ppb) 3/6/2019 16:17					(212.0 - 222.0') Soft drilling	
222									
223									
224				Topock - Weathered Bedrock - conglomerate	SM				
225	60								
226									
227									
End of Boring at 227.0 'bgs.									
228									
229									
230									
231									
232									
233									
234									
235									
236									
237									
238									
239									
240									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	03/02/2019	Surface Elevation:	480.3 ft amsl	Well ID: IRZ-17 Pilot
Date Completed:	03/13/2019	Northing (NAD83):	2103000.2	
Drilling Co.:	Cascade	Easting (NAD83):	7615871.3	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	227 ft bgs	Project: Final GW Remedy Phase I
Driller Name:	Steve Vasquez	Borehole Diameter:	6-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	O. Flores, L. Amaya	Depth to First Water:	26.55 ft bgs	
Logger:	G Jeffers / J. Wanner	Editor:	Sean McGrane	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
1					(0.0 - 0.5') Temporary Steel Plate with BMP		
2							
3					(0.5 - 5.0') Plastering Sand	(0.5 - 5.0') 7.9 bags	(0.5 - 5.0') 6 bags (-24%) Note: Wildcat Washed, actual volume installed was 24% less because of dredged materials collapsing during casing removal
4							
5					(0.0 - 9.0') 12" Borehole		
6							
7							
8							
9							
10			NR				
11							
12							
13					(5.0 - 137.0') Pea Gravel	(5.0 - 137.0') 55.3 bags	(5.0 - 137.0') 60 bags (8%) Note: Cal-Silica 1/4"-3/8", Actual volume is lower because backfilling was done in lifts to allow collection of VAS groundwater samples.
14							
15					(9.0 - 227.0') 6" Borehole		
16							
17							
18							
19							
20		Topock - Fill	SP				


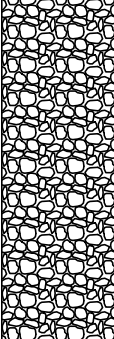

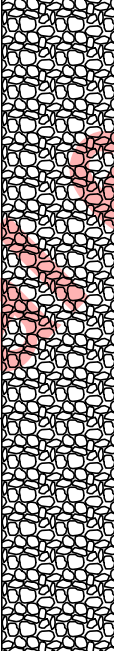





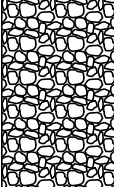


Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started:	03/02/2019	Surface Elevation:	480.3 ft amsl	Well ID: IRZ-17 Pilot
Date Completed:	03/13/2019	Northing (NAD83):	2103000.2	
Drilling Co.:	Cascade	Easting (NAD83):	7615871.3	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	227 ft bgs	Project: Final GW Remedy Phase I
Driller Name:	Steve Vasquez	Borehole Diameter:	6-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	O. Flores, L. Amaya	Depth to First Water:	26.55 ft bgs	
Logger:	G Jeffers / J. Wanner	Editor:	Sean McGrane	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
21		Topock - Fill	SP				
22		Topock - Fluvial Deposits	SM				
23							
24							
25		Topock - Fluvial Deposits	ML				
26							
27							
28		Topock - Fluvial Deposits	SM				
29		Topock - Fluvial Deposits	ML				
30					(5.0 - 137.0') Pea Gravel	(9.0 - 227.0') 6" Borehole	(5.0 - 137.0') 55.3 bags
31		Topock - Fluvial Deposits	MH				(5.0 - 137.0') 60 bags (8%) Note: Cal-Silica 1/4"-3/8", Actual volume is lower because backfilling was done in lifts to allow collection of VAS groundwater samples.
32							
33							
34	IRZ-17-VAS-32-37 (67 ppb) 3/2/2019 13:14	Topock - Fluvial Deposits	SM				
35							
36		Topock - Alluvium Deposits	SM				
37							
38							
39		Topock - Alluvium Deposits	GM				
40							

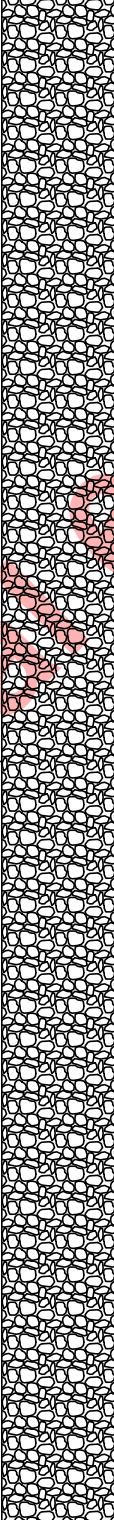
Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started:	03/02/2019	Surface Elevation:	480.3 ft amsl	Well ID: IRZ-17 Pilot
Date Completed:	03/13/2019	Northing (NAD83):	2103000.2	
Drilling Co.:	Cascade	Easting (NAD83):	7615871.3	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	227 ft bgs	Project: Final GW Remedy Phase I
Driller Name:	Steve Vasquez	Borehole Diameter:	6-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	O. Flores, L. Amaya	Depth to First Water:	26.55 ft bgs	
Logger:	G Jeffers / J. Wanner	Editor:	Sean McGrane	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
41		Topock - Alluvium Deposits	GM				
42							
43							
44							
45		Topock - Alluvium Deposits	SM				
46							
47							
48							
49							
50							
51							
52		Topock - Alluvium Deposits	SW				
53							
54		Topock - Alluvium Deposits	SM				
55							
56							
57		Topock - Alluvium Deposits	SW-SM				
58							
59		Topock - Alluvium Deposits	ML				
60							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started:	03/02/2019	Surface Elevation:	480.3 ft amsl	Well ID: IRZ-17 Pilot
Date Completed:	03/13/2019	Northing (NAD83):	2103000.2	
Drilling Co.:	Cascade	Easting (NAD83):	7615871.3	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	227 ft bgs	Project: Final GW Remedy Phase I
Driller Name:	Steve Vasquez	Borehole Diameter:	6-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	O. Flores, L. Amaya	Depth to First Water:	26.55 ft bgs	
Logger:	G Jeffers / J. Wanner	Editor:	Sean McGrane	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
61	IRZ-17-VAS-62-67 (0.604 J ppb) 3/2/2019 15:50	Topock - Alluvium Deposits	SM				
62		Topock - Alluvium Deposits	GM				
63		Topock - Alluvium Deposits	SM				
64		Topock - Alluvium Deposits	ML				
65							
66							
67							
68							
69							
70		Topock - Alluvium Deposits	SM		(5.0 - 137.0') Pea Gravel	(9.0 - 227.0') 6" Borehole	(5.0 - 137.0') 55.3 bags
71							
72							
73							
74							
75							
76							
77							
78		Topock - Alluvium Deposits	ML				
79							
80							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started:	03/02/2019	Surface Elevation:	480.3 ft amsl	Well ID: IRZ-17 Pilot
Date Completed:	03/13/2019	Northing (NAD83):	2103000.2	
Drilling Co.:	Cascade	Easting (NAD83):	7615871.3	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	227 ft bgs	Project: Final GW Remedy Phase I
Driller Name:	Steve Vasquez	Borehole Diameter:	6-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	O. Flores, L. Amaya	Depth to First Water:	26.55 ft bgs	
Logger:	G Jeffers / J. Wanner	Editor:	Sean McGrane	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
81		Topock - Alluvium Deposits	SM				
82							
83		Topock - Alluvium Deposits	ML				
84							
85							
86		Topock - Alluvium Deposits	SM				
87							
88							
89							
90					(5.0 - 137.0') Pea Gravel		
91							
92		Topock - Alluvium Deposits	ML				
93							
94							
95							
96							
97							
98		Topock - Alluvium Deposits	SM				
99							
100							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started:	03/02/2019	Surface Elevation:	480.3 ft amsl	Well ID: IRZ-17 Pilot
Date Completed:	03/13/2019	Northing (NAD83):	2103000.2	
Drilling Co.:	Cascade	Easting (NAD83):	7615871.3	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	227 ft bgs	Project: Final GW Remedy Phase I
Driller Name:	Steve Vasquez	Borehole Diameter:	6-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	O. Flores, L. Amaya	Depth to First Water:	26.55 ft bgs	
Logger:	G Jeffers / J. Wanner	Editor:	Sean McGrane	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
101							
102							
103							
104	IRZ-17-VAS-102-107 (<0.17 U ppb) 3/3/2019 11:50						
105							
106							
107							
108							
109		Topock - Alluvium Deposits	SM				
110					(5.0 - 137.0') Pea Gravel		
111							
112							
113							
114							
115							
116							
117							
118							
119							
120		Topock - Alluvium Deposits	ML				

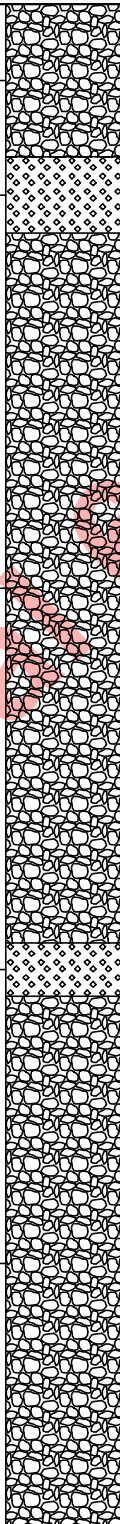
Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started:	03/02/2019	Surface Elevation:	480.3 ft amsl	Well ID: IRZ-17 Pilot
Date Completed:	03/13/2019	Northing (NAD83):	2103000.2	
Drilling Co.:	Cascade	Easting (NAD83):	7615871.3	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	227 ft bgs	Project: Final GW Remedy Phase I
Driller Name:	Steve Vasquez	Borehole Diameter:	6-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	O. Flores, L. Amaya	Depth to First Water:	26.55 ft bgs	
Logger:	G Jeffers / J. Wanner	Editor:	Sean McGrane	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
121		Topock - Alluvium Deposits	ML				
122							
123							
124							
125							
126							
127							
128		Topock - Alluvium Deposits	SM				
129							
130							
131							
132							
133		Topock - Alluvium Deposits	ML				
134	IRZ-17VAS-132-137 (<0.17 U ppb) 3/13/2019 12:05	Topock - Alluvium Deposits	GM				
135							
136							
137							
138	IRZ-17-VAS-137-142 (<0.17 U ppb) 3/12/2019 14:50	Topock - Alluvium Deposits	SM				
139							
140							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started:	03/02/2019	Surface Elevation:	480.3 ft amsl	Well ID: IRZ-17 Pilot
Date Completed:	03/13/2019	Northing (NAD83):	2103000.2	
Drilling Co.:	Cascade	Easting (NAD83):	7615871.3	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	227 ft bgs	Project: Final GW Remedy Phase I
Driller Name:	Steve Vasquez	Borehole Diameter:	6-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	O. Flores, L. Amaya	Depth to First Water:	26.55 ft bgs	
Logger:	G Jeffers / J. Wanner	Editor:	Sean McGrane	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction		Calculated Material Volumes	Material Volumes Installed
141	IRZ-17-VAS-137-142 (<0.17 U ppb) 3/12/2019 14:50	Topock - Alluvium Deposits	SM		(138.0 - 142.0') Pea Gravel		(138.0 - 142.0') 2.1 bags	(138.0 - 142.0') 2 bags (-5%) Note: Cal-Silica 1/4"-3/8" inch
142	IRZ-17-VAS-142-147 (84 ppb) 3/4/2019 10:24				(142.0 - 143.0') Plastering Sand		(142.0 - 143.0') 0.4 bags	(142.0 - 143.0') 0.88 bags (120%) Note: Wildcat Washed, installed before sampling
143					(143.0 - 152.3') Pea Gravel		(143.0 - 152.3') 3.9 bags	(143.0 - 152.3') 5 bags (28%) Note: Cal-Silica 1/4"-3/8" inch
144								
145								
146	IRZ-17-VAS-147-152 (<0.33 U ppb) 3/12/2019 11:05				(152.3 - 153.0') Plastering Sand		(152.3 - 153.0') 0.3 bags	(152.3 - 153.0') 0.25 bags (-17%) Note: Wildcat Washed, installed before sampling
147								
148								
149								
150	IRZ-17-SS-152-157 3/4/2019 12:00				(153.0 - 182.0') Pea Gravel		(153.0 - 182.0') 12.2 bags	(153.0 - 182.0') 10 bags (-18%) Note: Cal-Silica 1/4"-3/8" inch
151								
152								
153								
154	Topock - Alluvium Deposits	ML						
155								
156								
157								
158								
159								
160								

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started:	03/02/2019	Surface Elevation:	480.3 ft amsl	Well ID: IRZ-17 Pilot
Date Completed:	03/13/2019	Northing (NAD83):	2103000.2	
Drilling Co.:	Cascade	Easting (NAD83):	7615871.3	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	227 ft bgs	Project: Final GW Remedy Phase I
Driller Name:	Steve Vasquez	Borehole Diameter:	6-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	O. Flores, L. Amaya	Depth to First Water:	26.55 ft bgs	
Logger:	G Jeffers / J. Wanner	Editor:	Sean McGrane	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
161			ML				
162		Topock - Alluvium Deposits	SM				
163		Topock - Alluvium Deposits	GM				
164	IRZ-17-VAS-162-167 (<0.17 U ppb) 3/4/2019 17:01						
165							
166							
167							
168							
169							
170					(153.0 - 182.0') Pea Gravel	(9.0 - 227.0') 6" Borehole	(153.0 - 182.0') 12.2 bags
171							
172		Topock - Alluvium Deposits	SM				(153.0 - 182.0') 10 bags (-18%) Note: Cal-Silica 1/4"-3/8" inch
173							
174	IRZ-17-VAS-172-177 (<0.17 U ppb) 3/5/2019 15:20						
175							
176							
177							
178							
179							
180							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started:	03/02/2019	Surface Elevation:	480.3 ft amsl	Well ID: IRZ-17 Pilot
Date Completed:	03/13/2019	Northing (NAD83):	2103000.2	
Drilling Co.:	Cascade	Easting (NAD83):	7615871.3	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	227 ft bgs	Project: Final GW Remedy Phase I
Driller Name:	Steve Vasquez	Borehole Diameter:	6-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	O. Flores, L. Amaya	Depth to First Water:	26.55 ft bgs	
Logger:	G Jeffers / J. Wanner	Editor:	Sean McGrane	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
181		Topock - Alluvium Deposits	SM		(153.0 - 182.0') Pea Gravel	(153.0 - 182.0') 12.2 bags	(153.0 - 182.0') 10 bags (-18%) Note: Cal-Silica 1/4"-3/8" inch
182							
183		Topock - Alluvium Deposits	ML				
184							
185		Topock - Alluvium Deposits	SM				
186					(182.0 - 192.0') Cemex #3 MESH (8x10)	(182.0 - 192.0') 4.2 bags	(182.0 - 192.0') 6 bags (43%) Note: Lapis Lustre Sand
187							
188		Topock - Alluvium Deposits	ML				
189							
190					(9.0 - 227.0') 6" Borehole		
191							
192							
193		Topock - Weathered Bedrock - conglomerate	SM		(192.0 - 227.0') Bentonite seal pack	(192.0 - 227.0') 10.2 bags	(192.0 - 227.0') 13 bags (27%) Note: Puregold Medium Chips and Enviroplug Chips
194							
195							
196							
197							
198	IRZ-17-VAS-197-202 (<0.17 U ppb) 3/6/2019 11:20						
199							
200							

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Date Started:	03/02/2019	Surface Elevation:	480.3 ft amsl	Well ID: IRZ-17 Pilot
Date Completed:	03/13/2019	Northing (NAD83):	2103000.2	
Drilling Co.:	Cascade	Easting (NAD83):	7615871.3	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	227 ft bgs	Project: Final GW Remedy Phase I
Driller Name:	Steve Vasquez	Borehole Diameter:	6-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	O. Flores, L. Amaya	Depth to First Water:	26.55 ft bgs	
Logger:	G Jeffers / J. Wanner	Editor:	Sean McGrane	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
201	IRZ-17-VAS-197-202 (<0.17 U ppb) 3/6/2019 11:20	Topock - Weathered Bedrock - conglomerate	SM				
202							
203							
204							
205							
206		Topock - Weathered Bedrock - conglomerate	ML				
207							
208							
209							
210							
211		Topock - Weathered Bedrock - conglomerate	SM				
212							
213							
214							
215							
216		Topock - Weathered Bedrock - conglomerate	ML				
217							
218							
219							
220							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Temporary Backfill Log

Sheet: 12 of 12

Date Started:	03/02/2019	Surface Elevation:	480.3 ft amsl	Well ID: IRZ-17 Pilot
Date Completed:	03/13/2019	Northing (NAD83):	2103000.2	
Drilling Co.:	Cascade	Easting (NAD83):	7615871.3	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	227 ft bgs	Project: Final GW Remedy Phase I
Driller Name:	Steve Vasquez	Borehole Diameter:	6-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	O. Flores, L. Amaya	Depth to First Water:	26.55 ft bgs	
Logger:	G Jeffers / J. Wanner	Editor:	Sean McGrane	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
221	IRZ-17-VAS-217-222 (<0.17 U ppb) 3/6/2019 16:17						
222							
223		Topock - Weathered Bedrock - conglomerate	SM		(192.0 - 227.0') Bentonite seal pack	(9.0 - 227.0') 6" Borehole	(192.0 - 227.0') 10.2 bags
224							(192.0 - 227.0') 13 bags (27%) Note: Puregold Medium Chips and Enviroplug Chips
225							
226							
227							
228							
229							
230							
231							
232							
233							
234							
235							
236							
237							
238							
239							
240							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

TEMP ABANDONMENT LOG_PG&E_TOPOCK C:\USERS\SMCGRANE\DOCUMENTS\PG&E_TOPOCK\DATABASE FOR LOGGING FILES\03_19\TOPOCK DATA TEMPLATE FOR PLOG.GDT 06/03/19 16:44

Date Started:	11/17/2019	Surface Elevation:	494.7 ft amsl	Boring No.: IRZ-18 Pilot	
Date Completed:	12/05/2019	Northing (NAD83):	2102884.7		
Drilling Co.:	Cascade	Easting (NAD83):	7615808.8	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	217 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	4-10 inches	Location:	PG&E Topock, Topock, California
Driller Name:	Jose Hernandez	Depth to First Water:	41.07 ft bgs		
Drilling Asst:	L. Amaya / P. Almanza	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	Chris Bonessi	Sampling Interval:	Continuous		
Editor:	Kendra Keon	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
1	36			Topock - Fill	GW		(0.0 - 0.4') Topock - Fill; Well graded gravel (GW); medium pebbles to very large pebbles, round; little small to large cobbles, subround to round; trace very fine to very coarse grained sand, subangular to subround; trace silt; trace clay; dry; gravel road base		
2				Topock - Fluvial Deposits	SW		(0.4 - 4.0') Topock - Fluvial Deposits; Well graded sand with gravel (SW); very dark gray (7.5YR 3/1); very fine grained to very coarse grained, subangular to subround; some granules to very large pebbles, subround to round; little small to large cobbles, subround to round; trace silt; trace clay; dry; logged from hand auger cuttings		
3								(3.0') Hand auger refusal.	(3.0') 2 gallons of water used; 0 gallons of water recovered; 2 gallons of water lost
4									
5	48			Topock - Fluvial Deposits	SW		(4.0 - 9.0') Topock - Fluvial Deposits; Well graded sand with gravel (SW); brown (7.5YR 4/3); very fine grained to medium grained, subangular to round; little granules to very large pebbles, subround to round; little small cobbles, round; little medium to very coarse grained sand, subangular to round; trace silt; dry		(4.0 - 12.0') No water used
6									
7									
8									
9				Topock - Fluvial Deposits	GW		(9.0 - 9.5') Topock - Fluvial Deposits; Well graded gravel with sand (GW); dark brown (7.5YR 3/2); granules to large pebbles, subangular to round; and very fine to very coarse grained sand, subangular to round; trace small cobbles, round; trace silt; dry		
10	60			Topock - Fluvial Deposits	SW		(9.5 - 11.0') Topock - Fluvial Deposits; Well graded sand with gravel (SW); brown (7.5YR 4/3); very fine grained to very coarse grained, subangular to round; little granules to very large pebbles, subround to round; little small cobbles, round; trace silt; dry; grading coarser with depth	(10.0 - 17.0') Formation Collapse.	
11									
12				Topock - Fluvial Deposits	SW		(11.0 - 14.0') Topock - Fluvial Deposits; Well graded sand with gravel (SW); brown (7.5YR 4/3); very fine grained to medium grained, subangular to round; little granules to very large pebbles, subround to round; little small cobbles, round; little medium to very coarse grained sand, subangular to round; trace silt; dry	(12.0 - 14.0') Drilled with water.	(12.0 - 14.0') 10 gallons of water used; 0 gallons of water recovered; 10 gallons of water lost
13	48								
14				Topock - Fluvial Deposits	SW		(14.0 - 16.5') Topock - Fluvial Deposits; Well graded sand with gravel (SW); brown (7.5YR 5/3); very fine grained to very coarse grained, subangular to round; some granules to very large pebbles, subround to round; little small to large cobbles, round; trace silt; dry	(14.0 - 34.0') Rough drilling.	(14.0 - 207.0') No water used
15									
16									
17	12			Topock - Fluvial Deposits	GW		(16.5 - 17.0') Topock - Fluvial Deposits; Well graded gravel (GW); boulder		
18									
19	48			Topock - Fluvial Deposits	SW-SM		(17.0 - 23.0') Topock - Fluvial Deposits; Well graded sand with silt and gravel (SW-SM); brown (7.5YR 4/3); very fine grained to very coarse grained, subangular to round; and small to very large pebbles, subround to round; some small to large cobbles, round; little silt; dry; many pulverized cobbles resulted in higher concentration of silt		
20									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	11/17/2019	Surface Elevation:	494.7 ft amsl	Boring No.: IRZ-18 Pilot	
Date Completed:	12/05/2019	Northing (NAD83):	2102884.7		
Drilling Co.:	Cascade	Easting (NAD83):	7615808.8	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	217 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	4-10 inches	Location:	PG&E Topock, Topock, California
Driller Name:	Jose Hernandez	Depth to First Water:	41.07 ft bgs		
Drilling Asst:	L. Amaya / P. Almanza	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	Chris Bonessi	Sampling Interval:	Continuous		
Editor:	Kendra Keon	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
21	48			Topock - Fluvial Deposits	SW-SM				
22									
23							(23.0 - 32.0') Topock - Alluvium Deposits; Well graded sand with silt and gravel (SW-SM); brown (7.5YR 4/2); very fine grained to very coarse grained, angular to subround; some granules to very large pebbles, angular to subangular; little silt; trace clay; dry		
24	60								
25									
26				Topock - Alluvium Deposits	SW-SM				
27									
28							(28'); increase in gravel, decrease in sand		
29									
30	96						(30'); decrease in gravel, increase in sand		
31									
32									
33				Topock - Alluvium Deposits	SW-SM		(32.0 - 37.0') Topock - Alluvium Deposits; Well graded sand with silt and gravel (SW-SM); brown (7.5YR 4/2) with reddish brown / moderate brown (5YR 4/4); very fine grained to very coarse grained, angular to subround; some granules to very large pebbles, angular to subangular; little silt; trace small to large cobbles, subangular to subround; trace clay; dry		
34									
35								(34.0 - 47.0') Rough drilling.	
36									
37	72	IRZ-18-SS-35-40 12/6/2019 11:05		Topock - Alluvium Deposits	SM		(37.0 - 41.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown / moderate brown (5YR 4/4); very fine grained to very coarse grained, angular to subround; some granules to very large pebbles, angular to subangular; little silt; trace clay; dry		
38									
39							(39'); moist		
40									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	11/17/2019	Surface Elevation:	494.7 ft amsl	Boring No.: IRZ-18 Pilot	
Date Completed:	12/05/2019	Northing (NAD83):	2102884.7		
Drilling Co.:	Cascade	Easting (NAD83):	7615808.8	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	217 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	4-10 inches	Location:	PG&E Topock, Topock, California
Driller Name:	Jose Hernandez	Depth to First Water:	41.07 ft bgs		
Drilling Asst:	L. Amaya / P. Almanza	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	Chris Bonessi	Sampling Interval:	Continuous		
Editor:	Kendra Keon	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid	
41	84	IRZ-18-SS-40-45 12/6/2019 11:10	IRZ-18-VAS-42-47 (580 ppb) 11/19/2019 09:20	Topock - Alluvium Deposits	SM		(40'); wet; increase in coarse sand			
42				Topock - Alluvium Deposits	SM		(41.0 - 47.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown / moderate brown (5YR 4/4); very fine grained to very coarse grained, angular to subround; some silt; little granules to very large pebbles, angular to subangular; trace clay; moist; core was very hot upon extraction, moisture content may be biased			
43										
44										(44'); wet
45	120	IRZ-18-SS-45-50 12/6/2019 11:15		Topock - Alluvium Deposits	SM		(47.0 - 57.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 4/3); very fine grained to very coarse grained, subangular to subround; some silt; little granules to large pebbles, angular to subround; trace clay; moist	(47.0 - 67.0') Rough drilling.		
46										
47		IRZ-18-SS-50-55 12/6/2019 11:20		Topock - Alluvium Deposits	SM		(52') brown (7.5YR 4/3) to brown (10YR 4/3); little silt; wet			
48										
49		IRZ-18-SS-55-60 12/6/2019 11:25		Topock - Alluvium Deposits	SM		(57.5 - 67.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 4/3); very fine grained to very coarse grained, angular to subround; some silt; little granules to very large pebbles, angular to subangular; trace clay; wet			
50										
51		120			Topock - Alluvium Deposits	SM				
52										
53										
54										
55										
56										
57	120		Topock - Alluvium Deposits	SM						
58										
59										
60										

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Date Started:	11/17/2019	Surface Elevation:	494.7 ft amsl	Boring No.: IRZ-18 Pilot	
Date Completed:	12/05/2019	Northing (NAD83):	2102884.7		
Drilling Co.:	Cascade	Easting (NAD83):	7615808.8	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	217 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	4-10 inches	Location:	PG&E Topock, Topock, California
Driller Name:	Jose Hernandez	Depth to First Water:	41.07 ft bgs		
Drilling Asst:	L. Amaya / P. Almanza	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	Chris Bonessi	Sampling Interval:	Continuous		
Editor:	Kendra Keon	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
61									
62		IRZ-18-SS-60-65 12/6/2019 11:30					(62'); some granules to large pebbles, subangular to subround; little silt		
63	120			Topock - Alluvium Deposits	SM				
64			IRZ-18-VAS-62-67 (<0.033 U ppb) 11/19/2019 13:05						
65									
66									
67		IRZ-18-SS-65-70 12/6/2019 11:35							
68				Topock - Alluvium Deposits	SM		(67.0 - 70.0') Topock - Alluvium Deposits; Silty sand (SM); brown (7.5YR 4/3); very fine grained to very coarse grained, angular to subround; and silt; little granules to very large pebbles, angular to subangular; trace clay; wet		
69	60		IRZ-18-VAS-67-72 (<0.033 U ppb) 11/19/2019 16:00						
70									
71							(70.0 - 76.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 4/3); very fine grained to very coarse grained, angular to subround; some granules to very large pebbles, angular to subangular; little silt; trace clay; wet		
72									
73		IRZ-18-SS-70-76 12/6/2019 11:40		Topock - Alluvium Deposits	SM				(72.0 - 86.0') Rough drilling.
74									
75							(74'); some silt; little granules to very large pebbles, angular to subangular; wet to moist		
76	180								
77							(76.0 - 80.0') Topock - Alluvium Deposits; Sandy silt (ML); brown (7.5YR 4/3); low plasticity; some very fine to very coarse grained sand, subangular to subround; little granules to large pebbles, subangular to subround; little clay; moist; very stiff		
78		IRZ-18-SS-76-80 12/6/2019 11:45		Topock - Alluvium Deposits	ML				
79									
80							(79') reddish brown / moderate brown (5YR 4/4)		

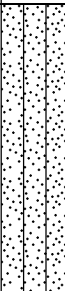
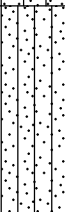
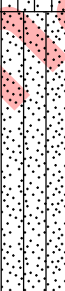


Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	11/17/2019	Surface Elevation:	494.7 ft amsl	Boring No.: IRZ-18 Pilot		
Date Completed:	12/05/2019	Northing (NAD83):	2102884.7			
Drilling Co.:	Cascade	Easting (NAD83):	7615808.8		Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	217 ft bgs		Project:	Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	4-10 inches		Location:	PG&E Topock, Topock, California
Driller Name:	Jose Hernandez	Depth to First Water:	41.07 ft bgs			
Drilling Asst:	L. Amaya / P. Almanza	Sampling Method:	4 inch x 10 ft Core Barrel		Project Number:	RC000753.0051
Logger:	Chris Bonessi	Sampling Interval:	Continuous			
Editor:	Kendra Keon	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No			

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
81							(80.0 - 92.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown / moderate brown (5YR 4/4); very fine grained to very coarse grained, angular to subround; some granules to very large pebbles, angular to subround; some silt; trace clay; wet		
82									
83		IRZ-18-SS-80-85 12/6/2019 11:50							
84	180								
85									
86				Topock - Alluvium Deposits	SM				
87									
88		IRZ-18-SS-85-92 12/6/2019 11:55					(87') brown (7.5YR 5/3); little granules to large pebbles, angular to subround; wet		
89									
90									
91								(90.0 - 102.0') Rough drilling.	
92	120								
93									
94		IRZ-18-SS-92-96 12/6/2019 12:00		Topock - Alluvium Deposits	ML		(92.0 - 96.0') Topock - Alluvium Deposits; Sandy silt (ML); brown (7.5YR 4/4); low plasticity; some very fine to very coarse grained sand, subangular to subround; little granules to large pebbles, subangular to subround; little clay; moist; very stiff		
95									
96							(95'); wet		
97									
98	60	IRZ-18-SS-96-100 12/6/2019 12:05		Topock - Alluvium Deposits	SM		(96.0 - 104.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown / moderate brown (5YR 4/4) with brown (7.5YR 4/4); very fine grained to very coarse grained, angular to subround; some silt; little granules to very large pebbles, angular to subround; trace clay; wet; coarseness increases with depth		
99									
100									

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Date Started:	11/17/2019	Surface Elevation:	494.7 ft amsl	Boring No.: IRZ-18 Pilot	
Date Completed:	12/05/2019	Northing (NAD83):	2102884.7		
Drilling Co.:	Cascade	Easting (NAD83):	7615808.8	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	217 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	4-10 inches	Location:	PG&E Topock, Topock, California
Driller Name:	Jose Hernandez	Depth to First Water:	41.07 ft bgs		
Drilling Asst:	L. Amaya / P. Almanza	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	Chris Bonessi	Sampling Interval:	Continuous		
Editor:	Kendra Keon	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
101	60	IRZ-18-SS-100-104 12/6/2019 12:10		Topock - Alluvium Deposits	SM		(102') reddish brown / moderate brown (5YR 4/4); some granules to very large pebbles, angular to subround		
102									
103									
104	60	IRZ-18-SS-104-109 12/6/2019 12:15	IRZ-18-VAS-102-107 (<0.17 U ppb) 11/20/2019 11:35	Topock - Alluvium Deposits	ML		(104.0 - 109.0') Topock - Alluvium Deposits; Sandy silt with gravel (ML); reddish brown / moderate brown (5YR 4/4); low plasticity; some granules to very large pebbles, angular to subround; some very fine to very coarse grained sand, angular to subround; trace clay; wet; stiff		
105									
106									
107									
108									
109									
110	120	IRZ-18-SS-109-115 12/6/2019 12:20					(109.0 - 117.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (5YR 4/3); medium grained to very coarse grained, angular to subround; little granules to very large pebbles, angular to subangular; little silt; trace clay; wet	(109.0 - 122.0') Drill rods chattering.	
111									
112									
113									
114									
115									
116									
117									
118									
119	120	IRZ-18-SS-115-120 12/6/2019 12:25		Topock - Alluvium Deposits	ML		(117.0 - 117.5') Topock - Alluvium Deposits; Sandy silt (ML); reddish brown (5YR 4/3); low plasticity; little granules to very large pebbles, angular to subround; little very fine to very coarse grained sand, angular to subround; trace clay; dry; hard; strong cementation		
120				Topock - Alluvium Deposits	SM		(117.3') strongly cemented silt layer		
						(117.5 - 127.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (5YR 4/3); medium grained to very coarse grained, angular to subround; some granules to very large pebbles, angular to subangular; little silt; trace clay; wet			

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Date Started:	11/17/2019	Surface Elevation:	494.7 ft amsl	Boring No.: IRZ-18 Pilot	
Date Completed:	12/05/2019	Northing (NAD83):	2102884.7		
Drilling Co.:	Cascade	Easting (NAD83):	7615808.8	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	217 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	4-10 inches	Location:	PG&E Topock, Topock, California
Driller Name:	Jose Hernandez	Depth to First Water:	41.07 ft bgs		
Drilling Asst:	L. Amaya / P. Almanza	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	Chris Bonessi	Sampling Interval:	Continuous		
Editor:	Kendra Keon	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
121	120	IRZ-18-SS-120-127 12/6/2019 12:30		Topock - Alluvium Deposits	SM		(120'); some granules to very large pebbles, angular to subangular; some silt; decrease in sand, decrease in granules and pebbles, increase in silt		
122									
123									
124							(123'); little granules to very large pebbles, angular to subangular; increase in sand, decrease in silt, decrease in granules and pebbles		
125	84	IRZ-18-SS-127-131.5 12/6/2019 12:35		Topock - Alluvium Deposits	ML			(126.0 - 130.0') Rough drilling.	
126									
127									
128							(127.0 - 128.5') Topock - Alluvium Deposits; Sandy silt (ML); reddish brown / moderate brown (5YR 4/4); low plasticity; little very fine to very coarse grained sand, angular to subround; trace granules to very large pebbles, angular to subround; trace clay; moist; stiff		
129	96	IRZ-18-SS-135-140 12/6/2019 12:45		Topock - Alluvium Deposits	ML		(128.5 - 131.7') Topock - Alluvium Deposits; Sandy silt with gravel (ML); reddish brown / moderate brown (5YR 4/4); low plasticity; little granules to large pebbles, angular to subangular; little very fine to very coarse grained sand, angular to subround; trace clay; dry; hard; moderate cementation (129') reddish brown (5YR 5/4); dry; very stiff (129.5'); moist; hard		
130									
131									
132							(131.5'); dry		
133		IRZ-18-SS-137-142 11/21/2019 15:31	IRZ-18-VAS-137-142 (<0.17 U ppb)	Topock - Alluvium Deposits	ML		(131.7 - 142.0') Topock - Alluvium Deposits; Sandy silt (ML); reddish brown / moderate brown (5YR 4/4); low plasticity; some very fine to very coarse grained sand, angular to subround; little granules to very large pebbles, angular to subround; little clay; moist; very stiff	(134.0 - 142.0') Very hard drilling.	
134									
135									
136									
137							(137'); wet; medium stiff		
138									
139									
140									

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SOIL BORING LOG, PG&E TOPOCK C:\USERS\MCGRANED\DOCUMENTS\PG&E TOPOCK\DRIFT BORING LOGS\GINT FILES\022720\TOPOCK DATABASE FOR PLOG.GPJ TOPOCK DATA TEMPLATE FOR PLOG.GDT 02/27/20 14:21

Date Started:	11/17/2019	Surface Elevation:	494.7 ft amsl	Boring No.: IRZ-18 Pilot	
Date Completed:	12/05/2019	Northing (NAD83):	2102884.7		
Drilling Co.:	Cascade	Easting (NAD83):	7615808.8	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	217 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	4-10 inches	Location:	PG&E Topock, Topock, California
Driller Name:	Jose Hernandez	Depth to First Water:	41.07 ft bgs		
Drilling Asst:	L. Amaya / P. Almanza	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	Chris Bonessi	Sampling Interval:	Continuous		
Editor:	Kendra Keon	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
141	96		IRZ-18-VAS-137-142 (<0.17 U ppb) 11/21/2019 15:31	Topock - Alluvium Deposits	ML		(140'); dry; hard		
142		IRZ-18-SS-140-145 12/6/2019 12:50		Topock - Alluvium Deposits	SM		(142.0 - 145.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (2.5YR 4/4); very fine grained to very coarse grained, angular to subangular; some silt; little granules to very large pebbles, subangular to subround; little clay; wet		
143									
144									
145									
146				Topock - Alluvium Deposits	ML		(145.0 - 147.0') Topock - Alluvium Deposits; Sandy silt (ML); reddish brown (2.5YR 4/4); low plasticity; some very fine to very coarse grained sand, angular to subround; little clay; wet; medium stiff		
147	120	IRZ-18-SS-145-150 12/6/2019 12:55					(147.0 - 152.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (2.5YR 4/4); very fine grained to very coarse grained, angular to subangular; some silt; little granules to very large pebbles, subangular to subround; little clay; wet		
148			IRZ-18-VAS-147-152 (<0.17 U ppb) 11/21/2019 13:20	Topock - Alluvium Deposits	SM				
149									
150									
151									
152		IRZ-18-SS-150-155 12/6/2019 13:00					(152.0 - 157.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (2.5YR 4/4); medium grained to very coarse grained, angular to subangular; little granules to very large pebbles, subangular to subround; little silt; little clay; wet		
153			IRZ-18-VAS-152-157 (<0.17 U ppb) 11/22/2019 09:30	Topock - Alluvium Deposits	SM				
154	60								
155									
156									
157		IRZ-18-SS-155-160 12/6/2019 13:05					(157.0 - 164.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (2.5YR 4/4); medium grained to very coarse grained, angular to subround; some very fine to fine grained grained sand, angular to subround; little granules to very large pebbles, angular to subangular; little silt; trace clay; wet	(157.0') Multiple clean out runs to set sampler. Slough in casing.	
158	60		IRZ-18-VAS-157-162 (870 ppb) 11/22/2019 12:15	Topock - Alluvium Deposits	SM				
159									
160									

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Date Started:	11/17/2019	Surface Elevation:	494.7 ft amsl	Boring No.: IRZ-18 Pilot	
Date Completed:	12/05/2019	Northing (NAD83):	2102884.7		
Drilling Co.:	Cascade	Easting (NAD83):	7615808.8	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	217 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	4-10 inches	Location:	PG&E Topock, Topock, California
Driller Name:	Jose Hernandez	Depth to First Water:	41.07 ft bgs		
Drilling Asst:	L. Amaya / P. Almanza	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	Chris Bonessi	Sampling Interval:	Continuous		
Editor:	Kendra Keon	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
161	60		IRZ-18-VAS-157-162 (870 ppb) 11/22/2019 12:15	Topock - Alluvium Deposits	SM				
162		IRZ-18-SS-160-165 12/6/2019 13:10							
163				Topock - Alluvium Deposits	SM		(164.0 - 168.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (2.5YR 4/4); very fine grained to medium grained, angular to subround; some coarse to very coarse grained sand, angular to subround; little granules to large pebbles, angular to subangular; little silt; trace clay; wet		
164	60	IRZ-18-VAS-162-167 (3300 ppb) 11/22/2019 15:00							
165				Topock - Alluvium Deposits	SM		(168.0 - 172.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (2.5YR 4/4); medium grained to very coarse grained, angular to subround; some granules to very large pebbles, angular to subangular; some very fine to fine grained grained sand, angular to subround; little silt; trace clay; coarser clasts composed of metadiorite; wet	(167.0 - 172.0') Slough fell in around the sampler had to retract and clean out casing.	
166		IRZ-18-SS-165-170 12/6/2019 13:15							
167				Topock - Alluvium Deposits	SM		(170') little granules to very large pebbles, angular to subangular; wet; increase in sand, decrease in granules and pebbles		
168	60	IRZ-18-VAS-167-172 (4700 ppb) 11/23/2019 10:00							
169				Topock - Alluvium Deposits	ML		(172.0 - 173.5') Topock - Alluvium Deposits; Sandy silt (ML); reddish brown (5YR 4/3); low plasticity; some very fine to very coarse grained sand, angular to subround; little granules to large pebbles, angular to subangular; little clay; wet; medium stiff		
170		IRZ-18-SS-170-177.5 12/6/2019 13:20							
171				Topock - Alluvium Deposits	SM		(173.5 - 177.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (2.5YR 4/4); medium grained to very coarse grained, angular to subround; some very fine to fine grained grained sand, angular to subround; little granules to very large pebbles, angular to subangular; little silt; trace clay; wet		
172	60	IRZ-18-VAS-172-177 (660 ppb) 12/3/2019 10:30							
173				Topock - Alluvium Deposits	ML		(177.5 - 182.0') Topock - Alluvium Deposits; Sandy silt (ML); reddish brown (2.5YR 4/4) to red (2.5YR 4/6); low plasticity; some very fine to very coarse grained sand, angular to subround; little granules to large pebbles, angular to subangular; little clay; wet; medium stiff	(177.0 - 187.0') Hard drilling.	
174		IRZ-18-SS-177.5-182 12/6/2019 13:25							
175				Topock - Alluvium Deposits	ML				
176	60	IRZ-18-VAS-177-182 (390 ppb) 12/3/2019 14:40							
177				Topock - Alluvium Deposits	ML				
178		IRZ-18-SS-177.5-182 12/6/2019 13:25							
179	60			Topock - Alluvium Deposits	ML				
180		IRZ-18-VAS-177-182 (390 ppb) 12/3/2019 14:40							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	11/17/2019	Surface Elevation:	494.7 ft amsl	Boring No.: IRZ-18 Pilot	
Date Completed:	12/05/2019	Northing (NAD83):	2102884.7		
Drilling Co.:	Cascade	Easting (NAD83):	7615808.8	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	217 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	4-10 inches	Location:	PG&E Topock, Topock, California
Driller Name:	Jose Hernandez	Depth to First Water:	41.07 ft bgs		
Drilling Asst:	L. Amaya / P. Almanza	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	Chris Bonessi	Sampling Interval:	Continuous		
Editor:	Kendra Keon	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
181	60	IRZ-18-SS-177.5-182 12/6/2019 13:25	IRZ-18-VAS-177-182 (390 ppb) 12/3/2019 14:40	Topock - Alluvium Deposits	ML		(181'); dry; hard; moderate cementation (181.3'); wet; medium stiff; decrease in sand, increase in silt		
182									
183									
184	60	IRZ-18-SS-182-185 12/6/2019 13:30	IRZ-18-VAS-182-187 (<0.17 U ppb) 12/4/2019 11:00	Topock - Alluvium Deposits	SM		(182.0 - 190.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); red (2.5YR 4/6); very fine grained to very coarse grained, angular to subround; low plasticity; some silt; little granules to large pebbles, angular to subangular; little clay; wet		
185									
186							(185'); dry (185.2'); moist		
187							(186'); dry (186.1'); moist		
188		IRZ-18-SS-185-190 12/6/2019 13:35						(187.0 - 192.0') Hard drilling. Lost last 2 feet downhole upon extraction.	
189			IRZ-18-VAS-187-192 (<0.17 U ppb) 12/4/2019 15:35						
190	36						(190.0 - 192.0') No recovery (NR); see drilling notes		
191					NR				
192				Topock - Alluvium Deposits	SM		(192.0 - 193.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (2.5YR 4/4); very fine grained to very coarse grained, angular to subround; low plasticity; some silt; little granules to large pebbles, angular to subangular; little clay; wet	(192.0 - 203.0') Rough drilling.	
193							(193.0 - 198.0') Topock - Weathered Bedrock - conglomerate; Sandy silt with gravel (ML); reddish brown (5YR 4/3); low plasticity; some very fine to very coarse grained sand, angular to subangular; little granules to very large pebbles, angular to subangular; little clay; coarser clasts composed of metadiorite; moist to wet; stiff		
194				Topock - Weathered Bedrock - conglomerate	ML		(195'); moist to dry; hard		
195	60								
196									
197									
198									
199	120			Topock - Weathered Bedrock - conglomerate	ML		(198.0 - 204.0') Topock - Weathered Bedrock - conglomerate; Sandy silt (ML); reddish brown (5YR 4/3); medium plasticity; some very fine to very coarse grained sand, angular to subround; little granules to large pebbles, angular to subangular; little clay; moist to dry; hard		
200									

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Date Started:	11/17/2019	Surface Elevation:	494.7 ft amsl	Boring No.: IRZ-18 Pilot	
Date Completed:	12/05/2019	Northing (NAD83):	2102884.7		
Drilling Co.:	Cascade	Easting (NAD83):	7615808.8	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	217 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	4-10 inches	Location:	PG&E Topock, Topock, California
Driller Name:	Jose Hernandez	Depth to First Water:	41.07 ft bgs		
Drilling Asst:	L. Amaya / P. Almanza	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	Chris Bonessi	Sampling Interval:	Continuous		
Editor:	Kendra Keon	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
201	120			Topock - Weathered Bedrock - conglomerate	ML				
202									
203								(203.0 - 207.0') Soft drilling.	
204			IRZ-18-VAS-202-207 (<0.17 U ppb) 12/5/2019 13:10				(204.0 - 211.0') Topock - Weathered Bedrock - conglomerate; Sandy silt with gravel (ML); reddish brown (5YR 4/3); low plasticity; some very fine to very coarse grained sand, angular to subangular; little granules to very large pebbles, angular to subangular; little clay; coarser clasts composed of metadiorite; moist; very stiff		
205	120			Topock - Weathered Bedrock - conglomerate	ML				
206									
207									
208								(207.0 - 214.0') Hard drilling.	(207.0 - 217.0') 500 gallons of water used; 50 gallons of water recovered; 450 gallons of water lost
209									
210									
211									
212				Topock - Weathered Bedrock - conglomerate	ML		(211.0 - 214.0') Topock - Weathered Bedrock - conglomerate; Sandy silt (ML); reddish brown (5YR 4/3); some very fine to very coarse grained sand, angular to subangular; little granules to large pebbles, angular to subangular; little clay; moist		
213									
214							(213.5'); dry; hard		
215				Topock - Weathered Bedrock - conglomerate	SM		(214.0 - 217.0') Topock - Weathered Bedrock - conglomerate; Silty sand with gravel (SM); reddish brown (2.5YR 4/4); very fine grained to very coarse grained, angular to subround; low plasticity; some silt; little granules to large pebbles, angular to subangular; little clay; coarser clasts composed of metadiorite; moist	(214.0 - 217.0') Soft drilling, stopped drilling due to the collection of three ND samples below last detection.	
216									
217									
End of Boring at 217.0' bgs.									
218									
219									
220									

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SOIL BORING LOG, PG&E TOPOCK C:\USERS\MCGRANE\DOCUMENTS\PG&E TOPOCK\DRIFT BORING LOGS\GINT FILES\022720\TOPOCK DATABASE FOR PLOG.GPJ TOPOCK DATA TEMPLATE FOR PLOG.GPJ 02/27/20 14:21

Date Started:	12/06/2019	Surface Elevation:	494.7 ft amsl	Well ID: IRZ-18 Pilot
Date Completed:	12/06/2019	Northing (NAD83):	2102884.7	
Drilling Co.:	Cascade	Easting (NAD83):	7615808.8	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	217 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Jose Hernandez	Borehole Diameter:	4-10 inches	Location: PG&E Topock, Topock, California
Drilling Asst:	L. Amaya / P. Almanza	Depth to First Water:	41.07 ft bgs	
Logger:	Chris Bonessi	Editor:	Kendra Keon	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
1		Topock - Fill	GW		(0.0 - 0.5') Steel Plate		Note: Steel plates with BMPs in place
2		Topock - Fluvial Deposits	SW		(0.5 - 5.0') Plastering Sand	(0.5 - 5.0') 5.5 bags	(0.5 - 5.0') 10 bags (82%) Note: Wildcat Washed, used >20% of the calculated volume due to potential voids forming during drilling
3							
4							
5		Topock - Fluvial Deposits	SW				
6							
7							
8							
9		Topock - Fluvial Deposits	GW				
10		Topock - Fluvial Deposits	SW				
11							
12		Topock - Fluvial Deposits	SW		(5.0 - 180.0') Cemex #3 MESH (8x10)	(5.0 - 180.0') 70.1 bags	(5.0 - 180.0') 92 bags (31%) Note: Lapis Lustre Sand, used >20% of the calculated volume due to potential voids forming during drilling
13							
14							
15		Topock - Fluvial Deposits	SW				
16							
17		Topock - Fluvial Deposits	GW				
18							
19		Topock - Fluvial Deposits	SW-SM				
20							

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Date Started:	12/06/2019	Surface Elevation:	494.7 ft amsl	Well ID: IRZ-18 Pilot
Date Completed:	12/06/2019	Northing (NAD83):	2102884.7	
Drilling Co.:	Cascade	Easting (NAD83):	7615808.8	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	217 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Jose Hernandez	Borehole Diameter:	4-10 inches	Location: PG&E Topock, Topock, California
Drilling Asst:	L. Amaya / P. Almanza	Depth to First Water:	41.07 ft bgs	
Logger:	Chris Bonessi	Editor:	Kendra Keon	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
21		Topock - Fluvial Deposits	SW-SM				
22							
23							
24							
25							
26							
27		Topock - Alluvium Deposits	SW-SM				
28							
29							
30					(5.0 - 180.0') Cemex #3 MESH (8x10)	(7.0 - 207.0') 6.0" Borehole	(5.0 - 180.0') 70.1 bags
31							(5.0 - 180.0') 92 bags (31%) Note: Lapis Lustre Sand, used >20% of the calculated volume due to potential voids forming during drilling
32							
33		Topock - Alluvium Deposits	SW-SM				
34							
35							
36							
37							
38		Topock - Alluvium Deposits	SM				
39							
40							

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Date Started:	12/06/2019	Surface Elevation:	494.7 ft amsl	Well ID: IRZ-18 Pilot
Date Completed:	12/06/2019	Northing (NAD83):	2102884.7	
Drilling Co.:	Cascade	Easting (NAD83):	7615808.8	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	217 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Jose Hernandez	Borehole Diameter:	4-10 inches	Location: PG&E Topock, Topock, California
Drilling Asst:	L. Amaya / P. Almanza	Depth to First Water:	41.07 ft bgs	
Logger:	Chris Bonessi	Editor:	Kendra Keon	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
41		Topock - Alluvium Deposits	SM				
42							
43							
44	IRZ-18-VAS-42-47 (580 ppb) 11/19/2019 09:20	Topock - Alluvium Deposits	SM				
45							
46							
47							
48							
49							
50					(5.0 - 180.0') Cemex #3 MESH (8x10)	(7.0 - 207.0') 6.0" Borehole	(5.0 - 180.0') 70.1 bags
51							
52		Topock - Alluvium Deposits	SM				
53							
54							
55							
56							
57							
58							
59		Topock - Alluvium Deposits	SM				
60							

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Date Started:	12/06/2019	Surface Elevation:	494.7 ft amsl	Well ID: IRZ-18 Pilot
Date Completed:	12/06/2019	Northing (NAD83):	2102884.7	
Drilling Co.:	Cascade	Easting (NAD83):	7615808.8	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	217 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Jose Hernandez	Borehole Diameter:	4-10 inches	Location: PG&E Topock, Topock, California
Drilling Asst:	L. Amaya / P. Almanza	Depth to First Water:	41.07 ft bgs	
Logger:	Chris Bonessi	Editor:	Kendra Keon	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
61							
62							
63		Topock - Alluvium Deposits	SM				
64	IRZ-18-VAS-62-67 (<0.033 U ppb) 11/19/2019 13:05						
65							
66							
67							
68		Topock - Alluvium Deposits	SM				
69	IRZ-18-VAS-67-72 (<0.033 U ppb) 11/19/2019 16:00						
70					(5.0 - 180.0') Cemex #3 MESH (8x10)	(7.0 - 207.0') 6.0" Borehole	(5.0 - 180.0') 70.1 bags
71							
72							
73		Topock - Alluvium Deposits	SM				
74							
75							
76							
77							
78		Topock - Alluvium Deposits	ML				
79							
80							

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Date Started:	12/06/2019	Surface Elevation:	494.7 ft amsl	Well ID: IRZ-18 Pilot
Date Completed:	12/06/2019	Northing (NAD83):	2102884.7	
Drilling Co.:	Cascade	Easting (NAD83):	7615808.8	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	217 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Jose Hernandez	Borehole Diameter:	4-10 inches	Location: PG&E Topock, Topock, California
Drilling Asst:	L. Amaya / P. Almanza	Depth to First Water:	41.07 ft bgs	
Logger:	Chris Bonessi	Editor:	Kendra Keon	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
81							
82							
83							
84							
85							
86		Topock - Alluvium Deposits	SM				
87							
88							
89							
90					(5.0 - 180.0') Cemex #3 MESH (8x10)		
91							
92							
93		Topock - Alluvium Deposits	ML				
94							
95							
96							
97		Topock - Alluvium Deposits	SM				
98							
99							
100							

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Date Started:	12/06/2019	Surface Elevation:	494.7 ft amsl	Well ID: IRZ-18 Pilot
Date Completed:	12/06/2019	Northing (NAD83):	2102884.7	
Drilling Co.:	Cascade	Easting (NAD83):	7615808.8	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	217 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Jose Hernandez	Borehole Diameter:	4-10 inches	Location: PG&E Topock, Topock, California
Drilling Asst:	L. Amaya / P. Almanza	Depth to First Water:	41.07 ft bgs	
Logger:	Chris Bonessi	Editor:	Kendra Keon	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction		Calculated Material Volumes	Material Volumes Installed
101								
102		Topock - Alluvium Deposits	SM					
103								
104	IRZ-18-VAS-102-107 (<0.17 U ppb) 11/20/2019 11:35							
105		Topock - Alluvium Deposits	ML					
106								
107								
108								
109								
110					(5.0 - 180.0') Cemex #3 MESH (8x10)	(7.0 - 207.0') 6.0" Borehole	(5.0 - 180.0') 70.1 bags	(5.0 - 180.0') 92 bags (31%) Note: Lapis Lustre Sand, used >20% of the calculated volume due to potential voids forming during drilling
111								
112								
113		Topock - Alluvium Deposits	SM					
114	IRZ-18-VAS-112-117 (<0.17 U ppb) 11/20/2019 14:25							
115								
116								
117		Topock - Alluvium Deposits	ML					
118								
119		Topock - Alluvium Deposits	SM					
120								

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Date Started:	12/06/2019	Surface Elevation:	494.7 ft amsl	Well ID: IRZ-18 Pilot
Date Completed:	12/06/2019	Northing (NAD83):	2102884.7	
Drilling Co.:	Cascade	Easting (NAD83):	7615808.8	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	217 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Jose Hernandez	Borehole Diameter:	4-10 inches	Location: PG&E Topock, Topock, California
Drilling Asst:	L. Amaya / P. Almanza	Depth to First Water:	41.07 ft bgs	
Logger:	Chris Bonessi	Editor:	Kendra Keon	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
121		Topock - Alluvium Deposits	SM				
122							
123							
124							
125		Topock - Alluvium Deposits	ML				
126							
127		Topock - Alluvium Deposits	ML		(5.0 - 180.0') Cemex #3 MESH (8x10)	(7.0 - 207.0') 6.0" Borehole	(5.0 - 180.0') 70.1 bags
128							
129							
130							
131		Topock - Alluvium Deposits	ML				(5.0 - 180.0') 92 bags (31%) Note: Lapis Lustre Sand, used >20% of the calculated volume due to potential voids forming during drilling
132							
133							
134							
135							
136							
137							
138	IRZ-18-VAS-137-142 (<0.17 U ppb) 11/21/2019 15:31						
139							
140							

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Date Started:	12/06/2019	Surface Elevation:	494.7 ft amsl	Well ID: IRZ-18 Pilot
Date Completed:	12/06/2019	Northing (NAD83):	2102884.7	
Drilling Co.:	Cascade	Easting (NAD83):	7615808.8	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	217 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Jose Hernandez	Borehole Diameter:	4-10 inches	Location: PG&E Topock, Topock, California
Drilling Asst:	L. Amaya / P. Almanza	Depth to First Water:	41.07 ft bgs	
Logger:	Chris Bonessi	Editor:	Kendra Keon	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
141	IRZ-18-VAS-137-142 (<0.17 U ppb) 11/21/2019 15:31	Topock - Alluvium Deposits	ML				
142							
143		Topock - Alluvium Deposits	SM				
144							
145							
146		Topock - Alluvium Deposits	ML				
147							
148							
149	IRZ-18-VAS-147-152 (<0.17 U ppb) 11/21/2019 13:20	Topock - Alluvium Deposits	SM		(5.0 - 180.0') Cemex #3 MESH (8x10)	(7.0 - 207.0') 6.0" Borehole	(5.0 - 180.0') 70.1 bags
150							
151							
152							
153							
154	IRZ-18-VAS-152-157 (<0.17 U ppb) 11/22/2019 09:30	Topock - Alluvium Deposits	SM				
155							
156							
157							
158	IRZ-18-VAS-157-162 (870 ppb) 11/22/2019 12:15	Topock - Alluvium Deposits	SM				
159							
160							

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Date Started:	12/06/2019	Surface Elevation:	494.7 ft amsl	Well ID: IRZ-18 Pilot
Date Completed:	12/06/2019	Northing (NAD83):	2102884.7	
Drilling Co.:	Cascade	Easting (NAD83):	7615808.8	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	217 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Jose Hernandez	Borehole Diameter:	4-10 inches	Location: PG&E Topock, Topock, California
Drilling Asst:	L. Amaya / P. Almanza	Depth to First Water:	41.07 ft bgs	
Logger:	Chris Bonessi	Editor:	Kendra Keon	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction		Calculated Material Volumes	Material Volumes Installed
161	IRZ-18-VAS-157-162 (870 ppb) 11/22/2019 12:15	Topock - Alluvium Deposits	SM					
162								
163								
164	IRZ-18-VAS-162-167 (3300 ppb) 11/22/2019 15:00	Topock - Alluvium Deposits	SM					
165								
166								
167								
168								
169	IRZ-18-VAS-167-172 (4700 ppb) 11/23/2019 10:00	Topock - Alluvium Deposits	SM		(5.0 - 180.0') Cemex #3 MESH (8x10)	(7.0 - 207.0') 6.0" Borehole	(5.0 - 180.0') 70.1 bags	(5.0 - 180.0') 92 bags (31%) Note: Lapis Lustre Sand, used >20% of the calculated volume due to potential voids forming during drilling
170								
171								
172								
173		Topock - Alluvium Deposits	ML					
174	IRZ-18-VAS-172-177 (660 ppb) 12/3/2019 10:30	Topock - Alluvium Deposits	SM					
175								
176								
177								
178	IRZ-18-VAS-177-182 (390 ppb) 12/3/2019 14:40	Topock - Alluvium Deposits	ML					
179								
180								

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Date Started:	12/06/2019	Surface Elevation:	494.7 ft amsl	Well ID: IRZ-18 Pilot
Date Completed:	12/06/2019	Northing (NAD83):	2102884.7	
Drilling Co.:	Cascade	Easting (NAD83):	7615808.8	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	217 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Jose Hernandez	Borehole Diameter:	4-10 inches	Location: PG&E Topock, Topock, California
Drilling Asst:	L. Amaya / P. Almanza	Depth to First Water:	41.07 ft bgs	
Logger:	Chris Bonessi	Editor:	Kendra Keon	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
181	IRZ-18-VAS-177-182 (390 ppb) 12/3/2019 14:40	Topock - Alluvium Deposits	ML				
182							
183							
184	IRZ-18-VAS-182-187 (<0.17 U ppb) 12/4/2019 11:00	Topock - Alluvium Deposits	SM		(180.0 - 190.0') Cemex # 2/12 MESH (16x30)	(180.0 - 190.0') 3.9 bags	(180.0 - 190.0') 7 bags (79%) Note: Lapis Lustre Sand, used >20% of the calculated volume due to potential voids forming during drilling
185							
186							
187							
188							
189	IRZ-18-VAS-187-192 (<0.17 U ppb) 12/4/2019 15:35						
190					(7.0 - 207.0') 6.0" Borehole		
191			NR				
192							
193		Topock - Alluvium Deposits	SM				
194							
195		Topock - Weathered Bedrock - conglomerate	ML		(190.0 - 217.0') Bentonite seal pellets	(190.0 - 217.0') 6.7 buckets	(190.0 - 217.0') 8 buckets (19%) Note: Pel-Plug (TR30) 3/8"
196							
197							
198							
199		Topock - Weathered Bedrock - conglomerate	ML				
200							


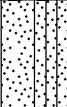




Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started:	12/06/2019	Surface Elevation:	494.7 ft amsl	Well ID: IRZ-18 Pilot
Date Completed:	12/06/2019	Northing (NAD83):	2102884.7	
Drilling Co.:	Cascade	Easting (NAD83):	7615808.8	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	217 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Jose Hernandez	Borehole Diameter:	4-10 inches	Location: PG&E Topock, Topock, California
Drilling Asst:	L. Amaya / P. Almanza	Depth to First Water:	41.07 ft bgs	
Logger:	Chris Bonessi	Editor:	Kendra Keon	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
201	IRZ-18-VAS-202-207 (<0.17 U ppb) 12/5/2019 13:10	Topock - Weathered Bedrock - conglomerate	ML		(7.0 - 207.0') 6.0" Borehole		
202							
203		Topock - Weathered Bedrock - conglomerate	ML		(190.0 - 217.0') Bentonite seal pellets	(190.0 - 217.0') 6.7 buckets	(190.0 - 217.0') 8 buckets (19%) Note: Pel-Plug (TR30) 3/8"
204							
205							
206							
207							
208		Topock - Weathered Bedrock - conglomerate	ML		(207.0 - 217.0') 4.0" Borehole		
209							
210		Topock - Weathered Bedrock - conglomerate	ML				
211							
212		Topock - Weathered Bedrock - conglomerate	SM				
213							
214							
215							
216							
217							
218							
219							
220							


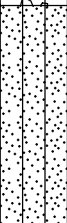
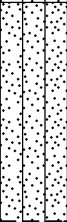

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started:	10/18/2018	Surface Elevation:	497.7 ft amsl	Boring No.: IRZ-20 Pilot
Date Completed:	10/31/2018	Northing (NAD83):	2102761.4	
Drilling Co.:	Cascade	Easting (NAD83):	7615814.2	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	187 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	4-12 inches	Location: PG&E Topock, Needles, California
Driller Name:	E. Ramoes/S. Vasquez	Depth to First Water:	44.5 ft bgs	
Drilling Asst:	T. Alymer/C. Alvarez	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger:	Connor Mills	Sampling Interval:	Continuous	
Editor:	Sean McGrane	Converted to Well:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid					
1	60			Topock - Fluvial Deposits	GW-GM		(0.0 - 4.0') Topock - Fluvial Deposits; Well graded gravel with silt and sand (GW-GM); very pale brown (10YR 8/3); granules to very large pebbles, angular to subround; and very fine to very coarse grained sand, angular to round; little silt; trace cobbles, angular to subangular; dry		(0.0 - 187.0') No water used					
2														
3														
4														
5	66			Topock - Fluvial Deposits	SP-SM		(4.0 - 5.5') Topock - Fluvial Deposits; Poorly graded sand with silt (SP-SM); very pale brown (10YR 8/3); very fine grained to fine grained, angular to subround; little silt; dry; homogeneous							
6										(5.5 - 7.0') Topock - Fluvial Deposits; Silty sand (SM); very pale brown (10YR 8/3); very fine grained to very coarse grained, angular to round; and silt; trace granule to small pebbles, angular to subround; dry				
7										(7.0 - 13.0') Topock - Fluvial Deposits; Silty sand (SM); very pale brown (10YR 8/3); fine grained to fine grained, angular to round; little silt; dry				
8														
9														
10														
11				Topock - Fluvial Deposits	SM									
12														
13														
14														
15							Topock - Fluvial Deposits			SM		(13.0 - 15.0') Topock - Fluvial Deposits; Silty sand (SM); very pale brown (10YR 8/3); very fine grained to very coarse grained, angular to subround; little silt; trace granules to very large pebbles, angular to subround; trace cobbles, angular to subround; dry		
16														
17				Topock - Fluvial Deposits	SM		(15.0 - 17.0') Topock - Fluvial Deposits; Silty sand (SM); very pale brown (10YR 8/3); very fine grained to fine grained, angular to subround; little silt; dry							
18														
19	120			Topock - Fluvial Deposits	GM		(17.0 - 33.0') Topock - Fluvial Deposits; Silty gravel with sand (GM); grayish brown (10YR 5/2); very fine grained to coarse grained, angular to round; some fine to very coarse grained sand, angular to round; little silt; little clay; trace cobbles, angular to subangular; dry							
20														

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Date Started:	10/18/2018	Surface Elevation:	497.7 ft amsl	Boring No.: IRZ-20 Pilot	
Date Completed:	10/31/2018	Northing (NAD83):	2102761.4		
Drilling Co.:	Cascade	Easting (NAD83):	7615814.2	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	187 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	4-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	E. Ramoes/S. Vasquez	Depth to First Water:	44.5 ft bgs		
Drilling Asst:	T. Alymer/C. Alvarez	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	Connor Mills	Sampling Interval:	Continuous		
Editor:	Sean McGrane	Converted to Well:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
21	120			Topock - Fluvial Deposits	GM			(22.0 - 36.0') Open borehole collapsed overnight between 10/18/18 to 10/19/18	(0.0 - 187.0') No water used
22									
23									
24									
25									
26									
27									
28									
29									
30									
31									
32									
33	96			Topock - Fluvial Deposits	SM		(33.0 - 36.0') Topock - Fluvial Deposits; Silty sand with gravel (SM); brown (10YR 5/3); very fine grained to coarse grained, angular to round; some silt; little clay; trace granules to very large, angular to subround; dry		
34									
35				Topock - Fluvial Deposits	SM		(36.0 - 39.0') Topock - Fluvial Deposits; Silty sand with gravel (SM); brown (10YR 4/3); very fine grained to very coarse grained, angular to subangular; little granule to very large pebbles, angular to subround; little silt; dry; strong cementation		
36									
37				Topock - Alluvium Deposits	SM		(39.0 - 47.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); grayish brown (10YR 5/2); very fine grained to very coarse grained, angular to subangular; and granule to very large pebbles,		
38									
39									
40									

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Date Started:	10/18/2018	Surface Elevation:	497.7 ft amsl	Boring No.: <u>IRZ-20 Pilot</u>
Date Completed:	10/31/2018	Northing (NAD83):	2102761.4	
Drilling Co.:	Cascade	Easting (NAD83):	7615814.2	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	187 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	4-12 inches	Location: PG&E Topock, Needles, California
Driller Name:	E. Ramoes/S. Vasquez	Depth to First Water:	44.5 ft bgs	
Drilling Asst:	T. Alymer/C. Alvarez	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger:	Connor Mills	Sampling Interval:	Continuous	
Editor:	Sean McGrane	Converted to Well:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	

SOIL BORING LOG PG&E TOPOCK DATABASE FOR PI OG GP1 TOPOCK DATA TEMPLATE FOR PI OG GDT 05/22/19 17:15

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Date Started:	10/18/2018	Surface Elevation:	497.7 ft amsl	Boring No.: <u>IRZ-20 Pilot</u>	
Date Completed:	10/31/2018	Northing (NAD83):	2102761.4		
Drilling Co.:	Cascade	Easting (NAD83):	7615814.2	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	187 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	4-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	E. Ramoes/S. Vasquez	Depth to First Water:	44.5 ft bgs		
Drilling Asst:	T. Alymer/C. Alvarez	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	Connor Mills	Sampling Interval:	Continuous		
Editor:	Sean McGrane	Converted to Well:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
61	96	IRZ-20-SS-60-65 10/30/2018 12:06		Topock - Alluvium Deposits	SM				(0.0 - 187.0') No water used
62									
63									
64									
65	114	IRZ-20-SS-65-70 10/30/2018 12:08		Topock - Alluvium Deposits	ML		(65.0 - 69.0') Topock - Alluvium Deposits; Sandy silt (ML); brown (10YR 5/3); no plasticity; some very fine to coarse grained sand, angular to subround; little small pebbles, angular to subangular; moist		
66									
67									
68									
69		IRZ-20-SS-70-75 10/30/2018 12:10		Topock - Alluvium Deposits	ML		(69.0 - 71.0') Topock - Alluvium Deposits; Sandy silt (ML); brown (7.5YR 4/4); no plasticity; some fine to coarse grained sand, angular to subround; little granule to small pebbles, angular to subangular; moist		
70									
71									
72									
73		IRZ-20-SS-75-80 10/30/2018 12:12		Topock - Alluvium Deposits	ML		(71.0 - 77.0') Topock - Alluvium Deposits; Silt with sand (ML); brown (7.5YR 4/4); no plasticity; little very fine to coarse grained sand, angular to subround; trace granule to medium pebbles, angular to subangular; trace clay; moist		
74									
75									
76									
77				Topock - Alluvium Deposits	ML		(77.0 - 83.0') Topock - Alluvium Deposits; Sandy silt (ML); brown (7.5YR 4/4); no plasticity; some very fine to medium grained sand, angular to subround; trace granule, angular to subangular; wet		
78									
79									
80									

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Date Started:	10/18/2018	Surface Elevation:	497.7 ft amsl	Boring No.: <u>IRZ-20 Pilot</u>	
Date Completed:	10/31/2018	Northing (NAD83):	2102761.4		
Drilling Co.:	Cascade	Easting (NAD83):	7615814.2	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	187 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	4-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	E. Ramoes/S. Vasquez	Depth to First Water:	44.5 ft bgs		
Drilling Asst:	T. Alymer/C. Alvarez	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	Connor Mills	Sampling Interval:	Continuous		
Editor:	Sean McGrane	Converted to Well:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
81									(0.0 - 187.0') No water used
82									
83		IRZ-20-SS-80-85 10/30/2018 12:14		Topock - Alluvium Deposits	ML				
84	114		IRZ-20-VAS-82-87 (<0.033 U ppb) 10/21/2018 14:45				(83.0 - 107.0') Topock - Alluvium Deposits; Silty sand (SM); brown (10YR 4/3); very fine grained to coarse grained, angular to subround; and silt; little granule to small pebbles, angular to subangular; wet		
85									
86									
87		IRZ-20-SS-85-90 10/30/2018 12:16							
88									
89									
90									
91									
92	132	IRZ-20-SS-90-95 10/30/2018 12:18		Topock - Alluvium Deposits	SM				
93									
94									
95									
96									
97									
98	120	IRZ-20-SS-95-100 11/30/2018 12:20							
99									
100									

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Date Started:	10/18/2018	Surface Elevation:	497.7 ft amsl	Boring No.: IRZ-20 Pilot
Date Completed:	10/31/2018	Northing (NAD83):	2102761.4	
Drilling Co.:	Cascade	Easting (NAD83):	7615814.2	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	187 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	4-12 inches	Location: PG&E Topock, Needles, California
Driller Name:	E. Ramoes/S. Vasquez	Depth to First Water:	44.5 ft bgs	
Drilling Asst:	T. Alymer/C. Alvarez	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger:	Connor Mills	Sampling Interval:	Continuous	
Editor:	Sean McGrane	Converted to Well:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
101	120	IRZ-20-SS-100-105 10/30/2018 12:22		Topock - Alluvium Deposits	SM				(0.0 - 187.0') No water used
102									
103									
104									
105	103.2	IRZ-20-SS-105-110 10/30/2018 12:24		Topock - Alluvium Deposits	SM		(107.0 - 109.0') Topock - Alluvium Deposits; Sandy silt with gravel (SM); brown (7.5YR 4/3); fine grained to coarse grained, angular to subround; and silt; little granule to small pebbles, angular to subangular; wet		
106									
107									
108									
109									
110									
111									
112									
113	132	IRZ-20-SS-110-115 10/30/2018 12:26	IRZ-20-VAS-112-117 (<0.17 U ppb) 10/22/2018 14:02	Topock - Alluvium Deposits	ML		(109.0 - 117.0') Topock - Alluvium Deposits; Sandy silt (ML); brown (10YR 4/3); no plasticity; some fine to coarse grained sand, angular to subround; trace granule, angular to subround; trace clay; wet		
114									
115									
116									
117									
118									
119									
120									
		IRZ-20-SS-115-120 10/30/2018 12:28		Topock - Alluvium Deposits	ML		(117.0 - 123.0') Topock - Alluvium Deposits; Sandy silt (ML); strong brown (7.5YR 4/6); no plasticity; little granule to medium pebbles, angular to subangular; little fine to coarse grained sand, angular to subround; wet		

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	<u>10/18/2018</u>	Surface Elevation:	<u>497.7 ft amsl</u>	Boring No.: <u>IRZ-20 Pilot</u>
Date Completed:	<u>10/31/2018</u>	Northing (NAD83):	<u>2102761.4</u>	
Drilling Co.:	<u>Cascade</u>	Easting (NAD83):	<u>7615814.2</u>	Client: <u>PG&E</u>
Drilling Method:	<u>Sonic Drilling</u>	Total Depth:	<u>187 ft bgs</u>	Project: <u>Final GW Remedy Phase 1</u>
Drill Rig Type:	<u>Prosonic Truck Mount</u>	Borehole Diameter:	<u>4-12 inches</u>	Location: <u>PG&E Topock, Needles, California</u>
Driller Name:	<u>E. Ramoes/S. Vasquez</u>	Depth to First Water:	<u>44.5 ft bgs</u>	
Drilling Asst:	<u>T. Alymer/C. Alvarez</u>	Sampling Method:	<u>4 inch x 10 ft Core Barrel</u>	Project Number: <u>RC000753.0051</u>
Logger:	<u>Connor Mills</u>	Sampling Interval:	<u>Continuous</u>	
Editor:	<u>Sean McGrane</u>	Converted to Well:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
121				Topock - Alluvium Deposits	ML				(0.0 - 187.0') No water used
122									
123		IRZ-20-SS-120-125 10/30/2018 12:30		Topock - Alluvium Deposits	GM		(123.0 - 124.5') Topock - Alluvium Deposits; Silty gravel with sand (GM); yellowish brown / moderate yellowish brown(10YR 5/4); granules to very large pebbles, angular to subangular; some silt; little very fine to coarse grained sand, angular to subangular; moist		
124	132								
125				Topock - Alluvium Deposits	ML		(124.5 - 127.0') Topock - Alluvium Deposits; Sandy silt (ML); brown (7.5YR 4/3); no plasticity; little granule to medium pebbles, angular to subangular; little fine to coarse grained sand, angular to subround; moist		
126									
127		IRZ-20-SS-125-130 10/30/2018 12:32		Topock - Alluvium Deposits	ML		(127.0 - 131.0') Topock - Alluvium Deposits; Sandy silt (ML); reddish brown / moderate brown(5YR 4/4); no plasticity; some fine grained sand, angular to subround; trace granule to small pebbles, angular to subangular; wet		
128									
129									
130									
131									
132	132	IRZ-20-SS-130-135 10/30/2018 12:34	IRZ-20-SS-131-136 (<0.17 U ppb) 10/23/2018 13:25	Topock - Alluvium Deposits	SM		(131.0 - 136.5') Topock - Alluvium Deposits; Silty sand (SM); brown (7.5YR 5/3); fine grained to coarse grained, angular to subround; some silt; little granule to medium pebbles, subangular to round; wet		
133									
134									
135									
136									
137		IRZ-20-SS-135-140 10/30/2018 12:36		Topock - Alluvium Deposits	SM		(136.5 - 157.0') Topock - Alluvium Deposits; Silty sand (SM); reddish brown (5YR 5/4); very fine grained to coarse grained, angular to subangular; and silt; little granule to very large pebbles, angular to subangular; wet; granules and pebbles are composed of metadiorite		
138	132								
139									
140									


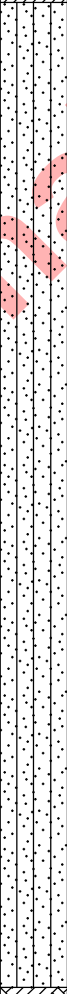

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	<u>10/18/2018</u>	Surface Elevation:	<u>497.7 ft amsl</u>	Boring No.: <u>IRZ-20 Pilot</u>	
Date Completed:	<u>10/31/2018</u>	Northing (NAD83):	<u>2102761.4</u>		
Drilling Co.:	<u>Cascade</u>	Easting (NAD83):	<u>7615814.2</u>	Client:	<u>PG&E</u>
Drilling Method:	<u>Sonic Drilling</u>	Total Depth:	<u>187 ft bgs</u>	Project:	<u>Final GW Remedy Phase 1</u>
Drill Rig Type:	<u>Prosonic Truck Mount</u>	Borehole Diameter:	<u>4-12 inches</u>	Location:	<u>PG&E Topock, Needles, California</u>
Driller Name:	<u>E. Ramoes/S. Vasquez</u>	Depth to First Water:	<u>44.5 ft bgs</u>		
Drilling Asst:	<u>T. Alymer/C. Alvarez</u>	Sampling Method:	<u>4 inch x 10 ft Core Barrel</u>	Project Number:	<u>RC000753.0051</u>
Logger:	<u>Connor Mills</u>	Sampling Interval:	<u>Continuous</u>		
Editor:	<u>Sean McGrane</u>	Converted to Well:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
141									(0.0 - 187.0') No water used
142									
143		IRZ-20-SS-140-145 10/30/2018 12:38							
144	132								
145									
146									
147		IRZ-20-SS-145-150 10/30/2018 12:40							
148				Topock - Alluvium Deposits	SM				
149									
150									
151									
152	132	IRZ-20-SS-150-155 10/30/2018 12:42							
153									
154									
155									
156									
157		IRZ-20-SS-155-160 10/30/2018 12:44							
158	132			Topock - Weathered Bedrock - conglomerate	ML		(157.0 - 160.0') Topock - Weathered Bedrock - conglomerate; Sandy silt (ML); brown (7.5YR 5/4); no plasticity; and fine to coarse grained sand, angular to subround; trace granule, angular to subangular; trace clay; moist	(157.0 - 167.0') Soil core hot and dry, lost approximately 2 ft. of core down hole, tripped back in to retrieve lost core	
159									
160									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	10/18/2018	Surface Elevation:	497.7 ft amsl	Boring No.: <u>IRZ-20 Pilot</u>	
Date Completed:	10/31/2018	Northing (NAD83):	2102761.4		
Drilling Co.:	Cascade	Easting (NAD83):	7615814.2	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	187 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	4-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	E. Ramoes/S. Vasquez	Depth to First Water:	44.5 ft bgs		
Drilling Asst:	T. Alymer/C. Alvarez	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	Connor Mills	Sampling Interval:	Continuous		
Editor:	Sean McGrane	Converted to Well:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
161	132	IRZ-20-SS-160-165 10/30/2018 12:46		Topock - Weathered Bedrock - conglomerate	CL		(160.0 - 166.0') Topock - Weathered Bedrock - conglomerate; Lean clay with sand (CL); brown (10YR 4/3); low plasticity; some small to medium pebbles, angular to subangular; some fine to coarse grained sand, angular to subround; little silt; trace cobbles, angular to subangular; dry	(157.0 - 167.0') Soil core hot and dry, lost approximately 2 ft. of core down hole, tripped back in to retrieve lost core	(0.0 - 187.0') No water used
162									
163									
164									
165	87.6	IRZ-20-SS-165-170 10/30/2018 12:48		Topock - Weathered Bedrock - conglomerate	ML		(166.0 - 179.5') Topock - Weathered Bedrock - conglomerate; Sandy silt with gravel (ML); dark yellowish brown (10YR 3/6); medium plasticity; some fine to coarse grained sand, angular to subround; little granule to small pebbles, angular to subangular; wet		
166									
167									
168									
169									
170									
171									
172									
173									
174									
175	79.2	IRZ-20-SS-173-178 (<0.83 U ppb) 10/24/2018 14:12		Topock - Weathered Bedrock - conglomerate					
176									
177									
178									
179									
180									
							(179.5 - 182.0') Topock - Competent Bedrock - conglomerate;	(177.0 - 182.0') Very rough drilling, had refusal at 182', tripped out and make another run for 182-187'.	


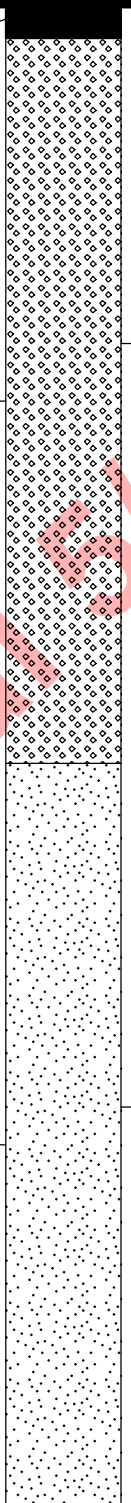

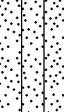




Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	10/18/2018	Surface Elevation:	497.7 ft amsl	Boring No.: IRZ-20 Pilot
Date Completed:	10/31/2018	Northing (NAD83):	2102761.4	
Drilling Co.:	Cascade	Easting (NAD83):	7615814.2	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	187 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	4-12 inches	Location: PG&E Topock, Needles, California
Driller Name:	E. Ramoes/S. Vasquez	Depth to First Water:	44.5 ft bgs	
Drilling Asst:	T. Alymer/C. Alvarez	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger:	Connor Mills	Sampling Interval:	Continuous	
Editor:	Sean McGrane	Converted to Well:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
181	79.2			Topock - Competent Bedrock - conglomerate			dark yellowish brown (10YR 4/4); dry; moderate cementation; friable		(0.0 - 187.0') No water used
182									
183		IRZ-20-SS-180-187 10/30/2018 12:54							
184	58.8			Topock - Competent Bedrock - conglomerate			(182.0 - 187.0') Topock - Competent Bedrock - conglomerate; yellowish red (5YR 4/6); moist; weak cementation; friable	(182.0 - 187.0') Had to vibrate the core barrel and lost the core downhole, retrieved with flapper bit, sediment were very wet due to lost of core in the borehole	
185									
186									
187									
End of Boring at 187.0' bgs.									
188									
189									
190									
191									
192									
193									
194									
195									
196									
197									
198									
199									
200									

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Date Started:	10/18/2018	Surface Elevation:	497.7 ft amsl	Well ID: IRZ-20 Pilot
Date Completed:	10/31/2018	Northing (NAD83):	2102761.4	
Drilling Co.:	Cascade	Easting (NAD83):	7615814.2	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	187 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	E. Ramoos/S. Vasquez	Borehole Diameter:	4-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	T. Alymer/C. Alvarez	Depth to First Water:	44.5 ft bgs	
Logger:	Connor Mills	Editor:	Sean McGrane	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction		Calculated Material Volumes	Material Volumes Installed		
1		Topock - Fluvial Deposits	GW-GM		(0.0 - 0.5') Temporary Steel Plate with BMP		(0.0 - 0.5') 1 plate	(0.0 - 0.5') 1 plate (0%)		
2										
3										
4										
5		Topock - Fluvial Deposits	SP-SM		(0.5 - 10.0') Cemex #0/30 MESH (30x50)		(0.5 - 10.0') 7.9 bags	(0.5 - 10.0') 8 bags (1%) Note: Lapis Lustre Sand		
6		Topock - Fluvial Deposits	SM							
7										
8		Topock - Fluvial Deposits	SM							
9										
10										
11										
12										
13										
14		Topock - Fluvial Deposits	SM							
15					(10.0 - 177.0') Plastering Sand		(10.0 - 177.0') 51.1 bags	(10.0 - 177.0') 68 bags (33%) Note: Wildcat Washed		
16		Topock - Fluvial Deposits	SM							
17										
18		Topock - Fluvial Deposits	GM							
19										
20										
21										

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Date Started:	10/18/2018	Surface Elevation:	497.7 ft amsl	Well ID: IRZ-20 Pilot
Date Completed:	10/31/2018	Northing (NAD83):	2102761.4	
Drilling Co.:	Cascade	Easting (NAD83):	7615814.2	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	187 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	E. Ramoes/S. Vasquez	Borehole Diameter:	4-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	T. Alymer/C. Alvarez	Depth to First Water:	44.5 ft bgs	
Logger:	Connor Mills	Editor:	Sean McGrane	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
21							
22							
23							
24							
25							
26							
27		Topock - Fluvial Deposits	GM				
28							
29							
30					(10.0 - 177.0') Plastering Sand		
31							
32							
33							
34		Topock - Fluvial Deposits	SM				
35							
36							
37		Topock - Fluvial Deposits	SM				
38							
39							
40		Topock - Alluvium Deposits	SM				

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started:	10/18/2018	Surface Elevation:	497.7 ft amsl	Well ID: IRZ-20 Pilot
Date Completed:	10/31/2018	Northing (NAD83):	2102761.4	
Drilling Co.:	Cascade	Easting (NAD83):	7615814.2	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	187 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	E. Ramoses/S. Vasquez	Borehole Diameter:	4-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	T. Alymer/C. Alvarez	Depth to First Water:	44.5 ft bgs	
Logger:	Connor Mills	Editor:	Sean McGrane	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
41							
42							
43		Topock - Alluvium Deposits	SM				
44							
45							
46							
47							
48							
49							
50					(10.0 - 177.0') Plastering Sand	(9.0 - 177.0') 6" Borehole	(10.0 - 177.0') 68 bags (33%) Note: Wildcat Washed
51							
52		Topock - Alluvium Deposits	GM				
53	IRZ-20-VAS-51-56 (150 ppb) 10/20/2018 11:40						
54							
55							
56		Topock - Alluvium Deposits	SM				
57							
58		Topock - Alluvium Deposits	SM				
59							
60							

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Date Started:	10/18/2018	Surface Elevation:	497.7 ft amsl	Well ID: IRZ-20 Pilot
Date Completed:	10/31/2018	Northing (NAD83):	2102761.4	
Drilling Co.:	Cascade	Easting (NAD83):	7615814.2	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	187 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	E. Ramoes/S. Vasquez	Borehole Diameter:	4-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	T. Alymer/C. Alvarez	Depth to First Water:	44.5 ft bgs	
Logger:	Connor Mills	Editor:	Sean McGrane	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
61		Topock - Alluvium Deposits	SM				
62							
63							
64							
65		Topock - Alluvium Deposits	ML				
66							
67							
68							
69		Topock - Alluvium Deposits	ML				
70							
71							
72							
73		Topock - Alluvium Deposits	ML				
74							
75							
76							
77		Topock - Alluvium Deposits	ML				
78							
79							
80							

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Date Started:	10/18/2018	Surface Elevation:	497.7 ft amsl	Well ID: IRZ-20 Pilot
Date Completed:	10/31/2018	Northing (NAD83):	2102761.4	
Drilling Co.:	Cascade	Easting (NAD83):	7615814.2	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	187 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	E. Ramoes/S. Vasquez	Borehole Diameter:	4-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	T. Alymer/C. Alvarez	Depth to First Water:	44.5 ft bgs	
Logger:	Connor Mills	Editor:	Sean McGrane	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
81		Topock - Alluvium Deposits	ML				
82							
83							
84	IRZ-20-VAS-82-87 (<0.033 U ppb) 10/21/2018 14:45						
85							
86							
87							
88							
89							
90					(10.0 - 177.0') Plastering Sand	(9.0 - 177.0') 6" Borehole	(10.0 - 177.0') 51.1 bags
91		Topock - Alluvium Deposits	SM				(10.0 - 177.0') 68 bags (33%) Note: Wildcat Washed
92							
93							
94							
95							
96							
97							
98							
99							
100							

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Date Started:	10/18/2018	Surface Elevation:	497.7 ft amsl	Well ID: IRZ-20 Pilot
Date Completed:	10/31/2018	Northing (NAD83):	2102761.4	
Drilling Co.:	Cascade	Easting (NAD83):	7615814.2	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	187 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	E. Ramoes/S. Vasquez	Borehole Diameter:	4-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	T. Alymer/C. Alvarez	Depth to First Water:	44.5 ft bgs	
Logger:	Connor Mills	Editor:	Sean McGrane	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
101							
102							
103		Topock - Alluvium Deposits	SM				
104							
105							
106							
107							
108		Topock - Alluvium Deposits	SM				
109							
110					(10.0 - 177.0') Plastering Sand	(9.0 - 177.0') 6" Borehole	(10.0 - 177.0') 51.1 bags
111							
112							
113		Topock - Alluvium Deposits	ML				
114	IRZ-20-VAS-112-117 (<0.17 U ppb) 10/22/2018 14:02						
115							
116							
117							
118		Topock - Alluvium Deposits	ML				
119							
120							

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Date Started:	10/18/2018	Surface Elevation:	497.7 ft amsl	Well ID: IRZ-20 Pilot
Date Completed:	10/31/2018	Northing (NAD83):	2102761.4	
Drilling Co.:	Cascade	Easting (NAD83):	7615814.2	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	187 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	E. Ramoses/S. Vasquez	Borehole Diameter:	4-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	T. Alymer/C. Alvarez	Depth to First Water:	44.5 ft bgs	
Logger:	Connor Mills	Editor:	Sean McGrane	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction		Calculated Material Volumes	Material Volumes Installed
121		Topock - Alluvium Deposits	ML		(10.0 - 177.0') Plastering Sand	(9.0 - 177.0') 6" Borehole	(10.0 - 177.0') 51.1 bags	(10.0 - 177.0') 68 bags (33%) Note: Wildcat Washed
122								
123		Topock - Alluvium Deposits	GM					
124								
125		Topock - Alluvium Deposits	ML		(10.0 - 177.0') Plastering Sand	(9.0 - 177.0') 6" Borehole	(10.0 - 177.0') 51.1 bags	(10.0 - 177.0') 68 bags (33%) Note: Wildcat Washed
126								
127		Topock - Alluvium Deposits	ML					
128								
129		Topock - Alluvium Deposits	ML		(10.0 - 177.0') Plastering Sand	(9.0 - 177.0') 6" Borehole	(10.0 - 177.0') 51.1 bags	(10.0 - 177.0') 68 bags (33%) Note: Wildcat Washed
130								
131		Topock - Alluvium Deposits	ML					
132								
133	IRZ-20-SS-131-136 (<0.17 U ppb) 10/23/2018 13:25	Topock - Alluvium Deposits	SM		(10.0 - 177.0') Plastering Sand	(9.0 - 177.0') 6" Borehole	(10.0 - 177.0') 51.1 bags	(10.0 - 177.0') 68 bags (33%) Note: Wildcat Washed
134								
135		Topock - Alluvium Deposits	SM					
136								
137		Topock - Alluvium Deposits	SM		(10.0 - 177.0') Plastering Sand	(9.0 - 177.0') 6" Borehole	(10.0 - 177.0') 51.1 bags	(10.0 - 177.0') 68 bags (33%) Note: Wildcat Washed
138								
139		Topock - Alluvium Deposits	SM					
140								


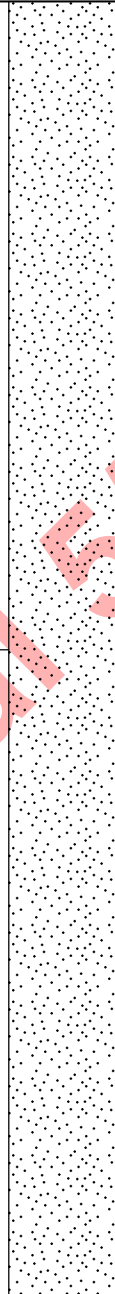
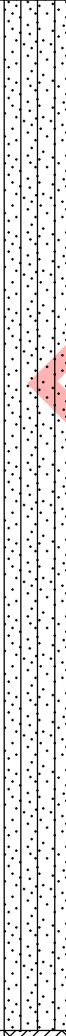
Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started:	10/18/2018	Surface Elevation:	497.7 ft amsl	Well ID: IRZ-20 Pilot
Date Completed:	10/31/2018	Northing (NAD83):	2102761.4	
Drilling Co.:	Cascade	Easting (NAD83):	7615814.2	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	187 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	E. Ramoes/S. Vasquez	Borehole Diameter:	4-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	T. Alymer/C. Alvarez	Depth to First Water:	44.5 ft bgs	
Logger:	Connor Mills	Editor:	Sean McGrane	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction		Calculated Material Volumes	Material Volumes Installed
141								
142								
143								
144								
145								
146								
147								
148								
149		Topock - Alluvium Deposits	SM					
150					(10.0 - 177.0') Plastering Sand	(9.0 - 177.0') 6" Borehole	(10.0 - 177.0') 51.1 bags	(10.0 - 177.0') 68 bags (33%) Note: Wildcat Washed
151								
152								
153								
154								
155								
156								
157								
158		Topock - Weathered Bedrock - conglomerate	ML					
159								
160								

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started:	10/18/2018	Surface Elevation:	497.7 ft amsl	Well ID: IRZ-20 Pilot
Date Completed:	10/31/2018	Northing (NAD83):	2102761.4	
Drilling Co.:	Cascade	Easting (NAD83):	7615814.2	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	187 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	E. Ramoes/S. Vasquez	Borehole Diameter:	4-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	T. Alymer/C. Alvarez	Depth to First Water:	44.5 ft bgs	
Logger:	Connor Mills	Editor:	Sean McGrane	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction		Calculated Material Volumes	Material Volumes Installed				
161	IRZ-20-VAS-173-178 (<0.83 U ppb) 10/24/2018 14:12	Topock - Weathered Bedrock - conglomerate	CL			(10.0 - 177.0') 6" Borehole	(10.0 - 177.0') 51.1 bags	(10.0 - 177.0') 68 bags (33%) Note: Wildcat Washed				
162												
163												
164												
165												
166		Topock - Weathered Bedrock - conglomerate	ML						(10.0 - 177.0') Plastering Sand	(177.0 - 187.0') 4" Borehole	(177.0 - 187.0') 2.8 bags	(177.0 - 187.0') 2 bags (-29%) Note: Lapis Lustre Sand
167												
168												
169												
170												
171												
172												
173												
174												
175												
176												
177												
178												
179												
180												








Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started:	10/18/2018	Surface Elevation:	497.7 ft amsl	Well ID: IRZ-20 Pilot
Date Completed:	10/31/2018	Northing (NAD83):	2102761.4	
Drilling Co.:	Cascade	Easting (NAD83):	7615814.2	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	187 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	E. Ramoes/S. Vasquez	Borehole Diameter:	4-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	T. Alymer/C. Alvarez	Depth to First Water:	44.5 ft bgs	
Logger:	Connor Mills	Editor:	Sean McGrane	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction			Calculated Material Volumes	Material Volumes Installed
181		Topock - Competent Bedrock - conglomerate							
182									
183									
184					(177.0 - 187.0') Cemex #0/30 MESH (30x50)	(177.0 - 187.0') 4" Borehole		(177.0 - 187.0') 2.8 bags	(177.0 - 187.0') 2 bags (-29%) Note: Lapis Lustre Sand
185		Topock - Competent Bedrock - conglomerate							
186									
187									
188									
189									
190									
191									
192									
193									
194									
195									
196									
197									
198									
199									
200									






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Date Started:	12/15/2018	Surface Elevation:	498.7 ft amsl	Boring No.: <u>IRZ-21-Pilot</u>	
Date Completed:	12/19/2018	Northing (NAD83):	2102688.4		
Drilling Co.:	Cascade	Easting (NAD83):	7615817.1	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	166 ft bgs	Project:	Final Groundwater Remedy Phase
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	4-12 inches	Location:	1
Driller Name:	Steve Vasquez	Depth to First Water:	44.5 ft bgs	PG&E Topock, Needles, California	
Drilling Asst:	N. Dominguez/C. Alvarez	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	Connor Mills	Sampling Interval:	Continuous		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
1	84			Topock - Fluvial Deposits	SP		(0.0 - 4.5') Topock - Fluvial Deposits; Poorly graded sand with gravel (SP); yellowish brown / moderate yellowish brown(10YR 5/4); very fine grained to medium grained, subangular to subround; some granules to very large pebbles, subangular to subround; trace silt; dry		(0.0 - 158.0') No water used
2									
3				Topock - Fluvial Deposits	GW		(4.5 - 11.5') Topock - Fluvial Deposits; Well graded gravel with sand (GW); brown (10YR 5/3); granules to very large pebbles, subangular to subround; some very fine to medium grained sand, angular to subround; trace cobbles, angular to subround; trace silt; dry		
4									
5									
6									
7	120			Topock - Fluvial Deposits	SP		(11.5 - 13.0') Topock - Fluvial Deposits; Poorly graded sand (SP); yellowish brown (10YR 5/6); very fine grained to fine grained, subangular to round; trace granules, angular to subround; trace silt; dry		
8									
9				Topock - Fluvial Deposits	GW		(13.0 - 16.0') Topock - Fluvial Deposits; Well graded gravel with sand (GW); yellowish brown / moderate yellowish brown(10YR 5/4); granules to very large pebbles, subangular to subround; some very fine to medium grained sand, subangular to subround; trace silt; dry		
10									
11	120			Topock - Fluvial Deposits	SP		(16.0 - 17.0') Topock - Fluvial Deposits; Poorly graded sand (SP); yellowish brown (10YR 5/6); very fine grained to fine grained, subangular to round; trace granules, angular to subround; trace cobbles, angular to subangular; trace silt; dry		
12									
13				Topock - Fluvial Deposits	SP		(17.0 - 19.0') Topock - Fluvial Deposits; Poorly graded sand with gravel (SP); yellowish brown / moderate yellowish brown(10YR 5/4); very fine grained to medium grained, subangular to subround; some granules to very large pebbles, subangular to subround; trace silt; dry		
14									
15				Topock - Fluvial Deposits	GM		(19.0 - 23.0') Topock - Fluvial Deposits; Silty gravel with sand (GM); light yellowish brown (10YR 6/4); granules to very large pebbles, angular to subround; little very fine to coarse grained		
16									


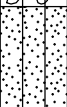
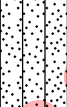
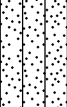

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Date Started:	12/15/2018	Surface Elevation:	498.7 ft amsl	Boring No.: IRZ-21-Pilot
Date Completed:	12/19/2018	Northing (NAD83):	2102688.4	
Drilling Co.:	Cascade	Easting (NAD83):	7615817.1	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	166 ft bgs	Project: Final Groundwater Remedy Phase
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	4-12 inches	Location: 1
Driller Name:	Steve Vasquez	Depth to First Water:	44.5 ft bgs	PG&E Topock, Needles, California
Drilling Asst:	N. Dominguez/C. Alvarez	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger:	Connor Mills	Sampling Interval:	Continuous	
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
21	120			Topock - Fluvial Deposits	GM		sand, angular to subangular; little silt; trace boulders; dry (21'); one foot solid rock core from a boulder composed of basalt		(0.0 - 158.0') No water used
22									
23				Topock - Fluvial Deposits	GM		(23.0 - 25.0') Topock - Fluvial Deposits; Silty gravel with sand (GM); light brownish gray / pale yellowish brown (10YR 6/2); granules to very large pebbles, subangular to subround; some silt; little very fine to very coarse grained sand, angular to subangular; trace boulders; dry; pulverized boulder from 23-24		
24									
25	120			Topock - Alluvium Deposits	GM		(25.0 - 34.5') Topock - Alluvium Deposits; Silty gravel with sand (GM); yellowish brown / moderate yellowish brown (10YR 5/4); granules to large pebbles, angular to subangular; some silt; little very fine to very coarse grained sand, angular to subangular; dry		
26									
27									
28									
29									
30									
31	60			Topock - Alluvium Deposits	GM		(34.5 - 37.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); light reddish brown / light brown (5YR 6/4); granules to very large pebbles; some very fine to coarse grained sand, angular to subangular; little silt; dry		
32									
33									
34									
35				Topock - Alluvium Deposits	GM		(37.0 - 42.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); granules to very large pebbles, angular to subround; little silt; dry		
36									
37									
38									
39									
40									

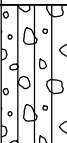





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Date Started:	<u>12/15/2018</u>	Surface Elevation:	<u>498.7 ft amsl</u>	Boring No.: <u>IRZ-21-Pilot</u>
Date Completed:	<u>12/19/2018</u>	Northing (NAD83):	<u>2102688.4</u>	
Drilling Co.:	<u>Cascade</u>	Easting (NAD83):	<u>7615817.1</u>	Client: <u>PG&E</u>
Drilling Method:	<u>Sonic Drilling</u>	Total Depth:	<u>166 ft bgs</u>	Project: <u>Final Groundwater Remedy Phase</u>
Drill Rig Type:	<u>Prosonic Truck Mount</u>	Borehole Diameter:	<u>4-12 inches</u>	Location: <u>1</u>
Driller Name:	<u>Steve Vasquez</u>	Depth to First Water:	<u>44.5 ft bgs</u>	<u>PG&E Topock, Needles, California</u>
Drilling Asst:	<u>N. Dominguez/C. Alvarez</u>	Sampling Method:	<u>4 inch x 10 ft Core Barrel</u>	Project Number: <u>RC000753.0051</u>
Logger:	<u>Connor Mills</u>	Sampling Interval:	<u>Continuous</u>	
Editor:	<u>Sean McGrane</u>	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
41	60			Topock - Alluvium Deposits	GM				(0.0 - 158.0') No water used
42				Topock - Alluvium Deposits	SM		(42.0 - 43.5') Topock - Alluvium Deposits; Silty sand (SM); yellowish brown / moderate yellowish brown (10YR 5/4); fine grained to very coarse grained, subangular to subround; little granules to medium pebbles, angular to subangular; little silt; dry		
43									
44	60						(43.5 - 52.0') Topock - Alluvium Deposits; Silty sand (SM); light yellowish brown (10YR 6/4); fine grained to very coarse grained, angular to subround; some silt; little granules to large pebbles, angular to subround; little clay; moist	(44.5') Approximate depth of water table	
45		IRZ-21-SS-43-48 12/19/2018 08:35							
46									
47									
48				Topock - Alluvium Deposits	SM				
49									
50		IRZ-21-SS-48-53 12/19/2018 08:40							
51									
52	120								
53							(52.0 - 57.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); light yellowish brown (10YR 6/4); no plasticity; some very fine to very coarse grained sand grained sand, angular to subangular; some silt; little granules to small pebbles, angular to subangular; little clay; wet		
54		IRZ-21-SS-52-57 12/19/2018 08:45	IRZ-21-VAS-52-57 (97 ppb) 12/15/2018 14:14	Topock - Alluvium Deposits	SM				
55									
56									
57									
58	108	IRZ-21-SS-57-62 12/19/2018 08:50		Topock - Alluvium Deposits	ML		(57.0 - 62.0') Topock - Alluvium Deposits; Gravelly silt with sand (ML); yellowish brown / moderate yellowish brown (10YR 5/4); no plasticity; some granules to very large pebbles, angular to subangular; little very fine to coarse grained sand, angular to subangular; little clay; wet		
59									
60									

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Date Started:	12/15/2018	Surface Elevation:	498.7 ft amsl	Boring No.: <u>IRZ-21-Pilot</u>	
Date Completed:	12/19/2018	Northing (NAD83):	2102688.4		
Drilling Co.:	Cascade	Easting (NAD83):	7615817.1	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	166 ft bgs	Project:	Final Groundwater Remedy Phase
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	4-12 inches	Location:	1
Driller Name:	Steve Vasquez	Depth to First Water:	44.5 ft bgs	PG&E Topock, Needles, California	
Drilling Asst:	N. Dominguez/C. Alvarez	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	Connor Mills	Sampling Interval:	Continuous		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
61	108	IRZ-21-SS-57-62 12/19/2018 08:50		Topock - Alluvium Deposits	ML				(0.0 - 158.0') No water used
62		IRZ-21-SS-62-67 12/19/2018 08:55		Topock - Alluvium Deposits	SM		(62.0 - 64.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 5/3); very fine grained to very coarse grained, angular to subangular; some granules to very large pebbles, angular to subangular; some silt; wet; @ 64.5 ft bgs trace small cobbles of weathered metadiorite		
63				Topock - Alluvium Deposits	SM		(64.5 - 67.0') Topock - Alluvium Deposits; Silty sand (SM); brown (10YR 5/3); fine grained to very coarse grained, subround to round; some silt; little granules to small pebbles, angular to subround; wet		
64									
65									
66									
67	108	IRZ-21-SS-67-72 12/19/2018 09:00		Topock - Alluvium Deposits	SC		(67.0 - 74.5') Topock - Alluvium Deposits; Clayey sand with gravel (SC); yellowish red (5YR 4/6); very fine grained to very coarse grained, angular to subangular; some clay; little granules to medium pebbles, angular to subangular; little silt; wet		
68									
69									
70									
71		IRZ-21-SS-72-77 12/19/2018 09:05		Topock - Alluvium Deposits	SM		(74.5 - 82.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown / moderate brown(5YR 4/4); fine grained to very coarse grained, angular to subround; some granules to very large pebbles, angular to subangular; some silt; wet; trace very large pebbles		
72									
73									
74									
75	120	IRZ-21-SS-77-82 12/19/2018 09:10	IRZ-21-VAS-77-82 (1.1 ppb) 12/16/2018 09:25	Topock - Alluvium Deposits	SM				
76									
77									
78									
79									
80									

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Date Started:	12/15/2018	Surface Elevation:	498.7 ft amsl	Boring No.: <u>IRZ-21-Pilot</u>	
Date Completed:	12/19/2018	Northing (NAD83):	2102688.4		
Drilling Co.:	Cascade	Easting (NAD83):	7615817.1	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	166 ft bgs	Project:	Final Groundwater Remedy Phase
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	4-12 inches	Location:	1
Driller Name:	Steve Vasquez	Depth to First Water:	44.5 ft bgs	PG&E Topock, Needles, California	
Drilling Asst:	N. Dominguez/C. Alvarez	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	Connor Mills	Sampling Interval:	Continuous		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
81		IRZ-21-SS-77-82 12/19/2018 09:10	IRZ-21-VAS-77-82 (1.1 ppb) 12/16/2018 09:25	Topock - Alluvium Deposits	SM				(0.0 - 158.0') No water used
82									
83	120			Topock - Alluvium Deposits	ML		(82.0 - 87.0') Topock - Alluvium Deposits; Sandy silt with gravel (ML); brown (7.5YR 5/4); no plasticity; some clay; little granules to large pebbles, angular to subangular; little very fine to medium grained sand, angular to subangular; trace boulders, angular to subangular; dry to moist; tightly packed		
84		IRZ-21-SS-82-87 12/19/2018 09:15							
85									
86									
87							(86.6'); trace 4 inch boulder fragment		
88				Topock - Alluvium Deposits	SM		(87.0 - 89.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (5YR 5/4); very fine grained to very coarse grained, subangular to subround; some silt; little medium to very large pebbles, angular to subangular; little clay; wet		
89		IRZ-21-SS-87-92 12/19/2018 09:20							
90				Topock - Alluvium Deposits	SM		(89.5 - 92.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (5YR 5/4); very fine grained to very coarse grained, subangular to subround; some medium to very large pebbles, angular to subangular; little silt; little clay; wet		
91									
92	120								
93				Topock - Alluvium Deposits	SM		(92.0 - 97.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (5YR 5/4); very fine grained to very coarse grained, angular to subangular; some granules to large pebbles, angular; some silt; little clay; wet		
94		IRZ-21-SS-92-97 12/19/2018 09:25							
95									
96									
97									
98	120	IRZ-21-SS-97-102 12/19/2018 09:30		Topock - Alluvium Deposits	SM		(97.0 - 117.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown / moderate brown(5YR 4/4); very fine grained to very coarse grained, angular to subround; some small to large pebbles, angular to subangular; some silt; wet; composed of metadiorite		
99									
100									

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Date Started:	12/15/2018	Surface Elevation:	498.7 ft amsl	Boring No.: <u>IRZ-21-Pilot</u>	
Date Completed:	12/19/2018	Northing (NAD83):	2102688.4		
Drilling Co.:	Cascade	Easting (NAD83):	7615817.1	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	166 ft bgs	Project:	Final Groundwater Remedy Phase
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	4-12 inches	Location:	1
Driller Name:	Steve Vasquez	Depth to First Water:	44.5 ft bgs	PG&E Topock, Needles, California	
Drilling Asst:	N. Dominguez/C. Alvarez	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	Connor Mills	Sampling Interval:	Continuous		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
101		IRZ-21-SS-97-102 12/19/2018 09:30							(0.0 - 158.0') No water used
102									
103	120								
104		IRZ-21-SS-102-107 12/19/2018 09:35							
105									
106									
107									
108									
109		IRZ-21-SS-107-112 12/19/2018 09:40		Topock - Alluvium Deposits	SM				
110									
111									
112	120						(111.5'); trace cobbles		
113									
114		IRZ-21-SS-112-117 12/19/2018 09:45	IRZ-21-VAS-112-117 (< 0.17 U ppb) 12/16/2018 14:47						
115									
116									
117									
118	120	IRZ-21-SS-117-122 12/19/2018 09:50		Topock - Alluvium Deposits	SM		(117.0 - 121.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown / moderate brown(5YR 4/4); very fine grained to very coarse grained, subangular to round; little small to large pebbles, angular; little silt; little clay; wet; gravel composed of metadiorite		
119									
120									

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Date Started:	<u>12/15/2018</u>	Surface Elevation:	<u>498.7 ft amsl</u>	Boring No.: <u>IRZ-21-Pilot</u>	
Date Completed:	<u>12/19/2018</u>	Northing (NAD83):	<u>2102688.4</u>		
Drilling Co.:	<u>Cascade</u>	Easting (NAD83):	<u>7615817.1</u>	Client:	<u>PG&E</u>
Drilling Method:	<u>Sonic Drilling</u>	Total Depth:	<u>166 ft bgs</u>	Project:	<u>Final Groundwater Remedy Phase</u>
Drill Rig Type:	<u>Prosonic Truck Mount</u>	Borehole Diameter:	<u>4-12 inches</u>	Location:	<u>1</u>
Driller Name:	<u>Steve Vasquez</u>	Depth to First Water:	<u>44.5 ft bgs</u>	<u>PG&E Topock, Needles, California</u>	
Drilling Asst:	<u>N. Dominguez/C. Alvarez</u>	Sampling Method:	<u>4 inch x 10 ft Core Barrel</u>	Project Number:	<u>RC000753.0051</u>
Logger:	<u>Connor Mills</u>	Sampling Interval:	<u>Continuous</u>		
Editor:	<u>Sean McGrane</u>	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
121	120	IRZ-21-SS-117-122 12/19/2018 09:50		Topock - Alluvium Deposits	SM		(121.0 - 127.0') Topock - Alluvium Deposits; Silt with sand (ML); yellowish red (5YR 4/6); low plasticity; some clay; little granules to medium pebbles, angular to subangular; little very fine to very coarse grained sand, angular to subround; wet; gravel composed of metadiorite		(0.0 - 158.0') No water used
122		Topock - Alluvium Deposits		ML		(127.0 - 129.5') Topock - Alluvium Deposits; Sandy silt (ML); reddish brown (5YR 5/4); low plasticity; little granules to large pebbles, angular to subangular; little very fine to very coarse grained sand, angular to subround; wet; gravel composed of metadiorite			
123									
124									
125									
126									
127	1644	IRZ-21-SS-127-132 12/19/2018 10:00		Topock - Alluvium Deposits	ML		(129.5 - 132.0') Topock - Alluvium Deposits; Silty sand (SM); reddish brown (5YR 5/4); very fine grained to very coarse grained, angular to subangular; and silt; little granules to medium pebbles, angular to subangular; wet; gravel composed of metadiorite		
128									
129									
130		Topock - Alluvium Deposits	SM		(132.0 - 136.0') Topock - Alluvium Deposits; Clayey gravel with sand (GC); reddish brown (5YR 5/4); granules to large pebbles, angular to subangular; some clay; little very fine to very coarse grained sand, angular to subangular; little silt; wet; gravel composed of metadiorite				
131									
132									
133	120	IRZ-21-SS-132-137 12/19/2018 10:05	IRZ-21-VAS-132-137 (< 0.17 U ppb) 12/17/2018 11:12	Topock - Alluvium Deposits	GC		(136.0 - 146.0') Topock - Alluvium Deposits; Sandy silt (ML); reddish brown (5YR 5/4); no plasticity; some clay; little granules to medium pebbles, angular to subangular; little very fine to very coarse grained sand, angular to subangular; moist; gravel composed of metadiorite		
134									
135				Topock - Alluvium Deposits	ML				
136									
137									
138	120	IRZ-21-SS-137-142 12/19/2018 10:10		Topock - Alluvium Deposits	ML				
139									
140									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	12/15/2018	Surface Elevation:	498.7 ft amsl	Boring No.: <u>IRZ-21-Pilot</u>	
Date Completed:	12/19/2018	Northing (NAD83):	2102688.4		
Drilling Co.:	Cascade	Easting (NAD83):	7615817.1	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	166 ft bgs	Project:	Final Groundwater Remedy Phase
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	4-12 inches	Location:	1
Driller Name:	Steve Vasquez	Depth to First Water:	44.5 ft bgs	PG&E Topock, Needles, California	
Drilling Asst:	N. Dominguez/C. Alvarez	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	Connor Mills	Sampling Interval:	Continuous		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
141	120	IRZ-21-SS-137-142 12/19/2018 10:10		Topock - Alluvium Deposits	ML				(0.0 - 158.0') No water used
142									
143									
144									
145	54	IRZ-21-SS-142-147 12/19/2018 10:15		Topock - Alluvium Deposits	SM		(146.0 - 153.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown / moderate brown (5YR 4/4); fine grained to very coarse grained, subangular to round; some silt; little granule to medium pebble, subangular to subround; wet; gravel composed of metadiorite		
146									
147									
148									
149	102	IRZ-21-SS-147-152 12/19/2018 10:20	IRZ-21-VAS-147-152 (3600 ppb) 12/18/2018 10:07	Topock - Alluvium Deposits	SM				
150									
151									
152									
153	102	IRZ-21-SS-152-158 12/19/2018 10:25		Topock - Weathered Bedrock - conglomerate	ML		(153.0 - 158.0') Topock - Weathered Bedrock - conglomerate; Sandy silt (ML); yellowish red (5YR 4/6); no plasticity; some very fine to very coarse grained sand, angular to subround; little granule to large pebble, subangular to subround; dry to moist; gravel composed of metadiorite, some metadiorite has iron oxidation		
154									
155									
156									
157	102			Topock - Competent Bedrock - conglomerate			(158.0 - 166.0') Topock - Competent Bedrock - conglomerate; red (2.5YR 5/6); dry; friable	(158.0 - 161.0') Rough drilling encountered bedrock at approximately 158 feet bgs	
158									
159									
160									

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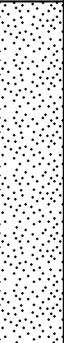
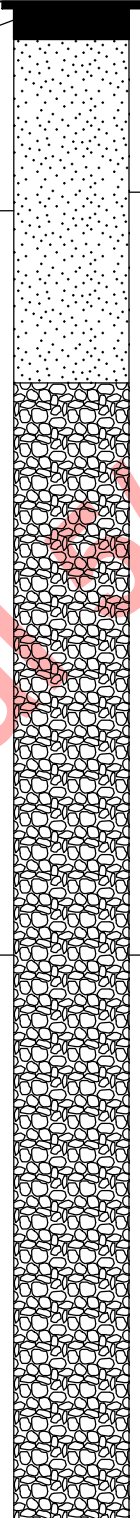


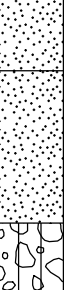
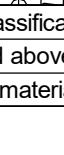
Date Started:	12/15/2018	Surface Elevation:	498.7 ft amsl	Boring No.: IRZ-21-Pilot	
Date Completed:	12/19/2018	Northing (NAD83):	2102688.4		
Drilling Co.:	Cascade	Easting (NAD83):	7615817.1	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	166 ft bgs	Project:	Final Groundwater Remedy Phase
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	4-12 inches	Location:	1
Driller Name:	Steve Vasquez	Depth to First Water:	44.5 ft bgs	PG&E Topock, Needles, California	
Drilling Asst:	N. Dominguez/C. Alvarez	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number: RC000753.0051	
Logger:	Connor Mills	Sampling Interval:	Continuous		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
161	102								
162									
163				Topock - Competent Bedrock - conglomerate				(161.0 - 166.0') Rough drilling drilled an additional 5 feet to confirm bedrock	
164	60								
165									
166									
167									
168									
169									
170									
171									
172									
173									
174									
175									
176									
177									
178									
179									
180									

End of Boring at 166.0 'bgs.

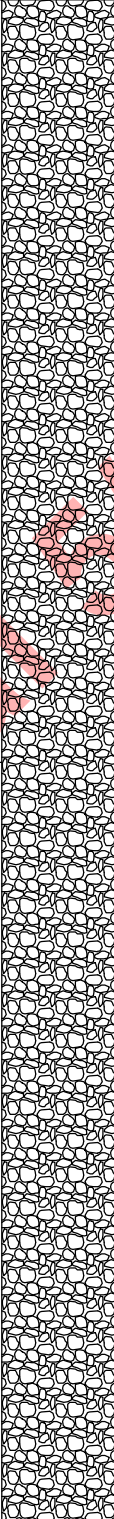
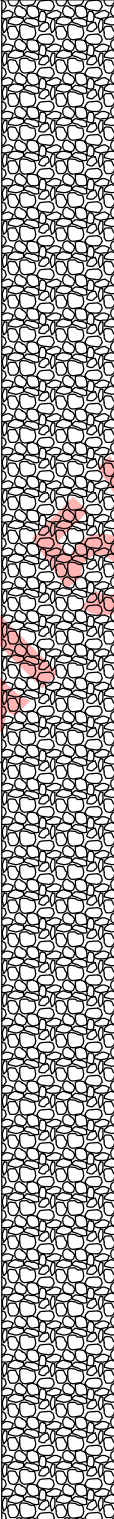
Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	12/15/2018	Surface Elevation:	498.7 ft amsl	Well ID: IRZ-21-Pilot
Date Completed:	12/19/2018	Northing (NAD83):	2102688.4	
Drilling Co.:	Cascade	Easting (NAD83):	7615817.1	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	166 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Steve Vasquez	Borehole Diameter:	4-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	N. Dominguez/C. Alvarez	Depth to First Water:	44.5 ft bgs	
Logger:	Connor Mills	Editor:	Sean McGrane	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction		Calculated Material Volumes	Material Volumes Installed		
1		Topock - Fluvial Deposits	SP		(0.0 - 0.5') Temporary Steel Plate with BMP		(0.0 - 0.5') 1	(0.0 - 0.5') 1 (0%)		
2										
3										
4										
5		Topock - Fluvial Deposits	GW		(0.5 - 5.0') Cemex # 2/12 Mesh (16x30)		(0.5 - 5.0') 7.9 bags	(0.5 - 5.0') 7 bags (-11%) Note: Lapis Lustre Sand		
6										
7										
8										
9		Topock - Fluvial Deposits	SP		(5.0 - 156.0') Pea Gravel		(5.0 - 156.0') 63.3 bags	(5.0 - 156.0') 61 bags (-4%) Note: Cal-silica 3/8" x 1/4"		
10										
11										
12										
13		Topock - Fluvial Deposits	GW		(5.0 - 156.0') 6" Borehole					
14										
15										
16										
17		Topock - Fluvial Deposits	SP							
18										
19										
20										

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started:	12/15/2018	Surface Elevation:	498.7 ft amsl	Well ID: IRZ-21-Pilot
Date Completed:	12/19/2018	Northing (NAD83):	2102688.4	
Drilling Co.:	Cascade	Easting (NAD83):	7615817.1	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	166 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Steve Vasquez	Borehole Diameter:	4-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	N. Dominguez/C. Alvarez	Depth to First Water:	44.5 ft bgs	
Logger:	Connor Mills	Editor:	Sean McGrane	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction		Calculated Material Volumes	Material Volumes Installed
21		Topock - Fluvial Deposits	GM					
22								
23								
24		Topock - Fluvial Deposits	GM					
25								
26								
27								
28								
29								
30		Topock - Alluvium Deposits	GM					
31							(5.0 - 156.0') 63.3 bags	(5.0 - 156.0') 61 bags (-4%) Note: Cal-silica 3/8" x 1/4"
32								
33								
34								
35								
36		Topock - Alluvium Deposits	GM					
37								
38								
39		Topock - Alluvium Deposits	GM					
40								

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Temporary Backfill Log

Date Started:	12/15/2018	Surface Elevation:	498.7 ft amsl	Well ID: IRZ-21-Pilot
Date Completed:	12/19/2018	Northing (NAD83):	2102688.4	
Drilling Co.:	Cascade	Easting (NAD83):	7615817.1	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	166 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Steve Vasquez	Borehole Diameter:	4-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	N. Dominguez/C. Alvarez	Depth to First Water:	44.5 ft bgs	
Logger:	Connor Mills	Editor:	Sean McGrane	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
41		Topock - Alluvium Deposits	GM				
42		Topock - Alluvium Deposits	SM				
43							
44							
45							
46							
47							
48		Topock - Alluvium Deposits	SM				
49							
50					(5.0 - 156.0') Pea Gravel	(5.0 - 156.0') 6" Borehole	(5.0 - 156.0') 63.3 bags
51							
52							
53							
54	IRZ-21-VAS-52-57 (97 ppb) 12/15/2018 14:14	Topock - Alluvium Deposits	SM				
55							
56							
57							
58		Topock - Alluvium Deposits	ML				
59							
60							

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Date Started:	12/15/2018	Surface Elevation:	498.7 ft amsl	Well ID: IRZ-21-Pilot
Date Completed:	12/19/2018	Northing (NAD83):	2102688.4	
Drilling Co.:	Cascade	Easting (NAD83):	7615817.1	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	166 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Steve Vasquez	Borehole Diameter:	4-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	N. Dominguez/C. Alvarez	Depth to First Water:	44.5 ft bgs	
Logger:	Connor Mills	Editor:	Sean McGrane	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
61		Topock - Alluvium Deposits	ML				
62							
63		Topock - Alluvium Deposits	SM				
64							
65		Topock - Alluvium Deposits	SM				
66							
67							
68							
69							
70					(5.0 - 156.0') Pea Gravel		
71		Topock - Alluvium Deposits	SC		(5.0 - 156.0') 6" Borehole	(5.0 - 156.0') 63.3 bags	(5.0 - 156.0') 61 bags (-4%) Note: Cal-silica 3/8" x 1/4"
72							
73							
74							
75							
76							
77		Topock - Alluvium Deposits	SM				
78	IRZ-21-VAS-77-82 (1.1 ppb) 12/16/2018 09:25						
79							
80							

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Date Started:	12/15/2018	Surface Elevation:	498.7 ft amsl	Well ID: IRZ-21-Pilot
Date Completed:	12/19/2018	Northing (NAD83):	2102688.4	
Drilling Co.:	Cascade	Easting (NAD83):	7615817.1	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	166 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Steve Vasquez	Borehole Diameter:	4-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	N. Dominguez/C. Alvarez	Depth to First Water:	44.5 ft bgs	
Logger:	Connor Mills	Editor:	Sean McGrane	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction		Calculated Material Volumes	Material Volumes Installed			
81	IRZ-21-VAS-77-82 (1.1 ppb) 12/16/2018 09:25	Topock - Alluvium Deposits	SM				(5.0 - 156.0') 63.3 bags	(5.0 - 156.0') 61 bags (-4%) Note: Cal-silica 3/8" x 1/4"			
82											
83											
84											
85											
86		Topock - Alluvium Deposits	ML								
87											
88		Topock - Alluvium Deposits	SM								
89											
90		Topock - Alluvium Deposits	SM								
91											
92											
93		Topock - Alluvium Deposits	SM								
94											
95											
96											
97											
98		Topock - Alluvium Deposits	SM								
99											
100											

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started:	12/15/2018	Surface Elevation:	498.7 ft amsl	Well ID: IRZ-21-Pilot
Date Completed:	12/19/2018	Northing (NAD83):	2102688.4	
Drilling Co.:	Cascade	Easting (NAD83):	7615817.1	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	166 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Steve Vasquez	Borehole Diameter:	4-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	N. Dominguez/C. Alvarez	Depth to First Water:	44.5 ft bgs	
Logger:	Connor Mills	Editor:	Sean McGrane	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
101							
102							
103							
104							
105							
106							
107							
108							
109		Topock - Alluvium Deposits	SM				
110					(5.0 - 156.0') Pea Gravel	(5.0 - 156.0') 6" Borehole	(5.0 - 156.0') 63.3 bags
111							
112							
113							
114	IRZ-21-VAS-112-117 (< 0.17 U ppb) 12/16/2018 14:47						
115							
116							
117							
118		Topock - Alluvium Deposits	SM				
119							
120							

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Date Started:	12/15/2018	Surface Elevation:	498.7 ft amsl	Well ID: IRZ-21-Pilot
Date Completed:	12/19/2018	Northing (NAD83):	2102688.4	
Drilling Co.:	Cascade	Easting (NAD83):	7615817.1	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	166 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Steve Vasquez	Borehole Diameter:	4-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	N. Dominguez/C. Alvarez	Depth to First Water:	44.5 ft bgs	
Logger:	Connor Mills	Editor:	Sean McGrane	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
121		Topock - Alluvium Deposits	SM				
122							
123							
124		Topock - Alluvium Deposits	ML				
125							
126							
127							
128		Topock - Alluvium Deposits	ML				
129							
130		Topock - Alluvium Deposits	SM		(5.0 - 156.0') Pea Gravel	(5.0 - 156.0') 6" Borehole	(5.0 - 156.0') 63.3 bags
131							
132							
133							
134	IRZ-21-VAS-132-137 (< 0.17 U ppb) 12/17/2018 11:12	Topock - Alluvium Deposits	GC				
135							
136							
137							
138		Topock - Alluvium Deposits	ML				
139							
140							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started:	12/15/2018	Surface Elevation:	498.7 ft amsl	Well ID: IRZ-21-Pilot
Date Completed:	12/19/2018	Northing (NAD83):	2102688.4	
Drilling Co.:	Cascade	Easting (NAD83):	7615817.1	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	166 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Steve Vasquez	Borehole Diameter:	4-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	N. Dominguez/C. Alvarez	Depth to First Water:	44.5 ft bgs	
Logger:	Connor Mills	Editor:	Sean McGrane	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
141							
142							
143		Topock - Alluvium Deposits	ML				
144							
145							
146							
147							
148	IRZ-21-VAS-147-152 (3600 ppb) 12/18/2018 10:07						
149		Topock - Alluvium Deposits	SM		(5.0 - 156.0') Pea Gravel	(5.0 - 156.0') 6" Borehole	(5.0 - 156.0') 63.3 bags
150							(5.0 - 156.0') 61 bags (-4%) Note: Cal-silica 3/8" x 1/4"
151							
152							
153							
154							
155		Topock - Weathered Bedrock - conglomerate	ML				
156							
157							
158					(156.0 - 166.0') Cemex # 2/12 Mesh (16x30)	(156.0 - 166.0') 4" Borehole	(156.0 - 166.0') 2.8 bags
159		Topock - Competent Bedrock - conglomerate					(156.0 - 166.0') 3 bags (7%) Note: Lapis Lustre Sand
160							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started:	12/15/2018	Surface Elevation:	498.7 ft amsl	Well ID: IRZ-21-Pilot
Date Completed:	12/19/2018	Northing (NAD83):	2102688.4	
Drilling Co.:	Cascade	Easting (NAD83):	7615817.1	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	166 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Steve Vasquez	Borehole Diameter:	4-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	N. Dominguez/C. Alvarez	Depth to First Water:	44.5 ft bgs	
Logger:	Connor Mills	Editor:	Sean McGrane	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction			Calculated Material Volumes	Material Volumes Installed
161									
162									
163		Topock - Competent Bedrock - conglomerate			(156.0 - 166.0') Cemex # 2/12 Mesh (16x30)	(156.0 - 166.0') 4" Borehole		(156.0 - 166.0') 2.8 bags	(156.0 - 166.0') 3 bags (7%) Note: Lapis Lustre Sand
164									
165									
166									
167									
168									
169									
170									
171									
172									
173									
174									
175									
176									
177									
178									
179									
180									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Well Construction Log

Date Started:	06/05/2019	Surface Elevation:	498.7 ft amsl	Well ID: IRZ-21
Date Completed:	06/15/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Dual Rotary	Northing (NAD83):	2102688.4	Project: Final GW Remedy Phase 1
Driller Name:	Jon Martinez	Easting (NAD83):	7615817.1	Location: PG&E Topock, Needles, California
Drilling Asst:	E. Martinez / W. Saylor	Borehole Diameter:	18-24 inches	
Logger:	KK / AM / ER	Water Level Start:	45.75 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	11/16/2019	
Total Depth:	166.5 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
1		Topock - Fluvial Deposits	SP		(0.0 - 47.4') 10" Suregrip 17 Casing		(0.0 - 4.0') 29 bags (39%) Note: Lapis Lustre Sand, used >20% of calculated volume due to potential voids forming during drilling
2					(0.0 - 4.0') Cemex #8 0/30 Mesh	(0.0 - 4.0') 20.8 bags	
3							
4							
5		Topock - Fluvial Deposits	GW		(0.0 - 21.8') 24.0" Borehole	(4.0 - 35.2') 459.2 gallons	(4.0 - 35.2') 523 gallons (14%) Note: Type I, II and V and Benseal
6							
7							
8							
9		Topock - Fluvial Deposits	SP		(4.0 - 35.2') Portland Cement 3% Bentonite		
10							
11		Topock - Fluvial Deposits	GW				
12							
13		Topock - Fluvial Deposits	SP				
14							
15		Topock - Fluvial Deposits	SP				
16							
17		Topock - Fluvial Deposits	SP				
18							
19		Topock - Fluvial Deposits	GM				
20							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, groundwater data was collected during drilling of the pilot borehole

Date Started:	06/05/2019	Surface Elevation:	498.7 ft amsl	Well ID: IRZ-21
Date Completed:	06/15/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Dual Rotary	Northing (NAD83):	2102688.4	Project: Final GW Remedy Phase 1
Driller Name:	Jon Martinez	Easting (NAD83):	7615817.1	Location: PG&E Topock, Needles, California
Drilling Asst:	E. Martinez / W. Saylor	Borehole Diameter:	18-24 inches	
Logger:	KK / AM / ER	Water Level Start:	45.75 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	11/16/2019	
Total Depth:	166.5 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
21		Topock - Fluvial Deposits	GM		(0.0 - 47.4') 10" Suregrip 17 Casing		
22							
23		Topock - Fluvial Deposits	GM				
24							
25		Topock - Alluvium Deposits	GM				
26							
27							
28					(4.0 - 35.2') Portland Cement 3% Bentonite	(4.0 - 35.2') 459.2 gallons	(4.0 - 35.2') 523 gallons (14%) Note: Type I, II and V and Benseal
29							
30							
31							
32							
33							
34							
35		Topock - Alluvium Deposits	GM		(34.5 - 35.5') Centralizer		
36					(35.2 - 36.7') Bentonite seal chips	(35.2 - 36.7') 2.5 bags	(35.2 - 36.7') 3 bags (20%) Note: Puregold Medium Chips, drillers requested to add bentonite chip seal to prevent grout migration
37							
38		Topock - Alluvium Deposits	GM		(36.7 - 40.4') Cemex Bunker # 8 0/30 mesh	(36.7 - 40.4') 9 bags	(36.7 - 40.4') 10 bags (11%) Note: Lapis Lustre Sand
39							
40							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, groundwater data was collected during drilling of the pilot borehole

Date Started:	06/05/2019	Surface Elevation:	498.7 ft amsl	Well ID: IRZ-21
Date Completed:	06/15/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Dual Rotary	Northing (NAD83):	2102688.4	Project: Final GW Remedy Phase 1
Driller Name:	Jon Martinez	Easting (NAD83):	7615817.1	Location: PG&E Topock, Needles, California
Drilling Asst:	E. Martinez / W. Saylor	Borehole Diameter:	18-24 inches	
Logger:	KK / AM / ER	Water Level Start:	45.75 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	11/16/2019	
Total Depth:	166.5 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
41		Topock - Alluvium Deposits	GM		(0.0 - 47.4') 10" Suregrip 17 Casing	(36.7 - 40.4') 9 bags	
42		Topock - Alluvium Deposits	SM				
43							
44							
45							
46							
47							
48		Topock - Alluvium Deposits	SM		(47.4 - 65.4') 10" 25-slot 316L SS Wire Wrap Screen		
49							
50					(40.4 - 69.1') Cemex # 2/16 mesh (16x30)	(40.4 - 69.1') 70.1 bags	(40.4 - 69.1') 91 bags (30%) Note: Lapis Lustre Sand, used >20% of calculated volume due to potential voids forming during drilling
51							
52							
53							
54	IRZ-21-VAS-52-57-EB (97 ppb) 12/15/2018 14:50	Topock - Alluvium Deposits	SM				
55							
56							
57							
58		Topock - Alluvium Deposits	ML				
59							
60							

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Date Started:	06/05/2019	Surface Elevation:	498.7 ft amsl	Well ID: IRZ-21
Date Completed:	06/15/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Dual Rotary	Northing (NAD83):	2102688.4	Project: Final GW Remedy Phase 1
Driller Name:	Jon Martinez	Easting (NAD83):	7615817.1	Location: PG&E Topock, Needles, California
Drilling Asst:	E. Martinez / W. Saylor	Borehole Diameter:	18-24 inches	
Logger:	KK / AM / ER	Water Level Start:	45.75 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	11/16/2019	
Total Depth:	166.5 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
61		Topock - Alluvium Deposits	ML		(47.4 - 65.4') 10" 25-slot 316L SS Wire Wrap Screen		
62							
63		Topock - Alluvium Deposits	SM				
64							
65		Topock - Alluvium Deposits	SM		(40.4 - 69.1') Cemex # 2/16 mesh (16x30)	(40.4 - 69.1') 70.1 bags	(40.4 - 69.1') 91 bags (30%) Note: Lapis Lustre Sand, used >20% of calculated volume due to potential voids forming during drilling
66							
67							
68							
69							
70		Topock - Alluvium Deposits	SC		(69.1 - 70.2') Cemex Bunker #8 0/30 Mesh	(69.1 - 70.2') 2.8 bags	(69.1 - 70.2') 4 bags (43%) Note: Lapis Lustre Sand, used >20% of calculated volume due to potential voids forming during drilling
71							
72							
73							
74							
75							
76							
77							
78	IRZ-21-VAS-77-82 (1.1 ppb) 12/16/2018 09:25	Topock - Alluvium Deposits	SM		(70.2 - 132.1') Bentonite seal chips	(70.2 - 132.1') 104.9 bags	(70.2 - 132.1') 123 bags (17%) Note: Puregold Medium Chips
79							
80					(79.5 - 80.5') Centralizer		

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Date Started:	06/05/2019	Surface Elevation:	498.7 ft amsl	Well ID: IRZ-21
Date Completed:	06/15/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Dual Rotary	Northing (NAD83):	2102688.4	Project: Final GW Remedy Phase 1
Driller Name:	Jon Martinez	Easting (NAD83):	7615817.1	Location: PG&E Topock, Needles, California
Drilling Asst:	E. Martinez / W. Saylor	Borehole Diameter:	18-24 inches	
Logger:	KK / AM / ER	Water Level Start:	45.75 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	11/16/2019	
Total Depth:	166.5 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction		Calculated Material Volumes	Material Volumes Installed
81	IRZ-21-VAS-77-82 (1.1 ppb) 12/16/2018 09:25	Topock - Alluvium Deposits	SM			(65.4 - 140.4') 10" Suregrip 17 Casing (61.8 - 81.8') 18.0" Borehole		
82								
83		Topock - Alluvium Deposits	ML					
84								
85								
86								
87		Topock - Alluvium Deposits	SM					
88								
89								
90		Topock - Alluvium Deposits	SM		(70.2 - 132.1') Bentonite seal chips	(81.8 - 101.8') 18.0" Borehole	(70.2 - 132.1') 104.9 bags	(70.2 - 132.1') 123 bags (17%) Note: Puregold Medium Chips
91								
92								
93		Topock - Alluvium Deposits	SM					
94								
95								
96								
97								
98		Topock - Alluvium Deposits	SM					
99								
100								

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, groundwater data was collected during drilling of the pilot borehole

Date Started:	06/05/2019	Surface Elevation:	498.7 ft amsl	Well ID: IRZ-21
Date Completed:	06/15/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Dual Rotary	Northing (NAD83):	2102688.4	Project: Final GW Remedy Phase 1
Driller Name:	Jon Martinez	Easting (NAD83):	7615817.1	Location: PG&E Topock, Needles, California
Drilling Asst:	E. Martinez / W. Saylors	Borehole Diameter:	18-24 inches	
Logger:	KK / AM / ER	Water Level Start:	45.75 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	11/16/2019	
Total Depth:	166.5 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
101					(65.4 - 140.4') 10" Suregrip 17 Casing (81.8 - 101.8') 18.0" Borehole		
102							
103							
104							
105							
106							
107							
108							
109		Topock - Alluvium Deposits	SM				
110					(70.2 - 132.1') Bentonite seal chips	(70.2 - 132.1') 104.9 bags	(70.2 - 132.1') 123 bags (17%) Note: Puregold Medium Chips
111					(101.8 - 121.8') 18.0" Borehole		
112							
113							
114	IRZ-21-VAS-112-117 (< 0.17 U ppb) 12/16/2018 14:47						
115							
116							
117							
118		Topock - Alluvium Deposits	SM				
119							
120					(119.5 - 120.5') Centralizer		

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Date Started:	06/05/2019	Surface Elevation:	498.7 ft amsl	Well ID: IRZ-21
Date Completed:	06/15/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Dual Rotary	Northing (NAD83):	2102688.4	Project: Final GW Remedy Phase 1
Driller Name:	Jon Martinez	Easting (NAD83):	7615817.1	Location: PG&E Topock, Needles, California
Drilling Asst:	E. Martinez / W. Saylor	Borehole Diameter:	18-24 inches	
Logger:	KK / AM / ER	Water Level Start:	45.75 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	11/16/2019	
Total Depth:	166.5 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
121		Topock - Alluvium Deposits	SM		(65.4 - 140.4') 10" Suregrip 17 Casing (101.8 - 121.8') 18.0" Borehole		
122							
123							
124		Topock - Alluvium Deposits	ML				
125							
126					(70.2 - 132.1') Bentonite seal chips	(70.2 - 132.1') 104.9 bags	(70.2 - 132.1') 123 bags (17%) Note: Puregold Medium Chips
127							
128		Topock - Alluvium Deposits	ML				
129							
130							
131		Topock - Alluvium Deposits	SM		(121.8 - 141.8') 18.0" Borehole		
132							
133					(132.1 - 133.1') #6 60 mesh sand	(132.1 - 133.1') 2.6	(132.1 - 133.1') 4 (54%) Note: Lapis Lustre Sand, used >20% of calculated volume due to potential voids forming during drilling
134	IRZ-21-VAS-132-137-EB (< 0.17 U ppb) 12/17/2018 17:24	Topock - Alluvium Deposits	GC				
135							
136							
137					(133.1 - 166.5') Cemex #1/20 MESH (20x40)	(133.1 - 166.5') 83.6 bags	(133.1 - 166.5') 89 bags (6%) Note: Lapis Lustre Sand
138		Topock - Alluvium Deposits	ML				
139							
140							

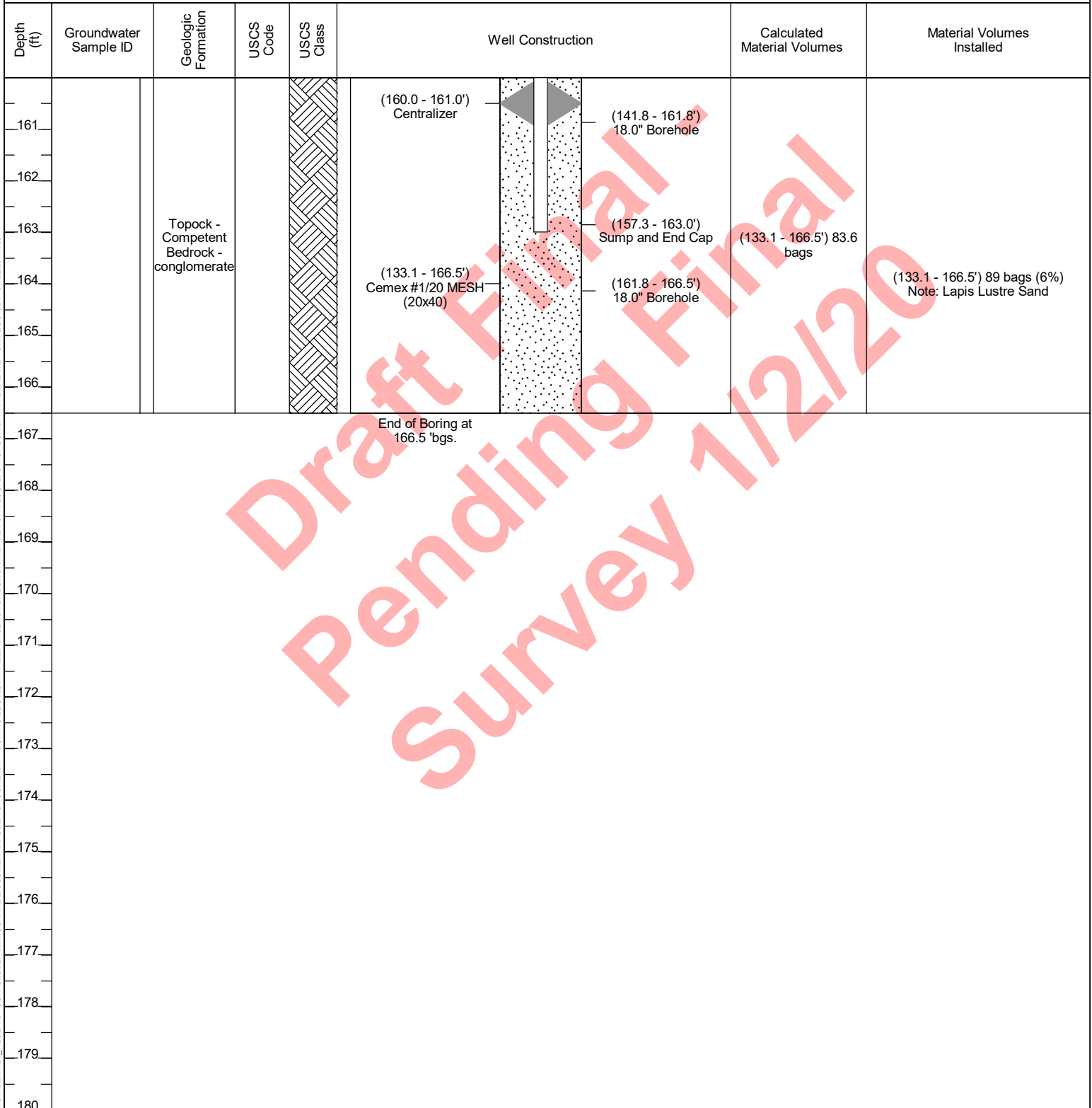
Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, groundwater data was collected during drilling of the pilot borehole

Date Started:	06/05/2019	Surface Elevation:	498.7 ft amsl	Well ID: IRZ-21
Date Completed:	06/15/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Dual Rotary	Northing (NAD83):	2102688.4	Project: Final GW Remedy Phase 1
Driller Name:	Jon Martinez	Easting (NAD83):	7615817.1	Location: PG&E Topock, Needles, California
Drilling Asst:	E. Martinez / W. Saylor	Borehole Diameter:	18-24 inches	
Logger:	KK / AM / ER	Water Level Start:	45.75 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	11/16/2019	
Total Depth:	166.5 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
141							
142							
143		Topock - Alluvium Deposits	ML		(140.4 - 157.3') 10" 15-slot 316L SS Wire Wrap Screen		
144							
145							
146							
147							
148							
149	IRZ-21-VAS-147-152 (3600 ppb) 12/18/2018 10:07	Topock - Alluvium Deposits	SM		(121.8 - 141.8') 18.0" Borehole		
150					(133.1 - 166.5') Cemex #1/20 MESH (20x40)	(133.1 - 166.5') 83.6 bags	(133.1 - 166.5') 89 bags (6%) Note: Lapis Lustre Sand
151					(141.8 - 161.8') 18.0" Borehole		
152							
153							
154							
155		Topock - Weathered Bedrock - conglomerate	ML				
156							
157							
158							
159		Topock - Competent Bedrock - conglomerate					
160							

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Date Started: 06/05/2019	Surface Elevation: 498.7 ft amsl	Well ID: IRZ-21
Date Completed: 06/15/2019	Shallow Well Elevation: N/A	
Drilling Co.: Cascade	Deep Well Elevation: N/A	Client: PG&E
Drilling Method: Dual Rotary	Northing (NAD83): 2102688.4	Project: Final GW Remedy Phase 1
Driller Name: Jon Martinez	Easting (NAD83): 7615817.1	Location: PG&E Topock, Needles, California
Drilling Asst: E. Martinez / W. Saylor	Borehole Diameter: 18-24 inches	
Logger: KK / AM / ER	Water Level Start: 45.75 ft bgs	Project Number: RC000753.0051
Editor: Sean McGrane	Development End Date: 11/16/2019	
Total Depth: 166.5 ft bgs	Well Completion: <input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	



Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, groundwater data was collected during drilling of the pilot borehole

Date Started: 11/28/2018	Surface Elevation: 500.0 ft amsl	Boring No.: IRZ-23 Pilot
Date Completed: 12/03/2018	Northing (NAD83): 2102535.3	
Drilling Co.: Cascade	Easting (NAD83): 7615825.8	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 147 ft bgs	Project: Final Groundwater Remedy Phase
Drill Rig Type: Prosonic Truck Mount	Borehole Diameter: 6-12 inches	Location: 1
Driller Name: Steve Vasquez	Depth to First Water: 47 ft bgs	PG&E Topock, Needles, California
Drilling Asst: N. Dominguez/C. Alvarez	Sampling Method: 4 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger: Connor Mills	Sampling Interval: Continuous	
Editor: Sean McGrane	Converted to Well: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
1	84			Topock - Fluvial Deposits	SP-SM		(0.0 - 2.0') Topock - Fluvial Deposits; Poorly graded sand with silt and gravel (SP-SM); brown (7.5YR 5/3); very fine grained to medium grained, angular to subround; little granule to very large pebbles, subangular to round; little silt; trace cobbles, subangular to round; dry		(0.0 - 147.0') No water used
2				Topock - Fluvial Deposits	GM		(2.0 - 4.5') Topock - Fluvial Deposits; Silty gravel with sand (GM); brown (7.5YR 5/3); granules to large pebbles, angular to subround; some very fine to medium grained sand, angular to subround; some silt; trace cobbles, angular to subangular; dry; 2 inch streak of orangish silt is through out the core		
3							(4.5 - 5.0') Topock - Fluvial Deposits; Well graded sand with silt (SW-SM); very pale brown / grayish orange(10YR 7/4); very fine grained to coarse grained, angular to round; little silt; dry		
4				Topock - Fluvial Deposits	GM		(5.0 - 7.0') Topock - Fluvial Deposits; Silty gravel with sand (GM); brown (7.5YR 5/3); granules to large pebbles, angular to subangular; some very fine to medium grained sand, angular to subangular; trace cobbles, angular to subangular; dry		
5	120			Topock - Fluvial Deposits	SP-SM		(7.0 - 17.0') Topock - Fluvial Deposits; Poorly graded sand with silt and gravel (SP-SM); very fine grained to medium grained, subangular to subround; some granule to very large pebbles, angular to round; little silt; trace cobbles, angular to subround; dry		
6									
7									
8									
9									
10									
11									
12									
13	60			Topock - Fluvial Deposits	SM		(17.0 - 19.5') Topock - Fluvial Deposits; Silty sand (SM); reddish brown (5YR 5/3) with brownish yellow / dark yellowish orange(10YR 6/6); very fine grained to fine grained, angular to subround; little silt; trace boulders; dry		
14							(18') very dark grayish brown (10YR 3/2); 1.5 ft solid core from a boulder with a frothy texture, basalt		
15				Topock - Fluvial Deposits	SM				
16							(19.5 - 23.0') Topock - Fluvial Deposits; Silty sand with gravel (SM);		

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Date Started:	<u>11/28/2018</u>	Surface Elevation:	<u>500.0 ft amsl</u>	Boring No.: <u>IRZ-23 Pilot</u>	
Date Completed:	<u>12/03/2018</u>	Northing (NAD83):	<u>2102535.3</u>		
Drilling Co.:	<u>Cascade</u>	Easting (NAD83):	<u>7615825.8</u>	Client:	<u>PG&E</u>
Drilling Method:	<u>Sonic Drilling</u>	Total Depth:	<u>147 ft bgs</u>	Project:	<u>Final Groundwater Remedy Phase</u>
Drill Rig Type:	<u>Prosonic Truck Mount</u>	Borehole Diameter:	<u>6-12 inches</u>	Location:	<u>1</u>
Driller Name:	<u>Steve Vasquez</u>	Depth to First Water:	<u>47 ft bgs</u>	<u>PG&E Topock, Needles, California</u>	
Drilling Asst:	<u>N. Dominguez/C. Alvarez</u>	Sampling Method:	<u>4 inch x 10 ft Core Barrel</u>	Project Number:	<u>RC000753.0051</u>
Logger:	<u>Connor Mills</u>	Sampling Interval:	<u>Continuous</u>		
Editor:	<u>Sean McGrane</u>	Converted to Well:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
21	60			Topock - Fluvial Deposits	SM		brown (10YR 5/3); very fine grained to coarse grained, angular to subround; some granule to very large pebbles, angular to subround; some silt; trace cobbles, angular to subangular; dry		(0.0 - 147.0') No water used
22									
23				Topock - Fluvial Deposits	ML		(23.0 - 23.5') Topock - Fluvial Deposits; Silt with sand (ML); gray (10YR 5/1); no plasticity; little very fine to coarse grained sand, angular to subround; trace granule to medium pebbles, angular to subround; dry; soft		
24									
25	60			Topock - Fluvial Deposits	GW-GM		(23.5 - 27.0') Topock - Fluvial Deposits; Well graded gravel with silt and sand (GW-GM); light brown (7.5YR 6/3); granules to very large pebbles; some very fine to coarse grained sand, angular to subround; little silt; dry		
26									
27									
28				Topock - Fluvial Deposits	GM		(27.0 - 30.5') Topock - Fluvial Deposits; Silty gravel (GM); brown (10YR 5/3); granules to very large pebbles, angular to subround; and silt; little fine to medium grained sand, angular to subround; trace cobbles, angular; dry; large pebbles and cobbles composed of 1-4 in. metadiorite, cobbles were pulverized into a silty powder		
29									
30	108								
31				Topock - Fluvial Deposits	SM		(30.5 - 31.5') Topock - Fluvial Deposits; Silty sand with gravel (SM); light yellowish brown (10YR 6/4); very fine grained to coarse grained, subangular to subround; and granule to large pebble, subangular to subround; some silt; dry		
32				Topock - Fluvial Deposits	ML		(31.5 - 32.0') Topock - Fluvial Deposits; Silt with sand (ML); gray (10YR 5/1); no plasticity; little very fine to coarse grained sand, angular to subround; trace granule to medium pebbles, angular to subround; dry; soft; 4.5 inch boulder of basalt at end of core		
33				Topock - Alluvium Deposits	ML		(32.0 - 35.0') Topock - Alluvium Deposits; Sandy silt with gravel (ML); brown (7.5YR 5/3); no plasticity; some very fine to coarse grained sand, angular to subround; little granule to large pebbles, angular to subangular; dry		
34									
35									
36	120			Topock - Alluvium Deposits	ML		(35.0 - 37.0') Topock - Alluvium Deposits; Gravelly silt with sand (ML); brown (7.5YR 5/3); no plasticity; some granule to very large pebbles, angular to subangular; little very fine to coarse grained sand, angular to subangular; dry		
37									
38				Topock - Alluvium Deposits	ML		(37.0 - 47.0') Topock - Alluvium Deposits; Sandy silt with gravel (ML); no plasticity; some very fine to coarse grained sand, angular to subangular; little small to medium pebbles, angular to subangular; dry; soft		
39									
40									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	11/28/2018	Surface Elevation:	500.0 ft amsl	Boring No.: IRZ-23 Pilot	
Date Completed:	12/03/2018	Northing (NAD83):	2102535.3		
Drilling Co.:	Cascade	Easting (NAD83):	7615825.8	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	147 ft bgs	Project:	Final Groundwater Remedy Phase
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	6-12 inches	Location:	1
Driller Name:	Steve Vasquez	Depth to First Water:	47 ft bgs	PG&E Topock, Needles, California	
Drilling Asst:	N. Dominguez/C. Alvarez	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number: RC000753.0051	
Logger:	Connor Mills	Sampling Interval:	Continuous		
Editor:	Sean McGrane	Converted to Well:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
41	120			Topock - Alluvium Deposits	ML				(0.0 - 147.0') No water used
42									
43									
44									
45				Topock - Alluvium Deposits	ML			(44.0 - 47.0') Moist Sediments	
46									
47	108	IRZ-23-SS-45-50 12/4/2018 09:00							
48									
49				Topock - Alluvium Deposits	SM		(47.0') Approximate depth of water table		
50									
51				Topock - Alluvium Deposits	SM		(49.5 - 52.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); very fine grained to coarse grained, angular to subround; some silt; little granule to very large pebbles, angular to subangular; trace cobbles, angular to subangular; wet		
52									
53				Topock - Alluvium Deposits	ML		(52.0 - 59.5') Topock - Alluvium Deposits; Silt with sand (ML); no plasticity; little fine to coarse grained sand, angular to subround; trace medium to very large pebble, angular to subangular; wet	(52.0 - 57.0') Tight formation	
54									
55									
56	120	IRZ-23-SS-50-55 12/4/2018 09:05							
57				Topock - Alluvium Deposits	ML				
58									
59									
60									
					SM		(59.5 - 62.0') Topock - Alluvium Deposits; Silty sand with gravel (SM);		

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	11/28/2018	Surface Elevation:	500.0 ft amsl	Boring No.: IRZ-23 Pilot	
Date Completed:	12/03/2018	Northing (NAD83):	2102535.3		
Drilling Co.:	Cascade	Easting (NAD83):	7615825.8	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	147 ft bgs	Project:	Final Groundwater Remedy Phase
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	6-12 inches	Location:	1
Driller Name:	Steve Vasquez	Depth to First Water:	47 ft bgs	PG&E Topock, Needles, California	
Drilling Asst:	N. Dominguez/C. Alvarez	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number: RC000753.0051	
Logger:	Connor Mills	Sampling Interval:	Continuous		
Editor:	Sean McGrane	Converted to Well:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
61	120		IRZ-23-VAS-57-62 (5.3 ppb) 11/30/2018 12:46	Topock - Alluvium Deposits	SM		brown (7.5YR 5/3); very fine grained to very coarse grained, angular to subround; some silt; little granule to medium pebbles, angular to subround; wet	(57.0 - 62.0') Sample screen had ~4 ft of water and did not produce well, driller thought 6-inch casing to be broken down hole, pulled 6-inch casing from borehole it was plugged with sediment, issues with the casing resulted in the sample being collected greater than 5 ft below first water	(0.0 - 147.0') No water used
62		IRZ-23-SS-60-65 12/4/2018 09:15					(62.0 - 69.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 5/3); fine grained to very coarse grained, angular to subround; some granule to very large pebbles, subangular to subround; little silt; trace cobbles, subangular to round; wet		
63									
64									
65									
66				Topock - Alluvium Deposits	SM				
67	120	IRZ-23-SS-65-70 12/4/2018 09:20							
68									
69			IRZ-23-VAS-67-72 (85 ppb) 12/1/2018 08:50						
70									
71				Topock - Alluvium Deposits	SM		(69.5 - 72.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 5/3); fine grained to very coarse grained, angular to subround; little granules to very large pebbles, subangular to subround; little silt; trace cobbles, subangular to round; wet		
72		IRZ-23-SS-70-75 12/4/2018 09:25							
73									
74									
75									
76	120			Topock - Alluvium Deposits	ML		(72.0 - 82.0') Topock - Alluvium Deposits; Silt with sand (ML); reddish brown (5YR 5/3); no plasticity; little very fine to medium grained sand, angular to subround; trace granule to small pebbles, angular to subangular; dry; potential contact of older and younger alluvium	(72.0 - 82.0') Drilling was tough, core came out hot and steaming	
77		IRZ-23-SS-75-80 12/4/2018 09:30							
78									
79									
80									

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Date Started:	11/28/2018	Surface Elevation:	500.0 ft amsl	Boring No.: <u>IRZ-23 Pilot</u>	
Date Completed:	12/03/2018	Northing (NAD83):	2102535.3		
Drilling Co.:	Cascade	Easting (NAD83):	7615825.8	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	147 ft bgs	Project:	Final Groundwater Remedy Phase
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	6-12 inches	Location:	1
Driller Name:	Steve Vasquez	Depth to First Water:	47 ft bgs	PG&E Topock, Needles, California	
Drilling Asst:	N. Dominguez/C. Alvarez	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number: RC000753.0051	
Logger:	Connor Mills	Sampling Interval:	Continuous		
Editor:	Sean McGrane	Converted to Well:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
81	120			Topock - Alluvium Deposits	ML			(72.0 - 82.0') Drilling was tough, core came out hot and steaming	(0.0 - 147.0') No water used
82		IRZ-23-SS-80-85 12/4/2018 09:35		Topock - Alluvium Deposits	SM		(82.0 - 84.5') Topock - Alluvium Deposits; Silty sand (SM); brown (7.5YR 4/4); very fine grained to coarse grained, angular to subangular; and silt; little granule to large pebbles, angular to subangular; wet		
83									
84									
85				Topock - Alluvium Deposits	ML		(84.5 - 87.0') Topock - Alluvium Deposits; Sandy silt (ML); reddish brown (5YR 5/4); no plasticity; little granule to medium pebbles, angular to subangular; little very fine to coarse grained sand, angular to subangular; moist; medium stiff		
86									
87	108	IRZ-23-SS-85-90 12/4/2018 09:40		Topock - Alluvium Deposits	SM		(87.0 - 94.5') Topock - Alluvium Deposits; Silty sand (SM); brown (7.5YR 4/4); very fine grained to coarse grained, angular to subangular; some silt; little granule to large pebbles, angular to subangular; little clay; wet		
88									
89									
90									
91				Topock - Alluvium Deposits	SM				
92		IRZ-23-SS-90-95 12/4/2018 09:45							
93									
94			IRZ-23-VAS-92-97 (<0.033 U ppb) 12/3/2018 11:47						
95	54			Topock - Alluvium Deposits	SM		(94.5 - 97.0') Topock - Alluvium Deposits; Silty sand (SM); reddish brown (5YR 5/4); fine grained to very coarse grained, angular to subround; some silt; little granule to medium pebbles, angular to subround; wet		
96									
97		IRZ-23-SS-95-100 12/4/2018 09:50		Topock - Alluvium Deposits	SM		(97.0 - 102.0') Topock - Alluvium Deposits; Silty sand (SM); dark yellowish brown (10YR 4/4); fine grained to very coarse grained, angular to subround; some silt; trace granule to large pebbles, angular to subangular; wet		
98									
99	120								
100									

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Date Started:	11/28/2018	Surface Elevation:	500.0 ft amsl	Boring No.: IRZ-23 Pilot	
Date Completed:	12/03/2018	Northing (NAD83):	2102535.3		
Drilling Co.:	Cascade	Easting (NAD83):	7615825.8	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	147 ft bgs	Project:	Final Groundwater Remedy Phase
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	6-12 inches	Location:	1
Driller Name:	Steve Vasquez	Depth to First Water:	47 ft bgs	PG&E Topock, Needles, California	
Drilling Asst:	N. Dominguez/C. Alvarez	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number: RC000753.0051	
Logger:	Connor Mills	Sampling Interval:	Continuous		
Editor:	Sean McGrane	Converted to Well:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
101				Topock - Alluvium Deposits	SM				(0.0 - 147.0') No water used
102				Topock - Alluvium Deposits	GM		(102.0 - 103.0') Topock - Alluvium Deposits; Silty gravel (GM); brown (7.5YR 4/4); granules to very large pebbles, angular to subangular; some silt; little very fine to medium grained sand, angular to subround; trace cobbles, angular to subangular; dry		
103				Topock - Alluvium Deposits	SM		(103.0 - 107.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); dark yellowish brown (10YR 4/4); fine grained to very coarse grained, subangular to subround; some silt; little granule to large pebbles, angular to subangular; wet		
104									
105									
106									
107									
108									
109									
110									
111									
112									
113									
114									
115									
116									
117									
118									
119									
120									

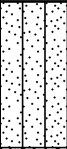

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	<u>11/28/2018</u>	Surface Elevation:	<u>500.0 ft amsl</u>	Boring No.: <u>IRZ-23 Pilot</u>	
Date Completed:	<u>12/03/2018</u>	Northing (NAD83):	<u>2102535.3</u>		
Drilling Co.:	<u>Cascade</u>	Easting (NAD83):	<u>7615825.8</u>	Client:	<u>PG&E</u>
Drilling Method:	<u>Sonic Drilling</u>	Total Depth:	<u>147 ft bgs</u>	Project:	<u>Final Groundwater Remedy Phase</u>
Drill Rig Type:	<u>Prosonic Truck Mount</u>	Borehole Diameter:	<u>6-12 inches</u>	Location:	<u>1</u>
Driller Name:	<u>Steve Vasquez</u>	Depth to First Water:	<u>47 ft bgs</u>	<u>PG&E Topock, Needles, California</u>	
Drilling Asst:	<u>N. Dominguez/C. Alvarez</u>	Sampling Method:	<u>4 inch x 10 ft Core Barrel</u>	Project Number: <u>RC000753.0051</u>	
Logger:	<u>Connor Mills</u>	Sampling Interval:	<u>Continuous</u>		
Editor:	<u>Sean McGrane</u>	Converted to Well:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
121				Topock - Alluvium Deposits	SM			(117.0 - 127.0') Hard drilling, dry	(0.0 - 147.0') No water used
122		IRZ-23-SS-120-125 12/4/2018 10:15					(122.0 - 127.0') Topock - Alluvium Deposits; Sandy silt with gravel (ML); yellowish red (5YR 4/6); no plasticity; little granule to medium pebbles, angular to subangular; little fine to medium grained sand, angular to subangular; wet		
123			IRZ-23-VAS-122-127 (2000 ppb) 12/2/2018 09:24	Topock - Alluvium Deposits	ML				
124	120								
125									
126									
127		IRZ-23-SS-125-130 12/4/2018 10:20					(127.0 - 133.0') Topock - Alluvium Deposits; Silty sand (SM); (5YR 4/8); fine grained to coarse grained, angular to subround; some silt; little granule to medium pebbles, angular to subangular; wet; granules and pebbles composed of trace pieces of metadiorite 1-4 in. dia.		
128									
129									
130				Topock - Alluvium Deposits	SM				
131									
132	114	IRZ-23-SS-130-135 12/4/2018 10:25							
133									
134				Topock - Alluvium Deposits	ML		(133.0 - 136.5') Topock - Alluvium Deposits; Sandy silt (ML); reddish brown (5YR 4/3); no plasticity; some very fine to medium grained sand, angular to subround; trace granule to medium pebbles, angular to subround; wet		
135									
136									
137		IRZ-23-SS-135-140 12/4/2018 10:30		Topock - Alluvium Deposits	GM		(136.5 - 137.0') Topock - Alluvium Deposits; Silty gravel (GM); dark gray (7.5YR 4/1); granules to very large pebbles, angular to subangular; some silt; little very fine to medium grained sand, angular to subangular; dry		
138	120			Topock - Alluvium Deposits	GM		(137.0 - 139.5') Topock - Alluvium Deposits; Silty gravel with sand (GM); reddish brown / moderate brown (5YR 4/4); granules to large pebbles, angular to subangular; some silt; little fine to coarse grained sand, angular to subround; trace clay; wet; trace pebbles of metadiorite 20-70 mm		
139									
140					SM		(139.5 - 142.0') Topock - Weathered Bedrock - conglomerate; Silty		

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Date Started:	11/28/2018	Surface Elevation:	500.0 ft amsl	Boring No.: IRZ-23 Pilot	
Date Completed:	12/03/2018	Northing (NAD83):	2102535.3		
Drilling Co.:	Cascade	Easting (NAD83):	7615825.8	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	147 ft bgs	Project:	Final Groundwater Remedy Phase
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	6-12 inches	Location:	1
Driller Name:	Steve Vasquez	Depth to First Water:	47 ft bgs	PG&E Topock, Needles, California	
Drilling Asst:	N. Dominguez/C. Alvarez	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number: RC000753.0051	
Logger:	Connor Mills	Sampling Interval:	Continuous		
Editor:	Sean McGrane	Converted to Well:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
141	120		IRZ-23-VAS-139-144 (3000 ppb) 12/2/2018 14:17	Topock - Weathered Bedrock - conglomerate	SM		sand (SM); yellowish red (5YR 4/6); very fine grained to coarse grained, angular to subround; and silt; trace granule to medium pebbles, angular to subround; wet; trace pieces of metadiorite 10-40 mm		(0.0 - 147.0') No water used
142									
143							(142.0 - 147.0') Topock - Competent Bedrock - conglomerate; yellowish red (5YR 4/6); little very fine to coarse grained sand, subangular to round; dry; hard; strong cementation; friable	(142.0 - 147.0') Drill was tough with rig chattering.	
144				Topock - Competent Bedrock - conglomerate					
145									
146									
147									

End of Boring at 147.0 'bgs.

Final 6/1/19

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Date Started:	11/28/2018	Surface Elevation:	500.0 ft amsl	Well ID: IRZ-23 Pilot
Date Completed:	12/03/2018	Northing (NAD83):	2102535.3	
Drilling Co.:	Cascade	Easting (NAD83):	7615825.8	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	147 ft bgs	Project: Final Groundwater Remedy Phase
Driller Name:	Steve Vasquez	Borehole Diameter:	6-12 inches	Location: 1
Drilling Asst:	N. Dominguez/C. Alvarez	Depth to First Water:	47 ft bgs	PG&E Topock, Needles, California
Logger:	Connor Mills	Editor:	Sean McGrane	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
1		Topock - Fluvial Deposits	SP-SM		(0.0 - 0.5') Temporary Steel Plate with BMP	(0.0 - 0.5') 1 plate	(0.0 - 0.5') 1 plate (0%)
2							
3		Topock - Fluvial Deposits	GM		(0.5 - 5.0') Cemex #0/30 MESH (30x50)	(0.5 - 5.0') 7.9 bags	(0.5 - 5.0') 6 bags (-24%) Note: Lapis Lustre Sand
4							
5		Topock - Fluvial Deposits	SW-SM				
6		Topock - Fluvial Deposits	GM				
7							
8							
9							
10							
11							
12		Topock - Fluvial Deposits	SP-SM		(5.0 - 137.0') Cemex #3 MESH (8x10)	(5.0 - 137.0') 55.3 bags	(5.0 - 137.0') 68 bags (23%) Note: Lapis Lustre Sand
13							
14							
15							
16							
17							
18		Topock - Fluvial Deposits	SM				
19							
20			SM				

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Date Started:	11/28/2018	Surface Elevation:	500.0 ft amsl	Well ID: IRZ-23 Pilot	
Date Completed:	12/03/2018	Northing (NAD83):	2102535.3		
Drilling Co.:	Cascade	Easting (NAD83):	7615825.8	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	147 ft bgs	Project:	Final Groundwater Remedy Phase
Driller Name:	Steve Vasquez	Borehole Diameter:	6-12 inches	Location:	1
Drilling Asst:	N. Dominguez/C. Alvarez	Depth to First Water:	47 ft bgs	PG&E Topock, Needles, California	
Logger:	Connor Mills	Editor:	Sean McGrane	Project Number: RC000753.0051	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
21		Topock - Fluvial Deposits	SM				
22							
23		Topock - Fluvial Deposits	ML				
24							
25		Topock - Fluvial Deposits	GW-GM				
26							
27							
28		Topock - Fluvial Deposits	GM				
29							
30					(5.0 - 137.0') Cemex #3 MESH (8x10)	(4.0 - 147.0') 6" Borehole	(5.0 - 137.0') 55.3 bags
31		Topock - Fluvial Deposits	SM				(5.0 - 137.0') 68 bags (23%) Note: Lapis Lustre Sand
32		Topock - Fluvial Deposits	ML				
33							
34		Topock - Alluvium Deposits	ML				
35							
36		Topock - Alluvium Deposits	ML				
37							
38							
39		Topock - Alluvium Deposits	ML				
40							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started:	11/28/2018	Surface Elevation:	500.0 ft amsl	Well ID: IRZ-23 Pilot
Date Completed:	12/03/2018	Northing (NAD83):	2102535.3	
Drilling Co.:	Cascade	Easting (NAD83):	7615825.8	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	147 ft bgs	Project: Final Groundwater Remedy Phase
Driller Name:	Steve Vasquez	Borehole Diameter:	6-12 inches	Location: 1
Drilling Asst:	N. Dominguez/C. Alvarez	Depth to First Water:	47 ft bgs	PG&E Topock, Needles, California
Logger:	Connor Mills	Editor:	Sean McGrane	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
41		Topock - Alluvium Deposits	ML				
42							
43							
44		Topock - Alluvium Deposits	SM				
45							
46							
47		Topock - Alluvium Deposits	SM		(5.0 - 137.0') Cemex #3 MESH (8x10)	(4.0 - 147.0') 6" Borehole	(5.0 - 137.0') 55.3 bags
48							
49							
50		Topock - Alluvium Deposits	SM				(5.0 - 137.0') 68 bags (23%) Note: Lapis Lustre Sand
51							
52							
53		Topock - Alluvium Deposits	ML				
54							
55							
56		Topock - Alluvium Deposits	ML				
57							
58							
59	IRZ-23-VAS-57-62 (5.3 ppb) 11/30/2018 12:46						
60			SM				

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started:	11/28/2018	Surface Elevation:	500.0 ft amsl	Well ID: IRZ-23 Pilot	
Date Completed:	12/03/2018	Northing (NAD83):	2102535.3		
Drilling Co.:	Cascade	Easting (NAD83):	7615825.8	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	147 ft bgs	Project:	Final Groundwater Remedy Phase
Driller Name:	Steve Vasquez	Borehole Diameter:	6-12 inches	Location:	1
Drilling Asst:	N. Dominguez/C. Alvarez	Depth to First Water:	47 ft bgs	PG&E Topock, Needles, California	
Logger:	Connor Mills	Editor:	Sean McGrane	Project Number: RC000753.0051	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction		Calculated Material Volumes	Material Volumes Installed
61	IRZ-23-VAS-57-62 (5.3 ppb) 11/30/2018 12:46	Topock - Alluvium Deposits	SM					
62								
63								
64								
65								
66		Topock - Alluvium Deposits	SM					
67								
68								
69	IRZ-23-VAS-67-72 (85 ppb) 12/1/2018 08:50							
70		Topock - Alluvium Deposits	SM		(5.0 - 137.0') Cemex #3 MESH (8x10)	(4.0 - 147.0') 6" Borehole	(5.0 - 137.0') 55.3 bags	(5.0 - 137.0') 68 bags (23%) Note: Lapis Lustre Sand
71								
72								
73								
74								
75								
76		Topock - Alluvium Deposits	ML					
77								
78								
79								
80								

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started:	11/28/2018	Surface Elevation:	500.0 ft amsl	Well ID: IRZ-23 Pilot	
Date Completed:	12/03/2018	Northing (NAD83):	2102535.3		
Drilling Co.:	Cascade	Easting (NAD83):	7615825.8	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	147 ft bgs	Project:	Final Groundwater Remedy Phase
Driller Name:	Steve Vasquez	Borehole Diameter:	6-12 inches	Location:	1
Drilling Asst:	N. Dominguez/C. Alvarez	Depth to First Water:	47 ft bgs	PG&E Topock, Needles, California	
Logger:	Connor Mills	Editor:	Sean McGrane	Project Number: RC000753.0051	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction		Calculated Material Volumes	Material Volumes Installed
81		Topock - Alluvium Deposits	ML					
82								
83		Topock - Alluvium Deposits	SM					
84								
85		Topock - Alluvium Deposits	ML					
86								
87								
88								
89								
90		Topock - Alluvium Deposits	SM		(5.0 - 137.0') Cemex #3 MESH (8x10)	(4.0 - 147.0') 6" Borehole	(5.0 - 137.0') 55.3 bags	(5.0 - 137.0') 68 bags (23%) Note: Lapis Lustre Sand
91								
92								
93	IRZ-23-VAS-92-97 (<0.033 U ppb) 12/3/2018 11:47							
94								
95		Topock - Alluvium Deposits	SM					
96								
97								
98		Topock - Alluvium Deposits	SM					
99								
100								

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started: 11/28/2018	Surface Elevation: 500.0 ft amsl	Well ID: IRZ-23 Pilot
Date Completed: 12/03/2018	Northing (NAD83): 2102535.3	
Drilling Co.: Cascade	Easting (NAD83): 7615825.8	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 147 ft bgs	Project: Final Groundwater Remedy Phase
Driller Name: Steve Vasquez	Borehole Diameter: 6-12 inches	Location: 1
Drilling Asst: N. Dominguez/C. Alvarez	Depth to First Water: 47 ft bgs	PG&E Topock, Needles, California
Logger: Connor Mills	Editor: Sean McGrane	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction		Calculated Material Volumes	Material Volumes Installed
101		Topock - Alluvium Deposits	SM		<div> <div>(5.0 - 137.0') Cemex #3 MESH (8x10)</div> <div>(4.0 - 147.0') 6" Borehole</div> </div>		(5.0 - 137.0') 55.3 bags	(5.0 - 137.0') 68 bags (23%) Note: Lapis Lustre Sand
102		Topock - Alluvium Deposits	GM					
103								
104								
105		Topock - Alluvium Deposits	SM					
106								
107								
108								
109								
110								
111								
112		Topock - Alluvium Deposits	GM					
113								
114								
115								
116								
117								
118								
119		Topock - Alluvium Deposits	SM					
120								


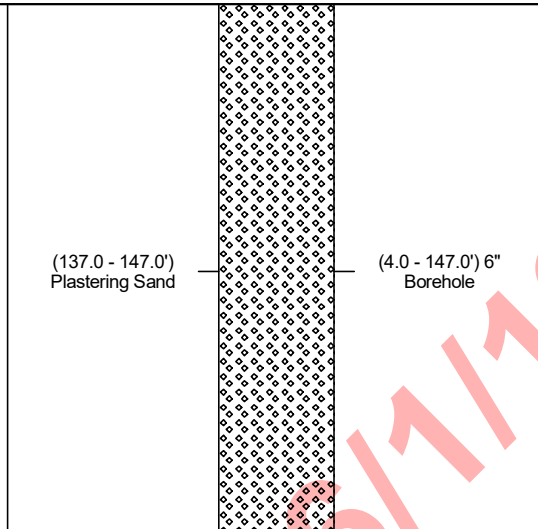
Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started:	11/28/2018	Surface Elevation:	500.0 ft amsl	Well ID: IRZ-23 Pilot
Date Completed:	12/03/2018	Northing (NAD83):	2102535.3	
Drilling Co.:	Cascade	Easting (NAD83):	7615825.8	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	147 ft bgs	Project: Final Groundwater Remedy Phase
Driller Name:	Steve Vasquez	Borehole Diameter:	6-12 inches	Location: 1
Drilling Asst:	N. Dominguez/C. Alvarez	Depth to First Water:	47 ft bgs	PG&E Topock, Needles, California
Logger:	Connor Mills	Editor:	Sean McGrane	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
121		Topock - Alluvium Deposits	SM				
122							
123							
124	IRZ-23-VAS-122-127 (2000 ppb) 12/2/2018 09:24	Topock - Alluvium Deposits	ML				
125							
126							
127							
128							
129		Topock - Alluvium Deposits	SM		(5.0 - 137.0') Cemex #3 MESH (8x10)	(5.0 - 137.0') 55.3 bags	(5.0 - 137.0') 68 bags (23%) Note: Lapis Lustre Sand
130							
131							
132							
133							
134		Topock - Alluvium Deposits	ML				
135							
136							
137		Topock - Alluvium Deposits	GM				
138		Topock - Alluvium Deposits	GM		(137.0 - 147.0') Plastering Sand	(137.0 - 147.0') 2.8 bags	(137.0 - 147.0') 4 bags (43%) Note: Wildcat Washed
139							
140			SM				

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Date Started:	11/28/2018	Surface Elevation:	500.0 ft amsl	Well ID: IRZ-23 Pilot	
Date Completed:	12/03/2018	Northing (NAD83):	2102535.3		
Drilling Co.:	Cascade	Easting (NAD83):	7615825.8	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	147 ft bgs	Project:	Final Groundwater Remedy Phase
Driller Name:	Steve Vasquez	Borehole Diameter:	6-12 inches	Location:	1
Drilling Asst:	N. Dominguez/C. Alvarez	Depth to First Water:	47 ft bgs	PG&E Topock, Needles, California	
Logger:	Connor Mills	Editor:	Sean McGrane	Project Number: RC000753.0051	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction		Calculated Material Volumes	Material Volumes Installed
141	IRZ-23-VAS-139-144 (3000 ppb) 12/2/2018 14:17	Topock - Weathered Bedrock - conglomerate	SM				(137.0 - 147.0') 2.8 bags	(137.0 - 147.0') 4 bags (43%) Note: Wildcat Washed
142		Topock - Competent Bedrock - conglomerate						
143								
144								
145								
146								
147								
148								
149								
150								
151								
152								
153								
154								
155								
156								
157								
158								
159								
160								

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started:	06/17/2019	Surface Elevation:	500.0 ft amsl	Boring No.: IRZ-23
Date Completed:	06/25/2019	Northing (NAD83):	2102535.3	
Drilling Co.:	Cascade	Easting (NAD83):	7615825.8	Client: PG&E
Drilling Method:	Dual Rotary	Total Depth:	150.4 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Foremost DR-24 HD	Conductor Casing Diameter:	24 inches	Location: PG&E Topock, Needles, California
Driller Name:	Jon Martinez	Drill Casing Diameter:	18 inches	
Drilling Asst:	E. Martinez / W. Saylors	Drill Bit:	17 Tricone	Project Number: RC000753.0051
Tool-Pusher:	Arnold Lamon	Depth to First Water:	49.49 ft bgs	
Rig Geologist:	E. Redner / A. Mack	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Drilling Run and Average Penetration Rate	USCS Code	USCS Class	Casing Diameter	Description (See Pilot boring log for full geologic descriptions)	Drilling Notes	Drilling Fluid
1		SP-SM			(0.0 - 2.0') Topock - Fluvial Deposits; Poorly graded sand with silt and gravel (SP-SM); brown (7.5YR 5/3)	(0.0 - 21.5') Loss of drilling fluid.	(0.0 - 21.5') 24.4 gallons of water used; 0 gallons of water recovered; 24.4 gallons of water lost
2					(2.0 - 4.5') Topock - Fluvial Deposits; Silty gravel with sand (GM); brown (7.5YR 5/3)		
3		GM					
4							
5		SW-SM			(4.5 - 5.0') Topock - Fluvial Deposits; Well graded sand with silt (SW-SM); very pale brown / grayish orange (10YR 7/4)	(5.0') Observed trace amounts of Cemex #3 MESH (8x10) Lapis Lustre Sand and some amount of Cemex #0/30 MESH (30/50) Lapis Lustre Sand in drill cuttings (See Photo Log).	
6		GM			(5.0 - 7.0') Topock - Fluvial Deposits; Silty gravel with sand (GM); brown (7.5YR 5/3)		
7					(7.0 - 17.0') Topock - Fluvial Deposits; Poorly graded sand with silt and gravel (SP-SM)		
8							
9							
10	(0.0 - 21.5) 4.24 mins/ft			(0.0 - 21.5') 24.0" Steel Casing		(10.0') Observed trace amounts of Cemex #3 MESH (8x10) Lapis Lustre Sand in drill cuttings (see Photo Log).	
11							
12		SP-SM					
13							
14						(14.0 - 15.0') Rough drilling.	
15						(15.0 - 17.0') Normal drilling, observed trace to little amounts of Cemex #3 MESH (8x10) Lapis Lustre Sand in drill cuttings (See Photo Log).	
16							
17							
18		SM			(17.0 - 19.5') Topock - Fluvial Deposits; Silty sand (SM); reddish brown (5YR 5/3) with brownish yellow / dark yellowish orange (10YR 6/6)	(17.0 - 18.0') Rough drilling.	
19							
20		SM			(19.5 - 23.0') Topock - Fluvial		

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Remarks: blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	06/17/2019	Surface Elevation:	500.0 ft amsl	Boring No.: IRZ-23
Date Completed:	06/25/2019	Northing (NAD83):	2102535.3	
Drilling Co.:	Cascade	Easting (NAD83):	7615825.8	Client: PG&E
Drilling Method:	Dual Rotary	Total Depth:	150.4 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Foremost DR-24 HD	Conductor Casing Diameter:	24 inches	Location: PG&E Topock, Needles, California
Driller Name:	Jon Martinez	Drill Casing Diameter:	18 inches	
Drilling Asst:	E. Martinez / W. Saylor	Drill Bit:	17 Tricone	Project Number: RC000753.0051
Tool-Pusher:	Arnold Lamon	Depth to First Water:	49.49 ft bgs	
Rig Geologist:	E. Redner / A. Mack	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Drilling Run and Average Penetration Rate	USCS Code	USCS Class	Casing Diameter	Description (See Pilot boring log for full geologic descriptions)	Drilling Notes	Drilling Fluid
21	(0.0 - 21.5) 4.24 mins/ft	SM		(0.0 - 21.5') 24.0" Steel Casing	Deposits; Silty sand with gravel (SM); brown (10YR 5/3)	(20.0') Observed trace amounts of Cemex #3 MESH (8x10) Lapis Lustre Sand in drill cuttings (see Photo Log).	
22						(21.5 - 39.2') Loss of drilling fluid.	(21.5 - 39.2') 30.5 gallons of water used; 0 gallons of water recovered; 30.5 gallons of water lost
23		ML			(23.0 - 23.5') Topock - Fluvial Deposits; Silt with sand (ML); gray (10YR 5/1)		
24					(23.5 - 27.0') Topock - Fluvial Deposits; Well graded gravel with silt and sand (GW-GM); light brown (7.5YR 6/3)		
25		GW-GM				(25.0') Observed trace amounts of Cemex #3 MESH (8x10) Lapis Lustre Sand in drill cuttings (See Photo Log).	
26						(26.0 - 28.0') Rough drilling.	
27							
28		GM			(27.0 - 30.5') Topock - Fluvial Deposits; Silty gravel (GM); brown (10YR 5/3)	(28.0 - 38.0') Slow drilling, encountered very hard boulder 28 ft. to 30 ft. bgs.	
29							
30	(21.5 - 39.2) 5.07 mins/ft			(21.5 - 39.2') 18.0" Steel Casing			
31		SM			(30.5 - 31.5') Topock - Fluvial Deposits; Silty sand with gravel (SM); light yellowish brown (10YR 6/4)		
32		ML			(31.5 - 32.0') Topock - Fluvial Deposits; Silt with sand (ML); gray (10YR 5/1)		
33					(32.0 - 35.0') Topock - Alluvium Deposits; Sandy silt with gravel (ML); brown (7.5YR 5/3)		
34		ML					
35							
36		ML			(35.0 - 37.0') Topock - Alluvium Deposits; Gravely silt with sand (ML); brown (7.5YR 5/3)	(35.0') Observed trace amounts of Cemex #3 MESH (8x10) Lapis Lustre Sand in drill cuttings (See Photo Log).	
37							
38					(37.0 - 47.0') Topock - Alluvium Deposits; Sandy silt with gravel (ML)		
39		ML					
40	(39.2 - 59.0) 2.02 mins/ft			(39.2 - 59.0') 18.0" Steel Casing		(39.2 - 59.0') Loss of drilling fluid.	(39.2 - 59.0') 6.1 gallons of water used; 0 gallons of

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Remarks: blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	06/17/2019	Surface Elevation:	500.0 ft amsl	Boring No.: IRZ-23
Date Completed:	06/25/2019	Northing (NAD83):	2102535.3	
Drilling Co.:	Cascade	Easting (NAD83):	7615825.8	Client: PG&E
Drilling Method:	Dual Rotary	Total Depth:	150.4 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Foremost DR-24 HD	Conductor Casing Diameter:	24 inches	Location: PG&E Topock, Needles, California
Driller Name:	Jon Martinez	Drill Casing Diameter:	18 inches	
Drilling Asst:	E. Martinez / W. Saylors	Drill Bit:	17 Tricone	Project Number: RC000753.0051
Tool-Pusher:	Arnold Lamon	Depth to First Water:	49.49 ft bgs	
Rig Geologist:	E. Redner / A. Mack	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Drilling Run and Average Penetration Rate	USCS Code	USCS Class	Casing Diameter	Description (See Pilot boring log for full geologic descriptions)	Drilling Notes	Drilling Fluid
41							water recovered; 6.1 gallons of water lost
42							
43							
44		ML					
45						(45.0') Observed trace amounts of Cemex #3 MESH (8x10) Lapis Lustre Sand in drill cuttings (See Photo Log).	
46							
47					(47.0 - 49.5') Topock - Alluvium Deposits; Silty sand (SM)		
48		SM					
49							
50	(39.2 - 59.0) 2.02 mins/ft			(39.2 - 59.0') 18.0" Steel Casing	(49.5 - 52.0') Topock - Alluvium Deposits; Silty sand with gravel (SM)		
51		SM					
52					(52.0 - 59.5') Topock - Alluvium Deposits; Silt with sand (ML)		
53							
54							
55							
56		ML				(55.0') Observed trace amounts of Cemex #3 MESH (8x10) Lapis Lustre Sand in drill cuttings (See Photo Log).	
57							
58							
59							
60	(59.0 - 79.0) 1.65 mins/ft	SM		(59.0 - 79.0') 18.0" Steel Casing	(59.5 - 62.0') Topock - Alluvium	(59.0 - 79.0') Loss of drilling fluid.	(59.0 - 79.0') 6.1 gallons of water used; 0 gallons of water recovered; 6.1

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Remarks: blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	06/17/2019	Surface Elevation:	500.0 ft amsl	Boring No.: IRZ-23
Date Completed:	06/25/2019	Northing (NAD83):	2102535.3	
Drilling Co.:	Cascade	Easting (NAD83):	7615825.8	Client: PG&E
Drilling Method:	Dual Rotary	Total Depth:	150.4 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Foremost DR-24 HD	Conductor Casing Diameter:	24 inches	Location: PG&E Topock, Needles, California
Driller Name:	Jon Martinez	Drill Casing Diameter:	18 inches	
Drilling Asst:	E. Martinez / W. Saylors	Drill Bit:	17 Tricone	Project Number: RC000753.0051
Tool-Pusher:	Arnold Lamon	Depth to First Water:	49.49 ft bgs	
Rig Geologist:	E. Redner / A. Mack	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Drilling Run and Average Penetration Rate	USCS Code	USCS Class	Casing Diameter	Description (See Pilot boring log for full geologic descriptions)	Drilling Notes	Drilling Fluid
61		SM			Deposits; Silty sand with gravel (SM); brown (7.5YR 5/3)		gallons of water lost
62							
63					(62.0 - 69.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 5/3)		
64							
65							
66		SM				(65.0') Observed little amounts of Cemex #3 MESH (8x10) Lapis Lustre Sand in drill cuttings (See Photo Log).	
67							
68							
69							
70	(59.0 - 79.0) 1.65 mins/ft			(59.0 - 79.0') 18.0" Steel Casing	(69.5 - 72.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 5/3)		
71		SM					
72							
73					(72.0 - 82.0') Topock - Alluvium Deposits; Silt with sand (ML); reddish brown (5YR 5/3)	(72.0 - 73.0') Drill rods chattering, rough drilling potential hard rock	
74							
75							
76		ML				(75.0') Observed little amounts of Cemex #3 MESH (8x10) Lapis Lustre Sand in drill cuttings (See Photo Log).	
77							
78							
79							
80	(79.0 - 94.0) 3.53 mins/ft			(79.0 - 94.0') 18.0" Steel Casing		(79.0 - 98.6') Drilled with water.	(79.0 - 98.6') 24.4 gallons of water used; 157 gallons of water recovered; 132.6

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Date Started:	06/17/2019	Surface Elevation:	500.0 ft amsl	Boring No.: IRZ-23
Date Completed:	06/25/2019	Northing (NAD83):	2102535.3	
Drilling Co.:	Cascade	Easting (NAD83):	7615825.8	Client: PG&E
Drilling Method:	Dual Rotary	Total Depth:	150.4 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Foremost DR-24 HD	Conductor Casing Diameter:	24 inches	Location: PG&E Topock, Needles, California
Driller Name:	Jon Martinez	Drill Casing Diameter:	18 inches	
Drilling Asst:	E. Martinez / W. Saylor	Drill Bit:	17 Tricone	Project Number: RC000753.0051
Tool-Pusher:	Arnold Lamon	Depth to First Water:	49.49 ft bgs	
Rig Geologist:	E. Redner / A. Mack	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Drilling Run and Average Penetration Rate	USCS Code	USCS Class	Casing Diameter	Description (See Pilot boring log for full geologic descriptions)	Drilling Notes	Drilling Fluid
81		ML					gallons of water gained
82					(82.0 - 84.5') Topock - Alluvium Deposits; Silty sand (SM); brown (7.5YR 4/4)		
83		SM					
84							
85					(84.5 - 87.0') Topock - Alluvium Deposits; Sandy silt (ML); reddish brown (5YR 5/4)	(85.0') Observed little amounts of Cemex #3 MESH (8x10) Lapis Lustre Sand in drill cuttings (See Photo Log).	
86		ML					
87	(79.0 - 94.0) 3.53 mins/ft			(79.0 - 94.0') 18.0" Steel Casing	(87.0 - 94.5') Topock - Alluvium Deposits; Silty sand (SM); brown (7.5YR 4/4)		
88							
89						(89.0 - 90.0') Rough drilling.	
90		SM					
91							
92							
93							
94						(94.0 - 96.0') Slow drilling.	
95					(94.5 - 97.0') Topock - Alluvium Deposits; Silty sand (SM); reddish brown (5YR 5/4)		
96	(94.0 - 98.6) 4.18 mins/ft	SM		(94.0 - 98.6') 18.0" Steel Casing			
97							
98					(97.0 - 102.0') Topock - Alluvium Deposits; Silty sand (SM); dark yellowish brown (10YR 4/4)		
99		SM				(98.6 - 118.3') Drilled with water.	(98.6 - 118.3') 2403.4 gallons of water used; 4200 gallons of water recovered; 1796.6 gallons of water gained
100	(98.6 - 118.3) 4.41 mins/ft			(98.6 - 118.3') 18.0" Steel Casing			

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater

Remarks: blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	06/17/2019	Surface Elevation:	500.0 ft amsl	Boring No.: IRZ-23
Date Completed:	06/25/2019	Northing (NAD83):	2102535.3	
Drilling Co.:	Cascade	Easting (NAD83):	7615825.8	Client: PG&E
Drilling Method:	Dual Rotary	Total Depth:	150.4 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Foremost DR-24 HD	Conductor Casing Diameter:	24 inches	Location: PG&E Topock, Needles, California
Driller Name:	Jon Martinez	Drill Casing Diameter:	18 inches	
Drilling Asst:	E. Martinez / W. Saylor	Drill Bit:	17 Tricone	Project Number: RC000753.0051
Tool-Pusher:	Arnold Lamon	Depth to First Water:	49.49 ft bgs	
Rig Geologist:	E. Redner / A. Mack	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Drilling Run and Average Penetration Rate	USCS Code	USCS Class	Casing Diameter	Description (See Pilot boring log for full geologic descriptions)	Drilling Notes	Drilling Fluid
101		SM				(101.0') Rough drilling.	
102		GM			(102.0 - 103.0') Topock - Alluvium Deposits; Silty gravel (GM); brown (7.5YR 4/4)		
103					(103.0 - 107.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); dark yellowish brown (10YR 4/4)		
104		SM				(105.0') Observed trace amounts of Cemex #3 MESH (8x10) Lapis Lustre Sand in drill cuttings (See Photo Log).	
105							
106							
107					(107.0 - 117.0') Topock - Alluvium Deposits; Silty gravel (GM); brown (10YR 4/3)		
108							
109	(98.6 - 118.3) 4.41 mins/ft			(98.6 - 118.3') 18.0" Steel Casing			
110							
111							
112		GM					
113							
114							
115						(115.0') Observed trace amounts of Cemex #3 MESH (8x10) Lapis Lustre Sand in drill cuttings (See Photo Log).	
116						(115.1 - 118.3') Slow drilling/hard rock.	
117							
118					(117.0 - 122.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 4/4)		
119	(118.3 - 139.2) 4.30 mins/ft	SM		(118.3 - 139.2') 18.0" Steel Casing		(118.3 - 147.0') Drilled with water.	(118.3 - 147.0') 608.48 gallons of water used; 6040 gallons of water recovered; 5431.52 gallons of water gained
120							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater

Remarks: blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	06/17/2019	Surface Elevation:	500.0 ft amsl	Boring No.: IRZ-23
Date Completed:	06/25/2019	Northing (NAD83):	2102535.3	
Drilling Co.:	Cascade	Easting (NAD83):	7615825.8	Client: PG&E
Drilling Method:	Dual Rotary	Total Depth:	150.4 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Foremost DR-24 HD	Conductor Casing Diameter:	24 inches	Location: PG&E Topock, Needles, California
Driller Name:	Jon Martinez	Drill Casing Diameter:	18 inches	
Drilling Asst:	E. Martinez / W. Saylors	Drill Bit:	17 Tricone	Project Number: RC000753.0051
Tool-Pusher:	Arnold Lamon	Depth to First Water:	49.49 ft bgs	
Rig Geologist:	E. Redner / A. Mack	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Drilling Run and Average Penetration Rate	USCS Code	USCS Class	Casing Diameter	Description (See Pilot boring log for full geologic descriptions)	Drilling Notes	Drilling Fluid
121		SM					
122					(122.0 - 127.0') Topock - Alluvium Deposits; Sandy silt with gravel (ML); yellowish red (5YR 4/6)		
123							
124							
125		ML				(125.0') Observed trace to little amounts of Cemex #3 MESH (8x10) Lapis Lustre Sand in drill cuttings (See Photo Log).	
126							
127					(127.0 - 133.0') Topock - Alluvium Deposits; Silty sand (SM); (5YR 4/8)		
128							
129							
130	(118.3 - 139.2) 4.30 mins/ft	SM		(118.3 - 139.2') 18.0" Steel Casing			
131							
132							
133					(133.0 - 136.5') Topock - Alluvium Deposits; Sandy silt (ML); reddish brown (5YR 4/3)		
134							
135		ML				(135.0') Observed trace amounts of Cemex #3 MESH (8x10) Lapis Lustre Sand in drill cuttings (See Photo Log).	
136						(136.0 - 139.0') Rough drilling.	
137		GM			(136.5 - 137.0') Topock - Alluvium Deposits; Silty gravel (GM); dark gray (7.5YR 4/1)		
138		GM			(137.0 - 139.5') Topock - Alluvium Deposits; Silty gravel with sand (GM); reddish brown / moderate brown (5YR 4/4)		
139							
140	(139.2 - 147.0) 2.57 mins/ft	SM			(139.5 - 142.0') Topock -		

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater

Remarks: blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	06/17/2019	Surface Elevation:	500.0 ft amsl	Boring No.: IRZ-23	
Date Completed:	06/25/2019	Northing (NAD83):	2102535.3		
Drilling Co.:	Cascade	Easting (NAD83):	7615825.8	Client:	PG&E
Drilling Method:	Dual Rotary	Total Depth:	150.4 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Foremost DR-24 HD	Conductor Casing Diameter:	24 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Jon Martinez	Drill Casing Diameter:	18 inches		
Drilling Asst:	E. Martinez / W. Saylor	Drill Bit:	17 Tricone	Project Number:	RC000753.0051
Tool-Pusher:	Arnold Lamon	Depth to First Water:	49.49 ft bgs		
Rig Geologist:	E. Redner / A. Mack	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Drilling Run and Average Penetration Rate	USCS Code	USCS Class	Casing Diameter	Description (See Pilot boring log for full geologic descriptions)	Drilling Notes	Drilling Fluid
141		SM			Weathered Bedrock - conglomerate; Silty sand (SM); yellowish red (5YR 4/6)		
142						(142.0') Observed trace amounts of Plastering Sand in drill cuttings (See Photo Log).	
143	(139.2 - 147.0) 2.57 mins/ft			(139.2 - 147.0') 17.5" Open Hole	(142.0 - 150.4') Topock - Competent Bedrock - conglomerate; yellowish red (5YR 4/6); No Recovery overdrilled with DR rig for well installation		
144							
145							
146							
147							
148						(147.0 - 150.4') Drilled with water.	
149	(147.0 - 150.4) 20.59 mins/ft			(147.0 - 150.4') 17.5" Open Hole			
150							
151	End of Boring at 150.4' bgs.						
152							
153							
154							
155							
156							
157							
158							
159							
160							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater

Remarks: blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	06/26/2019	Surface Elevation:	500.0 ft amsl	Well ID: IRZ-23
Date Completed:	06/30/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Dual Rotary	Northing (NAD83):	2102535.3	Project: Final GW Remedy Phase 1
Driller Name:	Jon Martinez	Easting (NAD83):	7615825.8	Location: PG&E Topock, Needles, California
Drilling Asst:	E. Martinez / W. Saylors	Borehole Diameter:	17.5-24 inches	
Logger:	Athony Mack	Water Level Start:	46.85 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	8/11/2019	
Total Depth:	150.4 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
1		Topock - Fluvial Deposits	SP-SM		(0.0 - 92.1') 10" Suregrip 17 Casing		
2							
3		Topock - Fluvial Deposits	GM		(0.0 - 6.0') #0/30 sand	(0.0 - 6.0') 31.1 bags	(0.0 - 6.0') 35 bags (13%) Note: Lapis Lustre Sand
4							
5		Topock - Fluvial Deposits	SW-SM				
6		Topock - Fluvial Deposits	GM				
7							
8							
9							
10					(0.0 - 21.5') 24.0" Borehole		
11							
12		Topock - Fluvial Deposits	SP-SM				
13					(6.0 - 66.5') Portland Cement 3% Bentonite	(6.0 - 66.5') 737.1 gallons	(6.0 - 66.5') 1060 gallons (44%) Note: Type I, II and V and Benseal, used >20% of the calculated volume due to potential grout migration and voids forming during drilling
14							
15							
16							
17							
18		Topock - Fluvial Deposits	SM				
19							
20			SM				

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, groundwater data was collected during drilling of the pilot borehole

Date Started: 06/26/2019	Surface Elevation: 500.0 ft amsl	Well ID: IRZ-23
Date Completed: 06/30/2019	Shallow Well Elevation: N/A	
Drilling Co.: Cascade	Deep Well Elevation: N/A	Client: PG&E
Drilling Method: Dual Rotary	Northing (NAD83): 2102535.3	Project: Final GW Remedy Phase 1
Driller Name: Jon Martinez	Easting (NAD83): 7615825.8	Location: PG&E Topock, Needles, California
Drilling Asst: E. Martinez / W. Saylor	Borehole Diameter: 17.5-24 inches	
Logger: Athony Mack	Water Level Start: 46.85 ft bgs	Project Number: RC000753.0051
Editor: Sean McGrane	Development End Date: 8/11/2019	
Total Depth: 150.4 ft bgs	Well Completion: <input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
21		Topock - Fluvial Deposits	SM		(0.0 - 92.1') 10" Suregrip 17 Casing		
22							
23		Topock - Fluvial Deposits	ML				
24							
25		Topock - Fluvial Deposits	GW-GM				
26							
27							
28		Topock - Fluvial Deposits	GM		(27.5 - 28.5') Centralizer		
29							
30					(6.0 - 66.5') Portland Cement 3% Bentonite		
31		Topock - Fluvial Deposits	SM			(21.5 - 39.2') 18.0" Borehole	
32		Topock - Fluvial Deposits	ML				
33		Topock - Alluvium Deposits	ML				
34							
35							
36		Topock - Alluvium Deposits	ML				
37							
38		Topock - Alluvium Deposits	ML				
39							
40						(39.2 - 59.0') 18.0" Borehole	

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Date Started:	06/26/2019	Surface Elevation:	500.0 ft amsl	Well ID: IRZ-23
Date Completed:	06/30/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Dual Rotary	Northing (NAD83):	2102535.3	Project: Final GW Remedy Phase 1
Driller Name:	Jon Martinez	Easting (NAD83):	7615825.8	Location: PG&E Topock, Needles, California
Drilling Asst:	E. Martinez / W. Saylor	Borehole Diameter:	17.5-24 inches	
Logger:	Athony Mack	Water Level Start:	46.85 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	8/11/2019	
Total Depth:	150.4 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction		Calculated Material Volumes	Material Volumes Installed	
41	IRZ-23-VAS-57-62 (5.3 ppb) 11/30/2018 12:46	Topock - Alluvium Deposits	ML		(0.0 - 92.1') 10" Suregrip 17 Casing		(6.0 - 66.5') 737.1 gallons	(6.0 - 66.5') 1060 gallons (44%) Note: Type I, II and V and Benseal, used >20% of the calculated volume due to potential grout migration and voids forming during drilling	
42									
43									
44									
45									
46									
47									
48		Topock - Alluvium Deposits	SM		(6.0 - 66.5') Portland Cement 3% Bentonite	(39.2 - 59.0') 18.0" Borehole			
49									
50		Topock - Alluvium Deposits	SM		(6.0 - 66.5') Portland Cement 3% Bentonite	(39.2 - 59.0') 18.0" Borehole			
51									
52		Topock - Alluvium Deposits	ML		(6.0 - 66.5') Portland Cement 3% Bentonite	(39.2 - 59.0') 18.0" Borehole			
53									
54									
55									
56									
57									
58									
59									
60									

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Date Started:	06/26/2019	Surface Elevation:	500.0 ft amsl	Well ID: IRZ-23
Date Completed:	06/30/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Dual Rotary	Northing (NAD83):	2102535.3	Project: Final GW Remedy Phase 1
Driller Name:	Jon Martinez	Easting (NAD83):	7615825.8	Location: PG&E Topock, Needles, California
Drilling Asst:	E. Martinez / W. Saylor	Borehole Diameter:	17.5-24 inches	
Logger:	Athony Mack	Water Level Start:	46.85 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	8/11/2019	
Total Depth:	150.4 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
61	IRZ-23-VAS-57-62 (5.3 ppb) 11/30/2018 12:46	Topock - Alluvium Deposits	SM		(0.0 - 92.1') 10" Suregrip 17 Casing		
62							
63		Topock - Alluvium Deposits	SM		(6.0 - 66.5') Portland Cement 3% Bentonite	(6.0 - 66.5') 737.1 gallons	(6.0 - 66.5') 1060 gallons (44%) Note: Type I, II and V and Benseal, used >20% of the calculated volume due to potential grout migration and voids forming during drilling
64					(63.6 - 64.6') Centralizer		
65							
66							
67							
68					(66.5 - 68.6') Bentonite seal chips	(66.5 - 68.6') 3.56 bags	(66.5 - 68.6') 4 bags (12%) Note: Puregold Medium Chips, installed bentonite seal at the request of the drillers to prevent grout migration
69	IRZ-23-VAS-67-72 (85 ppb) 12/1/2018 08:50	Topock - Alluvium Deposits	SM				
70					(59.0 - 79.0') 18.0" Borehole		
71					(68.6 - 72.0') Cemex #60 (40x70 mesh)	(68.6 - 72.0') 7.3 bags	(68.6 - 72.0') 11 bags (51%) Note: Lapis Lustre Sand, used >20% of the calculated volume due to potential voids forming during drilling
72							
73							
74							
75							
76		Topock - Alluvium Deposits	ML		(72.0 - 150.4') Cemex 30 mesh (30x70) sand	(72.0 - 150.4') 194.8 bags	(72.0 - 150.4') 209 bags (7%) Note: Lapis Lustre Sand, swabbed filter pack for approximately 2.5 hours prior to installing transition sand
77							
78							
79							
80					(79.0 - 94.0') 18.0" Borehole		

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Date Started:	06/26/2019	Surface Elevation:	500.0 ft amsl	Well ID: IRZ-23
Date Completed:	06/30/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Dual Rotary	Northing (NAD83):	2102535.3	Project: Final GW Remedy Phase 1
Driller Name:	Jon Martinez	Easting (NAD83):	7615825.8	Location: PG&E Topock, Needles, California
Drilling Asst:	E. Martinez / W. Saylor	Borehole Diameter:	17.5-24 inches	
Logger:	Athony Mack	Water Level Start:	46.85 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	8/11/2019	
Total Depth:	150.4 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
81		Topock - Alluvium Deposits	ML		(0.0 - 92.1') 10" Suregrip 17 Casing		
82							
83		Topock - Alluvium Deposits	SM				
84							
85		Topock - Alluvium Deposits	ML				
86							
87					(79.0 - 94.0') 18.0" Borehole		
88							
89							
90		Topock - Alluvium Deposits	SM		(72.0 - 150.4') Cemex 30 mesh (30x70) sand	(72.0 - 150.4') 194.8 bags	(72.0 - 150.4') 209 bags (7%) Note: Lapis Lustre Sand, swabbed filter pack for approximately 2.5 hours prior to installing transition sand
91							
92					(92.1 - 142.0') 10" 10-slot 316 SS Wire Wrap Screen		
93							
94	IRZ-23-VAS-92-97 (<0.033 U ppb) 12/3/2018 11:47						
95		Topock - Alluvium Deposits	SM				
96					(94.0 - 98.6') 18.0" Borehole		
97							
98		Topock - Alluvium Deposits	SM				
99					(98.6 - 118.3') 18.0" Borehole		
100							

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Date Started:	06/26/2019	Surface Elevation:	500.0 ft amsl	Well ID: IRZ-23
Date Completed:	06/30/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Dual Rotary	Northing (NAD83):	2102535.3	Project: Final GW Remedy Phase 1
Driller Name:	Jon Martinez	Easting (NAD83):	7615825.8	Location: PG&E Topock, Needles, California
Drilling Asst:	E. Martinez / W. Saylor	Borehole Diameter:	17.5-24 inches	
Logger:	Athony Mack	Water Level Start:	46.85 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	8/11/2019	
Total Depth:	150.4 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
101		Topock - Alluvium Deposits	SM		(92.1 - 142.0') 10" 10-slot 316 SS Wire Wrap Screen		
102		Topock - Alluvium Deposits	GM				
103							
104		Topock - Alluvium Deposits	SM				
105							
106							
107							
108							
109							
110					(72.0 - 150.4') Cemex 30 mesh (30x70) sand	(72.0 - 150.4') 194.8 bags	(72.0 - 150.4') 209 bags (7%) Note: Lapis Lustre Sand, swabbed filter pack for approximately 2.5 hours prior to installing transition sand
111							
112		Topock - Alluvium Deposits	GM				
113							
114							
115							
116							
117							
118							
119		Topock - Alluvium Deposits	SM		(118.3 - 139.2') 18.0" Borehole		
120							

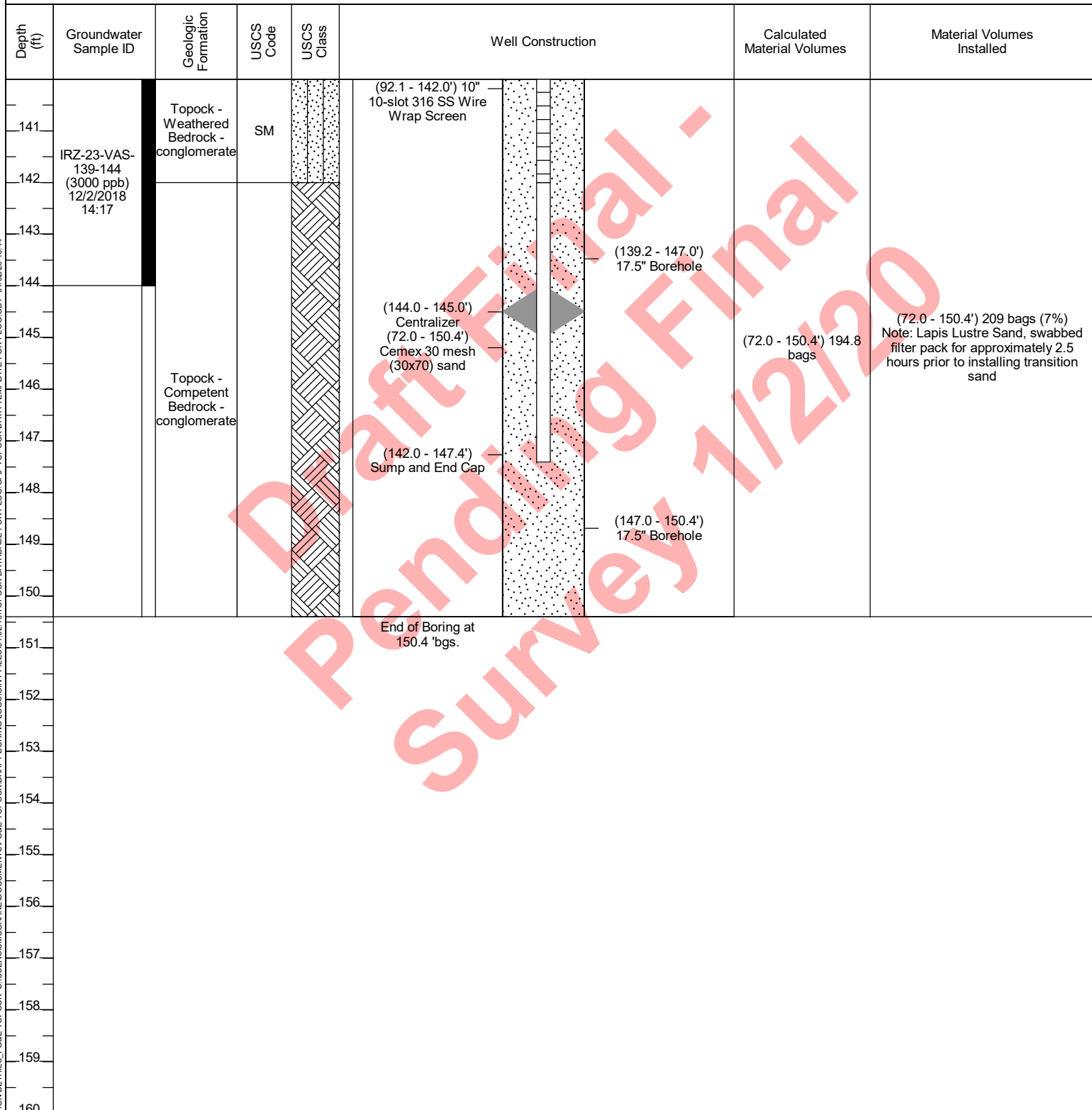
Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, groundwater data was collected during drilling of the pilot borehole

Date Started:	06/26/2019	Surface Elevation:	500.0 ft amsl	Well ID: IRZ-23
Date Completed:	06/30/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Dual Rotary	Northing (NAD83):	2102535.3	Project: Final GW Remedy Phase 1
Driller Name:	Jon Martinez	Easting (NAD83):	7615825.8	Location: PG&E Topock, Needles, California
Drilling Asst:	E. Martinez / W. Saylor	Borehole Diameter:	17.5-24 inches	
Logger:	Athony Mack	Water Level Start:	46.85 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	8/11/2019	
Total Depth:	150.4 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
121		Topock - Alluvium Deposits	SM		(92.1 - 142.0') 10" 10-slot 316 SS Wire Wrap Screen		
122							
123							
124	IRZ-23-VAS-122-127 (2000 ppb) 12/2/2018 09:24	Topock - Alluvium Deposits	ML				
125							
126							
127							
128							
129		Topock - Alluvium Deposits	SM		(72.0 - 150.4') Cemex 30 mesh (30x70) sand		
130					(118.3 - 139.2') 18.0" Borehole	(72.0 - 150.4') 194.8 bags	(72.0 - 150.4') 209 bags (7%) Note: Lapis Lustre Sand, swabbed filter pack for approximately 2.5 hours prior to installing transition sand
131							
132							
133		Topock - Alluvium Deposits	ML				
134							
135							
136							
137		Topock - Alluvium Deposits	GM				
138		Topock - Alluvium Deposits	GM				
139							
140			SM		(139.2 - 147.0') 17.5" Borehole		

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, groundwater data was collected during drilling of the pilot borehole

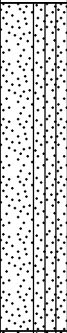


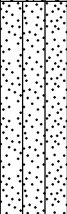
Date Started:	06/26/2019	Surface Elevation:	500.0 ft amsl	Well ID: IRZ-23
Date Completed:	06/30/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Dual Rotary	Northing (NAD83):	2102535.3	Project: Final GW Remedy Phase 1
Driller Name:	Jon Martinez	Easting (NAD83):	7615825.8	Location: PG&E Topock, Needles, California
Drilling Asst:	E. Martinez / W. Saylor	Borehole Diameter:	17.5-24 inches	
Logger:	Athony Mack	Water Level Start:	46.85 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	8/11/2019	
Total Depth:	150.4 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	



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WELL CONSTRUCTION DETAILS - PG&E TOPOCK DRAFT BORING LOGS\GINT FILES\01.02.19\TOPOCK DATA TEMPLATE FOR PLOG.GPJ - TOPOCK DATA TEMPLATE FOR PLOG.GPJ 01/02/20 16:44

Date Started:	12/04/2018	Surface Elevation:	500.4 ft amsl	Boring No.: <u>IRZ-25-Pilot</u>	
Date Completed:	12/12/2018	Northing (NAD83):	2102414.6		
Drilling Co.:	Cascade	Easting (NAD83):	7615824.5	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	172 ft bgs	Project:	Final Groundwater Remedy Phase
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	6-12 inches	Location:	1
Driller Name:	Steve Vasquez	Depth to First Water:	48.4 ft bgs	PG&E Topock, Needles, California	
Drilling Asst:	N. Dominguez/C. Alvarez	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	Connor Mills	Sampling Interval:	Continuous		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
1	84			Topock - Fluvial Deposits	SP-SM		(0.0 - 4.5') Topock - Fluvial Deposits; Poorly graded sand with silt and gravel (SP-SM); very fine grained to fine grained, subangular to subround; little granules to very large pebbles, angular to subangular; little silt; dry	(7.0') Rough drilling	(0.0 - 172.0') No water used
2							(4.0 - 4.5'); lens of granules to medium pebbles		
3				Topock - Fluvial Deposits	SP-SM		(4.5 - 12.0') Topock - Fluvial Deposits; Poorly graded sand with silt (SP-SM); pale brown (10YR 6/3); very fine grained to fine grained, angular to subround; little silt; trace granules to very large pebbles, angular to round; trace cobbles, subround to round; dry		
4									
5	120				SW-SM		(12.0 - 17.0') Topock - Fluvial Deposits; Well graded sand with silt and gravel (SW-SM); pale brown (10YR 6/3); very fine grained to coarse grained, angular to subround; some granules to very large pebbles, angular to subangular; little silt; trace cobbles, angular to subangular; trace boulders, angular to subangular; dry		
6							(14') very dark grayish brown (10YR 3/2); solid rock cores from boulders of basalt with frothy texture		
7				Topock - Fluvial Deposits	SM		(17.0 - 20.5') Topock - Fluvial Deposits; Silty sand with gravel (SM); brown (10YR 5/3); very fine grained to coarse grained, angular to subangular; some silt; little granules to very large pebbles, angular to subround; trace cobbles, angular to subangular; trace boulders, angular to subangular; dry		
8							(19.0 - 20.5') gray (7.5YR 6/1) and white (10YR 8/1); rock core from boulder composed of metadiorite, very hard		








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Date Started:	12/04/2018	Surface Elevation:	500.4 ft amsl	Boring No.: <u>IRZ-25-Pilot</u>	
Date Completed:	12/12/2018	Northing (NAD83):	2102414.6		
Drilling Co.:	Cascade	Easting (NAD83):	7615824.5	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	172 ft bgs	Project:	Final Groundwater Remedy Phase
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	6-12 inches	Location:	1
Driller Name:	Steve Vasquez	Depth to First Water:	48.4 ft bgs	PG&E Topock, Needles, California	
Drilling Asst:	N. Dominguez/C. Alvarez	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	Connor Mills	Sampling Interval:	Continuous		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
21	120				SM		(20.5 - 32.0') Topock - Fluvial Deposits; Sandy silt with gravel (ML); light yellowish brown (10YR 6/4); no plasticity; little granules to large pebbles, angular to subround; little very fine to fine grained sand, angular to subround; trace cobbles, angular to subround; trace boulders, angular to subangular; dry		(0.0 - 172.0') No water used
22									
23									
24									
25									
26									
27				Topock - Fluvial Deposits	ML				
28									
29									
30							(29.5'); to 32' powerdized rock and solid cores from boulders composed of metadiorite.		
31									
32	120								
33									
34									
35									
36				Topock - Fluvial Deposits	SM		(32.0 - 40.0') Topock - Fluvial Deposits; Silty sand with gravel (SM); pale brown (10YR 6/3); very fine grained to medium grained, angular to subround; and granules to very large pebbles, subangular to subround; little silt; trace cobbles, angular to subround; dry		
37									
38	108								
39									
40									






Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	12/04/2018	Surface Elevation:	500.4 ft amsl	Boring No.: <u>IRZ-25-Pilot</u>	
Date Completed:	12/12/2018	Northing (NAD83):	2102414.6		
Drilling Co.:	Cascade	Easting (NAD83):	7615824.5	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	172 ft bgs	Project:	Final Groundwater Remedy Phase
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	6-12 inches	Location:	1
Driller Name:	Steve Vasquez	Depth to First Water:	48.4 ft bgs	PG&E Topock, Needles, California	
Drilling Asst:	N. Dominguez/C. Alvarez	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number: RC000753.0051	
Logger:	Connor Mills	Sampling Interval:	Continuous		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
41	108			Topock - Fluvial Deposits	GM		(40.0 - 41.5') Topock - Fluvial Deposits; Silty gravel with sand (GM); pale brown (10YR 6/3); granules to very large pebbles, angular to subround; some very fine to medium grained sand, angular to subangular; little silt; trace cobbles, angular to subround; dry		(0.0 - 172.0') No water used
42				Topock - Fluvial Deposits	GW-GM		(41.5 - 49.5') Topock - Fluvial Deposits; Well graded gravel with silt and sand (GW-GM); light brown (7.5YR 6/4); granules to very large pebbles, subangular to subround; some cobbles, angular to subround; little very fine to medium grained sand, angular to round; little silt; dry		
43									
44									
45	114	IRZ-25-SS-47-52 12/14/2018 10:35		Topock - Fluvial Deposits	GW-GM		(47'); moist; to 49.5 ft bgs	(49.5') Approximate depth to water table	
46									
47				Topock - Alluvium Deposits	SM		(49.5 - 52.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (10YR 5/3); very fine grained to very coarse grained, subangular to subround; some granules to medium pebbles, angular to subangular; some silt; wet		
48									
49				Topock - Alluvium Deposits	GM		(52.0 - 57.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); reddish brown (5YR 5/4); angular to subangular; some very fine to coarse grained sand, angular to subangular; some silt; little clay; dry to moist		
50									
51									
52									
53	120	IRZ-25-SS-52-57 12/14/2018 10:40	IRZ-25-VAS-52-57 (3500 ppb) 12/5/2018 10:40	Topock - Alluvium Deposits	ML		(57.0 - 59.5') Topock - Alluvium Deposits; Sandy silt (ML); reddish brown (5YR 5/4); no plasticity; and very fine to very coarse grained sand, angular to subangular; little granules to small pebble, angular to subangular; wet to dry; stiff; strong cementation		
54									
55				Topock - Alluvium Deposits	GM		(59.5 - 68.0') Topock - Alluvium Deposits; Silty gravel with sand		
56									

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Date Started:	12/04/2018	Surface Elevation:	500.4 ft amsl	Boring No.: <u>IRZ-25-Pilot</u>	
Date Completed:	12/12/2018	Northing (NAD83):	2102414.6		
Drilling Co.:	Cascade	Easting (NAD83):	7615824.5	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	172 ft bgs	Project:	Final Groundwater Remedy Phase
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	6-12 inches	Location:	1
Driller Name:	Steve Vasquez	Depth to First Water:	48.4 ft bgs	PG&E Topock, Needles, California	
Drilling Asst:	N. Dominguez/C. Alvarez	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	Connor Mills	Sampling Interval:	Continuous		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
61	120	IRZ-25-SS-57-62 12/14/2018 10:45		Topock - Alluvium Deposits	GM		(GM); reddish brown (5YR 5/4); granules to very large pebbles, angular to subangular; some very fine to coarse grained sand, angular to subangular; some silt; little clay; dry to moist		(0.0 - 172.0') No water used
62									
63									
64									
65	120	IRZ-25-SS-62-67 12/14/2018 10:55	IRZ-25-VAS-62-67 (620 ppb) 12/5/2018 14:17	Topock - Alluvium Deposits	GM				
66									
67									
68									
69									
70									
71									
72									
73	120	IRZ-25-SS-67-72 12/14/2018 10:55		Topock - Alluvium Deposits	SM		(68.0 - 72.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (5YR 5/4); very fine grained to very coarse grained, subangular to subround; some silt; little granules to medium pebble, angular to subangular; wet		
74									
75									
76									
77	60	IRZ-25-SS-72-77 12/14/2018 11:05		Topock - Alluvium Deposits	SM		(72.0 - 77.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); yellowish brown / moderate yellowish brown (10YR 5/4); fine grained to very coarse grained, subangular to subround; some silt; little granules to medium pebble, angular to subround; wet		
78									
79									
80									
		IRZ-25-SS-77-82 12/14/2018 11:05		Topock - Alluvium Deposits	GM		(77.0 - 79.5') Topock - Alluvium Deposits; Silty gravel with sand (GM); reddish brown (5YR 5/4); granules to large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subround; little silt; wet		
					SM		(79.5 - 87.0') Topock - Alluvium Deposits; Silty sand with gravel		

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Date Started:	12/04/2018	Surface Elevation:	500.4 ft amsl	Boring No.: <u>IRZ-25-Pilot</u>	
Date Completed:	12/12/2018	Northing (NAD83):	2102414.6		
Drilling Co.:	Cascade	Easting (NAD83):	7615824.5	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	172 ft bgs	Project:	Final Groundwater Remedy Phase
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	6-12 inches	Location:	1
Driller Name:	Steve Vasquez	Depth to First Water:	48.4 ft bgs	PG&E Topock, Needles, California	
Drilling Asst:	N. Dominguez/C. Alvarez	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number: RC000753.0051	
Logger:	Connor Mills	Sampling Interval:	Continuous		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
81	60	IRZ-25-SS-77-82 12/14/2018 11:05		Topock - Alluvium Deposits	SM		(SM); reddish brown (5YR 5/4); very fine grained to very coarse grained, subangular to round; little granules to medium pebbles, angular to subangular; little silt; trace cobbles, angular to subangular; wet; cobbles composed of metadiorite		(0.0 - 172.0') No water used
82									
83									
84		IRZ-25-SS-82-87 12/14/2018 11:10							
85									
86									
87				Topock - Alluvium Deposits	SM		(87.0 - 94.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (5YR 5/4); fine grained to very coarse grained, subangular to round; some silt; little granules to medium pebble, angular to subangular; wet; trace large pebbles		
88									
89		IRZ-25-SS-87-92 12/14/2018 11:15							
90									
91									
92	108						IRZ-25-VAS-92-97 (130 ppb) 12/6/2018 09:07	Topock - Alluvium Deposits	ML
95		IRZ-25-SS-92-97 12/14/2018 11:20	Topock - Alluvium Deposits	SM		(95.5 - 97.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown / moderate brown(5YR 4/4); very fine grained to very coarse grained, angular to subround; some granules to large pebble, angular to subangular; some silt; trace cobbles; wet; cobbles composed of metadiorite			
96									
97				Topock - Alluvium Deposits	SW-SM				
98	114	IRZ-25-SS-97-102 12/14/2018 11:25							
99									
100									

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Date Started:	12/04/2018	Surface Elevation:	500.4 ft amsl	Boring No.: <u>IRZ-25-Pilot</u>	
Date Completed:	12/12/2018	Northing (NAD83):	2102414.6		
Drilling Co.:	Cascade	Easting (NAD83):	7615824.5	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	172 ft bgs	Project:	Final Groundwater Remedy Phase
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	6-12 inches	Location:	1
Driller Name:	Steve Vasquez	Depth to First Water:	48.4 ft bgs	PG&E Topock, Needles, California	
Drilling Asst:	N. Dominguez/C. Alvarez	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number: RC000753.0051	
Logger:	Connor Mills	Sampling Interval:	Continuous		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
101	114	IRZ-25-SS-97-102 12/14/2018 11:25		Topock - Alluvium Deposits	SW-SM				(0.0 - 172.0') No water used
102									
103				Topock - Alluvium Deposits	ML		(102.0 - 103.5') Topock - Alluvium Deposits; Sandy silt with gravel (ML); light reddish brown / light brown(5YR 6/4); little granules to large pebbles, angular to subangular; little very fine to very coarse grained sand, subangular to subround; little clay; trace cobbles; wet; 100 mm cobble composed of metadiorite		
104		IRZ-25-SS-102-107 12/14/2018 11:30		Topock - Alluvium Deposits	GM		(103.5 - 109.5') Topock - Alluvium Deposits; Silty gravel (GM); reddish brown (5YR 5/4); granules to large pebbles, angular to subround; some silt; little very fine to very coarse grained sand, angular to subround; trace; wet; trace very large pebble		
105	120								
106									
107									
108		IRZ-25-SS-107-112 12/14/2018 11:35		Topock - Alluvium Deposits	SM		(109.5 - 117.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); (5YR 4/); fine grained to very coarse grained, subangular to subround; some granules to very large pebbles, angular to subround; some silt; trace cobbles; wet; very large pebbles to cobbles composed of trace amounts of metadiorite		
109	120								
110									
111									
112		IRZ-25-SS-112-117 12/14/2018 11:40	IRZ-25-VAS-112-117 (< 0.17 U ppb) 12/11/2018 10:34	Topock - Alluvium Deposits	SM				
113	120								
114									
115									
116									
117	120								
118		IRZ-25-SS-117-122 12/14/2018 11:45		Topock - Alluvium Deposits	SM		(117.0 - 119.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown / moderate brown(5YR 4/4); very fine grained to very coarse grained, subangular to subround; little granules to medium pebbles, angular to subround; little silt; little clay; wet		
119									
120					ML		(119.5 - 124.5') Topock - Alluvium Deposits; Sandy silt with gravel		




Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	<u>12/04/2018</u>	Surface Elevation:	<u>500.4 ft amsl</u>	Boring No.: <u>IRZ-25-Pilot</u>	
Date Completed:	<u>12/12/2018</u>	Northing (NAD83):	<u>2102414.6</u>		
Drilling Co.:	<u>Cascade</u>	Easting (NAD83):	<u>7615824.5</u>	Client:	<u>PG&E</u>
Drilling Method:	<u>Sonic Drilling</u>	Total Depth:	<u>172 ft bgs</u>	Project:	<u>Final Groundwater Remedy Phase</u>
Drill Rig Type:	<u>Prosonic Truck Mount</u>	Borehole Diameter:	<u>6-12 inches</u>	Location:	<u>1</u>
Driller Name:	<u>Steve Vasquez</u>	Depth to First Water:	<u>48.4 ft bgs</u>	<u>PG&E Topock, Needles, California</u>	
Drilling Asst:	<u>N. Dominguez/C. Alvarez</u>	Sampling Method:	<u>4 inch x 10 ft Core Barrel</u>	Project Number: <u>RC000753.0051</u>	
Logger:	<u>Connor Mills</u>	Sampling Interval:	<u>Continuous</u>		
Editor:	<u>Sean McGrane</u>	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
121	120	IRZ-25-SS-117-122 12/14/2018 11:45		Topock - Alluvium Deposits	ML		(ML); reddish brown / moderate brown(5YR 4/4); some very fine to very coarse grained sand, angular to subround; little granules to medium pebbles, angular to subangular; wet		(0.0 - 172.0') No water used
122		IRZ-25-SS-122-127 12/14/2018 10:50							
123									
124									
125	120	IRZ-25-SS-127-132 12/14/2018 11:55		Topock - Alluvium Deposits	SM		(124.5 - 127.0') Topock - Alluvium Deposits; Silty sand (SM); reddish brown / moderate brown(5YR 4/4); very fine grained to coarse grained, subangular to subround; some silt; little granules to medium pebbles, angular to subangular; wet		
126									
127									
128									
129	120	IRZ-25-SS-132-137 12/14/2018 12:00		Topock - Alluvium Deposits	GM		(127.0 - 132.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); reddish brown (5YR 5/4); granules to large pebbles, angular to subangular; and silt; little very fine to coarse grained sand, angular to subangular; dry to moist; moderate cementation		
130									
131									
132									
133	120	IRZ-25-SS-137-142 12/14/2018 12:05		Topock - Alluvium Deposits	ML		(132.0 - 137.0') Topock - Alluvium Deposits; Sandy silt with gravel (ML); reddish brown / moderate brown(5YR 4/4); no plasticity; little granules to medium pebbles, angular to subangular; little very fine to very coarse grained sand, angular to subround; dry to moist		
134									
135									
136									
137	120			Topock - Alluvium Deposits	ML		(137.0 - 139.5') Topock - Alluvium Deposits; Sandy silt (ML); reddish brown / moderate brown(5YR 4/4); no plasticity; some very fine to coarse grained sand, angular to subround; little granules to medium pebbles, angular to subangular; little clay; wet; dessicated		
138									
139									
140									
					ML		(139.5 - 147.0') Topock - Alluvium Deposits; Sandy silt with gravel		

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Date Started:	12/04/2018	Surface Elevation:	500.4 ft amsl	Boring No.: <u>IRZ-25-Pilot</u>	
Date Completed:	12/12/2018	Northing (NAD83):	2102414.6		
Drilling Co.:	Cascade	Easting (NAD83):	7615824.5	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	172 ft bgs	Project:	Final Groundwater Remedy Phase
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	6-12 inches	Location:	1
Driller Name:	Steve Vasquez	Depth to First Water:	48.4 ft bgs	PG&E Topock, Needles, California	
Drilling Asst:	N. Dominguez/C. Alvarez	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number: RC000753.0051	
Logger:	Connor Mills	Sampling Interval:	Continuous		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
141	120	IRZ-25-SS-137-142 12/14/2018 12:05		Topock - Alluvium Deposits	ML		(ML); reddish brown / moderate brown (5YR 4/4); no plasticity; little granules to medium pebbles, angular to subangular; little very fine to coarse grained sand, angular to subangular; little clay; hard		(0.0 - 172.0') No water used
142									
143									
144									
145		IRZ-25-SS-142-147 12/14/2018 00:10							
146	108			Topock - Alluvium Deposits	SM		(147.0 - 157.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (5YR 4/3); fine grained to very coarse grained, subangular to round; some granules to large pebbles, angular to subround; little silt; trace cobbles, angular to subangular; wet; cobbles composed of metadiorite	(147.0 - 157.0') Very saturated material with potential to produce water	
147									
148									
149		IRZ-25-SS-147-152 12/14/2018 12:15	IRZ-25-VAS-147-152 (3600 ppb) 12/11/2018 13:54						
150									
151									
152									
153									
154		IRZ-25-SS-152-157 12/14/2018 00:20							
155									
156	108			Topock - Weathered Bedrock - conglomerate	ML		(157.0 - 162.0') Topock - Weathered Bedrock - conglomerate; Gravelly silt (ML); reddish brown (5YR 5/4); no plasticity; little granules to large pebbles, angular to subangular; little very fine to medium grained sand, angular to subangular; dry		
157									
158									
159									
160									

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Date Started:	12/04/2018	Surface Elevation:	500.4 ft amsl	Boring No.: IRZ-25-Pilot
Date Completed:	12/12/2018	Northing (NAD83):	2102414.6	
Drilling Co.:	Cascade	Easting (NAD83):	7615824.5	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	172 ft bgs	Project: Final Groundwater Remedy Phase
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	6-12 inches	Location: 1
Driller Name:	Steve Vasquez	Depth to First Water:	48.4 ft bgs	PG&E Topock, Needles, California
Drilling Asst:	N. Dominguez/C. Alvarez	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger:	Connor Mills	Sampling Interval:	Continuous	
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
161				Topock - Weathered Bedrock - conglomerate	ML				(0.0 - 172.0') No water used
162									
163	108	IRZ-25-SS-162-166 12/14/2018 12:25	IRZ-25-VAS-162-167 (3000 ppb) 12/13/2018 10:37	Topock - Weathered Bedrock - conglomerate	ML		(162.0 - 166.0') Topock - Weathered Bedrock - conglomerate; Gravelly silt (ML); reddish brown / moderate brown (5YR 4/4); low plasticity; some granules to medium pebbles, angular to subround; little very fine to coarse grained sand, angular to subround; wet; stiff	(162.0 - 172.0') Drill rods chattering, rough drilling	
164									
165									
166									
167							(166.0 - 172.0') Topock - Competent Bedrock - conglomerate; reddish brown (5YR 5/4); dry; moderate cementation; friable		
168									
169	60			Topock - Competent Bedrock - conglomerate					
170									
171									
172									
End of Boring at 172.0' bgs.									
173									
174									
175									
176									
177									
178									
179									
180									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	12/04/2018	Surface Elevation:	500.4 ft amsl	Well ID: IRZ-25-Pilot
Date Completed:	12/12/2018	Northing (NAD83):	2102414.6	
Drilling Co.:	Cascade	Easting (NAD83):	7615824.5	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	172 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Steve Vasquez	Borehole Diameter:	6-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	N. Dominguez/C. Alvarez	Depth to First Water:	48.4 ft bgs	
Logger:	Connor Mills	Editor:	Sean McGrane	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction		Calculated Material Volumes	Material Volumes Installed	
1		Topock - Fluvial Deposits	SP-SM		(0.0 - 0.5') Temporary Steel Plate with BMP	(0.0 - 4.0') 12" Borehole	(0.0 - 0.5') 1	(0.0 - 0.5') 1 (0%)	
2					(0.5 - 5.0') Plastered Sand		(0.5 - 5.0') 7.9 bags	(0.5 - 5.0') 4 bags (-49%) Note: Wildcat Washed	
3									
4									
5		Topock - Fluvial Deposits	SP-SM						
6									
7									
8									
9		Topock - Fluvial Deposits	SW-SM						
10									
11									
12									
13		Topock - Fluvial Deposits	SM						
14									
15									
16									
17		Topock - Fluvial Deposits							
18									
19									
20									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started:	12/04/2018	Surface Elevation:	500.4 ft amsl	Well ID: IRZ-25-Pilot
Date Completed:	12/12/2018	Northing (NAD83):	2102414.6	
Drilling Co.:	Cascade	Easting (NAD83):	7615824.5	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	172 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Steve Vasquez	Borehole Diameter:	6-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	N. Dominguez/C. Alvarez	Depth to First Water:	48.4 ft bgs	
Logger:	Connor Mills	Editor:	Sean McGrane	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
21			SM				
22							
23							
24							
25							
26		Topock - Fluvial Deposits	ML				
27							
28							
29							
30					(5.0 - 157.0') Pea Gravel	(4.0 - 172.0') 6" Borehole	(5.0 - 157.0') 65.8 bags
31							(5.0 - 157.0') 60 bags (-9%) Note: Cal-Silica 3/8"x1/4"
32							
33							
34							
35							
36		Topock - Fluvial Deposits	SM				
37							
38							
39							
40							


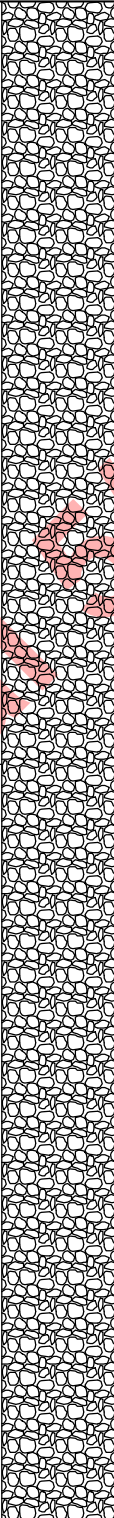
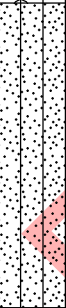
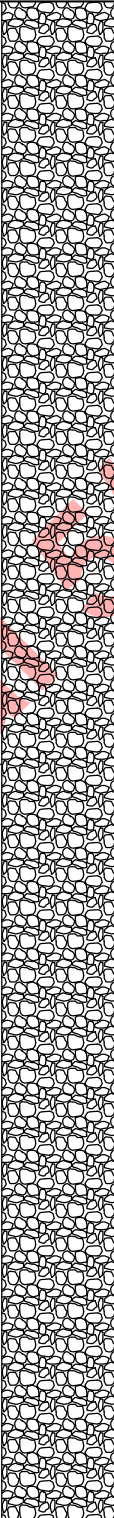
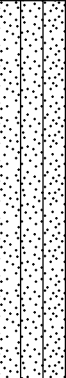
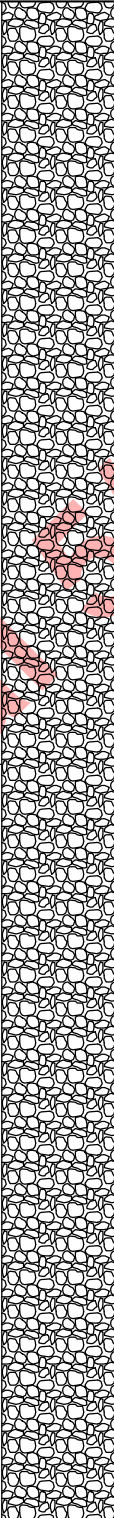

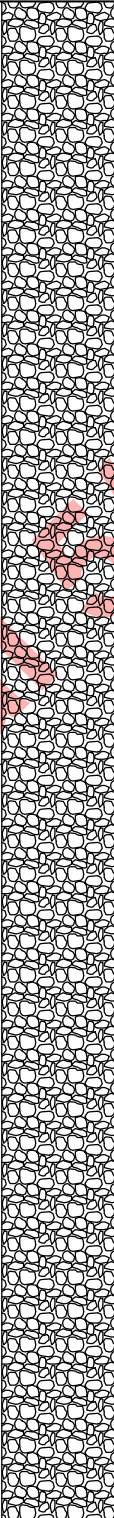
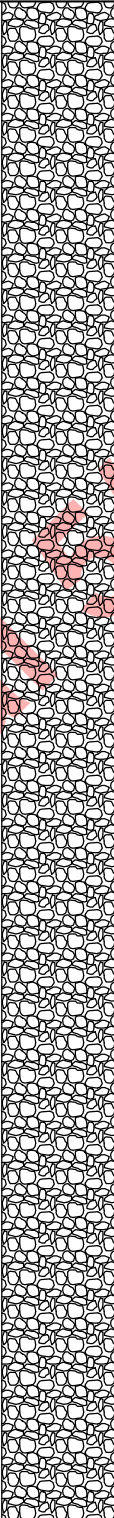
Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started:	12/04/2018	Surface Elevation:	500.4 ft amsl	Well ID: IRZ-25-Pilot
Date Completed:	12/12/2018	Northing (NAD83):	2102414.6	
Drilling Co.:	Cascade	Easting (NAD83):	7615824.5	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	172 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Steve Vasquez	Borehole Diameter:	6-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	N. Dominguez/C. Alvarez	Depth to First Water:	48.4 ft bgs	
Logger:	Connor Mills	Editor:	Sean McGrane	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
41		Topock - Fluvial Deposits	GM				
42							
43							
44							
45		Topock - Fluvial Deposits	GW-GM				
46							
47							
48							
49							
50		Topock - Alluvium Deposits	SM		(5.0 - 157.0') Pea Gravel	(4.0 - 172.0') 6" Borehole	(5.0 - 157.0') 65.8 bags
51							
52							
53		Topock - Alluvium Deposits	GM				
54	IRZ-25-VAS-52-57 (3500 ppb) 12/5/2018 10:40						
55							
56							
57							
58		Topock - Alluvium Deposits	ML				
59							
60			GM				

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started:	12/04/2018	Surface Elevation:	500.4 ft amsl	Well ID: IRZ-25-Pilot
Date Completed:	12/12/2018	Northing (NAD83):	2102414.6	
Drilling Co.:	Cascade	Easting (NAD83):	7615824.5	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	172 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Steve Vasquez	Borehole Diameter:	6-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	N. Dominguez/C. Alvarez	Depth to First Water:	48.4 ft bgs	
Logger:	Connor Mills	Editor:	Sean McGrane	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction			Calculated Material Volumes	Material Volumes Installed
61	IRZ-25-VAS-62-67 (620 ppb) 12/5/2018 14:17	Topock - Alluvium Deposits	GM			(5.0 - 157.0') Pea Gravel	(4.0 - 172.0') 6" Borehole	(5.0 - 157.0') 65.8 bags	(5.0 - 157.0') 60 bags (-9%) Note: Cal-Silica 3/8"x1/4"
62									
63									
64									
65									
66									
67									
68	Topock - Alluvium Deposits	SM			(5.0 - 157.0') Pea Gravel	(4.0 - 172.0') 6" Borehole	(5.0 - 157.0') 65.8 bags	(5.0 - 157.0') 60 bags (-9%) Note: Cal-Silica 3/8"x1/4"	
69									
70									
71									
72	Topock - Alluvium Deposits	SM			(5.0 - 157.0') Pea Gravel	(4.0 - 172.0') 6" Borehole	(5.0 - 157.0') 65.8 bags	(5.0 - 157.0') 60 bags (-9%) Note: Cal-Silica 3/8"x1/4"	
73									
74									
75									
76	Topock - Alluvium Deposits	SM			(5.0 - 157.0') Pea Gravel	(4.0 - 172.0') 6" Borehole	(5.0 - 157.0') 65.8 bags	(5.0 - 157.0') 60 bags (-9%) Note: Cal-Silica 3/8"x1/4"	
77									
78									
79									
80		SM			(5.0 - 157.0') Pea Gravel	(4.0 - 172.0') 6" Borehole	(5.0 - 157.0') 65.8 bags	(5.0 - 157.0') 60 bags (-9%) Note: Cal-Silica 3/8"x1/4"	

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started:	12/04/2018	Surface Elevation:	500.4 ft amsl	Well ID: IRZ-25-Pilot
Date Completed:	12/12/2018	Northing (NAD83):	2102414.6	
Drilling Co.:	Cascade	Easting (NAD83):	7615824.5	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	172 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Steve Vasquez	Borehole Diameter:	6-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	N. Dominguez/C. Alvarez	Depth to First Water:	48.4 ft bgs	
Logger:	Connor Mills	Editor:	Sean McGrane	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
81							
82							
83		Topock - Alluvium Deposits	SM				
84							
85							
86							
87							
88							
89							
90		Topock - Alluvium Deposits	SM		(5.0 - 157.0') Pea Gravel		
91					(4.0 - 172.0') 6" Borehole		
92						(5.0 - 157.0') 65.8 bags	(5.0 - 157.0') 60 bags (-9%) Note: Cal-Silica 3/8"x1/4"
93							
94	IRZ-25-VAS-92-97 (130 ppb) 12/6/2018 09:07						
95		Topock - Alluvium Deposits	ML				
96		Topock - Alluvium Deposits	SM				
97							
98		Topock - Alluvium Deposits	SW-SM				
99							
100							

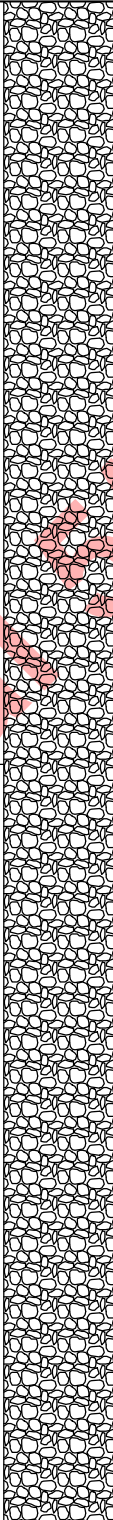
Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started:	12/04/2018	Surface Elevation:	500.4 ft amsl	Well ID: IRZ-25-Pilot
Date Completed:	12/12/2018	Northing (NAD83):	2102414.6	
Drilling Co.:	Cascade	Easting (NAD83):	7615824.5	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	172 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Steve Vasquez	Borehole Diameter:	6-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	N. Dominguez/C. Alvarez	Depth to First Water:	48.4 ft bgs	
Logger:	Connor Mills	Editor:	Sean McGrane	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
101		Topock - Alluvium Deposits	SW-SM				
102		Topock - Alluvium Deposits	ML				
103							
104		Topock - Alluvium Deposits	GM				
105							
106							
107							
108							
109							
110					(5.0 - 157.0') Pea Gravel	(4.0 - 172.0') 6" Borehole	(5.0 - 157.0') 65.8 bags
111							
112							
113		Topock - Alluvium Deposits	SM				
114	IRZ-25-VAS-112-117 (< 0.17 U ppb) 12/11/2018 10:34						
115							
116							
117							
118		Topock - Alluvium Deposits	SM				
119							
120			ML				

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started:	12/04/2018	Surface Elevation:	500.4 ft amsl	Well ID: IRZ-25-Pilot
Date Completed:	12/12/2018	Northing (NAD83):	2102414.6	
Drilling Co.:	Cascade	Easting (NAD83):	7615824.5	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	172 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Steve Vasquez	Borehole Diameter:	6-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	N. Dominguez/C. Alvarez	Depth to First Water:	48.4 ft bgs	
Logger:	Connor Mills	Editor:	Sean McGrane	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction		Calculated Material Volumes	Material Volumes Installed					
121		Topock - Alluvium Deposits	ML										
122													
123													
124													
125		Topock - Alluvium Deposits	SM										
126													
127		Topock - Alluvium Deposits	GM									(5.0 - 157.0') 65.8 bags	(5.0 - 157.0') 60 bags (-9%) Note: Cal-Silica 3/8"x1/4"
128													
129													
130													
131		Topock - Alluvium Deposits	ML										
132													
133													
134													
135													
136													
137		Topock - Alluvium Deposits	ML										
138													
139													
140			ML										

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started:	12/04/2018	Surface Elevation:	500.4 ft amsl	Well ID: IRZ-25-Pilot
Date Completed:	12/12/2018	Northing (NAD83):	2102414.6	
Drilling Co.:	Cascade	Easting (NAD83):	7615824.5	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	172 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Steve Vasquez	Borehole Diameter:	6-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	N. Dominguez/C. Alvarez	Depth to First Water:	48.4 ft bgs	
Logger:	Connor Mills	Editor:	Sean McGrane	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
141							
142							
143							
144		Topock - Alluvium Deposits	ML				
145							
146							
147							
148							
149	IRZ-25-VAS-147-152 (3600 ppb) 12/11/2018 13:54				(5.0 - 157.0') Pea Gravel	(5.0 - 157.0') 65.8 bags	(5.0 - 157.0') 60 bags (-9%) Note: Cal-Silica 3/8"x1/4"
150							
151							
152		Topock - Alluvium Deposits	SM		(4.0 - 172.0') 6" Borehole		
153							
154							
155							
156							
157							
158		Topock - Weathered Bedrock - conglomerate	ML		(157.0 - 172.0') Cemex # 2/12 Mesh (16x30)	(157.0 - 172.0') 2.8 bags	(157.0 - 172.0') 4 bags (43%) Note: Lapis Lustre Sand
159							
160							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started:	12/04/2018	Surface Elevation:	500.4 ft amsl	Well ID: IRZ-25-Pilot
Date Completed:	12/12/2018	Northing (NAD83):	2102414.6	
Drilling Co.:	Cascade	Easting (NAD83):	7615824.5	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	172 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Steve Vasquez	Borehole Diameter:	6-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	N. Dominguez/C. Alvarez	Depth to First Water:	48.4 ft bgs	
Logger:	Connor Mills	Editor:	Sean McGrane	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
161		Topock - Weathered Bedrock - conglomerate	ML				
162							
163							
164	IRZ-25-VAS-162-167 (3000 ppb) 12/13/2018 10:37	Topock - Weathered Bedrock - conglomerate	ML				
165							
166					(157.0 - 172.0') Cemex # 2/12 Mesh (16x30)	(4.0 - 172.0') 6" Borehole	(157.0 - 172.0') 2.8 bags
167							(157.0 - 172.0') 4 bags (43%) Note: Lapis Lustre Sand
168							
169		Topock - Competent Bedrock - conglomerate					
170							
171							
172							
173							
174							
175							
176							
177							
178							
179							
180							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Drilling Log

Sheet: 1 of 9

Date Started:	04/26/2019	Surface Elevation:	500.4 ft amsl	Boring No.: IRZ-25
Date Completed:	05/12/2019	Northing (NAD83):	2102414.6	
Drilling Co.:	Cascade	Easting (NAD83):	7615824.5	Client: PG&E
Drilling Method:	Dual Rotary	Total Depth:	174 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Foremost DR-24 HD	Conductor Casing Diameter:	18 inches	Location: PG&E Topock, Needles, California
Driller Name:	Jon Martinez	Drill Casing Diameter:	16 inches	
Drilling Asst:	E. Martinez / W. Saylor	Drill Bit:	15.5 & 17.5 inch Tri-cone	Project Number: RC000753.0051
Tool-Pusher:	Arnold Lamon	Depth to First Water:	48.4 ft bgs	
Rig Geologist:	A. Mack / D Cornell	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Drilling Run and Average Penetration Rate	USCS Code	USCS Class	Casing Diameter	Description (See Pilot boring log for full geologic descriptions)	Drilling Notes	Drilling Fluid
1					(0.0 - 4.5') Topock - Fluvial Deposits; Poorly graded sand with silt and gravel (SP-SM)	(0.0 - 17.0') Drilled with water.	(0.0 - 21.2') 845.46 gallons of water used; 615.18 gallons of water recovered; 230.28 gallons of water lost
2							
3		SP-SM					
4							
5					(4.5 - 12.0') Topock - Fluvial Deposits; Poorly graded sand with silt (SP-SM); pale brown (10YR 6/3)		
6							
7							
8		SP-SM					
9							
10	(0.0 - 21.2) 8.02 mins/ft			(0.0 - 21.2') 18.0" Steel Casing			
11							
12							
13					(12.0 - 17.0') Topock - Fluvial Deposits; Well graded sand with silt and gravel (SW-SM); pale brown (10YR 6/3)		
14		SW-SM					
15							
16							
17							
18					(17.0 - 20.5') Topock - Fluvial Deposits; Silty sand with gravel (SM); brown (10YR 5/3)	(17.0 - 21.2') Rough drilling.	
19		SM					
20							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater

Remarks: blue water table symbol represents depth to water measured during the first VAS interval of the pilot borehole

Date Started:	04/26/2019	Surface Elevation:	500.4 ft amsl	Boring No.: IRZ-25
Date Completed:	05/12/2019	Northing (NAD83):	2102414.6	
Drilling Co.:	Cascade	Easting (NAD83):	7615824.5	Client: PG&E
Drilling Method:	Dual Rotary	Total Depth:	174 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Foremost DR-24 HD	Conductor Casing Diameter:	18 inches	Location: PG&E Topock, Needles, California
Driller Name:	Jon Martinez	Drill Casing Diameter:	16 inches	
Drilling Asst:	E. Martinez / W. Saylor	Drill Bit:	15.5 & 17.5 inch Tri-cone	Project Number: RC000753.0051
Tool-Pusher:	Arnold Lamon	Depth to First Water:	48.4 ft bgs	
Rig Geologist:	A. Mack / D Cornell	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Drilling Run and Average Penetration Rate	USCS Code	USCS Class	Casing Diameter	Description (See Pilot boring log for full geologic descriptions)	Drilling Notes	Drilling Fluid
21	(0.0 - 21.2) 8.02 mins/ft	SM		(0.0 - 21.2') 18.0" Steel Casing	(20.5 - 32.0') Topock - Fluvial Deposits; Sandy silt with gravel (ML); light yellowish brown (10YR 6/4)		
22						(21.2 - 30.0') Advanced 9 ft during 1st 2 hrs, no advancement during 3rd hour. Volume of waste water declined from beginning to end of drilling run. Possible loss could be from backflow to cuttings and shaker tanks.	(21.2 - 31.0') 1065.06 gallons of water used; -121.6 gallons of water recovered; 1186.66 gallons of water lost
23							
24							
25							
26	(21.2 - 30.0) 23.89 mins/ft	ML		(21.2 - 30.0') 18.0" Steel Casing			
27							
28							
29							
30							
31	(30.0 - 31.0) 197.18 mins/ft			(30.0 - 31.0') 18.0" Steel Casing		(30.0 - 31.0') Borehole only advanced 1 foot in 4 hrs, likely drilling on a boulder.	
32						(31.0 - 41.0') Drilled with water.	(31.0 - 41.0') 1087.02 gallons of water used; 2478 gallons of water recovered; 1390.98 gallons of water gained
33					(32.0 - 40.0') Topock - Fluvial Deposits; Silty sand with gravel (SM); pale brown (10YR 6/3)		
34							
35							
36	(31.0 - 41.0) 12.09 mins/ft	SM		(31.0 - 41.0') 18.0" Steel Casing			
37							
38							
39							
40							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater

Remarks: blue water table symbol represents depth to water measured during the first VAS interval of the pilot borehole

Date Started:	04/26/2019	Surface Elevation:	500.4 ft amsl	Boring No.: IRZ-25
Date Completed:	05/12/2019	Northing (NAD83):	2102414.6	
Drilling Co.:	Cascade	Easting (NAD83):	7615824.5	Client: PG&E
Drilling Method:	Dual Rotary	Total Depth:	174 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Foremost DR-24 HD	Conductor Casing Diameter:	18 inches	Location: PG&E Topock, Needles, California
Driller Name:	Jon Martinez	Drill Casing Diameter:	16 inches	
Drilling Asst:	E. Martinez / W. Saylor	Drill Bit:	15.5 & 17.5 inch Tri-cone	Project Number: RC000753.0051
Tool-Pusher:	Arnold Lamon	Depth to First Water:	48.4 ft bgs	
Rig Geologist:	A. Mack / D Cornell	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Drilling Run and Average Penetration Rate	USCS Code	USCS Class	Casing Diameter	Description (See Pilot boring log for full geologic descriptions)	Drilling Notes	Drilling Fluid
41	(31.0 - 41.0) 12.09 mins/ft	GM	(31.0 - 41.0') 18.0" Steel Casing	(40.0 - 41.5') Topock - Fluvial Deposits; Silty gravel with sand (GM); pale brown (10YR 6/3)			
42	(41.0 - 43.0) 8.50 mins/ft		(41.0 - 43.0') 16.0" Steel Casing	(41.5 - 49.5') Topock - Fluvial Deposits; Well graded gravel with silt and sand (GW-GM); light brown (7.5YR 6/4)		(41.0 - 43.0') Drilled with water.	(41.0 - 43.0') 230.58 gallons of water used; 0 gallons of water recovered; 230.58 gallons of water lost
43						(43.0 - 61.5') Drilled with water.	(43.0 - 61.5') 684.42 gallons of water used; 526.16 gallons of water recovered; 158.26 gallons of water lost
44							
45							
46							
47							
48							
49							
50							
51							
52	(43.0 - 61.5) 7.04 mins/ft		(43.0 - 61.5') 16.0" Steel Casing	(49.5 - 52.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (10YR 5/3)			
53				(52.0 - 57.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); reddish brown (5YR 5/4)			
54							
55							
56							
57							
58					(57.0 - 59.5') Topock - Alluvium Deposits; Sandy silt (ML); reddish brown (5YR 5/4)		
59							
60					(59.5 - 68.0') Topock - Alluvium		

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater

Remarks: blue water table symbol represents depth to water measured during the first VAS interval of the pilot borehole

Drilling Log

Sheet: 4 of 9

Date Started:	04/26/2019	Surface Elevation:	500.4 ft amsl	Boring No.: IRZ-25
Date Completed:	05/12/2019	Northing (NAD83):	2102414.6	
Drilling Co.:	Cascade	Easting (NAD83):	7615824.5	Client: PG&E
Drilling Method:	Dual Rotary	Total Depth:	174 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Foremost DR-24 HD	Conductor Casing Diameter:	18 inches	Location: PG&E Topock, Needles, California
Driller Name:	Jon Martinez	Drill Casing Diameter:	16 inches	
Drilling Asst:	E. Martinez / W. Saylor	Drill Bit:	15.5 & 17.5 inch Tri-cone	Project Number: RC000753.0051
Tool-Pusher:	Arnold Lamon	Depth to First Water:	48.4 ft bgs	
Rig Geologist:	A. Mack / D Cornell	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Drilling Run and Average Penetration Rate	USCS Code	USCS Class	Casing Diameter	Description (See Pilot boring log for full geologic descriptions)	Drilling Notes	Drilling Fluid
61	(43.0 - 61.5) 7.04 mins/ft			(43.0 - 61.5') 16.0" Steel Casing	Deposits; Silty gravel with sand (GM); reddish brown (5YR 5/4)		
62						(61.5 - 81.5') Drilled with water.	(61.5 - 81.5') 527.04 gallons of water used; 848.24 gallons of water recovered; 321.2 gallons of water gained
63							
64		GM					
65							
66							
67							
68							
69					(68.0 - 72.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (5YR 5/4)		
70		SM					
71	(61.5 - 81.5) 3.67 mins/ft			(61.5 - 81.5') 16.0" Steel Casing			
72							
73					(72.0 - 77.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); yellowish brown / moderate yellowish brown (10YR 5/4)		
74		SM					
75							
76							
77							
78		GM			(77.0 - 79.5') Topock - Alluvium Deposits; Silty gravel with sand (GM); reddish brown (5YR 5/4)		
79							
80		SM			(79.5 - 87.0') Topock - Alluvium		

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater

Remarks: blue water table symbol represents depth to water measured during the first VAS interval of the pilot borehole

Date Started:	04/26/2019	Surface Elevation:	500.4 ft amsl	Boring No.: IRZ-25	
Date Completed:	05/12/2019	Northing (NAD83):	2102414.6		
Drilling Co.:	Cascade	Easting (NAD83):	7615824.5	Client:	PG&E
Drilling Method:	Dual Rotary	Total Depth:	174 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Foremost DR-24 HD	Conductor Casing Diameter:	18 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Jon Martinez	Drill Casing Diameter:	16 inches		
Drilling Asst:	E. Martinez / W. Saylors	Drill Bit:	15.5 & 17.5 inch Tri-cone	Project Number:	RC000753.0051
Tool-Pusher:	Arnold Lamon	Depth to First Water:	48.4 ft bgs		
Rig Geologist:	A. Mack / D Cornell	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Drilling Run and Average Penetration Rate	USCS Code	USCS Class	Casing Diameter	Description (See Pilot boring log for full geologic descriptions)	Drilling Notes	Drilling Fluid
81	(61.5 - 81.5) 3.67 mins/ft			(61.5 - 81.5') 16.0" Steel Casing	Deposits; Silty sand with gravel (SM); reddish brown (5YR 5/4)		
82						(81.5 - 101.5') Drilled with water.	(81.5 - 101.5') 475.8 gallons of water used; 1816.12 gallons of water recovered; 1340.32 gallons of water gained
83							
84		SM					
85							
86							
87							
88					(87.0 - 94.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (5YR 5/4)		
89							
90							
91	(81.5 - 101.5) 4.60 mins/ft	SM		(81.5 - 101.5') 16.0" Steel Casing			
92							
93							
94							
95		ML			(94.5 - 95.5') Topock - Alluvium Deposits; Gravelly silt (ML); reddish brown (5YR 5/4)		
96		SM			(95.5 - 97.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown / moderate brown (5YR 4/4)		
97							
98		SW-SM			(97.0 - 102.0') Topock - Alluvium Deposits; Well graded sand with silt and gravel (SW-SM); light reddish brown / light brown (5YR 6/4)		
99							
100							

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Remarks: blue water table symbol represents depth to water measured during the first VAS interval of the pilot borehole

Date Started:	04/26/2019	Surface Elevation:	500.4 ft amsl	Boring No.: IRZ-25
Date Completed:	05/12/2019	Northing (NAD83):	2102414.6	
Drilling Co.:	Cascade	Easting (NAD83):	7615824.5	Client: PG&E
Drilling Method:	Dual Rotary	Total Depth:	174 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Foremost DR-24 HD	Conductor Casing Diameter:	18 inches	Location: PG&E Topock, Needles, California
Driller Name:	Jon Martinez	Drill Casing Diameter:	16 inches	
Drilling Asst:	E. Martinez / W. Saylor	Drill Bit:	15.5 & 17.5 inch Tri-cone	Project Number: RC000753.0051
Tool-Pusher:	Arnold Lamon	Depth to First Water:	48.4 ft bgs	
Rig Geologist:	A. Mack / D Cornell	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Drilling Run and Average Penetration Rate	USCS Code	USCS Class	Casing Diameter	Description (See Pilot boring log for full geologic descriptions)	Drilling Notes	Drilling Fluid
101	(81.5 - 101.5) 4.60 mins/ft	SW-SM		(81.5 - 101.5') 16.0" Steel Casing			
102					(102.0 - 103.5') Topock - Alluvium Deposits; Sandy silt with gravel (ML); light reddish brown / light brown (5YR 6/4)	(101.5 - 121.5') Drilled with water.	(101.5 - 121.5') 325.74 gallons of water used; 4086.84 gallons of water recovered; 3761.1 gallons of water gained
103		ML					
104					(103.5 - 109.5') Topock - Alluvium Deposits; Silty gravel (GM); reddish brown (5YR 5/4)		
105							
106		GM					
107							
108							
109							
110					(109.5 - 117.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); (5YR 4/)		
111	(101.5 - 121.5) 6.21 mins/ft			(101.5 - 121.5') 16.0" Steel Casing			
112							
113		SM					
114							
115							
116							
117							
118		SM			(117.0 - 119.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown / moderate brown (5YR 4/4)		
119							
120		ML			(119.5 - 124.5') Topock - Alluvium		

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Remarks: blue water table symbol represents depth to water measured during the first VAS interval of the pilot borehole

Date Started:	04/26/2019	Surface Elevation:	500.4 ft amsl	Boring No.: IRZ-25
Date Completed:	05/12/2019	Northing (NAD83):	2102414.6	
Drilling Co.:	Cascade	Easting (NAD83):	7615824.5	Client: PG&E
Drilling Method:	Dual Rotary	Total Depth:	174 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Foremost DR-24 HD	Conductor Casing Diameter:	18 inches	Location: PG&E Topock, Needles, California
Driller Name:	Jon Martinez	Drill Casing Diameter:	16 inches	
Drilling Asst:	E. Martinez / W. Saylor	Drill Bit:	15.5 & 17.5 inch Tri-cone	Project Number: RC000753.0051
Tool-Pusher:	Arnold Lamon	Depth to First Water:	48.4 ft bgs	
Rig Geologist:	A. Mack / D Cornell	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Drilling Run and Average Penetration Rate	USCS Code	USCS Class	Casing Diameter	Description (See Pilot boring log for full geologic descriptions)	Drilling Notes	Drilling Fluid
121	(101.5 - 121.5) 6.21 mins/ft			(101.5 - 121.5') 16.0" Steel Casing	Deposits; Sandy silt with gravel (ML); reddish brown / moderate brown (5YR 4/4)		
122		ML				(121.5 - 141.5') Drilled with water.	(121.5 - 141.5') 118.34 gallons of water used; 1244.4 gallons of water recovered; 1126.06 gallons of water gained
123							
124							
125		SM			(124.5 - 127.0') Topock - Alluvium Deposits; Silty sand (SM); reddish brown / moderate brown (5YR 4/4)		
126							
127							
128		GM			(127.0 - 132.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); reddish brown (5YR 5/4)	(127.0') During the first attempt of installing the well the lower screen twisted during removal of the drill casing. The well was removed from the borehole and the borehole was redrilled. Cascade recommended not advancing 16 inch casing and install the well in an open hole after redrilling.	(127.0 - 174.0') 280 gallons of water used; 12440 gallons of water recovered; 12160 gallons of water gained
129							
130							
131	(121.5 - 141.5) 1.75 mins/ft			(121.5 - 141.5') 16.0" Steel Casing			
132							
133		ML			(132.0 - 137.0') Topock - Alluvium Deposits; Sandy silt with gravel (ML); reddish brown / moderate brown (5YR 4/4)		
134							
135							
136							
137							
138		ML			(137.0 - 139.5') Topock - Alluvium Deposits; Sandy silt (ML); reddish brown / moderate brown (5YR 4/4)		
139							
140		ML			(139.5 - 147.0') Topock - Alluvium		

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Remarks: blue water table symbol represents depth to water measured during the first VAS interval of the pilot borehole

Date Started:	<u>04/26/2019</u>	Surface Elevation:	<u>500.4 ft amsl</u>	Boring No.: <u>IRZ-25</u>
Date Completed:	<u>05/12/2019</u>	Northing (NAD83):	<u>2102414.6</u>	
Drilling Co.:	<u>Cascade</u>	Easting (NAD83):	<u>7615824.5</u>	Client: <u>PG&E</u>
Drilling Method:	<u>Dual Rotary</u>	Total Depth:	<u>174 ft bgs</u>	Project: <u>Final GW Remedy Phase 1</u>
Drill Rig Type:	<u>Foremost DR-24 HD</u>	Conductor Casing Diameter:	<u>18 inches</u>	Location: <u>PG&E Topock, Needles, California</u>
Driller Name:	<u>Jon Martinez</u>	Drill Casing Diameter:	<u>16 inches</u>	
Drilling Asst:	<u>E. Martinez / W. Saylor</u>	Drill Bit:	<u>15.5 & 17.5 inch Tri-cone</u>	Project Number: <u>RC000753.0051</u>
Tool-Pusher:	<u>Arnold Lamon</u>	Depth to First Water:	<u>48.4 ft bgs</u>	
Rig Geologist:	<u>A. Mack / D Cornell</u>	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Drilling Run and Average Penetration Rate	USCS Code	USCS Class	Casing Diameter	Description (See Pilot boring log for full geologic descriptions)	Drilling Notes	Drilling Fluid
141	(121.5 - 141.5) 1.75 mins/ft	ML		(121.5 - 141.5') 16.0" Steel Casing	Deposits; Sandy silt with gravel (ML); reddish brown / moderate brown (5YR 4/4)		
142						(141.5 - 161.5') Drilled with water.	(141.5 - 161.5') 161.04 gallons of water used; 1726.08 gallons of water recovered; 1565.04 gallons of water gained
143							
144							
145							
146							
147							
148	(141.5 - 161.5) 2.10 mins/ft	SM		(147.0 - 157.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (5YR 4/3)			
149							
150							
151				(141.5 - 161.5') 16" Steel Casing			
152							
153							
154							
155		ML			(157.0 - 162.0') Topock - Weathered Bedrock - conglomerate; Gravelly silt (ML); reddish brown (5YR 5/4)	(155.0') During redrill the loss returns due to a plug in the drill pipe tripped out drill rods and installed normal bottom hole assembly.	
156							
157							
158							
159							
160							

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Remarks: blue water table symbol represents depth to water measured during the first VAS interval of the pilot borehole

Date Started:	04/26/2019	Surface Elevation:	500.4 ft amsl	Boring No.: IRZ-25
Date Completed:	05/12/2019	Northing (NAD83):	2102414.6	
Drilling Co.:	Cascade	Easting (NAD83):	7615824.5	Client: PG&E
Drilling Method:	Dual Rotary	Total Depth:	174 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Foremost DR-24 HD	Conductor Casing Diameter:	18 inches	Location: PG&E Topock, Needles, California
Driller Name:	Jon Martinez	Drill Casing Diameter:	16 inches	
Drilling Asst:	E. Martinez / W. Saylors	Drill Bit:	15.5 & 17.5 inch Tri-cone	Project Number: RC000753.0051
Tool-Pusher:	Arnold Lamon	Depth to First Water:	48.4 ft bgs	
Rig Geologist:	A. Mack / D Cornell	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Drilling Run and Average Penetration Rate	USCS Code	USCS Class	Casing Diameter	Description (See Pilot boring log for full geologic descriptions)	Drilling Notes	Drilling Fluid
161	(141.5 - 161.5) 2.10 mins/ft	ML		(141.5 - 161.5') 16" Steel Casing			
162					(162.0 - 166.0') Topock - Weathered Bedrock - conglomerate; Gravelly silt (ML); reddish brown / moderate brown (5YR 4/4)	(161.5 - 173.0') Drilled with water, casing became stuck in bedrock attempted to dislodge while advancing borehole. Circulated water to clean out borehole.	
163		ML					
164							
165							
166							
167	(161.5 - 173.0) 6.22 mins/ft			(161.5 - 173.0') 15.5" Open Hole	(166.0 - 174.0') Topock - Competent Bedrock - conglomerate; reddish brown (5YR 5/4)		
168							
169							
170							
171							
172							
173							
174	(173.0 - 174.0) mins/ft			(173.0 - 174.0') 15.5" Open Hole			
End of Boring at 174.0 'bgs.							
175							
176							
177							
178							
179							
180							

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Remarks: blue water table symbol represents depth to water measured during the first VAS interval of the pilot borehole

Drilling Log

Sheet: 1 of 9

Date Started:	04/26/2019	Surface Elevation:	500.4 ft amsl	Boring No.: IRZ-25
Date Completed:	05/12/2019	Northing (NAD83):	2102414.6	
Drilling Co.:	Cascade	Easting (NAD83):	7615824.5	Client: PG&E
Drilling Method:	Dual Rotary	Total Depth:	174 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Foremost DR-24 HD	Conductor Casing Diameter:	18 inches	Location: PG&E Topock, Needles, California
Driller Name:	Jon Martinez	Drill Casing Diameter:	16 inches	
Drilling Asst:	E. Martinez / W. Saylor	Drill Bit:	15.5 & 17.5 inch Tri-cone	Project Number: RC000753.0051
Tool-Pusher:	Arnold Lamon	Depth to First Water:	48.4 ft bgs	
Rig Geologist:	A. Mack / D Cornell	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Drilling Run and Average Penetration Rate	USCS Code	USCS Class	Casing Diameter	Description (See Pilot boring log for full geologic descriptions)	Drilling Notes	Drilling Fluid
1					(0.0 - 4.5') Topock - Fluvial Deposits; Poorly graded sand with silt and gravel (SP-SM)	(0.0 - 17.0') Drilled with water.	(0.0 - 21.2') 845.46 gallons of water used; 615.18 gallons of water recovered; 230.28 gallons of water lost
2							
3		SP-SM					
4							
5					(4.5 - 12.0') Topock - Fluvial Deposits; Poorly graded sand with silt (SP-SM); pale brown (10YR 6/3)		
6							
7							
8		SP-SM					
9							
10	(0.0 - 21.2) 8.02 mins/ft			(0.0 - 21.2') 18.0" Steel Casing			
11							
12							
13					(12.0 - 17.0') Topock - Fluvial Deposits; Well graded sand with silt and gravel (SW-SM); pale brown (10YR 6/3)		
14		SW-SM					
15							
16							
17							
18					(17.0 - 20.5') Topock - Fluvial Deposits; Silty sand with gravel (SM); brown (10YR 5/3)	(17.0 - 21.2') Rough drilling.	
19		SM					
20							

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Remarks: blue water table symbol represents depth to water measured during the first VAS interval of the pilot borehole

Date Started:	04/26/2019	Surface Elevation:	500.4 ft amsl	Boring No.: IRZ-25
Date Completed:	05/12/2019	Northing (NAD83):	2102414.6	
Drilling Co.:	Cascade	Easting (NAD83):	7615824.5	Client: PG&E
Drilling Method:	Dual Rotary	Total Depth:	174 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Foremost DR-24 HD	Conductor Casing Diameter:	18 inches	Location: PG&E Topock, Needles, California
Driller Name:	Jon Martinez	Drill Casing Diameter:	16 inches	
Drilling Asst:	E. Martinez / W. Saylor	Drill Bit:	15.5 & 17.5 inch Tri-cone	Project Number: RC000753.0051
Tool-Pusher:	Arnold Lamon	Depth to First Water:	48.4 ft bgs	
Rig Geologist:	A. Mack / D Cornell	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Drilling Run and Average Penetration Rate	USCS Code	USCS Class	Casing Diameter	Description (See Pilot boring log for full geologic descriptions)	Drilling Notes	Drilling Fluid
21	(0.0 - 21.2) 8.02 mins/ft	SM		(0.0 - 21.2') 18.0" Steel Casing	(20.5 - 32.0') Topock - Fluvial Deposits; Sandy silt with gravel (ML); light yellowish brown (10YR 6/4)		
22						(21.2 - 30.0') Advanced 9 ft during 1st 2 hrs, no advancement during 3rd hour. Volume of waste water declined from beginning to end of drilling run. Possible loss could be from backflow to cuttings and shaker tanks.	(21.2 - 31.0') 1065.06 gallons of water used; -121.6 gallons of water recovered; 1186.66 gallons of water lost
23							
24							
25							
26	(21.2 - 30.0) 23.89 mins/ft	ML		(21.2 - 30.0') 18.0" Steel Casing			
27							
28							
29							
30							
31	(30.0 - 31.0) 197.18 mins/ft			(30.0 - 31.0') 18.0" Steel Casing		(30.0 - 31.0') Borehole only advanced 1 foot in 4 hrs, likely drilling on a boulder.	
32						(31.0 - 41.0') Drilled with water.	(31.0 - 41.0') 1087.02 gallons of water used; 2478 gallons of water recovered; 1390.98 gallons of water gained
33					(32.0 - 40.0') Topock - Fluvial Deposits; Silty sand with gravel (SM); pale brown (10YR 6/3)		
34							
35							
36	(31.0 - 41.0) 12.09 mins/ft	SM		(31.0 - 41.0') 18.0" Steel Casing			
37							
38							
39							
40							

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Remarks: blue water table symbol represents depth to water measured during the first VAS interval of the pilot borehole

Date Started:	04/26/2019	Surface Elevation:	500.4 ft amsl	Boring No.: IRZ-25
Date Completed:	05/12/2019	Northing (NAD83):	2102414.6	
Drilling Co.:	Cascade	Easting (NAD83):	7615824.5	Client: PG&E
Drilling Method:	Dual Rotary	Total Depth:	174 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Foremost DR-24 HD	Conductor Casing Diameter:	18 inches	Location: PG&E Topock, Needles, California
Driller Name:	Jon Martinez	Drill Casing Diameter:	16 inches	
Drilling Asst:	E. Martinez / W. Saylor	Drill Bit:	15.5 & 17.5 inch Tri-cone	Project Number: RC000753.0051
Tool-Pusher:	Arnold Lamon	Depth to First Water:	48.4 ft bgs	
Rig Geologist:	A. Mack / D Cornell	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Drilling Run and Average Penetration Rate	USCS Code	USCS Class	Casing Diameter	Description (See Pilot boring log for full geologic descriptions)	Drilling Notes	Drilling Fluid
41	(31.0 - 41.0) 12.09 mins/ft	GM	(31.0 - 41.0') 18.0" Steel Casing	(40.0 - 41.5') Topock - Fluvial Deposits; Silty gravel with sand (GM); pale brown (10YR 6/3)			
42	(41.0 - 43.0) 8.50 mins/ft		(41.0 - 43.0') 16.0" Steel Casing	(41.5 - 49.5') Topock - Fluvial Deposits; Well graded gravel with silt and sand (GW-GM); light brown (7.5YR 6/4)		(41.0 - 43.0') Drilled with water.	(41.0 - 43.0') 230.58 gallons of water used; 0 gallons of water recovered; 230.58 gallons of water lost
43						(43.0 - 61.5') Drilled with water.	(43.0 - 61.5') 684.42 gallons of water used; 526.16 gallons of water recovered; 158.26 gallons of water lost
44							
45							
46							
47							
48							
49							
50							
51							
52	(43.0 - 61.5) 7.04 mins/ft		(43.0 - 61.5') 16.0" Steel Casing	(49.5 - 52.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (10YR 5/3)			
53				(52.0 - 57.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); reddish brown (5YR 5/4)			
54							
55							
56							
57							
58					(57.0 - 59.5') Topock - Alluvium Deposits; Sandy silt (ML); reddish brown (5YR 5/4)		
59							
60					(59.5 - 68.0') Topock - Alluvium		

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Remarks: blue water table symbol represents depth to water measured during the first VAS interval of the pilot borehole

Date Started:	04/26/2019	Surface Elevation:	500.4 ft amsl	Boring No.: IRZ-25
Date Completed:	05/12/2019	Northing (NAD83):	2102414.6	
Drilling Co.:	Cascade	Easting (NAD83):	7615824.5	Client: PG&E
Drilling Method:	Dual Rotary	Total Depth:	174 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Foremost DR-24 HD	Conductor Casing Diameter:	18 inches	Location: PG&E Topock, Needles, California
Driller Name:	Jon Martinez	Drill Casing Diameter:	16 inches	
Drilling Asst:	E. Martinez / W. Saylor	Drill Bit:	15.5 & 17.5 inch Tri-cone	Project Number: RC000753.0051
Tool-Pusher:	Arnold Lamon	Depth to First Water:	48.4 ft bgs	
Rig Geologist:	A. Mack / D Cornell	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Drilling Run and Average Penetration Rate	USCS Code	USCS Class	Casing Diameter	Description (See Pilot boring log for full geologic descriptions)	Drilling Notes	Drilling Fluid
61	(43.0 - 61.5) 7.04 mins/ft			(43.0 - 61.5') 16.0" Steel Casing	Deposits; Silty gravel with sand (GM); reddish brown (5YR 5/4)		
62						(61.5 - 81.5') Drilled with water.	(61.5 - 81.5') 527.04 gallons of water used; 848.24 gallons of water recovered; 321.2 gallons of water gained
63							
64		GM					
65							
66							
67							
68							
69					(68.0 - 72.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (5YR 5/4)		
70		SM					
71	(61.5 - 81.5) 3.67 mins/ft			(61.5 - 81.5') 16.0" Steel Casing			
72							
73					(72.0 - 77.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); yellowish brown / moderate yellowish brown (10YR 5/4)		
74		SM					
75							
76							
77							
78		GM			(77.0 - 79.5') Topock - Alluvium Deposits; Silty gravel with sand (GM); reddish brown (5YR 5/4)		
79							
80		SM			(79.5 - 87.0') Topock - Alluvium		

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater

Remarks: blue water table symbol represents depth to water measured during the first VAS interval of the pilot borehole

Date Started:	04/26/2019	Surface Elevation:	500.4 ft amsl	Boring No.: IRZ-25	
Date Completed:	05/12/2019	Northing (NAD83):	2102414.6		
Drilling Co.:	Cascade	Easting (NAD83):	7615824.5	Client:	PG&E
Drilling Method:	Dual Rotary	Total Depth:	174 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Foremost DR-24 HD	Conductor Casing Diameter:	18 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Jon Martinez	Drill Casing Diameter:	16 inches		
Drilling Asst:	E. Martinez / W. Saylors	Drill Bit:	15.5 & 17.5 inch Tri-cone	Project Number:	RC000753.0051
Tool-Pusher:	Arnold Lamon	Depth to First Water:	48.4 ft bgs		
Rig Geologist:	A. Mack / D Cornell	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Drilling Run and Average Penetration Rate	USCS Code	USCS Class	Casing Diameter	Description (See Pilot boring log for full geologic descriptions)	Drilling Notes	Drilling Fluid
81	(61.5 - 81.5) 3.67 mins/ft			(61.5 - 81.5') 16.0" Steel Casing	Deposits; Silty sand with gravel (SM); reddish brown (5YR 5/4)		
82						(81.5 - 101.5') Drilled with water.	(81.5 - 101.5') 475.8 gallons of water used; 1816.12 gallons of water recovered; 1340.32 gallons of water gained
83							
84		SM					
85							
86							
87							
88					(87.0 - 94.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (5YR 5/4)		
89							
90							
91	(81.5 - 101.5) 4.60 mins/ft	SM		(81.5 - 101.5') 16.0" Steel Casing			
92							
93							
94							
95		ML			(94.5 - 95.5') Topock - Alluvium Deposits; Gravelly silt (ML); reddish brown (5YR 5/4)		
96		SM			(95.5 - 97.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown / moderate brown (5YR 4/4)		
97							
98		SW-SM			(97.0 - 102.0') Topock - Alluvium Deposits; Well graded sand with silt and gravel (SW-SM); light reddish brown / light brown (5YR 6/4)		
99							
100							

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Remarks: blue water table symbol represents depth to water measured during the first VAS interval of the pilot borehole

Date Started:	04/26/2019	Surface Elevation:	500.4 ft amsl	Boring No.: IRZ-25
Date Completed:	05/12/2019	Northing (NAD83):	2102414.6	
Drilling Co.:	Cascade	Easting (NAD83):	7615824.5	Client: PG&E
Drilling Method:	Dual Rotary	Total Depth:	174 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Foremost DR-24 HD	Conductor Casing Diameter:	18 inches	Location: PG&E Topock, Needles, California
Driller Name:	Jon Martinez	Drill Casing Diameter:	16 inches	
Drilling Asst:	E. Martinez / W. Saylor	Drill Bit:	15.5 & 17.5 inch Tri-cone	Project Number: RC000753.0051
Tool-Pusher:	Arnold Lamon	Depth to First Water:	48.4 ft bgs	
Rig Geologist:	A. Mack / D Cornell	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Drilling Run and Average Penetration Rate	USCS Code	USCS Class	Casing Diameter	Description (See Pilot boring log for full geologic descriptions)	Drilling Notes	Drilling Fluid
101	(81.5 - 101.5) 4.60 mins/ft	SW-SM		(81.5 - 101.5') 16.0" Steel Casing			
102					(102.0 - 103.5') Topock - Alluvium Deposits; Sandy silt with gravel (ML); light reddish brown / light brown (5YR 6/4)	(101.5 - 121.5') Drilled with water.	(101.5 - 121.5') 325.74 gallons of water used; 4086.84 gallons of water recovered; 3761.1 gallons of water gained
103		ML					
104					(103.5 - 109.5') Topock - Alluvium Deposits; Silty gravel (GM); reddish brown (5YR 5/4)		
105							
106							
107		GM					
108							
109							
110					(109.5 - 117.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); (5YR 4/)		
111	(101.5 - 121.5) 6.21 mins/ft			(101.5 - 121.5') 16.0" Steel Casing			
112							
113		SM					
114							
115							
116							
117							
118		SM			(117.0 - 119.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown / moderate brown (5YR 4/4)		
119							
120		ML			(119.5 - 124.5') Topock - Alluvium		

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Remarks: blue water table symbol represents depth to water measured during the first VAS interval of the pilot borehole

Date Started:	04/26/2019	Surface Elevation:	500.4 ft amsl	Boring No.: IRZ-25
Date Completed:	05/12/2019	Northing (NAD83):	2102414.6	
Drilling Co.:	Cascade	Easting (NAD83):	7615824.5	Client: PG&E
Drilling Method:	Dual Rotary	Total Depth:	174 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Foremost DR-24 HD	Conductor Casing Diameter:	18 inches	Location: PG&E Topock, Needles, California
Driller Name:	Jon Martinez	Drill Casing Diameter:	16 inches	
Drilling Asst:	E. Martinez / W. Saylor	Drill Bit:	15.5 & 17.5 inch Tri-cone	Project Number: RC000753.0051
Tool-Pusher:	Arnold Lamon	Depth to First Water:	48.4 ft bgs	
Rig Geologist:	A. Mack / D Cornell	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Drilling Run and Average Penetration Rate	USCS Code	USCS Class	Casing Diameter	Description (See Pilot boring log for full geologic descriptions)	Drilling Notes	Drilling Fluid
121	(101.5 - 121.5) 6.21 mins/ft			(101.5 - 121.5') 16.0" Steel Casing	Deposits; Sandy silt with gravel (ML); reddish brown / moderate brown (5YR 4/4)		
122		ML				(121.5 - 141.5') Drilled with water.	(121.5 - 141.5') 118.34 gallons of water used; 1244.4 gallons of water recovered; 1126.06 gallons of water gained
123							
124							
125		SM			(124.5 - 127.0') Topock - Alluvium Deposits; Silty sand (SM); reddish brown / moderate brown (5YR 4/4)		
126							
127							
128		GM			(127.0 - 132.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); reddish brown (5YR 5/4)	(127.0') During the first attempt of installing the well the lower screen twisted during removal of the drill casing. The well was removed from the borehole and the borehole was redrilled. Cascade recommended not advancing 16 inch casing and install the well in an open hole after redrilling.	(127.0 - 174.0') 280 gallons of water used; 12440 gallons of water recovered; 12160 gallons of water gained
129							
130							
131	(121.5 - 141.5) 1.75 mins/ft			(121.5 - 141.5') 16.0" Steel Casing			
132							
133		ML			(132.0 - 137.0') Topock - Alluvium Deposits; Sandy silt with gravel (ML); reddish brown / moderate brown (5YR 4/4)		
134							
135							
136							
137							
138		ML			(137.0 - 139.5') Topock - Alluvium Deposits; Sandy silt (ML); reddish brown / moderate brown (5YR 4/4)		
139							
140		ML			(139.5 - 147.0') Topock - Alluvium		

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Remarks: blue water table symbol represents depth to water measured during the first VAS interval of the pilot borehole

Date Started:	04/26/2019	Surface Elevation:	500.4 ft amsl	Boring No.: IRZ-25
Date Completed:	05/12/2019	Northing (NAD83):	2102414.6	
Drilling Co.:	Cascade	Easting (NAD83):	7615824.5	Client: PG&E
Drilling Method:	Dual Rotary	Total Depth:	174 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Foremost DR-24 HD	Conductor Casing Diameter:	18 inches	Location: PG&E Topock, Needles, California
Driller Name:	Jon Martinez	Drill Casing Diameter:	16 inches	
Drilling Asst:	E. Martinez / W. Saylors	Drill Bit:	15.5 & 17.5 inch Tri-cone	Project Number: RC000753.0051
Tool-Pusher:	Arnold Lamon	Depth to First Water:	48.4 ft bgs	
Rig Geologist:	A. Mack / D Cornell	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Drilling Run and Average Penetration Rate	USCS Code	USCS Class	Casing Diameter	Description (See Pilot boring log for full geologic descriptions)	Drilling Notes	Drilling Fluid
141	(121.5 - 141.5) 1.75 mins/ft			(121.5 - 141.5') 16.0" Steel Casing	Deposits; Sandy silt with gravel (ML); reddish brown / moderate brown (5YR 4/4)		
142						(141.5 - 161.5') Drilled with water.	(141.5 - 161.5') 161.04 gallons of water used; 1726.08 gallons of water recovered; 1565.04 gallons of water gained
143							
144		ML					
145							
146							
147							
148					(147.0 - 157.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (5YR 4/3)		
149							
150							
151	(141.5 - 161.5) 2.10 mins/ft			(141.5 - 161.5') 16" Steel Casing			
152		SM					
153							
154							
155							
156						(155.0') During redrill the loss returns due to a plug in the drill pipe tripped out drill rods and installed normal bottom hole assembly.	
157							
158					(157.0 - 162.0') Topock - Weathered Bedrock - conglomerate; Gravelly silt (ML); reddish brown (5YR 5/4)		
159		ML					
160							

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Remarks: blue water table symbol represents depth to water measured during the first VAS interval of the pilot borehole

Date Started:	04/26/2019	Surface Elevation:	500.4 ft amsl	Boring No.: IRZ-25
Date Completed:	05/12/2019	Northing (NAD83):	2102414.6	
Drilling Co.:	Cascade	Easting (NAD83):	7615824.5	Client: PG&E
Drilling Method:	Dual Rotary	Total Depth:	174 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Foremost DR-24 HD	Conductor Casing Diameter:	18 inches	Location: PG&E Topock, Needles, California
Driller Name:	Jon Martinez	Drill Casing Diameter:	16 inches	
Drilling Asst:	E. Martinez / W. Saylors	Drill Bit:	15.5 & 17.5 inch Tri-cone	Project Number: RC000753.0051
Tool-Pusher:	Arnold Lamon	Depth to First Water:	48.4 ft bgs	
Rig Geologist:	A. Mack / D Cornell	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Drilling Run and Average Penetration Rate	USCS Code	USCS Class	Casing Diameter	Description (See Pilot boring log for full geologic descriptions)	Drilling Notes	Drilling Fluid
161	(141.5 - 161.5) 2.10 mins/ft	ML		(141.5 - 161.5') 16" Steel Casing			
162					(162.0 - 166.0') Topock - Weathered Bedrock - conglomerate; Gravelly silt (ML); reddish brown / moderate brown (5YR 4/4)	(161.5 - 173.0') Drilled with water, casing became stuck in bedrock attempted to dislodge while advancing borehole. Circulated water to clean out borehole.	
163		ML					
164							
165							
166							
167	(161.5 - 173.0) 6.22 mins/ft			(161.5 - 173.0') 15.5" Open Hole	(166.0 - 174.0') Topock - Competent Bedrock - conglomerate; reddish brown (5YR 5/4)		
168							
169							
170							
171							
172							
173							
174	(173.0 - 174.0) mins/ft			(173.0 - 174.0') 15.5" Open Hole			
End of Boring at 174.0 'bgs.							
175							
176							
177							
178							
179							
180							

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Remarks: blue water table symbol represents depth to water measured during the first VAS interval of the pilot borehole

Date Started:	05/12/2019	Surface Elevation:	500.4 ft amsl	Well ID: IRZ-25
Date Completed:	05/29/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Dual Rotary	Northing (NAD83):	2102414.6	Project: Final GW Remedy Phase 1
Driller Name:	Jon Martinez	Easting (NAD83):	7615824.5	Location: PG&E Topock, Needles, California
Drilling Asst:	E. Martinez / W. Saylors	Borehole Diameter:	15.5-18 inches	
Logger:	D Cornell / K. Keon	Water Level Start:	44.95 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	10/1/2019	
Total Depth:	174 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
1					(0.0 - 50.1') 10" Suregrip 17 Casing		
2		Topock - Fluvial Deposits	SP-SM		(0.0 - 4.0') Cemex #0/30 MESH	(0.0 - 4.0') 9 bags	(0.0 - 4.0') 17 bags (89%) Note: Lapis Lustre Sand, used >20% of the calculated volume due to potential voids forming during drilling
3							
4							
5							
6							
7							
8		Topock - Fluvial Deposits	SP-SM				
9							
10					(0.0 - 21.2') 18.0" Borehole		
11							
12					(4.0 - 31.1') Grout	(4.0 - 31.1') 211.4 gallons	(4.0 - 31.1') 413 gallons (95%) Note: Type I, II, and V 3% Benseal, grout not tagged will be tagged in morning, used > 20% of the calculated volume due to potential grout migration and voids forming during drilling
13							
14		Topock - Fluvial Deposits	SW-SM				
15							
16							
17							
18		Topock - Fluvial Deposits	SM				
19							
20							

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Date Started: 05/12/2019	Surface Elevation: 500.4 ft amsl	Well ID: IRZ-25
Date Completed: 05/29/2019	Shallow Well Elevation: N/A	
Drilling Co.: Cascade	Deep Well Elevation: N/A	Client: PG&E
Drilling Method: Dual Rotary	Northing (NAD83): 2102414.6	Project: Final GW Remedy Phase 1
Driller Name: Jon Martinez	Easting (NAD83): 7615824.5	Location: PG&E Topock, Needles, California
Drilling Asst: E. Martinez / W. Saylors	Borehole Diameter: 15.5-18 inches	
Logger: D Cornell / K. Keon	Water Level Start: 44.95 ft bgs	Project Number: RC000753.0051
Editor: Sean McGrane	Development End Date: 10/1/2019	
Total Depth: 174 ft bgs	Well Completion: <input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
21			SM		(0.0 - 50.1') 10" Suregrip 17 Casing		
22							
23							
24							
25							
26		Topock - Fluvial Deposits	ML		(4.0 - 31.1') Grout	(4.0 - 31.1') 211.4 gallons	(4.0 - 31.1') 413 gallons (95%) Note: Type I, II, and V 3% Benseal, grout not tagged will be tagged in morning, used > 20% of the calculated volume due to potential grout migration and voids forming during drilling
27							
28							
29							
30							
31							
32							
33					(32.5 - 33.5') Centralizer (31.1 - 35.1') Bentonite seal chips	(31.1 - 35.1') 6.3 bags	(31.1 - 35.1') 17 bags (170%) Note: Puregold Medium Chips, bentonite installed because of concerns with grout migration due potential large void from 29 to 32 ft. bgs, used >20% of the calculated volume due to potential voids forming during drilling
34							
35							
36		Topock - Fluvial Deposits	SM				
37							
38					(35.1 - 45.0') Cemex Bunker #6 60 Mesh Lapis Lustre Sand	(35.1 - 45.0') 16.6 bags	(35.1 - 45.0') 51 bags (207%) Note: Lapis Lustre Sand, used >20% of the claulated volume due to potential voids forming during drilling
39							
40							

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Date Started:	05/12/2019	Surface Elevation:	500.4 ft amsl	Well ID: IRZ-25
Date Completed:	05/29/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Dual Rotary	Northing (NAD83):	2102414.6	Project: Final GW Remedy Phase 1
Driller Name:	Jon Martinez	Easting (NAD83):	7615824.5	Location: PG&E Topock, Needles, California
Drilling Asst:	E. Martinez / W. Saylor	Borehole Diameter:	15.5-18 inches	
Logger:	D Cornell / K. Keon	Water Level Start:	44.95 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	10/1/2019	
Total Depth:	174 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
41		Topock - Fluvial Deposits	GM		(0.0 - 50.1') 10" Suregrip 17 Casing		
42							
43					(35.1 - 45.0') Cemex Bunker #6 60 Mesh Lapis Lustre Sand	(35.1 - 45.0') 16.6 bags	(35.1 - 45.0') 51 bags (207%) Note: Lapis Lustre Sand, used >20% of the calculated volume due to potential voids forming during drilling
44							
45		Topock - Fluvial Deposits	GW-GM				
46							
47							
48							
49							
50		Topock - Alluvium Deposits	SM		(50.1 - 67.1') 10" 10-slot 316 SS Wire Wrap Screen		
51							
52							
53					(45.0 - 69.0') Cemex Bunker #11 (30x70) Lapis Lustre Sand	(45.0 - 69.0') 36.5 bags	(45.0 - 69.0') 200 bags (448%) Note: Lapis Lustre Sand, used >20% of calculated volume due to potential voids forming during drilling, swabbed filter pack for approximately 1.5 hours prior to the installation of the bentonite seal
54	IRZ-25-VAS-52-57 (3500 ppb) 12/5/2018 10:40	Topock - Alluvium Deposits	GM				
55							
56							
57							
58		Topock - Alluvium Deposits	ML				
59							
60			GM				

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Date Started:	05/12/2019	Surface Elevation:	500.4 ft amsl	Well ID: IRZ-25
Date Completed:	05/29/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Dual Rotary	Northing (NAD83):	2102414.6	Project: Final GW Remedy Phase 1
Driller Name:	Jon Martinez	Easting (NAD83):	7615824.5	Location: PG&E Topock, Needles, California
Drilling Asst:	E. Martinez / W. Saylor	Borehole Diameter:	15.5-18 inches	
Logger:	D Cornell / K. Keon	Water Level Start:	44.95 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	10/1/2019	
Total Depth:	174 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction		Calculated Material Volumes	Material Volumes Installed
61	IRZ-25-VAS-62-67 (620 ppb) 12/5/2018 14:17	Topock - Alluvium Deposits	GM		(50.1 - 67.1') 10" 10-slot 316 SS Wire Wrap Screen		(43.0 - 61.5') 16.0" Borehole	(45.0 - 69.0') 36.5 bags
62								
63								
64								
65								
66								(45.0 - 69.0') 200 bags (448%) Note: Lapis Lustre Sand, used >20% of calculated volume due to potential voids forming during drilling, swabbed filter pack for approximately 1.5 hours prior to the installation of the bentonite seal
67								
68		Topock - Alluvium Deposits	SM		(67.1 - 77.1') 10" Suregrip 17 Casing		(61.5 - 81.5') 16.0" Borehole	(69.0 - 74.0') 5.3 bags
69								
70								
71					(68.0 - 69.0') Centralizer		(61.5 - 81.5') 16.0" Borehole	(69.0 - 74.0') 28 bags (428%) Note: Puregold Medium Chips, used >20% of the calculated volume due to potential voids forming during drilling
72								
73								
74		Topock - Alluvium Deposits	SM		(70.5 - 71.5') Centralizer (69.0 - 74.0') Bentonite seal chips		(61.5 - 81.5') 16.0" Borehole	(69.0 - 74.0') 5.3 bags
75								
76		Topock - Alluvium Deposits	SM				(61.5 - 81.5') 16.0" Borehole	(69.0 - 74.0') 5.3 bags
77								
78								
79		Topock - Alluvium Deposits	GM		(74.0 - 103.8') Cemex #3 Mesh (8x20)		(77.1 - 100.0') 10" 30-slot 316 SS Wire Wrap Screen	(74.0 - 103.8') 45.3 bags
80								
			SM					(74.0 - 103.8') 172 bags (280%) Note: Lapis Lustre Sand, used >20% of the calculated volume due to potential voids forming during drilling, filter pack was swabbed for approximately 30 minutes prior to installation of the bentonite seal

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Date Started:	05/12/2019	Surface Elevation:	500.4 ft amsl	Well ID: IRZ-25
Date Completed:	05/29/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Dual Rotary	Northing (NAD83):	2102414.6	Project: Final GW Remedy Phase 1
Driller Name:	Jon Martinez	Easting (NAD83):	7615824.5	Location: PG&E Topock, Needles, California
Drilling Asst:	E. Martinez / W. Saylor	Borehole Diameter:	15.5-18 inches	
Logger:	D Cornell / K. Keon	Water Level Start:	44.95 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	10/1/2019	
Total Depth:	174 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction		Calculated Material Volumes	Material Volumes Installed
81		Topock - Alluvium Deposits	SM			(77.1 - 100.0') 10" 30-slot 316 SS Wire Wrap Screen		
82								
83								
84								
85								
86		Topock - Alluvium Deposits	SM			(74.0 - 103.8') Cemex #3 Mesh (8x20)	(74.0 - 103.8') 45.3 bags	(74.0 - 103.8') 172 bags (280%) Note: Lapis Lustre Sand, used >20% of the calculated volume due to potential voids forming during drilling, filter pack was swabbed for approximately 30 minutes prior to installation of the bentonite seal
87								
88								
89								
90								
91	IRZ-25-VAS-92-97 (130 ppb) 12/6/2018 09:07	Topock - Alluvium Deposits	ML			(81.5 - 101.5') 16.0" Borehole		
92								
93								
94								
95								
96		Topock - Alluvium Deposits	SM					
97								
98								
99								
100								

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, groundwater data was collected during drilling of the pilot borehole

Date Started:	05/12/2019	Surface Elevation:	500.4 ft amsl	Well ID: IRZ-25
Date Completed:	05/29/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Dual Rotary	Northing (NAD83):	2102414.6	Project: Final GW Remedy Phase 1
Driller Name:	Jon Martinez	Easting (NAD83):	7615824.5	Location: PG&E Topock, Needles, California
Drilling Asst:	E. Martinez / W. Saylor	Borehole Diameter:	15.5-18 inches	
Logger:	D Cornell / K. Keon	Water Level Start:	44.95 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	10/1/2019	
Total Depth:	174 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
101		Topock - Alluvium Deposits	SW-SM		(100.0 - 135.0') 10" Suregrip 17 Casing		
102					(74.0 - 103.8') Cemex #3 Mesh (8x20)		
103		Topock - Alluvium Deposits	ML		(81.5 - 101.5') 16.0" Borehole	(74.0 - 103.8') 45.3 bags	(74.0 - 103.8') 172 bags (280%) Note: Lapis Lustre Sand, used >20% of the calculated volume due to potential voids forming during drilling, filter pack was swabbed for approximately 30 minutes prior to installation of the bentonite seal
104							
105							
106		Topock - Alluvium Deposits	GM				
107							
108							
109							
110							
111					(101.5 - 121.5') 16.0" Borehole		
112					(103.8 - 126.0') Bentonite seal chips	(103.8 - 126.0') 23.4 bags	(103.8 - 126.0') 34 bags (45%) Note: Puregold Medium Chips, used >20% of the calculated volume due to potential voids forming during drilling
113		Topock - Alluvium Deposits	SM				
114	IRZ-25-VAS-112-117 (< 0.17 U ppb) 12/11/2018 10:34				(114.5 - 115.5') Centralizer		
115							
116							
117							
118		Topock - Alluvium Deposits	SM				
119							
120			ML				

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, groundwater data was collected during drilling of the pilot borehole

Date Started:	05/12/2019	Surface Elevation:	500.4 ft amsl	Well ID: IRZ-25
Date Completed:	05/29/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Dual Rotary	Northing (NAD83):	2102414.6	Project: Final GW Remedy Phase 1
Driller Name:	Jon Martinez	Easting (NAD83):	7615824.5	Location: PG&E Topock, Needles, California
Drilling Asst:	E. Martinez / W. Saylors	Borehole Diameter:	15.5-18 inches	
Logger:	D Cornell / K. Keon	Water Level Start:	44.95 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	10/1/2019	
Total Depth:	174 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction		Calculated Material Volumes	Material Volumes Installed
121		Topock - Alluvium Deposits	ML			(100.0 - 135.0') 10" Suregrip 17 Casing	(103.8 - 126.0') 23.4 bags	(103.8 - 126.0') 34 bags (45%) Note: Puregold Medium Chips, used >20% of the calculated volume due to potential voids forming during drilling
122						(101.5 - 121.5') 16.0" Borehole		
123						(103.8 - 126.0') Bentonite seal chips		
124								
125		Topock - Alluvium Deposits	SM					
126								
127		Topock - Alluvium Deposits	GM					
128								
129								
130								
131								
132		Topock - Alluvium Deposits	ML			(121.5 - 141.5') 16.0" Borehole	(126.0 - 174.0') 67.8 bags	(126.0 - 174.0') 136.7 bags (102%) Note: Lapis Lustre Sand, used >20% of calculated volume due to potential voids forming during redrill of borehole, filter pack entered well through upper screens and removed, swabbed filter pack for approximately 30 minutes prior to installing bentonite seal
133						(126.0 - 174.0') Cemex Bunker #8 0/30 Mesh		
134								
135								
136		Topock - Alluvium Deposits	ML			(135.0 - 166.0') 10" 10-slot 316 SS Wire Wrap Screen		
137								
138								
139		Topock - Alluvium Deposits	ML					
140								
140			ML					

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, groundwater data was collected during drilling of the pilot borehole

Date Started:	05/12/2019	Surface Elevation:	500.4 ft amsl	Well ID: IRZ-25
Date Completed:	05/29/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Dual Rotary	Northing (NAD83):	2102414.6	Project: Final GW Remedy Phase 1
Driller Name:	Jon Martinez	Easting (NAD83):	7615824.5	Location: PG&E Topock, Needles, California
Drilling Asst:	E. Martinez / W. Saylor	Borehole Diameter:	15.5-18 inches	
Logger:	D Cornell / K. Keon	Water Level Start:	44.95 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	10/1/2019	
Total Depth:	174 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
141					(135.0 - 166.0') 10" 10-slot 316 SS Wire Wrap Screen		
142							
143		Topock - Alluvium Deposits	ML				
144							
145							
146							
147							
148							
149	IRZ-25-VAS-147-152 (3600 ppb) 12/11/2018 13:54						
150					(126.0 - 174.0') Cemex Bunker #8 0/30 Mesh	(126.0 - 174.0') 67.8 bags	(126.0 - 174.0') 136.7 bags (102%) Note: Lapis Lustre Sand, used >20% of calculated volume due to potential voids forming during redrill of borehole, filter pack entered well through upper screens and removed, swabbed filter pack for approximately 30 minutes prior to installing bentonite seal
151					(141.5 - 161.5') 16" Borehole		
152		Topock - Alluvium Deposits	SM				
153							
154							
155							
156							
157							
158		Topock - Weathered Bedrock - conglomerate	ML				
159							
160							














Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, groundwater data was collected during drilling of the pilot borehole

Date Started:	05/12/2019	Surface Elevation:	500.4 ft amsl	Well ID: IRZ-25
Date Completed:	05/29/2019	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Dual Rotary	Northing (NAD83):	2102414.6	Project: Final GW Remedy Phase 1
Driller Name:	Jon Martinez	Easting (NAD83):	7615824.5	Location: PG&E Topock, Needles, California
Drilling Asst:	E. Martinez / W. Saylor	Borehole Diameter:	15.5-18 inches	
Logger:	D Cornell / K. Keon	Water Level Start:	44.95 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	10/1/2019	
Total Depth:	174 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
161		Topock - Weathered Bedrock - conglomerate	ML				
162							
163							
164	IRZ-25-VAS-162-167 (3000 ppb) 12/13/2018 10:37	Topock - Weathered Bedrock - conglomerate	ML				
165							
166							
167					(126.0 - 174.0') Cemex Bunker #8 0/30 Mesh		
168							
169					(168.0 - 169.0') Centralizer		
170		Topock - Competent Bedrock - conglomerate					
171							
172							
173							
174							
175					End of Boring at 174.0' bgs.		
176							
177							
178							
179							
180							











Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, groundwater data was collected during drilling of the pilot borehole

Date Started:	03/14/2019	Surface Elevation:	501.2 ft amsl	Boring No.: <u>IRZ-27-Pilot</u>
Date Completed:	03/21/2019	Northing (NAD83):	2102236.8	
Drilling Co.:	Cascade	Easting (NAD83):	7615803.1	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	159 ft bgs	Project: Final GW Remedy Phase I
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	4-12 inches	Location: PG&E Topock, Needles, California
Driller Name:	Steve Vasquez	Depth to First Water:	47.15 ft bgs	
Drilling Asst:	O. Flores/L. Amaya	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger:	Judd Wanner	Sampling Interval:	Continuous	
Editor:	Gantt Jeffers	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid				
1				Topock - Fill	SM		(0.0 - 5.0') Topock - Fill; Silty sand (SM); yellowish brown / moderate yellowish brown(10YR 5/4); very fine grained to very coarse grained, angular to subround; some silt; little clay; trace granules to small pebbles, angular to subround; trace cobbles, subangular; dry	(0.0 - 5.0') Hand cleared for utility locate	(0.0 - 7.0') No used				
2													
3													
4													
5	32.4			Topock - Fluvial Deposits	SW		(5.0 - 5.5') Topock - Fluvial Deposits; Well graded sand with gravel (SW); brown (10YR 4/3); very fine grained to very coarse grained, angular to round; and very fine to very coarse grained sand; little granules to very large pebbles, angular to subround; trace silt; trace clay; dry						
6				Topock - Fluvial Deposits	SW-SM		(5.5 - 6.5') Topock - Fluvial Deposits; Well graded sand with gravel (SW-SM); dark yellowish brown (10YR 4/4) to brown (10YR 4/3); very fine grained to very coarse grained, angular to round; and granules to large pebbles, angular to subround; and very fine to very coarse grained sand, subangular to subround; trace cobbles, subangular to round; trace silt; trace clay; dry						
7				Topock - Fluvial Deposits	SW-SM		(6.5 - 7.0') Topock - Fluvial Deposits; Well graded sand with gravel (SW-SM); dark yellowish brown (10YR 4/4); very fine grained to very coarse grained, subangular to round; little granules to large pebbles, subangular to round; trace silt; trace clay; dry						
8	134.4			Topock - Fluvial Deposits	GP		(7.0 - 9.0') Topock - Fluvial Deposits; Poorly graded gravel (GP); weak red (2.5YR 5/2) to pale brown (10YR 6/3); small cobbles to boulders, subangular to round; trace clay; dry; boulder of gniess has been pulverized during drilling	(7.0 - 11.0') Drilled through boulder	(7.0 - 17.0') 200 gal of water used				
9				Topock - Fluvial Deposits			SC				(9.0 - 9.5') Topock - Fluvial Deposits; Clayey sand with gravel (SC); dark yellowish brown (10YR 4/4); very fine grained to very coarse grained, angular to round; some granules to very large pebbles, subangular to round; little clay; trace cobbles, subround; trace silt; dry		
10				Topock - Fluvial Deposits	SW		(9.5 - 10.8') Topock - Fluvial Deposits; Well graded sand with gravel (SW); brown (10YR 5/3); very fine grained to very coarse grained, angular to round; little granules to large pebbles, subangular to round; trace silt; dry						
11				Topock - Fluvial Deposits	GW-GM		(10.8 - 12.0') Topock - Fluvial Deposits; Well graded gravel with silt and sand (GW-GM); grayish brown (10YR 5/2); granules to very large pebbles, angular to round; little very fine to very coarse grained sand, subangular to round; little silt; trace cobbles, subround to round; trace clay; dry; cobbles have been pulverized						
12				Topock - Fluvial Deposits	GP		(12.0 - 13.0') Topock - Fluvial Deposits; Poorly graded gravel (GP); gray (10YR 5/1); small pebbles to boulders, subround; dry; cobbles and bouldrs have been pulverized by drilling						
13				Topock - Fluvial Deposits	SM		(13.0 - 14.5') Topock - Fluvial Deposits; Silty sand with gravel (SM); brown (7.5YR 5/3); very fine grained to very coarse grained, subangular to round; some granules to very large pebbles, subangular to round; little silt; little clay; trace cobbles, subangular to subround; dry; cobbles have been pulverized						
14				Topock - Fluvial Deposits			SW-SM			(14.5 - 17.0') Topock - Fluvial Deposits; Well graded sand with silt and gravel (SW-SM); brown (10YR 5/3); very fine grained to very coarse grained, subangular to round; some granules to very large pebbles, subangular to round; little silt; trace cobbles, subangular to subround; trace clay; dry			
15				60			Topock - Fluvial Deposits	GW-GC			(17.0 - 18.5') Topock - Fluvial Deposits; Well graded gravel with clay and sand (GW-GC); brown (7.5YR 4/4); granules to very large pebbles, subangular to round; little very fine to very coarse grained sand, angular to subround; little silt; trace cobbles, subangular to subround; trace clay; dry		(17.0 - 127.0') No used
16							Topock - Fluvial Deposits	GW-GM			(18.5 - 19.5') Topock - Fluvial Deposits; Well graded gravel with silt		
17													
18													
19													
20													

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	03/14/2019	Surface Elevation:	501.2 ft amsl	Boring No.: IRZ-27-Pilot	
Date Completed:	03/21/2019	Northing (NAD83):	2102236.8		
Drilling Co.:	Cascade	Easting (NAD83):	7615803.1	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	159 ft bgs	Project:	Final GW Remedy Phase I
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	4-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Steve Vasquez	Depth to First Water:	47.15 ft bgs		
Drilling Asst:	O. Flores/L. Amaya	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	Judd Wanner	Sampling Interval:	Continuous		
Editor:	Gantt Jeffers	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
21	60			Topock - Fluvial Deposits	GM		and sand (GW-GM); dark grayish brown / dark yellowish brown(10YR 4/2); granules to very large pebbles, subround to round; little very fine to very coarse grained sand, subangular to subround; little silt; trace cobbles, subangular to subround; trace clay; trace mica; dry; fractured cobble to boulder fragments, larger clasts consist of metadiorite		(17.0 - 127.0') No used
22				Topock - Fluvial Deposits	GW-GM		(19.5 - 21.0') Topock - Fluvial Deposits; Silty gravel with sand (GM); grayish brown (10YR 5/2) to dark grayish brown / dark yellowish brown(10YR 4/2); granules to very large pebbles, angular to subangular; some fine to medium grained sand, angular to subangular; little silt; little clay; trace cobbles, angular; trace mica; dry; trace coarse to very coarse sand, larger clasts consist of metadiorite		
23				Topock - Fluvial Deposits	SW-SM		(21.0 - 22.0') Topock - Fluvial Deposits; Well graded gravel with silt and sand (GW-GM); brown (7.5YR 5/3) to brown (7.5YR 4/3); granules to very large pebbles, angular to subround; little silt; trace cobbles, angular to subround; trace clay; little fractured cobble and boulder fragments		
24							(22.0 - 27.0') Topock - Fluvial Deposits; Well graded sand with silt and gravel (SW-SM); dark yellowish brown (10YR 4/4) to brown (10YR 5/3); very fine grained to very coarse grained, angular to round; some granules to very large pebbles, subangular to round; little cobbles, subround to round; little silt; dry; little fractured cobble and boulder fragments, larger clasts consist of metadiorite		
25	66								
26				Topock - Alluvium Deposits	SM		(27.0 - 32.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 4/4) with brown (7.5YR 5/2); very fine grained to very coarse grained, angular to subangular; some granules to large pebbles, angular to subangular; little silt; trace mica; dry; larger clasts consist of metadiorite		
27									
28									
29	70.8			Topock - Alluvium Deposits	SM		(32.0 - 32.8') Topock - Alluvium Deposits; Silty sand (SM); reddish brown / moderate brown(5YR 4/4); some silt; possible trace pyrite which is subangular, very fine to medium		
30				Topock - Alluvium Deposits	SM		(32.8 - 44.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 4/4) with brown (7.5YR 5/2); very fine grained to very coarse grained, angular to subangular; little granules to very large pebbles, angular to subangular; little silt; increase in granule and pebbles, color change		
31									
32									
33	93.6			Topock - Alluvium Deposits	SM				
34				Topock - Alluvium Deposits	SM				
35									
36									
37				Topock - Alluvium Deposits	SM				
38				Topock - Alluvium Deposits	SM				
39	123.6								
40							(39.5') brown (10YR 5/3) to pale brown (10YR 6/3); some silt		

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started: <u>03/14/2019</u>	Surface Elevation: <u>501.2 ft amsl</u>	Boring No.: IRZ-27-Pilot
Date Completed: <u>03/21/2019</u>	Northing (NAD83): <u>2102236.8</u>	
Drilling Co.: <u>Cascade</u>	Easting (NAD83): <u>7615803.1</u>	Client: <u>PG&E</u>
Drilling Method: <u>Sonic Drilling</u>	Total Depth: <u>159 ft bgs</u>	Project: <u>Final GW Remedy Phase I</u>
Drill Rig Type: <u>Prosonic Truck Mount</u>	Borehole Diameter: <u>4-12 inches</u>	Location: <u>PG&E Topock, Needles, California</u>
Driller Name: <u>Steve Vasquez</u>	Depth to First Water: <u>47.15 ft bgs</u>	
Drilling Asst: <u>O. Flores/L. Amaya</u>	Sampling Method: <u>4 inch x 10 ft Core Barrel</u>	Project Number: <u>RC000753.0051</u>
Logger: <u>Judd Wanner</u>	Sampling Interval: <u>Continuous</u>	
Editor: <u>Gantt Jeffers</u>	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
41	123.6			Topock - Alluvium Deposits	SM				(17.0 - 127.0') No used
42									
43									
44									
45	116.4	IRZ-27-SS-47.0-52.0 3/21/2019 13:44		Topock - Alluvium Deposits	SM		(44.5 - 47.0') Topock - Alluvium Deposits; Silty sand (SM); brown (7.5YR 4/3); very fine grained to very coarse grained, angular; some granules to very large pebbles, angular to subangular; little silt; trace cobbles		(50.0') Approximate depth to water
46									
47									
48									
49	60	IRZ-27-SS-52.01-57.0 3/21/2019 13:48	IRZ-27-VAS-52-57 (4400 ppb) 3/15/2019 15:55	Topock - Alluvium Deposits	ML		(47.0 - 49.5') Topock - Alluvium Deposits; Sandy silt with gravel (ML); brown (7.5YR 4/4); low plasticity; some fine to medium grained sand, angular to subangular; little granules to very large pebbles, angular to subround; little clay; moist; stiff to very stiff		
50									
51									
52									
53				Topock - Alluvium Deposits	GM		(49.5 - 57.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); brown (7.5YR 4/3); granules to very large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subround; little silt; trace mica; dry; larger clasts consist of metadiorite		
54									
55							(54.5') brown (7.5YR 5/3) to brown (10YR 4/3); color change		
56									
57		IRZ-27-SS-57.0-62.0 3/21/2019 13:50		Topock - Alluvium Deposits	SM		(57.0 - 61.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 4/4); very fine grained to very coarse grained, angular to subangular; some silt; little granules to very large pebbles, angular to subangular; trace cobbles, angular; trace mica; moist; blocky; weak cementation; larger clasts consist of metadiorite		
58									
59									
60							(59.25') brown (7.5YR 4/4) and dark yellowish brown (10YR 4/4); trace clay; mottling		

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	03/14/2019	Surface Elevation:	501.2 ft amsl	Boring No.: <u>IRZ-27-Pilot</u>
Date Completed:	03/21/2019	Northing (NAD83):	2102236.8	
Drilling Co.:	Cascade	Easting (NAD83):	7615803.1	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	159 ft bgs	Project: Final GW Remedy Phase I
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	4-12 inches	Location: PG&E Topock, Needles, California
Driller Name:	Steve Vasquez	Depth to First Water:	47.15 ft bgs	
Drilling Asst:	O. Flores/L. Amaya	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger:	Judd Wanner	Sampling Interval:	Continuous	
Editor:	Gantt Jeffers	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
61	60	IRZ-27-SS-57.0-62.0 3/21/2019 13:50		Topock - Alluvium Deposits	SM				(17.0 - 127.0') No used
62				Topock - Alluvium Deposits	GM		(61.0 - 62.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); (7.5YR); granules to very large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subround; some silt; dry; weak cementation; larger clasts consist of metadiorite		
63				Topock - Alluvium Deposits	SM		(62.0 - 63.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 4/4); very fine grained to very coarse grained, angular to subangular; little granules to medium pebbles, angular to subangular; little clay; dry; blocky; weak cementation; larger clasts consist of metadiorite		
64							(62.75') trace clay; moist to wet; increase in sand, decrease in silt		
65							(63.5 - 68.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); yellowish red (5YR 4/6) to reddish brown / moderate brown(5YR 4/4); very fine grained to very coarse grained, angular to subangular; little granules to large pebbles, subangular to subround; little silt; wet; larger clasts consist of metadiorite		
66				Topock - Alluvium Deposits	SM		(65.25'); some silt; trace cobbles, angular		
67									
68				Topock - Alluvium Deposits	SW-SM		(68.0 - 68.8') Topock - Alluvium Deposits; Well graded sand with silt and gravel (SW-SM); gray (5YR 5/1) to dark reddish gray (5YR 4/2); very fine grained to very coarse grained, angular; and granules to very large pebbles, angular to subangular; trace cobbles, angular; trace silt; trace clay; wet; larger clasts consist of metadiorite		
69	180	IRZ-27-SS-67-72 4/3/2019 14:04					(68.8 - 74.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); yellowish red (5YR 4/6) to reddish brown / moderate brown(5YR 4/4); very fine grained to very coarse grained, angular to subangular; little granules to very large pebbles, subround; little silt; trace cobbles, subangular; trace clay; wet; moderate cementation; trace very large pebbles		
70				Topock - Alluvium Deposits	SM				
71									
72									
73									
74		IRZ-27-SS-72-77 4/3/2019 16:09	IRZ-27-VAS-72-77 (<0.033 U ppb) 3/17/2019 13:15	Topock - Alluvium Deposits	SM		(74.0 - 75.5') Topock - Alluvium Deposits; Silty sand (SM); yellowish red (5YR 4/6) to reddish brown / moderate brown(5YR 4/4); very fine grained to very coarse grained, angular to subround; little granules to very large pebbles, angular; little silt; trace clay; wet		
75									
76									
77									
78	235.2	IRZ-27-SS-77-82 4/3/2019 16:11		Topock - Alluvium Deposits	SM		(75.5 - 82.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); yellowish red (5YR 4/6) to reddish brown / moderate brown(5YR 4/4); very fine grained to very coarse grained, angular to subangular; some granules to very large pebbles, angular to subangular; little silt; trace cobbles, angular; trace mica; wet		
79									
80									

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Date Started:	03/14/2019	Surface Elevation:	501.2 ft amsl	Boring No.: <u>IRZ-27-Pilot</u>	
Date Completed:	03/21/2019	Northing (NAD83):	2102236.8		
Drilling Co.:	Cascade	Easting (NAD83):	7615803.1	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	159 ft bgs	Project:	Final GW Remedy Phase I
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	4-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Steve Vasquez	Depth to First Water:	47.15 ft bgs		
Drilling Asst:	O. Flores/L. Amaya	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	Judd Wanner	Sampling Interval:	Continuous		
Editor:	Gantt Jeffers	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
81		IRZ-27-SS-77-82 4/3/2019 16:11		Topock - Alluvium Deposits	SM				(17.0 - 127.0') No used
82				Topock - Alluvium Deposits	SM		(82.0 - 82.8') Topock - Alluvium Deposits; Silty sand (SM); brown (7.5YR 4/4); very fine grained to very coarse grained, angular to subangular; little granules to medium pebbles, angular; little silt; trace cobbles, angular; trace clay; wet		
83				Topock - Alluvium Deposits	SW-SM		(82.8 - 83.5') Topock - Alluvium Deposits; Well graded sand with silt (SW-SM); brown (7.5YR 4/4); very fine grained to very coarse grained, angular to subangular; little granules to very large pebbles, angular to subangular; little silt; wet; includes a very large pebble of conglomerate having angular aggregate to 9mm and strong cementation		
84		IRZ-27-SS-82-87 4/3/2019 16:17		Topock - Alluvium Deposits	SW				
85							(83.5 - 84.5') Topock - Alluvium Deposits; Well graded sand (SW); brown (7.5YR 4/4); very fine grained to very coarse grained, angular to subangular; trace granules to very large pebbles, angular to subangular; trace silt; wet		
86				Topock - Alluvium Deposits	SM		(84.5 - 88.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (5YR 4/3) to reddish brown (5YR 5/3); very fine grained to very coarse grained, angular to subangular; some silt; little granules to very large pebbles, angular; trace clay; wet		
87									
88									
89	235.2	IRZ-27-SS-87-92 4/3/2019 16:22		Topock - Alluvium Deposits	SM		(88.5 - 89.5') Topock - Alluvium Deposits; Silty sand (SM); reddish brown (5YR 4/3) to reddish brown (5YR 5/3); very fine grained to very coarse grained, angular to subangular; little silt; trace large to very large pebbles, angular; wet; trace sandy silt nodules		
90							(89.5 - 97.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (5YR 4/3) to reddish brown (5YR 5/3); very fine grained to very coarse grained, angular; some granules to very large pebbles, angular to subangular; little silt; little clay; trace cobbles, angular; wet		
91									
92									
93				Topock - Alluvium Deposits	SM				
94		IRZ-27-SS-92-97 4/3/2019 16:23							
95									
96							(95.3') reddish brown / moderate brown (5YR 4/4) to yellowish red (5YR 4/6); little granules to very large pebbles, angular; color change, decrease in silt, no cobbles		
97									
98	122.4	IRZ-27-SS-97-102 4/3/2019 16:07		Topock - Alluvium Deposits	SM		(97.0 - 98.0') Topock - Alluvium Deposits; Silty sand (SM); brown (7.5YR 4/4); very fine grained to very coarse grained, angular to subangular; little silt; trace granules to medium pebbles, angular		
99				Topock - Alluvium Deposits	SM		(98.0 - 107.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 4/4); very fine grained to very coarse grained, angular; little granules to very large pebbles, angular; little silt; little clay; trace cobbles, angular, small cobbles; wet		
100									

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Date Started: 03/14/2019	Surface Elevation: 501.2 ft amsl	Boring No.: IRZ-27-Pilot
Date Completed: 03/21/2019	Northing (NAD83): 2102236.8	
Drilling Co.: Cascade	Easting (NAD83): 7615803.1	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 159 ft bgs	Project: Final GW Remedy Phase I
Drill Rig Type: Prosonic Truck Mount	Borehole Diameter: 4-12 inches	Location: PG&E Topock, Needles, California
Driller Name: Steve Vasquez	Depth to First Water: 47.15 ft bgs	
Drilling Asst: O. Flores/L. Amaya	Sampling Method: 4 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger: Judd Wanner	Sampling Interval: Continuous	
Editor: Gantt Jeffers	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
101		IRZ-27-SS-97-102 4/3/2019 16:07							(17.0 - 127.0') No used
102									
103	122.4			Topock - Alluvium Deposits	SM				
104		IRZ-27-SS-102-107 4/3/2019 16:19	IRZ-27-AS-102-107 <0.17 U ppb 3/18/2019 16:10						
105									
106									
107									
108							(107.0 - 118.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 4/4) to dark yellowish brown (10YR 4/4); very fine grained to very coarse grained, angular to subround; some granules to very large pebbles, angular; little silt; little clay; trace cobbles, angular, small cobbles; dry		
109		IRZ-27-SS-107-112 4/3/2019 16:22							
110	96								
111									
112				Topock - Alluvium Deposits	SM			(111.0 - 114.0') Rough drilling	
113									
114		IRZ-27-SS-4/3/2019 16:20							
115	33.6								(114.0') Core barrel plugged off, driller had to go back into hole to recover 114.0-117.0 ft.
116									
117									
118		IRZ-27-SS-117-122 4/3/2019 16:12							
119	62.4			Topock - Alluvium Deposits	SC		(118.0 - 122.0') Topock - Alluvium Deposits; Clayey sand (SC); reddish brown / moderate brown(5YR 4/4) to yellowish red (5YR 4/6); very fine grained to very coarse grained, angular to subround; some clay; trace granules to medium pebbles, angular; trace silt; coarser clasts composed of metadiorite; moist		
120									

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Date Started:	03/14/2019	Surface Elevation:	501.2 ft amsl	Boring No.: <u>IRZ-27-Pilot</u>	
Date Completed:	03/21/2019	Northing (NAD83):	2102236.8		
Drilling Co.:	Cascade	Easting (NAD83):	7615803.1	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	159 ft bgs	Project:	Final GW Remedy Phase I
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	4-12 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Steve Vasquez	Depth to First Water:	47.15 ft bgs		
Drilling Asst:	O. Flores/L. Amaya	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	Judd Wanner	Sampling Interval:	Continuous		
Editor:	Gantt Jeffers	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
121	62.4	IRZ-27-SS-117-122 4/3/2019 16:12		Topock - Alluvium Deposits	SC				(17.0 - 127.0') No used
122									
123				Topock - Weathered Bedrock - conglomerate			(122.0 - 124.5') Topock - Weathered Bedrock - conglomerate; reddish brown (2.5YR 4/4); dry; moderate cementation; friable conglomerate bedrock, conglomerate bedrock with alternating zones of fine grained matrix and coarser grained matrix, potential high point of the conglomerate or large piece that was moved	(122.0') Core barrel plugged off, driller thinks there was a formation change going back into wet soil material	
124	60	IRZ-27-SS-122-127 4/3/2019 16:08							
125									
126				Topock - Weathered Bedrock - conglomerate	SM		(124.5 - 129.5') Topock - Weathered Bedrock - conglomerate; Silty sand (SM); reddish brown (2.5YR 4/4) to dark reddish brown (2.5YR 3/4); very fine grained to very coarse grained, angular to subround; little silt; little clay; trace granules, subangular; dry	(122.0 - 127.0') Core barrel got stuck, driller advanced casing using water to retrieve the core barrel, conglomerate bedrock with alternating zones of fine grained matrix and coarser grained matrix, potential high point of the conglomerate or large piece that was moved	
127									
128									
129		IRZ-27-SS-127-132 4/3/2019 16:02							
130									
131									
132	126								
133				Topock - Weathered Bedrock - conglomerate			(129.5 - 137.0') Topock - Weathered Bedrock - conglomerate; reddish brown (2.5YR 4/4); dry; friable conglomerate bedrock	(132.0 - 137.0') Sample collected during the installation of temporary backfill	
134		IRZ-27-SS-132-137 4/3/2019 16:04	IRZ-27-VAS-132-137 (1300 ppb) 3/20/2019 15:30						
135									
136									
137									
138	60	IRZ-27-SS-137-142 4/3/2019 15:58		Topock - Weathered Bedrock - conglomerate	GW-GM		(137.0 - 156.0') Topock - Weathered Bedrock - conglomerate; Well graded gravel with silt and sand (GW-GM); reddish brown (2.5YR 4/4) to dark reddish brown (2.5YR 3/4); granules to large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subangular; little silt; little clay; dry		
139									
140									

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Date Started: 03/14/2019	Surface Elevation: 501.2 ft amsl	Boring No.: IRZ-27-Pilot
Date Completed: 03/21/2019	Northing (NAD83): 2102236.8	
Drilling Co.: Cascade	Easting (NAD83): 7615803.1	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 159 ft bgs	Project: Final GW Remedy Phase I
Drill Rig Type: Prosonic Truck Mount	Borehole Diameter: 4-12 inches	Location: PG&E Topock, Needles, California
Driller Name: Steve Vasquez	Depth to First Water: 47.15 ft bgs	
Drilling Asst: O. Flores/L. Amaya	Sampling Method: 4 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger: Judd Wanner	Sampling Interval: Continuous	
Editor: Gantt Jeffers	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
141	60	IRZ-27-SS-137-142 4/3/2019 15:58							(127.0 - 156.0') 200 gal of water used
142									
143									
144									
145	69.6								
146									
147									
148				Topock - Weathered Bedrock - conglomerate	GW-GM				
149									
150	31.2								
151									
152									
153									
154									
155	34.8								
156									
157							(156.0 - 159.0') (NR); No Recovery	(156.0 - 159.0') Core washed out	
158					NR				
159									
160							End of Boring at 159.0' bgs.		

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Date Started:	03/14/2019	Surface Elevation:	501.2 ft amsl	Well ID: IRZ-27-Pilot
Date Completed:	03/21/2019	Northing (NAD83):	2102236.8	
Drilling Co.:	Cascade	Easting (NAD83):	7615803.1	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	159 ft bgs	Project: Final GW Remedy Phase I
Driller Name:	Steve Vasquez	Borehole Diameter:	4-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	O. Flores/L. Amaya	Depth to First Water:	47.15 ft bgs	
Logger:	Gantt Jeffers	Editor:	Michael Andrews	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed			
1		Topock - Fill	SM		(0.0 - 0.5') Steel plate with BMPs					
2										
3								(0.5 - 5.0') Plastering Sand	(0.5 - 5.0') 7.9 bags	(0.5 - 5.0') 4 bags (-49%) Note: Wildcat Washed
4										
5		Topock - Fluvial Deposits	SW							
6		Topock - Fluvial Deposits	SW-SM							
7		Topock - Fluvial Deposits	SW-SM							
8		Topock - Fluvial Deposits	GP							
9		Topock - Fluvial Deposits	SC							
10		Topock - Fluvial Deposits	SW							
11		Topock - Fluvial Deposits	GW-GM							
12		Topock - Fluvial Deposits	GP			(5.0 - 131.5') Pea Gravel	(5.0 - 131.5') 54.4 bags	(5.0 - 131.5') 56 bags (3%) Note: Cal-Silica 3/8" to 1/4"		
13		Topock - Fluvial Deposits	SM							
14		Topock - Fluvial Deposits	SW-SM							
15		Topock - Fluvial Deposits	GW-GC							
16		Topock - Fluvial Deposits	GW-GM							
17		Topock - Fluvial Deposits	GM							
18										
19										
20										

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Date Started:	03/14/2019	Surface Elevation:	501.2 ft amsl	Well ID: IRZ-27-Pilot
Date Completed:	03/21/2019	Northing (NAD83):	2102236.8	
Drilling Co.:	Cascade	Easting (NAD83):	7615803.1	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	159 ft bgs	Project: Final GW Remedy Phase I
Driller Name:	Steve Vasquez	Borehole Diameter:	4-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	O. Flores/L. Amaya	Depth to First Water:	47.15 ft bgs	
Logger:	Gantt Jeffers	Editor:	Michael Andrews	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
21		Topock - Fluvial Deposits	GM				
22		Topock - Fluvial Deposits	GW-GM				
23							
24		Topock - Fluvial Deposits	SW-SM				
25							
26							
27							
28							
29		Topock - Alluvium Deposits	SM				
30					(5.0 - 131.5') Pea Gravel	(9.0 - 156.0') 6" Borehole	(5.0 - 131.5') 54.4 bags
31							
32		Topock - Alluvium Deposits	SM				
33							
34							
35							
36		Topock - Alluvium Deposits	SM				
37							
38							
39							
40							

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Date Started:	03/14/2019	Surface Elevation:	501.2 ft amsl	Well ID: IRZ-27-Pilot
Date Completed:	03/21/2019	Northing (NAD83):	2102236.8	
Drilling Co.:	Cascade	Easting (NAD83):	7615803.1	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	159 ft bgs	Project: Final GW Remedy Phase I
Driller Name:	Steve Vasquez	Borehole Diameter:	4-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	O. Flores/L. Amaya	Depth to First Water:	47.15 ft bgs	
Logger:	Gantt Jeffers	Editor:	Michael Andrews	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
41							
42		Topock - Alluvium Deposits	SM				
43							
44							
45		Topock - Alluvium Deposits	SM				
46							
47							
48		Topock - Alluvium Deposits	ML				
49							
50					(5.0 - 131.5') Pea Gravel	(9.0 - 156.0') 6" Borehole	(5.0 - 131.5') 54.4 bags
51							
52							
53	IRZ-27-VAS-52-57 (4400 ppb) 3/15/2019 15:55	Topock - Alluvium Deposits	GM				(5.0 - 131.5') 56 bags (3%) Note: Cal-Silica 3/8" to 1/4"
54							
55							
56							
57							
58		Topock - Alluvium Deposits	SM				
59							
60							

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Date Started:	03/14/2019	Surface Elevation:	501.2 ft amsl	Well ID: IRZ-27-Pilot
Date Completed:	03/21/2019	Northing (NAD83):	2102236.8	
Drilling Co.:	Cascade	Easting (NAD83):	7615803.1	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	159 ft bgs	Project: Final GW Remedy Phase I
Driller Name:	Steve Vasquez	Borehole Diameter:	4-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	O. Flores/L. Amaya	Depth to First Water:	47.15 ft bgs	
Logger:	Gantt Jeffers	Editor:	Michael Andrews	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
61		Topock - Alluvium Deposits	SM				
62		Topock - Alluvium Deposits	GM				
63		Topock - Alluvium Deposits	SM				
64							
65							
66		Topock - Older Alluvium Deposits	SM				
67							
68		Topock - Older Alluvium Deposits	SW-SM				
69							
70					(5.0 - 131.5') Pea Gravel	(9.0 - 156.0') 6" Borehole	(5.0 - 131.5') 54.4 bags
71		Topock - Older Alluvium Deposits	SM				(5.0 - 131.5') 56 bags (3%) Note: Cal-Silica 3/8" to 1/4"
72							
73							
74	IRZ-27-VAS-72-77 (<0.033 U ppb) 3/17/2019 13:15	Topock - Older Alluvium Deposits	SM				
75							
76							
77							
78		Topock - Older Alluvium Deposits	SM				
79							
80							

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Date Started:	03/14/2019	Surface Elevation:	501.2 ft amsl	Well ID: IRZ-27-Pilot
Date Completed:	03/21/2019	Northing (NAD83):	2102236.8	
Drilling Co.:	Cascade	Easting (NAD83):	7615803.1	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	159 ft bgs	Project: Final GW Remedy Phase I
Driller Name:	Steve Vasquez	Borehole Diameter:	4-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	O. Flores/L. Amaya	Depth to First Water:	47.15 ft bgs	
Logger:	Gantt Jeffers	Editor:	Michael Andrews	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
81		Topock - Older Alluvium Deposits	SM				
82		Topock - Older Alluvium Deposits	SM				
83		Topock - Older Alluvium Deposits	SW-SM				
84		Topock - Older Alluvium Deposits	SW				
85							
86		Topock - Older Alluvium Deposits	SM				
87							
88							
89		Topock - Older Alluvium Deposits	SM				
90					(5.0 - 131.5') Pea Gravel	(9.0 - 156.0') 6" Borehole	(5.0 - 131.5') 54.4 bags
91							(5.0 - 131.5') 56 bags (3%) Note: Cal-Silica 3/8" to 1/4"
92							
93		Topock - Older Alluvium Deposits	SM				
94							
95							
96							
97							
98		Topock - Older Alluvium Deposits	SM				
99		Topock - Older Alluvium Deposits	SM				
100							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started:	03/14/2019	Surface Elevation:	501.2 ft amsl	Well ID: IRZ-27-Pilot
Date Completed:	03/21/2019	Northing (NAD83):	2102236.8	
Drilling Co.:	Cascade	Easting (NAD83):	7615803.1	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	159 ft bgs	Project: Final GW Remedy Phase I
Driller Name:	Steve Vasquez	Borehole Diameter:	4-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	O. Flores/L. Amaya	Depth to First Water:	47.15 ft bgs	
Logger:	Gantt Jeffers	Editor:	Michael Andrews	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
101							
102							
103							
104							
105	IRZ-27-AS-102-107 (<0.17 U ppb) 3/18/2019 16:10	Topock - Older Alluvium Deposits	SM				
106							
107							
108							
109							
110					(5.0 - 131.5') Pea Gravel	(9.0 - 156.0') 6" Borehole	(5.0 - 131.5') 54.4 bags
111							
112							
113		Topock - Older Alluvium Deposits	SM				
114							
115							
116							
117							
118							
119		Topock - Older Alluvium Deposits	SC				
120							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started:	03/14/2019	Surface Elevation:	501.2 ft amsl	Well ID: IRZ-27-Pilot
Date Completed:	03/21/2019	Northing (NAD83):	2102236.8	
Drilling Co.:	Cascade	Easting (NAD83):	7615803.1	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	159 ft bgs	Project: Final GW Remedy Phase I
Driller Name:	Steve Vasquez	Borehole Diameter:	4-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	O. Flores/L. Amaya	Depth to First Water:	47.15 ft bgs	
Logger:	Gantt Jeffers	Editor:	Michael Andrews	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
121		Topock - Older Alluvium Deposits	SC				
122							
123		Topock - Competent Bedrock - conglomerate					
124							
125							
126					(5.0 - 131.5') Pea Gravel	(5.0 - 131.5') 54.4 bags	(5.0 - 131.5') 56 bags (3%) Note: Cal-Silica 3/8" to 1/4"
127		Topock - Weathered Bedrock - conglomerate	SM				
128							
129							
130					(9.0 - 156.0') 6" Borehole		
131							
132							
133		Topock - Competent Bedrock - conglomerate	SM				
134	IRZ-27-VAS-132-137 (1300 ppb) 3/20/2019 15:30				(131.5 - 137.0') Cemex #3 MESH (8x10)	(131.5 - 137.0') 2.2 bags	(131.5 - 137.0') 3.5 bags (59%) Note: Lapis Lustre Sand
135							
136							
137							
138		Topock - Weathered Bedrock - conglomerate	GW-GM		(137.0 - 141.5') Cemex #3 MESH (8x10)	(137.0 - 141.5') 1.8 bags	(137.0 - 141.5') 2 bags (11%) Note: Lapis Lustre Sand
139							
140							

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Date Started:	03/14/2019	Surface Elevation:	501.2 ft amsl	Well ID: IRZ-27-Pilot
Date Completed:	03/21/2019	Northing (NAD83):	2102236.8	
Drilling Co.:	Cascade	Easting (NAD83):	7615803.1	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	159 ft bgs	Project: Final GW Remedy Phase I
Driller Name:	Steve Vasquez	Borehole Diameter:	4-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	O. Flores/L. Amaya	Depth to First Water:	47.15 ft bgs	
Logger:	Gantt Jeffers	Editor:	Michael Andrews	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
141					(137.0 - 141.5') Cemex #3 MESH (8x10)	(137.0 - 141.5') 1.8 bags	(137.0 - 141.5') 2 bags (11%) Note: Lapis Lustre Sand
142							
143							
144							
145							
146							
147							
148		Topock - Weathered Bedrock - conglomerate	GW-GM		(9.0 - 156.0') 6" Borehole		
149					(141.5 - 156.0') Bentonite seal chips	(141.5 - 156.0') 2.6 bags	(141.5 - 156.0') 2 bags (-23%) Note: Rathole Puregold medium chips
150							
151							
152					(147.0 - 156.0') 4" Borehole		
153	-no sample-- (Interval did not produce.) 3/20/2019 10:15						
154							
155							
156							
157			NR				
158							
159							
160							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started:	<u>12/11/2019</u>	Surface Elevation:	<u>501.6 ft amsl</u>	Boring No.: <u>IRZ-29 Pilot</u>
Date Completed:	<u>12/19/2019</u>	Northing (NAD83):	<u>2102085.0</u>	
Drilling Co.:	<u>Cascade</u>	Easting (NAD83):	<u>7615788.9</u>	Client: <u>PG&E</u>
Drilling Method:	<u>Sonic Drilling</u>	Total Depth:	<u>132 ft bgs</u>	Project: <u>Final GW Remedy Phase 1</u>
Drill Rig Type:	<u>Boart Longyear Track Mount</u>	Borehole Diameter:	<u>6-10 inches</u>	Location: <u>PG&E Topock, Topock, California</u>
Driller Name:	<u>Eddie Ramos</u>	Depth to First Water:	<u>47.75 ft bgs</u>	
Drilling Asst:	<u>H. Amezguita/ L. Amaya</u>	Sampling Method:	<u>4 inch x 10 ft. Core Barrel</u>	Project Number: <u>RC000753.0051</u>
Logger:	<u>S. McGrane / G. Willford</u>	Sampling Interval:	<u>Continuous</u>	
Editor:	<u>Kendra Keon</u>	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
1							(0.0 - 7.0') Topock - Fill; Silty sand with gravel (SM); yellowish brown / moderate yellowish brown (10YR 5/4); fine grained to very coarse grained, angular to subround; little granules to large pebbles, subangular to round; little silt; dry; possible fill	(0.0 - 7.0') Soft-Loose material fell out of initial run into the hopper, logged material from hopper.	(0.0 - 67.0') No water used
2									
3									
4	84			Topock - Fill	SM				
5									
6									
7									
8							(7.0 - 13.0') Topock - Fill; Silty sand (SM); yellowish brown / moderate yellowish brown (10YR 5/4); very fine grained to coarse grained, angular to subround; little granules to small pebbles, angular to subround; little silt; dry; possible fill	(7.0 - 14.0') Normal drilling conditions.	
9									
10				Topock - Fill	SM				
11									
12	120								
13							(13.0 - 17.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); pale brown (10YR 6/3) little brown (10YR 4/3); very fine grained to very coarse grained, angular to subround; little granules to medium pebbles, angular to subangular; little silt; dry	(14.0 - 17.0') Soft drilling.	
14				Topock - Alluvium Deposits	SM				
15									
16									
17							(17.0 - 27.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (10YR 4/3) trace reddish brown (5YR 5/4); very fine grained to very coarse grained, angular to subround; some granules to very large pebbles, angular to subround; little silt; trace small cobbles, angular; trace clay; dry; moderate cementation; some pieces of drill cuttings moderately cemented	(17.0 - 27.0') Rough drilling.	
18				Topock - Alluvium Deposits	SM				
19	120								
20									

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Date Started:	12/11/2019	Surface Elevation:	501.6 ft amsl	Boring No.: IRZ-29 Pilot	
Date Completed:	12/19/2019	Northing (NAD83):	2102085.0		
Drilling Co.:	Cascade	Easting (NAD83):	7615788.9	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	132 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Boart Longyear Track Mount	Borehole Diameter:	6-10 inches	Location:	PG&E Topock, Topock, California
Driller Name:	Eddie Ramos	Depth to First Water:	47.75 ft bgs		
Drilling Asst:	H. Amezguita/ L. Amaya	Sampling Method:	4 inch x 10 ft. Core Barrel	Project Number:	RC000753.0051
Logger:	S. McGrane / G. Willford	Sampling Interval:	Continuous		
Editor:	Kendra Keon	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
21	120			Topock - Alluvium Deposits	SM				
22									
23									
24									
25									
26									
27	114				NR		(27.0 - 27.5') No recovery (NR); fell out of core barrel when bagging.	(27.0 - 31.0') Hard drilling.	
28				Topock - Alluvium Deposits	ML		(27.5 - 29.0') Topock - Alluvium Deposits; Sandy silt with gravel (ML); brown (10YR 4/3); no plasticity; some very fine to very coarse grained sand, angular to subround; little granules to small pebbles, angular to subround; little clay; trace small cobbles, subround; dry; cobbles composed of conglomerate		
29				Topock - Alluvium Deposits	SC		(29.0 - 31.0') Topock - Alluvium Deposits; Clayey sand with gravel (SC); brown (7.5YR 4/4); very fine grained to very coarse grained, angular to subround; some granules to very large pebbles, subangular to round; little small cobbles, subangular to subround; little silt; little clay; moist; cobbles composed of conglomerate		
30				Topock - Alluvium Deposits	ML		(31.0 - 31.8') Topock - Alluvium Deposits; Sandy silt with gravel (ML); brown (10YR 4/3); no plasticity; some very fine to very coarse grained sand, angular to subround; little granules to small pebbles, angular to subround; little clay; trace small cobbles, subround; dry; cobbles composed of conglomerate	(31.0 - 33.0') Soft drilling.	
31				Topock - Alluvium Deposits	SC		(31.8 - 38.0') Topock - Alluvium Deposits; Clayey sand with gravel (SC); brown (7.5YR 5/4); very fine grained to very coarse grained, angular to subround; some granules to very large pebbles, subangular to round; little silt; little clay; trace small cobbles, subangular to subround; coarser clasts composed of metadiorite; moist to dry; cobbles composed of conglomerate	(33.0 - 34.5') Hard drilling.	
32							(33.25') dark grayish brown / dark yellowish brown (10YR 4/2); trace silt; dry; increase in sand, decrease in granules and pebbles, angular to subangular	(34.5 - 35.0') Soft drilling.	
33							(34.25') brown (7.5YR 5/2); coarser clasts composed of metadiorite; moist to dry; weak cementation; granules and pebbles angular to subround	(35.0 - 37.0') Hard drilling.	
34							(35.25') brown (7.5YR 4/4); moist		
35									
36									
37	120			Topock - Alluvium Deposits	ML		(38.0 - 40.5') Topock - Alluvium Deposits; Sandy silt with gravel (ML); brown (7.5YR 4/4); no plasticity; some very fine to very coarse grained sand, angular to subround; little granules to large pebbles, angular to subangular; little clay; coarser clasts composed of metadiorite; dry to moist; moderate cementation	(37.0 - 43.0') Normal drilling.	
38									
39									
40								(39.5 - 42.5')	

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Date Started:	12/11/2019	Surface Elevation:	501.6 ft amsl	Boring No.: IRZ-29 Pilot	
Date Completed:	12/19/2019	Northing (NAD83):	2102085.0		
Drilling Co.:	Cascade	Easting (NAD83):	7615788.9	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	132 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Boart Longyear Track Mount	Borehole Diameter:	6-10 inches	Location:	PG&E Topock, Topock, California
Driller Name:	Eddie Ramos	Depth to First Water:	47.75 ft bgs		
Drilling Asst:	H. Amezguita/ L. Amaya	Sampling Method:	4 inch x 10 ft. Core Barrel	Project Number:	RC000753.0051
Logger:	S. McGrane / G. Willford	Sampling Interval:	Continuous		
Editor:	Kendra Keon	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
41	120			Topock - Alluvium Deposits	ML		(40.5 - 41.3') Topock - Alluvium Deposits; Silty sand with gravel (SM); dark yellowish brown (10YR 4/4); very fine grained to very coarse grained, angular to subround; some silt; little granules to very large pebbles, angular to subangular; little clay; coarser clasts composed of metadiorite; dry to moist	Core bag broke sample disturbed.	
42				Topock - Alluvium Deposits	ML				
43				Topock - Alluvium Deposits	SC		(41.3 - 42.0') Topock - Alluvium Deposits; Sandy silt with gravel (ML); dark yellowish brown (10YR 4/4); no plasticity; some very fine to very coarse grained sand, angular to subround; little granules to very large pebbles, angular to subangular; little clay; trace small cobbles, subangular; coarser clasts composed of metadiorite; dry to moist; sample disturbed	(43.0 - 43.5') Hard drilling.	
44				Topock - Alluvium Deposits	SM		(42.0 - 43.5') Topock - Alluvium Deposits; Clayey sand with gravel (SC); brown (7.5YR 5/4); very fine grained to very coarse grained, angular to subround; some granules to very large pebbles, angular to subangular; little clay; trace small cobbles, subround; trace silt; coarser clasts composed of metadiorite; dry to moist; cobbles composed of conglomerate	(43.5 - 47.0') Normal drilling.	
45									
46							(43.5 - 44.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (10YR 5/3); very fine grained to very coarse grained, angular to subround; some silt; little granules to very large pebbles, angular to subangular; little clay; trace small cobbles, subangular; coarser clasts composed of metadiorite; dry to moist; cobbles composed of conglomerate		
47		IRZ-29-SS-45-50 12/20/2019 11:00		Topock - Alluvium Deposits	SM		(44.0 - 51.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 4/4); very fine grained to very coarse grained, angular to subround; some granules to very large pebbles, angular to subround; little silt; little clay; coarser clasts composed of metadiorite; dry to moist; weak cementation	(47.8') Approximate depth to groundwater.	
48							(45.25') moist		
49	62.4		IRZ-29-VAS-47-52 (4400 ppb) 12/16/2019 14:46				(48') brown (7.5YR 4/3); some silt; trace clay; coarser clasts composed of metadiorite; wet; increase in sand, decrease in granules and pebbles		
50							(48.75'); moist to wet		
51							(50'); some granules to large pebbles, angular to subangular; little silt; moist to wet; increase in sand, no clay		
52							(51'); some granules to very large pebbles, angular to subangular; trace clay; decrease in sand		
53		IRZ-29-SS-50-55 12/20/2019 11:05		Topock - Alluvium Deposits	SM		(51.5 - 53.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown / moderate brown (5YR 4/4); very fine grained to very coarse grained, angular to subround; some silt; little granules to medium pebbles, angular to subround; trace clay; moist to wet	(52.0 - 57.0') Hard drilling.	
54							(52'); and silt; decrease in sand		
55	63.6						(53.0 - 59.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 5/4); very fine grained to medium grained, angular to subround; some silt; little granules to very large pebbles, angular to subangular; little coarse to very coarse grained sand, angular to subround; little clay; coarser clasts composed of metadiorite; moist to wet; moderate cementation; weak HCL reaction		
56				Topock - Alluvium Deposits	SM				
57									
58		IRZ-29-SS-55-60 12/20/2019 11:10					(57') brown (7.5YR 4/4); little granules to large pebbles, angular to subangular; little silt; trace clay; increase sand, trace very large pebbles	(57.0 - 67.0') Hard drilling, fine grained sediments stretched during bagging.	
59	132								
60					ML		(59.5 - 64.5') Topock - Alluvium Deposits; Sandy silt with gravel		

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Date Started:	12/11/2019	Surface Elevation:	501.6 ft amsl	Boring No.: IRZ-29 Pilot	
Date Completed:	12/19/2019	Northing (NAD83):	2102085.0		
Drilling Co.:	Cascade	Easting (NAD83):	7615788.9	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	132 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Boart Longyear Track Mount	Borehole Diameter:	6-10 inches	Location:	PG&E Topock, Topock, California
Driller Name:	Eddie Ramos	Depth to First Water:	47.75 ft bgs		
Drilling Asst:	H. Amezguita/ L. Amaya	Sampling Method:	4 inch x 10 ft. Core Barrel	Project Number:	RC000753.0051
Logger:	S. McGrane / G. Willford	Sampling Interval:	Continuous		
Editor:	Kendra Keon	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
61	132	IRZ-29-SS-60-65 12/20/2019 11:15	IRZ-29-VAS-62-67 (2400 ppb) 12/17/2019 10:00	Topock - Alluvium Deposits	ML	<div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div>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Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	12/11/2019	Surface Elevation:	501.6 ft amsl	Boring No.: IRZ-29 Pilot	
Date Completed:	12/19/2019	Northing (NAD83):	2102085.0		
Drilling Co.:	Cascade	Easting (NAD83):	7615788.9	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	132 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Boart Longyear Track Mount	Borehole Diameter:	6-10 inches	Location:	PG&E Topock, Topock, California
Driller Name:	Eddie Ramos	Depth to First Water:	47.75 ft bgs		
Drilling Asst:	H. Amezguita/ L. Amaya	Sampling Method:	4 inch x 10 ft. Core Barrel	Project Number:	RC000753.0051
Logger:	S. McGrane / G. Willford	Sampling Interval:	Continuous		
Editor:	Kendra Keon	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
81				Topock - Alluvium Deposits	ML		(7.5YR 4/4); low plasticity; some very fine to very coarse grained sand, angular to subround; little granules to medium pebbles, angular to subangular; little clay; coarser clasts composed of metadiorite; moist; very stiff (80.75'); trace clay; increase in silt, decrease in sand		
82				Topock - Alluvium Deposits	GW		(81.5 - 81.8') Topock - Alluvium Deposits; Well graded gravel (GW); very dark greenish gray (GLE1 3/1); small cobbles to boulders, angular to subround; coarser clasts composed of metadiorite; dry; iron oxide staining; boulder and cobbles have been pulverized		
83		IRZ-29-SS-80-85 12/20/2019 11:40		Topock - Alluvium Deposits	ML		(81.8 - 85.0') Topock - Alluvium Deposits; Sandy silt with gravel (ML); brown (7.5YR 4/3); medium plasticity; some very fine to very coarse grained sand, angular to subround; little granules to medium pebbles, angular to subround; little clay; coarser clasts composed of metadiorite; moist to wet; very stiff (83') reddish brown / moderate brown (5YR 4/4); little granules to large pebbles, angular to subround; decrease in silt, increase in granules and pebbles		
84	240								
85									
86				Topock - Alluvium Deposits	SM		(85.0 - 87.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 4/4); very fine grained to very coarse grained, angular to subround; some silt; little granules to large pebbles, angular to subangular; little clay; coarser clasts composed of metadiorite; moist; sand increases, silt decreases with depth		
87									
88		IRZ-29-SS-85-90 12/20/2019 11:45		Topock - Alluvium Deposits	ML		(87.0 - 87.8') Topock - Alluvium Deposits; Sandy silt with gravel (ML); brown (7.5YR 4/3); medium plasticity; some very fine to very coarse grained sand, angular to subround; little granules to large pebbles, angular to subangular; little clay; coarser clasts composed of metadiorite; moist; very stiff	(87.0 - 92.0') Normal drilling.	
89				Topock - Alluvium Deposits	SM				
90	60			Topock - Alluvium Deposits	ML		(87.8 - 88.3') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown / moderate brown (5YR 4/4); very fine grained to very coarse grained; some silt; little granules to very large pebbles, angular to subangular; trace clay; coarser clasts composed of metadiorite; wet		
91			IRZ-29-VAS-87-92 (<0.033 U ppb) 12/17/2019 14:41						
92							(88.3 - 90.5') Topock - Alluvium Deposits; Sandy silt with gravel (ML); reddish brown / moderate brown (5YR 4/4); medium plasticity; some very fine to very coarse grained sand, angular to subround; little granules to very large pebbles, angular to subangular; little clay; coarser clasts composed of metadiorite; moist		
93		IRZ-29-SS-90-95 12/20/2019 11:50		Topock - Alluvium Deposits	SM		(90.5 - 95.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown / moderate brown (5YR 4/4); very fine grained to very coarse grained, angular to subround; some silt; little granules to very large pebbles, angular to subangular; little clay; coarser clasts composed of metadiorite; wet (92'); little silt; wet; increase in sand, increase in granules and pebbles, no clay	(92.0 - 103.0') Normal drilling.	
94									
95									
96	180			Topock - Alluvium Deposits	ML		(95.0 - 96.5') Topock - Alluvium Deposits; Sandy silt with gravel (ML); reddish brown / moderate brown (5YR 4/4); medium plasticity; and very fine to very coarse grained sand, angular to subround; little granules to very large pebbles, angular to subangular; wet		
97									
98		IRZ-29-SS-95-100 12/20/2019 11:55		Topock - Alluvium Deposits	ML		(96.5 - 99.3') Topock - Alluvium Deposits; Sandy silt with gravel (ML); brown (7.5YR 4/4); low plasticity; some very fine to very coarse grained sand, angular to subround; little granules to very large pebbles, angular to subangular; little clay; coarser clasts composed of metadiorite; moist; hard		
99									
100				Topock - Alluvium	ML		(99.3 - 104.5') Topock - Alluvium Deposits; Sandy silt with gravel (ML); reddish brown / moderate brown (5YR 4/4); medium		





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Date Started:	12/11/2019	Surface Elevation:	501.6 ft amsl	Boring No.: IRZ-29 Pilot	
Date Completed:	12/19/2019	Northing (NAD83):	2102085.0		
Drilling Co.:	Cascade	Easting (NAD83):	7615788.9	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	132 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Boart Longyear Track Mount	Borehole Diameter:	6-10 inches	Location:	PG&E Topock, Topock, California
Driller Name:	Eddie Ramos	Depth to First Water:	47.75 ft bgs		
Drilling Asst:	H. Amezguita/ L. Amaya	Sampling Method:	4 inch x 10 ft. Core Barrel	Project Number:	RC000753.0051
Logger:	S. McGrane / G. Willford	Sampling Interval:	Continuous		
Editor:	Kendra Keon	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
101	180	IRZ-29-SS-100-105 12/20/2019 12:00		Deposits	ML		plasticity; some granules to very large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subround; trace clay; coarser clasts composed of metadiorite; moist; hard	(103.0 - 104.0') Hard drilling.	
102				Topock - Alluvium Deposits					
103									
104									
105	120	IRZ-29-SS-105-110 12/20/2019 12:05		Topock - Alluvium Deposits	GW		(104.5 - 105.0') Topock - Alluvium Deposits; Well graded gravel (GW); very dark greenish gray (GLE Y1 3/1); boulders, angular to subangular; dry; pulverized boulder	(107.0 - 112.0') Normal drilling.	(107.0 - 132.0') No water used
106				Topock - Alluvium Deposits	ML		(105.0 - 113.5') Topock - Alluvium Deposits; Sandy silt with gravel (ML); reddish brown / moderate brown (5YR 4/4); medium plasticity; some very fine to very coarse grained sand, angular to subround; little granules to very large pebbles, angular to subangular; trace clay; coarser clasts composed of metadiorite; moist; hard		
107							(107') reddish brown (5YR 5/4); little clay; decrease in silt		
108							(109') reddish brown / moderate brown (5YR 4/4); trace clay; moist; increase in silt		
109	72	IRZ-29-SS-110-113.5 12/20/2019 12:10		Topock - Alluvium Deposits	SM		(113') little clay; dry; decrease in silt	(112.0 - 117.0') Intermittent zones of hard and soft drilling, potential confining units.	
110									
111									
112									
113		IRZ-29-VAS-112-117 (760 ppb) 12/18/2019 15:12		Topock - Alluvium Deposits	SM		(113.5 - 117.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown / moderate brown (5YR 4/4); very fine grained to very coarse grained, angular to subround; some granules to very large pebbles, angular to subangular; some silt; trace clay; coarser clasts composed of metadiorite; wet	(117.0 - 119.0') Normal drilling.	
114									
115									
116									
117		IRZ-29-SS-113.5-119 12/20/2019 12:15		Topock - Alluvium Deposits	SM		(117.0 - 119.0') Topock - Alluvium Deposits; Silty sand (SM); brown (10YR 4/3); very fine grained to very coarse grained, angular to round; some silt; little granules to very large pebbles, angular to subround; coarser clasts composed of metadiorite; wet	(119.0 - 123.0') Hard drilling.	
118									
119									
120									
		IRZ-29-SS-119-121 12/20/2019		Topock - Weathered Bedrock -	ML		(119.0 - 121.0') Topock - Weathered Bedrock - conglomerate; Sandy silt with gravel (ML); reddish brown / moderate brown (5YR 4/4); medium plasticity; some very fine to very coarse grained		

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	12/11/2019	Surface Elevation:	501.6 ft amsl	Boring No.: IRZ-29 Pilot
Date Completed:	12/19/2019	Northing (NAD83):	2102085.0	
Drilling Co.:	Cascade	Easting (NAD83):	7615788.9	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	132 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Boart Longyear Track Mount	Borehole Diameter:	6-10 inches	Location: PG&E Topock, Topock, California
Driller Name:	Eddie Ramos	Depth to First Water:	47.75 ft bgs	
Drilling Asst:	H. Amezguita/ L. Amaya	Sampling Method:	4 inch x 10 ft. Core Barrel	Project Number: RC000753.0051
Logger:	S. McGrane / G. Willford	Sampling Interval:	Continuous	
Editor:	Kendra Keon	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
121	72	12:20		conglomerate	ML		sand, angular to subround; little granules to very large pebbles, angular to subangular; moist to wet	(120.5') During clean out run material kept falling out of the core barrel. Attempted push sampler down to 122 ft. bgs tagged at 120.5 ft bgs. (123.0 - 124.0') Core barrel locked up stopped cutting lost bottom foot of core. (124.0 - 127.0') Drill rods chattering heavily. (126.0 - 132.0') Lost core down hole. (127.0 - 129.0') Softer zone, drill rods stopped chattering. (129.0 - 130.0') Drill rods chattering. (130.0 - 132.0') Smoother drilling, rods stopped chattering.	
122			Topock - Competent Bedrock - conglomerate			(121.0 - 123.0') Topock - Competent Bedrock - conglomerate; (2.5YR4/3); dry; friable pulverized			
123				NR		(123.0 - 124.0') No recovery (NR); see drilling notes			
124	24						(124.0 - 132.0') Topock - Competent Bedrock - conglomerate; (2.5YR4/3); dry; friable pulverized (124.75'); moist (126'); core fell out of core barrel down hole and mixed with water column what was recovered was highly saturated		
125									
126									
127									
128					Topock - Competent Bedrock - conglomerate				
129									
130									
131									
132									
End of Boring at 132.0 'bgs.									
133									
134									
135									
136									
137									
138									
139									
140									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	12/19/2019	Surface Elevation:	501.6 ft amsl	Well ID: IRZ-29 Pilot
Date Completed:	12/20/2019	Northing (NAD83):	2102085.0	
Drilling Co.:	Cascade	Easting (NAD83):	7615788.9	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	132 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Eddie Ramos	Borehole Diameter:	6-10 inches	Location: PG&E Topock, Topock, California
Drilling Asst:	H. Amezquita/ L. Amaya	Depth to First Water:	47.75 ft bgs	
Logger:	S. McGrane / G. Willford	Editor:	Kendra Keon	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
1					(0.0 - 0.5') Steel Plate		Note: Steel plates with BMPs in place
2							
3					(0.5 - 5.0') Transition Sand (#00)	(0.5 - 5.0') 5.5 bags	(0.5 - 5.0') 5 bags (-9%) Note: Lapis Lustre Sand
4		Topock - Fill	SM		(0.0 - 7.0') 10.0" Borehole		
5							
6							
7							
8							
9							
10		Topock - Fill	SM				
11							
12							
13					(5.0 - 118.0') Cemex #3 MESH (8x10)	(5.0 - 118.0') 45.3 bags	(5.0 - 118.0') 57 bags (26%) Note: Lapis Lustre Sand, used >20% of calculated volume due to potential voids forming
14							
15		Topock - Alluvium Deposits	SM		(7.0 - 116.0') 6.0" Borehole		
16							
17							
18							
19		Topock - Alluvium Deposits	SM				
20							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started:	12/19/2019	Surface Elevation:	501.6 ft amsl	Well ID: IRZ-29 Pilot
Date Completed:	12/20/2019	Northing (NAD83):	2102085.0	
Drilling Co.:	Cascade	Easting (NAD83):	7615788.9	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	132 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Eddie Ramos	Borehole Diameter:	6-10 inches	Location: PG&E Topock, Topock, California
Drilling Asst:	H. Amezquita/ L. Amaya	Depth to First Water:	47.75 ft bgs	
Logger:	S. McGrane / G. Willford	Editor:	Kendra Keon	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
21							
22							
23		Topock - Alluvium Deposits	SM				
24							
25							
26							
27			NR				
28		Topock - Alluvium Deposits	ML				
29							
30		Topock - Alluvium Deposits	SC		(5.0 - 118.0') Cemex #3 MESH (8x10)	(5.0 - 118.0') 45.3 bags	(5.0 - 118.0') 57 bags (26%) Note: Lapis Lustre Sand, used >20% of calculated volume due to potential voids forming
31		Topock - Alluvium Deposits	ML				
32							
33							
34		Topock - Alluvium Deposits	SC				
35							
36							
37							
38							
39		Topock - Alluvium Deposits	ML				
40							

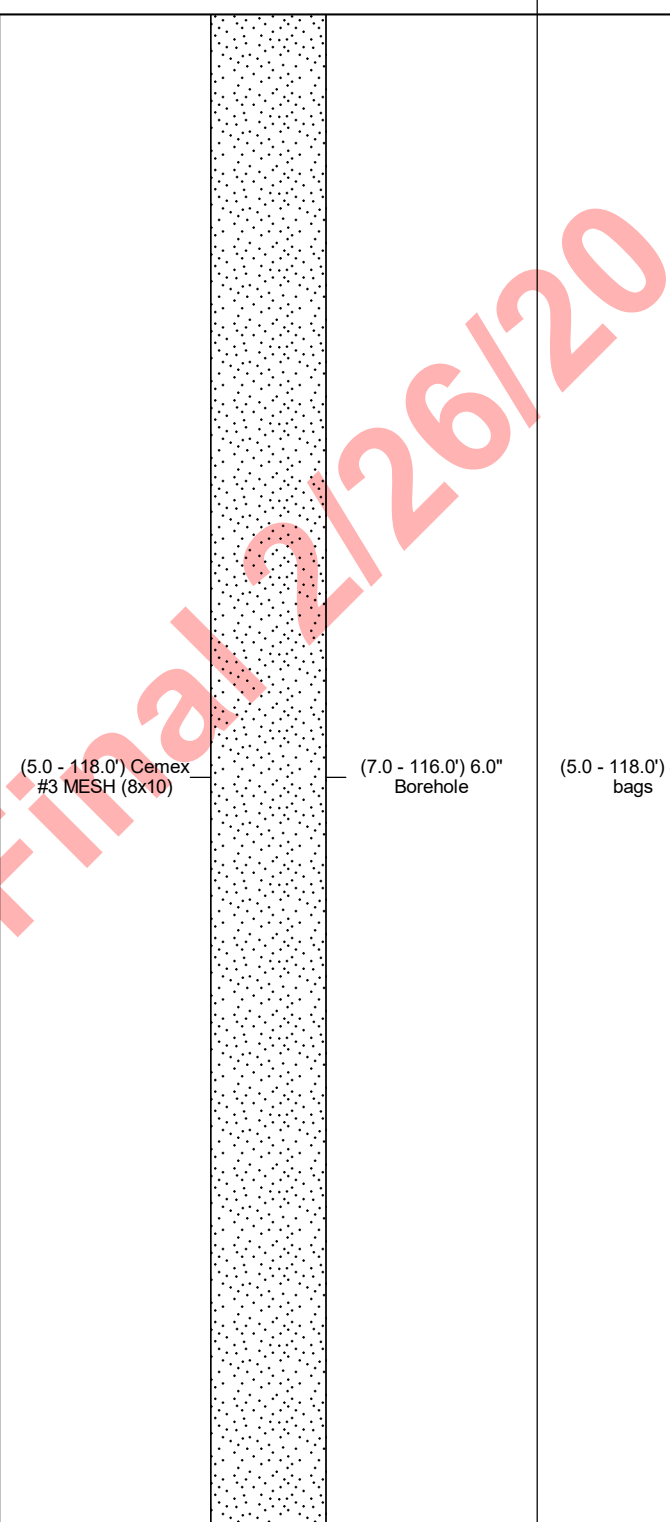
Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started:	12/19/2019	Surface Elevation:	501.6 ft amsl	Well ID: IRZ-29 Pilot
Date Completed:	12/20/2019	Northing (NAD83):	2102085.0	
Drilling Co.:	Cascade	Easting (NAD83):	7615788.9	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	132 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Eddie Ramos	Borehole Diameter:	6-10 inches	Location: PG&E Topock, Topock, California
Drilling Asst:	H. Amezquita/ L. Amaya	Depth to First Water:	47.75 ft bgs	
Logger:	S. McGrane / G. Willford	Editor:	Kendra Keon	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
41		Topock - Alluvium Deposits	ML				
42		Topock - Alluvium Deposits	SM				
43		Topock - Alluvium Deposits	ML				
44		Topock - Alluvium Deposits	SC				
45		Topock - Alluvium Deposits	SM				
46							
47							
48		Topock - Alluvium Deposits	SM				
49	IRZ-29-VAS-47-52 (4400 ppb) 12/16/2019 14:46						
50					(5.0 - 118.0') Cemex #3 MESH (8x10)	(7.0 - 116.0') 6.0" Borehole	(5.0 - 118.0') 45.3 bags
51							
52		Topock - Alluvium Deposits	SM				
53							
54							
55							
56		Topock - Alluvium Deposits	SM				
57							
58							
59							
60			ML				

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Date Started:	12/19/2019	Surface Elevation:	501.6 ft amsl	Well ID: IRZ-29 Pilot
Date Completed:	12/20/2019	Northing (NAD83):	2102085.0	
Drilling Co.:	Cascade	Easting (NAD83):	7615788.9	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	132 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Eddie Ramos	Borehole Diameter:	6-10 inches	Location: PG&E Topock, Topock, California
Drilling Asst:	H. Amezquita/ L. Amaya	Depth to First Water:	47.75 ft bgs	
Logger:	S. McGrane / G. Willford	Editor:	Kendra Keon	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
61	IRZ-29-VAS-62-67 (2400 ppb) 12/17/2019 10:00	Topock - Alluvium Deposits	ML				
62		Topock - Alluvium Deposits	ML				
63		Topock - Alluvium Deposits	ML				
64		Topock - Alluvium Deposits	ML				
65		Topock - Alluvium Deposits	ML				
66		Topock - Alluvium Deposits	ML				
67		Topock - Alluvium Deposits	ML				
68		Topock - Alluvium Deposits	ML				
69		Topock - Alluvium Deposits	SM				
70		Topock - Older Alluvium Deposits	SM				
71		Topock - Older Alluvium Deposits	SM				
72		Topock - Older Alluvium Deposits	SM				
73		Topock - Older Alluvium Deposits	SM				
74		Topock - Older Alluvium Deposits	SM				
75		Topock - Older Alluvium Deposits	SM				
76		Topock - Older Alluvium Deposits	SM				
77		Topock - Older Alluvium Deposits	SM				
78		Topock - Older Alluvium Deposits	SM				
79		Topock - Older Alluvium Deposits	SM				
80		Topock - Older Alluvium Deposits	SM				
81		Topock - Older Alluvium Deposits	SM				
82		Topock - Older Alluvium Deposits	SM				
83		Topock - Older Alluvium Deposits	SM				
84		Topock - Older Alluvium Deposits	SM				
85		Topock - Older Alluvium Deposits	SM				
86		Topock - Older Alluvium Deposits	SM				
87		Topock - Older Alluvium Deposits	SM				
88		Topock - Older Alluvium Deposits	SM				
89		Topock - Older Alluvium Deposits	SM				
90		Topock - Older Alluvium Deposits	SM				
91		Topock - Older Alluvium Deposits	SM				
92		Topock - Older Alluvium Deposits	SM				
93		Topock - Older Alluvium Deposits	SM				
94		Topock - Older Alluvium Deposits	SM				
95		Topock - Older Alluvium Deposits	SM				
96		Topock - Older Alluvium Deposits	SM				
97		Topock - Older Alluvium Deposits	SM				
98		Topock - Older Alluvium Deposits	SM				
99		Topock - Older Alluvium Deposits	SM				
100		Topock - Older Alluvium Deposits	SM				
101		Topock - Older Alluvium Deposits	SM				
102		Topock - Older Alluvium Deposits	SM				
103		Topock - Older Alluvium Deposits	SM				
104		Topock - Older Alluvium Deposits	SM				
105		Topock - Older Alluvium Deposits	SM				
106		Topock - Older Alluvium Deposits	SM				
107		Topock - Older Alluvium Deposits	SM				
108		Topock - Older Alluvium Deposits	SM				
109		Topock - Older Alluvium Deposits	SM				
110		Topock - Older Alluvium Deposits	SM				
111		Topock - Older Alluvium Deposits	SM				
112		Topock - Older Alluvium Deposits	SM				
113		Topock - Older Alluvium Deposits	SM				
114		Topock - Older Alluvium Deposits	SM				
115		Topock - Older Alluvium Deposits	SM				
116		Topock - Older Alluvium Deposits	SM				
117		Topock - Older Alluvium Deposits	SM				
118		Topock - Older Alluvium Deposits	SM				
119		Topock - Older Alluvium Deposits	SM				
120		Topock - Older Alluvium Deposits	SM				
121		Topock - Older Alluvium Deposits	SM				
122		Topock - Older Alluvium Deposits	SM				
123		Topock - Older Alluvium Deposits	SM				
124		Topock - Older Alluvium Deposits	SM				
125		Topock - Older Alluvium Deposits	SM				
126		Topock - Older Alluvium Deposits	SM				
127		Topock - Older Alluvium Deposits	SM				
128		Topock - Older Alluvium Deposits	SM				
129		Topock - Older Alluvium Deposits	SM				
130		Topock - Older Alluvium Deposits	SM				
131		Topock - Older Alluvium Deposits	SM				
132		Topock - Older Alluvium Deposits	SM				

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started:	12/19/2019	Surface Elevation:	501.6 ft amsl	Well ID: IRZ-29 Pilot
Date Completed:	12/20/2019	Northing (NAD83):	2102085.0	
Drilling Co.:	Cascade	Easting (NAD83):	7615788.9	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	132 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Eddie Ramos	Borehole Diameter:	6-10 inches	Location: PG&E Topock, Topock, California
Drilling Asst:	H. Amezquita/ L. Amaya	Depth to First Water:	47.75 ft bgs	
Logger:	S. McGrane / G. Willford	Editor:	Kendra Keon	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
81		Topock - Alluvium Deposits	ML				
82		Topock - Alluvium Deposits	GW				
83		Topock - Alluvium Deposits	ML				
84							
85							
86		Topock - Alluvium Deposits	SM				
87							
88		Topock - Alluvium Deposits	ML				
89		Topock - Alluvium Deposits	SM				
90	IRZ-29-VAS-87-92 (<0.033 U ppb) 12/17/2019 14:41	Topock - Alluvium Deposits	ML		(5.0 - 118.0') Cemex #3 MESH (8x10)	(7.0 - 116.0') 6.0" Borehole	(5.0 - 118.0') 45.3 bags
91							
92							
93		Topock - Alluvium Deposits	SM				
94							
95							
96		Topock - Alluvium Deposits	ML				
97							
98		Topock - Alluvium Deposits	ML				
99							
100		Topock - Alluvium Deposits	ML				

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started:	12/19/2019	Surface Elevation:	501.6 ft amsl	Well ID: IRZ-29 Pilot
Date Completed:	12/20/2019	Northing (NAD83):	2102085.0	
Drilling Co.:	Cascade	Easting (NAD83):	7615788.9	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	132 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Eddie Ramos	Borehole Diameter:	6-10 inches	Location: PG&E Topock, Topock, California
Drilling Asst:	H. Amezquita/ L. Amaya	Depth to First Water:	47.75 ft bgs	
Logger:	S. McGrane / G. Willford	Editor:	Kendra Keon	Project Number: RC000753.0051

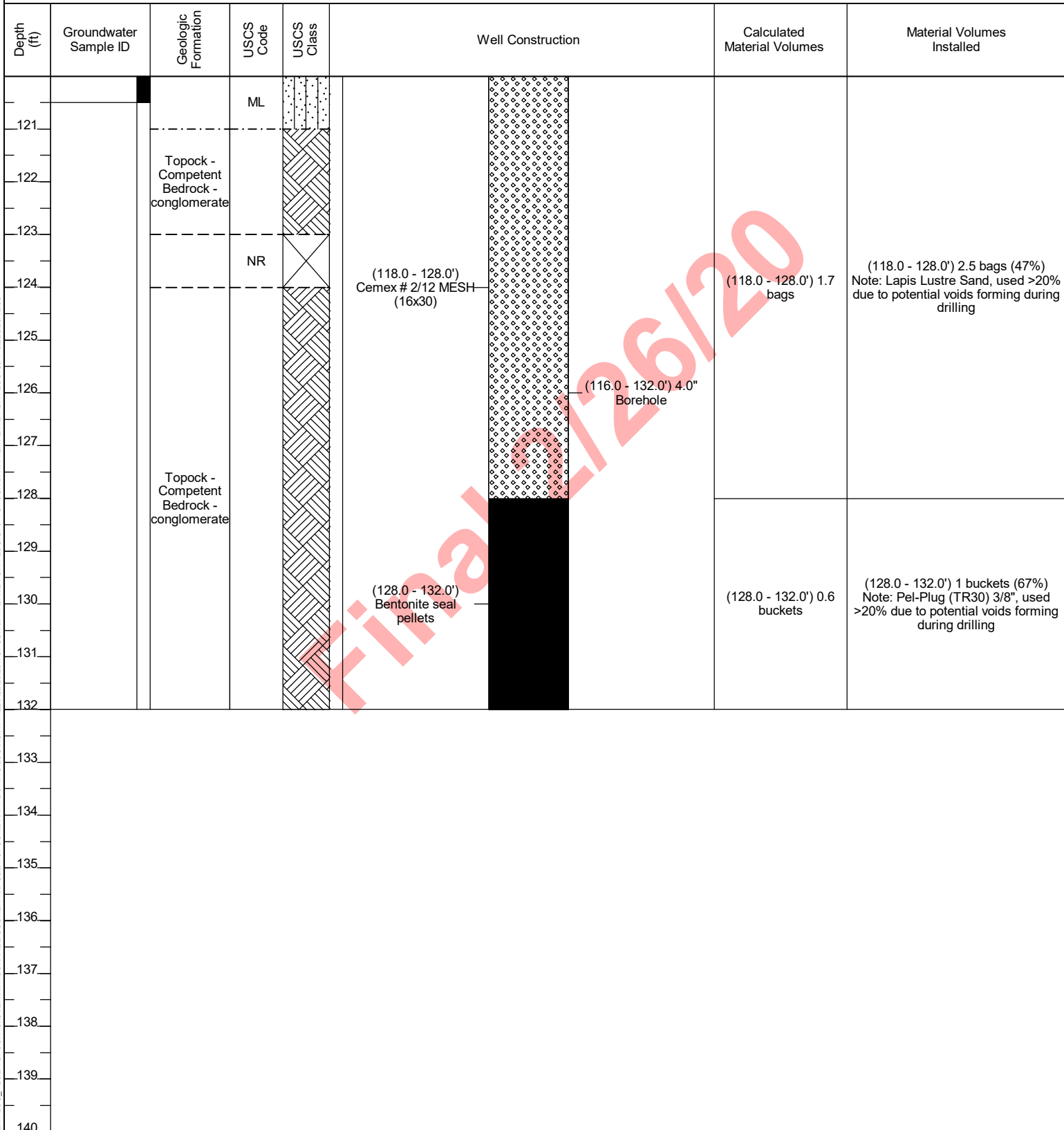
Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
101		Topock - Alluvium Deposits	ML				
102							
103							
104							
105		Topock - Alluvium Deposits	GW				
106							
107							
108							
109		Topock - Alluvium Deposits	ML		(5.0 - 118.0') Cemex #3 MESH (8x10)	(5.0 - 118.0') 45.3 bags	(5.0 - 118.0') 57 bags (26%) Note: Lapis Lustre Sand, used >20% of calculated volume due to potential voids forming
110							
111							
112							
113							
114	IRZ-29-VAS-112-117 (760 ppb) 12/18/2019 15:12	Topock - Alluvium Deposits	SM				
115							
116							
117							
118	IRZ-29-VAS-116-120.5 (23 ppb) 12/19/2019 10:26	Topock - Alluvium Deposits	SM		(116.0 - 132.0') 4.0" Borehole		
119		Topock - Weathered Bedrock - conglomerate	ML		(118.0 - 128.0') Cemex # 2/12 MESH (16x30)	(118.0 - 128.0') 1.7 bags	(118.0 - 128.0') 2.5 bags (47%) Note: Lapis Lustre Sand, used >20% due to potential voids forming during drilling
120							

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Temporary Backfill Log

Sheet: 7 of 7

Date Started:	12/19/2019	Surface Elevation:	501.6 ft amsl	Well ID: IRZ-29 Pilot
Date Completed:	12/20/2019	Northing (NAD83):	2102085.0	
Drilling Co.:	Cascade	Easting (NAD83):	7615788.9	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	132 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Eddie Ramos	Borehole Diameter:	6-10 inches	Location: PG&E Topock, Topock, California
Drilling Asst:	H. Amezquita/ L. Amaya	Depth to First Water:	47.75 ft bgs	
Logger:	S. McGrane / G. Willford	Editor:	Kendra Keon	Project Number: RC000753.0051



Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Drilling Log

Sheet: 1 of 7

Date Started:	02/10/2020	Surface Elevation:	501.6 ft amsl	Boring No.: IRZ-29
Date Completed:	02/12/2020	Northing (NAD83):	2102085.0	
Drilling Co.:	Cascade	Easting (NAD83):	7615788.9	Client: PG&E
Drilling Method:	Dual Rotary	Total Depth:	128.5 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Foremost DR-24HD	Conductor Casing Diameter:	18 inches	Location: PG&E Topock, Topock, California
Driller Name:	Jon Martinez	Drill Casing Diameter:	16 inches	
Drilling Asst:	A. & H. Amezcuita	Drill Bit:	15.5 & 17.5 Tricone	Project Number: RC000753.0051
Tool-Pusher:	Arnold Lamon	Depth to First Water:	47.75 ft bgs	
Rig Geologist:	D. Cornell / E. Redner	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Drilling Run and Average Penetration Rate	USCS Code	USCS Class	Casing Diameter	Description (See Pilot boring log for full geologic descriptions)	Drilling Notes	Drilling Fluid
1					(0.0 - 7.0') Topock - Fill; Silty sand with gravel (SM); yellowish brown / moderate yellowish brown (10YR 5/4)	(0.0 - 0.3') Observed temporary backfill material, Cemex #60 Mesh sand, at the surface (see Photo Log).	(0.0 - 21.0') 231 gallons of water used; 150 gallons of water recovered; 81 gallons of water lost
2							
3							
4		SM					
5						(5.0 - 10.0') Observed temporary backfill material Cemex #3 in drill cuttings (see Photo Log).	
6							
7					(7.0 - 13.0') Topock - Fill; Silty sand with gravel (SM); yellowish brown / moderate yellowish brown (10YR 5/4)		
8							
9							
10	(0.0 - 21.0) 1.69 mins/ft	SM		(0.0 - 21.0') 18.0" Steel Casing		(10.1 - 20.0') Observed temporary backfill material Cemex #3 in drill cuttings (see Photo Log).	
11							
12							
13					(13.0 - 17.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); pale brown (10YR 6/3) little brown (10YR 4/3)		
14							
15		SM					
16							
17					(17.0 - 27.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (10YR 4/3) trace reddish brown (5YR 5/4)		
18		SM					
19							
20							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater

Remarks: NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval of pilot borehole

Date Started:	02/10/2020	Surface Elevation:	501.6 ft amsl	Boring No.: IRZ-29
Date Completed:	02/12/2020	Northing (NAD83):	2102085.0	
Drilling Co.:	Cascade	Easting (NAD83):	7615788.9	Client: PG&E
Drilling Method:	Dual Rotary	Total Depth:	128.5 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Foremost DR-24HD	Conductor Casing Diameter:	18 inches	Location: PG&E Topock, Topock, California
Driller Name:	Jon Martinez	Drill Casing Diameter:	16 inches	
Drilling Asst:	A. & H. Amezcuita	Drill Bit:	15.5 & 17.5 Tricone	Project Number: RC000753.0051
Tool-Pusher:	Arnold Lamon	Depth to First Water:	47.75 ft bgs	
Rig Geologist:	D. Cornell / E. Redner	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Drilling Run and Average Penetration Rate	USCS Code	USCS Class	Casing Diameter	Description (See Pilot boring log for full geologic descriptions)	Drilling Notes	Drilling Fluid
21	(0.0 - 21.0) 1.69 mins/ft			(0.0 - 21.0') 18.0" Steel Casing		(20.1 - 30.0') Observed temporary backfill material Cemex # 3 in drill cuttings (see Photo Log).	
22							(21.0 - 42.0') 347 gallons of water used; 250 gallons of water recovered; 97 gallons of water lost
23							
24		SM					
25							
26						(25.0 - 42.0') Rough drilling.	
27		NR			(27.0 - 27.5') No recovery (NR)		
28		ML			(27.5 - 29.0') Topock - Alluvium Deposits; Sandy silt with gravel (ML); brown (10YR 4/3)		
29							
30		SC			(29.0 - 31.0') Topock - Alluvium Deposits; Clayey sand with gravel (SC); brown (7.5YR 4/4)		
31	(21.0 - 42.0) 1.81 mins/ft			(21.0 - 42.0') 18.0" Steel Casing		(30.1 - 40.0') Observed temporary backfill material Cemex # 3 in drill cuttings (see Photo Log).	
32		ML			(31.0 - 31.8') Topock - Alluvium Deposits; Sandy silt with gravel (ML); brown (10YR 4/3)		
33					(31.8 - 38.0') Topock - Alluvium Deposits; Clayey sand with gravel (SC); brown (7.5YR 5/4)		
34							
35		SC					
36							
37							
38							
39		ML			(38.0 - 40.5') Topock - Alluvium Deposits; Sandy silt with gravel (ML); brown (7.5YR 4/4)		
40							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater

Remarks: NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval of pilot borehole

Date Started:	02/10/2020	Surface Elevation:	501.6 ft amsl	Boring No.: IRZ-29
Date Completed:	02/12/2020	Northing (NAD83):	2102085.0	
Drilling Co.:	Cascade	Easting (NAD83):	7615788.9	Client: PG&E
Drilling Method:	Dual Rotary	Total Depth:	128.5 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Foremost DR-24HD	Conductor Casing Diameter:	18 inches	Location: PG&E Topock, Topock, California
Driller Name:	Jon Martinez	Drill Casing Diameter:	16 inches	
Drilling Asst:	A. & H. Amezcuita	Drill Bit:	15.5 & 17.5 Tricone	Project Number: RC000753.0051
Tool-Pusher:	Arnold Lamon	Depth to First Water:	47.75 ft bgs	
Rig Geologist:	D. Cornell / E. Redner	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Drilling Run and Average Penetration Rate	USCS Code	USCS Class	Casing Diameter	Description (See Pilot boring log for full geologic descriptions)	Drilling Notes	Drilling Fluid
41	(21.0 - 42.0) 1.81 mins/ft	ML		(21.0 - 42.0') 18.0" Steel Casing	(40.5 - 41.3') Topock - Alluvium Deposits; Silty sand with gravel (SM); dark yellowish brown (10YR 4/4)	(40.1 - 50.0') Observed temporary backfill material Cemex # 3 in drill cuttings (see Photo Log).	
42		SM			(41.3 - 42.0') Topock - Alluvium Deposits; Sandy silt with gravel (ML); dark yellowish brown (10YR 4/4)		
43		ML			(42.0 - 43.5') Topock - Alluvium Deposits; Clayey sand with gravel (SC); brown (7.5YR 5/4)		
44	(42.0 - 58.8) 1.96 mins/ft	SC		(42.0 - 58.8') 16.0" Steel Casing	(43.5 - 44.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (10YR 5/3)	(42.0 - 81.0') Smooth drilling possibly due to new bit.	(42.0 - 58.8') 230 gallons of water used; 300 gallons of water recovered; 70 gallons of water gained
45		SM			(44.0 - 51.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 4/4)		
46							
47							
48		SM			(48') brown (7.5YR 4/3)		
49							
50							
51							
52							
53		SM			(51.5 - 53.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown / moderate brown (5YR 4/4) (52')		
54					(53.0 - 59.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 5/4)		
55							
56							
57		SM			(57') brown (7.5YR 4/4)		
58							
59		(58.8 - 79.1) 1.33 mins/ft					
60	ML			(59.5 - 64.5') Topock - Alluvium			

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater

Remarks: NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval of pilot borehole

Date Started:	02/10/2020	Surface Elevation:	501.6 ft amsl	Boring No.: IRZ-29
Date Completed:	02/12/2020	Northing (NAD83):	2102085.0	
Drilling Co.:	Cascade	Easting (NAD83):	7615788.9	Client: PG&E
Drilling Method:	Dual Rotary	Total Depth:	128.5 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Foremost DR-24HD	Conductor Casing Diameter:	18 inches	Location: PG&E Topock, Topock, California
Driller Name:	Jon Martinez	Drill Casing Diameter:	16 inches	
Drilling Asst:	A. & H. Amezcuita	Drill Bit:	15.5 & 17.5 Tricone	Project Number: RC000753.0051
Tool-Pusher:	Arnold Lamon	Depth to First Water:	47.75 ft bgs	
Rig Geologist:	D. Cornell / E. Redner	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Drilling Run and Average Penetration Rate	USCS Code	USCS Class	Casing Diameter	Description (See Pilot boring log for full geologic descriptions)	Drilling Notes	Drilling Fluid
61					Deposits; Sandy silt with gravel (ML); reddish brown (5YR 4/3)	(60.1 - 70.0') Observed temporary backfill material Cemex # 3 in drill cuttings (see Photo Log).	
62							
63		ML					
64					(64') brown (7.5YR 4/4)		
65					(64.5 - 67.0') Topock - Alluvium Deposits; Sandy silt with gravel (ML); brown (7.5YR 5/3)		
66		ML					
67							
68		ML			(67.0 - 67.8') Topock - Alluvium Deposits; Silt with sand (ML); brown (7.5YR 4/4) with dark reddish brown (2.5YR 3/4)		
69					(67.8 - 70.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown / moderate brown (5YR 4/4)		
70	(58.8 - 79.1) 1.33 mins/ft	SM		(58.8 - 79.1') 16.0" Steel Casing			
71					(70.5 - 76.8') Topock - Older Alluvium Deposits; Silty sand with gravel (SM); reddish brown / moderate brown (5YR 4/4)	(70.1 - 80.0') Observed temporary backfill material Cemex # 3 in drill cuttings (see Photo Log).	
72							
73							
74		SM					
75							
76							
77		ML			(76.8 - 77.8') Topock - Alluvium Deposits; Silt with sand (ML); brown (7.5YR 4/4)		
78					(77.8 - 79.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (5YR 5/4)		
79		SM					
80	(79.1 - 99.1) 1.56 mins/ft	ML		(79.1 - 99.1') 16.0" Steel Casing	(79.0 - 81.5') Topock - Alluvium Deposits; Sandy silt (ML); brown (7.5YR 4/4)		(79.1 - 99.0') 200 gallons of water used; 275 gallons of water recovered; 75

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Remarks: NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval of pilot borehole

Date Started:	02/10/2020	Surface Elevation:	501.6 ft amsl	Boring No.: IRZ-29
Date Completed:	02/12/2020	Northing (NAD83):	2102085.0	
Drilling Co.:	Cascade	Easting (NAD83):	7615788.9	Client: PG&E
Drilling Method:	Dual Rotary	Total Depth:	128.5 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Foremost DR-24HD	Conductor Casing Diameter:	18 inches	Location: PG&E Topock, Topock, California
Driller Name:	Jon Martinez	Drill Casing Diameter:	16 inches	
Drilling Asst:	A. & H. Amezguita	Drill Bit:	15.5 & 17.5 Tricone	Project Number: RC000753.0051
Tool-Pusher:	Arnold Lamon	Depth to First Water:	47.75 ft bgs	
Rig Geologist:	D. Cornell / E. Redner	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Drilling Run and Average Penetration Rate	USCS Code	USCS Class	Casing Diameter	Description (See Pilot boring log for full geologic descriptions)	Drilling Notes	Drilling Fluid
81		ML			(80.75')	(80.1 - 90.0') Observed temporary backfill material Cemex # 3 in drill cuttings (see Photo Log).	gallons of water gained
82		GW			(81.5 - 81.8') Topock - Alluvium Deposits; Well graded gravel (GW); very dark greenish gray (GLEY 1 3/1)		
83		ML			(81.8 - 85.0') Topock - Alluvium Deposits; Sandy silt with gravel (ML); brown (7.5YR 4/3) (83') reddish brown / moderate brown (5YR 4/4)		
84							
85							
86		SM			(85.0 - 87.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 4/4)		
87							
88		ML			(87.0 - 87.8') Topock - Alluvium Deposits; Sandy silt with gravel (ML); brown (7.5YR 4/3)		
89		SM			(87.8 - 88.3') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown / moderate brown (5YR 4/4)		
90	(79.1 - 99.1) 1.56 mins/ft	ML		(79.1 - 99.1') 16.0" Steel Casing	(88.3 - 90.5') Topock - Alluvium Deposits; Sandy silt with gravel (ML); reddish brown / moderate brown (5YR 4/4)	(90.1 - 100.0') Observed temporary backfill material Cemex # 3 in drill cuttings (see Photo Log).	
91					(90.5 - 95.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown / moderate brown (5YR 4/4)		
92							
93		SM					
94							
95							
96		ML			(95.0 - 96.5') Topock - Alluvium Deposits; Sandy silt with gravel (ML); reddish brown / moderate brown (5YR 4/4)		
97					(96.5 - 99.3') Topock - Alluvium Deposits; Sandy silt with gravel (ML); brown (7.5YR 4/4)		
98		ML					
99							
100	(99.1 - 119.4) 1.42 mins/ft	ML		(99.1 - 119.4') 16.0" Steel Casing	(99.3 - 104.5') Topock - Alluvium Deposits; Sandy silt with gravel		(99.1 - 119.4') 165 gallons of water used; 300 gallons of water recovered; 135

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Remarks: NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval of pilot borehole

Date Started:	02/10/2020	Surface Elevation:	501.6 ft amsl	Boring No.: IRZ-29
Date Completed:	02/12/2020	Northing (NAD83):	2102085.0	
Drilling Co.:	Cascade	Easting (NAD83):	7615788.9	Client: PG&E
Drilling Method:	Dual Rotary	Total Depth:	128.5 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Foremost DR-24HD	Conductor Casing Diameter:	18 inches	Location: PG&E Topock, Topock, California
Driller Name:	Jon Martinez	Drill Casing Diameter:	16 inches	
Drilling Asst:	A. & H. Amezcuita	Drill Bit:	15.5 & 17.5 Tricone	Project Number: RC000753.0051
Tool-Pusher:	Arnold Lamon	Depth to First Water:	47.75 ft bgs	
Rig Geologist:	D. Cornell / E. Redner	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Drilling Run and Average Penetration Rate	USCS Code	USCS Class	Casing Diameter	Description (See Pilot boring log for full geologic descriptions)	Drilling Notes	Drilling Fluid
101					(ML); reddish brown / moderate brown (5YR 4/4)	(100.1 - 110.0') Observed temporary backfill material Cemex # 3 in drill cuttings (see Photo Log).	gallons of water gained
102		ML					
103							
104							
105		GW			(104.5 - 105.0') Topock - Alluvium Deposits; Well graded gravel (GW); very dark greenish gray (GLE1 3/1)		
106					(105.0 - 113.5') Topock - Alluvium Deposits; Sandy silt with gravel (ML); reddish brown / moderate brown (5YR 4/4)		
107					(107') reddish brown (5YR 5/4)		
108							
109		ML			(109') reddish brown / moderate brown (5YR 4/4)		
110	(99.1 - 119.4) 1.42 mins/ft			(99.1 - 119.4') 16.0" Steel Casing		(110.1 - 120.0') Observed temporary backfill material Cemex # 3 in drill cuttings (see Photo Log).	
111							
112							
113							
114					(113.5 - 117.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown / moderate brown (5YR 4/4)		
115		SM					
116							
117							
118		SM			(117.0 - 119.0') Topock - Alluvium Deposits; Silty sand (SM); brown (10YR 4/3)		
119							
120	(119.4 - 128.5) 2.91 mins/ft	ML			(119.0 - 121.0') Topock - Weathered Bedrock - conglomerate; Sandy silt with	(119.0 - 128.1') Rods bouncing likely due to bedrock.	(119.4 - 128.5') 230 gallons of water used; 500

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Remarks: NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval of pilot borehole

Date Started:	02/10/2020	Surface Elevation:	501.6 ft amsl	Boring No.: IRZ-29	
Date Completed:	02/12/2020	Northing (NAD83):	2102085.0		
Drilling Co.:	Cascade	Easting (NAD83):	7615788.9	Client:	PG&E
Drilling Method:	Dual Rotary	Total Depth:	128.5 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Foremost DR-24HD	Conductor Casing Diameter:	18 inches	Location:	PG&E Topock, Topock, California
Driller Name:	Jon Martinez	Drill Casing Diameter:	16 inches		
Drilling Asst:	A. & H. Amezguita	Drill Bit:	15.5 & 17.5 Tricone	Project Number:	RC000753.0051
Tool-Pusher:	Arnold Lamon	Depth to First Water:	47.75 ft bgs		
Rig Geologist:	D. Cornell / E. Redner	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Drilling Run and Average Penetration Rate	USCS Code	USCS Class	Casing Diameter	Description (See Pilot boring log for full geologic descriptions)	Drilling Notes	Drilling Fluid
121		ML			gravel (ML); reddish brown / moderate brown (5YR 4/4)	(120.1 - 128.5') Observed temporary backfill material Cemex # 3 in drill cuttings (see Photo Log).	gallons of water recovered; 270 gallons of water gained
122					(121.0 - 123.0') Topock - Competent Bedrock - conglomerate; (2.5YR4/3)		
123					(123.0 - 124.0') No recovery (NR)		
124	(119.4 - 128.5) 2.91 mins/ft	NR		(119.4 - 128.5') 15.5" Open Hole	(124.0 - 128.5') Topock - Competent Bedrock - conglomerate; (2.5YR4/3)		
125							
126							
127							
128							
129					End of Boring at 128.5' bgs.		
130							
131							
132							
133							
134							
135							
136							
137							
138							
139							
140							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater
 Remarks: NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval of pilot borehole

Date Started:	02/18/2020	Surface Elevation:	501.6 ft amsl	Well ID: IRZ-29
Date Completed:	02/22/2020	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Dual Rotary	Northing (NAD83):	2102085.0	Project: Final GW Remedy Phase 1
Driller Name:	Jon Martinez	Easting (NAD83):	7615788.9	Location: PG&E Topock, Topock, California
Drilling Asst:	A. & H. Amezguita	Borehole Diameter:	15.5-18 inches	
Logger:	D. Cornell / E. Redner	Water Level Start:	47.75 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	N/A	
Total Depth:	128.5 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
1		Topock - Fill	SM		(0.0 - 48.2') 10" Suregrip 17 Casing		
2					(0.0 - 4.3') Cemex #30 Mesh (30x70)	(0.0 - 4.3') 10.5 bags	(0.0 - 4.3') 9 bags (-14%) Note: Lapis Lustre Sand
3							
4							
5		Topock - Fill	SM				
6							
7							
8							
9		Topock - Fill	SM				
10					(0.0 - 21.0') 18.0" Borehole		
11							
12							
13		Topock - Alluvium Deposits	SM		(4.3 - 37.0') Portland Cement 3% Bentonite	(4.3 - 37.0') 289.7 gallons	(4.3 - 37.0') 310 gallons (7%) Note: Type I, II and V and Benseal
14							
15							
16							
17		Topock - Alluvium Deposits	SM				
18							
19							
20							

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Date Started:	02/18/2020	Surface Elevation:	501.6 ft amsl	Well ID: IRZ-29
Date Completed:	02/22/2020	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Dual Rotary	Northing (NAD83):	2102085.0	Project: Final GW Remedy Phase 1
Driller Name:	Jon Martinez	Easting (NAD83):	7615788.9	Location: PG&E Topock, Topock, California
Drilling Asst:	A. & H. Amezguita	Borehole Diameter:	15.5-18 inches	
Logger:	D. Cornell / E. Redner	Water Level Start:	47.75 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	N/A	
Total Depth:	128.5 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
21		Topock - Alluvium Deposits	SM		(0.0 - 48.2') 10" Suregrip 17 Casing		
22							
23							
24							
25			NR				
26							
27		Topock - Alluvium Deposits	ML				
28							
29		Topock - Alluvium Deposits	SC		(4.3 - 37.0') Portland Cement 3% Bentonite	(4.3 - 37.0') 289.7 gallons	(4.3 - 37.0') 310 gallons (7%) Note: Type I, II and V and Benseal
30							
31		Topock - Alluvium Deposits	ML				
32							
33		Topock - Alluvium Deposits	SC				
34							
35					(21.0 - 42.0') 18.0" Borehole		
36							
37			SC		(34.5 - 35.5') Centralizer		
38							
39							
40		Topock - Alluvium Deposits	ML		(37.0 - 40.4') Cemex #60 Mesh (40x70)	(37.0 - 40.4') 8.3 bags	(37.0 - 40.4') 8 bags (-4%) Note: Lapis Lustre Sand

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Date Started:	02/18/2020	Surface Elevation:	501.6 ft amsl	Well ID: IRZ-29
Date Completed:	02/22/2020	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Dual Rotary	Northing (NAD83):	2102085.0	Project: Final GW Remedy Phase 1
Driller Name:	Jon Martinez	Easting (NAD83):	7615788.9	Location: PG&E Topock, Topock, California
Drilling Asst:	A. & H. Amezguita	Borehole Diameter:	15.5-18 inches	
Logger:	D. Cornell / E. Redner	Water Level Start:	47.75 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	N/A	
Total Depth:	128.5 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
41		Topock - Alluvium Deposits	SM		(0.0 - 48.2') 10" Suregrip 17 Casing		
42		Topock - Alluvium Deposits	ML				
43		Topock - Alluvium Deposits	SC				
44		Topock - Alluvium Deposits	SM				
45							
46							
47							
48		Topock - Alluvium Deposits	SM				
49	IRZ-29-VAS-47-52 (4400 ppb) 12/16/2019 14:46				(48.2 - 77.0') 10" 10-Slot Screen		
50					(40.4 - 79.0') Cemex #30 Mesh (30x70)	(40.4 - 79.0') 66.8 bags	(40.4 - 79.0') 92 bags (38%) Note: Lapis Lustre Sand, used >20% of the calculated volume due to potential voids forming during drilling. Swabbed lower screen for approximately 105 minutes.
51							
52		Topock - Alluvium Deposits	SM				
53							
54							
55							
56		Topock - Alluvium Deposits	SM				
57							
58							
59							
60			ML		(58.8 - 79.1') 16.0" Borehole		

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval of pilot borehole

Date Started:	02/18/2020	Surface Elevation:	501.6 ft amsl	Well ID: IRZ-29
Date Completed:	02/22/2020	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Dual Rotary	Northing (NAD83):	2102085.0	Project: Final GW Remedy Phase 1
Driller Name:	Jon Martinez	Easting (NAD83):	7615788.9	Location: PG&E Topock, Topock, California
Drilling Asst:	A. & H. Amezguita	Borehole Diameter:	15.5-18 inches	
Logger:	D. Cornell / E. Redner	Water Level Start:	47.75 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	N/A	
Total Depth:	128.5 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
61	IRZ-29-VAS-62-67 (2400 ppb) 12/17/2019 10:00	Topock - Alluvium Deposits	ML		(48.2 - 77.0') 10" 10-Slot Screen		
62							
63		Topock - Alluvium Deposits	ML				
64							
65		Topock - Alluvium Deposits	ML				
66							
67		Topock - Alluvium Deposits	ML				
68							
69		Topock - Alluvium Deposits	SM		(40.4 - 79.0') Cemex #30 Mesh (30x70)	(58.8 - 79.1') 16.0" Borehole	(40.4 - 79.0') 66.8 bags
70							(40.4 - 79.0') 92 bags (38%) Note: Lapis Lustre Sand, used >20% of the calculated volume due to potential voids forming during drilling. Swabbed lower screen for approximately 105 minutes.
71		Topock - Older Alluvium Deposits	SM				
72							
73							
74							
75							
76							
77		Topock - Alluvium Deposits	ML			(77.0 - 92.1') 10" Suregrip 17 Casing	
78		Topock - Alluvium Deposits	SM				
79		Topock - Alluvium Deposits	ML		(79.0 - 80.4') Cemex #60 Mesh (40x70)	(79.1 - 99.1') 16.0" Borehole	(79.0 - 80.4') 2.3 bags
80							(79.0 - 80.4') 2 bags (-13%) Note: Lapis Lustre Sand

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval of pilot borehole

Date Started:	02/18/2020	Surface Elevation:	501.6 ft amsl	Well ID: IRZ-29
Date Completed:	02/22/2020	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Dual Rotary	Northing (NAD83):	2102085.0	Project: Final GW Remedy Phase 1
Driller Name:	Jon Martinez	Easting (NAD83):	7615788.9	Location: PG&E Topock, Topock, California
Drilling Asst:	A. & H. Amezguita	Borehole Diameter:	15.5-18 inches	
Logger:	D. Cornell / E. Redner	Water Level Start:	47.75 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	N/A	
Total Depth:	128.5 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
81		Topock - Alluvium Deposits	ML				
82		Topock - Alluvium Deposits	GW		(80.4 - 85.9') Bentonite seal pellets		(80.4 - 85.9') 11 buckets (47%) Note: Pel-Plug 3/8" TR30, used >20% of the calculated volume due to potential voids forming during drilling.
83		Topock - Alluvium Deposits	ML		(82.5 - 83.5') Centralizer	(80.4 - 85.9') 7.5 buckets	
84							
85							
86		Topock - Alluvium Deposits	SM		(85.9 - 87.3') Cemex #60 Mesh (40x70)	(85.9 - 87.3') 2.4 bags	(85.9 - 87.3') 4 bags (67%) Note: Lapis Lustre Sand, used >20% of the calculated volume due to potential voids forming during drilling.
87		Topock - Alluvium Deposits	ML				
88		Topock - Alluvium Deposits	SM				
89	IRZ-29-VAS-87-92 (<0.033 U ppb) 12/17/2019 14:41	Topock - Alluvium Deposits	ML		(79.1 - 99.1') 16.0" Borehole		
90							
91							
92		Topock - Alluvium Deposits	SM		(92.1 - 120.9') 10" 10-Slot 316L SS Wire Wrap Screen		
93					(87.3 - 128.5') Cemex #30 Mesh (30x70)	(87.3 - 128.5') 72.5 bags	(87.3 - 128.5') 68 bags (-6%) Note: Lapis Lustre Sand, swabbed lower screen for approximately 90 minutes.
94							
95		Topock - Alluvium Deposits	ML				
96							
97		Topock - Alluvium Deposits	ML				
98							
99		Topock - Alluvium	ML		(99.1 - 119.4') 16.0" Borehole		
100							

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Date Started:	02/18/2020	Surface Elevation:	501.6 ft amsl	Well ID: IRZ-29
Date Completed:	02/22/2020	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Dual Rotary	Northing (NAD83):	2102085.0	Project: Final GW Remedy Phase 1
Driller Name:	Jon Martinez	Easting (NAD83):	7615788.9	Location: PG&E Topock, Topock, California
Drilling Asst:	A. & H. Amezcuita	Borehole Diameter:	15.5-18 inches	
Logger:	D. Cornell / E. Redner	Water Level Start:	47.75 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	N/A	
Total Depth:	128.5 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
101		Deposits			(92.1 - 120.9') 10" 10-Slot 316L SS Wire Wrap Screen		
102		Topock - Alluvium Deposits	ML				
103							
104							
105		Topock - Alluvium Deposits	GW				
106							
107							
108							
109		Topock - Alluvium Deposits	ML				
110					(87.3 - 128.5') Cemex #30 Mesh (30x70)		
111					(99.1 - 119.4') 16.0" Borehole		
112						(87.3 - 128.5') 72.5 bags	(87.3 - 128.5') 68 bags (-6%) Note: Lapis Lustre Sand, swabbed lower screen for approximately 90 minutes.
113							
114	IRZ-29-VAS-112-117 (760 ppb) 12/18/2019 15:12	Topock - Alluvium Deposits	SM				
115							
116							
117							
118	IRZ-29-VAS-116-120.5 (23 ppb) 12/19/2019 10:26	Topock - Alluvium Deposits	SM				
119		Topock - Weathered Bedrock -	ML				
120					(119.4 - 128.5') 15.5" Borehole		

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Date Started:	02/18/2020	Surface Elevation:	501.6 ft amsl	Well ID: IRZ-29
Date Completed:	02/22/2020	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Dual Rotary	Northing (NAD83):	2102085.0	Project: Final GW Remedy Phase 1
Driller Name:	Jon Martinez	Easting (NAD83):	7615788.9	Location: PG&E Topock, Topock, California
Drilling Asst:	A. & H. Amezguita	Borehole Diameter:	15.5-18 inches	
Logger:	D. Cornell / E. Redner	Water Level Start:	47.75 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	N/A	
Total Depth:	128.5 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
121		conglomerate	ML				
122		Topock - Competent Bedrock - conglomerate					
123			NR				
124					(123.0 - 124.0') Centralizer (87.3 - 128.5') Cemex #30 Mesh (30x70)	(119.4 - 128.5') 15.5" Borehole	(87.3 - 128.5') 72.5 bags Note: Lapis Lustre Sand, swabbed lower screen for approximately 90 minutes.
125		Topock - Competent Bedrock - conglomerate					
126							
127							
128							
129					End of Boring at 128.5' bgs.		
130							
131							
132							
133							
134							
135							
136							
137							
138							
139							
140							




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Date Started:	01/07/2020	Surface Elevation:	502.1 ft amsl	Boring No.: IRZ-31 Pilot
Date Completed:	01/11/2020	Northing (NAD83):	2101940.2	
Drilling Co.:	Cascade	Easting (NAD83):	7615789.1	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	127 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	6-10 inches	Location: PG&E Topock, Topock, California
Driller Name:	Eddie Ramos	Depth to First Water:	47.25 ft bgs	
Drilling Asst:	J. Candelaria / F. Sandoval	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger:	Joe Lantham	Sampling Interval:	Continuous	
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
1							(0.0 - 8.0') No recovery (NR); see drilling notes	(0.0 - 8.0') Core not collected drilled with 10-inch conductor casing to 8 ft. bgs.	(0.0 - 127.0') No water used
2									
3									
4	0				NR				
5									
6									
7									
8									
9							(8.0 - 17.0') Topock - Alluvium Deposits; Well graded gravel with sand (GW); yellowish brown / moderate yellowish brown (10YR 5/4); granules to very large pebbles, angular to subround; and very fine to very coarse grained sand, angular to subround; trace silt; trace clay; little coarser clasts composed of metadiorite; dry to moist	(8.0 - 22.0') Normal drilling.	
10									
11									
12				Topock - Alluvium Deposits	GW				
13	108								
14									
15									
16									
17									
18				Topock - Alluvium Deposits	SM		(17.0 - 27.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); yellowish brown / moderate yellowish brown (10YR 5/4); very fine grained to very coarse grained, angular to subround; some granules to large pebbles, angular to subround; little silt; trace clay; some coarser clasts composed of metadiorite; dry to moist; iron oxide staining		
19	120								
20									





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Date Started:	01/07/2020	Surface Elevation:	502.1 ft amsl	Boring No.: IRZ-31 Pilot
Date Completed:	01/11/2020	Northing (NAD83):	2101940.2	
Drilling Co.:	Cascade	Easting (NAD83):	7615789.1	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	127 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	6-10 inches	Location: PG&E Topock, Topock, California
Driller Name:	Eddie Ramos	Depth to First Water:	47.25 ft bgs	
Drilling Asst:	J. Candelaria / F. Sandoval	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger:	Joe Lantham	Sampling Interval:	Continuous	
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
21	120			Topock - Alluvium Deposits	SM			(22.0 - 25.0') Soft drilling.	
22									
23									
24									
25									
26	120			Topock - Alluvium Deposits	SW-SM		(27.0 - 31.0') Topock - Alluvium Deposits; Well graded sand with silt and gravel (SW-SM); dark yellowish brown (10YR 4/4); very fine grained to very coarse grained, angular to subangular; and granules to large pebbles, angular to subangular; little silt; trace clay; some coarser clasts composed of metadiorite	(25.0 - 112.0') Rough drilling.	
27									
28									
29									
30									
31									
32									
33									
34									
35									
36									
37									
38									
39									
40									
					GW-GM		(39.5 - 44.0') Topock - Alluvium Deposits; Well graded gravel with		

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Date Started:	01/07/2020	Surface Elevation:	502.1 ft amsl	Boring No.: IRZ-31 Pilot	
Date Completed:	01/11/2020	Northing (NAD83):	2101940.2		
Drilling Co.:	Cascade	Easting (NAD83):	7615789.1	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	127 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	6-10 inches	Location:	PG&E Topock, Topock, California
Driller Name:	Eddie Ramos	Depth to First Water:	47.25 ft bgs		
Drilling Asst:	J. Candelaria / F. Sandoval	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	Joe Lantham	Sampling Interval:	Continuous		
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
41	120			Topock - Alluvium Deposits	GW-GM		silt and sand (GW-GM); brown (10YR 5/3); granules to large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subangular; little silt; trace clay; trace mica; little coarser clasts composed of metadiorite; dry to moist; iron oxide staining		
42									
43							(43'); iron oxide staining; 2-inch lense of light gray material, decrease in granules and pebbles, increase in sand		
44									
45	60	IRZ-31-SS-45-50 1/12/2020 08:28		Topock - Alluvium Deposits	SM		(44.0 - 46.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 5/4); fine grained to very coarse grained, subangular to subround; some granules to medium pebbles, angular; little silt; some coarser clasts composed of metadiorite; dry to moist		
46									
47							(46.0 - 55.0') Topock - Alluvium Deposits; Silt with gravel (ML); brown (7.5YR 5/4); no plasticity; some granules to very large pebbles, angular to subangular; little very fine to very coarse grained sand, angular to subangular; little clay; little coarser clasts composed of metadiorite; dry to moist; iron oxide staining		
48									
49	60		IRZ-31-VAS-48-53 (2000 ppb) 1/8/2020 15:45	Topock - Alluvium Deposits	ML				
50									
51									
52									
53	60	IRZ-31-SS-50-55 1/12/2020 08:36					(52'); little granules to very large pebbles, angular to subangular; trace clay; moist		
54									
55									
56									
57	120	IRZ-31-SS-55-60 1/12/2020 08:45		Topock - Alluvium Deposits	GM		(55.0 - 57.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); brown (7.5YR 5/4); granules to large pebbles, angular; some silt; little very fine to very coarse grained sand, angular to subangular; trace clay; some coarser clasts composed of metadiorite; dry to moist; iron oxide staining		
58									
59							(57.0 - 58.5') Topock - Alluvium Deposits; Poorly graded sand with silt and gravel (SP-SM); brown (7.5YR 5/4); very fine grained to fine grained, subangular to subround; some granules to large pebbles, angular; little silt; some coarser clasts composed of metadiorite; moist; iron oxide staining		
60							(58.5 - 60.5') Topock - Alluvium Deposits; Silty gravel with sand (GM); brown (7.5YR 5/4); granules to very large pebbles, angular; some very fine to very coarse grained sand, angular to subangular; some silt; some coarser clasts composed of metadiorite; dry to moist; iron oxide staining		






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Date Started:	01/07/2020	Surface Elevation:	502.1 ft amsl	Boring No.: IRZ-31 Pilot	
Date Completed:	01/11/2020	Northing (NAD83):	2101940.2		
Drilling Co.:	Cascade	Easting (NAD83):	7615789.1	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	127 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	6-10 inches	Location:	PG&E Topock, Topock, California
Driller Name:	Eddie Ramos	Depth to First Water:	47.25 ft bgs		
Drilling Asst:	J. Candelaria / F. Sandoval	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	Joe Lantham	Sampling Interval:	Continuous		
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
61	120	IRZ-31-SS-60-65 1/12/2020 09:01		Topock - Alluvium Deposits	GM	SW-SM	(60.5 - 61.0') Topock - Alluvium Deposits; Well graded sand with silt (SW-SM); brown (7.5YR 5/4); very fine grained to coarse grained, angular to subround; little granules to medium pebbles, angular to subangular; little silt; trace coarser clasts composed of metadiorite; moist to wet		
62				Topock - Alluvium Deposits	GM		(61.0 - 67.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); brown (7.5YR 5/4); granules to very large pebbles, angular to subangular; some very fine to very coarse grained sand, subangular to subround; some silt; some coarser clasts composed of metadiorite; moist to wet		
63				Topock - Alluvium Deposits	GM				
64	120	IRZ-31-SS-65-70 1/12/2020 09:13		Topock - Alluvium Deposits	SM		(67.0 - 68.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 5/4); very fine grained to very coarse grained, angular to subround; some granules to very large pebbles, angular to subangular; some silt; some coarser clasts composed of metadiorite; moist; iron oxide staining		
65				Topock - Alluvium Deposits	GM		(68.0 - 74.5') Topock - Alluvium Deposits; Silty gravel with sand (GM); brown (7.5YR 5/4); granules to very large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subround; some silt; some coarser clasts composed of metadiorite; trace mica; wet		
66				Topock - Alluvium Deposits	GM				
67	120	IRZ-31-SS-70-75 1/12/2020 09:20		Topock - Alluvium Deposits	GM		(72.5'); dry to moist		
68				Topock - Alluvium Deposits	GM		(73.5') greenish gray (GLE1 5/5GY); dry		
69				Topock - Alluvium Deposits	GM				
70	120	IRZ-31-SS-75-80 1/12/2020 09:35		Topock - Alluvium Deposits	GM		(74.5 - 78.5') Topock - Alluvium Deposits; Silty gravel with sand (GM); brown (7.5YR 5/4); granules to very large pebbles, angular to subangular; some very fine to very coarse grained sand, subangular to subround; little silt; some coarser clasts composed of metadiorite; wet; iron oxide staining		
71				Topock - Alluvium Deposits	GM				
72				Topock - Alluvium Deposits	GM				
73	120	IRZ-31-SS-75-80 1/12/2020 09:35		Topock - Alluvium Deposits	GM				
74				Topock - Alluvium Deposits	GM				
75				Topock - Alluvium Deposits	GM				
76	120	IRZ-31-SS-75-80 1/12/2020 09:35		Topock - Alluvium Deposits	GM				
77				Topock - Alluvium Deposits	GM				
78				Topock - Alluvium Deposits	GM				
79	120	IRZ-31-SS-75-80 1/12/2020 09:35		Topock - Alluvium Deposits	GM				
80				Topock - Alluvium Deposits	GM				
				Topock - Alluvium Deposits	GM				



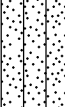
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Date Started:	01/07/2020	Surface Elevation:	502.1 ft amsl	Boring No.: IRZ-31 Pilot	
Date Completed:	01/11/2020	Northing (NAD83):	2101940.2		
Drilling Co.:	Cascade	Easting (NAD83):	7615789.1	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	127 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	6-10 inches	Location:	PG&E Topock, Topock, California
Driller Name:	Eddie Ramos	Depth to First Water:	47.25 ft bgs		
Drilling Asst:	J. Candelaria / F. Sandoval	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	Joe Lantham	Sampling Interval:	Continuous		
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
81	120	IRZ-31-SS-80-85 1/12/2020 09:39		Topock - Alluvium Deposits	GM		(80.0 - 86.5') Topock - Alluvium Deposits; Silty gravel with sand (GM); brown (7.5YR 5/4); granules to very large pebbles, angular; some fine to very coarse grained sand, angular to subround; some silt; some coarser clasts composed of metadiorite; wet; iron oxide staining		
82							(84'); dry to moist		
83									
84									
85	120	IRZ-31-SS-85-90 1/12/2020 09:48		Topock - Alluvium Deposits	SM		(86.5 - 88.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 5/4); very fine grained to very coarse grained, angular to subround; some granules to large pebbles, angular to subround; little silt; some coarser clasts composed of metadiorite; wet		
86									
87									
88									
89	120	IRZ-31-SS-90-95 1/12/2020 09:51		Topock - Alluvium Deposits	SM		(88.0 - 91.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 5/4); very fine grained to very coarse grained, subangular to subround; some small to very large pebbles, angular to round; little silt; trace small cobbles; moist; iron oxide staining		
90									
91									
92									
93	120	IRZ-31-SS-95-100 1/12/2020 09:53		Topock - Alluvium Deposits	GM		(91.0 - 97.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); yellowish brown / moderate yellowish brown (10YR 5/4); granules to very large pebbles, angular to subround; some very fine to very coarse grained sand, angular to subround; some silt; some coarser clasts composed of metadiorite; dry to moist		
94									
95									
96									
97	120	IRZ-31-SS-95-100 1/12/2020 09:53		Topock - Alluvium Deposits	SM		(97.0 - 98.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 5/4); very fine grained to very coarse grained, subangular to subround; some silt; little granules to large pebbles, angular to subround; little coarser clasts composed of metadiorite; moist to wet; iron oxide staining		
98									
99									
100							(98.5 - 100.5') Topock - Alluvium Deposits; Silty gravel with sand (GM); brown (7.5YR 5/4); granules to very large pebbles, angular to subangular; and very fine to very coarse grained sand, subangular to subround; little silt; some coarser clasts composed of metadiorite; trace mica; moist; iron oxide staining		


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Date Started:	01/07/2020	Surface Elevation:	502.1 ft amsl	Boring No.: IRZ-31 Pilot	
Date Completed:	01/11/2020	Northing (NAD83):	2101940.2		
Drilling Co.:	Cascade	Easting (NAD83):	7615789.1	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	127 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	6-10 inches	Location:	PG&E Topock, Topock, California
Driller Name:	Eddie Ramos	Depth to First Water:	47.25 ft bgs		
Drilling Asst:	J. Candelaria / F. Sandoval	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	Joe Lantham	Sampling Interval:	Continuous		
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
101	120	IRZ-31-SS-100-105 1/12/2020 09:58		Topock - Alluvium Deposits	GM		(100.5 - 107.0') Topock - Alluvium Deposits; Well graded gravel with sand (GW); yellowish brown / moderate yellowish brown (10YR 5/4); granules to very large pebbles, angular to subangular; and very fine to very coarse grained sand, subangular to subround; trace silt; some coarser clasts composed of metadiorite; trace mica; dry to moist; iron oxide staining (102') brown (7.5YR 5/4); moist		
102					GW		(105.5'); dry to moist		
103		IRZ-31-VAS-102-107 (2300 ppb) 1/10/2020 10:35							
104									
105	120	IRZ-31-SS-105-110 1/12/2020 10:10		Topock - Alluvium Deposits	GM		(107.0 - 114.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); granules to very large pebbles, angular to subround; some very fine to very coarse grained sand, angular to subround; little silt; some coarser clasts composed of metadiorite; trace mica; moist to wet; iron oxide staining (108.5'); dry to moist	(112.0 - 114.0') Drill rods chattering.	(114.0 - 120.0') Soft drilling.
106									
107							(111.5') grayish brown (10YR 5/2); dry		
108			IRZ-31-SS-110-115 1/12/2020 10:13						
109									
110			IRZ-31-VAS-115-120 (2500 ppb) 1/11/2020 11:33	Topock - Weathered Bedrock - conglomerate	SM		(114.0 - 120.3') Topock - Weathered Bedrock - conglomerate; Silty sand with gravel (SM); reddish brown (2.5YR 4/4); very fine grained to very coarse grained, subangular to subround; some granules to very large pebbles, angular to subangular; little silt; some coarser clasts composed of metadiorite; moist; iron oxide staining (115'); wet		
111							(117.5'); moist		
112									
113									
114									
115									
116									
117									
118									
119									
120									

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Date Started:	01/07/2020	Surface Elevation:	502.1 ft amsl	Boring No.: IRZ-31 Pilot	
Date Completed:	01/11/2020	Northing (NAD83):	2101940.2		
Drilling Co.:	Cascade	Easting (NAD83):	7615789.1	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	127 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	6-10 inches	Location:	PG&E Topock, Topock, California
Driller Name:	Eddie Ramos	Depth to First Water:	47.25 ft bgs		
Drilling Asst:	J. Candelaria / F. Sandoval	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	Joe Lantham	Sampling Interval:	Continuous		
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid	
121	120			Topock - Competent Bedrock - conglomerate			(120.3 - 127.0') Topock - Competent Bedrock - conglomerate; brown (7.5YR 5/4); dry, friable, pulverized	(120.0 - 122.0') Drill rods chattering.		
122										(122.0 - 127.0') Rough drilling.
123										
124										
125										
126										
127										
End of Boring at 127.0 'bgs.										
128										
129										
130										
131										
132										
133										
134										
135										
136										
137										
138										
139										
140										

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	01/11/2020	Surface Elevation:	502.1 ft amsl	Well ID: IRZ-31 Pilot
Date Completed:	01/12/2020	Northing (NAD83):	2101940.2	
Drilling Co.:	Cascade	Easting (NAD83):	7615789.1	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	127 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Eddie Ramos	Borehole Diameter:	6-10 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	J. Candelaria / F. Sandoval	Depth to First Water:	47.25 ft bgs	
Logger:	Joe Lantham	Editor:	Grant Willford	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
1					(0.0 - 0.5') Steel Plate		Note: Steel plates with BMPs in place
2							
3					(0.5 - 5.0') Cemex #60	(0.5 - 5.0') 4.9 bags	(0.5 - 5.0') 5 bags (2%) Note: Lapis Lustre Sand
4			NR		(0.0 - 8.0') 10.0" Borehole		
5							
6							
7							
8							
9							
10							
11							
12		Topock - Alluvium Deposits	GW		(5.0 - 117.0') Cemex #3 MESH (8x10)	(5.0 - 117.0') 46.1 bags	(5.0 - 117.0') 58 bags (26%) Note: Lapis Lustre Sand, used >20% due to potential voids forming during drilling
13							
14					(8.0 - 127.0') 6.0" Borehole		
15							
16							
17							
18		Topock - Alluvium Deposits	SM				
19							
20							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started:	01/11/2020	Surface Elevation:	502.1 ft amsl	Well ID: IRZ-31 Pilot
Date Completed:	01/12/2020	Northing (NAD83):	2101940.2	
Drilling Co.:	Cascade	Easting (NAD83):	7615789.1	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	127 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Eddie Ramos	Borehole Diameter:	6-10 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	J. Candelaria / F. Sandoval	Depth to First Water:	47.25 ft bgs	
Logger:	Joe Lantham	Editor:	Grant Willford	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction		Calculated Material Volumes	Material Volumes Installed
21		Topock - Alluvium Deposits	SM					
22								
23								
24								
25								
26		Topock - Alluvium Deposits	SW-SM					
27								
28								
29								
30								
31		Topock - Alluvium Deposits	GW					
32								
33								
34								
35								
36								
37								
38								
39								
40								
			GW-GM					

Final 2/18/20

(5.0 - 117.0') Cemex #3 MESH (8x10)







(8.0 - 127.0') 6.0" Borehole

(5.0 - 117.0') 46.1 bags

(5.0 - 117.0') 58 bags (26%)
Note: Lapis Lustre Sand, used >20% due to potential voids forming during drilling

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started:	01/11/2020	Surface Elevation:	502.1 ft amsl	Well ID: IRZ-31 Pilot
Date Completed:	01/12/2020	Northing (NAD83):	2101940.2	
Drilling Co.:	Cascade	Easting (NAD83):	7615789.1	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	127 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Eddie Ramos	Borehole Diameter:	6-10 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	J. Candelaria / F. Sandoval	Depth to First Water:	47.25 ft bgs	
Logger:	Joe Lantham	Editor:	Grant Willford	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
41		Topock - Alluvium Deposits	GW-GM				
42							
43							
44		Topock - Alluvium Deposits	SM				
45							
46							
47		Topock - Alluvium Deposits	ML		(5.0 - 117.0') Cemex #3 MESH (8x10)	(8.0 - 127.0') 6.0" Borehole	(5.0 - 117.0') 46.1 bags
48							
49	IRZ-31-VAS-48-53 (2000 ppb) 1/8/2020 15:45						
50							
51							
52							
53							
54							
55		Topock - Alluvium Deposits	GM				
56							
57							
58		Topock - Alluvium Deposits	SP-SM				
59							
60		Topock - Alluvium Deposits	GM				

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

TEMP ABANDONMENT LOG_PG&E_TOPOCK C:\USERS\MCGRANE\DOCUMENTS\PG&E_TOPOCK\KIDRAFT BORING LOGS\GINT FILES\02_18_20\TOPOCK DATABASE FOR PLOG.GPJ TOPOCK DATA TEMPLATE FOR PLOG.GDT 02/18/20 13:23

Date Started:	01/11/2020	Surface Elevation:	502.1 ft amsl	Well ID: IRZ-31 Pilot
Date Completed:	01/12/2020	Northing (NAD83):	2101940.2	
Drilling Co.:	Cascade	Easting (NAD83):	7615789.1	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	127 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Eddie Ramos	Borehole Diameter:	6-10 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	J. Candelaria / F. Sandoval	Depth to First Water:	47.25 ft bgs	
Logger:	Joe Lantham	Editor:	Grant Willford	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
61		Topock - Alluvium Deposits	GM				
62			SW-SM				
63							
64		Topock - Alluvium Deposits	GM				
65							
66							
67		Topock - Alluvium Deposits	SM				
68							
69							
70		Topock - Alluvium Deposits	GM		(5.0 - 117.0') Cemex #3 MESH (8x10)	(8.0 - 127.0') 6.0" Borehole	(5.0 - 117.0') 46.1 bags
71							
72							
73							
74	IRZ-31-VAS-72-77 (480 ppb) 1/9/2020 13:10						
75		Topock - Alluvium Deposits	GM				
76							
77							
78							
79		Topock - Alluvium Deposits	SW-SM				
80							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Temporary Backfill Log

Date Started:	01/11/2020	Surface Elevation:	502.1 ft amsl	Well ID: IRZ-31 Pilot
Date Completed:	01/12/2020	Northing (NAD83):	2101940.2	
Drilling Co.:	Cascade	Easting (NAD83):	7615789.1	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	127 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Eddie Ramos	Borehole Diameter:	6-10 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	J. Candelaria / F. Sandoval	Depth to First Water:	47.25 ft bgs	
Logger:	Joe Lantham	Editor:	Grant Willford	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction		Calculated Material Volumes	Material Volumes Installed
81		Topock - Alluvium Deposits	GM					
82								
83		Topock - Alluvium Deposits	SM					
84								
85		Topock - Alluvium Deposits	SM					
86								
87		Topock - Alluvium Deposits	SM					
88								
89		Topock - Alluvium Deposits	SM					
90								
91		Topock - Alluvium Deposits	GM					
92								
93		Topock - Alluvium Deposits	GM					
94								
95		Topock - Alluvium Deposits	SM					
96								
97		Topock - Alluvium Deposits	GM					
98								
99		Topock - Alluvium Deposits	GM					
100								

(5.0 - 117.0') Cemex #3 MESH (8x10)

(8.0 - 127.0') 6.0" Borehole

(5.0 - 117.0') 46.1 bags

(5.0 - 117.0') 58 bags (26%)
Note: Lapis Lustre Sand, used >20% due to potential voids forming during drilling

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started:	01/11/2020	Surface Elevation:	502.1 ft amsl	Well ID: IRZ-31 Pilot
Date Completed:	01/12/2020	Northing (NAD83):	2101940.2	
Drilling Co.:	Cascade	Easting (NAD83):	7615789.1	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	127 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Eddie Ramos	Borehole Diameter:	6-10 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	J. Candelaria / F. Sandoval	Depth to First Water:	47.25 ft bgs	
Logger:	Joe Lantham	Editor:	Grant Willford	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
101			GM				
102							
103							
104	IRZ-31-VAS-102-107 (2300 ppb) 1/10/2020 10:35	Topock - Alluvium Deposits	GW				
105							
106							
107							
108							
109					(5.0 - 117.0') Cemex #3 MESH (8x10)	(5.0 - 117.0') 46.1 bags	(5.0 - 117.0') 58 bags (26%) Note: Lapis Lustre Sand, used >20% due to potential voids forming during drilling
110							
111		Topock - Alluvium Deposits	GM		(8.0 - 127.0') 6.0" Borehole		
112							
113							
114							
115							
116							
117	IRZ-31-VAS-115-120 (2500 ppb) 1/11/2020 11:33	Topock - Weathered Bedrock - conglomerate	SM				
118							
119					(117.0 - 127.0') Cemex # 2/12 MESH (16x30)	(117.0 - 127.0') 3.9 bags	(117.0 - 127.0') 6 bags (54%) Note: Lapis Lustre Sand, used >20% due to potential voids forming during drilling
120							

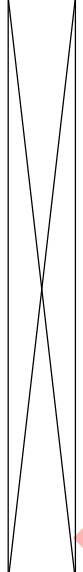


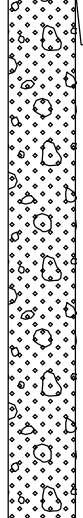

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started:	01/11/2020	Surface Elevation:	502.1 ft amsl	Well ID: IRZ-31 Pilot
Date Completed:	01/12/2020	Northing (NAD83):	2101940.2	
Drilling Co.:	Cascade	Easting (NAD83):	7615789.1	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	127 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Eddie Ramos	Borehole Diameter:	6-10 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	J. Candelaria / F. Sandoval	Depth to First Water:	47.25 ft bgs	
Logger:	Joe Lantham	Editor:	Grant Willford	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction		Calculated Material Volumes	Material Volumes Installed
121								
122								
123								
124		Topock - Competent Bedrock - conglomerate			(117.0 - 127.0') Cemex # 2/12 MESH (16x30)	(8.0 - 127.0') 6.0" Borehole	(117.0 - 127.0') 3.9 bags	(117.0 - 127.0') 6 bags (54%) Note: Lapis Lustre Sand, used >20% due to potential voids forming during drilling
125								
126								
127								
128								
129								
130								
131								
132								
133								
134								
135								
136								
137								
138								
139								
140								






Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started:	01/23/2020	Surface Elevation:	502.7 ft amsl	Boring No.: <u>IRZ-33-Pilot</u>	
Date Completed:	01/23/2020	Northing (NAD83):	2101792.0		
Drilling Co.:	Cascade	Easting (NAD83):	7615827.9	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	116 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Boart Longyear Track Mount	Borehole Diameter:	6-10 inches	Location:	PG&E Topock, Topock, California
Driller Name:	Eddie Ramos	Depth to First Water:	49.56 ft bgs		
Drilling Asst:	J. Candelaria / F. Sandoval	Sampling Method:	4 inch x 10ft Core Barrel	Project Number:	RC000753.0051
Logger:	Joe Lantham	Sampling Interval:	Continuous		
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
1	0				NR		(0.0 - 8.0') No recovery (NR); see drilling notes	(0.0 - 8.0') Cored with 10 inch conductor casing down to 8 ft bgs.	(0.0 - 116.0') No water used
2									
3									
4									
5									
6									
7									
8									
9	108			Topock - Fill	SW		(8.0 - 10.5') Topock - Fill; Well graded sand with gravel (SW); dark yellowish brown (10YR 4/4); very fine grained to very coarse grained, angular to round; little granules to very large pebbles, subangular to round; trace silt; little coarser clasts composed of metadiorite; moist	(8.0 - 27.0') Soft drilling.	
10				Topock - Fill	GW		(10.5 - 11.2') Topock - Fill; Well graded gravel with sand (GW); brown (10YR 5/3); granules to very large pebbles, angular to subround; and very fine to very coarse grained sand, angular to subround; trace silt; and coarser clasts composed of metadiorite; dry		
11				Topock - Fill	SW		(11.2 - 18.5') Topock - Fill; Poorly graded sand with gravel (SW); yellowish brown / moderate yellowish brown (10YR 5/4); very fine grained to very coarse grained, angular to round; some granules to very large pebbles, angular to round; trace silt; some coarser clasts composed of metadiorite; dry to moist		
12							(14.5'); moist; increase in granules and pebbles, decrease in sand		
13							(16.5'); dry to moist		
14							(17'); increase in sand, decrease in granules and pebbles		
15				Topock - Fill	GW		(18.5 - 21.7') Topock - Fill; Well graded gravel with sand (GW); yellowish brown / moderate yellowish brown (10YR 5/4) trace grayish green (GLE1 5/5G); granules to very large pebbles, angular to subround; and very fine to very coarse grained sand, angular to subround; trace silt; and coarser clasts composed of		
16									
17									
18									
19	120								
20									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	01/23/2020	Surface Elevation:	502.7 ft amsl	Boring No.: <u>IRZ-33-Pilot</u>	
Date Completed:	01/23/2020	Northing (NAD83):	2101792.0		
Drilling Co.:	Cascade	Easting (NAD83):	7615827.9	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	116 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Boart Longyear Track Mount	Borehole Diameter:	6-10 inches	Location:	PG&E Topock, Topock, California
Driller Name:	Eddie Ramos	Depth to First Water:	49.56 ft bgs		
Drilling Asst:	J. Candelaria / F. Sandoval	Sampling Method:	4 inch x 10ft Core Barrel	Project Number:	RC000753.0051
Logger:	Joe Lantham	Sampling Interval:	Continuous		
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
21				Topock - Fill	GW		metadiorite; trace mica; moist		
22							(21.5'); lens of pulverized grey rock and silt		
23							(21.7 - 33.0') Topock - Alluvium Deposits; Well graded sand with gravel (SW); yellowish brown / moderate yellowish brown (10YR 5/4); very fine grained to very coarse grained, angular to subround; and granules to very large pebbles, angular to subround; trace silt; and coarser clasts composed of metadiorite; trace sandstone; dry to moist		
24	120								
25									
26									
27				Topock - Alluvium Deposits	SW		(26'); some granules to very large pebbles, angular to subround; trace quartzite; moist; increase in sand, decrease in granules and pebbles		
28								(27.0 - 37.0') Rough drilling.	
29							(29'); dry to moist		
30							(30'); moist		
31									
32	120								
33				Topock - Alluvium Deposits	SW-SM		(33.0 - 34.5') Topock - Alluvium Deposits; Well graded sand with silt and gravel (SW-SM); grayish brown (10YR 5/2); very fine grained to very coarse grained, angular to subround; and granules to large pebbles, angular to subround; little silt; and coarser clasts composed of metadiorite; dry		
34									
35				Topock - Alluvium Deposits	SW		(34.5 - 39.0') Topock - Alluvium Deposits; Well graded sand with gravel (SW); yellowish brown / moderate yellowish brown (10YR 5/4); very fine grained to coarse grained, angular to subround; little granules to very large pebbles, angular to subangular; trace silt; little coarser clasts composed of metadiorite; dry to moist		
36									
37								(37.0 - 57.0') Normal drilling.	
38									
39	120			Topock - Alluvium Deposits	SM		(39.0 - 39.2') Topock - Alluvium Deposits; Silty sand with gravel (SM); olive gray / light olive gray (5Y 5/2); very fine grained to medium grained, subangular to subround; little granules to very		
40									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	01/23/2020	Surface Elevation:	502.7 ft amsl	Boring No.: <u>IRZ-33-Pilot</u>	
Date Completed:	01/23/2020	Northing (NAD83):	2101792.0		
Drilling Co.:	Cascade	Easting (NAD83):	7615827.9	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	116 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Boart Longyear Track Mount	Borehole Diameter:	6-10 inches	Location:	PG&E Topock, Topock, California
Driller Name:	Eddie Ramos	Depth to First Water:	49.56 ft bgs		
Drilling Asst:	J. Candelaria / F. Sandoval	Sampling Method:	4 inch x 10ft Core Barrel	Project Number:	RC000753.0051
Logger:	Joe Lantham	Sampling Interval:	Continuous		
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
41	120			Topock - Alluvium Deposits	SM		large pebbles, angular to subangular; little silt; little coarser clasts composed of metadiorite; dry (39.2 - 46.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); yellowish brown / moderate yellowish brown (10YR 5/4); very fine grained to very coarse grained, angular to subround; and granules to large pebbles, angular to subangular; little silt; and coarser clasts composed of metadiorite; moist (40.3') dark yellowish brown (10YR 4/4); dry; increase in sand, decrease in granules and pebbles		
42									
43									
44									
45									
46		IRZ-33-SS-45-47 1/24/2020 08:30		Topock - Alluvium Deposits	ML		(46.0 - 46.5') Topock - Alluvium Deposits; Sandy silt (ML); dark grayish brown (2.5Y 4/2); low plasticity; some very fine to fine grained sand, subangular to subround; trace granules to medium pebbles, subangular; trace coarser clasts composed of metadiorite; dry		
47									
48									
49		IRZ-33-SS-47-51 1/24/2020 08:34		Topock - Alluvium Deposits	SM		(46.5 - 51.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); yellowish brown / moderate yellowish brown (10YR 5/4); very fine grained to very coarse grained, angular to subround; some silt; little granules to very large pebbles, angular; little coarser clasts composed of metadiorite; moist to wet; iron oxide staining		
50									
51			IRZ-33-VAS-49-54 (2100 ppb) 1/21/2020 13:05						
52	120								
53		IRZ-33-SS-51-56 1/24/2020 08:38		Topock - Alluvium Deposits	SW-SM		(51.0 - 56.0') Topock - Alluvium Deposits; Well graded sand with silt and gravel (SW-SM); yellowish brown / moderate yellowish brown (10YR 5/4); very fine grained to very coarse grained, angular to subangular; some granules to very large pebbles, angular to subangular; little silt; some coarser clasts composed of metadiorite; dry to moist; iron oxide staining		
54									
55							(54'); moist (55'); dry to moist		
56									
57							(56.0 - 67.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); light olive brown (2.5Y 5/3); very fine grained to very coarse grained, subangular to subround; some silt; little granules to very large pebbles, angular to subangular; little coarser clasts composed of metadiorite; dry		
58	120	IRZ-33-SS-56-60 1/24/2020 08:42		Topock - Alluvium Deposits	SM		(57') brown (7.5YR 5/4); some granules to very large pebbles, angular to subangular; moist; iron oxide staining; increase in sand, decrease in silt	(57.0 - 77.0') Rough drilling.	
59							(59'); moist to wet		
60									


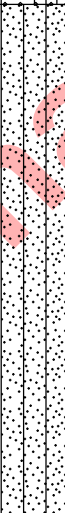

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	01/23/2020	Surface Elevation:	502.7 ft amsl	Boring No.: <u>IRZ-33-Pilot</u>	
Date Completed:	01/23/2020	Northing (NAD83):	2101792.0		
Drilling Co.:	Cascade	Easting (NAD83):	7615827.9	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	116 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Boart Longyear Track Mount	Borehole Diameter:	6-10 inches	Location:	PG&E Topock, Topock, California
Driller Name:	Eddie Ramos	Depth to First Water:	49.56 ft bgs		
Drilling Asst:	J. Candelaria / F. Sandoval	Sampling Method:	4 inch x 10ft Core Barrel	Project Number:	RC000753.0051
Logger:	Joe Lantham	Sampling Interval:	Continuous		
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
61	120	IRZ-33-SS-60-65 1/24/2020 08:45		Topock - Alluvium Deposits	SM		(61'); moist		
62							(62.5'); dry		
63							(63'); moist to wet		
64							(64'); dry to moist; iron oxide staining		
65	120	IRZ-33-SS-65-70 1/24/2020 08:50		Topock - Alluvium Deposits	SM		(65.5') yellowish brown / moderate yellowish brown (10YR 5/4); little silt; moist to wet; iron oxide staining; increase in sand, increase in granules and pebbles		
66									
67							(67.0 - 77.0') Topock - Alluvium Deposits; Silty sand (SM); brown (7.5YR 5/4); very fine grained to very coarse grained, angular to subround; some silt; little granules to very large pebbles, angular to subangular; little coarser clasts composed of metadiorite; wet		
68									
69	120	IRZ-33-SS-70-75 1/24/2020 09:00		Topock - Alluvium Deposits	SM		(69') yellowish brown / moderate yellowish brown (10YR 5/4); dry to moist		
70									
71									
72									
73	120	IRZ-33-SS-75-77 1/24/2020 09:04	IRZ-33-VAS-72-77 (1600 ppb) 1/22/2020 09:40				(74') brown (7.5YR 5/4); moist to wet		
74									
75									
76									
77	120	IRZ-33-SS-77-80 1/24/2020 09:09		Topock - Alluvium Deposits	SM		(77.0 - 80.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 5/4); very fine grained to very coarse grained, angular to subround; some silt; little granules to very large pebbles, angular to subangular; wet; iron oxide staining	(77.0 - 87.0') Soft drilling.	
78									
79									
80									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	01/23/2020	Surface Elevation:	502.7 ft amsl	Boring No.: <u>IRZ-33-Pilot</u>	
Date Completed:	01/23/2020	Northing (NAD83):	2101792.0		
Drilling Co.:	Cascade	Easting (NAD83):	7615827.9	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	116 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Boart Longyear Track Mount	Borehole Diameter:	6-10 inches	Location:	PG&E Topock, Topock, California
Driller Name:	Eddie Ramos	Depth to First Water:	49.56 ft bgs		
Drilling Asst:	J. Candelaria / F. Sandoval	Sampling Method:	4 inch x 10ft Core Barrel	Project Number:	RC000753.0051
Logger:	Joe Lantham	Sampling Interval:	Continuous		
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid					
81	120	IRZ-33-SS-80-84 1/24/2020 09:13		Topock - Alluvium Deposits	SW-SM		(80.0 - 87.0') Topock - Alluvium Deposits; Well graded sand with silt and gravel (SW-SM); brown (7.5YR 5/4); very fine grained to very coarse grained, angular to subround; some granules to very large pebbles, angular to subangular; little silt; trace clay; some coarser clasts composed of metadiorite; wet; iron oxide staining							
82							(82.5'); green staining							
83		IRZ-33-SS-84-87 1/24/2020 09:17								Topock - Alluvium Deposits	SM		(87.0 - 102.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); yellowish brown / moderate yellowish brown (10YR 5/4); very fine grained to very coarse grained, angular to subround; some granules to very large pebbles, angular to subangular; some silt; trace clay; some coarser clasts composed of metadiorite; moist; iron oxide staining (88'); dry to moist (89'); moist	(87.0 - 107.0') Normal drilling.
84													(91') brown (7.5YR 5/4); and granules to very large pebbles, angular to subangular; little silt; wet; decrease in clay	
85	IRZ-33-SS-90-95 1/24/2020 09:27			Topock - Alluvium Deposits	SM			(95.5') yellowish brown / moderate yellowish brown (10YR 5/4); some granules to very large pebbles, angular to subangular; dry; increase in silt and sand, green staining						
86								(97'); some silt; little granules to very large pebbles, angular to subangular; trace clay; moist; decrease in sand						
87	IRZ-33-SS-95-99 1/24/2020 09:32							Topock - Alluvium Deposits		SM		(98'); and silt; moist; increase in sand, decrease in granules and pebbles		
88												(99'); dry to moist		
89	IRZ-33-SS-99-102 1/24/2020			Topock - Alluvium Deposits	SM									
90														
91														
92														
93														
94														
95														
96														
97														
98														
99														
100														

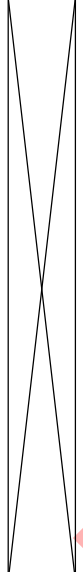


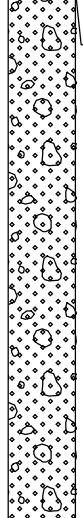

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	01/23/2020	Surface Elevation:	502.7 ft amsl	Boring No.: <u>IRZ-33-Pilot</u>	
Date Completed:	01/23/2020	Northing (NAD83):	2101792.0		
Drilling Co.:	Cascade	Easting (NAD83):	7615827.9	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	116 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Boart Longyear Track Mount	Borehole Diameter:	6-10 inches	Location:	PG&E Topock, Topock, California
Driller Name:	Eddie Ramos	Depth to First Water:	49.56 ft bgs		
Drilling Asst:	J. Candelaria / F. Sandoval	Sampling Method:	4 inch x 10ft Core Barrel	Project Number:	RC000753.0051
Logger:	Joe Lantham	Sampling Interval:	Continuous		
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
101	120	09:37 IRZ-33-SS-99-102 1/24/2020 09:37		Topock - Alluvium Deposits	SM		(100') brown (7.5YR 5/4); iron oxide staining; red and white mottling present		
102		IRZ-33-SS-102-107 1/24/2020 09:42		Topock - Alluvium Deposits	SM		(102.0 - 107.0') Topock - Alluvium Deposits; Silty sand (SM); brown (7.5YR 5/4); very fine grained to very coarse grained, angular to subround; some silt; little granules to very large pebbles, angular to subangular; little coarser clasts composed of metadiorite; wet; iron oxide staining		
103									
104									
105									
106	60	IRZ-33-SS-107-109 1/24/2020 09:48	IRZ-33-VAS-105-110 (1300 ppb) 1/23/2020 10:10	Topock - Alluvium Deposits	SW		(106'); dry to moist; red and white mottling present	(107.0 - 112.0') Very rough drilling, drill rods chattering, bedrock contact at 110.5 ft bgs.	
107									
108									
109									
110	48	IRZ-33-SS-109-111 1/24/2020 09:53		Topock - Weathered Bedrock - conglomerate	ML		(109.0 - 110.5') Topock - Weathered Bedrock - conglomerate; Sandy silt (ML); brown (7.5YR 4/4); no plasticity; and very fine to very coarse grained sand, angular to subround; little granules to large pebbles, angular to subangular; little coarser clasts composed of metadiorite; moist to wet	(112.0 - 116.0') Very rough drilling, drill rods chattering, 6 inches of slough from 112 to 112.5 ft bgs.	
111				Topock - Competent Bedrock - conglomerate			(110.5 - 116.0') Topock - Competent Bedrock - conglomerate; dry, friable, pulverized bedrock		
112									
113									
114									
115									
116									
End of Boring at 116.0' bgs.									
117									
118									
119									
120									

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Date Started:	01/23/2020	Surface Elevation:	502.7 ft amsl	Boring No.: IRZ-33-Pilot
Date Completed:	01/23/2020	Northing (NAD83):	2101792.0	
Drilling Co.:	Cascade	Easting (NAD83):	7615827.9	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	116 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Boart Longyear Track Mount	Borehole Diameter:	6-10 inches	Location: PG&E Topock, Topock, California
Driller Name:	Eddie Ramos	Depth to First Water:	49.56 ft bgs	
Drilling Asst:	J. Candelaria / F. Sandoval	Sampling Method:	4 inch x 10ft Core Barrel	Project Number: RC000753.0051
Logger:	Joe Lantham	Sampling Interval:	Continuous	
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
1	0				NR		(0.0 - 8.0') No recovery (NR); see drilling notes	(0.0 - 8.0') Cored with 10 inch conductor casing down to 8 ft bgs.	(0.0 - 116.0') No water used
2									
3									
4									
5									
6									
7									
8									
9	108			Topock - Fill	SW		(8.0 - 10.5') Topock - Fill; Well graded sand with gravel (SW); dark yellowish brown (10YR 4/4); very fine grained to very coarse grained, angular to round; little granules to very large pebbles, subangular to round; trace silt; little coarser clasts composed of metadiorite; moist	(8.0 - 27.0') Soft drilling.	
10				Topock - Fill	GW		(10.5 - 11.2') Topock - Fill; Well graded gravel with sand (GW); brown (10YR 5/3); granules to very large pebbles, angular to subround; and very fine to very coarse grained sand, angular to subround; trace silt; and coarser clasts composed of metadiorite; dry		
11				Topock - Fill	SW		(11.2 - 18.5') Topock - Fill; Poorly graded sand with gravel (SW); yellowish brown / moderate yellowish brown (10YR 5/4); very fine grained to very coarse grained, angular to round; some granules to very large pebbles, angular to round; trace silt; some coarser clasts composed of metadiorite; dry to moist		
12							(14.5'); moist; increase in granules and pebbles, decrease in sand		
13							(16.5'); dry to moist		
14							(17'); increase in sand, decrease in granules and pebbles		
15				Topock - Fill	GW		(18.5 - 21.7') Topock - Fill; Well graded gravel with sand (GW); yellowish brown / moderate yellowish brown (10YR 5/4) trace grayish green (GLE1 5/5G); granules to very large pebbles, angular to subround; and very fine to very coarse grained sand, angular to subround; trace silt; and coarser clasts composed of		
16									
17									
18									
19	120								
20									

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Date Started:	01/23/2020	Surface Elevation:	502.7 ft amsl	Boring No.: IRZ-33-Pilot	
Date Completed:	01/23/2020	Northing (NAD83):	2101792.0		
Drilling Co.:	Cascade	Easting (NAD83):	7615827.9	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	116 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Boart Longyear Track Mount	Borehole Diameter:	6-10 inches	Location:	PG&E Topock, Topock, California
Driller Name:	Eddie Ramos	Depth to First Water:	49.56 ft bgs		
Drilling Asst:	J. Candelaria / F. Sandoval	Sampling Method:	4 inch x 10ft Core Barrel	Project Number:	RC000753.0051
Logger:	Joe Lantham	Sampling Interval:	Continuous		
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
21				Topock - Fill	GW		metadiorite; trace mica; moist		
22							(21.5'); lens of pulverized grey rock and silt		
23							(21.7 - 33.0') Topock - Alluvium Deposits; Well graded sand with gravel (SW); yellowish brown / moderate yellowish brown (10YR 5/4); very fine grained to very coarse grained, angular to subround; and granules to very large pebbles, angular to subround; trace silt; and coarser clasts composed of metadiorite; trace sandstone; dry to moist		
24	120								
25									
26									
27				Topock - Alluvium Deposits	SW		(26'); some granules to very large pebbles, angular to subround; trace quartzite; moist; increase in sand, decrease in granules and pebbles		
28								(27.0 - 37.0') Rough drilling.	
29							(29'); dry to moist		
30							(30'); moist		
31									
32	120								
33				Topock - Alluvium Deposits	SW-SM		(33.0 - 34.5') Topock - Alluvium Deposits; Well graded sand with silt and gravel (SW-SM); grayish brown (10YR 5/2); very fine grained to very coarse grained, angular to subround; and granules to large pebbles, angular to subround; little silt; and coarser clasts composed of metadiorite; dry		
34									
35				Topock - Alluvium Deposits	SW		(34.5 - 39.0') Topock - Alluvium Deposits; Well graded sand with gravel (SW); yellowish brown / moderate yellowish brown (10YR 5/4); very fine grained to coarse grained, angular to subround; little granules to very large pebbles, angular to subangular; trace silt; little coarser clasts composed of metadiorite; dry to moist		
36									
37								(37.0 - 57.0') Normal drilling.	
38									
39	120			Topock - Alluvium Deposits	SM		(39.0 - 39.2') Topock - Alluvium Deposits; Silty sand with gravel (SM); olive gray / light olive gray (5Y 5/2); very fine grained to medium grained, subangular to subround; little granules to very		
40					SM				

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SOIL BORING LOG, PG&E TOPOCK C:\USERS\MCGRANED\DOCUMENTS\PG&E TOPOCK\DATABASE FOR PLOG.GPJ TOPOCK DATA TEMPLATE FOR PLOG.GPJ 02/21/20 16:49

Date Started:	01/23/2020	Surface Elevation:	502.7 ft amsl	Boring No.: <u>IRZ-33-Pilot</u>	
Date Completed:	01/23/2020	Northing (NAD83):	2101792.0		
Drilling Co.:	Cascade	Easting (NAD83):	7615827.9	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	116 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Boart Longyear Track Mount	Borehole Diameter:	6-10 inches	Location:	PG&E Topock, Topock, California
Driller Name:	Eddie Ramos	Depth to First Water:	49.56 ft bgs		
Drilling Asst:	J. Candelaria / F. Sandoval	Sampling Method:	4 inch x 10ft Core Barrel	Project Number:	RC000753.0051
Logger:	Joe Lantham	Sampling Interval:	Continuous		
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
41	120			Topock - Alluvium Deposits	SM		large pebbles, angular to subangular; little silt; little coarser clasts composed of metadiorite; dry (39.2 - 46.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); yellowish brown / moderate yellowish brown (10YR 5/4); very fine grained to very coarse grained, angular to subround; and granules to large pebbles, angular to subangular; little silt; and coarser clasts composed of metadiorite; moist (40.3') dark yellowish brown (10YR 4/4); dry; increase in sand, decrease in granules and pebbles		
42									
43									
44									
45									
46		IRZ-33-SS-45-47 1/24/2020 08:30		Topock - Alluvium Deposits	ML		(46.0 - 46.5') Topock - Alluvium Deposits; Sandy silt (ML); dark grayish brown (2.5Y 4/2); low plasticity; some very fine to fine grained sand, subangular to subround; trace granules to medium pebbles, subangular; trace coarser clasts composed of metadiorite; dry		
47									
48									
49		IRZ-33-SS-47-51 1/24/2020 08:34		Topock - Alluvium Deposits	SM		(46.5 - 51.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); yellowish brown / moderate yellowish brown (10YR 5/4); very fine grained to very coarse grained, angular to subround; some silt; little granules to very large pebbles, angular; little coarser clasts composed of metadiorite; moist to wet; iron oxide staining		
50									
51			IRZ-33-VAS-49-54 (2100 ppb) 1/21/2020 13:05						
52	120								
53		IRZ-33-SS-51-56 1/24/2020 08:38		Topock - Alluvium Deposits	SW-SM		(51.0 - 56.0') Topock - Alluvium Deposits; Well graded sand with silt and gravel (SW-SM); yellowish brown / moderate yellowish brown (10YR 5/4); very fine grained to very coarse grained, angular to subangular; some granules to very large pebbles, angular to subangular; little silt; some coarser clasts composed of metadiorite; dry to moist; iron oxide staining		
54									
55							(54'); moist (55'); dry to moist		
56									
57							(56.0 - 67.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); light olive brown (2.5Y 5/3); very fine grained to very coarse grained, subangular to subround; some silt; little granules to very large pebbles, angular to subangular; little coarser clasts composed of metadiorite; dry		
58	120	IRZ-33-SS-56-60 1/24/2020 08:42		Topock - Alluvium Deposits	SM		(57') brown (7.5YR 5/4); some granules to very large pebbles, angular to subangular; moist; iron oxide staining; increase in sand, decrease in silt	(57.0 - 77.0') Rough drilling.	
59							(59'); moist to wet		
60									





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Date Started:	01/23/2020	Surface Elevation:	502.7 ft amsl	Boring No.: <u>IRZ-33-Pilot</u>	
Date Completed:	01/23/2020	Northing (NAD83):	2101792.0		
Drilling Co.:	Cascade	Easting (NAD83):	7615827.9	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	116 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Boart Longyear Track Mount	Borehole Diameter:	6-10 inches	Location:	PG&E Topock, Topock, California
Driller Name:	Eddie Ramos	Depth to First Water:	49.56 ft bgs		
Drilling Asst:	J. Candelaria / F. Sandoval	Sampling Method:	4 inch x 10ft Core Barrel	Project Number:	RC000753.0051
Logger:	Joe Lantham	Sampling Interval:	Continuous		
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
61	120	IRZ-33-SS-60-65 1/24/2020 08:45		Topock - Alluvium Deposits	SM		(61'); moist		
62							(62.5'); dry		
63							(63'); moist to wet		
64							(64'); dry to moist; iron oxide staining		
65	120	IRZ-33-SS-65-70 1/24/2020 08:50		Topock - Alluvium Deposits	SM		(65.5') yellowish brown / moderate yellowish brown (10YR 5/4); little silt; moist to wet; iron oxide staining; increase in sand, increase in granules and pebbles		
66									
67							(67.0 - 77.0') Topock - Alluvium Deposits; Silty sand (SM); brown (7.5YR 5/4); very fine grained to very coarse grained, angular to subround; some silt; little granules to very large pebbles, angular to subangular; little coarser clasts composed of metadiorite; wet		
68									
69	120	IRZ-33-SS-70-75 1/24/2020 09:00		Topock - Alluvium Deposits	SM		(69') yellowish brown / moderate yellowish brown (10YR 5/4); dry to moist		
70									
71									
72									
73	120	IRZ-33-VAS-72-77 (1600 ppb) 1/22/2020 09:40		Topock - Alluvium Deposits	SM		(74') brown (7.5YR 5/4); moist to wet		
74									
75									
76									
77	120	IRZ-33-SS-75-77 1/24/2020 09:04		Topock - Alluvium Deposits	SM				
78									
79									
80									
							(77.0 - 80.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 5/4); very fine grained to very coarse grained, angular to subround; some silt; little granules to very large pebbles, angular to subangular; wet; iron oxide staining	(77.0 - 87.0') Soft drilling.	

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	01/23/2020	Surface Elevation:	502.7 ft amsl	Boring No.: <u>IRZ-33-Pilot</u>	
Date Completed:	01/23/2020	Northing (NAD83):	2101792.0		
Drilling Co.:	Cascade	Easting (NAD83):	7615827.9	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	116 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Boart Longyear Track Mount	Borehole Diameter:	6-10 inches	Location:	PG&E Topock, Topock, California
Driller Name:	Eddie Ramos	Depth to First Water:	49.56 ft bgs		
Drilling Asst:	J. Candelaria / F. Sandoval	Sampling Method:	4 inch x 10ft Core Barrel	Project Number:	RC000753.0051
Logger:	Joe Lantham	Sampling Interval:	Continuous		
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid	
81	120	IRZ-33-SS-80-84 1/24/2020 09:13		Topock - Alluvium Deposits	SW-SM		(80.0 - 87.0') Topock - Alluvium Deposits; Well graded sand with silt and gravel (SW-SM); brown (7.5YR 5/4); very fine grained to very coarse grained, angular to subround; some granules to very large pebbles, angular to subangular; little silt; trace clay; some coarser clasts composed of metadiorite; wet; iron oxide staining			
82										
83										
84										
85		IRZ-33-SS-84-87 1/24/2020 09:17						(82.5'); green staining		
86										
87										
88										
89	120	IRZ-33-SS-87-90 1/24/2020 09:22		Topock - Alluvium Deposits	SM		(87.0 - 102.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); yellowish brown / moderate yellowish brown (10YR 5/4); very fine grained to very coarse grained, angular to subround; some granules to very large pebbles, angular to subangular; some silt; trace clay; some coarser clasts composed of metadiorite; moist; iron oxide staining (88'); dry to moist (89'); moist	(87.0 - 107.0') Normal drilling.		
90										
91										
92										
93		IRZ-33-SS-90-95 1/24/2020 09:27					(91') brown (7.5YR 5/4); and granules to very large pebbles, angular to subangular; little silt; wet; decrease in clay			
94										
95		IRZ-33-SS-95-99 1/24/2020 09:32								
96							(95.5') yellowish brown / moderate yellowish brown (10YR 5/4); some granules to very large pebbles, angular to subangular; dry; increase in silt and sand, green staining			
97	(97'); some silt; little granules to very large pebbles, angular to subangular; trace clay; moist; decrease in sand									
98	(98'); and silt; moist; increase in sand, decrease in granules and pebbles									
99	120	IRZ-33-SS-99-102 1/24/2020					(99'); dry to moist			
100										

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Date Started:	01/23/2020	Surface Elevation:	502.7 ft amsl	Boring No.: IRZ-33-Pilot
Date Completed:	01/23/2020	Northing (NAD83):	2101792.0	
Drilling Co.:	Cascade	Easting (NAD83):	7615827.9	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	116 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Boart Longyear Track Mount	Borehole Diameter:	6-10 inches	Location: PG&E Topock, Topock, California
Driller Name:	Eddie Ramos	Depth to First Water:	49.56 ft bgs	
Drilling Asst:	J. Candelaria / F. Sandoval	Sampling Method:	4 inch x 10ft Core Barrel	Project Number: RC000753.0051
Logger:	Joe Lantham	Sampling Interval:	Continuous	
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
101	120	09:37 IRZ-33-SS-99-102 1/24/2020 09:37		Topock - Alluvium Deposits	SM		(100') brown (7.5YR 5/4); iron oxide staining; red and white mottling present		
102		IRZ-33-SS-102-107 1/24/2020 09:42		Topock - Alluvium Deposits	SM		(102.0 - 107.0') Topock - Alluvium Deposits; Silty sand (SM); brown (7.5YR 5/4); very fine grained to very coarse grained, angular to subround; some silt; little granules to very large pebbles, angular to subangular; little coarser clasts composed of metadiorite; wet; iron oxide staining		
103									
104									
105									
106							(106'); dry to moist; red and white mottling present		
107	60	IRZ-33-SS-107-109 1/24/2020 09:48	IRZ-33-VAS-105-110 (1300 ppb) 1/23/2020 10:10	Topock - Alluvium Deposits	SW		(107.0 - 109.0') Topock - Alluvium Deposits; Well graded sand (SW); dark yellowish brown (10YR 4/4); very fine grained to very coarse grained, angular to subround; trace small to very large pebbles, angular to subangular; trace silt; trace coarser clasts composed of metadiorite; wet	(107.0 - 112.0') Very rough drilling, drill rods chattering, bedrock contact at 110.5 ft bgs.	
108				IRZ-33-SS-109-111 1/24/2020 09:53	Topock - Weathered Bedrock - conglomerate	ML			
109									
110									
111							(110.5 - 116.0') Topock - Competent Bedrock - conglomerate; dry, friable, pulverized bedrock		
112	48			Topock - Competent Bedrock - conglomerate				(112.0 - 116.0') Very rough drilling, drill rods chattering, 6 inches of slough from 112 to 112.5 ft bgs.	
113									
114									
115									
116									
End of Boring at 116.0' bgs.									
117									
118									
119									
120									




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Date Started:	01/12/2020	Surface Elevation:	505.0 ft amsl	Boring No.: IRZ-35 Pilot
Date Completed:	01/14/2020	Northing (NAD83):	2101643.1	
Drilling Co.:	Cascade	Easting (NAD83):	7615918.0	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	102 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Boart Longyear Track Mount	Borehole Diameter:	6-10 inches	Location: PG&E Topock, Topock, California
Driller Name:	Eddie Ramos	Depth to First Water:	51.47 ft bgs	
Drilling Asst:	J. Candelaria / F. Sandoval	Sampling Method:	4 inch x 10ft Core Barrel	Project Number: RC000753.0051
Logger:	Joe Lantham	Sampling Interval:	Continuous	
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
1							(0.0 - 8.0') No recovery (NR); see drilling notes	(0.0 - 8.0') Core not collected drilled with 10-inch conductor casing to 8 ft. bgs.	(0.0 - 102.0') No water used
2									
3									
4									
5									
6									
7									
8								(7.0 - 17.0') Soft drilling.	
9				Topock - Fill	SW-SM		(8.0 - 9.0') Topock - Fill; Well graded sand with silt and gravel (SW-SM); yellowish brown / moderate yellowish brown (10YR 5/4); very fine grained to very coarse grained, subangular to round; and granules to very large pebbles, angular to subangular; little silt; and coarser clasts composed of metadiorite; moist; iron oxide staining	(8.0 - 17.0') Soft drilling.	
10							(9.0 - 24.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 5/4); very fine grained to very coarse grained, angular to subround; some granules to very large pebbles, angular to subround; little silt; trace small cobbles; some coarser clasts composed of metadiorite; dry to moist; iron oxide staining		
11									
12	120								
13	108								
14									
15				Topock - Alluvium Deposits	SM		(15'); moist		
16									
17									
18								(17.0 - 35.0') Normal Drilling.	
19	120						(18.5') brown (10YR 5/3); subangular to round; some granules to very large pebbles, angular to subangular; little silt; trace small cobbles; dry to moist; increase in silt, decrease in granules to very large pebbles		
20									

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Date Started:	01/12/2020	Surface Elevation:	505.0 ft amsl	Boring No.: IRZ-35 Pilot	
Date Completed:	01/14/2020	Northing (NAD83):	2101643.1		
Drilling Co.:	Cascade	Easting (NAD83):	7615918.0	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	102 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Boart Longyear Track Mount	Borehole Diameter:	6-10 inches	Location:	PG&E Topock, Topock, California
Driller Name:	Eddie Ramos	Depth to First Water:	51.47 ft bgs		
Drilling Asst:	J. Candelaria / F. Sandoval	Sampling Method:	4 inch x 10ft Core Barrel	Project Number:	RC000753.0051
Logger:	Joe Lantham	Sampling Interval:	Continuous		
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
21				Topock - Alluvium Deposits	SM		(21'); dry		
22							(22'); dry to moist		
23									
24	120								
25				Topock - Alluvium Deposits	SW		(24.5 - 28.0') Topock - Alluvium Deposits; Well graded sand with gravel (SW); brown (7.5YR 4/4); very fine grained to very coarse grained, angular to subangular; little granules to very large pebbles, angular to subangular; trace silt; little coarser clasts composed of metadiorite; dry to moist		
26									
27									
28				Topock - Alluvium Deposits	SM		(28.0 - 43.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 5/4); very fine grained to very coarse grained, angular to subangular; some granules to very large pebbles, angular to subangular; little silt; some coarser clasts composed of metadiorite; dry to moist		
29									
30									
31									
32	120								
33									
34									
35									
36									
37									
38	120							(35.0 - 37.0') Rough drilling.	
39									
40								(37.0 - 42.0') Normal drilling.	

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Date Started:	01/12/2020	Surface Elevation:	505.0 ft amsl	Boring No.: IRZ-35 Pilot
Date Completed:	01/14/2020	Northing (NAD83):	2101643.1	
Drilling Co.:	Cascade	Easting (NAD83):	7615918.0	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	102 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Boart Longyear Track Mount	Borehole Diameter:	6-10 inches	Location: PG&E Topock, Topock, California
Driller Name:	Eddie Ramos	Depth to First Water:	51.47 ft bgs	
Drilling Asst:	J. Candelaria / F. Sandoval	Sampling Method:	4 inch x 10ft Core Barrel	Project Number: RC000753.0051
Logger:	Joe Lantham	Sampling Interval:	Continuous	
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid							
41	120			Topock - Alluvium Deposits	SM		(41.5'); moist	(42.0 - 47.0') Rough drilling.								
42							(42.5'); some granules to large pebbles, angular; dry									
43					IRZ-35-SS- 45-50 1/15/2020 14:45		Topock - Alluvium Deposits			GW-GM		(43.0 - 49.5') Topock - Alluvium Deposits; Well graded gravel with silt and sand (GW-GM); brown (7.5YR 5/4); granules to very large pebbles, angular; little silt; and coarser clasts composed of metadiorite; dry				
44												(47'); trace small cobbles, subangular to round; moist				
45																
46																
47																
48																
49																
50																
51																
52																
53																
54																
55																
56																
57																
58																
59																
60																

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	01/12/2020	Surface Elevation:	505.0 ft amsl	Boring No.: IRZ-35 Pilot	
Date Completed:	01/14/2020	Northing (NAD83):	2101643.1		
Drilling Co.:	Cascade	Easting (NAD83):	7615918.0	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	102 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Boart Longyear Track Mount	Borehole Diameter:	6-10 inches	Location:	PG&E Topock, Topock, California
Driller Name:	Eddie Ramos	Depth to First Water:	51.47 ft bgs		
Drilling Asst:	J. Candelaria / F. Sandoval	Sampling Method:	4 inch x 10ft Core Barrel	Project Number:	RC000753.0051
Logger:	Joe Lantham	Sampling Interval:	Continuous		
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
61									
62									
63		IRZ-35-SS-60-65 1/15/2020 15:00					(64'); moist		
64	120								
65									
66				Topock - Alluvium Deposits	SM				
67		IRZ-35-SS-65-70 1/15/2020 15:05						(67.0 - 68.0') Soft drilling.	
68							(68'); dry to moist	(68.0 - 72.0') Rough drilling.	
69			IRZ-35-VAS-67-72 (920 ppb) 1/13/2020 15:40				(69'); moist		
70	60								
71									
72		IRZ-35-SS-70-75 1/15/2020 15:10		Topock - Alluvium Deposits	SW		(71.5 - 73.5') Topock - Alluvium Deposits; Well graded sand with gravel (SW); brown (7.5YR 5/4); very fine grained to very coarse grained, angular to subangular; little granules to very large pebbles, angular to subangular; trace silt; little coarser clasts composed of metadiorite; moist (72.5'); wet	(72.0 - 77.0') Normal drilling.	
73									
74				Topock - Alluvium Deposits	SM		(73.5 - 77.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 5/4); very fine grained to very coarse grained, angular to subangular; little granules to very large pebbles, angular to subangular; little silt; little coarser clasts composed of metadiorite; moist to wet; iron oxide staining (74'); dry to moist (74.5'); moist to wet		
75	600								
76									
77		IRZ-35-SS-75-80 1/15/2020 15:20		Topock - Alluvium Deposits	GM		(77.0 - 85.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); brown (7.5YR 5/4); granules to very large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subangular; little silt; and coarser clasts composed of metadiorite; moist to wet	(77.0 - 97.0') Soft drilling.	
78	120								
79									
80									

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Date Started:	01/12/2020	Surface Elevation:	505.0 ft amsl	Boring No.: IRZ-35 Pilot	
Date Completed:	01/14/2020	Northing (NAD83):	2101643.1		
Drilling Co.:	Cascade	Easting (NAD83):	7615918.0	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	102 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Boart Longyear Track Mount	Borehole Diameter:	6-10 inches	Location:	PG&E Topock, Topock, California
Driller Name:	Eddie Ramos	Depth to First Water:	51.47 ft bgs		
Drilling Asst:	J. Candelaria / F. Sandoval	Sampling Method:	4 inch x 10ft Core Barrel	Project Number:	RC000753.0051
Logger:	Joe Lantham	Sampling Interval:	Continuous		
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
81							(81'); wet		
82		IRZ-35-SS-80-85 1/15/2020 15:25		Topock - Alluvium Deposits	GM				
83	120								
84			IRZ-35-VAS-82-87 (2500 ppb) 1/14/2020 12:15						
85									
86		IRZ-35-SS-85-88 1/15/2020 15:30		Topock - Alluvium Deposits	SM		(85.0 - 87.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown / moderate brown (5YR 4/4); very fine grained to very coarse grained, angular to subangular; some granules to very large pebbles, angular to subangular; some silt; little coarser clasts composed of metadiorite; wet; iron oxide staining		
87									
88				Topock - Weathered Bedrock - conglomerate	SM		(87.0 - 88.0') Topock - Weathered Bedrock - conglomerate; Silty sand (SM); reddish brown / moderate brown (5YR 4/4); very fine grained to coarse grained, subangular; little granules to large pebbles, angular to subangular; little silt; little coarser clasts composed of metadiorite; moist; iron oxide staining		
89							(88.0 - 102.0') Topock - Competent Bedrock - conglomerate		
90									
91									
92	120								
93									
94				Topock - Competent Bedrock - conglomerate					
95									
96									
97									
98	60							(97.0 - 102.0') Rough drilling likely due to broken metal drilling piece getting caught, found piece in soil core.	
99									
100									

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Boring Log

Sheet: 6 of 6

Date Started:	01/12/2020	Surface Elevation:	505.0 ft amsl	Boring No.: IRZ-35 Pilot	
Date Completed:	01/14/2020	Northing (NAD83):	2101643.1		
Drilling Co.:	Cascade	Easting (NAD83):	7615918.0	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	102 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Boart Longyear Track Mount	Borehole Diameter:	6-10 inches	Location:	PG&E Topock, Topock, California
Driller Name:	Eddie Ramos	Depth to First Water:	51.47 ft bgs		
Drilling Asst:	J. Candelaria / F. Sandoval	Sampling Method:	4 inch x 10ft Core Barrel	Project Number:	RC000753.0051
Logger:	Joe Lantham	Sampling Interval:	Continuous		
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
101	60			Topock - Competent Bedrock - conglomerate					
102							End of Boring at 102.0 'bgs.		
103									
104									
105									
106									
107									
108									
109									
110									
111									
112									
113									
114									
115									
116									
117									
118									
119									
120									

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Date Started:	01/15/2020	Surface Elevation:	505.0 ft amsl	Well ID: IRZ-35 Pilot
Date Completed:	01/15/2020	Northing (NAD83):	2101643.1	
Drilling Co.:	Cascade	Easting (NAD83):	7615918.0	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	102 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Eddie Ramos	Borehole Diameter:	6-10 inches	Location: PG&E Topock, Topock, California
Drilling Asst:	J. Candelaria / F. Sandoval	Depth to First Water:	51.47 ft bgs	
Logger:	Joe Lantham	Editor:	Grant Willford	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
1					(0.0 - 0.5') Steel Plate		Note: Steel plates with BMPs in place
2							
3					(0.5 - 5.0') Cemex #60	(0.5 - 5.0') 5.5 bags	(0.5 - 5.0') 6 bags (9%) Note: Lapis Lustre Sand
4			NR		(0.0 - 8.0') 10.0" Borehole		
5							
6							
7							
8							
9		Topock - Fill	SW-SM				
10							
11							
12							
13					(5.0 - 86.0') Cemex #3 MESH (8x10)	(5.0 - 86.0') 33.9 bags	(5.0 - 86.0') 39.5 bags (17%) Note: Lapis Lustre Sand
14		Topock - Alluvium Deposits	SM		(8.0 - 102.0') 6.0" Borehole		
15							
16							
17							
18							
19							
20							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Temporary Backfill Log

Date Started:	01/15/2020	Surface Elevation:	505.0 ft amsl	Well ID: IRZ-35 Pilot
Date Completed:	01/15/2020	Northing (NAD83):	2101643.1	
Drilling Co.:	Cascade	Easting (NAD83):	7615918.0	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	102 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Eddie Ramos	Borehole Diameter:	6-10 inches	Location: PG&E Topock, Topock, California
Drilling Asst:	J. Candelaria / F. Sandoval	Depth to First Water:	51.47 ft bgs	
Logger:	Joe Lantham	Editor:	Grant Willford	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
21		Topock - Alluvium Deposits	SM				
22							
23							
24		Topock - Alluvium Deposits	SW				
25							
26							
27		Topock - Alluvium Deposits	SM		(5.0 - 86.0') Cemex #3 MESH (8x10)	(8.0 - 102.0') 6.0" Borehole	(5.0 - 86.0') 33.9 bags
28							
29							
30							
31							
32							
33							
34							
35							
36							
37							
38							
39							
40							

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Date Started:	01/15/2020	Surface Elevation:	505.0 ft amsl	Well ID: IRZ-35 Pilot
Date Completed:	01/15/2020	Northing (NAD83):	2101643.1	
Drilling Co.:	Cascade	Easting (NAD83):	7615918.0	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	102 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Eddie Ramos	Borehole Diameter:	6-10 inches	Location: PG&E Topock, Topock, California
Drilling Asst:	J. Candelaria / F. Sandoval	Depth to First Water:	51.47 ft bgs	
Logger:	Joe Lantham	Editor:	Grant Willford	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
41		Topock - Alluvium Deposits	SM				
42							
43							
44		Topock - Alluvium Deposits	GW-GM				
45							
46							
47							
48							
49							
50					(5.0 - 86.0') Cemex #3 MESH (8x10)		
51							
52		Topock - Alluvium Deposits	GM				
53							
54	IRZ-35-VAS-52-57 (810 ppb) 1/13/2020 10:45						
55							
56		Topock - Alluvium Deposits	SW				
57							
58		Topock - Alluvium Deposits	SM				
59							
60							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started:	01/15/2020	Surface Elevation:	505.0 ft amsl	Well ID: IRZ-35 Pilot
Date Completed:	01/15/2020	Northing (NAD83):	2101643.1	
Drilling Co.:	Cascade	Easting (NAD83):	7615918.0	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	102 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Eddie Ramos	Borehole Diameter:	6-10 inches	Location: PG&E Topock, Topock, California
Drilling Asst:	J. Candelaria / F. Sandoval	Depth to First Water:	51.47 ft bgs	
Logger:	Joe Lantham	Editor:	Grant Willford	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction		Calculated Material Volumes	Material Volumes Installed
61								
62								
63								
64								
65								
66		Topock - Alluvium Deposits	SM					
67								
68								
69	IRZ-35-VAS-67-72 (920 ppb) 1/13/2020 15:40							
70					(5.0 - 86.0') Cemex #3 MESH (8x10)	(8.0 - 102.0') 6.0" Borehole	(5.0 - 86.0') 33.9 bags	(5.0 - 86.0') 39.5 bags (17%) Note: Lapis Lustre Sand
71								
72		Topock - Alluvium Deposits	SW					
73								
74		Topock - Alluvium Deposits	SM					
75								
76								
77								
78		Topock - Alluvium Deposits	GM					
79								
80								

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started:	01/15/2020	Surface Elevation:	505.0 ft amsl	Well ID: IRZ-35 Pilot
Date Completed:	01/15/2020	Northing (NAD83):	2101643.1	
Drilling Co.:	Cascade	Easting (NAD83):	7615918.0	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	102 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Eddie Ramos	Borehole Diameter:	6-10 inches	Location: PG&E Topock, Topock, California
Drilling Asst:	J. Candelaria / F. Sandoval	Depth to First Water:	51.47 ft bgs	
Logger:	Joe Lantham	Editor:	Grant Willford	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
81	IRZ-35-VAS-82-87 (2500 ppb) 1/14/2020 12:15	Topock - Alluvium Deposits	GM		(5.0 - 86.0') Cemex #3 MESH (8x10)	(5.0 - 86.0') 33.9 bags	(5.0 - 86.0') 39.5 bags (17%) Note: Lapis Lustre Sand
82		Topock - Alluvium Deposits	SM				
83		Topock - Weathered Bedrock - conglomerate	SM				
84		Topock - Competent Bedrock - conglomerate			(86.0 - 96.0') Cemex # 2/12 MESH (16x30)	(86.0 - 96.0') 3.9 bags	(86.0 - 96.0') 3.5 bags (-10%) Note: Lapis Lustre Sand
85							
86							
87							
88							
89							
90					(8.0 - 102.0') 6.0" Borehole		
91							
92							
93							
94							
95							
96							
97							
98					(96.0 - 102.0') Bentonite seal chips	(96.0 - 102.0') 0.6 bags	(96.0 - 102.0') 0.5 bags (-17%) Note: Puregold Medium Chips
99							
100							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Temporary Backfill Log

Sheet: 6 of 6

Date Started:	01/15/2020	Surface Elevation:	505.0 ft amsl	Well ID: IRZ-35 Pilot
Date Completed:	01/15/2020	Northing (NAD83):	2101643.1	
Drilling Co.:	Cascade	Easting (NAD83):	7615918.0	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	102 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Eddie Ramos	Borehole Diameter:	6-10 inches	Location: PG&E Topock, Topock, California
Drilling Asst:	J. Candelaria / F. Sandoval	Depth to First Water:	51.47 ft bgs	
Logger:	Joe Lantham	Editor:	Grant Willford	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction		Calculated Material Volumes	Material Volumes Installed
101		Topock - Competent Bedrock - conglomerate			(96.0 - 102.0') Bentonite seal chips	(8.0 - 102.0') 6.0" Borehole	(96.0 - 102.0') 0.6 bags	(96.0 - 102.0') 0.5 bags (-17%) Note: Puregold Medium Chips
102								
103								
104								
105								
106								
107								
108								
109								
110								
111								
112								
113								
114								
115								
116								
117								
118								
119								
120								

Final 2/22/20

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started:	<u>10/05/2019</u>	Surface Elevation:	<u>505.2 ft amsl</u>	Boring No.: <u>IRZ-37 Pilot</u>
Date Completed:	<u>10/07/2019</u>	Northing (NAD83):	<u>2101555.8</u>	
Drilling Co.:	<u>Cascade</u>	Easting (NAD83):	<u>7616004.6</u>	Client: <u>PG&E</u>
Drilling Method:	<u>Sonic Drilling</u>	Total Depth:	<u>87 ft bgs</u>	Project: <u>Final GW Remedy Phase 1</u>
Drill Rig Type:	<u>Boart Longyear Track</u>	Borehole Diameter:	<u>4-6 inches</u>	Location: <u>PG&E Topock, Topock, California</u>
Driller Name:	<u>Eddie Ramos</u>	Depth to First Water:	<u>48.25 ft bgs</u>	
Drilling Asst:	<u>F. Sandoval/J. Candelaria</u>	Sampling Method:	<u>4 inch x 10 ft. Core Barrel</u>	Project Number: <u>RC000753.0051</u>
Logger:	<u>Grant Willford</u>	Sampling Interval:	<u>Continuous</u>	
Editor:	<u>Sean McGrane</u>	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
1	60						(0.0 - 15.0') Topock - Fill; Silty sand with gravel (SM); pale yellow (2.5Y 8/2) with very pale brown (10YR 7/3); very fine grained to coarse grained, angular to subround; little granules to medium pebbles, angular to round; little silt; dry	(0.0 - 5.0') Hand augered for utility clearance.	(0.0 - 87.0') No water used
2									
3									
4									
5									
6	120							(5.0 - 17.0') Soft drilling.	
7									
8				Topock - Fill	SM				
9									
10									
11									
12							(12'); moist		
13									
14									
15									
16	84						(15.0 - 27.0') Topock - Alluvium Deposits; Silty sand (SM); very pale brown / grayish orange (10YR 7/4); very fine grained to medium grained, angular to subround; little granules to medium pebbles, angular to subangular; little silt; dry; homogeneous; weak cementation; trace organics 15-15.3		
17									
18				Topock - Alluvium Deposits	SM				
19									
20								(17.0 - 27.0') Soft drilling. Fine materials filled up/compacted in core bags leading to 7/10 ft recovery. Driller also noted core barrel was full	

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	<u>10/05/2019</u>	Surface Elevation:	<u>505.2 ft amsl</u>	Boring No.: <u>IRZ-37 Pilot</u>
Date Completed:	<u>10/07/2019</u>	Northing (NAD83):	<u>2101555.8</u>	
Drilling Co.:	<u>Cascade</u>	Easting (NAD83):	<u>7616004.6</u>	Client: <u>PG&E</u>
Drilling Method:	<u>Sonic Drilling</u>	Total Depth:	<u>87 ft bgs</u>	Project: <u>Final GW Remedy Phase 1</u>
Drill Rig Type:	<u>Boart Longyear Track</u>	Borehole Diameter:	<u>4-6 inches</u>	Location: <u>PG&E Topock, Topock, California</u>
Driller Name:	<u>Eddie Ramos</u>	Depth to First Water:	<u>48.25 ft bgs</u>	
Drilling Asst:	<u>F. Sandoval/J. Candelaria</u>	Sampling Method:	<u>4 inch x 10 ft. Core Barrel</u>	Project Number: <u>RC000753.0051</u>
Logger:	<u>Grant Willford</u>	Sampling Interval:	<u>Continuous</u>	
Editor:	<u>Sean McGrane</u>	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
21								prior to drill cutting collection.	
22									
23									
24	84			Topock - Alluvium Deposits	SM				
25									
26									
27									
28							(27.0 - 35.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 4/4); very fine grained to medium grained, angular to subround; little granules to medium pebbles, angular to subangular; little silt; trace small cobbles, subround; dry; homogeneous; weak cementation	(27.0 - 37.0') Soft drilling 27-35 ft bgs Hard drilling 35-37 ft bgs. Fine materials filled up/compacted in core bags leading to 7/10 ft recovery. Driller also noted core barrel was full prior to drill cutting collection.	
29									
30									
31				Topock - Alluvium Deposits	SM				
32	84								
33									
34									
35									
36							(35.0 - 44.0') Topock - Alluvium Deposits; Silt with sand (ML); brown (7.5YR 4/4); low plasticity; and very fine to medium grained sand, angular to subround; little granules to small pebbles, angular to subangular; dry; very soft to soft; homogeneous; low plasticity when wetted		
37									
38				Topock - Alluvium Deposits	ML			(37.0 - 47.0') Rough drilling.	
39	120								
40									

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Date Started:	<u>10/05/2019</u>	Surface Elevation:	<u>505.2 ft amsl</u>	Boring No.: <u>IRZ-37 Pilot</u>
Date Completed:	<u>10/07/2019</u>	Northing (NAD83):	<u>2101555.8</u>	
Drilling Co.:	<u>Cascade</u>	Easting (NAD83):	<u>7616004.6</u>	Client: <u>PG&E</u>
Drilling Method:	<u>Sonic Drilling</u>	Total Depth:	<u>87 ft bgs</u>	Project: <u>Final GW Remedy Phase 1</u>
Drill Rig Type:	<u>Boart Longyear Track</u>	Borehole Diameter:	<u>4-6 inches</u>	Location: <u>PG&E Topock, Topock, California</u>
Driller Name:	<u>Eddie Ramos</u>	Depth to First Water:	<u>48.25 ft bgs</u>	
Drilling Asst:	<u>F. Sandoval/J. Candelaria</u>	Sampling Method:	<u>4 inch x 10 ft. Core Barrel</u>	Project Number: <u>RC000753.0051</u>
Logger:	<u>Grant Willford</u>	Sampling Interval:	<u>Continuous</u>	
Editor:	<u>Sean McGrane</u>	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
41	120			Topock - Alluvium Deposits	ML				
42									
43									
44									
45	120	IRZ-37-SS-45-50 10/9/2019 08:15		Topock - Alluvium Deposits	SM		(44.0 - 49.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); very fine grained to very coarse grained, angular to subround; little granules to large pebbles, angular to subangular; little silt; trace clay; dry; moderate cementation		
46									
47								(47.0 - 50.0') Soft drilling.	
48									
49	120	IRZ-37-SS-50-55 10/9/2019 08:25		Topock - Alluvium Deposits	ML		(49.0 - 53.0') Topock - Alluvium Deposits; Sandy silt with gravel (ML); reddish brown (5YR 5/4); low plasticity; and very fine to very coarse grained sand, angular to subround; little granules to medium pebbles, angular to subangular; trace clay; moist; stiff; mottled; moderate cementation		
50								(50.0 - 52.0') Rough drilling.	
51									
52								(52.0 - 55.0') Soft drilling.	
53	120	IRZ-37-VAS-52-57 (1000 ppb) 10/6/2019 14:30		Topock - Alluvium Deposits	GP		(53.0 - 53.4') Topock - Alluvium Deposits; Poorly graded gravel (GP); light greenish gray (GLE2 7/1); small cobbles; dry; pulverized metadiorite boulder		
54									
55				Topock - Alluvium Deposits	SM		(53.4 - 57.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (5YR 5/4); very fine grained to very coarse grained, angular to subround; some granules to large pebbles, angular to subangular; little silt; trace small cobbles, subangular; trace clay; moist to dry; mottled; strong cementation; iron oxide staining; some red staining on gravel clasts (55'); dry	(55.0 - 57.0') Rough drilling.	
56									
57	120	IRZ-37-SS-55-60 10/9/2019 08:30	IRZ-37-VAS-57-62 (1100 ppb) 10/7/2019 10:35	Topock - Alluvium Deposits	SM		(57.0 - 60.0') Topock - Alluvium Deposits; Silty sand (SM); reddish brown (5YR 5/4); very fine grained to very coarse grained, angular to subround; little granules to small pebbles, angular to subangular; little silt; trace clay; wet to moist; iron oxide staining	(57.0 - 64.0') Normal drilling conditions.	
58									
59									
60									

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Date Started:	10/05/2019	Surface Elevation:	505.2 ft amsl	Boring No.: IRZ-37 Pilot	
Date Completed:	10/07/2019	Northing (NAD83):	2101555.8		
Drilling Co.:	Cascade	Easting (NAD83):	7616004.6	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	87 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Boart Longyear Track	Borehole Diameter:	4-6 inches	Location:	PG&E Topock, Topock, California
Driller Name:	Eddie Ramos	Depth to First Water:	48.25 ft bgs		
Drilling Asst:	F. Sandoval/J. Candelaria	Sampling Method:	4 inch x 10 ft. Core Barrel	Project Number:	RC000753.0051
Logger:	Grant Willford	Sampling Interval:	Continuous		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
61			IRZ-37-VAS-57-62 (1100 ppb) 10/7/2019 10:35	Topock - Alluvium Deposits	SM		(60.0 - 62.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (5YR 5/4); very fine grained to very coarse grained, angular to subround; some granules to very large pebbles, angular to subround; little silt; trace small cobbles, angular; trace clay; moist; moderate cementation; iron oxide staining		
62		IRZ-37-SS-60-65 10/9/2019 08:40		Topock - Alluvium Deposits	SM		(62.0 - 67.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (5YR 5/4) little light greenish gray (GLE2 7/1); very fine grained to very coarse grained, angular to subround; little granules to large pebbles, angular to subangular; little silt; coarser clasts composed of metadiorite; dry; mottled; weak cementation; iron oxide staining; some red staining on coarser clasts	(64.0 - 66.5') Rough drilling.	
63	120								
64									
65									
66									
67		IRZ-37-SS-65-70 10/9/2019 08:39		Topock - Alluvium Deposits	SM		(67.0 - 74.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (5YR 5/4) with light brown (7.5YR 6/3); very fine grained to very coarse grained, angular to subround; some silt; little granules to medium pebbles, angular to subangular; trace clay; moist; mottled; moderate cementation; iron oxide staining; 20,50,25,5. Color change from 72-74.5 ft bgs to 5YR 5/4 some 2.5YR 5/6.	(66.5 - 67.0') Soft drilling. (67.0 - 75.0') Normal drilling conditions.	
68									
69									
70									
71									
72	120	IRZ-37-SS-70-75 10/9/2019 08:20		Topock - Alluvium Deposits	SM		(72') reddish brown (5YR 5/4) with red (2.5YR 5/6)		
73									
74									
75				Topock - Competent Bedrock - conglomerate			(74.5 - 87.0') Topock - Competent Bedrock - conglomerate; red (2.5YR 5/6); dry; moderate cementation; iron oxide staining; pulverized/highly fractured rock, friable	(75.0 - 77.0') Rough drilling.	
76									
77									
78	120							(77.0 - 87.0') Rough drilling. Core barrel locked up; had some difficulties getting it out. Lost core downhole after freeing up core barrel	
79									
80									

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Boring Log

Sheet: 5 of 5

Date Started:	10/05/2019	Surface Elevation:	505.2 ft amsl	Boring No.: IRZ-37 Pilot	
Date Completed:	10/07/2019	Northing (NAD83):	2101555.8		
Drilling Co.:	Cascade	Easting (NAD83):	7616004.6	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	87 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Boart Longyear Track	Borehole Diameter:	4-6 inches	Location:	PG&E Topock, Topock, California
Driller Name:	Eddie Ramos	Depth to First Water:	48.25 ft bgs		
Drilling Asst:	F. Sandoval/J. Candelaria	Sampling Method:	4 inch x 10 ft. Core Barrel	Project Number:	RC000753.0051
Logger:	Grant Willford	Sampling Interval:	Continuous		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
81	120			Topock - Competent Bedrock - conglomerate				Recovered core with flapper drill bit.	
82									
83									
84									
85									
86									
87									
End of Boring at 87.0 'bgs.									
88									
89									
90									
91									
92									
93									
94									
95									
96									
97									
98									
99									
100									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, blue water table symbol represents depth to water measured during the first VAS interval

SOIL BORING LOG PG&E TOPOCK C:\USERS\MCGRANE\DOCUMENTS\PG&E TOPOCK\DRIFT BORING LOGS\GINT FILES\02.23.20\TOPOCK DATABASE FOR PLOG.GPJ TOPOCK DATA TEMPLATE FOR PLOG.GDT 02/23/20 12:45

Date Started:	10/08/2019	Surface Elevation:	505.2 ft amsl	Well ID: IRZ-37 Pilot
Date Completed:	10/08/2019	Northing (NAD83):	2101555.8	
Drilling Co.:	Cascade	Easting (NAD83):	7616004.6	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	87 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Eddie Ramos	Borehole Diameter:	4-6 inches	Location: PG&E Topock, Topock, California
Drilling Asst:	F. Sandoval/J. Candelaria	Depth to First Water:	48.25 ft bgs	
Logger:	Grant Willford	Editor:	Sean McGrane	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
1					(0.0 - 0.5') Steel Plate		Note: Steel plates with BMPs in place
2							
3					(0.5 - 5.0') Choker Sand Seal	(0.5 - 5.0') 2 bags	(0.5 - 5.0') 2 bags (0%) Note: Wildcat Plaster Sand
4							
5							
6							
7							
8		Topock - Fill	SM				
9							
10							
11							
12							
13					(5.0 - 72.0') Cemex #3 MESH (8x10)	(5.0 - 72.0') 33.5 bags	(5.0 - 72.0') 26.3 bags (-21%) Note: Lapis Lustre Sand, used >20% of the calculated volume due to potential voids forming during drilling
14							
15							
16							
17		Topock - Alluvium Deposits	SM				
18							
19							
20							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started:	10/08/2019	Surface Elevation:	505.2 ft amsl	Well ID: IRZ-37 Pilot
Date Completed:	10/08/2019	Northing (NAD83):	2101555.8	
Drilling Co.:	Cascade	Easting (NAD83):	7616004.6	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	87 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Eddie Ramos	Borehole Diameter:	4-6 inches	Location: PG&E Topock, Topock, California
Drilling Asst:	F. Sandoval/J. Candelaria	Depth to First Water:	48.25 ft bgs	
Logger:	Grant Willford	Editor:	Sean McGrane	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction		Calculated Material Volumes	Material Volumes Installed
21		Topock - Alluvium Deposits	SM					
22								
23								
24								
25								
26		Topock - Alluvium Deposits	SM		(5.0 - 72.0') Cemex #3 MESH (8x10)	(0.0 - 82.0') 6.0" Borehole	(5.0 - 72.0') 33.5 bags	(5.0 - 72.0') 26.3 bags (-21%) Note: Lapis Lustre Sand, used >20% of the calculated volume due to potential voids forming during drilling
27								
28								
29								
30								
31								
32								
33								
34								
35								
36		Topock - Alluvium Deposits	ML					
37								
38								
39								
40								

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started:	10/08/2019	Surface Elevation:	505.2 ft amsl	Well ID: IRZ-37 Pilot
Date Completed:	10/08/2019	Northing (NAD83):	2101555.8	
Drilling Co.:	Cascade	Easting (NAD83):	7616004.6	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	87 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Eddie Ramos	Borehole Diameter:	4-6 inches	Location: PG&E Topock, Topock, California
Drilling Asst:	F. Sandoval/J. Candelaria	Depth to First Water:	48.25 ft bgs	
Logger:	Grant Willford	Editor:	Sean McGrane	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
41							
42		Topock - Alluvium Deposits	ML				
43							
44							
45		Topock - Alluvium Deposits	SM				
46							
47							
48							
49							
50		Topock - Alluvium Deposits	ML		(5.0 - 72.0') Cemex #3 MESH (8x10)	(0.0 - 82.0') 6.0" Borehole	(5.0 - 72.0') 33.5 bags
51							
52							
53		Topock - Alluvium Deposits	GP				
54	IRZ-37-VAS-52-57 (1000 ppb) 10/6/2019 14:30						
55		Topock - Alluvium Deposits	SM				
56							
57							
58	IRZ-37-VAS-57-62 (1100 ppb) 10/7/2019 10:35	Topock - Alluvium Deposits	SM				
59							
60							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started:	10/08/2019	Surface Elevation:	505.2 ft amsl	Well ID: IRZ-37 Pilot
Date Completed:	10/08/2019	Northing (NAD83):	2101555.8	
Drilling Co.:	Cascade	Easting (NAD83):	7616004.6	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	87 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Eddie Ramos	Borehole Diameter:	4-6 inches	Location: PG&E Topock, Topock, California
Drilling Asst:	F. Sandoval/J. Candelaria	Depth to First Water:	48.25 ft bgs	
Logger:	Grant Willford	Editor:	Sean McGrane	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
61	IRZ-37-VAS-57-62 (1100 ppb) 10/7/2019 10:35	Topock - Alluvium Deposits	SM				
62							
63							
64		Topock - Alluvium Deposits	SM				
65							
66					(5.0 - 72.0') Cemex #3 MESH (8x10)	(5.0 - 72.0') 33.5 bags	(5.0 - 72.0') 26.3 bags (-21%) Note: Lapis Lustre Sand, used >20% of the calculated volume due to potential voids forming during drilling
67							
68							
69							
70		Topock - Alluvium Deposits	SM		(0.0 - 82.0') 6.0" Borehole		
71							
72							
73							
74							
75							
76					(72.0 - 81.0') Cemex # 2/12 MESH (16x30)	(72.0 - 81.0') 3.9 bags	(72.0 - 81.0') 4 bags (3%) Note: Lapis Lustre Sand
77		Topock - Competent Bedrock - conglomerate					
78							
79							
80							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started:	10/08/2019	Surface Elevation:	505.2 ft amsl	Well ID: IRZ-37 Pilot
Date Completed:	10/08/2019	Northing (NAD83):	2101555.8	
Drilling Co.:	Cascade	Easting (NAD83):	7616004.6	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	87 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Eddie Ramos	Borehole Diameter:	4-6 inches	Location: PG&E Topock, Topock, California
Drilling Asst:	F. Sandoval/J. Candelaria	Depth to First Water:	48.25 ft bgs	
Logger:	Grant Willford	Editor:	Sean McGrane	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
81					(72.0 - 81.0') Cemex # 2/12 MESH (16x30)	(72.0 - 81.0') 3.9 bags	(72.0 - 81.0') 4 bags (3%) Note: Lapis Lustre Sand
82							
83		Topock - Competent Bedrock - conglomerate					
84	--no sample-- (Interval did not produce) 10/8/2019 07:35				(81.0 - 87.0') Bentonite seal chips	(81.0 - 87.0') 0.6 bags	(81.0 - 87.0') 1.5 bags (150%) Note: Puregold Medium Chips, used >20% of the calculated volume due to potential voids forming during drilling
85							
86							
87							
88							
89							
90							
91							
92							
93							
94							
95							
96							
97							
98							
99							
100							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started:	01/25/2020	Surface Elevation:	505.2 ft amsl	Boring No.: IRZ-37
Date Completed:	01/26/2020	Northing (NAD83):	2101555.8	
Drilling Co.:	Cascade	Easting (NAD83):	7616004.6	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	82 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Boart Longyear Track	Conductor Casing Diameter:	N/A	Location: PG&E Topock, Topock, California
Driller Name:	Eddie Ramos	Drill Casing Diameter:	12 inches	
Drilling Asst:	J. Candelaria/F. Sandoval	Drill Bit:	N/A	Project Number: RC000753.0051
Tool-Pusher:	NA	Depth to First Water:	48.25 ft bgs	
Rig Geologist:	Joe Lantham	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Drilling Run and Average Penetration Rate	USCS Code	USCS Class	Casing Diameter	Description (See Pilot boring log for full geologic descriptions)	Drilling Notes	Drilling Fluid
1					(0.0 - 15.0') Topock - Fill; Silty sand with gravel (SM); pale yellow (2.5Y 8/2) with very pale brown (10YR 7/3)	(0.0 - 5.0') Soft drilling, observed temporary backfill material plastering sand in drill cuttings (see Photo Log).	(0.0 - 57.0') No water used
2							
3							
4							
5						(5.0 - 8.0') Soft drilling, observed temporary backfill material plastering sand and Mesh #3 Sand in drill cuttings (see Photo Log).	
6							
7							
8		SM				(8.0 - 17.0') Normal drilling, observed temporary backfill material Mesh #3 Sand in drill cuttings (see Photo Log).	
9							
10	(0.0 - 82.0) 0.08 mins/ft			(0.0 - 82.0') 12.0" Steel Casing			
11							
12							
13							
14							
15					(15.0 - 27.0') Topock - Alluvium Deposits; Silty sand (SM); very pale brown / grayish orange (10YR 7/4)		
16							
17							
18		SM				(17.0 - 27.0') Rough drilling, had to go back down twice because sands kept falling out of core barrel. Observed temporary backfill material Mesh #3 Sand in drill cuttings (see Photo Log).	
19							
20							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater

Remarks: blue water table symbol represents depth to water measured during the first VAS interval during drilling of the pilot borehole

Date Started:	01/25/2020	Surface Elevation:	505.2 ft amsl	Boring No.: IRZ-37
Date Completed:	01/26/2020	Northing (NAD83):	2101555.8	
Drilling Co.:	Cascade	Easting (NAD83):	7616004.6	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	82 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Boart Longyear Track	Conductor Casing Diameter:	N/A	Location: PG&E Topock, Topock, California
Driller Name:	Eddie Ramos	Drill Casing Diameter:	12 inches	
Drilling Asst:	J. Candelaria/F. Sandoval	Drill Bit:	N/A	Project Number: RC000753.0051
Tool-Pusher:	NA	Depth to First Water:	48.25 ft bgs	
Rig Geologist:	Joe Lantham	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Drilling Run and Average Penetration Rate	USCS Code	USCS Class	Casing Diameter	Description (See Pilot boring log for full geologic descriptions)	Drilling Notes	Drilling Fluid
21							
22							
23							
24		SM					
25							
26							
27							
28					(27.0 - 35.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 4/4)	(27.0 - 32.0') Rough drilling, had to go back down because sands kept falling out of core barrel.	
29							
30	(0.0 - 82.0) 0.08 mins/ft			(0.0 - 82.0') 12.0" Steel Casing			
31		SM					
32							
33						(32.0 - 37.0') Rough drilling, had to go back down because sands kept falling out of core barrel. Observed temporary backfill material Mesh #3 Sand in drill cuttings (see Photo Log).	
34							
35							
36					(35.0 - 44.0') Topock - Alluvium Deposits; Silt with sand (ML); brown (7.5YR 4/4)		
37							
38		ML				(37.0 - 47.0') Rough drilling, observed temporary backfill material Mesh #3 Sand in drill cuttings (see Photo Log).	
39							
40							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater

Remarks: blue water table symbol represents depth to water measured during the first VAS interval during drilling of the pilot borehole

Date Started:	01/25/2020	Surface Elevation:	505.2 ft amsl	Boring No.: IRZ-37	
Date Completed:	01/26/2020	Northing (NAD83):	2101555.8		
Drilling Co.:	Cascade	Easting (NAD83):	7616004.6	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	82 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Boart Longyear Track	Conductor Casing Diameter:	N/A	Location:	PG&E Topock, Topock, California
Driller Name:	Eddie Ramos	Drill Casing Diameter:	12 inches		
Drilling Asst:	J. Candelaria/F. Sandoval	Drill Bit:	N/A	Project Number:	RC000753.0051
Tool-Pusher:	NA	Depth to First Water:	48.25 ft bgs		
Rig Geologist:	Joe Lantham	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Drilling Run and Average Penetration Rate	USCS Code	USCS Class	Casing Diameter	Description (See Pilot boring log for full geologic descriptions)	Drilling Notes	Drilling Fluid
41							
42		ML					
43							
44					(44.0 - 49.0') Topock - Alluvium Deposits; Silty sand with gravel (SM)		
45							
46		SM					
47							
48						(47.0 - 57.0') Rough drilling, observed temporary backfill material Mesh #3 Sand in drill cuttings (see Photo Log).	
49							
50	(0.0 - 82.0) 0.08 mins/ft			(0.0 - 82.0') 12.0" Steel Casing	(49.0 - 53.0') Topock - Alluvium Deposits; Sandy silt with gravel (ML); reddish brown (5YR 5/4)		
51		ML					
52							
53		GP			(53.0 - 53.4') Topock - Alluvium Deposits; Poorly graded gravel (GP); light greenish gray (GLE2 7/1)		
54					(53.4 - 57.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (5YR 5/4)		
55		SM					
56							
57							
58		SM			(57.0 - 60.0') Topock - Alluvium Deposits; Silty sand (SM); reddish brown (5YR 5/4)	(57.0 - 67.0') Normal drilling, observed temporary backfill material Mesh #3 Sand in drill cuttings (see Photo Log).	(57.0 - 82.0') No water used
59							
60							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater

Remarks: blue water table symbol represents depth to water measured during the first VAS interval during drilling of the pilot borehole

Drilling Log

Sheet: 4 of 5

Date Started:	01/25/2020	Surface Elevation:	505.2 ft amsl	Boring No.: IRZ-37
Date Completed:	01/26/2020	Northing (NAD83):	2101555.8	
Drilling Co.:	Cascade	Easting (NAD83):	7616004.6	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	82 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type:	Boart Longyear Track	Conductor Casing Diameter:	N/A	Location: PG&E Topock, Topock, California
Driller Name:	Eddie Ramos	Drill Casing Diameter:	12 inches	
Drilling Asst:	J. Candelaria/F. Sandoval	Drill Bit:	N/A	Project Number: RC000753.0051
Tool-Pusher:	NA	Depth to First Water:	48.25 ft bgs	
Rig Geologist:	Joe Lantham	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Drilling Run and Average Penetration Rate	USCS Code	USCS Class	Casing Diameter	Description (See Pilot boring log for full geologic descriptions)	Drilling Notes	Drilling Fluid
61		SM			(60.0 - 62.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (5YR 5/4)		
62							
63					(62.0 - 67.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (5YR 5/4) little light greenish gray (GLEY2 7/1)		
64		SM					
65							
66							
67							
68					(67.0 - 74.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (5YR 5/4) with light brown (7.5YR 6/3)	(67.0 - 77.0') Normal drilling, observed temporary backfill material Mesh #3 Sand in drill cuttings (see Photo Log).	
69							
70	(0.0 - 82.0) 0.08 mins/ft	SM		(0.0 - 82.0') 12.0" Steel Casing			
71							
72					(72') reddish brown (5YR 5/4) with red (2.5YR 5/6)		
73							
74							
75					(74.5 - 82.0') Topock - Competent Bedrock - conglomerate; red (2.5YR 5/6)		
76							
77							
78						(77.0 - 80.0') Rough drilling, core barrel plugged up.	
79							
80							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater

Remarks: blue water table symbol represents depth to water measured during the first VAS interval during drilling of the pilot borehole

Date Started:	01/25/2020	Surface Elevation:	505.2 ft amsl	Boring No.: IRZ-37	
Date Completed:	01/26/2020	Northing (NAD83):	2101555.8		
Drilling Co.:	Cascade	Easting (NAD83):	7616004.6	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	82 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Boart Longyear Track	Conductor Casing Diameter:	N/A	Location:	PG&E Topock, Topock, California
Driller Name:	Eddie Ramos	Drill Casing Diameter:	12 inches		
Drilling Asst:	J. Candelaria/F. Sandoval	Drill Bit:	N/A	Project Number:	RC000753.0051
Tool-Pusher:	NA	Depth to First Water:	48.25 ft bgs		
Rig Geologist:	Joe Lantham	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Drilling Run and Average Penetration Rate	USCS Code	USCS Class	Casing Diameter	Description (See Pilot boring log for full geologic descriptions)	Drilling Notes	Drilling Fluid
81	(0.0 - 82.0) 0.08 mins/ft			(0.0 - 82.0') 12.0" Steel Casing		(80.0 - 82.0') Rough drilling, had to go back down three times because sands kept falling out of core barrel. Conducted borehole flush to remove fines in preparation for well installation.	(80.0 - 82.0') 600 gallons of water used; 600 gallons of water recovered; 0 gallons of water lost
82					End of Boring at 82.0 'bgs.		
83							
84							
85							
86							
87							
88							
89							
90							
91							
92							
93							
94							
95							
96							
97							
98							
99							
100							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater

Remarks: blue water table symbol represents depth to water measured during the first VAS interval during drilling of the pilot borehole

Date Started:	01/28/2020	Surface Elevation:	505.2 ft amsl	Well ID: IRZ-37
Date Completed:	02/04/2020	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	2101555.8	Project: Final GW Remedy Phase 1
Driller Name:	Eddie Ramos	Easting (NAD83):	7616004.6	Location: PG&E Topock, Topock, California
Drilling Asst:	J. Candelaria/F. Sandoval	Borehole Diameter:	12 inches	
Logger:	Joe Lantham	Water Level Start:	51.67 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	2/18/2020	
Total Depth:	82 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
1					(0.0 - 0.5') Steel Plate (0.5 - 49.0') 8" Suregrip 17 Casing		Note: Steel plates with BMPs in place
2					(1.0 - 4.0') Temporary Backfill Sand	(1.0 - 4.0') 2.6 bags	(1.0 - 4.0') 3 bags (15%) Note: Wildcat Plastering Sand
3							
4							
5							
6							
7							
8		Topock - Fill	SM				
9					(8.5 - 9.5') Centralizer		
10					(0.0 - 82.0') 12.0" Borehole		
11							
12					(4.0 - 36.0') Portland Cement 3% Bentonite	(4.0 - 36.0') 104.4 gallons	(4.0 - 36.0') 140 gallons (34%) Note: Type I, II, and V with Hydrogel, used >20% of the calculated volume due to potential voids forming during drilling and grout migration
13							
14							
15							
16							
17		Topock - Alluvium Deposits	SM				
18							
19							
20							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, groundwater samples were collected during drilling of the pilot borehole

Date Started:	01/28/2020	Surface Elevation:	505.2 ft amsl	Well ID: IRZ-37
Date Completed:	02/04/2020	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	2101555.8	Project: Final GW Remedy Phase 1
Driller Name:	Eddie Ramos	Easting (NAD83):	7616004.6	Location: PG&E Topock, Topock, California
Drilling Asst:	J. Candelaria/F. Sandoval	Borehole Diameter:	12 inches	
Logger:	Joe Lantham	Water Level Start:	51.67 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	2/18/2020	
Total Depth:	82 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction		Calculated Material Volumes	Material Volumes Installed
21		Topock - Alluvium Deposits	SM		(0.5 - 49.0') 8" Suregrip 17 Casing			
22								
23								
24								
25								
26								
27		Topock - Alluvium Deposits	SM		(4.0 - 36.0') Portland Cement 3% Bentonite	(0.0 - 82.0') 12.0" Borehole	(4.0 - 36.0') 104.4 gallons	(4.0 - 36.0') 140 gallons (34%) Note: Type I, II, and V with Hydrogel, used >20% of the calculated volume due to potential voids forming during drilling and grout migration
28								
29								
30								
31								
32								
33								
34								
35								
36		Topock - Alluvium Deposits	ML		(36.0 - 41.2') Cemex #60		(36.0 - 41.2') 4.5 bags	(36.0 - 41.2') 4.5 bags (0%) Note: Lapis Lustre Sand
37								
38								
39								
40								

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, groundwater samples were collected during drilling of the pilot borehole

Date Started:	01/28/2020	Surface Elevation:	505.2 ft amsl	Well ID: IRZ-37
Date Completed:	02/04/2020	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	2101555.8	Project: Final GW Remedy Phase 1
Driller Name:	Eddie Ramos	Easting (NAD83):	7616004.6	Location: PG&E Topock, Topock, California
Drilling Asst:	J. Candelaria/F. Sandoval	Borehole Diameter:	12 inches	
Logger:	Joe Lantham	Water Level Start:	51.67 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	2/18/2020	
Total Depth:	82 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
41					(0.5 - 49.0') 8" Suregrip 17 Casing (36.0 - 41.2') Cemex #60	(36.0 - 41.2') 4.5 bags	(36.0 - 41.2') 4.5 bags (0%) Note: Lapis Lustre Sand
42		Topock - Alluvium Deposits	ML				
43							
44							
45							
46		Topock - Alluvium Deposits	SM		(45.5 - 46.5') Centralizer		
47							
48							
49							
50					(49.0 - 74.0') 8" 0.010-Slot 316 SS Wire Wrap Screen		
51		Topock - Alluvium Deposits	ML		(41.2 - 82.0') Cemex #0/30 Mesh (30x50)	(41.2 - 82.0') 37.3 bags	(41.2 - 82.0') 38 bags (2%) Note: Lapis Lustre Sand, swabbed well screen to settle filter pack for approximately 30 minutes
52							
53		Topock - Alluvium Deposits	GP				
54	IRZ-37-VAS-52-57 (1000 ppb) 10/6/2019 14:30						
55		Topock - Alluvium Deposits	SM				
56							
57							
58	IRZ-37-VAS-57-62 (1100 ppb) 10/7/2019 10:35	Topock - Alluvium Deposits	SM				
59							
60							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, groundwater samples were collected during drilling of the pilot borehole

Date Started:	01/28/2020	Surface Elevation:	505.2 ft amsl	Well ID: IRZ-37
Date Completed:	02/04/2020	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	2101555.8	Project: Final GW Remedy Phase 1
Driller Name:	Eddie Ramos	Easting (NAD83):	7616004.6	Location: PG&E Topock, Topock, California
Drilling Asst:	J. Candelaria/F. Sandoval	Borehole Diameter:	12 inches	
Logger:	Joe Lantham	Water Level Start:	51.67 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	2/18/2020	
Total Depth:	82 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
61	IRZ-37-VAS-57-62 (1100 ppb) 10/7/2019 10:35	Topock - Alluvium Deposits	SM		(49.0 - 74.0') 8" 0.010-Slot 316 SS Wire Wrap Screen		
62							
63		Topock - Alluvium Deposits	SM				
64							
65							
66							
67							
68		Topock - Alluvium Deposits	SM				
69							
70					(41.2 - 82.0') Cemex #0/30 Mesh (30x50)	(0.0 - 82.0') 12.0" Borehole	(41.2 - 82.0') 37.3 bags
71							
72							
73							
74							
75		Topock - Competent Bedrock - conglomerate					
76							
77					(76.0 - 77.0') Centralizer		
78							
79							
80					(74.0 - 79.8') Sump and End Cap		

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, groundwater samples were collected during drilling of the pilot borehole

Date Started:	01/28/2020	Surface Elevation:	505.2 ft amsl	Well ID: IRZ-37
Date Completed:	02/04/2020	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	2101555.8	Project: Final GW Remedy Phase 1
Driller Name:	Eddie Ramos	Easting (NAD83):	7616004.6	Location: PG&E Topock, Topock, California
Drilling Asst:	J. Candelaria/F. Sandoval	Borehole Diameter:	12 inches	
Logger:	Joe Lantham	Water Level Start:	51.67 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	2/18/2020	
Total Depth:	82 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction			Calculated Material Volumes	Material Volumes Installed
81		Topock - Competent Bedrock - conglomerate			(41.2 - 82.0') Cemex #0/30 Mesh (30x50)		(0.0 - 82.0') 12.0" Borehole	(41.2 - 82.0') 37.3 bags	(41.2 - 82.0') 38 bags (2%) Note: Lapis Lustre Sand, swabbed well screen to settle filter pack for approximately 30 minutes
82					End of Boring at 82.0' bgs.				
83									
84									
85									
86									
87									
88									
89									
90									
91									
92									
93									
94									
95									
96									
97									
98									
99									
100									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, groundwater samples were collected during drilling of the pilot borehole


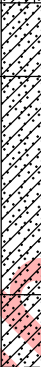

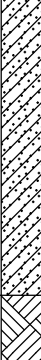

WELL CONSTRUCTION DETAILS_PG&E TOPOCK C:\USERS\SMCGRANE\DOCUMENTS\PG&E TOPOCK\DRIFT BORING LOGS\GINT FILES\022320\TOPOCK DATA TEMPLATE FOR PLOG.GDT 02/23/20 15:51

Date Started:	03/29/2019	Surface Elevation:	482.8 ft amsl	Boring No.: IRZ-39 Pilot
Date Completed:	03/31/2019	Northing (NAD83):	2101375.7	
Drilling Co.:	Cascade	Easting (NAD83):	7616112.5	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	54 ft bgs	Project: Final Groundwater Remedy Phase
Drill Rig Type:	Terrasonic track mount	Borehole Diameter:	4-12 inches	Location: 1
Driller Name:	Dan O'Mara	Depth to First Water:	26.61 ft bgs	PG&E Topock, Needles, California
Drilling Asst:	E. Huellmantel / J. Pacheco	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger:	Grant Willford	Sampling Interval:	Continuous	
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
1	12			Topsoil	SM		(0.0 - 0.5') Topsoil; Silty sand with gravel (SM); very fine grained to very coarse grained, angular to subangular; little granules to medium pebbles, angular to subround; little silt; little clay; dry; homogeneous; some organics, small pieces of grass		(0.0 - 54.0') No water used
2	30			Topock - Fill			(0.5 - 0.6') Topock - Fill; Asphalt		
3				Topock - Alluvium Deposits	SM		(0.6 - 2.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 4/4); very fine grained to very coarse grained, angular to subangular; some granules to medium pebbles, angular to subround; little silt; little clay; dry; homogeneous	(2.5 - 6.0') Soft drilling	
4				Topock - Alluvium Deposits	GP		(2.5 - 3.0') Topock - Alluvium Deposits; Poorly graded gravel (GP); (10YR 2.5/1); boulders, angular; dry; boulder composed of metadiorite		
5	42			Topock - Alluvium Deposits	GC		(3.0 - 5.5') Topock - Alluvium Deposits; Clayey gravel with sand (GC); reddish brown / moderate brown (5YR 4/4) some red (2.5YR 5/6); granules to large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subround; little silt; little clay; dry; iron oxide staining; gravel composed of mixed lithology; mostly metadiorite, few organics observed, small pieces of grass		
6							(5.5 - 16.0') Topock - Alluvium Deposits; Clayey sand with gravel (SC); reddish brown (5YR 5/4) some reddish brown (2.5YR 4/4); very fine grained to very coarse grained, angular to subangular; some granules to large pebbles, angular to subangular; dry; iron oxide staining; gravel composed of mixed lithology; mostly metadiorite	(6.0 - 16.0') Soft drilling	
7									
8									
9									
10									
11	114			Topock - Alluvium Deposits	SC				
12									
13									
14									
15									
16									
17									
18	120			Topock - Alluvium Deposits	SC		(16.0 - 20.0') Topock - Alluvium Deposits; Clayey sand with gravel (SC); brown (7.5YR 4/4) with reddish brown / moderate brown (5YR 4/4); very fine grained to very coarse grained, angular to subround; some granules to large pebbles, angular to subangular; some clay; little silt; dry; weak cementation; iron oxide staining	(16.0 - 26.0') Soft drilling	
19									
20									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	03/29/2019	Surface Elevation:	482.8 ft amsl	Boring No.: <u>IRZ-39 Pilot</u>	
Date Completed:	03/31/2019	Northing (NAD83):	2101375.7		
Drilling Co.:	Cascade	Easting (NAD83):	7616112.5	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	54 ft bgs	Project:	Final Groundwater Remedy Phase
Drill Rig Type:	Terrasonic track mount	Borehole Diameter:	4-12 inches	Location:	1
Driller Name:	Dan O'Mara	Depth to First Water:	26.61 ft bgs	PG&E Topock, Needles, California	
Drilling Asst:	E. Huellmantel / J. Pacheco	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number: RC000753.0051	
Logger:	Grant Willford	Sampling Interval:	Continuous		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
21	120			Topock - Alluvium Deposits	SC		(20.0 - 25.0') Topock - Alluvium Deposits; Clayey sand with gravel (SC); reddish brown / moderate brown(5YR 4/4) little red (2.5YR 5/6); very fine grained to very coarse grained, angular to subangular; some clay; little granules to medium pebbles, angular to subangular; little silt; dry; weak cementation; iron oxide staining	(16.0 - 26.0') Soft drilling	(0.0 - 54.0') No water used
22									
23									
24									
25									
26	120	IRZ-39-SS-26-31 3/31/2019 10:27	IRZ-39-VAS-27-32 (29 ppb) 3/30/2019 09:16	Topock - Alluvium Deposits	SC		(25.0 - 26.0') Topock - Alluvium Deposits; Clayey sand with gravel (SC); reddish brown (5YR 5/4) some reddish brown (2.5YR 4/4); very fine grained to very coarse grained, angular to subangular; some granules to large pebbles, angular to subangular; little silt; little clay; dry to moist; weak cementation; gravel composed of mixed litholgy; mostly metadiorite, moist at 25.6'	(26.0 - 36.0') Rough drilling	(27.8') Approximate depth to water table
27									
28									
29									
30									
31		IRZ-39-SS-31-36 3/31/2019 10:31		Topock - Alluvium Deposits	SC		(29.0 - 30.0') Topock - Alluvium Deposits; Clayey sand with gravel (SC); red (2.5YR 4/6) some red / moderate reddish brown(10R 4/6); very fine grained to very coarse grained, angular to subround; some granules to very large pebbles, angular to subangular; little cobbles, subangular; little silt; little clay; moist to dry; moderate cementation; iron oxide staining; gravel composed of mixed litholgy, mostly metadiorite, moist from 29-30', dry from 30-36'	(36.0 - 46.0') Rough drilling	
32									
33									
34									
35									
36	36	IRZ-39-SS-36-41 3/31/2019 10:34		Topock - Weathered Bedrock - conglomerate	SC		(30.0 - 39.0') Topock - Weathered Bedrock - conglomerate; Clayey sand with gravel (SC); red (2.5YR 4/6) some red / moderate reddish brown(10R 4/6); very fine grained to very coarse grained, angular to subround; some granules to very large pebbles, angular to subangular; little cobbles, subangular; little silt; little clay; moist to dry; moderate cementation; iron oxide staining; gravel composed of mixed litholgy, mostly metadiorite		
37									
38									
39									
40	84			Topock - Competent Bedrock -			(39.0 - 44.0') Topock - Competent Bedrock - conglomerate; red (2.5YR 5/6); dry; iron oxide staining; firable conglomerate, highly fractured and pulverized, when moist pulverized rock has low		

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	03/29/2019	Surface Elevation:	482.8 ft amsl	Boring No.: <u>IRZ-39 Pilot</u>	
Date Completed:	03/31/2019	Northing (NAD83):	2101375.7		
Drilling Co.:	Cascade	Easting (NAD83):	7616112.5	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	54 ft bgs	Project:	Final Groundwater Remedy Phase
Drill Rig Type:	Terrasonic track mount	Borehole Diameter:	4-12 inches	Location:	1
Driller Name:	Dan O'Mara	Depth to First Water:	26.61 ft bgs	PG&E Topock, Needles, California	
Drilling Asst:	E. Huellmantel / J. Pacheco	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number: RC000753.0051	
Logger:	Grant Willford	Sampling Interval:	Continuous		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
41				conglomerate			plasticity, moderate to strong cementation	(36.0 - 46.0') Rough drilling	(0.0 - 54.0') No water used
42				Topock - Competent Bedrock - conglomerate					
43	84	IRZ-39-SS-41-46	no sample (Interval did not produce)						
44		3/31/2019 10:40							
45							(44.0 - 54.0') Topock - Competent Bedrock - conglomerate; red (2.5YR 5/6); dry; moderate cementation; iron oxide staining; friable conglomerate, core not as pulverized as from 39-44 feet bgs		
46									
47								(46.0 - 54.0') Rough drilling, lost core down the borehole, had to go back in to retrieve 49 to 54 ft bgs	
48									
49				Topock - Competent Bedrock - conglomerate					
50	96								
51									
52									
53									
54									
55							End of Boring at 54.0 'bgs.		
56									
57									
58									
59									
60									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	03/29/2019	Surface Elevation:	482.8 ft amsl	Well ID: IRZ-39 Pilot
Date Completed:	03/31/2019	Northing (NAD83):	2101375.7	
Drilling Co.:	Cascade	Easting (NAD83):	7616112.5	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	54 ft bgs	Project: Final Groundwater Remedy Phase
Driller Name:	Dan O'Mara	Borehole Diameter:	4-12 inches	Location: 1
Drilling Asst:	E. Huellmantel / J. Pacheco	Depth to First Water:	26.61 ft bgs	PG&E Topock, Needles, California
Logger:	Grant Willford	Editor:	Sean McGrane	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction		Calculated Material Volumes	Material Volumes Installed						
		Topsoil	SM		(0.0 - 0.5') Temporary Steel Plate with BMP									
1		Topock - Fill												
2		Topock - Alluvium Deposits	SM			(0.0 - 4.0') 12" Borehole								
3		Topock - Alluvium Deposits	GP		(0.5 - 5.0') Plaster Sand		(0.5 - 5.0') 6.3 bags	(0.5 - 5.0') 6 bags (-5%) Note: Wildcat Cleanwash						
4		Topock - Alluvium Deposits	GC											
5														
6		Topock - Alluvium Deposits	SC		(5.0 - 36.0') Pea Gravel	(4.0 - 42.0') 6" Borehole	(5.0 - 36.0') 13.7 bags	(5.0 - 36.0') 12 bags (-12%) Note: Cal-silica 3/8 x 1/4"						
7														
8														
9														
10														
11														
12														
13														
14														
15														
16														
17		Topock - Alluvium Deposits	SC											
18														
19														
20														

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started:	03/29/2019	Surface Elevation:	482.8 ft amsl	Well ID: IRZ-39 Pilot
Date Completed:	03/31/2019	Northing (NAD83):	2101375.7	
Drilling Co.:	Cascade	Easting (NAD83):	7616112.5	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	54 ft bgs	Project: Final Groundwater Remedy Phase
Driller Name:	Dan O'Mara	Borehole Diameter:	4-12 inches	Location: 1
Drilling Asst:	E. Huellmantel / J. Pacheco	Depth to First Water:	26.61 ft bgs	PG&E Topock, Needles, California
Logger:	Grant Willford	Editor:	Sean McGrane	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
21							
22							
23		Topock - Alluvium Deposits	SC				
24							
25		Topock - Alluvium Deposits	SC				
26							
27		Topock - Alluvium Deposits	SC				
28					(5.0 - 36.0') Pea Gravel	(5.0 - 36.0') 13.7 bags	(5.0 - 36.0') 12 bags (-12%) Note: Cal-silica 3/8 x 1/4"
29	IRZ-39-VAS-27-32 (29 ppb) 3/30/2019 09:16	Topock - Alluvium Deposits	SC				
30					(4.0 - 42.0') 6" Borehole		
31							
32							
33							
34		Topock - Weathered Bedrock - conglomerate	SC				
35							
36							
37							
38					(36.0 - 46.0') Cemex #3 MESH (8x10)	(36.0 - 46.0') 3.9 bags	(36.0 - 46.0') 4 bags (3%) Note: Lapis Lustre Sand
39		Topock - Competent Bedrock - conglomerate					
40							


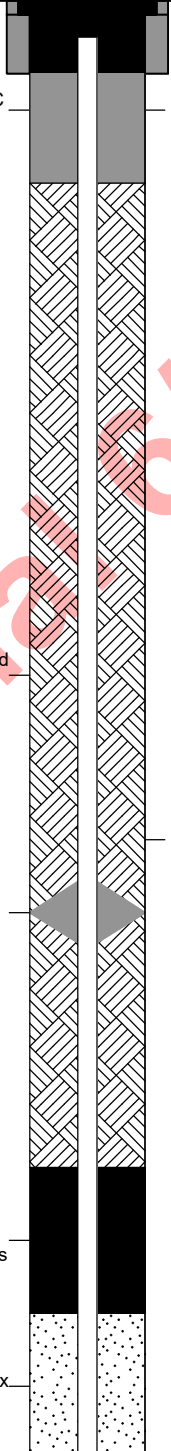

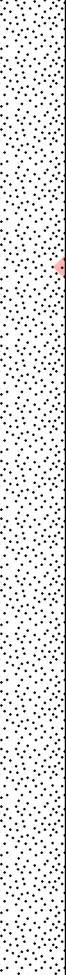
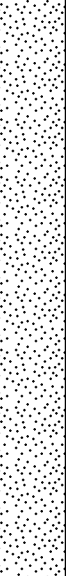
Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started:	03/29/2019	Surface Elevation:	482.8 ft amsl	Well ID: IRZ-39 Pilot
Date Completed:	03/31/2019	Northing (NAD83):	2101375.7	
Drilling Co.:	Cascade	Easting (NAD83):	7616112.5	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	54 ft bgs	Project: Final Groundwater Remedy Phase
Driller Name:	Dan O'Mara	Borehole Diameter:	4-12 inches	Location: 1
Drilling Asst:	E. Huellmantel / J. Pacheco	Depth to First Water:	26.61 ft bgs	PG&E Topock, Needles, California
Logger:	Grant Willford	Editor:	Sean McGrane	Project Number: RC000753.0051

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
41	no sample (Interval did not produce)	Topock - Competent Bedrock - conglomerate			(4.0 - 42.0') 6" Borehole	(36.0 - 46.0') 3.9 bags	(36.0 - 46.0') 4 bags (3%) Note: Lapis Lustre Sand
42							
43							
44							
45		Topock - Competent Bedrock - conglomerate			(42.0 - 54.0') 4" Borehole	(46.0 - 54.0') 1 bags	(46.0 - 54.0') 1 bags (0%) Note: Enviroplug - medium bentonite chips.
46							
47							
48							
49					(46.0 - 54.0') Backfill		
50							
51							
52							
53							
54							
55							
56							
57							
58							
59							
60							

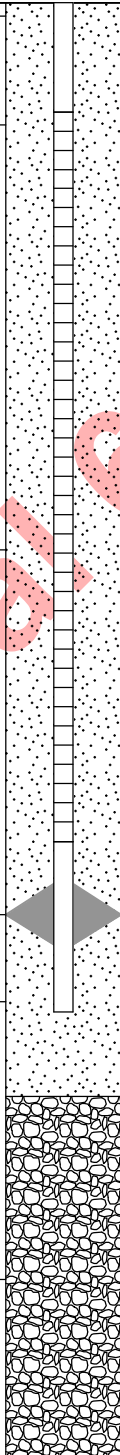
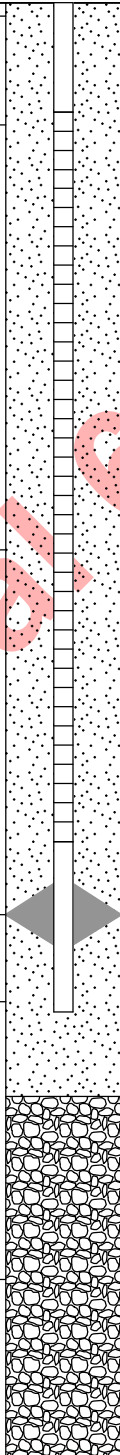
Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Date Started: 03/29/2019	Surface Elevation: 459.5 ft amsl	Well ID: MW-W-31
Date Completed: 04/13/2019	Shallow Well Elevation: 459.3 ft amsl	
Drilling Co.: Cascade	Deep Well Elevation: N/A	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): 2101904.2	Project: Final Groundwater Remedy Phase
Driller Name: Steve Vasquez	Easting (NAD83): 7616366.1	Location: 1
Drilling Asst: L. Amaya/ O. Flores	Borehole Diameter: 6-10 inches	PG&E Topock, Needles, California
Logger: Gantt Jeffers	Water Level Start: 4.83 ft bgs	Project Number: RC000753.0051
Editor: Sean McGrane	Development End Date: 4/4/2019	
Total Depth: 43 ft bgs	Well Completion: <input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
1		Topock - Fill			(0.0 - 1.0') Concrete Pad		(0.0 - 2.5') 9 bags Note: 2.5 x 2.5 ft concrete pad with 18" dia lockable vault, King Kon-Crete 4000 PSI
2					(0.5 - 21.5') 2" PVC Sch 40 Casing		(0.0 - 3.0') 10" Borehole
3							
4							
5							
6	MW-W-VAS-7-12 (<0.17 U) 3/27/2019 16:55	Topock - Fluvial Deposits	SP-SM				
7		Topock - Fluvial Deposits			(2.5 - 16.0') Portland Cement 5% Bentonite	(2.5 - 16.0') 30 gallons	(2.5 - 16.0') 55 gallons (83%) Note: Type I, II, and V low alkali - high sulphate resistant grout with 5% wyo-ben hydrogel Wyoming bentonite chips
8							
9							
10							
11							
12							
13					(12.0 - 13.0') Centralizer		
14							
15							
16							
17	Topock - Fluvial Deposits	SP		(16.0 - 18.0') Bentonite seal chips	(16.0 - 18.0') 0.5 bags	(16.0 - 18.0') 0.5 bags (0%) Note: Halliburton Holeplug 3/8	
18							
19				(18.0 - 35.0') Cemex #3 MESH (8x10)	(18.0 - 35.0') 5.7 bags	(18.0 - 35.0') 5.5 bags (-4%) Note: Lapis Lustre Sand	
20							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, blue water table symbol represents depth to water measured during the first VAS interval

Date Started: 03/29/2019	Surface Elevation: 459.5 ft amsl	Well ID: MW-W-31
Date Completed: 04/13/2019	Shallow Well Elevation: 459.3 ft amsl	
Drilling Co.: Cascade	Deep Well Elevation: N/A	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): 2101904.2	Project: Final Groundwater Remedy Phase
Driller Name: Steve Vasquez	Easting (NAD83): 7616366.1	Location: 1
Drilling Asst: L. Amaya/ O. Flores	Borehole Diameter: 6-10 inches	PG&E Topock, Needles, California
Logger: Gantt Jeffers	Water Level Start: 4.83 ft bgs	Project Number: RC000753.0051
Editor: Sean McGrane	Development End Date: 4/4/2019	
Total Depth: 43 ft bgs	Well Completion: <input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction		Calculated Material Volumes	Material Volumes Installed
21	MW-W-VAS-22-27 (0.266 J ppb) 3/28/2019 13:00	Topock - Fluvial Deposits	SP		(0.5 - 21.5') 2" PVC Sch 40 Casing			
22					(21.5 - 31.5') 2" Sch 40 PVC (20-slot) Screen			
23								
24								
25								
26	Topock - Fluvial Deposits	SM			(18.0 - 35.0') Cemex #3 MESH (8x10)		(18.0 - 35.0') 5.7 bags	(18.0 - 35.0') 5.5 bags (-4%) Note: Lapis Lustre Sand
27								
28								
29	Topock - Weathered Bedrock - conglomerate	SM				(3.0 - 43.0') 6" Borehole		
30								
31	Topock - Competent Bedrock - conglomerate				(32.0 - 33.0') Centralizer			
32								
33								
34								
35								
36								
37								
38								
39								
40								
					(35.0 - 43.0') Backfill		(35.0 - 43.0') 2.2 bags	(35.0 - 43.0') 2 bags (-9%) Note: Halliburton Holeplug 3/8

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	03/29/2019	Surface Elevation:	459.5 ft amsl	Well ID: MW-W-31
Date Completed:	04/13/2019	Shallow Well Elevation:	459.3 ft amsl	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	2101904.2	Project: Final Groundwater Remedy Phase
Driller Name:	Steve Vasquez	Easting (NAD83):	7616366.1	Location: 1
Drilling Asst:	L. Amaya/ O. Flores	Borehole Diameter:	6-10 inches	PG&E Topock, Needles, California
Logger:	Gantt Jeffers	Water Level Start:	4.83 ft bgs	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	4/4/2019	
Total Depth:	43 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed
41		Topock - Competent Bedrock - conglomerate			(35.0 - 43.0') Backfill	(35.0 - 43.0') 2.2 bags	(35.0 - 43.0') 2 bags (-9%) Note: Halliburton Holeplug 3/8"
42							
43							
44					End of Boring at 43.0' bgs.		
45							
46							
47							
48							
49							
50							
51							
52							
53							
54							
55							
56							
57							
58							
59							
60							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, blue water table symbol represents depth to water measured during the first VAS interval

Date Started: <u>03/29/2019</u>	Surface Elevation: <u>N/A</u>	Boring No.: <u>IRZ-39 Pilot</u>
Date Completed: <u>03/31/2019</u>	Northing (NAD83): <u>N/A</u>	
Drilling Co.: <u>Cascade</u>	Easting (NAD83): <u>N/A</u>	Client: <u>PG&E</u>
Drilling Method: <u>Sonic Drilling</u>	Total Depth: <u>54 ft bgs</u>	Project: <u>Final GW Remedy Phase 1</u>
Drill Rig Type: <u>Terrasonic track mount</u>	Borehole Diameter: <u>6-12 inches</u>	Location: <u>PG&E Topock, Needles, California</u>
Driller Name: <u>Dan O'Mara</u>	Depth to First Water: <u>26.61 ft bgs</u>	
Drilling Asst: <u>E. Huellmantel / J. Pacheco</u>	Sampling Method: <u>4 inch x 10 ft Core Barrel</u>	Project Number: <u>RC000753.0051</u>
Logger: <u>Grant Willford</u>	Sampling Interval: <u>Continuous</u>	
Editor: <u>Sean McGrane</u>	Converted to Well: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	








Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
1	12			Topsoil	SM		(0.0 - 0.5') Topsoil; Silty sand with gravel (SM); very fine grained to very coarse grained, angular to subangular; little granules to medium pebbles, angular to subround; little silt; little clay; dry; homogeneous; some organics, small pieces of grass		
2	30			Topock - Fill			(0.5 - 0.6') Topock - Fill; Asphalt		
3				Topock - Alluvium Deposits	SM		(0.6 - 2.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 4/4); very fine grained to very coarse grained, angular to subangular; some granules to medium pebbles, angular to subround; little silt; little clay; dry; homogeneous	(2.5 - 6.0') Soft drilling	
4				Topock - Alluvium Deposits	GP		(2.5 - 3.0') Topock - Alluvium Deposits; Poorly graded gravel (GP); (10YR 2.5/1); boulders, angular; dry; boulder composed of metadiorite		
5	42			Topock - Alluvium Deposits	GC		(3.0 - 5.5') Topock - Alluvium Deposits; Clayey gravel with sand (GC); reddish brown / moderate brown (5YR 4/4) some red (2.5YR 5/6); granules to large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subround; little silt; little clay; dry; iron oxide staining; gravel composed of mixed lithology; mostly metadiorite, few organics observed, small pieces of grass		
6				Topock - Alluvium Deposits	SC		(5.5 - 16.0') Topock - Alluvium Deposits; Clayey sand with gravel (SC); reddish brown (5YR 5/4) some reddish brown (2.5YR 4/4); very fine grained to very coarse grained, angular to subangular; some granules to large pebbles, angular to subangular; dry; iron oxide staining; gravel composed of mixed lithology; mostly metadiorite	(6.0 - 16.0') Soft drilling	
7									
8									
9									
10									
11	114								
12									
13									
14									
15									
16									
17				Topock - Alluvium Deposits	SC		(16.0 - 20.0') Topock - Alluvium Deposits; Clayey sand with gravel (SC); brown (7.5YR 4/4) with reddish brown / moderate brown (5YR 4/4); very fine grained to very coarse grained, angular to subround; some granules to large pebbles, angular to subangular; some clay; little silt; dry; weak cementation; iron oxide staining	(16.0 - 26.0') Soft drilling	
18	120								
19									
20									

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groundwater

Remarks:

Date Started: <u>03/29/2019</u>	Surface Elevation: <u>N/A</u>	Boring No.: IRZ-39 Pilot
Date Completed: <u>03/31/2019</u>	Northing (NAD83): <u>N/A</u>	
Drilling Co.: <u>Cascade</u>	Easting (NAD83): <u>N/A</u>	Client: <u>PG&E</u>
Drilling Method: <u>Sonic Drilling</u>	Total Depth: <u>54 ft bgs</u>	Project: <u>Final GW Remedy Phase 1</u>
Drill Rig Type: <u>Terrasonic track mount</u>	Borehole Diameter: <u>6-12 inches</u>	Location: <u>PG&E Topock, Needles, California</u>
Driller Name: <u>Dan O'Mara</u>	Depth to First Water: <u>26.61 ft bgs</u>	
Drilling Asst: <u>E. Huellmantel / J. Pacheco</u>	Sampling Method: <u>4 inch x 10 ft Core Barrel</u>	Project Number: <u>RC000753.0051</u>
Logger: <u>Grant Willford</u>	Sampling Interval: <u>Continuous</u>	
Editor: <u>Sean McGrane</u>	Converted to Well: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	



Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
21	120			Topock - Alluvium Deposits	SC		(20.0 - 25.0') Topock - Alluvium Deposits; Clayey sand with gravel (SC); reddish brown / moderate brown(5YR 4/4) little red (2.5YR 5/6); very fine grained to very coarse grained, angular to subangular; some clay; little granules to medium pebbles, angular to subangular; little silt; dry; weak cementation; iron oxide staining	(16.0 - 26.0') Soft drilling	
22									
23									
24									
25									
26	120	IRZ-39-SS-26-31 3/31/2019 10:27:47 AM	IRZ-39-VAS-27-32 (29 ppb) 3/30/2019 9:16:17 AM	Topock - Alluvium Deposits	SC		(25.0 - 26.0') Topock - Alluvium Deposits; Clayey sand with gravel (SC); reddish brown (5YR 5/4) some reddish brown (2.5YR 4/4); very fine grained to very coarse grained, angular to subangular; some granules to large pebbles, angular to subangular; little silt; little clay; dry to moist; weak cementation; gravel composed of mixed lithology; mostly metadiorite, moist at 25.6'	(26.0 - 36.0') Rough drilling	
27				Topock - Alluvium Deposits	SC		(26.0 - 29.0') Topock - Alluvium Deposits; Clayey sand with gravel (SC); dark reddish gray (5YR 4/2) with red (2.5YR 4/6); very fine grained to very coarse grained, angular to subangular; little granules to medium pebbles, angular to subangular; little silt; little clay; moist; moderate cementation; iron oxide staining; gravel composed of mixed lithology; mostly metadiorite		
28									
29				Topock - Alluvium Deposits	SC		(29.0 - 30.0') Topock - Alluvium Deposits; Clayey sand with gravel (SC); red (2.5YR 4/6) some red / moderate reddish brown(10R 4/6); very fine grained to very coarse grained, angular to subangular; some granules to very large pebbles, angular to subangular; little cobbles, subangular; little silt; little clay; moist to dry; moderate cementation; iron oxide staining; gravel composed of mixed lithology, mostly metadiorite, moist from 29-30', dry from 30-36'		
30				Topock - Weathered Bedrock - conglomerate	SC		(30.0 - 39.0') Topock - Weathered Bedrock - conglomerate; Clayey sand with gravel (SC); red (2.5YR 4/6) some red / moderate reddish brown(10R 4/6); very fine grained to very coarse grained, angular to subangular; some granules to very large pebbles, angular to subangular; little cobbles, subangular; little silt; little clay; moist to dry; moderate cementation; iron oxide staining; gravel composed of mixed lithology, mostly metadiorite		
31									
32									
33									
34									
35	36	IRZ-39-SS-31-36 3/31/2019 10:31:04 AM						(36.0 - 46.0') Rough drilling	
36									
37									
38									
39									
40	84			Topock - Competent Bedrock -			(39.0 - 44.0') Topock - Competent Bedrock - conglomerate; red (2.5YR 5/6); dry; iron oxide staining; friable conglomerate, highly fractured and pulverized, when moist pulverized rock has low		

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groundwater

Remarks:

Date Started: 03/29/2019	Surface Elevation: N/A	Boring No.: IRZ-39 Pilot
Date Completed: 03/31/2019	Northing (NAD83): N/A	
Drilling Co.: Cascade	Easting (NAD83): N/A	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 54 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type: Terrasonic track mount	Borehole Diameter: 6-12 inches	Location: PG&E Topock, Needles, California
Driller Name: Dan O'Mara	Depth to First Water: 26.61 ft bgs	
Drilling Asst: E. Huellmantel / J. Pacheco	Sampling Method: 4 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger: Grant Willford	Sampling Interval: Continuous	
Editor: Sean McGrane	Converted to Well: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	





Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
41	84	IRZ-39-SS-41-46 3/31/2019 10:40:04 AM	no sample (Interval did not produce)	conglomerate			plasticity, moderate to strong cementation	(36.0 - 46.0') Rough drilling	
42				Topock - Competent Bedrock - conglomerate					
43									
44									
45	96			Topock - Competent Bedrock - conglomerate			(44.0 - 54.0') Topock - Competent Bedrock - conglomerate; red (2.5YR 5/6); dry; moderate cementation; iron oxide staining; friable conglomerate, core not as pulverized as from 39-44 feet bgs	(46.0 - 54.0') Rough drilling, lost core down the borehole, had to go back in to retrieve 49 to 54 ft bgs	
46									
47									
48									
49									
50									
51									
52									
53									
54									
End of Boring at 54.0 'bgs.									
55									
56									
57									
58									
59									
60									

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groundwater

Remarks:

Date Started: <u>01/05/2019</u>	Surface Elevation: <u>N/A</u>	Boring No.: <u>MW-Bd</u>
Date Completed: <u>02/28/2019</u>	Northing (NAD83): <u>N/A</u>	
Drilling Co.: <u>Cascade</u>	Easting (NAD83): <u>N/A</u>	Client: <u>PG&E</u>
Drilling Method: <u>Sonic Drilling</u>	Total Depth: <u>357 ft bgs</u>	Project: <u>Final GW Remedy Phase 1</u>
Drill Rig Type: <u>Fullsize Track Mount</u>	Borehole Diameter: <u>6 inches</u>	Location: <u>PG&E Topock, Needles, California</u>
Driller Name: <u>Nick Petrone</u>	Depth to First Water: <u>21 ft bgs</u>	
Drilling Asst: <u>T. Alymer/ J. Candelaria</u>	Sampling Method: <u>10 ft Core Barrel</u>	Project Number: <u>RC000753.0051</u>
Logger: <u>G. Willford / C. Bonessi</u>	Sampling Interval: <u>Continuous</u>	
Editor: <u>Sean McGrane</u>	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	




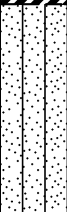


Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
1	39.6			Topock - Fill	SM		(0.0 - 12.0') Topock - Fill; Poorly graded sand with silt (SM); very pale brown (10YR 8/3); very fine grained to fine grained, angular to subround; little silt; dry; trace organics	(0.0 - 7.0') Soft drilling	(0.0 - 297.0') No water used
2									
3									
4									
5									
6									
7	120								
8									
9									
10									
11									
12									
13		Topock - Fill	GM		(12.0 - 13.5') Topock - Fill; Silty gravel with sand (GM); (GLE Y1 4/1); medium pebbles to very large pebbles, angular; some silt; little medium to very coarse grained sand, angular; dry; 1.5' Meta-Diorite Boulder				
14		Topock - Fluvial Deposits	GM		(13.5 - 17.0') Topock - Fluvial Deposits; Silty gravel with sand (GM); dark olive brown (2.5Y 3/3); granules to very large pebbles, angular to round; some very fine to very coarse grained sand, angular to subround; some silt; trace cobbles, angular to subround; dry; gravel composed of mixed lithology				
15									
16									
17	108			Topock - Fluvial Deposits	GM		(17.0 - 21.5') Topock - Fluvial Deposits; Silty gravel with sand (GM); dark grayish brown / dark yellowish brown(10YR 4/2); granules to very large pebbles, angular to subround; some very fine to very coarse grained sand, angular to subround; some silt; little clay; dry		
18									
19									
20									

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groundwater

Remarks: U = not detected above the laboratory reporting limit, ppb = parts per billion

Date Started: 01/05/2019	Surface Elevation: N/A	Boring No.: MW-Bd
Date Completed: 02/28/2019	Northing (NAD83): N/A	
Drilling Co.: Cascade	Easting (NAD83): N/A	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 357 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type: Fullsize Track Mount	Borehole Diameter: 6 inches	Location: PG&E Topock, Needles, California
Driller Name: Nick Petrone	Depth to First Water: 21 ft bgs	
Drilling Asst: T. Alymer/ J. Candelaria	Sampling Method: 10 ft Core Barrel	Project Number: RC000753.0051
Logger: G. Willford / C. Bonessi	Sampling Interval: Continuous	
Editor: Sean McGrane	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
21	108			Topock - Fluvial Deposits	GM			(21.0') Approximate depth to water table	(0.0 - 297.0') No water used
22				Topock - Fluvial Deposits	SC		(21.5 - 22.5') Topock - Fluvial Deposits; Clayey sand with gravel (SC); reddish yellow (7.5YR 6/6); very fine grained to very coarse grained, angular to subround; some granules to very large pebbles, subangular to subround; little silt; little clay; moist; gravel composed of mixed lithology		
23				Topock - Alluvium Deposits	CH		(22.5 - 24.0') Topock - Alluvium Deposits; Fat clay with gravel (CH); reddish yellow (5YR 6/8); high plasticity; little cobbles, subangular to subround; trace very fine grained sand, subangular to subround; trace silt; moist		
24				Topock - Alluvium Deposits	SM		(24.0 - 27.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 5/3); fine grained to very coarse grained, angular to subround; some silt; little granules to medium pebbles, angular to subround; little clay; moist		
25	60								
26									
27									
28									
29	120								
30									
31									
32									
33				Topock - Alluvium Deposits	SC		(32.0 - 33.0') Topock - Alluvium Deposits; Clayey sand with gravel (SC); light brown (7.5YR 6/4); fine grained to very coarse grained, angular to round; some clay; little granules to medium pebbles, angular to subround; little silt; wet; gravel composed of mixed lithology		
34				Topock - Alluvium Deposits	SM		(33.0 - 44.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 5/3); very fine grained to very coarse grained, angular to round; little granules to medium pebbles, angular to subround; little silt; little clay; trace cobbles, subangular; wet		
35									
36									
37									
38									
39									
40									

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Remarks: U = not detected above the laboratory reporting limit, ppb = parts per billion

Date Started: <u>01/05/2019</u>	Surface Elevation: <u>N/A</u>	Boring No.: <u>MW-Bd</u>
Date Completed: <u>02/28/2019</u>	Northing (NAD83): <u>N/A</u>	
Drilling Co.: <u>Cascade</u>	Easting (NAD83): <u>N/A</u>	Client: <u>PG&E</u>
Drilling Method: <u>Sonic Drilling</u>	Total Depth: <u>357 ft bgs</u>	Project: <u>Final GW Remedy Phase 1</u>
Drill Rig Type: <u>Fullsize Track Mount</u>	Borehole Diameter: <u>6 inches</u>	Location: <u>PG&E Topock, Needles, California</u>
Driller Name: <u>Nick Petrone</u>	Depth to First Water: <u>21 ft bgs</u>	
Drilling Asst: <u>T. Alymer/ J. Candelaria</u>	Sampling Method: <u>10 ft Core Barrel</u>	Project Number: <u>RC000753.0051</u>
Logger: <u>G. Willford / C. Bonessi</u>	Sampling Interval: <u>Continuous</u>	
Editor: <u>Sean McGrane</u>	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
41	120			Topock - Alluvium Deposits	SM				(0.0 - 297.0') No water used
42									
43									
44									
45				Topock - Alluvium Deposits	SM		(44.5 - 52.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 5/3) little grayish brown (10YR 5/2); very fine grained to very coarse grained, angular to round; little granules to very large pebbles, angular to subround; little cobbles, subangular to subround; little silt; little clay; wet		
46									
47	120								
48									
49			MW-B-VAS-47-52 (<0.17 U ppb) 1/9/2019 10:15:46 AM	Topock - Alluvium Deposits	SM				
50									
51									
52									
53				Topock - Alluvium Deposits	SM		(52.0 - 62.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 4/4); very fine grained to very fine grained, angular to round; some silt; little granules to very large pebbles, angular to round; little clay; trace cobbles, subangular to subround; moist to wet		
54									
55									
56	120								
57									
58									
59									
60									

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groundwater

Remarks: U = not detected above the laboratory reporting limit, ppb = parts per billion

Date Started: <u>01/05/2019</u>	Surface Elevation: <u>N/A</u>	Boring No.: <u>MW-Bd</u>
Date Completed: <u>02/28/2019</u>	Northing (NAD83): <u>N/A</u>	
Drilling Co.: <u>Cascade</u>	Easting (NAD83): <u>N/A</u>	Client: <u>PG&E</u>
Drilling Method: <u>Sonic Drilling</u>	Total Depth: <u>357 ft bgs</u>	Project: <u>Final GW Remedy Phase 1</u>
Drill Rig Type: <u>Fullsize Track Mount</u>	Borehole Diameter: <u>6 inches</u>	Location: <u>PG&E Topock, Needles, California</u>
Driller Name: <u>Nick Petrone</u>	Depth to First Water: <u>21 ft bgs</u>	
Drilling Asst: <u>T. Alymer/ J. Candelaria</u>	Sampling Method: <u>10 ft Core Barrel</u>	Project Number: <u>RC000753.0051</u>
Logger: <u>G. Willford / C. Bonessi</u>	Sampling Interval: <u>Continuous</u>	
Editor: <u>Sean McGrane</u>	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
61	120			Topock - Alluvium Deposits	SM				(0.0 - 297.0') No water used
62									
63				Topock - Alluvium Deposits	ML		(62.0 - 64.5') Topock - Alluvium Deposits; Sandy silt with gravel (ML); brown (7.5YR 4/3); medium plasticity; some very fine to medium grained sand, angular to round; little granules to medium pebbles, angular to subround; little clay; moist		
64									
65				Topock - Fluvial Deposits	GM		(64.5 - 65.5') Topock - Fluvial Deposits; Silty gravel with sand (GM); brown (7.5YR 4/4); granules to very large pebbles, angular to subround; some very fine to very coarse grained sand, angular to round; some silt; little cobbles, subangular to subround; trace clay; moist		(0.0 - 297.0') No water used
66									
67	120						(65.5 - 72.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 4/4); very fine grained to very coarse grained; some silt; little granules to very large pebbles, angular to subround; little cobbles, subangular to subround; trace clay; moist to wet		
68									
69			MW-B-VAS-67-72 (<0.17 U ppb) 1/9/2019 2:55:27 PM	Topock - Alluvium Deposits	SM				(0.0 - 297.0') No water used
70									
71									
72									
73				Topock - Alluvium Deposits	GM		(72.0 - 77.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); light brown (7.5YR 6/4); granules to very large pebbles, angular to round; some very fine to very coarse grained sand, angular to round; some silt; trace clay; moist to wet		(0.0 - 297.0') No water used
74									
75									
76	120								
77									(0.0 - 297.0') No water used
78				Topock - Alluvium Deposits	SM		(77.0 - 88.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); strong brown (7.5YR 5/6); very fine grained to very coarse grained, angular to round; little small to medium pebbles, angular to subround; little silt; trace clay; wet; majority of pebbles are elongated. Gravel composed of mixed lithology.		
79									
80									

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Remarks: U = not detected above the laboratory reporting limit, ppb = parts per billion

Date Started:	01/05/2019	Surface Elevation:	N/A	Boring No.: MW-Bd	
Date Completed:	02/28/2019	Northing (NAD83):	N/A		
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	357 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Fullsize Track Mount	Borehole Diameter:	6 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Nick Petrone	Depth to First Water:	21 ft bgs		
Drilling Asst:	T. Alymer/ J. Candelaria	Sampling Method:	10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	G. Willford / C. Bonessi	Sampling Interval:	Continuous		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
81	120								(0.0 - 297.0') No water used
82									
83									
84				Topock - Alluvium Deposits	SM				
85									
86									
87	120								
88									
89				Topock - Alluvium Deposits	GM		(88.0 - 91.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); brown (7.5YR 4/3); granules to small cobbles, angular to subround; some very fine to very coarse grained sand, angular to round; some silt; trace clay; moist; gravel composed mostly of meta-diorite		
90									
91									
92									
93									
94	60			Topock - Alluvium Deposits	SM		(91.0 - 97.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); strong brown (7.5YR 4/6); very fine grained to very coarse grained, angular to round; some granules to very large pebbles, angular to subround; some silt; trace cobbles, angular to subangular; trace clay; wet; gravel composed of mixed lithology		
95									
96									
97									
98	120			Topock - Alluvium Deposits	ML		(97.0 - 102.0') Topock - Alluvium Deposits; Sandy silt with gravel (ML); strong brown (7.5YR 5/6) trace red (10R 5/8); medium plasticity; some very fine to very coarse grained sand, subangular to round; little granules to medium pebbles, subangular to subround; trace clay; moist; iron oxide staining		
99									
100									

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groundwater

Remarks: U = not detected above the laboratory reporting limit, ppb = parts per billion

Date Started:	01/05/2019	Surface Elevation:	N/A	Boring No.: MW-Bd	
Date Completed:	02/28/2019	Northing (NAD83):	N/A		
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	357 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Fullsize Track Mount	Borehole Diameter:	6 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Nick Petrone	Depth to First Water:	21 ft bgs		
Drilling Asst:	T. Alymer/ J. Candelaria	Sampling Method:	10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	G. Willford / C. Bonessi	Sampling Interval:	Continuous		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

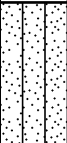




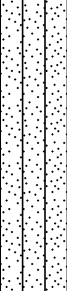
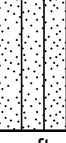
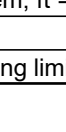
Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
101				Topock - Alluvium Deposits	ML				(0.0 - 297.0') No water used
102									
103									
104	120								
105									
106									
107									
108									
109									
110									
111									
112	120								
113									
114									
115									
116									
117									
118	120								
119									
120									

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groundwater

Remarks: U = not detected above the laboratory reporting limit, ppb = parts per billion

Date Started: <u>01/05/2019</u>	Surface Elevation: <u>N/A</u>	Boring No.: <u>MW-Bd</u>
Date Completed: <u>02/28/2019</u>	Northing (NAD83): <u>N/A</u>	
Drilling Co.: <u>Cascade</u>	Easting (NAD83): <u>N/A</u>	Client: <u>PG&E</u>
Drilling Method: <u>Sonic Drilling</u>	Total Depth: <u>357 ft bgs</u>	Project: <u>Final GW Remedy Phase 1</u>
Drill Rig Type: <u>Fullsize Track Mount</u>	Borehole Diameter: <u>6 inches</u>	Location: <u>PG&E Topock, Needles, California</u>
Driller Name: <u>Nick Petrone</u>	Depth to First Water: <u>21 ft bgs</u>	
Drilling Asst: <u>T. Alymer/ J. Candelaria</u>	Sampling Method: <u>10 ft Core Barrel</u>	Project Number: <u>RC000753.0051</u>
Logger: <u>G. Willford / C. Bonessi</u>	Sampling Interval: <u>Continuous</u>	
Editor: <u>Sean McGrane</u>	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
121	120			Topock - Alluvium Deposits	SM				(0.0 - 297.0') No water used
122				Topock - Alluvium Deposits	GM		(122.0 - 126.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); strong brown (7.5YR 5/6) trace very dark gray (7.5YR 3/1); granules to very large pebbles, angular to subround; some very fine to very coarse grained sand, angular to subround; some silt; little cobbles, subangular to subround; trace clay; moist		
123									
124									
125	120			Topock - Alluvium Deposits	SM		(126.0 - 129.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); strong brown (7.5YR 5/6); very fine grained to very coarse grained, angular to subround; some granules to very large pebbles, angular to subround; some silt; trace cobbles, subangular; trace clay; moist to wet		
126				Topock - Alluvium Deposits	GM		(129.0 - 134.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); strong brown (7.5YR 5/6) some very dark gray (10YR 3/1); granules to very large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subround; some silt; trace cobbles, angular; trace clay; moist; moderate cementation		
127									
128									
129	120			Topock - Alluvium Deposits	SM		(134.0 - 144.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); strong brown (7.5YR 5/6); very fine grained to very coarse grained, angular to round; some silt; little granules to medium pebbles, subangular to subround; trace cobbles, subangular; trace clay; moist		
130				Topock - Alluvium Deposits	GM				
131									
132									
133	120			Topock - Alluvium Deposits	SM				
134				Topock - Alluvium Deposits	GM				
135									
136									
137	120			Topock - Alluvium Deposits	SM				
138				Topock - Alluvium Deposits	GM				
139									
140									

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groundwater

Remarks: U = not detected above the laboratory reporting limit, ppb = parts per billion

Date Started: <u>01/05/2019</u>	Surface Elevation: <u>N/A</u>	Boring No.: <u>MW-Bd</u>
Date Completed: <u>02/28/2019</u>	Northing (NAD83): <u>N/A</u>	
Drilling Co.: <u>Cascade</u>	Easting (NAD83): <u>N/A</u>	Client: <u>PG&E</u>
Drilling Method: <u>Sonic Drilling</u>	Total Depth: <u>357 ft bgs</u>	Project: <u>Final GW Remedy Phase 1</u>
Drill Rig Type: <u>Fullsize Track Mount</u>	Borehole Diameter: <u>6 inches</u>	Location: <u>PG&E Topock, Needles, California</u>
Driller Name: <u>Nick Petrone</u>	Depth to First Water: <u>21 ft bgs</u>	
Drilling Asst: <u>T. Alymer/ J. Candelaria</u>	Sampling Method: <u>10 ft Core Barrel</u>	Project Number: <u>RC000753.0051</u>
Logger: <u>G. Willford / C. Bonessi</u>	Sampling Interval: <u>Continuous</u>	
Editor: <u>Sean McGrane</u>	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

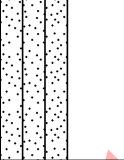
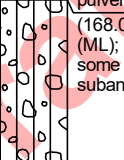
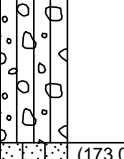
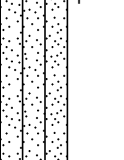
Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
141	120		MW-B-VAS-142-147 (<0.17 U ppb) 1/15/2019 2:25:50 PM	Topock - Alluvium Deposits	SM				(0.0 - 297.0') No water used
142									
143									
144									
145	120			Topock - Alluvium Deposits	SM		(144.0 - 147.0') Topock - Alluvium Deposits; Silty sand (SM); brown (7.5YR 5/4); very fine grained to very coarse grained, angular to subround; some silt; little granules to medium pebbles, subangular to round; trace clay; moist to wet		
146									
147									
148									
149	120			Topock - Alluvium Deposits	SM		(147.0 - 152.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); light brown (7.5YR 6/4)(4); very fine grained to very coarse grained, angular to subround; some silt; little granules to large pebbles, subangular to round; trace clay; moist to wet		
150									
151									
152									
153	120			Topock - Alluvium Deposits	GM		(152.5 - 154.0') Topock - Alluvium Deposits; Silty sand with gravel (GM); light brown (7.5YR 6/4); granules to very large pebbles; some very fine to very coarse grained sand, angular to subround; some silt; trace clay; moist		
154									
155				Topock - Alluvium Deposits	SM		(154.0 - 157.0') Topock - Alluvium Deposits; Silty sand (SM); brown (7.5YR 5/4); very fine grained to very coarse grained, angular to subround; some silt; little granules to medium pebbles, subangular to round; trace clay; wet		
156									
157	120								
158				Topock - Alluvium Deposits	GM		(157.0 - 160.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); dark brown (10YR 3/3) little reddish brown (2.5YR 4/4); granules to small cobbles, subangular to subround; some very fine to very coarse grained sand, angular to subround; little silt; little clay; moist		
159									
160									

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groundwater

Remarks: U = not detected above the laboratory reporting limit, ppb = parts per billion

Date Started: 01/05/2019	Surface Elevation: N/A	Boring No.: MW-Bd
Date Completed: 02/28/2019	Northing (NAD83): N/A	
Drilling Co.: Cascade	Easting (NAD83): N/A	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 357 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type: Fullsize Track Mount	Borehole Diameter: 6 inches	Location: PG&E Topock, Needles, California
Driller Name: Nick Petrone	Depth to First Water: 21 ft bgs	
Drilling Asst: T. Alymer/ J. Candelaria	Sampling Method: 10 ft Core Barrel	Project Number: RC000753.0051
Logger: G. Willford / C. Bonessi	Sampling Interval: Continuous	
Editor: Sean McGrane	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
161	120			Topock - Alluvium Deposits	SM		(160.0 - 167.0') Topock - Alluvium Deposits; Silty sand (SM); brown (7.5YR 5/4); very fine grained to very coarse grained, angular to subround; some silt; little granules to medium pebbles, subangular to round; trace clay; wet		(0.0 - 297.0') No water used
162									
163									
164									
165									
166	120			Topock - Alluvium Deposits	GP		(167.0 - 168.0') Topock - Alluvium Deposits; Poorly graded gravel (GP); (GLE Y2 6/1); small cobbles to large cobbles, angular; trace very fine to medium grained sand, angular to subangular; trace silt; dry; pulverized metadiorite boulder		
167									
168									
169									
170									
171	120			Topock - Alluvium Deposits	ML		(168.0 - 173.0') Topock - Alluvium Deposits; Sandy silt with gravel (ML); reddish brown / moderate brown(5YR 4/4); medium plasticity; some very fine to coarse grained sand; little granules to small pebbles, subangular to subround; little clay; moist to wet		
172									
173									
174									
175									
176	120			Topock - Alluvium Deposits	SM		(173.0 - 183.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown / moderate brown(5YR 4/4); very fine grained to very coarse grained, angular to subround; some granules to large pebbles, angular to subround; some silt; trace clay; wet		
177									
178									
179									
180									

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groundwater

Remarks: U = not detected above the laboratory reporting limit, ppb = parts per billion

Date Started: <u>01/05/2019</u>	Surface Elevation: <u>N/A</u>	Boring No.: <u>MW-Bd</u>
Date Completed: <u>02/28/2019</u>	Northing (NAD83): <u>N/A</u>	
Drilling Co.: <u>Cascade</u>	Easting (NAD83): <u>N/A</u>	Client: <u>PG&E</u>
Drilling Method: <u>Sonic Drilling</u>	Total Depth: <u>357 ft bgs</u>	Project: <u>Final GW Remedy Phase 1</u>
Drill Rig Type: <u>Fullsize Track Mount</u>	Borehole Diameter: <u>6 inches</u>	Location: <u>PG&E Topock, Needles, California</u>
Driller Name: <u>Nick Petrone</u>	Depth to First Water: <u>21 ft bgs</u>	
Drilling Asst: <u>T. Alymer/ J. Candelaria</u>	Sampling Method: <u>10 ft Core Barrel</u>	Project Number: <u>RC000753.0051</u>
Logger: <u>G. Willford / C. Bonessi</u>	Sampling Interval: <u>Continuous</u>	
Editor: <u>Sean McGrane</u>	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
181	120			Topock - Alluvium Deposits	SM				(0.0 - 297.0') No water used
182									
183									
184									
185									
186	114		MW-B-VAS-182-187 (<0.17 U ppb) 2/13/2019 10:30:35 AM	Topock - Alluvium Deposits	SM		(183.0 - 187.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); grayish brown (10YR 5/2) trace red (2.5YR 4/6); very fine grained to very coarse grained, angular to subround; some granules to large pebbles, angular to subround; some silt; trace clay; moist to wet		
187									
188				Topock - Alluvium Deposits	SM		(187.0 - 192.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); yellowish red / light brown(5YR 5/6); very fine grained to very coarse grained, angular to subround; some granules to very large pebbles, subangular to subround; little silt; trace cobbles, angular to subangular; trace clay; wet		
189									
190									
191									
192									
193				Topock - Alluvium Deposits	SM		(192.0 - 195.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 5/3); very fine grained to very coarse grained, angular to subround; some granules to very large pebbles, subangular to subround; little silt; trace cobbles, angular to subangular; trace clay; wet		
194									
195									
196	60			Topock - Alluvium Deposits	SM		(195.0 - 197.0') Topock - Alluvium Deposits; Silty sand (SM); light reddish brown (5YR 6/3); very fine grained to very coarse grained, angular to subround; some silt; little granules to medium pebbles, subangular to round; trace clay; moist		
197									
198				Topock - Alluvium Deposits	SM		(197.0 - 202.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); light reddish brown / light brown(5YR 6/4); fine grained to very coarse grained, angular to subround; little granules to large pebbles, subangular to subround; little silt; trace cobbles, subangular; trace clay; moist		
199									
200									

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Remarks: U = not detected above the laboratory reporting limit, ppb = parts per billion

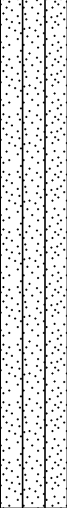
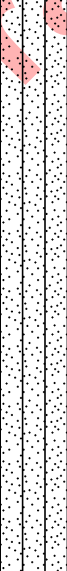
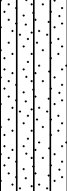
Date Started:	01/05/2019	Surface Elevation:	N/A	Boring No.: MW-Bd	
Date Completed:	02/28/2019	Northing (NAD83):	N/A		
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	357 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Fullsize Track Mount	Borehole Diameter:	6 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Nick Petrone	Depth to First Water:	21 ft bgs		
Drilling Asst:	T. Alymer/ J. Candelaria	Sampling Method:	10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	G. Willford / C. Bonessi	Sampling Interval:	Continuous		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
201	60			Topock - Alluvium Deposits	SM				(0.0 - 297.0') No water used
202							(202.0 - 207.0') (NR)	(202.0 - 207.0') No Core Recovery. Driller noted core barrel was full during core extraction.	
203									
204									
205									
206									
207	60						(207.0 - 215.0') Topock - Alluvium Deposits; Silty sand (SM); light reddish brown (5YR 6/3); very fine grained to very coarse grained, angular to subround; some silt; little granules to medium pebbles, subangular to round; trace clay; wet		
208									
209									
210									
211									
212									
213									
214									
215	60						(215.0 - 220.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); yellowish red / light brown(5YR 5/6); very fine grained to very coarse grained, angular to subround; some silt; little granules to medium pebbles, angular to subangular; trace cobbles, angular to subangular; trace clay; moist; gravel composed of mixed lithology		
216									
217									
218									
219	114								
220									

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Remarks: U = not detected above the laboratory reporting limit, ppb = parts per billion

Date Started: <u>01/05/2019</u>	Surface Elevation: <u>N/A</u>	Boring No.: <u>MW-Bd</u>
Date Completed: <u>02/28/2019</u>	Northing (NAD83): <u>N/A</u>	
Drilling Co.: <u>Cascade</u>	Easting (NAD83): <u>N/A</u>	Client: <u>PG&E</u>
Drilling Method: <u>Sonic Drilling</u>	Total Depth: <u>357 ft bgs</u>	Project: <u>Final GW Remedy Phase 1</u>
Drill Rig Type: <u>Fullsize Track Mount</u>	Borehole Diameter: <u>6 inches</u>	Location: <u>PG&E Topock, Needles, California</u>
Driller Name: <u>Nick Petrone</u>	Depth to First Water: <u>21 ft bgs</u>	
Drilling Asst: <u>T. Alymer/ J. Candelaria</u>	Sampling Method: <u>10 ft Core Barrel</u>	Project Number: <u>RC000753.0051</u>
Logger: <u>G. Willford / C. Bonessi</u>	Sampling Interval: <u>Continuous</u>	
Editor: <u>Sean McGrane</u>	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
221	114			Topock - Alluvium Deposits	SM		(220.0 - 227.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); yellowish red (5YR 4/6); fine grained to very coarse grained, angular to subround; some granules to large pebbles, angular to subround; some cobbles, angular to subangular; some silt; trace clay; moist to wet		(0.0 - 297.0') No water used
222									
223									
224									
225									
226	96			Topock - Alluvium Deposits	SM		(229.0 - 237.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); yellowish red (5YR 4/6); fine grained to very coarse grained, angular to subround; some silt; little granules to large pebbles, angular to subangular; trace cobbles, angular to subangular; trace clay; wet	(227.0 - 229.0') No core recovery. Driller noted core barrel was full during core extraction.	
227									
228									
229									
230									
231	60			Topock - Alluvium Deposits	ML		(237.0 - 242.0') Topock - Alluvium Deposits; Sandy silt with gravel (ML); reddish brown (2.5YR 4/4); low plasticity; some very fine to medium grained sand, angular to subround; little granules to medium pebbles, angular to subround; little clay; moist to dry; moderate cementation	(237.0 - 242.0') Rough drilling. End cap found in core	
232									
233									
234									
235									
236									
237									
238									
239									
240									

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groundwater

Remarks: U = not detected above the laboratory reporting limit, ppb = parts per billion

Date Started: <u>01/05/2019</u>	Surface Elevation: <u>N/A</u>	Boring No.: <u>MW-Bd</u>
Date Completed: <u>02/28/2019</u>	Northing (NAD83): <u>N/A</u>	
Drilling Co.: <u>Cascade</u>	Easting (NAD83): <u>N/A</u>	Client: <u>PG&E</u>
Drilling Method: <u>Sonic Drilling</u>	Total Depth: <u>357 ft bgs</u>	Project: <u>Final GW Remedy Phase 1</u>
Drill Rig Type: <u>Fullsize Track Mount</u>	Borehole Diameter: <u>6 inches</u>	Location: <u>PG&E Topock, Needles, California</u>
Driller Name: <u>Nick Petrone</u>	Depth to First Water: <u>21 ft bgs</u>	
Drilling Asst: <u>T. Alymer/ J. Candelaria</u>	Sampling Method: <u>10 ft Core Barrel</u>	Project Number: <u>RC000753.0051</u>
Logger: <u>G. Willford / C. Bonessi</u>	Sampling Interval: <u>Continuous</u>	
Editor: <u>Sean McGrane</u>	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
241	60			Topock - Alluvium Deposits	ML			(237.0 - 242.0') Rough drilling. End cap found in core	(0.0 - 297.0') No water used
242							(242.0 - 254.0') Topock - Alluvium Deposits; Sandy silt with gravel (ML); reddish brown (2.5YR 4/4); medium plasticity; some very fine to medium grained sand, angular to subround; little granules to large pebbles, angular to round; little clay; trace cobbles, angular to subangular; moist; weak cementation; iron oxide staining	(242.0 - 252.0') Drill rods chattering	
243									
244									
245									
246									
247	120								
248				Topock - Alluvium Deposits	ML				
249			MW-B-VAS-247-252 (<0.83 U ppb) 2/17/2019 11:25:00 AM						
250									
251							(251.0 - 251.2'); core slightly saturated		
252								(252.0 - 254.0') Rough drilling	
253									
254									
255							(254.0 - 269.0') Topock - Alluvium Deposits; Sandy elastic silt with gravel (MH); reddish brown (2.5YR 4/4); high plasticity; some very fine to coarse grained sand, angular to subround; little granules to small pebbles, subangular to subround; little clay; moist		
256	120			Topock - Alluvium Deposits	MH				
257									
258									
259							(258.5'); some granules to very large pebbles, subangular to subround; little clay; trace cobbles, subround; medium to high plasticity		
260									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW =

groundwater

Remarks: U = not detected above the laboratory reporting limit, ppb = parts per billion

SOIL BORING LOG PG&E TOPOCK C:\USERS\MCGRANE\DOCUMENTS\PG&E TOPOCK\DRIFT BORING LOGS\GINT FILES\05_08_19\TOPOCK DATA TEMPLATE FOR FLOG.GPJ TOPOCK DATA TEMPLATE FOR FLOG.GPJ 05/08/19 07:58

Date Started: <u>01/05/2019</u>	Surface Elevation: <u>N/A</u>	Boring No.: <u>MW-Bd</u>
Date Completed: <u>02/28/2019</u>	Northing (NAD83): <u>N/A</u>	
Drilling Co.: <u>Cascade</u>	Easting (NAD83): <u>N/A</u>	Client: <u>PG&E</u>
Drilling Method: <u>Sonic Drilling</u>	Total Depth: <u>357 ft bgs</u>	Project: <u>Final GW Remedy Phase 1</u>
Drill Rig Type: <u>Fullsize Track Mount</u>	Borehole Diameter: <u>6 inches</u>	Location: <u>PG&E Topock, Needles, California</u>
Driller Name: <u>Nick Petrone</u>	Depth to First Water: <u>21 ft bgs</u>	
Drilling Asst: <u>T. Alymer/ J. Candelaria</u>	Sampling Method: <u>10 ft Core Barrel</u>	Project Number: <u>RC000753.0051</u>
Logger: <u>G. Willford / C. Bonessi</u>	Sampling Interval: <u>Continuous</u>	
Editor: <u>Sean McGrane</u>	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
261	120								(0.0 - 297.0') No water used
262									
263									
264									
265				Topock - Alluvium Deposits	MH				
266			MW-B-VAS-264-269 (<0.33 U ppb) 2/18/2019 2:00:22 PM					(266.0 - 269.0') Drill rods chattering	
267	120								
268									
269									
270				Topock - Alluvium Deposits	ML		(269.0 - 272.0') Topock - Alluvium Deposits; Gravelly silt with sand (ML); dark red (2.5YR 3/6); low plasticity; some granules to large pebbles, subangular to round; little very fine to very coarse grained sand, angular to subround; little clay; moist to dry; moderate cementation		
271							(271'); strong cementation; dry at 271-271.4		
272									
273							(272.0 - 282.0') Topock - Alluvium Deposits; Silty sand with gravel (ML); reddish brown (2.5YR 4/4); low plasticity; some granules to very large pebbles, angular to subround; some very fine to very coarse grained sand, angular to subround; little clay; trace cobbles, subangular to subround; moist		
274									
275									
276	120			Topock - Alluvium Deposits	ML			(275.0 - 276.0') Drill rods chattering	
277									
278									
279									
280									

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Remarks: U = not detected above the laboratory reporting limit, ppb = parts per billion






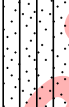

Date Started: 01/05/2019	Surface Elevation: N/A	Boring No.: MW-Bd
Date Completed: 02/28/2019	Northing (NAD83): N/A	
Drilling Co.: Cascade	Easting (NAD83): N/A	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 357 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type: Fullsize Track Mount	Borehole Diameter: 6 inches	Location: PG&E Topock, Needles, California
Driller Name: Nick Petrone	Depth to First Water: 21 ft bgs	
Drilling Asst: T. Alymer/ J. Candelaria	Sampling Method: 10 ft Core Barrel	Project Number: RC000753.0051
Logger: G. Willford / C. Bonessi	Sampling Interval: Continuous	
Editor: Sean McGrane	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
281	120			Topock - Alluvium Deposits	ML				(0.0 - 297.0') No water used
282							(282.0 - 288.0') Topock - Alluvium Deposits; Sandy silt with gravel (ML); reddish brown (2.5YR 4/4); medium plasticity; some very fine to coarse grained sand, angular to round; little granules to medium pebbles, angular to subround; little clay; moist		
283									
284									
285				Topock - Alluvium Deposits	ML				
286									
287	120								
288									
289			MW-B-VAS-287-292 (<0.17 U ppb) 2/20/2019 12:15:33 PM				(288.0 - 293.0') Topock - Alluvium Deposits; Sandy silt with gravel (ML); reddish brown (2.5YR 4/4); medium plasticity; some very fine to coarse grained sand, angular to subround; little granules to medium pebbles, subangular to subround; little clay; trace cobbles, subround; moist; strong cementation		
290				Topock - Alluvium Deposits	ML				
291									
292									
293								(292.0 - 297.0') Drill rods chattering	
294				Topock - Weathered Bedrock - conglomerate	GM		(293.0 - 295.0') Topock - Weathered Bedrock - conglomerate; Silty gravel (GM); reddish brown (2.5YR 4/4); medium pebbles to very large pebbles, subangular to subround; little very fine to coarse grained sand, angular to subround; little silt; little clay; trace cobbles, subangular to subround; dry		
295	60								
296				Topock - Weathered Bedrock - conglomerate	ML		(295.0 - 298.0') Topock - Weathered Bedrock - conglomerate; Gravely elastic silt with sand (ML); reddish brown (2.5YR 4/4); low plasticity; some granules to large pebbles, angular to subround; little very fine to coarse grained sand, angular to subround; little clay; moist		
297									
298									(297.0 - 301.0') Rough drilling
299	120			Topock - Weathered Bedrock - conglomerate	SM		(298.0 - 299.5') Topock - Weathered Bedrock - conglomerate; Silty sand with gravel (SM); brown (7.5YR 5/4); fine grained to very coarse grained, angular to subround; little granules to small pebbles, subangular to subround; little silt; little clay; moist to wet		(297.0 - 307.0') 200 gal of water used
300					GM		(299.5 - 301.5') Topock - Weathered Bedrock - conglomerate; Silty		

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Remarks: U = not detected above the laboratory reporting limit, ppb = parts per billion

Date Started:	01/05/2019	Surface Elevation:	N/A	Boring No.: <u>MW-Bd</u>	
Date Completed:	02/28/2019	Northing (NAD83):	N/A		
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	357 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Fullsize Track Mount	Borehole Diameter:	6 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Nick Petrone	Depth to First Water:	21 ft bgs		
Drilling Asst:	T. Alymer/ J. Candelaria	Sampling Method:	10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	G. Willford / C. Bonessi	Sampling Interval:	Continuous		
Editor:	Sean McGrane	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
301	120			Topock - Weathered Bedrock - conglomerate	GM		gravel with sand (GM); yellowish red (5YR 4/6); granules to very large pebbles, subangular to round; little fine to very coarse grained sand, angular to subround; little silt; trace cobbles, angular to round; trace clay; wet	(297.0 - 301.0') Rough drilling	(297.0 - 307.0') 200 gal of water used
302				Topock - Weathered Bedrock - conglomerate	MH		(301.5 - 313.5') Topock - Weathered Bedrock - conglomerate; Sandy elastic silt with gravel (MH); yellowish red (5YR 4/6); high plasticity; some granules to large pebbles, angular to subround; some cobbles, subangular to subround; some very fine to very coarse grained sand, angular to subround; little clay; moist; moderate cementation; gravel primarily composed of metadiorite.		
303									
304									
305									
306	180			Topock - Weathered Bedrock - conglomerate	MH				(307.0 - 322.0') 400 gal of water used
307									
308									
309				Topock - Weathered Bedrock - conglomerate	SM		(313.5 - 320.0') Topock - Weathered Bedrock - conglomerate; Silty sand with gravel (SM); yellowish red / light brown(5YR 5/6); fine grained to very coarse grained, angular to subround; little granules to large pebbles, subangular to subround; little silt; little clay; trace cobbles, subangular to subround		
310									
311									
312				Topock - Weathered Bedrock - conglomerate	SM			(310.0 - 318.0') Rough drilling	
313									
314									
315				Topock - Weathered Bedrock - conglomerate	SM				
316									
317									
318				Topock - Weathered Bedrock - conglomerate	SM				
319									
320									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater

Remarks: U = not detected above the laboratory reporting limit, ppb = parts per billion

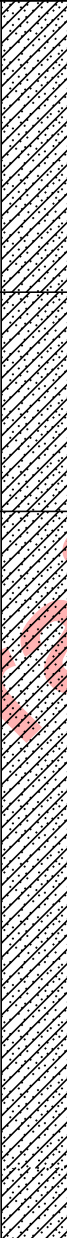
Date Started: 01/05/2019	Surface Elevation: N/A	Boring No.: MW-Bd
Date Completed: 02/28/2019	Northing (NAD83): N/A	
Drilling Co.: Cascade	Easting (NAD83): N/A	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 357 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type: Fullsize Track Mount	Borehole Diameter: 6 inches	Location: PG&E Topock, Needles, California
Driller Name: Nick Petrone	Depth to First Water: 21 ft bgs	
Drilling Asst: T. Alymer/ J. Candelaria	Sampling Method: 10 ft Core Barrel	Project Number: RC000753.0051
Logger: G. Willford / C. Bonessi	Sampling Interval: Continuous	
Editor: Sean McGrane	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
321	180		MW-B-VAS-317-322 (<0.17 U ppb) 2/21/2019 11:00:33 AM	Topock - Weathered Bedrock - conglomerate	ML		(320.0 - 322.0') Topock - Weathered Bedrock - conglomerate; Sandy silt with gravel (ML); reddish brown (2.5YR 4/4); medium plasticity; some very fine to coarse grained sand, angular to subround; little granules to medium pebbles, subangular to subround; little clay; trace cobbles, subround; moist; strong cementation		(307.0 - 322.0') 400 gal of water used
322							(322.0 - 337.0') Topock - Weathered Bedrock - conglomerate; Gravelly silt with sand (ML); reddish brown (2.5YR 4/4); low plasticity; little granules to medium pebbles, subangular to subround; little very fine to coarse grained sand, angular to subround; little clay; trace cobbles, subround; moist	(322.0 - 335.5') tight hard drilling	(322.0 - 337.0') 300 gal of water used
323									
324									
325									
326									
327									
328							(328'); 4-6" dry layer		
329				Topock - Weathered Bedrock - conglomerate	ML				
330	180								
331							(331'); 4-6" dry layer		
332									
333							(333'); 4-6" dry layer		
334									
335							(335'); 4-6" dry layer		
336								(335.5 - 337.0') Soft drilling	
337									
338	120			Topock - Weathered Bedrock - conglomerate	SC		(337.0 - 344.0') Topock - Weathered Bedrock - conglomerate; Clayey sand with gravel (SC); red (2.5YR 4/6) to reddish brown (2.5YR 4/4); very fine grained to very coarse grained, subangular to subround; some clay; little granules to medium pebbles, subangular to subround; little silt; trace cobbles, subround; dry to moist; strong cementation		(337.0 - 347.0') No water used
339									
340									

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Remarks: U = not detected above the laboratory reporting limit, ppb = parts per billion






Date Started: 01/05/2019	Surface Elevation: N/A	Boring No.: MW-Bd
Date Completed: 02/28/2019	Northing (NAD83): N/A	
Drilling Co.: Cascade	Easting (NAD83): N/A	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 357 ft bgs	Project: Final GW Remedy Phase 1
Drill Rig Type: Fullsize Track Mount	Borehole Diameter: 6 inches	Location: PG&E Topock, Needles, California
Driller Name: Nick Petrone	Depth to First Water: 21 ft bgs	
Drilling Asst: T. Alymer/ J. Candelaria	Sampling Method: 10 ft Core Barrel	Project Number: RC000753.0051
Logger: G. Willford / C. Bonessi	Sampling Interval: Continuous	
Editor: Sean McGrane	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
341	120		MW-B-VAS-339-344 (<0.33 U ppb) 2/27/2019 12:28:00 PM	Topock - Weathered Bedrock - conglomerate	SC				(337.0 - 347.0') No water used
342									
343									
344									
345	108			Topock - Weathered Bedrock - conglomerate	SC		(344.0 - 347.0') Topock - Weathered Bedrock - conglomerate; Clayey sand (SC); reddish brown(2.5YR 4/3); very fine grained to fine grained, subangular to subround; little clay; trace silt; moist to dry; moderate cementation; clay and sand are interbedded		
346									
347									
348				Topock - Weathered Bedrock - conglomerate	SC		(347.0 - 356.0') Topock - Weathered Bedrock - conglomerate; Clayey sand with gravel (SC); reddish brown (2.5YR 4/4) to reddish brown(2.5YR 4/3); very fine grained to very coarse grained, subangular to subround; some granules to very large pebbles, angular to subround; little silt; little clay; dry to moist; moderate cementation	(347.0 - 356.0') Rough drilling	(347.0 - 357.0') 400 gal of water used
349									
350									
351									
352									
353									
354			MW-B-VAS-352-357 (<0.33 U ppb) 2/28/2019 3:05:00 PM	Topock - Weathered Bedrock - conglomerate	SC				
355									
356									
357							(356.0 - 357.0') Topock - Weathered Bedrock - conglomerate; Clayey sand (SC); reddish brown(2.5YR 4/3); very fine grained to medium grained, subangular to subround; little clay; trace small to medium pebbles, subangular to subround; trace silt; moist; weak cementation	(356.0 - 357.0') Soft drilling	
End of Boring at 357.0' bgs.									
358									
359									
360									

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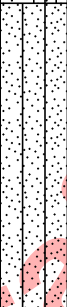
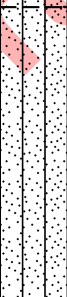
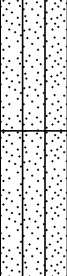

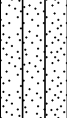
Remarks: U = not detected above the laboratory reporting limit, ppb = parts per billion

Date Started: 02/12/2019	Surface Elevation: N/A	Boring No.: MW-G
Date Completed: 02/18/2019	Northing (NAD83): N/A	
Drilling Co.: Cascade	Easting (NAD83): N/A	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 87 ft bgs	Project: Final GW Remedy Phase I
Drill Rig Type: Prosonic Truck Mount	Borehole Diameter: N/A	Location: PG&E Topock, Needles, California
Driller Name: Steve Vasquez	Depth to First Water: 50 ft bgs	
Drilling Asst: L. Amaya/ O. Flores	Sampling Method: 4 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger: Sean McGrane	Sampling Interval: Continuous	
Editor: Craig Prunier	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
1	48			Topock - Fill	NR		(0.0 - 4.0') Topock - Fill; No recovery (NR); Hand cleared for utility clearance cuttings not logged		(0.0 - 86.0') 50 gal of water used
2									
3									
4									
5	120			Topock - Fill	SW-SM		(4.0 - 8.5') Topock - Fill; Well graded sand with silt and gravel (SW-SM); brown (7.5YR 4/3); very fine grained to very coarse grained, angular to subround; little granules to large pebbles, angular to subangular; little silt; little clay; coarser clasts composed of metadiorite; dry		
6									
7									
8							(7.75'); some granules to very large pebbles, angular to subangular		
9				Topock - Fill	SC		(8.5 - 15.5') Topock - Fill; Clayey sand with gravel (SC); (5YR4/3); very fine grained to very coarse grained, angular to subangular; little granules to very large pebbles, angular to subangular; little silt; little clay; coarser clasts composed of metadiorite; dry		
10									
11							(10.5'); trace cobbles, subangular; iron oxide staining		
12							(11'); some granules to very large pebbles, angular to subangular		
13									
14							(13'); little granules to very large pebbles, angular to subangular		
15									
16				Topock - Fill	SC		(15.5 - 18.0') Topock - Fill; Clayey sand with gravel (SC); reddish brown / moderate brown (5YR 4/4) and reddish brown (5YR 5/4); very fine grained to very coarse grained, angular to subangular; some granules to very large pebbles, angular to subangular; little silt; little clay; trace cobbles, subangular; some coarser clast composed of conglomerate; little coarser clasts composed of metadiorite; dry		
17									
18	84			Topock - Alluvium Deposits	ML		(18.0 - 18.5') Topock - Alluvium Deposits; Sandy silt with gravel (ML); low plasticity; some very fine to very coarse grained sand, angular to subround; little granules to large pebbles, angular to subangular; little clay; coarser clasts composed of metadiorite; moist	(15.0 - 17.0') Lost 2 ft of down the hole	(18.0 - 18.5') 5 gal of water used
19				Topock - Alluvium Deposits	SC		(18.5 - 24.0') Topock - Alluvium Deposits; Clayey sand with gravel (SC); brown (7.5YR 4/3); very fine grained to very coarse grained, angular to subround; some granules to large pebbles, angular to		
20									

Notes: USCS = Unified Soil Classification System, ppb = Parts per Billion.

Date Started: 02/12/2019	Surface Elevation: N/A	Boring No.: MW-G
Date Completed: 02/18/2019	Northing (NAD83): N/A	
Drilling Co.: Cascade	Easting (NAD83): N/A	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 87 ft bgs	Project: Final GW Remedy Phase I
Drill Rig Type: Prosonic Truck Mount	Borehole Diameter: N/A	Location: PG&E Topock, Needles, California
Driller Name: Steve Vasquez	Depth to First Water: 50 ft bgs	
Drilling Asst: L. Amaya/ O. Flores	Sampling Method: 4 inch x 10 ft Core Barrel	Project Number: RC000753.0051
Logger: Sean McGrane	Sampling Interval: Continuous	
Editor: Craig Prunier	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
21	84			Topock - Alluvium Deposits	SC		subangular; little silt; little clay; coarser clasts composed of metadiorite; dry	(17.0 - 24.0') Recovered 15 to 18 ft. bgs, 18 to 24 ft. fell out of core barrel, ran 6 inch casing to 18 ft. and recovered 6 ft. of drill run 3, total recovery 7 ft.	(0.0 - 86.0') 50 gal of water used
22							(21'); trace cobbles, angular to subangular		
23							(22'); no cobbles		
24	78			Topock - Alluvium Deposits	SM		(24.0 - 25.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 4/3); very fine grained to very coarse grained, angular to subround; little granules to large pebbles, angular to subangular; little silt; little clay; coarser clasts composed of metadiorite; trace mica; dry		
25				Topock - Alluvium Deposits	SM		(25.0 - 29.3') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 5/4); very fine grained to very coarse grained, angular to subangular; some granules to very large pebbles, angular to subangular; little silt; trace clay; coarser clast composed of conglomerate; coarser clasts composed of metadiorite; dry		
26									
27									
28									
29	84			Topock - Alluvium Deposits	SM		(29.3 - 35.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (5YR 5/4); very fine grained to very coarse grained, angular to subround; little granules to large pebbles, angular to subround; little silt; little clay; coarser clast composed of conglomerate; coarser clasts composed of metadiorite; dry	(30.0 - 37.0') Top 0.5 ft of core slough.	
30							(30'); trace clay; increase in sand		
31				Topock - Alluvium Deposits	SM				
32									
33									
34							(33.25'); some granules to very large pebbles, angular to subround; trace cobbles, subangular; no clay		
35	78			Topock - Alluvium Deposits	SM		(35.0 - 37.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); (7.5R 5/4); very fine grained to very coarse grained, angular to subround; some granules to very large pebbles, angular to subround; some silt; trace cobbles, subround; trace clay; coarser clast composed of conglomerate; dry	(37.0 - 43.0') Top 0.5 ft. of core is slough	
36				Topock - Alluvium Deposits	SM				
37									
38									
39									
40									

Notes: USCS = Unified Soil Classification System, ppb = Parts per Billion.

Date Started: <u>02/12/2019</u>	Surface Elevation: <u>N/A</u>	Boring No.: <u>MW-G</u>
Date Completed: <u>02/18/2019</u>	Northing (NAD83): <u>N/A</u>	
Drilling Co.: <u>Cascade</u>	Easting (NAD83): <u>N/A</u>	Client: <u>PG&E</u>
Drilling Method: <u>Sonic Drilling</u>	Total Depth: <u>87 ft bgs</u>	Project: <u>Final GW Remedy Phase I</u>
Drill Rig Type: <u>Prosonic Truck Mount</u>	Borehole Diameter: <u>N/A</u>	Location: <u>PG&E Topock, Needles, California</u>
Driller Name: <u>Steve Vasquez</u>	Depth to First Water: <u>50 ft bgs</u>	
Drilling Asst: <u>L. Amaya/ O. Flores</u>	Sampling Method: <u>4 inch x 10 ft Core Barrel</u>	Project Number: <u>RC000753.0051</u>
Logger: <u>Sean McGrane</u>	Sampling Interval: <u>Continuous</u>	
Editor: <u>Craig Prunier</u>	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
41	78			Topock - Alluvium Deposits	SM			(37.0 - 43.0') Top 0.5 ft. of core is slough	(0.0 - 86.0') 50 gal of water used
42									
43									
44							(43.0 - 48.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (5YR 4/3); very fine grained to very coarse grained, angular to subround; some granules to very large pebbles, angular to subangular; little silt; trace clay; coarser clasts composed of metadiorite; dry		
45	48			Topock - Alluvium Deposits	SM				
46									
47							(47'); trace cobbles, subangular; moist to wet	(47.0 - 50.0') Vadose zone moist to wet	
48									
49		MW-G-SS-47.0-52.0 2/16/2019 3:55:52 PM					(48.0 - 55.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (5YR 4/3); very fine grained to very coarse grained, angular to round; some silt; little granules to large pebbles, angular to subround; trace cobbles, subangular; trace clay; coarser clasts composed of metadiorite; moist to wet		
50	78						(50'); wet; no cobbles		
51				Topock - Alluvium Deposits	SM				
52									
53									
54		MW-G-SS-52.0-57.0 2/16/2019 4:00:34 PM	MW-G-VAS-52.0-57.0 (680 ppb) 2/13/2019 4:28:34 PM						
55	48								
56				Topock - Alluvium Deposits	SM		(55.0 - 57.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown / moderate brown(5YR 4/4); very fine grained to very coarse grained, angular to subround; some granules to very large pebbles, angular to subround; little silt; little clay; coarser clasts composed of metadiorite; wet		
57									
58				Topock - Alluvium Deposits	ML		(57.0 - 57.8') Topock - Alluvium Deposits; Sandy silt (ML); yellowish red / light brown(5YR 5/6); medium plasticity; little granules to medium pebbles, angular; little very fine to very coarse grained sand, angular to subangular; little clay; wet; very stiff	(57.0 - 67.0') Rough drilling, drilled like rock, core was hot with moist to dry sediments	
59	120	MW-G-SS-57.0-62.0 2/16/2019 4:05:27 PM		Topock - Alluvium Deposits	ML		(57.8 - 62.0') Topock - Alluvium Deposits; Sandy silt (ML); yellowish red (5YR 4/6); low plasticity; and very fine to very coarse grained sand, angular to subround; little granules to large pebbles, angular to subround; little clay; dry to moist; hard; weak cementation		
60									

Notes: USCS = Unified Soil Classification System, ppb = Parts per Billion.

Date Started: <u>02/12/2019</u>	Surface Elevation: <u>N/A</u>	Boring No.: <u>MW-G</u>
Date Completed: <u>02/18/2019</u>	Northing (NAD83): <u>N/A</u>	
Drilling Co.: <u>Cascade</u>	Easting (NAD83): <u>N/A</u>	Client: <u>PG&E</u>
Drilling Method: <u>Sonic Drilling</u>	Total Depth: <u>87 ft bgs</u>	Project: <u>Final GW Remedy Phase I</u>
Drill Rig Type: <u>Prosonic Truck Mount</u>	Borehole Diameter: <u>N/A</u>	Location: <u>PG&E Topock, Needles, California</u>
Driller Name: <u>Steve Vasquez</u>	Depth to First Water: <u>50 ft bgs</u>	
Drilling Asst: <u>L. Amaya/ O. Flores</u>	Sampling Method: <u>4 inch x 10 ft Core Barrel</u>	Project Number: <u>RC000753.0051</u>
Logger: <u>Sean McGrane</u>	Sampling Interval: <u>Continuous</u>	
Editor: <u>Craig Prunier</u>	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
61	120	MW-G-SS-57.0-62.0 2/16/2019 4:05:27 PM		Topock - Alluvium Deposits	ML			(57.0 - 67.0') Rough drilling, drilled like rock, core was hot with moist to dry sediments	(0.0 - 86.0') 50 gal of water used
62									
63									
64	120	MW-G-SS-62.0-67.0 2/16/2019 4:10:27 PM		Topock - Alluvium Deposits	ML		(62.0 - 64.5') Topock - Alluvium Deposits; Sandy silt with gravel (ML); reddish brown / moderate brown (5YR 4/4); low plasticity; some very fine to very coarse grained sand, angular to subround; little granules to large pebbles, angular to subround; little clay; coarser clasts composed of metadiorite; dry; hard; weak cementation		
65									
66									
67	60			Topock - Alluvium Deposits	CL		(64.5 - 67.0') Topock - Alluvium Deposits; Sandy lean clay with gravel (CL); brown (7.5YR 4/3); medium plasticity; some very fine to very coarse grained sand, angular to subround; little granules to very large pebbles, angular to subround; little silt; moist; soft		
68									
69									
70	60	MW-G-SS-67.0-72.0 2/16/2019 4:15:27 PM	MW-G-VAS-67.0-72.0 (920 ppb) 2/14/2019 4:42:39 PM	Topock - Alluvium Deposits	ML		(67.0 - 67.8') Topock - Alluvium Deposits; Sandy silt (ML); reddish brown (5YR 5/4); low plasticity; some very fine to very coarse grained sand, angular to subround; little granules to very large pebbles, angular to round; little clay; trace cobbles, angular; coarser clasts composed of metadiorite; moist; very stiff	(67.0 - 69.5') Wet zone that might produce water, attempt to collect sample	
71				Topock - Alluvium Deposits	SM		(67.8 - 69.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 4/3); very fine grained to very coarse grained, angular to subround; some silt; little granules to large pebbles, angular to subround; little clay; wet		
72							(69.0 - 76.0') Topock - Alluvium Deposits; Sandy silt (ML); reddish brown (5YR 5/4); low plasticity; some very fine to very coarse grained sand, angular to subround; little granules to very large pebbles, angular to round; little clay; coarser clasts composed of metadiorite; moist; very stiff		
73	120			Topock - Alluvium Deposits	ML		(69.5') trace cobbles, subangular to subround; coarser clast composed of conglomerate; dry; weak cementation	(69.5 - 72.0') Drilled like rock core hot and dry	
74									
75									
76	120	MW-G-SS-72.0-77.0 2/17/2019 4:15:27 PM		Topock - Alluvium Deposits	ML		(72') moist to wet; weak cementation	(72.0 - 86.0') Used water to flush fines out of casing for well install	
77									
78									
79	120			Topock - Alluvium Deposits	SM		(76.0 - 77.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown / moderate brown (5YR 4/4); very fine grained to very coarse grained, angular to subround; little granules to large pebbles, angular to subangular; little silt; little clay; coarser clasts composed of metadiorite; wet		
80									
	120			Topock - Alluvium Deposits	SM		(77.5 - 79.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (2.5YR 4/4); very fine grained to very coarse grained, angular to subround; little granules to very large pebbles, angular to subangular; little silt; coarser clasts composed of metadiorite; wet		
	120			Topock - Alluvium Deposits	SM		(79.5 - 81.0') Topock - Alluvium Deposits; Silty sand with gravel (SM);		

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Date Started: <u>02/12/2019</u>	Surface Elevation: <u>N/A</u>	Boring No.: <u>MW-G</u>
Date Completed: <u>02/18/2019</u>	Northing (NAD83): <u>N/A</u>	
Drilling Co.: <u>Cascade</u>	Easting (NAD83): <u>N/A</u>	Client: <u>PG&E</u>
Drilling Method: <u>Sonic Drilling</u>	Total Depth: <u>87 ft bgs</u>	Project: <u>Final GW Remedy Phase I</u>
Drill Rig Type: <u>Prosonic Truck Mount</u>	Borehole Diameter: <u>N/A</u>	Location: <u>PG&E Topock, Needles, California</u>
Driller Name: <u>Steve Vasquez</u>	Depth to First Water: <u>50 ft bgs</u>	
Drilling Asst: <u>L. Amaya/ O. Flores</u>	Sampling Method: <u>4 inch x 10 ft Core Barrel</u>	Project Number: <u>RC000753.0051</u>
Logger: <u>Sean McGrane</u>	Sampling Interval: <u>Continuous</u>	
Editor: <u>Craig Prunier</u>	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
81	120	MW-G-SS-72.0-77.0 2/17/2019 4:15:27 PM	MW-G-VAS-77.0-82.0 (600 ppb) 2/15/2019 12:12:10 PM	Topock - Alluvium Deposits	SM		reddish brown (2.5YR 4/4); very fine grained to very coarse grained; some granules to large pebbles, angular to subround; some silt; trace clay; coarser clasts composed of metadiorite; wet	(72.0 - 86.0') Used water to flush fines out of casing for well install	(0.0 - 86.0') 50 gal of water used
82				Topock - Weathered Bedrock - conglomerate	SM		(81.0 - 82.0') Topock - Weathered Bedrock - conglomerate; Silty sand with gravel (SM); reddish brown (2.5YR 4/4); very fine grained to very coarse grained, angular to subround; some granules to large pebbles, angular to subround; little silt; little clay; trace cobbles, subangular; moist		(72.0 - 86.0') 600 gal of water used
83							(82.0 - 87.0') Topock - Competent Bedrock - conglomerate; reddish brown (2.5YR 4/4); dry; weak cementation; friable		(72.0 - 86.0') 600 gal of water used
84	60			Topock - Competent Bedrock - conglomerate				(83.0 - 87.0') Core barrel was getting hung up in hole, possible indication of bedrock	
85									
86									
87							End of Boring at 87.0 'bgs.		
88									
89									
90									
91									
92									
93									
94									
95									
96									
97									
98									
99									
100									

Notes: USCS = Unified Soil Classification System, ppb = Parts per Billion.

Boring Log

Sheet: 1 of 12

Date Started:	03/02/2019	Surface Elevation:	N/A	Boring No.: IRZ-17 Pilot	
Date Completed:	03/07/2019	Northing (NAD83):	N/A		
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client:	Pacific Gas & Electric
Drilling Method:	Sonic Drilling	Total Depth:	227 ft bgs	Location:	Groundwater Remedy Phase I
Driller Name:	Steve Vasquez	Borehole Diameter:	6 in	Needles, CA	
Drilling Asst:	O. Flores, L. Amaya	Depth to First Water:	24 ft bgs		
Logger:	Gantt Jeffers	Sampling Method:	10 ft Core Barrel	Project Number: RC000753.0051	
Editor:	Sean McGrane	Sampling Interval:	Continuous		
Weather:	Warm sunny to partly cloudy.	Converted to Well:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Description	Drilling Notes	Drilling Fluid
1							(0.0 - 19.5') (NR); No recovery loose dredge sands falling out of core barrel could not provide core will accurate depths.	(0.0 - 17.0') Due to loose dredge sand, driller did not core.	
2									
3									
4									
5									
6									
7									
8									
9									
10	0				NR				
11									
12									
13									
14									
15									
16									
17									
18								(17.0 - 19.5') Loose dredge sands continuously fell out of core barrel.	
19									
20	90			Topock - Fill	SP		(19.5 - 21.5') Topock - Fill; Poorly graded sand (SP); yellowish		


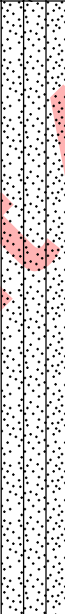



Notes: USCS = Unified Soil Classification System, U = not detected above the laboratory reporting limit, ppb = Parts per Billion.

Date Started:	<u>03/02/2019</u>	Surface Elevation:	<u>N/A</u>	Boring No.: <u>IRZ-17 Pilot</u>	
Date Completed:	<u>03/07/2019</u>	Northing (NAD83):	<u>N/A</u>		
Drilling Co.:	<u>Cascade</u>	Easting (NAD83):	<u>N/A</u>	Client:	<u>Pacific Gas & Electric</u>
Drilling Method:	<u>Sonic Drilling</u>	Total Depth:	<u>227 ft bgs</u>	Location:	<u>Groundwater Remedy Phase I</u>
Driller Name:	<u>Steve Vasquez</u>	Borehole Diameter:	<u>6 in</u>		<u>Needles, CA</u>
Drilling Asst:	<u>O. Flores, L. Amaya</u>	Depth to First Water:	<u>24 ft bgs</u>		
Logger:	<u>Gantt Jeffers</u>	Sampling Method:	<u>10 ft Core Barrel</u>	Project Number:	<u>RC000753.0051</u>
Editor:	<u>Sean McGrane</u>	Sampling Interval:	<u>Continuous</u>		
Weather:	<u>Warm sunny to partly cloudy.</u>	Converted to Well:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Description	Drilling Notes	Drilling Fluid
21	90	IRZ-17-SS-22-27 3/7/2019 11:28:00 AM		Topock - Fill	SP		brown / moderate yellowish brown(10YR 5/4); very fine grained to fine grained, angular to subround; trace silt; little mica; dry to moist; no odor; no staining; moist at 20.5' bgs		
22				Topock - Fluvial Deposits	SM		(21.5 - 24.0') Topock - Fluvial Deposits; Silty sand with gravel (SM); dark yellowish brown (10YR 4/4); very fine grained to very coarse grained, subangular to round; some granules to very large pebbles, subangular to round; little silt; trace cobbles, subangular to subround; moist; no odor; no staining; larger clasts consist of sandstone, granodiorite and metadiorite. Higher gravel content at bottom 4" of soil bed.		
23				Topock - Fluvial Deposits	ML		(24.0 - 28.0') Topock - Fluvial Deposits; Sandy silt with gravel (ML); yellowish brown / moderate yellowish brown(10YR 5/4); no plasticity, slow dilatency; some very fine to fine grained sand, subangular to subround; little granules to very large pebbles, subangular to round; trace cobbles, subround to round; trace mica; wet; medium stiff; no odor; no staining	(24.0 - 24.0') (24') Approximate depth of water table	
24	60	IRZ-17-SS-27-32 3/7/2019 11:33:00 AM		Topock - Fluvial Deposits	SM		(26'); some granules to very large pebbles, subangular to round; trace fine to very coarse sand, 3" lense at 26' bgs of decrease in silt.		
25				Topock - Fluvial Deposits	ML		(28.0 - 29.0') Topock - Fluvial Deposits; Silty sand with gravel (SM); yellowish brown / moderate yellowish brown(10YR 5/4); very fine grained to fine grained, subangular to round; and silt; little granules to very large pebbles, subangular to round; little mica; wet; no odor; no staining; trace med to very fine sand.		
26				Topock - Fluvial Deposits	ML		(29.0 - 30.0') Topock - Fluvial Deposits; Sandy silt with gravel (ML); yellowish brown / moderate yellowish brown(10YR 5/4); medium plasticity, slow dilatency; some very fine to fine grained sand, subangular to subround; little granules to very large pebbles, subangular to round; trace mica; wet; medium stiff; no odor; no staining		
27				Topock - Fluvial Deposits	MH		(30.0 - 33.5') Topock - Fluvial Deposits; Elastic silt with sand (MH); yellowish brown / moderate yellowish brown(10YR 5/4); high plasticity, no dilatency; little very fine grained sand, subangular to subround; trace granules to very large pebbles, subround to round; trace cobbles, round; trace clay; trace mica; wet; very soft; no odor; no staining; increase granules to very large pebbles at bottom of soil bed (4"), oxidized staining observed at bottom of bed.		
28	48	IRZ-17-SS-32-37 3/7/2019 11:36:00 AM	IRZ-17-VAS-32-37 (67 ppb) 3/2/2019 1:14:00 PM	Topock - Fluvial Deposits	SM		(33.5 - 35.5') Topock - Fluvial Deposits; Silty sand with gravel (SM); yellowish brown / moderate yellowish brown(10YR 5/4); very fine grained to very coarse grained, subangular to round; some silt; little granules to very large pebbles, subround to round; trace cobbles, round; trace clay; little mica; wet; no odor; iron oxide staining		
29				Topock - Alluvium Deposits	SM		(35.5 - 38.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); yellowish brown / moderate yellowish brown(10YR 5/4); very fine grained to very coarse grained, angular to subangular; little silt; little mica; wet; no odor; no staining		
30				Topock - Alluvium Deposits	GM		(38.0 - 44.5') Topock - Alluvium Deposits; Silty gravel with sand (GM); reddish brown (5YR 4/3); granules to very large pebbles, angular to subround; some very fine to very coarse grained sand, angular to subround; little silt; trace mica; wet; no odor; no staining; larger clasts consist of granodiorite.		
31	240	IRZ-17-SS-36-42 3/7/2019 11:45:00 AM							
32									
33									
34									
35									
36									
37									
38									
39									
40									


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Date Started:	03/02/2019	Surface Elevation:	N/A	Boring No.: IRZ-17 Pilot	
Date Completed:	03/07/2019	Northing (NAD83):	N/A		
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client:	Pacific Gas & Electric
Drilling Method:	Sonic Drilling	Total Depth:	227 ft bgs	Location:	Groundwater Remedy Phase I
Driller Name:	Steve Vasquez	Borehole Diameter:	6 in		Needles, CA
Drilling Asst:	O. Flores, L. Amaya	Depth to First Water:	24 ft bgs		
Logger:	Gantt Jeffers	Sampling Method:	10 ft Core Barrel	Project Number:	RC000753.0051
Editor:	Sean McGrane	Sampling Interval:	Continuous		
Weather:	Warm sunny to partly cloudy.	Converted to Well:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Description	Drilling Notes	Drilling Fluid	
41	240	IRZ-17-SS-36-42 3/7/2019 11:45:00 AM		Topock - Alluvium Deposits	GM		(40'); Increase in granules to very large pebbles.			
42										
43		IRZ-17-SS-42-47 3/7/2019 11:50:00 AM								(44.5 - 53.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown / moderate brown(5YR 4/4); very fine grained to very coarse grained, angular to subangular; little granules to very large pebbles, angular to subangular; little silt; trace cobbles, angular; little mica; wet; no odor; no staining; larger clasts consist of granodiorite and metadiorite.
44										
45										
46										
47		IRZ-17-SS-47-52 3/7/2019 11:55:00 AM								(46.5'); some granules to very large pebbles, angular to subangular; decrease in sand and silt.
48										
49										
50										
51		IRZ-17-SS-52-57 3/7/2019 12:10:00 PM								(49'); increase in silt, decrease in granules to very large pebbles.
52										
53										
54										
55	120	IRZ-17-SS-57-62 3/7/2019 12:25:00 PM		Topock - Alluvium Deposits	SW		(53.0 - 54.0') Topock - Alluvium Deposits; Well graded sand with gravel (SW); brown (10YR 4/3); very fine grained to very coarse grained, angular to subround; little granules to very large pebbles, angular to subround; trace cobbles, subround; trace silt; little mica; wet; no odor; no staining; larger clasts consist of granodiorite, clasts coarsen downward.			
56							(54.0 - 57.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown / moderate brown(5YR 4/4); very fine grained to very coarse grained, subangular to subround; some granules to very large pebbles, angular to subround; little silt; little mica; wet; no odor; no staining; larger clasts consist of granodiorites.			
57										
58										
59										
60										

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Date Started:	03/02/2019	Surface Elevation:	N/A	Boring No.: IRZ-17 Pilot	
Date Completed:	03/07/2019	Northing (NAD83):	N/A		
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client:	Pacific Gas & Electric
Drilling Method:	Sonic Drilling	Total Depth:	227 ft bgs	Location:	Groundwater Remedy Phase I
Driller Name:	Steve Vasquez	Borehole Diameter:	6 in		Needles, CA
Drilling Asst:	O. Flores, L. Amaya	Depth to First Water:	24 ft bgs		
Logger:	Gantt Jeffers	Sampling Method:	10 ft Core Barrel	Project Number:	RC000753.0051
Editor:	Sean McGrane	Sampling Interval:	Continuous		
Weather:	Warm sunny to partly cloudy.	Converted to Well:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Description	Drilling Notes	Drilling Fluid			
61	120	IRZ-17-SS-57-62 3/7/2019 12:25:00 PM		Topock - Alluvium Deposits	SM		subround; little granules to very large pebbles, angular to subangular; trace mica; wet; medium stiff to stiff; no odor; no staining	(67.0 - 87.0') Core compaction observed. switch back to 10' runs.				
62							(59.5 - 64.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown / moderate brown(5YR 4/4); very fine grained to very coarse grained, subangular to subround; some granules to very large pebbles, angular to subangular; some silt; little mica; wet; no odor; no staining; larger clasts consist of metadiorite and granodiorite.					
63		IRZ-17-SS-62-67 3/7/2019 1:05:00 PM	IRZ-17-VAS-62-67 (0.604 J ppb) 3/2/2019 3:50:00 PM	Topock - Alluvium Deposits	GM		(60'); little silt; increase in sand.					
64										(61'); some silt; decrease in sand.		
65					(64.0 - 65.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); reddish brown / moderate brown(5YR 4/4); granules to very large pebbles, angular to subangular; and very fine to very coarse grained sand, subangular to subround; little silt; little mica; wet; no odor; no staining							
66	Topock - Alluvium Deposits	SM		(65.0 - 75.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (10YR 5/3); very fine grained to very coarse grained, angular to subround; some granules to very large pebbles, angular to subangular; little silt; trace mica; wet; no odor; weak cementation; no staining								
67				(66') reddish brown / moderate brown(5YR 4/4); some silt; decrease in granules to very large pebbles, no cementation.								
68				(67') little granules to very large pebbles, angular to subangular; increase in sand, increase in silt, weathered granules to very large pebbles observed.								
69				IRZ-17-SS-67-72 3/7/2019 1:12:00 PM								
70												
71										(70.5'); some granules to very large pebbles, angular to subangular; weathered granules to very large pebbles observed.		
72				IRZ-17-SS-72-77 3/7/2019 1:25:00 PM						SM		
73												
74	(73.5'); little granules to very large pebbles, angular to subangular; increase in silt.											
75	192	IRZ-17-SS-77-82 3/7/2019 1:35:00 PM	Topock - Alluvium Deposits	ML			(75.5 - 80.5') Topock - Alluvium Deposits; Sandy silt with gravel (ML); reddish brown (5YR 5/4); no plasticity, slow dilatency; some granules to very large pebbles, angular to subangular; some very fine to very coarse grained sand, subangular to subround; trace mica; wet; stiff; no odor; no staining					
76												
77												
78												
79												
80												

Notes: USCS = Unified Soil Classification System, U = not detected above the laboratory reporting limit, ppb = Parts per Billion.

Date Started:	03/02/2019	Surface Elevation:	N/A	Boring No.: IRZ-17 Pilot	
Date Completed:	03/07/2019	Northing (NAD83):	N/A		
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client:	Pacific Gas & Electric
Drilling Method:	Sonic Drilling	Total Depth:	227 ft bgs	Location:	Groundwater Remedy Phase I
Driller Name:	Steve Vasquez	Borehole Diameter:	6 in		Needles, CA
Drilling Asst:	O. Flores, L. Amaya	Depth to First Water:	24 ft bgs		
Logger:	Gantt Jeffers	Sampling Method:	10 ft Core Barrel	Project Number:	RC000753.0051
Editor:	Sean McGrane	Sampling Interval:	Continuous		
Weather:	Warm sunny to partly cloudy.	Converted to Well:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Description	Drilling Notes	Drilling Fluid
81	192	IRZ-17-SS-77-82 3/7/2019 1:35:00 PM		Topock - Alluvium Deposits	SM		(80.5 - 82.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown / moderate brown(5YR 4/4); very fine grained to very coarse grained, angular to subround; some granules to very large pebbles, angular to subangular; some silt; trace mica; wet; no odor; no staining	(67.0 - 87.0') Core compaction observed. switch back to 10' runs.	
82									
83				Topock - Alluvium Deposits	ML		(82.0 - 85.5') Topock - Alluvium Deposits; Sandy silt with gravel (ML); reddish brown (5YR 5/4); no plasticity, no dilatency; some granules to very large pebbles, angular to subangular; some very fine to very coarse grained sand, subangular to subround; trace mica; wet; very stiff; no odor; weak cementation; iron oxide staining		
84		IRZ-17-SS-82-87 3/7/2019 1:51:00 PM							
85	120			Topock - Alluvium Deposits	SM		(85.5 - 88.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown / moderate brown(5YR 4/4) trace dusky red(5R 3/4); very fine grained to very coarse grained, angular to subround; some granules to very large pebbles, angular to subangular; some silt; trace mica; wet; no odor; iron oxide staining; crushed gravel fragments at bottom of formation.		
86									
87				Topock - Alluvium Deposits	ML		(88.0 - 96.5') Topock - Alluvium Deposits; Sandy silt with gravel (ML); reddish brown (5YR 5/4); no plasticity, no dilatency; some granules to very large pebbles, angular; some very fine to very coarse grained sand, angular to subround; trace mica; wet; very stiff; no odor		
88		IRZ-17-SS-87-92 3/7/2019 2:01:00 PM							
89	120			Topock - Alluvium Deposits	ML		(92'); moist; weak cementation; increase in granules to very large pebbles, decrease in sand.		
90									
91									
92		IRZ-17-SS-92-97 3/7/2019 2:07:00 PM							
93	120			Topock - Alluvium Deposits	SM		(96.5 - 119.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown / moderate brown(5YR 4/4); very fine grained to very coarse grained, angular to subround; some granules to very large pebbles, angular to subround; some silt; trace mica; wet; no odor; no staining		
94									
95									
96		IRZ-17-SS-97-102 3/7/2019 2:12:00 PM							
97	120			Topock - Alluvium Deposits	SM		(99.5'); little silt; increase in granules to very large pebbles.		
98									
99									
100									


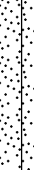

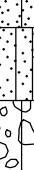
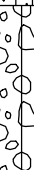
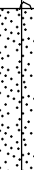

Notes: USCS = Unified Soil Classification System, U = not detected above the laboratory reporting limit, ppb = Parts per Billion.

Date Started:	03/02/2019	Surface Elevation:	N/A	Boring No.: IRZ-17 Pilot	
Date Completed:	03/07/2019	Northing (NAD83):	N/A		
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client:	Pacific Gas & Electric
Drilling Method:	Sonic Drilling	Total Depth:	227 ft bgs	Location:	Groundwater Remedy Phase I
Driller Name:	Steve Vasquez	Borehole Diameter:	6 in		Needles, CA
Drilling Asst:	O. Flores, L. Amaya	Depth to First Water:	24 ft bgs		
Logger:	Gantt Jeffers	Sampling Method:	10 ft Core Barrel	Project Number:	RC000753.0051
Editor:	Sean McGrane	Sampling Interval:	Continuous		
Weather:	Warm sunny to partly cloudy.	Converted to Well:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Description	Drilling Notes	Drilling Fluid
101		IRZ-17-SS-97-102 3/7/2019 2:12:00 PM							
102							(102'); some silt; moderate cementation; decrease in sand and granules to very large pebbles.		
103	120						(103'); increase in sand and granules to very large pebbles, decrease in silt.		
104		IRZ-17-SS-102-107 3/7/2019 2:18:00 PM	IRZ-17-VAS-102-107 (<0.17 U ppb) 3/3/2019 11:50:00 AM						
105									
106							(106'); decrease in sand, increase in granules to very large pebbles, silt nodules.		
107							(107'); increase slit, decrease in granules to very large pebbles.		
108									
109		IRZ-17-SS-107-112 3/7/2019 2:22:00 PM		Topock - Alluvium Deposits	SM		(108.5'); and granules to very large pebbles, angular to subround; little silt; decrease in silt.		
110							(109.5'); some silt; increase in silt, decrease in granules to very large pebbles.		
111									
112	120						(112') reddish brown / moderate brown(5YR 4/4) some dusky red(5R 3/4); increase silt, decrease granules to very large pebbles, trace weathered gravel, mottling.		
113									
114		IRZ-17-SS-112-117 3/7/2019 2:26:00 PM							
115									
116									
117							(117') reddish brown / moderate brown(5YR 4/4); little silt; decrease in silt, increase sand, no mottling.		
118	120	IRZ-17-SS-117-122 3/7/2019 2:31:00 PM							
119									
120				Topock - Alluvium Deposits	ML		(119.0 - 124.0') Topock - Alluvium Deposits; Sandy silt with gravel (ML); reddish brown / moderate brown(5YR 4/4) trace dusky red(5R 3/4); low plasticity, no dilatency; some granules to very		

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Date Started:	03/02/2019	Surface Elevation:	N/A	Boring No.: IRZ-17 Pilot	
Date Completed:	03/07/2019	Northing (NAD83):	N/A		
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client:	Pacific Gas & Electric
Drilling Method:	Sonic Drilling	Total Depth:	227 ft bgs	Location:	Groundwater Remedy Phase I
Driller Name:	Steve Vasquez	Borehole Diameter:	6 in		Needles, CA
Drilling Asst:	O. Flores, L. Amaya	Depth to First Water:	24 ft bgs		
Logger:	Gantt Jeffers	Sampling Method:	10 ft Core Barrel	Project Number:	RC000753.0051
Editor:	Sean McGrane	Sampling Interval:	Continuous		
Weather:	Warm sunny to partly cloudy.	Converted to Well:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Description	Drilling Notes	Drilling Fluid
121	120	IRZ-17-SS-117-122 3/7/2019 2:31:00 PM		Topock - Alluvium Deposits	ML		large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subround; wet; medium stiff to stiff; no odor; no staining; larger clasts consist of granodiorite and metadiorite. (120'); decrease in sand, increase in granules to very large pebbles.		
122							(122'); decrease silt, increase sand.		
123		IRZ-17-SS-122-127 3/7/2019 2:36:00 PM		Topock - Alluvium Deposits	SM		(124.0 - 132.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 4/3) some (7.5R 4/6); very fine grained to very coarse grained, angular to subround; some granules to very large pebbles, angular to subround; little silt; trace mica; wet; no odor; no staining; larger clasts consist of quartzite, granodiorite, and metadiorite, weathered gravel observed.		
124							(126') reddish brown / moderate brown(5YR 4/4); some silt; decrease sand.		
125									
126									
127	120	IRZ-17-SS-127-132 3/7/2019 2:40:00 PM		Topock - Alluvium Deposits	SM		(129.5 - 132.0'); little silt; increase sand.		
128									
129				Topock - Alluvium Deposits	ML		(132.0 - 133.0') Topock - Alluvium Deposits; Sandy silt with gravel (ML); reddish brown / moderate brown(5YR 4/4); low plasticity, no dilatancy; some granules to very large pebbles, angular to subround; some very fine to very coarse grained sand, angular to subround; trace cobbles, subangular to subround; wet; stiff; no odor; no staining; larger clasts consist of metadiorite.		
130							(133.0 - 136.5') Topock - Alluvium Deposits; Silty gravel with sand (GM); reddish brown / moderate brown(5YR 4/4); granules to very large pebbles, angular to subround; some very fine to very coarse grained sand, angular to subround; some silt; trace cobbles, subangular to subround; trace mica; wet; no odor; no staining; larger clasts consist of granite, granodiorite, and metadiorite, weathered granules to very large pebbles observed. 4" Silty sand with gravel lense at 134' bgs.		
131	120	IRZ-17-SS-132-137 3/7/2019 2:45:00 PM	IRZ-17-VAS-132-137 (<0.17 U ppb) 3/13/2019 12:05:00 PM	Topock - Alluvium Deposits	GM				
132									
133				Topock - Alluvium Deposits	SM		(136.5 - 156.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown / moderate brown(5YR 4/4); very fine grained to very coarse grained, angular to subround; some granules to very large pebbles, angular to subangular; some silt; trace mica; wet; no odor; no staining; larger clasts consist of metadiorite and granodiorite, trace weathered granules to very coarse pebbles. (137'); decrease granules to very large pebbles, increase sand.		
134									
135	120	IRZ-17-SS-137-142 3/7/2019 2:47:00 PM	IRZ-17-VAS-137-142 3/12/2019 2:50:00 PM	Topock - Alluvium Deposits	SM				
136									
137									
138									
139									
140									

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Date Started: 03/02/2019	Surface Elevation: N/A	Boring No.: IRZ-17 Pilot
Date Completed: 03/07/2019	Northing (NAD83): N/A	
Drilling Co.: Cascade	Easting (NAD83): N/A	Client: Pacific Gas & Electric
Drilling Method: Sonic Drilling	Total Depth: 227 ft bgs	Location: Groundwater Remedy Phase I
Driller Name: Steve Vasquez	Borehole Diameter: 6 in	Needles, CA
Drilling Asst: O. Flores, L. Amaya	Depth to First Water: 24 ft bgs	
Logger: Gantt Jeffers	Sampling Method: 10 ft Core Barrel	Project Number: RC000753.0051
Editor: Sean McGrane	Sampling Interval: Continuous	
Weather: Warm sunny to partly cloudy.	Converted to Well: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Description	Drilling Notes	Drilling Fluid
141		IRZ-17-SS-137-142 3/7/2019 2:47:00 PM	IRZ-17-VAS-137-142 3/12/2019 2:50:00 PM						
142							(142'); little silt; decrease in granules to very large pebbles, increase in sand.		
143	120								
144		IRZ-17-SS-142-147 3/7/2019 2:50:00 PM	IRZ-17-VAS-142-147 (84 ppb) 3/4/2019 10:24:00 AM						
145							(145'); some silt; decrease in sand.		
146									
147									
148				Topock - Alluvium Deposits	SM				
149		IRZ-17-SS-147-152 3/7/2019 2:53:00 PM	IRZ-17-VAS-147-152 (<0.33 U ppb) 3/12/2019 11:05:53 AM						
150									
151									
152	120						(152') dark grayish brown (2.5Y 4/2); decrease in sand, increase silt, some mottling.		
153							(153'); increase in sand, decrease silt, no moddling.		
154		IRZ-17-SS-152-157 3/7/2019 2:57:00 PM	IRZ-17-VAS-152-157 (7.0 ppb) 3/4/2019 12:00:00 PM						
155							(154.5'); 12-24 mm silt nodules.		
156									
157							(156.5 - 160.5') Topock - Alluvium Deposits; Sandy silt with gravel (ML); reddish brown / moderate brown(5YR 4/4); low plasticity, no dilatency; some granules to very large pebbles, angular to subround; some very fine to very coarse grained sand, angular to subround; wet; stiff; no odor; no staining; larger clasts consist of granodiorite, metadiorite, and feldspars.		
158	120	IRZ-17-SS-157-162 3/7/2019 2:59:00 PM		Topock - Alluvium Deposits	ML		(158'); moist; hard; weak cementation; decrease silt, increase sand.		
159							(158.5'); wet; very stiff; increase silt, no cementation.		
160									

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Date Started:	03/02/2019	Surface Elevation:	N/A	Boring No.: IRZ-17 Pilot	
Date Completed:	03/07/2019	Northing (NAD83):	N/A		
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client:	Pacific Gas & Electric
Drilling Method:	Sonic Drilling	Total Depth:	227 ft bgs	Location:	Groundwater Remedy Phase I
Driller Name:	Steve Vasquez	Borehole Diameter:	6 in		Needles, CA
Drilling Asst:	O. Flores, L. Amaya	Depth to First Water:	24 ft bgs		
Logger:	Gantt Jeffers	Sampling Method:	10 ft Core Barrel	Project Number:	RC000753.0051
Editor:	Sean McGrane	Sampling Interval:	Continuous		
Weather:	Warm sunny to partly cloudy.	Converted to Well:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Description	Drilling Notes	Drilling Fluid
161	120	IRZ-17-SS-157-162 3/7/2019 2:59:00 PM			ML				
162				Topock - Alluvium Deposits	SM		(160.5 - 162.5') Topock - Alluvium Deposits; Silty sand (SM); reddish brown / moderate brown(5YR 4/4); very fine grained to very coarse grained, angular to subangular; little granules to large pebbles, subangular to subround; little silt; trace mica; wet; no odor; no staining; 2-15 mm silt nodules, larger clasts consist of metadiorite.		
163				Topock - Alluvium Deposits	GM		(162.5 - 164.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); reddish brown / moderate brown(5YR 4/4); granules to very large pebbles, angular to subround; and very fine to very coarse grained sand, angular to subround; little silt; trace mica; wet; no odor; no staining; larger clasts consist of granodiorite and metadiorite.		
164		IRZ-17-SS-162-167 3/7/2019 3:01:00 PM	IRZ-17-VAS-162-167 (<0.17 U ppb) 3/4/2019 5:01:00 PM				(164.0 - 183.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown / moderate brown(5YR 4/4); very fine grained to very coarse grained, angular to subangular; little granules to large pebbles, angular to subround; little silt; trace mica; wet; no odor; no staining; larger clasts consist of metadiorite.		
165							(165.5') some granules to large pebbles, angular to subround; decrease in sand, increase in silt.		
166									
167									
168	120	IRZ-17-SS-167-172 3/7/2019 3:02:00 PM							
169									
170				Topock - Alluvium Deposits	SM		(170') dark reddish brown (5YR 3/3); and granules to large pebbles, angular to subround; decrease in sand.		
171									
172									
173							(173') dark reddish brown (5YR 3/3) and black (5YR 2.5/1); silt mottled.		
174		IRZ-17-SS-172-177 3/7/2019 3:04:00 PM	IRZ-17-VAS-172-177 (<0.17 U ppb) 3/5/2019 3:20:00 PM				(173.5') reddish brown / moderate brown(5YR 4/4); some granules to large pebbles, angular to subround; trace cobbles, subround; increase in sand, no mottling.		
175									
176									
177							(177'); some silt; trace clay; decrease in granules to very large pebbles and grain size, decrease sand.		
178	120	IRZ-17-SS-177-182 3/7/2019 3:05:00 PM					(178.5'); little silt; no clay, increase sand, trace weathered granules to very large pebbles.		
179							(179.5'); some silt; decrease in sand.		
180									

Notes: USCS = Unified Soil Classification System, U = not detected above the laboratory reporting limit, ppb = Parts per Billion.

Date Started: 03/02/2019	Surface Elevation: N/A	Boring No.: IRZ-17 Pilot
Date Completed: 03/07/2019	Northing (NAD83): N/A	
Drilling Co.: Cascade	Easting (NAD83): N/A	Client: Pacific Gas & Electric
Drilling Method: Sonic Drilling	Total Depth: 227 ft bgs	Location: Groundwater Remedy Phase I
Driller Name: Steve Vasquez	Borehole Diameter: 6 in	Needles, CA
Drilling Asst: O. Flores, L. Amaya	Depth to First Water: 24 ft bgs	
Logger: Gantt Jeffers	Sampling Method: 10 ft Core Barrel	Project Number: RC000753.0051
Editor: Sean McGrane	Sampling Interval: Continuous	
Weather: Warm sunny to partly cloudy.	Converted to Well: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Description	Drilling Notes	Drilling Fluid
181	120	IRZ-17-SS-177-182 3/7/2019 3:05:00 PM		Topock - Alluvium Deposits	SM		(180.5'); little granules to large pebbles, angular to subround; increase sand.		
182		IRZ-17-SS-182-187 3/7/2019 3:06:00 PM		Topock - Alluvium Deposits	ML		(183.0 - 185.5') Topock - Alluvium Deposits; Gravelly silt with sand (ML); yellowish red (5YR 4/6); low plasticity, no dilatency; some granules to very large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subround; trace mica; wet; stiff to very stiff; no odor; no staining; larger clasts consist of granodiorite and metadiorite.		
183				Topock - Alluvium Deposits	SM		(185.5 - 187.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); yellowish red (5YR 4/6); medium grained to very coarse grained, angular to subangular; some silt; little small to large pebbles, angular to subangular; little mica; wet; no odor; no staining; larger clasts consist of metadiorite.		
184				Topock - Alluvium Deposits	ML		(187.0 - 192.0') Topock - Alluvium Deposits; Sandy silt with gravel (ML); yellowish red (5YR 4/6); low plasticity, no dilatency; some granules to very large pebbles, angular to subround; some very fine to very coarse grained sand, angular to subround; trace mica; wet; stiff; no odor; no staining; larger clasts consist of metadiorite.		
185	60	IRZ-17-SS-187-192 3/7/2019 3:07:00 PM		Topock - Alluvium Deposits	ML				
186									
187									
188	60			Topock - Weathered Bedrock - conglomerate	SM		(192.0 - 206.5') Topock - Weathered Bedrock - conglomerate; Silty sand with gravel (SM); reddish brown (2.5YR 4/4); very fine grained to very coarse grained, angular to subangular; some granules to very large pebbles, angular to subangular; some silt; some mica; wet; no odor; weak cementation; no staining; trace weathered granules, tight formation.		
189									
190									
191	60								
192									
193									
194	60								
195									
196									
197	60	IRZ-17-VAS-197-202 (<0.17 U ppb) 3/6/2019 11:20:00 AM							
198									
199									
200									

Notes: USCS = Unified Soil Classification System, U = not detected above the laboratory reporting limit, ppb = Parts per Billion.

Date Started:	03/02/2019	Surface Elevation:	N/A	Boring No.: IRZ-17 Pilot	
Date Completed:	03/07/2019	Northing (NAD83):	N/A		
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client:	Pacific Gas & Electric
Drilling Method:	Sonic Drilling	Total Depth:	227 ft bgs	Location:	Groundwater Remedy Phase I
Driller Name:	Steve Vasquez	Borehole Diameter:	6 in		Needles, CA
Drilling Asst:	O. Flores, L. Amaya	Depth to First Water:	24 ft bgs		
Logger:	Gantt Jeffers	Sampling Method:	10 ft Core Barrel	Project Number:	RC000753.0051
Editor:	Sean McGrane	Sampling Interval:	Continuous		
Weather:	Warm sunny to partly cloudy.	Converted to Well:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Description	Drilling Notes	Drilling Fluid
201	60		IRZ-17-VAS-197-202 (<0.17 U ppb) 3/6/2019 11:20:00 AM						
202									
203				Topock - Weathered Bedrock - conglomerate	SM				
204									
205									
206									
207	120			Topock - Weathered Bedrock - conglomerate	ML		(206.5 - 209.5') Topock - Weathered Bedrock - conglomerate; Sandy silt with gravel (ML); red (2.5YR 4/6); low plasticity, no dilatency; some granules to very large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subround; trace mica; wet; very stiff; no odor; weak cementation; no staining; larger clasts consist of metadiorite and granodiarite trace weathred granules to very large pebbles.		
208									
209									
210				Topock - Weathered Bedrock - conglomerate	SM		(209.5 - 213.0') Topock - Weathered Bedrock - conglomerate; Silty sand with gravel (SM); reddish brown (2.5YR 4/4); very fine grained to very coarse grained, subangular to subround; some granules to very large pebbles, angular to subangular; some silt; some mica; wet; no odor; no staining; trace weathered granules to very large pebbles.		
211									
212									
213								(212.0 - 222.0') Soft drilling	
214				Topock - Weathered Bedrock - conglomerate	ML		(213.0 - 215.5') Topock - Weathered Bedrock - conglomerate; Sandy silt with gravel (ML); red (2.5YR 4/6); low plasticity, no dilatency; some granules to very large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subround; trace mica; wet; very stiff; no odor; no staining; larger clasts consist of metadiorite and granodiarite. trace weathred granules to very large pebbles.		
215									
216	120								
217									
218			IRZ-17-VAS-217-222 (<0.17 U ppb) 3/6/2019 4:17:00 PM	Topock - Weathered Bedrock - conglomerate	SM		(215.5 - 227.0') Topock - Weathered Bedrock - conglomerate; Silty sand with gravel (SM); reddish brown (2.5YR 4/4); very fine grained to very coarse grained, subangular to subround; some granules to very large pebbles, angular to subangular; some silt; some mica; wet; no odor; no staining; trace weathered granules to very large pebbles.		
219									
220									

Notes: USCS = Unified Soil Classification System, U = not detected above the laboratory reporting limit, ppb = Parts per Billion.

Boring Log


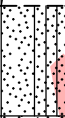

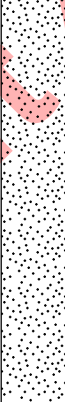
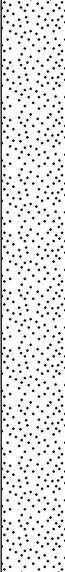
Sheet: 12 of 12

Date Started:	03/02/2019	Surface Elevation:	N/A	Boring No.: IRZ-17 Pilot	
Date Completed:	03/07/2019	Northing (NAD83):	N/A		
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client:	Pacific Gas & Electric
Drilling Method:	Sonic Drilling	Total Depth:	227 ft bgs	Location:	Groundwater Remedy Phase I
Driller Name:	Steve Vasquez	Borehole Diameter:	6 in	Needles, CA	
Drilling Asst:	O. Flores, L. Amaya	Depth to First Water:	24 ft bgs		
Logger:	Gantt Jeffers	Sampling Method:	10 ft Core Barrel	Project Number: RC000753.0051	
Editor:	Sean McGrane	Sampling Interval:	Continuous		
Weather:	Warm sunny to partly cloudy.	Converted to Well:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Description	Drilling Notes	Drilling Fluid
221	120		IRZ-17-VAS-217-222 (<0.17 U ppb) 3/6/2019 4:17:00 PM					(212.0 - 222.0') Soft drilling	
222									
223									
224				Topock - Weathered Bedrock - conglomerate	SM				
225	60								
226									
227									
End of Boring at 227.0' bgs.									
228									
229									
230									
231									
232									
233									
234									
235									
236									
237									
238									
239									
240									

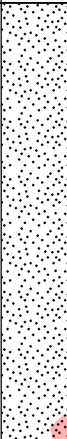



Notes: USCS = Unified Soil Classification System, U = not detected above the laboratory reporting limit, ppb = Parts per Billion.

Date Started: 03/27/2019	Surface Elevation: N/A	Boring No.: MW-W
Date Completed: 03/30/2019	Northing (NAD83): N/A	
Drilling Co.: Cascade	Easting (NAD83): N/A	Client: Pacific Gas & Electric
Drilling Method: Sonic Drilling	Total Depth: 43 ft bgs	Location: Groundwater Remedy Phase I
Driller Name: Steve Vasquez	Borehole Diameter: 6 in	Needles, CA
Drilling Asst: L. Amaya/ O. Flores	Depth to First Water: 5 ft bgs	
Logger: Gantt Jeffers	Sampling Method: 10 ft Core Barrel	Project Number: RC000753.0051
Editor: Sean McGrane	Sampling Interval: Continuous	
Weather: Warm, sunny, cloudy.	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Description	Drilling Notes	Drilling Fluid
1	60				NR		(0.0 - 5.0') (NR); No recovery, hand augered for utility clearance.	(0.0 - 5.0') hand augered for utility clearance.	(0.0 - 12.0') 50 gal of water used
2									
3									
4									
5									
6	24			Topock - Fluvial Deposits	SP-SM		(5.0 - 6.5') Topock - Fluvial Deposits; Poorly graded sand with silt (SP-SM); brown (7.5YR 5/4); very fine grained to fine grained, subangular to subround; little silt; trace granules to small pebbles, round; trace cobbles, round; trace mica; moist to wet; no odor; no staining; larger clasts consist of granodiarites.	(5.0 - 12.0') Soft drilling (5.0') Approximate depth to water table	
7									
8	60		MW-W- VAS-7-12 (<0.17 U ppb) 3/27/2019 4:55:00 PM				(6.5 - 26.0') Topock - Fluvial Deposits; Poorly graded sand (SP); brown (10YR 5/3); very fine grained to fine grained, subangular to subround; little mica; moist to wet; no odor; iron oxide staining		
9									
10									
11									
12									
13	156			Topock - Fluvial Deposits	SP		(8') very fine grained to medium grained; Increase in grain size sand, no iron oxide staining.	(12.0 - 27.0') soft drilling, compaction of soils in core.	(12.0 - 27.0') 50 gal of water used
14									
15									
16									
17									
18									
19									
20									

Notes: USCS = Unified Soil Classification System, U = not detected above the laboratory reporting limit, ppb = Parts per Billion.

Date Started:	03/27/2019	Surface Elevation:	N/A	Boring No.: MW-W	
Date Completed:	03/30/2019	Northing (NAD83):	N/A		
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client:	Pacific Gas & Electric
Drilling Method:	Sonic Drilling	Total Depth:	43 ft bgs	Location:	Groundwater Remedy Phase I
Driller Name:	Steve Vasquez	Borehole Diameter:	6 in	Needles, CA	
Drilling Asst:	L. Amaya/ O. Flores	Depth to First Water:	5 ft bgs		
Logger:	Gantt Jeffers	Sampling Method:	10 ft Core Barrel	Project Number: RC000753.0051	
Editor:	Sean McGrane	Sampling Interval:	Continuous		
Weather:	Warm, sunny, cloudy.	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		


Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Description	Drilling Notes	Drilling Fluid	
21	156		MW-W- VAS-22-27 (<0.33 U ppb) 3/28/2019 1:00:00 PM	Topock - Fluvial Deposits	SP			(12.0 - 27.0') soft drilling, compaction of soils in core.	(12.0 - 27.0') 50 gal of water used	
22										
23										
24										
25										
26	60					Topock - Fluvial Deposits	SM		(26.0 - 29.2') Topock - Fluvial Deposits; Silty sand (SM); grayish brown (2.5Y 5/2); very fine grained to fine grained, subangular to subround; little silt; little mica; little organics; wet; no odor; no staining	
27										
28										
29										
30										
31	24			Topock - Weathered Bedrock - conglomerate	SM		(29.2 - 31.0') Topock - Weathered Bedrock - conglomerate; Silty sand with gravel (SM); reddish brown (2.5YR 4/4); very fine grained to coarse grained, angular to subround; and silt; little granules to very large pebbles, angular to subangular; trace mica; wet; no odor; no staining; trace very coarse sand, larger clast consist of metadiorite and granodiorites.	(31.0 - 32.0') Rough drilling		
32										
33										
34										
35										
36	72			Topock - Competent Bedrock - conglomerate			(31.0 - 43.0') Topock - Competent Bedrock - conglomerate; dark reddish brown (2.5YR 3/4); dry; moderate cementation; friable	(34.0 - 40.0') Core was hot		
37										
38										
39										
40										

Notes: USCS = Unified Soil Classification System, U = not detected above the laboratory reporting limit, ppb = Parts per Billion.

Boring Log

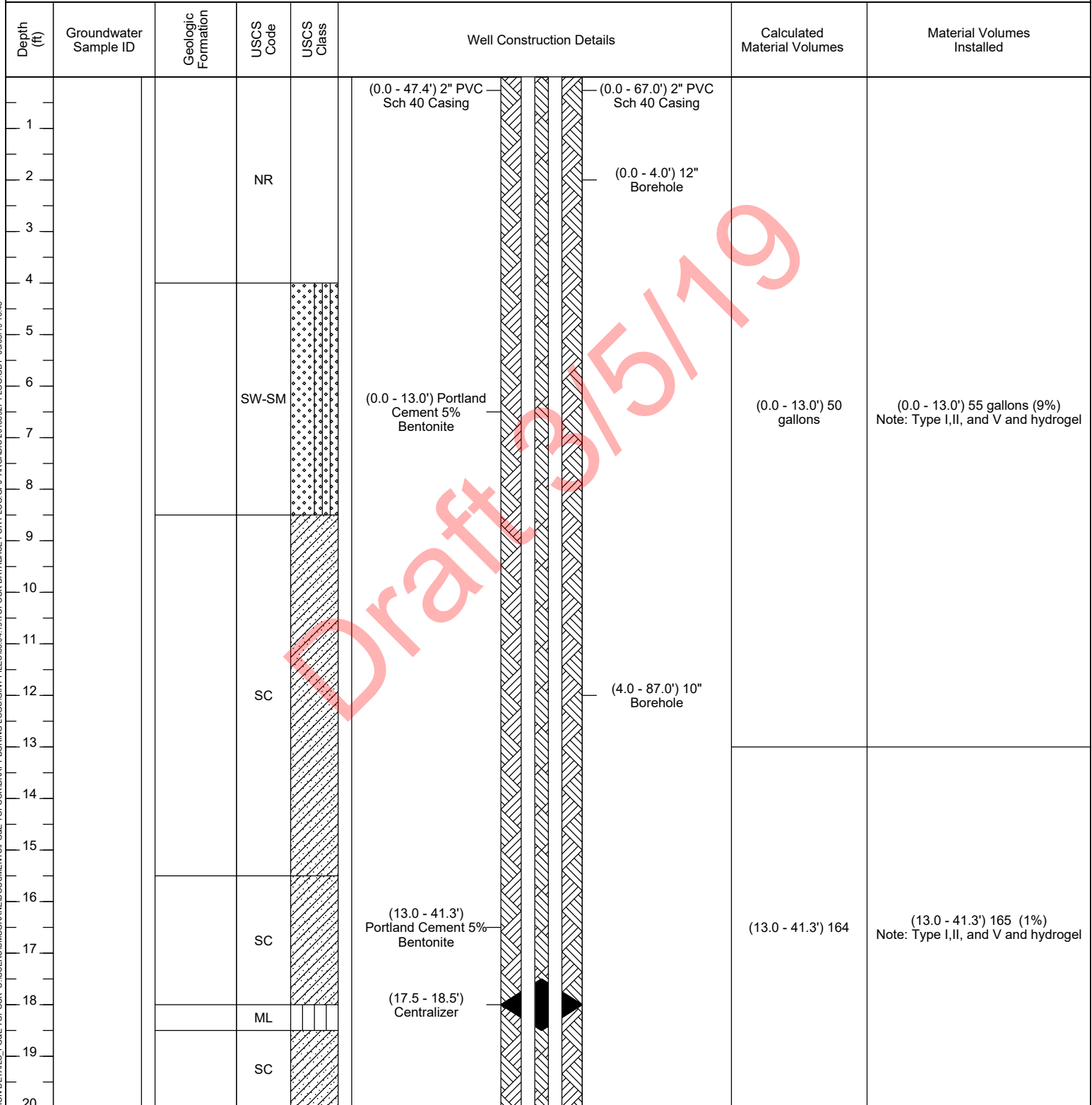
Sheet: 3 of 3

Date Started:	03/27/2019	Surface Elevation:	N/A	Boring No.: MW-W	
Date Completed:	03/30/2019	Northing (NAD83):	N/A		
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client:	Pacific Gas & Electric
Drilling Method:	Sonic Drilling	Total Depth:	43 ft bgs	Location:	Groundwater Remedy Phase I
Driller Name:	Steve Vasquez	Borehole Diameter:	6 in	Needles, CA	
Drilling Asst:	L. Amaya/ O. Flores	Depth to First Water:	5 ft bgs		
Logger:	Gantt Jeffers	Sampling Method:	10 ft Core Barrel	Project Number: RC000753.0051	
Editor:	Sean McGrane	Sampling Interval:	Continuous		
Weather:	Warm, sunny, cloudy.	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID		Groundwater Sample ID		Geologic Formation	USCS Code	USCS Class	Description	Drilling Notes		Drilling Fluid
41	36					Topock - Competent Bedrock - conglomerate						
42												
43												
End of Boring at 43.0 'bgs.												
44	<div>Draft 41119</div>											
45												
46												
47												
48												
49												
50												
51												
52												
53												
54												
55												
56												
57												
58												
59												
60												

Notes: USCS = Unified Soil Classification System, U = not detected above the laboratory reporting limit, ppb = Parts per Billion.

Date Started: 02/13/2019	Surface Elevation: N/A	Well ID: MW-G-57, MW-G-82
Date Completed: 02/18/2019	Northing (NAD83): N/A	
Drilling Co.: Cascade	Easting (NAD83): N/A	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 87 ft bgs	Location: Groundwater Remedy Phase I
Driller Name: Steve Vasquez	Borehole Diameter: 6 in	Needles, California
Drilling Asst: L. Amaya/ O. Flores	Water Level Start: 50 ft bgs	
Logger: Sean McGrane	Water Level Finish: N/A	Project Number: Topock
Editor: Sean McGrane	Development Date: N/A	
Weather: Sunny, rain, warm to cool	Well Completion: <input type="checkbox"/> Flush <input type="checkbox"/> Stick-up	



Remarks: USCS = Unified Soil Classification System, ppb = Parts per Billion.

Date Started: 02/13/2019	Surface Elevation: N/A	Well ID: MW-G-57, MW-G-82
Date Completed: 02/18/2019	Northing (NAD83): N/A	
Drilling Co.: Cascade	Easting (NAD83): N/A	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 87 ft bgs	Location: Groundwater Remedy Phase I
Driller Name: Steve Vasquez	Borehole Diameter: 6 in	Needles, California
Drilling Asst: L. Amaya/ O. Flores	Water Level Start: 50 ft bgs	
Logger: Sean McGrane	Water Level Finish: N/A	Project Number: Topock
Editor: Sean McGrane	Development Date: N/A	
Weather: Sunny, rain, warm to cool	Well Completion: <input type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction Details	Calculated Material Volumes	Material Volumes Installed
21					(0.0 - 47.4') 2" PVC Sch 40 Casing		
22			SC				
23							
24							
25			SM				
26							
27			SM				
28							
29							
30					(13.0 - 41.3') Portland Cement 5% Bentonite		
31						(13.0 - 41.3') 164	(13.0 - 41.3') 165 (1%) Note: Type I,II, and V and hydrogel
32			SM				
33							
34							
35							
36			SM				
37							
38							
39			SM				
40							

Remarks: USCS = Unified Soil Classification System, ppb = Parts per Billion.

Date Started:	02/13/2019	Surface Elevation:	N/A	Well ID: MW-G-57, MW-G-82
Date Completed:	02/18/2019	Northing (NAD83):	N/A	
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	87 ft bgs	Location: Groundwater Remedy Phase I
Driller Name:	Steve Vasquez	Borehole Diameter:	6 in	Needles, California
Drilling Asst:	L. Amaya/ O. Flores	Water Level Start:	50 ft bgs	
Logger:	Sean McGrane	Water Level Finish:	N/A	Project Number: Topock
Editor:	Sean McGrane	Development Date:	N/A	
Weather:	Sunny, rain, warm to cool	Well Completion:	<input type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction Details	Calculated Material Volumes	Material Volumes Installed
41			SM		(13 - 41.3') Portland Cement 5% Bentonite	(13.0 - 41.3') 164	(13.0 - 41.3') 165 (1%) Note: Type I,II, and V and hydrogel
42			SM		(0.0 - 47.4') 2" PVC Sch 40 Casing		
43					(41.3 - 45.0') Bentonite seal chips	(41.3 - 45.0') 2.79 bags	(41.3 - 45.0') 3 bags (7%) Note: Puregold medium chips
44			SM				
45			SM				
46			SM				
47			SM				
48					(47.4 - 57.4') 2" Sch 40 PVC (20-slot) Screen		
49							
50					(4.0 - 87.0') 10" Borehole		
51			SM				
52			SM				
53	MW-G-VAS-52.0-57.0 (680 ppb)				(45.0 - 61.0') Monterey #3 (52.5 - 53.5') Centralizer	(45.0 - 61.0') 15.05 bags	(45.0 - 61.0') 18 bags (16%) Note: Cemex, clean, graded, kiln dried. Extra volume was due to widening of borehole during flushing of fines.
54							
55			SM				
56			SM				
57			ML				
58			ML				
59			ML				
60							

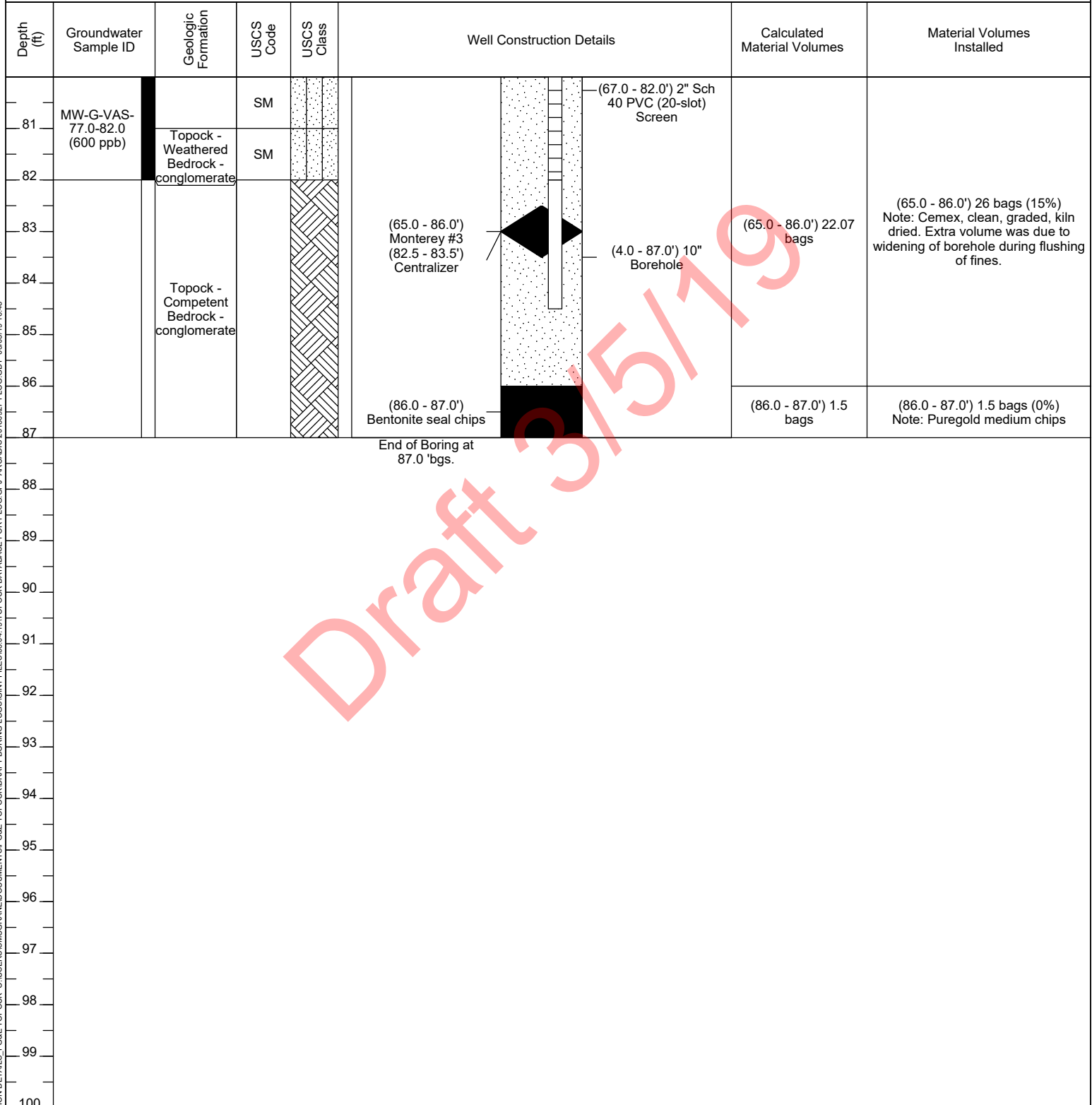
Remarks: USCS = Unified Soil Classification System, ppb = Parts per Billion.

Date Started:	02/13/2019	Surface Elevation:	N/A	Well ID: MW-G-57, MW-G-82
Date Completed:	02/18/2019	Northing (NAD83):	N/A	
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	87 ft bgs	Location: Groundwater Remedy Phase I
Driller Name:	Steve Vasquez	Borehole Diameter:	6 in	Needles, California
Drilling Asst:	L. Amaya/ O. Flores	Water Level Start:	50 ft bgs	
Logger:	Sean McGrane	Water Level Finish:	N/A	Project Number: Topock
Editor:	Sean McGrane	Development Date:	N/A	
Weather:	Sunny, rain, warm to cool	Well Completion:	<input type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction Details	Calculated Material Volumes	Material Volumes Installed
61			ML		(45.0 - 61.0') Monterey #3	(45.0 - 61.0') 15.05 bags	
62							
63			ML		(61.0 - 65.0') Bentonite seal pellets	(61.0 - 65.0') 3.81 buckets	(61.0 - 65.0') 4 buckets (5%) Note: Pel-Plug 3/8" TR30
64							
65			CL				
66							
67			ML				
68			SM		(67.0 - 82.0') 2" Sch 40 PVC (20-slot) Screen		
69	MW-G-VAS-67.0-72.0 (920 ppb)						
70					(4.0 - 87.0') 10" Borehole		
71							
72			ML		(65.0 - 86.0') Monterey #3	(65.0 - 86.0') 22.07 bags	(65.0 - 86.0') 26 bags (15%) Note: Cemex, clean, graded, kiln dried. Extra volume was due to widening of borehole during flushing of fines.
73							
74							
75							
76							
77			SM				
78	MW-G-VAS-77.0-82.0 (600 ppb)		SM				
79			SM				
80			SM				

Remarks: USCS = Unified Soil Classification System, ppb = Parts per Billion.

Date Started: 02/13/2019	Surface Elevation: N/A	Well ID: MW-G-57, MW-G-82
Date Completed: 02/18/2019	Northing (NAD83): N/A	
Drilling Co.: Cascade	Easting (NAD83): N/A	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 87 ft bgs	Location: Groundwater Remedy Phase I
Driller Name: Steve Vasquez	Borehole Diameter: 6 in	Needles, California
Drilling Asst: L. Amaya/ O. Flores	Water Level Start: 50 ft bgs	
Logger: Sean McGrane	Water Level Finish: N/A	Project Number: Topock
Editor: Sean McGrane	Development Date: N/A	
Weather: Sunny, rain, warm to cool	Well Completion: <input type="checkbox"/> Flush <input type="checkbox"/> Stick-up	



Remarks: USCS = Unified Soil Classification System, ppb = Parts per Billion.

WELL CONSTRUCTION DETAILS_PG&E TOPOCK C:\USERS\MCGRANE\DOCUMENTS\PG&E TOPOCK\DATABASE FOR PLOG.GPJ ARCADIS 20180927 PLOG.GDT 03/05/19 16:48

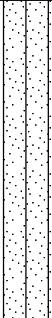



Date Started: 10/31/2018	Surface Elevation: N/A	Boring No.: IRZ-15 Pilot
Date Completed: 11/15/2018	Northing (NAD83): N/A	
Drilling Co.: Cascade	Easting (NAD83): N/A	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 257 ft bgs	Location: Groundwater Remedy Phase I
Driller Name: Nick Petrone	Borehole Diameter: 6 in	Needles, California
Drilling Asst: T. Aylmer/J. Candelaria	Depth to First Water: N/A	
Logger: A. Garcia / G Jeffers	Sampling Method: 10 ft Core Barrel	Project Number: Topock
Editor: Sean McGrane	Sampling Interval: Continuous	
Weather: Sunny warm to hot	Converted to Well: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Description	Drilling Notes	Drilling Fluid
1	0						(0.0 - 2.0'); No Recovery lost during hand clearance		
2									
3									
4	60				SP		(2.0 - 7.0') Poorly graded sand (SP); yellowish brown / moderate yellowish brown(10YR 5/4); very fine grained to medium grained, angular to round; little coarse to very coarse grained sand, angular to round; trace granules to small pebbles, subround; trace silt; trace clay; dry; no staining		
5									
6									
7									
8							(7.0 - 17.0') Poorly graded sand (SP); brown (10YR 4/3); very fine grained to medium grained, angular to round; little coarse to very coarse grained sand, angular to round; trace granules to small pebbles, subround; trace silt; trace clay; dry; no staining		
9									
10									
11									
12	120				SP				
13									
14									
15									
16									
17									
18									
19					SM		(17.0 - 24.5') Silty sand with gravel (SM); dark yellowish brown (10YR 4/4); very fine grained to very coarse grained, angular to subangular; some granules to large pebbles, angular to subangular; trace clay; dry; no staining		
20									

0 gal of water used





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Date Started: 10/31/2018	Surface Elevation: N/A	Boring No.: IRZ-15 Pilot
Date Completed: 11/15/2018	Northing (NAD83): N/A	
Drilling Co.: Cascade	Easting (NAD83): N/A	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 257 ft bgs	Location: Groundwater Remedy Phase I
Driller Name: Nick Petrone	Borehole Diameter: 6 in	Needles, California
Drilling Asst: T. Aylmer/J. Candelaria	Depth to First Water: N/A	
Logger: A. Garcia / G Jeffers	Sampling Method: 10 ft Core Barrel	Project Number: Topock
Editor: Sean McGrane	Sampling Interval: Continuous	
Weather: Sunny warm to hot	Converted to Well: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Description	Drilling Notes	Drilling Fluid
21	120				SM			27' Approximate depth of water table	0 gal of water used
22									
23									
24									
25	IRZ-15-SS-25-30			GW-GM		(24.5 - 27.0') Well graded gravel with silt and sand (GW-GM); very dark grayish brown (10YR 3/2); granules to large pebbles, angular to subangular; little very fine to very coarse grained sand, angular; little silt; moist; no staining			
26									
27									
28	IRZ-15-SS-25-30			ML		(27.0 - 29.5') Gravelly silt with sand (ML); brown (10YR 4/3); medium plasticity; little granules to very large pebbles, angular to subangular; little very fine to very coarse grained sand, angular to subangular; trace clay; wet; no staining			
29									
30									
31	120	IRZ-15-SS-30-35	IRZ-15-VAS-32-37 (13 ppb)		GM		(29.5 - 47.0') Silty gravel with sand (GM); brown (10YR 5/3); granules to medium pebbles, angular to subangular; and silt; little very fine to very coarse grained sand, subangular to round; trace large pebbles, angular to subangular; wet; no staining		
32									
33									
34									
35	IRZ-15-SS-35-40								
36									
37									
38									
39									
40									




Notes: USCS = Unified Soil Classification System, U = not detected above the laboratory reporting limit, ppb = Parts per Billion.

Date Started: 10/31/2018	Surface Elevation: N/A	Boring No.: IRZ-15 Pilot
Date Completed: 11/15/2018	Northing (NAD83): N/A	
Drilling Co.: Cascade	Easting (NAD83): N/A	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 257 ft bgs	Location: Groundwater Remedy Phase I
Driller Name: Nick Petrone	Borehole Diameter: 6 in	Needles, California
Drilling Asst: T. Aylmer/J. Candelaria	Depth to First Water: N/A	
Logger: A. Garcia / G Jeffers	Sampling Method: 10 ft Core Barrel	Project Number: Topock
Editor: Sean McGrane	Sampling Interval: Continuous	
Weather: Sunny warm to hot	Converted to Well: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Description	Drilling Notes	Drilling Fluid
41	96	IRZ-15-SS-40-45			GM				
42									
43									
44	96	IRZ-15-SS-45-50			GM		(47.0 - 57.0') Silty gravel with sand (GM); grayish brown (10YR 5/2); granules to medium pebbles, angular to subangular; some very fine to very coarse grained sand, subangular to round; little large to very large pebble, angular to subangular; little silt; trace cobbles, subangular; wet; no staining		
45									
46									
47	96	IRZ-15-SS-50-55			GM		(57.0 - 69.5') Silty gravel with sand (GM); brown (7.5YR 5/3) and reddish brown (5YR 5/3); granules to medium pebbles, angular to subangular; some very fine to very coarse grained sand, subangular to round; little large to very large pebbles, angular to subangular; little silt; trace cobbles, subangular; wet; no staining		
48									
49									
50	96	IRZ-15-SS-55-60			GM				
51									
52									
53	96								
54									
55									
56	96								
57									
58									
59	96								
60									
61									





Notes: USCS = Unified Soil Classification System, U = not detected above the laboratory reporting limit, ppb = Parts per Billion.

Date Started: 10/31/2018	Surface Elevation: N/A	Boring No.: IRZ-15 Pilot
Date Completed: 11/15/2018	Northing (NAD83): N/A	
Drilling Co.: Cascade	Easting (NAD83): N/A	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 257 ft bgs	Location: Groundwater Remedy Phase I
Driller Name: Nick Petrone	Borehole Diameter: 6 in	Needles, California
Drilling Asst: T. Aylmer/J. Candelaria	Depth to First Water: N/A	
Logger: A. Garcia / G Jeffers	Sampling Method: 10 ft Core Barrel	Project Number: Topock
Editor: Sean McGrane	Sampling Interval: Continuous	
Weather: Sunny warm to hot	Converted to Well: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Description	Drilling Notes	Drilling Fluid
61	108	IRZ-15-SS-60-65	IRZ-15-VAS-62-67 (0.459 J ppb)		GM				
62									
63									
64									
65	96	IRZ-15-SS-65-70			GW-GM		(69.5 - 74.5') Well graded gravel with silt and sand (GW-GM); brown (7.5YR 4/3); granules to large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subangular; little silt; trace very large pebbles, angular; trace cobbles, subangular; wet; no staining		0 gal of water used
66									
67									
68									
69									
70									
71	96	IRZ-15-SS-70-75			SW-SM		(74.5 - 87.0') Well graded sand with silt and gravel (SW-SM); brown (7.5YR 4/3); very fine grained to very coarse grained, angular to subround; and granules to very large pebbles, angular to subangular; little silt; wet; no staining		
72									
73									
74									
75									
76									
77	96	IRZ-15-SS-75-80							
78									
79									
80									






Notes: USCS = Unified Soil Classification System, U = not detected above the laboratory reporting limit, ppb = Parts per Billion.

Date Started: 10/31/2018	Surface Elevation: N/A	Boring No.: IRZ-15 Pilot
Date Completed: 11/15/2018	Northing (NAD83): N/A	
Drilling Co.: Cascade	Easting (NAD83): N/A	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 257 ft bgs	Location: Groundwater Remedy Phase I
Driller Name: Nick Petrone	Borehole Diameter: 6 in	Needles, California
Drilling Asst: T. Aylmer/J. Candelaria	Depth to First Water: N/A	
Logger: A. Garcia / G Jeffers	Sampling Method: 10 ft Core Barrel	Project Number: Topock
Editor: Sean McGrane	Sampling Interval: Continuous	
Weather: Sunny warm to hot	Converted to Well: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Description	Drilling Notes	Drilling Fluid
81	108	IRZ-15-SS-80-85			SW-SM				
82									
83									
84									
85	96	IRZ-15-SS-85-90			GM		(87.0 - 97.0') Silty gravel with sand (GM); brown (7.5YR 4/3); granules to large pebbles, angular to subangular; some silt; little very fine to very coarse grained sand, angular to subround; trace very large pebbles, angular; trace clay; metadiorite pebbles; wet; no staining		0 gal of water used
86									
87									
88									
89		IRZ-15-SS-90-95			GM				
90									
91									
92									
93		IRZ-15-SS-95-100			SM		(97.0 - 104.5') Silty sand with gravel (SM); reddish brown (2.5YR 4/4); very fine grained to very coarse grained, angular to subangular; and granules to very large pebbles, angular; little silt; trace cobbles, angular; wet; no staining		
94									
95									
96									
97									
98									
99									
100									

Notes: USCS = Unified Soil Classification System, U = not detected above the laboratory reporting limit, ppb = Parts per Billion.



















Date Started: 10/31/2018	Surface Elevation: N/A	Boring No.: IRZ-15 Pilot
Date Completed: 11/15/2018	Northing (NAD83): N/A	
Drilling Co.: Cascade	Easting (NAD83): N/A	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 257 ft bgs	Location: Groundwater Remedy Phase I
Driller Name: Nick Petrone	Borehole Diameter: 6 in	Needles, California
Drilling Asst: T. Aylmer/J. Candelaria	Depth to First Water: N/A	
Logger: A. Garcia / G Jeffers	Sampling Method: 10 ft Core Barrel	Project Number: Topock
Editor: Sean McGrane	Sampling Interval: Continuous	
Weather: Sunny warm to hot	Converted to Well: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Description	Drilling Notes	Drilling Fluid
101	96	IRZ-15-SS-100-105	IRZ-15-VAS-102-107 (< 0.17 U ppb)		SM				
102									
103									
104									
105	96	IRZ-15-SS-105-110			SM		(104.5 - 106.5') Silty sand with gravel (SM); reddish brown / moderate brown(5YR 4/4); very fine grained to very coarse grained, angular to subangular; some granules to very large pebble, angular; some silt; trace cobbles, angular; wet; no staining		
106									
107									
108									
109	96	IRZ-15-SS-110-115			ML		(106.5 - 116.0') Sandy silt with gravel (ML); reddish brown / moderate brown(5YR 4/4); medium plasticity; some granules to very large pebble, angular to subangular; some very fine to very coarse grained sand, angular to subangular; wet; weak cementation; no staining		
110									
111									
112									
113	96	IRZ-15-SS-110-115			GM		(116.0 - 117.0') Silty gravel with sand (GM); reddish brown / moderate brown(5YR 4/4); granules to very large pebbles, angular to subangular; and silt; little very fine to very coarse grained sand, angular to subangular; wet; weak cementation; no staining		
114									
115									
116									
117	96	IRZ-15-SS-110-115			ML		(117.0 - 120.0') Sandy silt with gravel (ML); reddish brown / moderate brown(5YR 4/4); medium plasticity; some granules to very large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subangular; wet; weak cementation; no staining		
118									
119									
120									

Notes: USCS = Unified Soil Classification System, U = not detected above the laboratory reporting limit, ppb = Parts per Billion.

0 gal of water used

Date Started: 10/31/2018	Surface Elevation: N/A	Boring No.: IRZ-15 Pilot
Date Completed: 11/15/2018	Northing (NAD83): N/A	
Drilling Co.: Cascade	Easting (NAD83): N/A	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 257 ft bgs	Location: Groundwater Remedy Phase I
Driller Name: Nick Petrone	Borehole Diameter: 6 in	Needles, California
Drilling Asst: T. Aylmer/J. Candelaria	Depth to First Water: N/A	
Logger: A. Garcia / G Jeffers	Sampling Method: 10 ft Core Barrel	Project Number: Topock
Editor: Sean McGrane	Sampling Interval: Continuous	
Weather: Sunny warm to hot	Converted to Well: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Description	Drilling Notes	Drilling Fluid
121	108				GM		(120.0 - 121.0') Silty gravel with sand (GM); reddish brown / moderate brown(5YR 4/4); granules to very large pebbles, angular to subangular; some silt; little very fine to very coarse grained sand, angular to subangular; wet; no staining		
122					ML		(121.0 - 127.0') Gravelly silt with sand (ML); reddish brown / moderate brown(5YR 4/4); medium plasticity; some granules to very large pebble, angular to subangular; little very fine to very coarse grained sand, angular to subangular; wet; weak cementation; no staining		
123									
124									
125									
126	96		IRZ-15-VAS-132-137 (< 0.17 U ppb)		GM		(127.0 - 137.0') Silty gravel with sand (GM); reddish brown / moderate brown(5YR 4/4); granules to very large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subangular; some silt; wet; weak cementation; no staining; pebbles composed of metadiorite.		0 gal of water used
127									
128									
129									
130									
131									
132									
133									
134									
135									
136					ML		(137.0 - 139.5') Gravelly silt with sand (ML); reddish brown / moderate brown(5YR 4/4); low plasticity; some granules to very large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subangular; wet; weak cementation; no staining		
137									
138									
139									
140					SM		(139.5 - 144.5') Silty sand with gravel (SM); reddish brown (2.5YR		

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



Date Started: <u>10/31/2018</u>	Surface Elevation: <u>N/A</u>	Boring No.: <u>IRZ-15 Pilot</u>
Date Completed: <u>11/15/2018</u>	Northing (NAD83): <u>N/A</u>	
Drilling Co.: <u>Cascade</u>	Easting (NAD83): <u>N/A</u>	Client: <u>PG&E</u>
Drilling Method: <u>Sonic Drilling</u>	Total Depth: <u>257 ft bgs</u>	Location: <u>Groundwater Remedy Phase I</u>
Driller Name: <u>Nick Petrone</u>	Borehole Diameter: <u>6 in</u>	<u>Needles, California</u>
Drilling Asst: <u>T. Aylmer/J. Candelaria</u>	Depth to First Water: <u>N/A</u>	
Logger: <u>A. Garcia / G Jeffers</u>	Sampling Method: <u>10 ft Core Barrel</u>	Project Number: <u>Topock</u>
Editor: <u>Sean McGrane</u>	Sampling Interval: <u>Continuous</u>	
Weather: <u>Sunny warm to hot</u>	Converted to Well: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Description	Drilling Notes	Drilling Fluid						
141	96	IRZ-15-SS-140-145			SM	<div></div>	4/4); very fine grained to very coarse grained, angular to subangular; some granules to very large pebbles, angular; little silt; trace cobbles, angular; wet; no staining		0 gal of water used						
142															
143															
144															
145		IRZ-15-SS-145-150			SM	<div></div>	(144.5 - 161.0') Silty sand with gravel (SM); reddish brown (2.5YR 4/4); very fine grained to very coarse grained, angular to subangular; some granules to very large pebbles, angular; some silt; trace cobbles, angular; wet; no staining								
146															
147															
148															
149	96	IRZ-15-SS-150-150								SM	<div></div>	(147'); increase in granules and very large pebbles, decrease in silt.			
150															
151															
152															
153		IRZ-15-SS-155-160											SM	<div></div>	(154.5'); no staining; decrease in silt, trace clay.
154															
155															
156															
157		IRZ-15-SS-155-160		SM	<div></div>										
158															
159															
160															

Notes: USCS = Unified Soil Classification System, U = not detected above the laboratory reporting limit, ppb = Parts per Billion.

SOIL BORING LOG, PG&E TOPACK C:\USERS\SMCGRANE\DOCUMENTS\PG&E TOPACK\DATABASE FOR PLOG.GPJ ARCADIS 20180927 PLOG.GDT 1/5/19

Date Started: <u>10/31/2018</u>	Surface Elevation: <u>N/A</u>	Boring No.: <u>IRZ-15 Pilot</u>
Date Completed: <u>11/15/2018</u>	Northing (NAD83): <u>N/A</u>	
Drilling Co.: <u>Cascade</u>	Easting (NAD83): <u>N/A</u>	Client: <u>PG&E</u>
Drilling Method: <u>Sonic Drilling</u>	Total Depth: <u>257 ft bgs</u>	Location: <u>Groundwater Remedy Phase I</u>
Driller Name: <u>Nick Petrone</u>	Borehole Diameter: <u>6 in</u>	<u>Needles, California</u>
Drilling Asst: <u>T. Aylmer/J. Candelaria</u>	Depth to First Water: <u>N/A</u>	
Logger: <u>A. Garcia / G Jeffers</u>	Sampling Method: <u>10 ft Core Barrel</u>	Project Number: <u>Topock</u>
Editor: <u>Sean McGrane</u>	Sampling Interval: <u>Continuous</u>	
Weather: <u>Sunny warm to hot</u>	Converted to Well: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	


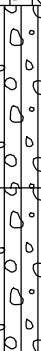
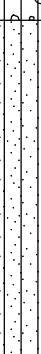


Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Description	Drilling Notes	Drilling Fluid
161	96	IRZ-15-SS-160-165	IRZ-15-VAS-162-167 (3200 ppb)		SM				
162				ML		(161.0 - 164.5') Gravelly silt with sand (ML); dark reddish brown(2.5YR 3/3); no plasticity; some granules to very large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subround; wet; weak cementation; no staining			
163									
164									
165				114	IRZ-15-SS-165-170		SM		
166									
167									
168									
169									
170	114	IRZ-15-SS-170-175		SM		(167.0 - 172.0') Silty sand with gravel (SM); reddish brown (2.5YR 4/4); very fine grained to very coarse grained, angular to subangular; some granules to very large pebbles, angular; some silt; trace cobbles, angular; trace clay; wet; no staining			
171									
172									
173									
174									
175	114	IRZ-15-SS-170-175		GM		(172.0 - 174.5') Silty gravel with sand (GM); reddish brown / moderate brown(5YR 4/4); granules to very large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subangular; some silt; wet; weak cementation; no staining			
176									
177									
178									
179									
180	114			GM		(174.5 - 187.0') Silty gravel with sand (GM); reddish brown / moderate brown(5YR 4/4); granules to very large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subangular; some silt; wet; weak cementation; no staining			

Notes: USCS = Unified Soil Classification System, U = not detected above the laboratory reporting limit, ppb = Parts per Billion.

Boring Log

Sheet: 10 of 13

Date Started: 10/31/2018	Surface Elevation: N/A	Boring No.: IRZ-15 Pilot
Date Completed: 11/15/2018	Northing (NAD83): N/A	
Drilling Co.: Cascade	Easting (NAD83): N/A	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 257 ft bgs	Location: Groundwater Remedy Phase I
Driller Name: Nick Petrone	Borehole Diameter: 6 in	Needles, California
Drilling Asst: T. Aylmer/J. Candelaria	Depth to First Water: N/A	
Logger: A. Garcia / G Jeffers	Sampling Method: 10 ft Core Barrel	Project Number: Topock
Editor: Sean McGrane	Sampling Interval: Continuous	
Weather: Sunny warm to hot	Converted to Well: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Description	Drilling Notes	Drilling Fluid	
181	108	IRZ-15-SS-180-185			GM					
182										
183										
184										
185			IRZ-15-VAS-182-187 (140 ppb)		GM					
186										
187										
188										
189	108	IRZ-15-SS-185-190			ML		(187.0 - 189.5') Gravelly silt with sand (ML); reddish brown (2.5YR 4/4); no plasticity; some granules to very large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subround; wet; weak cementation; no staining			
190										
191										
192										
193	108	IRZ-15-SS-190-195			ML		(189.5 - 192.0') Gravelly silt with sand (ML); reddish brown (2.5YR 4/4); very fine grained to fine grained, subangular to round; no plasticity; some granules to very large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subround; some silt; wet; weak cementation; no staining			
194										
195										
196										
197	108	IRZ-15-SS-195-200			ML		(192.0 - 197.0') Sandy silt with gravel (ML); reddish brown (2.5YR 4/4); no plasticity; some granules to very large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subround; wet; weak cementation; no staining			
198										
199										
200										
							(197.0 - 200.0') Silty sand with gravel (SM); dark reddish brown (2.5YR 3/4); very fine grained to very coarse grained, angular to subangular; some granules to very large pebbles, angular; some silt; trace cobbles, angular; trace clay; wet; no staining	197' Zone is coarse grained and very saturated.	0 gal of water used	

Notes: USCS = Unified Soil Classification System, U = not detected above the laboratory reporting limit, ppb = Parts per Billion.

Date Started: 10/31/2018		Surface Elevation: N/A		Boring No.: IRZ-15 Pilot
Date Completed: 11/15/2018		Northing (NAD83): N/A		
Drilling Co.: Cascade		Easting (NAD83): N/A		Client: PG&E
Drilling Method: Sonic Drilling		Total Depth: 257 ft bgs		Location: Groundwater Remedy Phase I
Driller Name: Nick Petrone		Borehole Diameter: 6 in		Needles, California
Drilling Asst: T. Aylmer/J. Candelaria		Depth to First Water: N/A		
Logger: A. Garcia / G Jeffers		Sampling Method: 10 ft Core Barrel		Project Number: Topock
Editor: Sean McGrane		Sampling Interval: Continuous		
Weather: Sunny warm to hot		Converted to Well: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Description	Drilling Notes	Drilling Fluid
201	108	IRZ-15-SS-200-205			SM		(200.0 - 206.5') Silty sand with gravel (SM); reddish brown (2.5YR 4/4); very fine grained to very coarse grained, angular to subangular; some granules to very large pebbles, angular; some silt; trace cobbles, angular; trace clay; wet; no staining		
202									
203									
204									
205	108	IRZ-15-SS-205-210			ML		(206.5 - 212.0') Sandy silt with gravel (ML); reddish brown (2.5YR 4/4); low plasticity; some very fine to very coarse grained sand, angular to subround; little granules to very large pebbles, angular to subangular; trace clay; wet; weak cementation; no staining		0 gal of water used
206									
207									
208									
209	108	IRZ-15-SS-210-215			ML		(212.0 - 227.0') Sandy silt with gravel (ML); red (2.5YR 4/6); medium plasticity; some silt; little granules to very large pebbles, angular to subangular; little very fine to very coarse grained sand, angular to subround; trace clay; wet; weak cementation; no staining		
210									
211									
212									
213	108	IRZ-15-SS-215-220			ML		(212.0 - 227.0') Sandy silt with gravel (ML); red (2.5YR 4/6); medium plasticity; some silt; little granules to very large pebbles, angular to subangular; little very fine to very coarse grained sand, angular to subround; trace clay; wet; weak cementation; no staining		
214									
215									
216									
217	108	IRZ-15-SS-215-220			ML		(212.0 - 227.0') Sandy silt with gravel (ML); red (2.5YR 4/6); medium plasticity; some silt; little granules to very large pebbles, angular to subangular; little very fine to very coarse grained sand, angular to subround; trace clay; wet; weak cementation; no staining		
218									
219									
220									
220							(219.5') red (2.5YR 4/6) and gray (2.5Y 6/1); no staining		

Notes: USCS = Unified Soil Classification System, U = not detected above the laboratory reporting limit, ppb = Parts per Billion.

Date Started: <u>10/31/2018</u>	Surface Elevation: <u>N/A</u>	Boring No.: <u>IRZ-15 Pilot</u>
Date Completed: <u>11/15/2018</u>	Northing (NAD83): <u>N/A</u>	
Drilling Co.: <u>Cascade</u>	Easting (NAD83): <u>N/A</u>	Client: <u>PG&E</u>
Drilling Method: <u>Sonic Drilling</u>	Total Depth: <u>257 ft bgs</u>	Location: <u>Groundwater Remedy Phase I</u>
Driller Name: <u>Nick Petrone</u>	Borehole Diameter: <u>6 in</u>	<u>Needles, California</u>
Drilling Asst: <u>T. Aylmer/J. Candelaria</u>	Depth to First Water: <u>N/A</u>	
Logger: <u>A. Garcia / G Jeffers</u>	Sampling Method: <u>10 ft Core Barrel</u>	Project Number: <u>Topock</u>
Editor: <u>Sean McGrane</u>	Sampling Interval: <u>Continuous</u>	
Weather: <u>Sunny warm to hot</u>	Converted to Well: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Description	Drilling Notes	Drilling Fluid
221	96				ML				0 gal of water used
222									
223									
224									
225									
226									
227									
228	60			ML		(227.0 - 232.0') Sandy silt with gravel (ML); red (2.5YR 4/6); medium plasticity; some very fine to very coarse grained sand, angular to subround; little granules to very large pebbles, angular to subangular; little clay; wet; weak cementation; no staining			
229									
230									
231									
232									
233									
234	60	IRZ-15-SS-232-237		SM		(232.0 - 237.0') Silty sand with gravel (SM); red (2.5YR 4/6); very fine grained to very coarse grained, angular to subround; some granules to very large pebbles, angular; some silt; trace cobbles, angular; moist; no staining			
235									
236									
237									
238									
239									
240				SM		(237.0 - 247.0') Silty sand with gravel (SM); red (2.5YR 4/6); very fine grained to very coarse grained, angular to subround; some granules to very large pebbles, angular; some silt; trace cobbles, angular; trace clay; moist; no staining			

Notes: USCS = Unified Soil Classification System, U = not detected above the laboratory reporting limit, ppb = Parts per Billion.

Date Started: 10/31/2018	Surface Elevation: N/A	Boring No.: IRZ-15 Pilot
Date Completed: 11/15/2018	Northing (NAD83): N/A	
Drilling Co.: Cascade	Easting (NAD83): N/A	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 257 ft bgs	Location: Groundwater Remedy Phase I
Driller Name: Nick Petrone	Borehole Diameter: 6 in	Needles, California
Drilling Asst: T. Aylmer/J. Candelaria	Depth to First Water: N/A	
Logger: A. Garcia / G Jeffers	Sampling Method: 10 ft Core Barrel	Project Number: Topock
Editor: Sean McGrane	Sampling Interval: Continuous	
Weather: Sunny warm to hot	Converted to Well: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Description	Drilling Notes	Drilling Fluid
241	108				SM				
242									
243									
244									
245									
246									
247	108				SM				
248							(247.0 - 255.0') Silty sand with gravel (SM); red (2.5YR 4/6); very fine grained to medium grained, angular to subround; some granules to very large pebbles, angular; some silt; trace clay; moist; no staining; trace coarse to very coarse sand		
249									
250									
251									
252									
253									
254									
255									
256				Topock - Competent Bedrock - conglomerate			(255.0 - 257.0') Topock - Competent Bedrock - conglomerate; red (2.5YR 4/6)		
257									
258							End of Boring at 257.0 'bgs.		
259									
260									

Notes: USCS = Unified Soil Classification System, U = not detected above the laboratory reporting limit, ppb = Parts per Billion.

SOIL BORING LOG, PG&E TOPACK C:\USERS\MCGRANE\DOCUMENTS\PG&E TOPACK\DRIFT BORING LOGS\GINT FILES\12.31.18\TOPOCK DATABASE FOR PLOG.GPJ ARCADIS 20180927 PLOG.GDT 1/5/19

Date Started:	12/15/2018	Surface Elevation:	N/A	Boring No.: IRZ-21-Pilot	
Date Completed:	12/19/2018	Northing (NAD83):	N/A		
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	166 ft bgs	Location:	Groundwater Remedy Phase I
Driller Name:	Steve Vasquez	Borehole Diameter:	6 in	Needles, California	
Drilling Asst:	N. Dominguez/C. Alvarez	Depth to First Water:	N/A		
Logger:	Connor Mills	Sampling Method:	10 ft Core Barrel	Project Number:	Topock
Editor:	Sean McGrane	Sampling Interval:	Continuous		
Weather:	Sunny cool to warm	Converted to Well:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Description	Drilling Notes	Drilling Fluid
1	84				SP		(0.0 - 4.5') Poorly graded sand with gravel (SP); yellowish brown / moderate yellowish brown(10YR 5/4); very fine grained to medium grained, subangular to subround; some granules to very large pebbles, subangular to subround; trace silt; dry		
2									
3									
4									
5	120				GW		(4.5 - 11.5') Well graded gravel with sand (GW); brown (10YR 5/3); granules to very large pebbles, subangular to subround; some very fine to medium grained sand, angular to subround; trace cobbles, angular to subround; trace silt; dry		0 gal of water used
6									
7									
8									
9	120				SP		(11.5 - 13.0') Poorly graded sand (SP); yellowish brown (10YR 5/6); very fine grained to fine grained, subangular to round; trace granules, angular to subround; trace silt; dry		
10									
11									
12									
13	120				GW		(13.0 - 16.0') Well graded gravel with sand (GW); yellowish brown / moderate yellowish brown(10YR 5/4); granules to very large pebbles, subangular to subround; some very fine to medium grained sand, subangular to subround; trace silt; dry		
14									
15									
16									
17	120				SP		(16.0 - 17.0') Poorly graded sand (SP); yellowish brown (10YR 5/6); very fine grained to fine grained, subangular to round; trace granules, angular to subround; trace cobbles, angular to subangular; trace silt; dry		
18									
19									
20									
21	120				SP		(17.0 - 19.0') Poorly graded sand with gravel (SP); yellowish brown / moderate yellowish brown(10YR 5/4); very fine grained to medium grained, subangular to subround; some granules to very large pebbles, subangular to subround; trace silt; dry		
22									
23									
24									
25	120				GM		(19.0 - 23.0') Silty gravel with sand (GM); light yellowish brown (10YR 6/4); granules to very large pebbles, angular to subround; little very fine to coarse grained sand, angular to subangular; little silt; trace boulders; dry		
26									
27									
28									

Notes: USCS = Unified Soil Classification System, U = not detected above the laboratory reporting limit, ppb = Parts per Billion.

Date Started: 12/15/2018	Surface Elevation: N/A	Boring No.: IRZ-21-Pilot
Date Completed: 12/19/2018	Northing (NAD83): N/A	
Drilling Co.: Cascade	Easting (NAD83): N/A	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 166 ft bgs	Location: Groundwater Remedy Phase I
Driller Name: Steve Vasquez	Borehole Diameter: 6 in	Needles, California
Drilling Asst: N. Dominguez/C. Alvarez	Depth to First Water: N/A	
Logger: Connor Mills	Sampling Method: 10 ft Core Barrel	Project Number: Topock
Editor: Sean McGrane	Sampling Interval: Continuous	
Weather: Sunny cool to warm	Converted to Well: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	


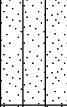




Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Description	Drilling Notes	Drilling Fluid
21	120				GM		(21') boulders; 1 foot solid core of basalt.		
22									
23					GM		(23.0 - 25.0') Silty gravel with sand (GM); light brownish gray / pale yellowish brown(10YR 6/2); granules to very large pebbles, subangular to subround; some silt; little very fine to very coarse grained sand, angular to subangular; trace boulders; dry; powdered boulder from 23-24.		
24									
25	120						(25.0 - 34.5') Silty gravel with sand (GM); yellowish brown / moderate yellowish brown(10YR 5/4); granules to large pebbles, angular to subangular; some silt; little very fine to very coarse grained sand, angular to subangular; dry		
26									
27									
28									
29					GM				
30									
31									
32									
33	60						(34.5 - 37.0') Silty gravel with sand (GM); light reddish brown / light brown(5YR 6/4); granules to very large pebbles; some very fine to coarse grained sand, angular to subangular; little silt; dry		
34									
35					GM				
36									
37	60						(37.0 - 42.0') Silty gravel with sand (GM); granules to very large pebbles, angular to subangular; some very fine to coarse grained sand, angular to subround; little silt; dry		
38									
39					GM				
40									

Notes: USCS = Unified Soil Classification System, U = not detected above the laboratory reporting limit, ppb = Parts per Billion.

Boring Log

Sheet: 3 of 9

Date Started: 12/15/2018	Surface Elevation: N/A	Boring No.: IRZ-21-Pilot
Date Completed: 12/19/2018	Northing (NAD83): N/A	
Drilling Co.: Cascade	Easting (NAD83): N/A	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 166 ft bgs	Location: Groundwater Remedy Phase I
Driller Name: Steve Vasquez	Borehole Diameter: 6 in	Needles, California
Drilling Asst: N. Dominguez/C. Alvarez	Depth to First Water: N/A	
Logger: Connor Mills	Sampling Method: 10 ft Core Barrel	Project Number: Topock
Editor: Sean McGrane	Sampling Interval: Continuous	
Weather: Sunny cool to warm	Converted to Well: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Description	Drilling Notes	Drilling Fluid
41					GM				
42									
43					SM		(42.0 - 43.5') Silty sand (SM); yellowish brown / moderate yellowish brown(10YR 5/4); fine grained to very coarse grained, subangular to subround; little granules to medium pebbles, angular to subangular; little silt; dry		
44									
45	60	IRZ-21-SS-43-48					(43.5 - 52.0') Silty sand (SM); light yellowish brown (10YR 6/4); fine grained to very coarse grained, angular to subround; some silt; little granules to large pebbles, angular to subround; little clay; moist (44.5'); wet	44.5' Approximate depth of water table	
46									
47									
48					SM				
49									
50		IRZ-21-SS-48-53							
51									
52	120								
53									
54									
55		IRZ-21-SS-52-57	IRZ-21-VAS-52-57 (97 ppb)		ML		(52.0 - 57.0') Silty sand with gravel (ML); light yellowish brown (10YR 6/4); no plasticity; some very fine to very coarse grained sand grained sand, angular to subangular; some silt; little granules to small pebbles, angular to subangular; little clay; wet		
56									
57									
58									
59		IRZ-21-SS-57-62			ML		(57.0 - 62.0') Gravelly silt with sand (ML); yellowish brown / moderate yellowish brown(10YR 5/4); no plasticity; some granules to very large pebbles, angular to subangular; little very fine to coarse grained sand, angular to subangular; little clay; wet		
60									

Notes: USCS = Unified Soil Classification System, U = not detected above the laboratory reporting limit, ppb = Parts per Billion.

Boring Log

Sheet: 4 of 9

Date Started: 12/15/2018	Surface Elevation: N/A	Boring No.: IRZ-21-Pilot
Date Completed: 12/19/2018	Northing (NAD83): N/A	
Drilling Co.: Cascade	Easting (NAD83): N/A	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 166 ft bgs	Location: Groundwater Remedy Phase I
Driller Name: Steve Vasquez	Borehole Diameter: 6 in	Needles, California
Drilling Asst: N. Dominguez/C. Alvarez	Depth to First Water: N/A	
Logger: Connor Mills	Sampling Method: 10 ft Core Barrel	Project Number: Topock
Editor: Sean McGrane	Sampling Interval: Continuous	
Weather: Sunny cool to warm	Converted to Well: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Description	Drilling Notes	Drilling Fluid
61	108	IRZ-21-SS-57-62			ML				
62							(62.0 - 64.5') Silty sand with gravel (SM); brown (7.5YR 5/3); very fine grained to very coarse grained, angular to subangular; some granules to very large pebbles, angular to subangular; some silt; wet; @ 64.5 ft bgs trace small cobbles of weathered metadiorite.		
63						SM			
64		IRZ-21-SS-62-67							
65							(64.5 - 67.0') Silty sand (SM); brown (10YR 5/3); fine grained to very coarse grained, subround to round; some silt; little granules to small pebbles, angular to subround; wet		
66					SM				
67									
68	108	IRZ-21-SS-67-72					(67.0 - 74.5') Clayey sand with gravel (SC); yellowish red (5YR 4/6); very fine grained to very coarse grained, angular to subangular; some clay; little granules to medium pebbles, angular to subangular; little silt; wet		
69									
70						SC			
71									
72		IRZ-21-SS-72-77							
73									
74									
75							(74.5 - 82.0') Silty sand with gravel (SM); reddish brown / moderate brown (5YR 4/4); fine grained to very coarse grained, angular to subround; some granules to very large pebbles, angular to subangular; some silt; wet; trace very large pebbles.		
76									
77					SM				
78		IRZ-21-SS-77-82	IRZ-21-VAS-77-82 (1.1 ppb)						
79									
80									

Notes: USCS = Unified Soil Classification System, U = not detected above the laboratory reporting limit, ppb = Parts per Billion.

0 gal of water used

Date Started: 12/15/2018	Surface Elevation: N/A	Boring No.: IRZ-21-Pilot
Date Completed: 12/19/2018	Northing (NAD83): N/A	
Drilling Co.: Cascade	Easting (NAD83): N/A	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 166 ft bgs	Location: Groundwater Remedy Phase I
Driller Name: Steve Vasquez	Borehole Diameter: 6 in	Needles, California
Drilling Asst: N. Dominguez/C. Alvarez	Depth to First Water: N/A	
Logger: Connor Mills	Sampling Method: 10 ft Core Barrel	Project Number: Topock
Editor: Sean McGrane	Sampling Interval: Continuous	
Weather: Sunny cool to warm	Converted to Well: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Description	Drilling Notes	Drilling Fluid
81	120	IRZ-21-SS-77-82	IRZ-21-VAS-77-82 (1.1 ppb)		SM				
82		IRZ-21-SS-82-87			ML		(82.0 - 87.0') Sandy silt with gravel (ML); brown (7.5YR 5/4); no plasticity; some clay; little granules to large pebbles, angular to subangular; little very fine to medium grained sand, angular to subangular; trace boulders, angular to subangular; dry to moist; tightly packed.		
83									
84									
85									
86	120	IRZ-21-SS-87-92			SM		(86.6'); trace 4 inch fragment of a boulder.		0 gal of water used
87									
88							(87.0 - 89.5') Silty sand with gravel (SM); reddish brown (5YR 5/4); very fine grained to very coarse grained, subangular to subround; some silt; little medium to very large pebbles, angular to subangular; little clay; wet		
89									
90		IRZ-21-SS-92-97			SM		(89.5 - 92.0') Silty sand with gravel (SM); reddish brown (5YR 5/4); very fine grained to very coarse grained, subangular to subround; some medium to very large pebbles, angular to subangular; little silt; little clay; wet		
91									
92							(92.0 - 97.0') Silty sand with gravel (SM); reddish brown (5YR 5/4); very fine grained to very coarse grained, angular to subangular; some granules to large pebbles, angular; some silt; little clay; wet		
93									
94	120	IRZ-21-SS-97-102			SM		(97.0 - 117.0') Silty sand with gravel (SM); reddish brown / moderate brown (5YR 4/4); very fine grained to very coarse grained, angular to subround; some small to large pebbles, angular to subangular; some silt; wet; composed of metadiorite		
95									
96									
97									
98									
99									
100									







Notes: USCS = Unified Soil Classification System, U = not detected above the laboratory reporting limit, ppb = Parts per Billion.

Date Started: 12/15/2018	Surface Elevation: N/A	Boring No.: IRZ-21-Pilot
Date Completed: 12/19/2018	Northing (NAD83): N/A	
Drilling Co.: Cascade	Easting (NAD83): N/A	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 166 ft bgs	Location: Groundwater Remedy Phase I
Driller Name: Steve Vasquez	Borehole Diameter: 6 in	Needles, California
Drilling Asst: N. Dominguez/C. Alvarez	Depth to First Water: N/A	
Logger: Connor Mills	Sampling Method: 10 ft Core Barrel	Project Number: Topock
Editor: Sean McGrane	Sampling Interval: Continuous	
Weather: Sunny cool to warm	Converted to Well: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Description	Drilling Notes	Drilling Fluid
101	120	IRZ-21-SS-97-102							
102									
103									
104									
105		IRZ-21-SS-102-107							
106	120								
107									
108									
109					SM				
110		IRZ-21-SS-107-112							
111									
112							(111.5'); trace cobbles		
113									
114									
115		IRZ-21-SS-112-117	IRZ-21-VAS-112-117 (< 0.17 U ppb)						
116	120								
117									
118							(117.0 - 121.0') Silty sand with gravel (SM); reddish brown / moderate brown(5YR 4/4); very fine grained to very coarse grained, subangular to round; little small to large pebbles, angular; little silt; little clay; wet; gravel composed of metadiorite		
119		IRZ-21-SS-117-122			SM				
120									
121									

Notes: USCS = Unified Soil Classification System, U = not detected above the laboratory reporting limit, ppb = Parts per Billion.

Date Started: 12/15/2018	Surface Elevation: N/A	Boring No.: IRZ-21-Pilot
Date Completed: 12/19/2018	Northing (NAD83): N/A	
Drilling Co.: Cascade	Easting (NAD83): N/A	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 166 ft bgs	Location: Groundwater Remedy Phase I
Driller Name: Steve Vasquez	Borehole Diameter: 6 in	Needles, California
Drilling Asst: N. Dominguez/C. Alvarez	Depth to First Water: N/A	
Logger: Connor Mills	Sampling Method: 10 ft Core Barrel	Project Number: Topock
Editor: Sean McGrane	Sampling Interval: Continuous	
Weather: Sunny cool to warm	Converted to Well: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Description	Drilling Notes	Drilling Fluid
121	120	IRZ-21-SS-117-122			SM				
122		IRZ-21-SS-122-127			ML		(121.0 - 127.0') Silt with sand (ML); yellowish red (5YR 4/6); low plasticity; some clay; little granules to medium pebbles, angular to subangular; little very fine to very coarse grained sand, angular to subround; wet; gravel composed of metadiorite		
123									
124									
125									
126	137	IRZ-21-SS-127-132			ML		(127.0 - 129.5') Sandy silt (ML); reddish brown (5YR 5/4); low plasticity; little granules to large pebbles, angular to subangular; little very fine to very coarse grained sand, angular to subround; wet; gravel composed of metadiorite		
127									
128					SM		(129.5 - 132.0') Silty sand (SM); reddish brown (5YR 5/4); very fine grained to very coarse grained, angular to subangular; and silt; little granules to medium pebbles, angular to subangular; wet; gravel composed of metadiorite		
129									
130		IRZ-21-SS-132-137	IRZ-21-VAS-132-137 (< 0.17 U ppb)		GC		(132.0 - 136.0') Clayey gravel with sand (GC); reddish brown (5YR 5/4); granules to large pebbles, angular to subangular; some clay; little very fine to very coarse grained sand, angular to subangular; little silt; wet; gravel composed of metadiorite		
131									
132									
133									
134		IRZ-21-SS-137-142			ML		(136.0 - 146.0') Sandy silt (ML); reddish brown (5YR 5/4); no plasticity; some clay; little granules to medium pebbles, angular to subangular; little very fine to very coarse grained sand, angular to subangular; moist; gravel composed of metadiorite		
135									
136									
137									
138									
139									
140									

0 gal of water used

Notes: USCS = Unified Soil Classification System, U = not detected above the laboratory reporting limit, ppb = Parts per Billion.


Date Started: 12/15/2018	Surface Elevation: N/A	Boring No.: IRZ-21-Pilot
Date Completed: 12/19/2018	Northing (NAD83): N/A	
Drilling Co.: Cascade	Easting (NAD83): N/A	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 166 ft bgs	Location: Groundwater Remedy Phase I
Driller Name: Steve Vasquez	Borehole Diameter: 6 in	Needles, California
Drilling Asst: N. Dominguez/C. Alvarez	Depth to First Water: N/A	
Logger: Connor Mills	Sampling Method: 10 ft Core Barrel	Project Number: Topock
Editor: Sean McGrane	Sampling Interval: Continuous	
Weather: Sunny cool to warm	Converted to Well: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Description	Drilling Notes	Drilling Fluid
141	120	IRZ-21-SS-137-142			ML				
142									
143									
144									
145		IRZ-21-SS-142-147							
146									
147							(146.0 - 153.0') Silty sand with gravel (SM); reddish brown / moderate brown(5YR 4/4); fine grained to very coarse grained, subangular to round; some silt; little granule to medium pebble, subangular to subround; wet; gravel composed of metadiorite		
148									
149	54	IRZ-21-SS-147-152	IRZ-21-VAS-147-152 (3600 ppb)		SM				0 gal of water used
150									
151									
152									
153									
154	102	IRZ-21-SS-152-158			ML		(153.0 - 158.0') Sandy silt (ML); yellowish red (5YR 4/6); no plasticity; some very fine to very coarse grained sand, angular to subround; little granule to large pebble, subangular to subround; dry to moist; gravel composed of metadiorite, some metadiorite has iron oxidation		
155									
156									
157									
158									
159				Topock - Competent Bedrock - conglomerate			(158.0 - 166.0') Topock - Competent Bedrock - conglomerate; red (2.5YR 5/6); dry	158' Rough drilling	
160									

Notes: USCS = Unified Soil Classification System, U = not detected above the laboratory reporting limit, ppb = Parts per Billion.

Boring Log

Date Started:	12/15/2018	Surface Elevation:	N/A	Boring No.: IRZ-21-Pilot	
Date Completed:	12/19/2018	Northing (NAD83):	N/A		
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	166 ft bgs	Location:	Groundwater Remedy Phase I
Driller Name:	Steve Vasquez	Borehole Diameter:	6 in	Needles, California	
Drilling Asst:	N. Dominguez/C. Alvarez	Depth to First Water:	N/A		
Logger:	Connor Mills	Sampling Method:	10 ft Core Barrel	Project Number: Topock	
Editor:	Sean McGrane	Sampling Interval:	Continuous		
Weather:	Sunny cool to warm	Converted to Well:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Description	Drilling Notes	Drilling Fluid
161	60			Topock - Competent Bedrock - conglomerate					
162									
163									
164									
165									
166									
End of Boring at 166.0 'bgs.									
167									
168									
169									
170									
171									
172									
173									
174									
175									
176									
177									
178									
179									
180									

Notes: USCS = Unified Soil Classification System, U = not detected above the laboratory reporting limit, ppb = Parts per Billion.

Date Started: 11/28/2018	Surface Elevation: N/A	Boring No.: IRZ-23 Pilot
Date Completed: 12/03/2018	Northing (NAD83): N/A	
Drilling Co.: Cascade	Easting (NAD83): N/A	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 147 ft bgs	Location: Groundwater Remedy Phase I
Driller Name: Steve Vasquez	Borehole Diameter: 6 in	Needles, California
Drilling Asst: N. Dominguez/C. Alvarez	Depth to First Water: N/A	
Logger: Connor Mills	Sampling Method: 10 ft Core Barrel	Project Number: Topock
Editor: Sean McGrane	Sampling Interval: Continuous	
Weather: Partly Cloudy 46 to 74 F	Converted to Well: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	







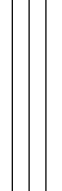
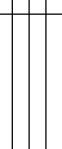

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Description	Drilling Notes	Drilling Fluid
1	84				SP-SM		(0.0 - 2.0') Poorly graded sand with silt and gravel (SP-SM); brown (7.5YR 5/3); very fine grained to medium grained, angular to subround; little granule to very large pebbles, subangular to round; little silt; trace cobbles, subangular to round; dry		
2									
3					GM		(2.0 - 4.5') Silty gravel with sand (GM); brown (7.5YR 5/3); granules to large pebbles, angular to subround; some very fine to medium grained sand, angular to subround; some silt; trace cobbles, angular to subangular; dry; a 2 inch streak of orangish silt is through out the core.		
4									
5	120				SW-SM		(4.5 - 5.0') Well graded sand with silt (SW-SM); very pale brown / grayish orange(10YR 7/4); very fine grained to coarse grained, angular to round; little silt; dry		
6					GM		(5.0 - 7.0') Silty gravel with sand (GM); brown (7.5YR 5/3); granules to large pebbles, angular to subangular; some very fine to medium grained sand, angular to subangular; trace cobbles, angular to subangular; dry		
7									
8									
9	60				SP-SM		(7.0 - 17.0') Poorly graded sand with silt and gravel (SP-SM); very fine grained to medium grained, subangular to subround; some granule to very large pebbles, angular to round; little silt; trace cobbles, angular to subround; dry		0 gal of water used
10									
11									
12									
13									
14									
15									
16									
17					SM		(17.0 - 19.5') Silty sand (SM); reddish brown (5YR 5/3) with brownish yellow / dark yellowish orange(10YR 6/6); very fine grained to fine grained, angular to subround; little silt; trace boulders; dry		
18							(18') very dark grayish brown (10YR 3/2); solid 1.5 ft core of basalt with a frothy texture.		
19									
20					SM		(19.5 - 23.0') Silty sand with gravel (SM); brown (10YR 5/3); very fine		

Notes: USCS = Unified Soil Classification System, U = not detected above the laboratory reporting limit, ppb = Parts per Billion.

Boring Log

Sheet: 2 of 8

Date Started: <u>11/28/2018</u>	Surface Elevation: <u>N/A</u>	Boring No.: <u>IRZ-23 Pilot</u>
Date Completed: <u>12/03/2018</u>	Northing (NAD83): <u>N/A</u>	
Drilling Co.: <u>Cascade</u>	Easting (NAD83): <u>N/A</u>	Client: <u>PG&E</u>
Drilling Method: <u>Sonic Drilling</u>	Total Depth: <u>147 ft bgs</u>	Location: <u>Groundwater Remedy Phase I</u>
Driller Name: <u>Steve Vasquez</u>	Borehole Diameter: <u>6 in</u>	<u>Needles, California</u>
Drilling Asst: <u>N. Dominguez/C. Alvarez</u>	Depth to First Water: <u>N/A</u>	
Logger: <u>Connor Mills</u>	Sampling Method: <u>10 ft Core Barrel</u>	Project Number: <u>Topock</u>
Editor: <u>Sean McGrane</u>	Sampling Interval: <u>Continuous</u>	
Weather: <u>Partly Cloudy 46 to 74 F</u>	Converted to Well: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Description	Drilling Notes	Drilling Fluid
21	60				SM		grained to coarse grained, angular to subround; some granule to very large pebbles, angular to subround; some silt; trace cobbles, angular to subangular; dry		
22									
23					ML		(23.0 - 23.5') Silt with sand (ML); gray (10YR 5/1); no plasticity; little very fine to coarse grained sand, angular to subround; trace granule to medium pebbles, angular to subround; dry; soft		
24					GW-GM		(23.5 - 27.0') Well graded gravel with silt and sand (GW-GM); light brown (7.5YR 6/3); granules to very large pebbles; some very fine to coarse grained sand, angular to subround; little silt; dry		
25	60								
26									
27									
28					GM		(27.0 - 30.5') Silty gravel (GM); brown (10YR 5/3); granules to very large pebbles, angular to subround; and silt; little fine to medium grained sand, angular to subround; trace cobbles, angular; dry; gravel composed of 1-4 in. metadiorite, cobbles were pulverized into a silty powder.		
29	60								
30									
31					SM		(30.5 - 31.5') Silty sand with gravel (SM); light yellowish brown (10YR 6/4); very fine grained to coarse grained, subangular to subround; and granule to large pebble, subangular to subround; some silt; dry		
32					ML		(31.5 - 32.0') Silt with sand (ML); gray (10YR 5/1); no plasticity; little very fine to coarse grained sand, angular to subround; trace granule to medium pebbles, angular to subround; dry; soft; 4.5 inch Basalt boulder at end of core.		
33	120				ML		(32.0 - 35.0') Sandy silt with gravel (ML); brown (7.5YR 5/3); no plasticity; some very fine to coarse grained sand, angular to subround; little granule to large pebbles, angular to subangular; dry		
34									
35									
36					ML		(35.0 - 37.0') Gravelly silt with sand (ML); brown (7.5YR 5/3); no plasticity; some granule to very large pebbles, angular to subangular; little very fine to coarse grained sand, angular to subangular; dry		
37	120								
38					ML		(37.0 - 47.0') Sandy silt with gravel (ML); no plasticity; some very fine to coarse grained sand, angular to subangular; little small to medium pebbles, angular to subangular; dry; soft		
39									
40									

0 gal of water used

Notes: USCS = Unified Soil Classification System, U = not detected above the laboratory reporting limit, ppb = Parts per Billion.

Date Started: 11/28/2018	Surface Elevation: N/A	Boring No.: IRZ-23 Pilot
Date Completed: 12/03/2018	Northing (NAD83): N/A	
Drilling Co.: Cascade	Easting (NAD83): N/A	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 147 ft bgs	Location: Groundwater Remedy Phase I
Driller Name: Steve Vasquez	Borehole Diameter: 6 in	Needles, California
Drilling Asst: N. Dominguez/C. Alvarez	Depth to First Water: N/A	
Logger: Connor Mills	Sampling Method: 10 ft Core Barrel	Project Number: Topock
Editor: Sean McGrane	Sampling Interval: Continuous	
Weather: Partly Cloudy 46 to 74 F	Converted to Well: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Description	Drilling Notes	Drilling Fluid
41									
42									
43									
44					ML				
45									
46									
47	108	IRZ-23-SS-45-50					(47.0 - 49.5') Silty sand (SM); fine grained to very coarse grained, subangular to subround; some silt; little granule to large pebbles, angular to subangular; poorly sorted; wet	47' Approximate depth of water table.	
48					SM				
49									
50					SM		(49.5 - 52.0') Silty sand with gravel (SM); very fine grained to coarse grained, angular to subround; some silt; little granule to very large pebbles, angular to subangular; trace cobbles, angular to subangular; wet		0 gal of water used
51									
52		IRZ-23-SS-50-55					(52.0 - 59.5') Silt with sand (ML); no plasticity; little fine to coarse grained sand, angular to subround; trace medium to very large pebble, angular to subangular; wet		
53									
54									
55									
56					ML				
57	120	IRZ-23-SS-55-60							
58			IRZ-23-VAS-57-62 (5.3 ppb)						
59									
60					SM		(59.5 - 62.0') Silty sand with gravel (SM); brown (7.5YR 5/3); very fine		

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Boring Log

Sheet: 4 of 8

Date Started: 11/28/2018	Surface Elevation: N/A	Boring No.: IRZ-23 Pilot
Date Completed: 12/03/2018	Northing (NAD83): N/A	
Drilling Co.: Cascade	Easting (NAD83): N/A	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 147 ft bgs	Location: Groundwater Remedy Phase I
Driller Name: Steve Vasquez	Borehole Diameter: 6 in	Needles, California
Drilling Asst: N. Dominguez/C. Alvarez	Depth to First Water: N/A	
Logger: Connor Mills	Sampling Method: 10 ft Core Barrel	Project Number: Topock
Editor: Sean McGrane	Sampling Interval: Continuous	
Weather: Partly Cloudy 46 to 74 F	Converted to Well: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Description	Drilling Notes	Drilling Fluid
61			IRZ-23-VAS-57-62 (5.3 ppb)		SM		grained to very coarse grained, angular to subround; some silt; little granule to medium pebbles, angular to subround; wet		
62		IRZ-23-SS-60-65					(62.0 - 69.5') Silty sand with gravel (SM); brown (7.5YR 5/3); fine grained to very coarse grained, angular to subround; some granule to very large pebbles, subangular to subround; little silt; trace cobbles, subangular to round; wet	62' Sediments were very saturated	
63									
64									
65									
66					SM				
67	120								
68		IRZ-23-SS-65-70							
69									
70			IRZ-23-VAS-67-72 (85 ppb)				(69.5 - 72.0') Silty sand with gravel (SM); brown (7.5YR 5/3); fine grained to very coarse grained, angular to subround; little granules to very large pebbles, subangular to subround; little silt; trace cobbles, subangular to round; wet		0 gal of water used
71					SM				
72		IRZ-23-SS-70-75					(72.0 - 82.0') Silt with sand (ML); reddish brown (5YR 5/3); no plasticity; little very fine to medium grained sand, angular to subround; trace granule to small pebbles, angular to subangular; dry; potential contact of older and younger alluvium	72' Drilling was tough, cores came out hot and smoking	
73									
74									
75									
76					ML				
77	120								
78		IRZ-23-SS-75-80							
79									
80									

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Date Started: 11/28/2018	Surface Elevation: N/A	Boring No.: IRZ-23 Pilot
Date Completed: 12/03/2018	Northing (NAD83): N/A	
Drilling Co.: Cascade	Easting (NAD83): N/A	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 147 ft bgs	Location: Groundwater Remedy Phase I
Driller Name: Steve Vasquez	Borehole Diameter: 6 in	Needles, California
Drilling Asst: N. Dominguez/C. Alvarez	Depth to First Water: N/A	
Logger: Connor Mills	Sampling Method: 10 ft Core Barrel	Project Number: Topock
Editor: Sean McGrane	Sampling Interval: Continuous	
Weather: Partly Cloudy 46 to 74 F	Converted to Well: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Description	Drilling Notes	Drilling Fluid
81					ML				
82		IRZ-23-SS-80-85			SM		(82.0 - 84.5') Silty sand (SM); brown (7.5YR 4/4); very fine grained to coarse grained, angular to subangular; and silt; little granule to large pebbles, angular to subangular; wet		
83									
84									
85					ML		(84.5 - 87.0') Sandy silt (ML); reddish brown (5YR 5/4); no plasticity; little granule to medium pebbles, angular to subangular; little very fine to coarse grained sand, angular to subangular; moist; medium stiff		
86									
87	108	IRZ-23-SS-85-90					(87.0 - 94.5') Silty sand (SM); brown (7.5YR 4/4); very fine grained to coarse grained, angular to subangular; some silt; little granule to large pebbles, angular to subangular; little clay; wet		
88									
89									
90					SM				
91									
92		IRZ-23-SS-90-95							
93									
94			IRZ-23-VAS-92-97 (<0.033 U ppb)						
95					SM		(94.5 - 97.0') Silty sand (SM); reddish brown (5YR 5/4); fine grained to very coarse grained, angular to subround; some silt; little granule to medium pebbles, angular to subround; wet		
96									
97	120	IRZ-23-SS-95-100					(97.0 - 102.0') Silty sand (SM); dark yellowish brown (10YR 4/4); fine grained to very coarse grained, angular to subround; some silt; trace granule to large pebbles, angular to subangular; wet		
98									
99					SM				
100	54								

0 gal of water used



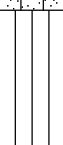

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Date Started: 11/28/2018	Surface Elevation: N/A	Boring No.: IRZ-23 Pilot
Date Completed: 12/03/2018	Northing (NAD83): N/A	
Drilling Co.: Cascade	Easting (NAD83): N/A	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 147 ft bgs	Location: Groundwater Remedy Phase I
Driller Name: Steve Vasquez	Borehole Diameter: 6 in	Needles, California
Drilling Asst: N. Dominguez/C. Alvarez	Depth to First Water: N/A	
Logger: Connor Mills	Sampling Method: 10 ft Core Barrel	Project Number: Topock
Editor: Sean McGrane	Sampling Interval: Continuous	
Weather: Partly Cloudy 46 to 74 F	Converted to Well: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Description	Drilling Notes	Drilling Fluid
101					SM				
102		IRZ-23-SS-100-105			GM		(102.0 - 103.0') Silty gravel (GM); brown (7.5YR 4/4); granules to very large pebbles, angular to subangular; some silt; little very fine to medium grained sand, angular to subround; trace cobbles, angular to subangular; dry		
103					SM		(103.0 - 107.0') Silty sand with gravel (SM); dark yellowish brown (10YR 4/4); fine grained to very coarse grained, subangular to subround; some silt; little granule to large pebbles, angular to subangular; wet		
104									
105									
106									
107		IRZ-23-SS-105-110					(107.0 - 117.0') Silty gravel (GM); brown (10YR 4/3); granules to large pebbles, subangular to subround; little fine to very coarse grained sand, angular to subround; little silt; little clay; dry; potential contact of older and younger alluvium		
108									
109									
110									
111									
112	120	IRZ-23-SS-110-115			GM				
113									
114									
115									
116									
117		IRZ-23-SS-115-120					(117.0 - 122.0') Silty sand with gravel (SM); brown (7.5YR 4/4); very fine grained to coarse grained, angular to subround; and silt; little granule to medium pebbles, angular to subangular; wet; tight formation, potential contact of weathered bedrock.	117' hard drilling, dry	
118					SM				
119									
120									

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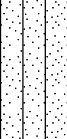

Date Started: 11/28/2018	Surface Elevation: N/A	Boring No.: IRZ-23 Pilot
Date Completed: 12/03/2018	Northing (NAD83): N/A	
Drilling Co.: Cascade	Easting (NAD83): N/A	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 147 ft bgs	Location: Groundwater Remedy Phase I
Driller Name: Steve Vasquez	Borehole Diameter: 6 in	Needles, California
Drilling Asst: N. Dominguez/C. Alvarez	Depth to First Water: N/A	
Logger: Connor Mills	Sampling Method: 10 ft Core Barrel	Project Number: Topock
Editor: Sean McGrane	Sampling Interval: Continuous	
Weather: Partly Cloudy 46 to 74 F	Converted to Well: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Description	Drilling Notes	Drilling Fluid
121	120	IRZ-23-SS-120-125	IRZ-23-VAS-122-127 (2000 ppb)		SM				
122							(122.0 - 127.0') Sandy silt with gravel (ML); yellowish red (5YR 4/6); no plasticity; little granule to medium pebbles, angular to subangular; little fine to medium grained sand, angular to subangular; wet		
123									
124									
125									
126	114	IRZ-23-SS-125-130			SM		(127.0 - 133.0') Silty sand (SM); (5YR 4/8); fine grained to coarse grained, angular to subround; some silt; little granule to medium pebbles, angular to subangular; wet; granules and pebbles composed of trace pieces of metadiorite 1-4 in. dia.		
127									
128									
129									
130									
131		IRZ-23-SS-130-135			ML		(133.0 - 136.5') Sandy silt (ML); reddish brown (5YR 4/3); no plasticity; some very fine to medium grained sand, angular to subround; trace granule to medium pebbles, angular to subround; wet		
132									
133									
134									
135									
136	IRZ-23-SS-135-140	GM		(136.5 - 137.0') Silty gravel (GM); dark gray (7.5YR 4/1); granules to very large pebbles, angular to subangular; some silt; little very fine to medium grained sand, angular to subangular; dry					
137				(137.0 - 139.5') Silty gravel with sand (GM); reddish brown / moderate brown(5YR 4/4); granules to large pebbles, angular to subangular; some silt; little fine to coarse grained sand, angular to subround; trace clay; wet; trace pebbles of metadiorite 20-70 mm.					
138									
139									
140				IRZ-23-VAS-139-144 (3000 ppb)	SM	(139.5 - 142.0') Silty sand (SM); yellowish red (5YR 4/6); very fine			

0 gal of water used

Notes: USCS = Unified Soil Classification System, U = not detected above the laboratory reporting limit, ppb = Parts per Billion.

Date Started: 11/28/2018	Surface Elevation: N/A	Boring No.: IRZ-23 Pilot
Date Completed: 12/03/2018	Northing (NAD83): N/A	
Drilling Co.: Cascade	Easting (NAD83): N/A	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 147 ft bgs	Location: Groundwater Remedy Phase I
Driller Name: Steve Vasquez	Borehole Diameter: 6 in	Needles, California
Drilling Asst: N. Dominguez/C. Alvarez	Depth to First Water: N/A	
Logger: Connor Mills	Sampling Method: 10 ft Core Barrel	Project Number: Topock
Editor: Sean McGrane	Sampling Interval: Continuous	
Weather: Partly Cloudy 46 to 74 F	Converted to Well: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Description	Drilling Notes	Drilling Fluid
141	120	IRZ-23-SS-140-147	IRZ-23-VAS-139-144 (3000 ppb)	Topock - Competent Bedrock - conglomerate	SM		grained to coarse grained, angular to subround; and silt; trace granule to medium pebbles, angular to subround; wet; trace pebbles of metadiorite 10-40 mm.	142' Drill was tough with rig chattering.	0 gal of water used
142					ML		(142.0 - 147.0') Topock - Competent Bedrock - conglomerate; Silt with sand (ML); yellowish red (5YR 4/6); no plasticity; little very fine to coarse grained sand, subangular to round; trace granule, subround to round; dry; hard; strong cementation		
143									
144									
145									
146									
147							End of Boring at 147.0 'bgs.		
148									
149									
150									
151									
152									
153									
154									
155									
156									
157									
158									
159									
160									

Notes: USCS = Unified Soil Classification System, U = not detected above the laboratory reporting limit, ppb = Parts per Billion.

Date Started: 12/04/2018 Surface Elevation: N/A
 Date Completed: 12/12/2018 Northing (NAD83): N/A
 Drilling Co.: Cascade Easting (NAD83): N/A Client: PG&E
 Drilling Method: Sonic Drilling Total Depth: 172 ft bgs Location: Groundwater Remedy Phase I
 Driller Name: Steve Vasquez Borehole Diameter: 6 in Needles, California
 Drilling Asst: N. Dominguez/C. Alvarez Depth to First Water: N/A
 Logger: Connor Mills Sampling Method: 10 ft Core Barrel Project Number: Topock
 Editor: Sean McGrane Sampling Interval: Continuous
 Weather: Sunny cool to warm Converted to Well: ☐ Yes ☒ No

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Description	Drilling Notes	Drilling Fluid
1	84				SP-SM		(0.0 - 4.5') Poorly graded sand with silt and gravel (SP-SM); very fine grained to fine grained, subangular to subround; little granules to very large pebbles, angular to subangular; little silt; dry		
2									
3									
4							(4'); 0.5 ft thick lens of granule- medium pebbles		
5	10				SP-SM		(4.5 - 12.0') Poorly graded sand with silt (SP-SM); pale brown (10YR 6/3); very fine grained to fine grained, angular to subround; little silt; trace granules to very large pebbles, angular to round; trace cobbles, subround to round; dry	7' rough drilling.	0 gal of water used
6									
7									
8									
9					SW-SM		(12.0 - 17.0') Well graded sand with silt and gravel (SW-SM); pale brown (10YR 6/3); very fine grained to coarse grained, angular to subround; some granules to very large pebbles, angular to subangular; little silt; trace cobbles, angular to subangular; trace boulders, angular to subangular; dry		
10									
11									
12									
13					SM		(14') very dark grayish brown (10YR 3/2); basalt boulders with frothy texture, in soil core segments.		
14									
15									
16									
17							(17.0 - 20.5') Silty sand with gravel (SM); brown (10YR 5/3); very fine grained to coarse grained, angular to subangular; some silt; little granules to very large pebbles, angular to subround; trace cobbles, angular to subangular; trace boulders, angular to subangular; dry		
18									
19									
20							(19') gray (7.5YR 6/1) and white (10YR 8/1); 1.5 ft core from a boulder composed of metadiorite, very hard.		








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Date Started: <u>12/04/2018</u>	Surface Elevation: <u>N/A</u>	Boring No.: <u>IRZ-25-Pilot</u>
Date Completed: <u>12/12/2018</u>	Northing (NAD83): <u>N/A</u>	
Drilling Co.: <u>Cascade</u>	Easting (NAD83): <u>N/A</u>	Client: <u>PG&E</u>
Drilling Method: <u>Sonic Drilling</u>	Total Depth: <u>172 ft bgs</u>	Location: <u>Groundwater Remedy Phase I</u>
Driller Name: <u>Steve Vasquez</u>	Borehole Diameter: <u>6 in</u>	<u>Needles, California</u>
Drilling Asst: <u>N. Dominguez/C. Alvarez</u>	Depth to First Water: <u>N/A</u>	
Logger: <u>Connor Mills</u>	Sampling Method: <u>10 ft Core Barrel</u>	Project Number: <u>Topock</u>
Editor: <u>Sean McGrane</u>	Sampling Interval: <u>Continuous</u>	
Weather: <u>Sunny cool to warm</u>	Converted to Well: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Description	Drilling Notes	Drilling Fluid			
21	10				SM		(20.5 - 32.0') Sandy silt with gravel (ML); light yellowish brown (10YR 6/4); no plasticity; little granules to large pebbles, angular to subround; little very fine to fine grained sand, angular to subround; trace cobbles, angular to subround; trace boulders, angular to subangular; dry		0 gal of water used			
22												
23												
24												
25												
26	10					ML				(29.5'); to 32' powerdized rock and solid cores from boulders composed of metadiorite.		
27												
28												
29												
30												
31	10							(32.0 - 40.0') Silty sand with gravel (SM); pale brown (10YR 6/3); very fine grained to medium grained, angular to subround; and granules to very large pebbles, subangular to subround; little silt; trace cobbles, angular to subround; dry				
32												
33												
34												
35												
36	10					SM						
37												
38												
39												
40												




Notes: USCS = Unified Soil Classification System, U = not detected above the laboratory reporting limit, ppb = Parts per Billion.

Date Started: <u>12/04/2018</u>	Surface Elevation: <u>N/A</u>	Boring No.: <u>IRZ-25-Pilot</u>
Date Completed: <u>12/12/2018</u>	Northing (NAD83): <u>N/A</u>	
Drilling Co.: <u>Cascade</u>	Easting (NAD83): <u>N/A</u>	Client: <u>PG&E</u>
Drilling Method: <u>Sonic Drilling</u>	Total Depth: <u>172 ft bgs</u>	Location: <u>Groundwater Remedy Phase I</u>
Driller Name: <u>Steve Vasquez</u>	Borehole Diameter: <u>6 in</u>	<u>Needles, California</u>
Drilling Asst: <u>N. Dominguez/C. Alvarez</u>	Depth to First Water: <u>N/A</u>	
Logger: <u>Connor Mills</u>	Sampling Method: <u>10 ft Core Barrel</u>	Project Number: <u>Topock</u>
Editor: <u>Sean McGrane</u>	Sampling Interval: <u>Continuous</u>	
Weather: <u>Sunny cool to warm</u>	Converted to Well: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Description	Drilling Notes	Drilling Fluid
41	9				GM		(40.0 - 41.5') Silty gravel with sand (GM); pale brown (10YR 6/3); granules to very large pebbles, angular to subround; some very fine to medium grained sand, angular to subangular; little silt; trace cobbles, angular to subround; dry		
42					GW-GM		(41.5 - 49.5') Well graded gravel with silt and sand (GW-GM); light brown (7.5YR 6/4); granules to very large pebbles, subangular to subround; some cobbles, angular to subround; little very fine to medium grained sand, angular to round; little silt; dry		
43									
44									
45	9.5	IRZ-25-SS-47-52			SM		(47'); moist; to 49.5 ft bgs		
46									
47		IRZ-25-SS-52-57	IRZ-25-VAS-52-57 (3500 ppb)		GM		(49.5 - 52.0') Silty sand with gravel (SM); brown (10YR 5/3); very fine grained to very coarse grained, subangular to subround; some granules to medium pebbles, angular to subangular; some silt; wet	49.5' Approximate depth to water table.	0 gal of water used
48									
49									
50									
51									
52		IRZ-25-SS-57-62			ML		(52.0 - 57.0') Silty gravel with sand (GM); reddish brown (5YR 5/4); angular to subangular; some very fine to coarse grained sand, angular to subangular; some silt; little clay; dry to moist		
53									
54									
55									
56					GM		(57.0 - 59.5') Sandy silt (ML); reddish brown (5YR 5/4); no plasticity; and very fine to very coarse grained sand, angular to subangular; little granules to small pebble, angular to subangular; wet to dry; stiff; strong cementation		
57									
58									
59									
60					GM		(59.5 - 68.0') Silty gravel with sand (GM); reddish brown (5YR 5/4);		

Notes: USCS = Unified Soil Classification System, U = not detected above the laboratory reporting limit, ppb = Parts per Billion.

Date Started: 12/04/2018	Surface Elevation: N/A	Boring No.: IRZ-25-Pilot
Date Completed: 12/12/2018	Northing (NAD83): N/A	
Drilling Co.: Cascade	Easting (NAD83): N/A	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 172 ft bgs	Location: Groundwater Remedy Phase I
Driller Name: Steve Vasquez	Borehole Diameter: 6 in	Needles, California
Drilling Asst: N. Dominguez/C. Alvarez	Depth to First Water: N/A	
Logger: Connor Mills	Sampling Method: 10 ft Core Barrel	Project Number: Topock
Editor: Sean McGrane	Sampling Interval: Continuous	
Weather: Sunny cool to warm	Converted to Well: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Description	Drilling Notes	Drilling Fluid
61	10	IRZ-25-SS-57-62			GM		granules to very large pebbles, angular to subangular; some very fine to coarse grained sand, angular to subangular; some silt; little clay; dry to moist		
62									
63									
64									
65	10	IRZ-25-SS-62-67	IRZ-25-VAS-62-67 (620 ppb)		SM		(68.0 - 72.0') Silty sand with gravel (SM); reddish brown (5YR 5/4); very fine grained to very coarse grained, subangular to subround; some silt; little granules to medium pebble, angular to subangular; wet		0 gal of water used
66									
67									
68									
69									
70									
71									
72									
73									
74									
75									
76									
77									
78									
79									
80									
					SM		(79.5 - 87.0') Silty sand with gravel (SM); reddish brown (5YR 5/4);		

Notes: USCS = Unified Soil Classification System, U = not detected above the laboratory reporting limit, ppb = Parts per Billion.

Boring Log

Sheet: 5 of 9

Date Started: 12/04/2018	Surface Elevation: N/A	Boring No.: IRZ-25-Pilot
Date Completed: 12/12/2018	Northing (NAD83): N/A	
Drilling Co.: Cascade	Easting (NAD83): N/A	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 172 ft bgs	Location: Groundwater Remedy Phase I
Driller Name: Steve Vasquez	Borehole Diameter: 6 in	Needles, California
Drilling Asst: N. Dominguez/C. Alvarez	Depth to First Water: N/A	
Logger: Connor Mills	Sampling Method: 10 ft Core Barrel	Project Number: Topock
Editor: Sean McGrane	Sampling Interval: Continuous	
Weather: Sunny cool to warm	Converted to Well: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	




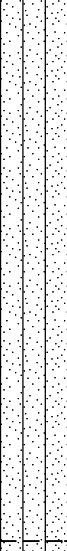


Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Description	Drilling Notes	Drilling Fluid
81	5	IRZ-25-SS-77-82			SM		very fine grained to very coarse grained, subangular to round; little granules to medium pebbles, angular to subangular; little silt; trace cobbles, angular to subangular; wet; cobbles composed of metadiorite		0 gal of water used
82									
83									
84									
85									
86	9	IRZ-25-SS-82-87			SM		(87.0 - 94.5') Silty sand with gravel (SM); reddish brown (5YR 5/4); fine grained to very coarse grained, subangular to round; some silt; little granules to medium pebble, angular to subangular; wet; trace large pebbles		
87									
88									
89									
90									
91		IRZ-25-SS-87-92	IRZ-25-VAS-92-97 (130 ppb)			SM		(87.0 - 94.5') Silty sand with gravel (SM); reddish brown (5YR 5/4); fine grained to very coarse grained, subangular to round; some silt; little granules to medium pebble, angular to subangular; wet; trace large pebbles	
92									
93									
94									
95									
96		IRZ-25-SS-92-97	IRZ-25-VAS-92-97 (130 ppb)		ML		(94.5 - 95.5') Gravelly silt (ML); reddish brown (5YR 5/4); no plasticity; little granules to medium pebble, angular to subangular; little very fine to very coarse grained sand, angular to subangular; dry to moist; hard; pebbles composed of metadiorite		
97									
98									
99									
100									
98		IRZ-25-SS-97-102			SW-SM		(97.0 - 102.0') Well graded sand with silt and gravel (SW-SM); light reddish brown / light brown(5YR 6/4); fine grained to very coarse grained, angular to round; some small to very large pebbles, angular to subangular; some silt; wet; trace very large pebbles composed of metadiorite.		
99									
100									

Notes: USCS = Unified Soil Classification System, U = not detected above the laboratory reporting limit, ppb = Parts per Billion.

Boring Log

Sheet: 6 of 9

Date Started: 12/04/2018	Surface Elevation: N/A	Boring No.: IRZ-25-Pilot
Date Completed: 12/12/2018	Northing (NAD83): N/A	
Drilling Co.: Cascade	Easting (NAD83): N/A	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 172 ft bgs	Location: Groundwater Remedy Phase I
Driller Name: Steve Vasquez	Borehole Diameter: 6 in	Needles, California
Drilling Asst: N. Dominguez/C. Alvarez	Depth to First Water: N/A	
Logger: Connor Mills	Sampling Method: 10 ft Core Barrel	Project Number: Topock
Editor: Sean McGrane	Sampling Interval: Continuous	
Weather: Sunny cool to warm	Converted to Well: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Description	Drilling Notes	Drilling Fluid
101	9.5	IRZ-25-SS-97-102			SW-SM				
102					ML		(102.0 - 103.5') Sandy silt with gravel (ML); light reddish brown / light brown(5YR 6/4); little granules to large pebbles, angular to subangular; little very fine to very coarse grained sand, subangular to subround; little clay; trace cobbles; wet; contains a 100 mm cobble of metadiorite		
103									
104	10	IRZ-25-SS-102-107			GM		(103.5 - 109.5') Silty gravel (GM); reddish brown (5YR 5/4); granules to large pebbles, angular to subround; some silt; little very fine to very coarse grained sand, angular to subround; trace; wet; trace very large pebble		
105									
106									
107	10	IRZ-25-SS-107-112					(109.5 - 117.0') Silty sand with gravel (SM); (5YR 4/); fine grained to very coarse grained, subangular to subround; some granules to very large pebbles, angular to subround; some silt; trace cobbles; wet; trace very large pebbles to small cobbles composed of metadiorite.		
108									
109									
110	10	IRZ-25-SS-112-117	IRZ-25-VAS-112-117 (< 0.17 U ppb)		SM				
111									
112									
113	10	IRZ-25-SS-117-122			SM		(117.0 - 119.5') Silty sand with gravel (SM); reddish brown / moderate brown(5YR 4/4); very fine grained to very coarse grained, subangular to subround; little granules to medium pebbles, angular to subround; little silt; little clay; wet		
114									
115									
116	10				ML		(119.5 - 124.5') Sandy silt with gravel (ML); reddish brown / moderate		
117									
118									
119									
120									

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Date Started: 12/04/2018	Surface Elevation: N/A	Boring No.: IRZ-25-Pilot
Date Completed: 12/12/2018	Northing (NAD83): N/A	
Drilling Co.: Cascade	Easting (NAD83): N/A	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 172 ft bgs	Location: Groundwater Remedy Phase I
Driller Name: Steve Vasquez	Borehole Diameter: 6 in	Needles, California
Drilling Asst: N. Dominguez/C. Alvarez	Depth to First Water: N/A	
Logger: Connor Mills	Sampling Method: 10 ft Core Barrel	Project Number: Topock
Editor: Sean McGrane	Sampling Interval: Continuous	
Weather: Sunny cool to warm	Converted to Well: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Description	Drilling Notes	Drilling Fluid
121	10	IRZ-25-SS-117-122			ML		brown(5YR 4/4); some very fine to very coarse grained sand, angular to subround; little granules to medium pebbles, angular to subangular; wet		
122									
123									
124									
125	10	IRZ-25-SS-122-127			SM		(124.5 - 127.0') Silty sand (SM); reddish brown / moderate brown(5YR 4/4); very fine grained to coarse grained, subangular to subround; some silt; little granules to medium pebbles, angular to subangular; wet		
126									
127									
128									
129	10	IRZ-25-SS-127-132			GM		(127.0 - 132.0') Silty gravel with sand (GM); reddish brown (5YR 5/4); granules to large pebbles, angular to subangular; and silt; little very fine to coarse grained sand, angular to subangular; dry to moist; moderate cementation		
130									
131									
132									
133	10	IRZ-25-SS-132-137			ML		(132.0 - 137.0') Sandy silt with gravel (ML); reddish brown / moderate brown(5YR 4/4); no plasticity; little granules to medium pebbles, angular to subangular; little very fine to very coarse grained sand, angular to subround; dry to moist		
134									
135									
136									
137	10	IRZ-25-SS-137-142			ML		(137.0 - 139.5') Sandy silt (ML); reddish brown / moderate brown(5YR 4/4); no plasticity; some very fine to coarse grained sand, angular to subround; little granules to medium pebbles, angular to subangular; little clay; wet; dessicated		
138									
139									
140									
					ML		(139.5 - 147.0') Sandy silt with gravel (ML); reddish brown / moderate		0 gal of water used

Notes: USCS = Unified Soil Classification System, U = not detected above the laboratory reporting limit, ppb = Parts per Billion.

Date Started: 12/04/2018	Surface Elevation: N/A	Boring No.: IRZ-25-Pilot
Date Completed: 12/12/2018	Northing (NAD83): N/A	
Drilling Co.: Cascade	Easting (NAD83): N/A	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 172 ft bgs	Location: Groundwater Remedy Phase I
Driller Name: Steve Vasquez	Borehole Diameter: 6 in	Needles, California
Drilling Asst: N. Dominguez/C. Alvarez	Depth to First Water: N/A	
Logger: Connor Mills	Sampling Method: 10 ft Core Barrel	Project Number: Topock
Editor: Sean McGrane	Sampling Interval: Continuous	
Weather: Sunny cool to warm	Converted to Well: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Description	Drilling Notes	Drilling Fluid
141	10	IRZ-25-SS-137-142			ML		brown(5YR 4/4); no plasticity; little granules to medium pebbles, angular to subangular; little very fine to coarse grained sand, angular to subangular; little clay; hard		
142									
143									
144									
145		IRZ-25-SS-142-147							
146	9				SM		(147.0 - 157.0') Silty sand with gravel (SM); reddish brown (5YR 4/3); fine grained to very coarse grained, subangular to round; some granules to large pebbles, angular to subround; little silt; trace cobbles, angular to subangular; wet; trace small cobbles composed of metadiorite	147' very loose saturated material with potential to produce a lot of water.	0 gal of water used
147									
148		IRZ-25-SS-147-152	IRZ-25-VAS-147-152 (3600 ppb)						
149									
150									
151	9				ML		(157.0 - 162.0') Gravelly silt (ML); reddish brown (5YR 5/4); no plasticity; little granules to large pebbles, angular to subangular; little very fine to medium grained sand, angular to subangular; dry		
152									
153		IRZ-25-SS-152-157							
154									
155									
156	9				ML		(157.0 - 162.0') Gravelly silt (ML); reddish brown (5YR 5/4); no plasticity; little granules to large pebbles, angular to subangular; little very fine to medium grained sand, angular to subangular; dry		
157									
158									
159									
160									







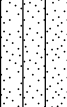
Notes: USCS = Unified Soil Classification System, U = not detected above the laboratory reporting limit, ppb = Parts per Billion.

Date Started: 12/04/2018	Surface Elevation: N/A	Boring No.: IRZ-25-Pilot
Date Completed: 12/12/2018	Northing (NAD83): N/A	
Drilling Co.: Cascade	Easting (NAD83): N/A	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 172 ft bgs	Location: Groundwater Remedy Phase I
Driller Name: Steve Vasquez	Borehole Diameter: 6 in	Needles, California
Drilling Asst: N. Dominguez/C. Alvarez	Depth to First Water: N/A	
Logger: Connor Mills	Sampling Method: 10 ft Core Barrel	Project Number: Topock
Editor: Sean McGrane	Sampling Interval: Continuous	
Weather: Sunny cool to warm	Converted to Well: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Description	Drilling Notes	Drilling Fluid
161					ML				
162									
163									
164		IRZ-25-SS-162-166	IRZ-25-VAS-162-167 (3000 ppb)		ML		(162.0 - 166.0') Gravelly silt (ML); reddish brown / moderate brown(5YR 4/4); low plasticity; some granules to medium pebbles, angular to subround; little very fine to coarse grained sand, angular to subround; wet; stiff	162' Drill rods chattering	
165									
166									
167	5						(166.0 - 172.0') Topock - Competent Bedrock - conglomerate; Gravelly silt (ML); reddish brown (5YR 5/4); no plasticity; little granules to large pebbles, angular to subangular; little very fine to medium grained sand, angular to subangular; dry; moderate cementation		0 gal of water used
168									
169				Topock - Competent Bedrock - conglomerate	ML				
170									
171									
172									
173							End of Boring at 172.0 'bgs.		
174									
175									
176									
177									
178									
179									
180									


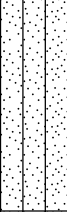

Notes: USCS = Unified Soil Classification System, U = not detected above the laboratory reporting limit, ppb = Parts per Billion.

Date Started: 10/18/2018	Surface Elevation: N/A	Boring No.: IRZ-20 Pilot
Date Completed: 11/30/2018	Northing (NAD83): N/A	
Drilling Co.: Cascade	Easting (NAD83): N/A	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 187 ft bgs	Location: Groundwater Remedy Phase I
Driller Name: E. Ramos/S. Vasquez	Borehole Diameter: 6 in	Needles, California
Drilling Asst: T. Alymer/C. Alvarez	Depth to First Water: N/A	
Logger: Connor Mills	Sampling Method: 10 ft Core Barrel	Project Number: Topock
Editor: Sean McGrane	Sampling Interval: Continuous	
Weather: Sunny Warm to hot	Converted to Well: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Description	Drilling Notes	Drilling Fluid
1	60			Topock - Fluvial Deposits	GW-GM		(0.0 - 4.0') Topock - Fluvial Deposits; Well graded gravel with silt and sand (GW-GM); very pale brown (10YR 8/3); granules to very large pebbles, angular to subround; and very fine to very coarse grained sand, angular to round; little silt; trace cobbles, angular to subangular; dry		
2									
3									
4									
5	66			Topock - Fluvial Deposits	SP-SM		(4.0 - 5.5') Topock - Fluvial Deposits; Poorly graded sand with silt (SP-SM); very pale brown (10YR 8/3); very fine grained to fine grained, angular to subround; little silt; dry; homogeneous		
6				Topock - Fluvial Deposits	SM		(5.5 - 7.0') Topock - Fluvial Deposits; Silty sand (SM); very pale brown (10YR 8/3); very fine grained to very coarse grained, angular to round; and silt; trace granule to small pebbles, angular to subround; dry		
7									
8									
9				Topock - Fluvial Deposits	SM		(7.0 - 13.0') Topock - Fluvial Deposits; Silty sand (SM); very pale brown (10YR 8/3); fine grained to fine grained, angular to round; little silt; dry		
10									
11									
12									
13				Topock - Fluvial Deposits	SM		(13.0 - 15.0') Topock - Fluvial Deposits; Silty sand (SM); very pale brown (10YR 8/3); very fine grained to very coarse grained, angular to subround; little silt; trace granules to very large pebbles, angular to subround; trace cobbles, angular to subround; dry		
14									
15				Topock - Fluvial Deposits	SM		(15.0 - 17.0') Topock - Fluvial Deposits; Silty sand (SM); very pale brown (10YR 8/3); very fine grained to fine grained, angular to subround; little silt; dry		
16									
17				Topock - Fluvial Deposits	GM		(17.0 - 33.0') Topock - Fluvial Deposits; Silty gravel with sand (GM); grayish brown (10YR 5/2); very fine grained to coarse grained, angular to round; some fine to very coarse grained sand, angular to round; little silt; little clay; trace cobbles, angular to subangular; dry		
18									
19									
20									

Notes: USCS = Unified Soil Classification System

Date Started: 10/18/2018	Surface Elevation: N/A	Boring No.: IRZ-20 Pilot
Date Completed: 11/30/2018	Northing (NAD83): N/A	
Drilling Co.: Cascade	Easting (NAD83): N/A	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 187 ft bgs	Location: Groundwater Remedy Phase I
Driller Name: E. Ramos/S. Vasquez	Borehole Diameter: 6 in	Needles, California
Drilling Asst: T. Alymer/C. Alvarez	Depth to First Water: N/A	
Logger: Connor Mills	Sampling Method: 10 ft Core Barrel	Project Number: Topock
Editor: Sean McGrane	Sampling Interval: Continuous	
Weather: Sunny Warm to hot	Converted to Well: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Description	Drilling Notes	Drilling Fluid
21	120			Topock - Fluvial Deposits	GM				
22									
23									
24									
25									
26									
27									
28									
29									
30									
31									
32									
33				Topock - Fluvial Deposits	SM		(33.0 - 36.0') Topock - Fluvial Deposits; Silty sand with gravel (SM); brown (10YR 5/3); very fine grained to coarse grained, angular to round; some silt; little clay; trace granules to very large, angular to subround; dry		
34									
35									
36									
37				Topock - Fluvial Deposits	SM		(36.0 - 39.0') Topock - Fluvial Deposits; Silty sand with gravel (SM); brown (10YR 4/3); very fine grained to very coarse grained, angular to subangular; little granule to very large pebbles, angular to subround; little silt; dry; strong cementation		
38									
39									
40				Topock - Alluvium Deposits	SM		(39.0 - 47.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); grayish brown (10YR 5/2); very fine grained to very coarse grained, angular to subangular; and granule to very large pebbles, angular to		






Notes: USCS = Unified Soil Classification System

Date Started: 10/18/2018	Surface Elevation: N/A	Boring No.: IRZ-20 Pilot
Date Completed: 11/30/2018	Northing (NAD83): N/A	
Drilling Co.: Cascade	Easting (NAD83): N/A	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 187 ft bgs	Location: Groundwater Remedy Phase I
Driller Name: E. Ramos/S. Vasquez	Borehole Diameter: 6 in	Needles, California
Drilling Asst: T. Alymer/C. Alvarez	Depth to First Water: N/A	
Logger: Connor Mills	Sampling Method: 10 ft Core Barrel	Project Number: Topock
Editor: Sean McGrane	Sampling Interval: Continuous	
Weather: Sunny Warm to hot	Converted to Well: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Description	Drilling Notes	Drilling Fluid							
41	96			Topock - Alluvium Deposits	SM		subround; little silt; trace clay; dry	Soil starts getting moist								
42																
43																
44																
45																
46		IRZ-20-SS- 45-50	IRZ-20-VAS- 51-56 (150 ppb)	Topock - Alluvium Deposits	GM		(47.0 - 56.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); brown (10YR 4/3); granules to large pebbles, angular to subangular; some very fine to coarse grained sand, angular to subround; little silt; moist									
47																
48	114	IRZ-20-SS- 50-55												(54'); wet		
49																
50																
51		IRZ-20-SS- 55-60						Topock - Alluvium Deposits	SM							(56.0 - 57.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); dark grayish brown / dark yellowish brown(10YR 4/2); very fine grained to coarse grained, angular to subround; some granule to large pebbles, angular to subangular; some silt; wet
52																
53																
54										(57.0 - 65.0') Topock - Alluvium Deposits; Silty sand (SM); yellowish brown / moderate yellowish brown(10YR 5/4); very fine grained to fine grained, angular to subround; and silt; trace granule to medium pebbles, angular to subround; moist						
55																
56																
57																
58																
59																
60																

Notes: USCS = Unified Soil Classification System

Date Started: <u>10/18/2018</u>		Surface Elevation: <u>N/A</u>		Boring No.: <u>IRZ-20 Pilot</u>	
Date Completed: <u>11/30/2018</u>		Northing (NAD83): <u>N/A</u>			
Drilling Co.: <u>Cascade</u>		Easting (NAD83): <u>N/A</u>		Client: <u>PG&E</u>	
Drilling Method: <u>Sonic Drilling</u>		Total Depth: <u>187 ft bgs</u>		Location: <u>Groundwater Remedy Phase I</u>	
Driller Name: <u>E. Ramos/S. Vasquez</u>		Borehole Diameter: <u>6 in</u>		<u>Needles, California</u>	
Drilling Asst: <u>T. Alymer/C. Alvarez</u>		Depth to First Water: <u>N/A</u>			
Logger: <u>Connor Mills</u>		Sampling Method: <u>10 ft Core Barrel</u>		Project Number: <u>Topock</u>	
Editor: <u>Sean McGrane</u>		Sampling Interval: <u>Continuous</u>			
Weather: <u>Sunny Warm to hot</u>		Converted to Well: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No			

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Description	Drilling Notes	Drilling Fluid
61	96	IRZ-20-SS-60-65		Topock - Alluvium Deposits	SM				
62									
63									
64									
65		IRZ-20-SS-65-70		Topock - Alluvium Deposits	ML		(65.0 - 69.0') Topock - Alluvium Deposits; Sandy silt (ML); brown (10YR 5/3); no plasticity; some very fine to coarse grained sand, angular to subround; little small pebbles, angular to subangular; moist		
66									
67									
68									
69		IRZ-20-SS-70-75		Topock - Alluvium Deposits	ML		(69.0 - 71.0') Topock - Alluvium Deposits; Sandy silt (ML); brown (7.5YR 4/4); no plasticity; some fine to coarse grained sand, angular to subround; little granule to small pebbles, angular to subangular; moist		
70									
71									
72									
73		IRZ-20-SS-75-80		Topock - Alluvium Deposits	CL		(71.0 - 77.0') Topock - Alluvium Deposits; Sandy lean clay (CL); brown (7.5YR 4/4); no plasticity; and silt; little very fine to coarse grained sand, angular to subround; trace granule to medium pebbles, angular to subangular; moist		
74									
75									
76									
77		IRZ-20-SS-75-80		Topock - Alluvium Deposits	ML		(77.0 - 83.0') Topock - Alluvium Deposits; Sandy silt (ML); brown (7.5YR 4/4); no plasticity; some very fine to medium grained sand, angular to subround; trace granule, angular to subangular; wet		
78									
79									
80									

Notes: USCS = Unified Soil Classification System

Date Started: 10/18/2018	Surface Elevation: N/A	Boring No.: IRZ-20 Pilot
Date Completed: 11/30/2018	Northing (NAD83): N/A	
Drilling Co.: Cascade	Easting (NAD83): N/A	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 187 ft bgs	Location: Groundwater Remedy Phase I
Driller Name: E. Ramos/S. Vasquez	Borehole Diameter: 6 in	Needles, California
Drilling Asst: T. Alymer/C. Alvarez	Depth to First Water: N/A	
Logger: Connor Mills	Sampling Method: 10 ft Core Barrel	Project Number: Topock
Editor: Sean McGrane	Sampling Interval: Continuous	
Weather: Sunny Warm to hot	Converted to Well: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Description	Drilling Notes	Drilling Fluid
81	114	IRZ-20-SS-80-85		Topock - Alluvium Deposits	ML				
82									
83									
84	132	IRZ-20-SS-85-90	IRZ-20-VAS-82-87 (<0.33 ppb)	Topock - Older Alluvium Deposits	SM		(83.0 - 107.0') Topock - Older Alluvium Deposits; Silty sand (SM); brown (10YR 4/3); very fine grained to coarse grained, angular to subround; and silt; little granule to small pebbles, angular to subangular; wet		
85									
86									
87									
88									
89									
90									
91									
92									
93									
94									
95									
96									
97									
98									
99									
100									


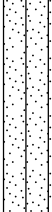
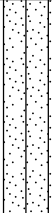


Notes: USCS = Unified Soil Classification System

Date Started: 10/18/2018	Surface Elevation: N/A	Boring No.: IRZ-20 Pilot
Date Completed: 11/30/2018	Northing (NAD83): N/A	
Drilling Co.: Cascade	Easting (NAD83): N/A	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 187 ft bgs	Location: Groundwater Remedy Phase I
Driller Name: E. Ramos/S. Vasquez	Borehole Diameter: 6 in	Needles, California
Drilling Asst: T. Alymer/C. Alvarez	Depth to First Water: N/A	
Logger: Connor Mills	Sampling Method: 10 ft Core Barrel	Project Number: Topock
Editor: Sean McGrane	Sampling Interval: Continuous	
Weather: Sunny Warm to hot	Converted to Well: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Description	Drilling Notes	Drilling Fluid	
101	120	IRZ-20-SS-100-105		Topock - Older Alluvium Deposits	SM	<div></div>				
102										
103										
104										
105										
106	103.2	IRZ-20-SS-105-110		Topock - Older Alluvium Deposits	SM	<div></div>	(107.0 - 109.0') Topock - Older Alluvium Deposits; Sandy silt with gravel (SM); brown (7.5YR 4/3); fine grained to coarse grained, angular to subround; and silt; little granule to small pebbles, angular to subangular; wet			
107										
108										
109										
110										
111		IRZ-20-SS-110-115		Topock - Older Alluvium Deposits	ML	<div></div>	(109.0 - 117.0') Topock - Older Alluvium Deposits; Sandy silt (ML); brown (10YR 4/3); no plasticity; some fine to coarse grained sand, angular to subround; trace granule, angular to subround; trace clay; wet			
112										
113										
114										
115										
116		IRZ-20-VAS-112-117 (<0.17 ppb)					<div></div>			
117										
118										
119										
120										
118		IRZ-20-SS-115-120		Topock - Older Alluvium Deposits	ML	<div></div>	(117.0 - 123.0') Topock - Older Alluvium Deposits; Sandy silt (ML); strong brown (7.5YR 4/6); no plasticity; little granule to medium pebbles, angular to subangular; little fine to coarse grained sand, angular to subround; wet			
119										

Notes: USCS = Unified Soil Classification System

Date Started: 10/18/2018	Surface Elevation: N/A	Boring No.: IRZ-20 Pilot
Date Completed: 11/30/2018	Northing (NAD83): N/A	
Drilling Co.: Cascade	Easting (NAD83): N/A	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 187 ft bgs	Location: Groundwater Remedy Phase I
Driller Name: E. Ramos/S. Vasquez	Borehole Diameter: 6 in	Needles, California
Drilling Asst: T. Alymer/C. Alvarez	Depth to First Water: N/A	
Logger: Connor Mills	Sampling Method: 10 ft Core Barrel	Project Number: Topock
Editor: Sean McGrane	Sampling Interval: Continuous	
Weather: Sunny Warm to hot	Converted to Well: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Description	Drilling Notes	Drilling Fluid
121	132	IRZ-20-SS-120-125		Topock - Older Alluvium Deposits	ML				
122				Topock - Older Alluvium Deposits	GM		(123.0 - 124.5') Topock - Older Alluvium Deposits; Silty gravel with sand (GM); yellowish brown / moderate yellowish brown(10YR 5/4); granules to very large pebbles, angular to subangular; some silt; little very fine to coarse grained sand, angular to subangular; moist		
123				Topock - Older Alluvium Deposits	ML		(124.5 - 127.0') Topock - Older Alluvium Deposits; Sandy silt (ML); brown (7.5YR 4/3); no plasticity; little granule to medium pebbles, angular to subangular; little fine to coarse grained sand, angular to subround; moist		
124	132	IRZ-20-SS-125-130		Topock - Older Alluvium Deposits	ML				
125				Topock - Older Alluvium Deposits	ML				
126				Topock - Older Alluvium Deposits	ML				
127	132	IRZ-20-SS-130-135		Topock - Older Alluvium Deposits	ML				
128				Topock - Older Alluvium Deposits	ML		(127.0 - 131.0') Topock - Older Alluvium Deposits; Sandy silt (ML); reddish brown / moderate brown(5YR 4/4); no plasticity; some fine grained sand, angular to subround; trace granule to small pebbles, angular to subangular; wet		
129				Topock - Older Alluvium Deposits	ML				
130	132	IRZ-20-SS-131-136 (<0.17 ppb)		Topock - Older Alluvium Deposits	SM				
131				Topock - Older Alluvium Deposits	SM		(131.0 - 136.5') Topock - Older Alluvium Deposits; Silty sand (SM); brown (7.5YR 5/3); fine grained to coarse grained, angular to subround; some silt; little granule to medium pebbles, subangular to round; wet		
132				Topock - Older Alluvium Deposits	SM				
133	132	IRZ-20-SS-135-140		Topock - Older Alluvium Deposits	SM				
134				Topock - Older Alluvium Deposits	SM		(136.5 - 157.0') Topock - Older Alluvium Deposits; Silty sand (SM); reddish brown (5YR 5/4); very fine grained to coarse grained, angular to subangular; and silt; little granule to very large pebbles, angular to subangular; wet; Granules and pebbles throughout the core are composed of metadiorite 50-60 mm)		
135				Topock - Older Alluvium Deposits	SM				
136	132	IRZ-20-SS-135-140		Topock - Older Alluvium Deposits	SM				
137				Topock - Older Alluvium Deposits	SM				
138				Topock - Older Alluvium Deposits	SM				
139	132	IRZ-20-SS-135-140		Topock - Older Alluvium Deposits	SM				
140				Topock - Older Alluvium Deposits	SM				

Notes: USCS = Unified Soil Classification System

Boring Log

Sheet: 8 of 10

Date Started: 10/18/2018	Surface Elevation: N/A	Boring No.: IRZ-20 Pilot
Date Completed: 11/30/2018	Northing (NAD83): N/A	
Drilling Co.: Cascade	Easting (NAD83): N/A	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 187 ft bgs	Location: Groundwater Remedy Phase I
Driller Name: E. Ramos/S. Vasquez	Borehole Diameter: 6 in	Needles, California
Drilling Asst: T. Alymer/C. Alvarez	Depth to First Water: N/A	
Logger: Connor Mills	Sampling Method: 10 ft Core Barrel	Project Number: Topock
Editor: Sean McGrane	Sampling Interval: Continuous	
Weather: Sunny Warm to hot	Converted to Well: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Description	Drilling Notes	Drilling Fluid
141	132	IRZ-20-SS-140-145		Topock - Older Alluvium Deposits	SM				
142									
143									
144									
145	132	IRZ-20-SS-145-150		Topock - Older Alluvium Deposits	SM				
146									
147									
148									
149	132	IRZ-20-SS-150-155		Topock - Older Alluvium Deposits	SM				
150									
151									
152									
153	132	IRZ-20-SS-155-160		Topock - Older Alluvium Deposits	SM				
154									
155									
156									
157	132	IRZ-20-SS-155-160		Topock - Older Alluvium Deposits	SM				
158									
159									
160									
157.0 - 160.0'				Topock - Weathered Bedrock - conglomerate	ML		(157.0 - 160.0') Topock - Weathered Bedrock - conglomerate; Sandy silt (ML); brown (7.5YR 5/4); no plasticity; and fine to coarse grained sand, angular to subround; trace granule, angular to subangular; trace clay; moist		

Notes: USCS = Unified Soil Classification System

Boring Log

Sheet: 9 of 10

Date Started: 10/18/2018	Surface Elevation: N/A	Boring No.: IRZ-20 Pilot
Date Completed: 11/30/2018	Northing (NAD83): N/A	
Drilling Co.: Cascade	Easting (NAD83): N/A	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 187 ft bgs	Location: Groundwater Remedy Phase I
Driller Name: E. Ramos/S. Vasquez	Borehole Diameter: 6 in	Needles, California
Drilling Asst: T. Alymer/C. Alvarez	Depth to First Water: N/A	
Logger: Connor Mills	Sampling Method: 10 ft Core Barrel	Project Number: Topock
Editor: Sean McGrane	Sampling Interval: Continuous	
Weather: Sunny Warm to hot	Converted to Well: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class			Description	Drilling Notes	Drilling Fluid	
161	132	IRZ-20-SS-160-165		Topock - Weathered Bedrock - conglomerate	CL				(160.0 - 166.0') Topock - Weathered Bedrock - conglomerate; Lean clay with sand (CL); brown (10YR 4/3); low plasticity; some small to medium pebbles, angular to subangular; some fine to coarse grained sand, angular to subround; little silt; trace cobbles, angular to subangular; dry	Rough drilling, had to go back down again with core barell to get remaining 2 ft. of core		
162												
163												
164												
165												
166												
167												
168												
169	87.6	IRZ-20-SS-165-170		Topock - Weathered Bedrock - conglomerate	ML							
170												
171												
172												
173												
174												
175												
176												
177												
178												
179	79.2	IRZ-20-SS-175-180										
180												
						Hatched			(179.5 - 182.0') Topock - Competent Bedrock - conglomerate; dark			

Notes: USCS = Unified Soil Classification System

Date Started: 10/18/2018	Surface Elevation: N/A	Boring No.: IRZ-20 Pilot
Date Completed: 11/30/2018	Northing (NAD83): N/A	
Drilling Co.: Cascade	Easting (NAD83): N/A	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 187 ft bgs	Location: Groundwater Remedy Phase I
Driller Name: E. Ramos/S. Vasquez	Borehole Diameter: 6 in	Needles, California
Drilling Asst: T. Alymer/C. Alvarez	Depth to First Water: N/A	
Logger: Connor Mills	Sampling Method: 10 ft Core Barrel	Project Number: Topock
Editor: Sean McGrane	Sampling Interval: Continuous	
Weather: Sunny Warm to hot	Converted to Well: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Description	Drilling Notes	Drilling Fluid
181				Topock - Competent Bedrock - conglomerate			yellowish brown (10YR 4/4); granules to very large pebbles, angular to subangular; some fine to coarse grained sand, angular to subangular; some silt; dry; moderate cementation		
182									
183									
184									
185	58.8	IRZ-20-SS-180-187		Topock - Competent Bedrock - conglomerate			(182.0 - 187.0') Topock - Competent Bedrock - conglomerate; yellowish red (5YR 4/6); and silt; some granule to small pebbles, angular to subangular; little fine to coarse grained sand, angular to round; trace cobbles, angular to subangular; moist; weak cementation	very rough drilling, couldnt advance past 182'. Had to pull it out and make another run for 182-187'.	
186									
187									
End of Boring at 187.0 'bgs.									
188									
189									
190									
191									
192									
193									
194									
195									
196									
197									
198									
199									
200									






Notes: USCS = Unified Soil Classification System

Date Started: 11/02/2018	Surface Elevation: N/A	Boring No.: MW-E
Date Completed: 11/27/2018	Northing (NAD83): N/A	
Drilling Co.: Cascade	Easting (NAD83): N/A	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 150 ft bgs	Location: Groundwater Remedy Phase I
Driller Name: Steve Vasques	Borehole Diameter: 10 in	Needles, California
Drilling Asst: N. Dominguez/C. Alvarez	Depth to First Water: N/A	
Logger: Connor Mills	Sampling Method: 10 ft Core Barrel	Project Number: Topock
Editor: Sean McGrane	Sampling Interval: Continuous	
Weather: 63 to 88° Sunny	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Description	Drilling Notes	Drilling Fluid
1	72			Topock - Fluvial Deposits	SW-SM		(0.0 - 4.5') Topock - Fluvial Deposits; Well graded sand with silt and gravel (SW-SM); brown (7.5YR 4/3); fine grained to coarse grained, angular to subround; some small to very large pebbles, angular to subround; little silt; trace cobbles, angular to subrounded; dry; no odor		
2									
3				Topock - Fluvial Deposits	SP-SM		(4.5 - 8.0') Topock - Fluvial Deposits; Poorly graded sand with silt and gravel (SP-SM); brown (7.5YR 4/3); fine grained to medium grained, subangular to round; some small to very large pebbles, angular to subround; little silt; trace cobbles, angular to subangular; trace coarse grained sand, subangular to round; dry; no odor		
4									
5	85.2			Topock - Fluvial Deposits	GM		(8.0 - 12.5') Topock - Fluvial Deposits; Silty gravel with sand (GM); yellowish brown / moderate yellowish brown(10YR 5/4); granules to very large pebbles, angular to subround; some fine to coarse grained sand, subangular to round; some silt; trace cobbles, subround to round; dry		
6									
7				Topock - Fluvial Deposits	SM		(12.5 - 15.0') Topock - Fluvial Deposits; Silty sand (SM); yellowish brown / moderate yellowish brown(10YR 5/4); very fine grained to medium grained, angular to subround; little granule to large pebbles, angular to round; little silt; trace cobbles, subangular to subrounded; dry		
8									
9				Topock - Fluvial Deposits	GP-GM		(15.0 - 32.0') Topock - Fluvial Deposits; Poorly graded gravel with silt (GP-GM); light brownish gray / pale yellowish brown(10YR 6/2); granules to very large pebbles, angular to subangular; some cobbles, angular to subangular; little silt; trace boulders, angular to subround; trace fine to medium grained sand, angular to subrounded; dry; boulders 10 inch cores of metadiorite rock.		
10									
11								Rough drilling. Drilled through a boulder, rock was pulverized into a fine powder.	
12									
13									
14									
15									
16									
17									
18									
19									
20									


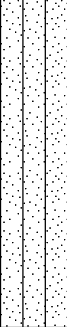


Notes: USCS = Unified Soil Classification System

Date Started: <u>11/02/2018</u>	Surface Elevation: <u>N/A</u>	Boring No.: <u>MW-E</u>
Date Completed: <u>11/27/2018</u>	Northing (NAD83): <u>N/A</u>	
Drilling Co.: <u>Cascade</u>	Easting (NAD83): <u>N/A</u>	Client: <u>PG&E</u>
Drilling Method: <u>Sonic Drilling</u>	Total Depth: <u>150 ft bgs</u>	Location: <u>Groundwater Remedy Phase I</u>
Driller Name: <u>Steve Vasques</u>	Borehole Diameter: <u>10 in</u>	<u>Needles, California</u>
Drilling Asst: <u>N. Dominguez/C. Alvarez</u>	Depth to First Water: <u>N/A</u>	
Logger: <u>Connor Mills</u>	Sampling Method: <u>10 ft Core Barrel</u>	Project Number: <u>Topock</u>
Editor: <u>Sean McGrane</u>	Sampling Interval: <u>Continuous</u>	
Weather: <u>63 to 88° Sunny</u>	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Description	Drilling Notes	Drilling Fluid
21	93.6			Topock - Fluvial Deposits	GP-GM				
22									
23									
24									
25									
26									
27	54			Topock - Fluvial Deposits	GP-GM				
28									
29									
30									
31									
32									
33	51.6			Topock - Fluvial Deposits	SM		(32.0 - 34.5') Topock - Fluvial Deposits; Silty sand with gravel (SM); pale brown (10YR 6/3); very fine grained to medium grained, angular to subround; and granule to very large pebbles, angular to subround; little silt; trace cobbles, angular to subangular; dry	Rough drilling	150 gal of water used
34									
35				Topock - Fluvial Deposits	SM		(34.5 - 37.0') Topock - Fluvial Deposits; Silty sand with gravel (SM); light yellowish brown (10YR 6/4); fine grained to coarse grained, angular to round; and granules to small pebbles, angular to subangular; little cobbles, angular to subround; little silt; trace clay; dry		
36									
37									
38									
39	48			Topock - Fluvial Deposits	GM		(37.0 - 42.5') Topock - Fluvial Deposits; Silty gravel with sand (GM); light yellowish brown (10YR 6/4); granules to very large pebbles, angular to round; some fine to coarse grained sand, angular to well-rounded; some silt; trace cobbles, angular to subangular; trace boulders, subround; dry; one boulder is a 10 inch core of basalt with yellowish green olivine crystals and a frothy texture.		
40									

Notes: USCS = Unified Soil Classification System

Date Started: 11/02/2018	Surface Elevation: N/A	Boring No.: MW-E
Date Completed: 11/27/2018	Northing (NAD83): N/A	
Drilling Co.: Cascade	Easting (NAD83): N/A	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 150 ft bgs	Location: Groundwater Remedy Phase I
Driller Name: Steve Vasques	Borehole Diameter: 10 in	Needles, California
Drilling Asst: N. Dominguez/C. Alvarez	Depth to First Water: N/A	
Logger: Connor Mills	Sampling Method: 10 ft Core Barrel	Project Number: Topock
Editor: Sean McGrane	Sampling Interval: Continuous	
Weather: 63 to 88° Sunny	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	



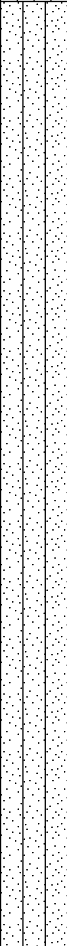
Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Description	Drilling Notes	Drilling Fluid
41				Topock - Fluvial Deposits	GM				
42									
43				Topock - Alluvium Deposits	SM		(42.5 - 47.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); light yellowish brown (10YR 6/4); fine grained to coarse grained, angular to subround; some granules to very large pebbles, angular to subangular; little silt; trace clay; dry		
44									
45									
46									
47									
48				Topock - Alluvium Deposits	ML		(47.0 - 54.5') Topock - Alluvium Deposits; Silt with sand (ML); light brown (7.5YR 6/4); low plasticity; little fine to coarse grained sand, angular to subangular; little clay; trace granule to medium pebbles, angular to subround; moist	Approximate depth of water table.	
49									
50									
51									
52	120								
53									
54									
55			MW-E-VAS-52-57 (7.0 ppb)						
56				Topock - Alluvium Deposits	GM		(54.5 - 64.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); pale brown (10YR 6/3); granules to large pebbles, angular to subangular; some fine to medium grained sand, angular to subangular; some silt; trace clay; dry	Core came out hot and dry	
57									
58									
59									
60									

Notes: USCS = Unified Soil Classification System

Boring Log

Sheet: 4 of 8

Date Started: 11/02/2018	Surface Elevation: N/A	Boring No.: MW-E
Date Completed: 11/27/2018	Northing (NAD83): N/A	
Drilling Co.: Cascade	Easting (NAD83): N/A	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 150 ft bgs	Location: Groundwater Remedy Phase I
Driller Name: Steve Vasques	Borehole Diameter: 10 in	Needles, California
Drilling Asst: N. Dominguez/C. Alvarez	Depth to First Water: N/A	
Logger: Connor Mills	Sampling Method: 10 ft Core Barrel	Project Number: Topock
Editor: Sean McGrane	Sampling Interval: Continuous	
Weather: 63 to 88° Sunny	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Description	Drilling Notes	Drilling Fluid
61	120			Topock - Alluvium Deposits	GM				
62									
63				Topock - Older Alluvium Deposits	ML		(64.0 - 67.0') Topock - Older Alluvium Deposits; Sandy silt (ML); reddish brown (5YR 5/4); no plasticity; some fine to coarse grained sand, subangular to subround; little granule to medium pebbles, angular to subangular; trace clay; moist; no staining		
64									
65	108			Topock - Older Alluvium Deposits	SM		(67.0 - 87.0') Topock - Older Alluvium Deposits; Silty sand (SM); reddish brown (5YR 5/4); very fine grained to coarse grained, angular to subround; some silt; little granule to large pebbles, angular to subangular; wet		
66									
67									
68									
69									
70									
71									
72									
73									
74									
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79									
80									

Notes: USCS = Unified Soil Classification System

SOIL BORING LOG, PG&E TOPACK C:\USERS\MCGRANE\DOCUMENTS\PG&E TOPACK\DRIFT BORING LOGS\GINT FILES\12.04.2018\TOPACK DATABASE FOR PLOG.GPJ ARCADIS 20180927 PLOG.GDT 12/4/18

Date Started: 11/02/2018	Surface Elevation: N/A	Boring No.: MW-E
Date Completed: 11/27/2018	Northing (NAD83): N/A	
Drilling Co.: Cascade	Easting (NAD83): N/A	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 150 ft bgs	Location: Groundwater Remedy Phase I
Driller Name: Steve Vasques	Borehole Diameter: 10 in	Needles, California
Drilling Asst: N. Dominguez/C. Alvarez	Depth to First Water: N/A	
Logger: Connor Mills	Sampling Method: 10 ft Core Barrel	Project Number: Topock
Editor: Sean McGrane	Sampling Interval: Continuous	
Weather: 63 to 88° Sunny	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Description	Drilling Notes	Drilling Fluid	
81	102			Topock - Older Alluvium Deposits	SM	<div></div>				
82			MW-E-VAS- 82-87.0 (200 ppb)							
83										
84										
85										
86										
87			105.6							
88										
89										
90										
91										
92										
93										
94	Topock - Older Alluvium Deposits	SM		<div></div>	(94.5 - 97.0') Topock - Older Alluvium Deposits; Silty sand (SM); reddish brown (5YR 5/4); medium grained to coarse grained, angular to subround; some silt; little granule to medium pebbles, angular to subangular; wet					
95										
96	Topock - Older Alluvium Deposits	ML		<div></div>	(97.0 - 109.5') Topock - Older Alluvium Deposits; Silt with sand (ML); reddish brown (5YR 5/4); no plasticity; little granule to large pebbles, angular to subangular; little fine to coarse grained sand, angular to subround; wet; no odor					
97										
98										
99										
100										

Notes: USCS = Unified Soil Classification System

SOIL BORING LOG, PG&E TOPACK C:\USERS\SMCGRANE\DOCUMENTS\PG&E TOPACK\DRIFT BORING LOGS\GINT FILES\12.04.2018\TOPACK DATABASE FOR PLOG.GPJ ARCADIS 20180927 PLOG.GDT 12/4/18

Date Started: 11/02/2018	Surface Elevation: N/A	Boring No.: MW-E
Date Completed: 11/27/2018	Northing (NAD83): N/A	
Drilling Co.: Cascade	Easting (NAD83): N/A	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 150 ft bgs	Location: Groundwater Remedy Phase I
Driller Name: Steve Vasques	Borehole Diameter: 10 in	Needles, California
Drilling Asst: N. Dominguez/C. Alvarez	Depth to First Water: N/A	
Logger: Connor Mills	Sampling Method: 10 ft Core Barrel	Project Number: Topock
Editor: Sean McGrane	Sampling Interval: Continuous	
Weather: 63 to 88° Sunny	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Description	Drilling Notes	Drilling Fluid
101	104.4			Topock - Older Alluvium Deposits	ML				
102									
103									
104									
105									
106									
107									
108	102			Topock - Older Alluvium Deposits	SM		(109.5 - 118.0') Topock - Older Alluvium Deposits; Silty sand with gravel (SM); reddish brown (5YR 5/4); fine grained to coarse grained, angular to subangular; and silt; little granule to large pebbles, angular to subangular; wet; some green staining in spots within the core.		
109									
110									
111									
112									
113									
114									
115									
116									
117									
118				Topock - Older Alluvium Deposits	ML		(118.0 - 122.0') Topock - Older Alluvium Deposits; Sandy silt (ML); reddish brown (5YR 5/3); no plasticity; some fine to coarse grained sand, angular to subround; little granule to large pebbles, angular to subangular; moist; very weathered.		
119									
120									
121									

Notes: USCS = Unified Soil Classification System



SOIL BORING LOG, PG&E TOPACK C:\USERS\SMCGRANE\DOCUMENTS\PG&E TOPACK\LOGS\GINT FILES\12.04.2018\TOPOCK DATABASE FOR PLOG.GPJ ARCADIS 20180927 PLOG.GDT 12/4/18

Date Started: 11/02/2018	Surface Elevation: N/A	Boring No.: MW-E
Date Completed: 11/27/2018	Northing (NAD83): N/A	
Drilling Co.: Cascade	Easting (NAD83): N/A	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 150 ft bgs	Location: Groundwater Remedy Phase I
Driller Name: Steve Vasques	Borehole Diameter: 10 in	Needles, California
Drilling Asst: N. Dominguez/C. Alvarez	Depth to First Water: N/A	
Logger: Connor Mills	Sampling Method: 10 ft Core Barrel	Project Number: Topock
Editor: Sean McGrane	Sampling Interval: Continuous	
Weather: 63 to 88° Sunny	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class			Description	Drilling Notes	Drilling Fluid
121	108			Topock - Older Alluvium Deposits	ML						
122				Topock - Older Alluvium Deposits	SM				(122.0 - 127.0') Topock - Older Alluvium Deposits; Silty sand with gravel (SM); light reddish brown / light brown(5YR 6/4); very fine grained to coarse grained, angular to subround; and silt; little granule to large pebbles, angular to subangular; wet; trace 1-4 inch pieces of metadiorite.		
123											
124											
125											
126											
127	120		Topock - Weathered Bedrock - conglomerate	SM				(127.0 - 137.0') Topock - Weathered Bedrock - conglomerate; Silty sand (SM); reddish brown (5YR 5/4); very fine grained to coarse grained, angular to subround; some silt; little granule to large pebbles, angular to subangular; wet			
128											
129											
130											
131											
132											
133											
134											
135	MW-E-VAS-137-142 (7300 ppb)		Topock - Weathered Bedrock - conglomerate	SM				(137.0 - 138.5') Topock - Weathered Bedrock - conglomerate; Silty sand (SM); reddish brown / moderate brown(5YR 4/4); fine grained to coarse grained, angular to subround; some silt; little granule to medium pebbles, angular to subangular; wet	Rough drilling		
136											
137											
138											
139											
140											
				Topock - Weathered Bedrock - conglomerate	ML				(138.5 - 139.5') Topock - Weathered Bedrock - conglomerate; Silt (ML); reddish brown / moderate brown(5YR 4/4); no plasticity; trace granule to medium pebbles, angular to subangular; trace fine grained sand, angular to subround; dry; very weathered rock, cemented.		
					SM				(139.5 - 142.0') Topock - Weathered Bedrock - conglomerate; Silty		








Notes: USCS = Unified Soil Classification System

Date Started:	<u>11/02/2018</u>	Surface Elevation:	<u>N/A</u>	Boring No.: <u>MW-E</u>
Date Completed:	<u>11/27/2018</u>	Northing (NAD83):	<u>N/A</u>	
Drilling Co.:	<u>Cascade</u>	Easting (NAD83):	<u>N/A</u>	Client: <u>PG&E</u>
Drilling Method:	<u>Sonic Drilling</u>	Total Depth:	<u>150 ft bgs</u>	Location: <u>Groundwater Remedy Phase I</u>
Driller Name:	<u>Steve Vasques</u>	Borehole Diameter:	<u>10 in</u>	<u>Needles, California</u>
Drilling Asst:	<u>N. Dominguez/C. Alvarez</u>	Depth to First Water:	<u>N/A</u>	
Logger:	<u>Connor Mills</u>	Sampling Method:	<u>10 ft Core Barrel</u>	Project Number: <u>Topock</u>
Editor:	<u>Sean McGrane</u>	Sampling Interval:	<u>Continuous</u>	
Weather:	<u>63 to 88° Sunny</u>	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Description	Drilling Notes	Drilling Fluid
141	114		MW-E-VAS-137-142 (7300 ppb)	Topock - Weathered Bedrock - conglomerate	SM		(SM); reddish brown (5YR 5/4); fine grained to coarse grained, angular to subangular; some silt; little granule to medium pebbles, angular to subangular; wet	Rough drilling	
142									
143									
144									
145									
146	36			Topock - Competent Bedrock - conglomerate			(142.0 - 150.0') Topock - Competent Bedrock - conglomerate; brown (7.5YR 5/4); very fine grained to medium pebbles, angular to subangular; and silt; trace granule to medium pebbles, angular to subangular; trace fine grained sand, angular to subround; dry; strong cementation; hard.		
147									
148									
149									
150									
End of Boring at 150.0 'bgs.									
151									
152									
153									
154									
155									
156									
157									
158									
159									
160									












Notes: USCS = Unified Soil Classification System

Date Started: <u>10/03/2018</u>	Surface Elevation: <u>N/A</u>	Boring No.: <u>MW-Ld</u>
Date Completed: <u>12/02/2018</u>	Northing (NAD83): <u>N/A</u>	
Drilling Co.: <u>Cascade</u>	Easting (NAD83): <u>N/A</u>	Client: <u>PG&E</u>
Drilling Method: <u>Sonic Drilling</u>	Total Depth: <u>315 ft bgs</u>	Location: <u>Groundwater Remedy Phase I</u>
Driller Name: <u>Dan O'Mara</u>	Borehole Diameter: <u>10 in</u>	<u>Needles, California</u>
Drilling Asst: <u>E. Huellmantel / J. Campbell</u>	Depth to First Water: <u>N/A</u>	
Logger: <u>Sean McGrane</u>	Sampling Method: <u>10 ft Core Barrel</u>	Project Number: <u>Topock</u>
Editor: <u>Sean McGrane</u>	Sampling Interval: <u>Continuous</u>	
Weather: <u>78 to 84° Partly Cloudy</u>	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Description	Drilling Notes	Drilling Fluid
1	72			Topock - Alluvium Deposits	SW		(0.0 - 1.5') Topock - Alluvium Deposits; Well graded sand with gravel (SW); brown (10YR 4/3); very fine grained to very coarse grained, angular to subround; some granule to large pebbles; some coarse to very coarse grained sand, subangular to subround; trace cobbles; trace boulders, angular to subangular; trace silt; dry		
2				Topock - Alluvium Deposits	SW		(1.5 - 6.0') Topock - Alluvium Deposits; Well graded sand with gravel (SW); brown (7.5YR 4/3); very fine grained to very coarse grained, subangular to round; some granule to medium pebbles, angular to subangular; trace silt; dry		
3									
4									
5									
6	120	()		Topock - Alluvium Deposits	SM		(6.0 - 11.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 4/3); very fine grained to very coarse grained, angular to subround; some granule to very large pebbles, angular to subangular; some silt; trace cobbles, angular; trace boulders, angular to subangular; dry		
7									
8				Topock - Alluvium Deposits	SW-SM		(11.0 - 16.0') Topock - Alluvium Deposits; Well graded sand with silt and gravel (SW-SM); dark grayish brown / dark yellowish brown(10YR 4/2); very fine grained to very coarse grained, angular to subangular; some granule to large pebbles; little silt; trace cobbles, angular to subangular; dry		
9									
10									
11				Topock - Alluvium Deposits	SW-SM		(16.0 - 21.5') Topock - Alluvium Deposits; Well graded sand with silt and gravel (SW-SM); very dark gray (10YR 3/1); very fine grained to very coarse grained, angular to subangular; some granule to very large pebbles; little silt; trace cobbles, angular to subangular; dry	Lost core barrel down hole	
12									
13									
14				Topock - Alluvium Deposits	SW-SM				
15									
16									
17				Topock - Alluvium Deposits	SW-SM				
18									
19									
20									







Notes: NR = No Recovery, USCS = Unified Soil Classification System

Date Started: <u>10/03/2018</u>	Surface Elevation: <u>N/A</u>	Boring No.: <u>MW-Ld</u>
Date Completed: <u>12/02/2018</u>	Northing (NAD83): <u>N/A</u>	
Drilling Co.: <u>Cascade</u>	Easting (NAD83): <u>N/A</u>	Client: <u>PG&E</u>
Drilling Method: <u>Sonic Drilling</u>	Total Depth: <u>315 ft bgs</u>	Location: <u>Groundwater Remedy Phase I</u>
Driller Name: <u>Dan O'Mara</u>	Borehole Diameter: <u>10 in</u>	<u>Needles, California</u>
Drilling Asst: <u>E. Huellmantel / J. Campbell</u>	Depth to First Water: <u>N/A</u>	
Logger: <u>Sean McGrane</u>	Sampling Method: <u>10 ft Core Barrel</u>	Project Number: <u>Topock</u>
Editor: <u>Sean McGrane</u>	Sampling Interval: <u>Continuous</u>	
Weather: <u>78 to 84° Partly Cloudy</u>	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Description	Drilling Notes	Drilling Fluid
21	96			Topock - Alluvium Deposits	SW-SM				
22				Topock - Alluvium Deposits	SM		(21.5 - 22.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); dark gray (10YR 4/1); very fine grained to very coarse grained, angular to subround; some granule to very large pebbles, angular to subangular; some silt; dry		
23				Topock - Alluvium Deposits	GP		(22.5 - 24.0') Topock - Alluvium Deposits; Poorly graded gravel (GP); black (10YR 2/1); small cobbles to large cobbles, angular to subround; dry		
24									
25	60				NR		(24.0 - 26.0') (NR); No Recovery sample bags broke		
26									
27				Topock - Alluvium Deposits	ML		(26.0 - 28.0') Topock - Alluvium Deposits; Sandy silt with gravel (ML); brown (10YR 5/3); no plasticity; some very fine to very coarse grained sand, angular to subangular; little granule to very large pebbles, angular to subangular; trace cobbles, angular to subangular; trace mica; dry	Rough drilling	
28									
29	84			Topock - Alluvium Deposits	ML		(28.0 - 29.5') Topock - Alluvium Deposits; Sandy silt with gravel (ML); brown (10YR 5/3); no plasticity; and very fine to very coarse grained sand, angular to subangular; little granule to very large pebbles, angular to subangular; trace cobbles, angular to subangular; trace mica; dry		
30				Topock - Alluvium Deposits	GW		(29.5 - 31.0') Topock - Alluvium Deposits; Well graded gravel with sand (GW); dark yellowish brown (10YR 4/4); granules to small cobbles, angular to subround; little very fine to coarse grained sand, subangular to subround; dry		
31									
32				Topock - Alluvium Deposits	ML		(31.0 - 34.5') Topock - Alluvium Deposits; Sandy silt with gravel (ML); brown (10YR 5/3); no plasticity; some very fine to very coarse grained sand, angular to subangular; little granule to very large pebbles, angular to subangular; trace cobbles, angular to subangular; trace mica; dry	Lost core barrel down hole	
33									
34									
35				Topock - Alluvium Deposits	SM		(34.5 - 38.0') Topock - Alluvium Deposits; Silty sand (SM); brown (10YR 5/3); very fine grained to fine grained, subangular to subround; and silt; dry		
36									
37				Topock - Alluvium Deposits	SM		(38.0 - 39.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); grayish brown (2.5Y 5/2); very fine grained to very coarse grained, angular to subround; some silt; little granule to large pebbles, angular to subangular; moist		
38				Topock - Alluvium Deposits	SM		(39.0 - 43.0') Topock - Alluvium Deposits; Silty sand (SM); very dark grayish brown (2.5Y 3/2); very fine grained to coarse grained, angular to subangular; and silt; trace granule to medium pebbles, angular to		
39									
40									



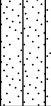




Notes: NR = No Recovery, USCS = Unified Soil Classification System

Date Started: <u>10/03/2018</u>	Surface Elevation: <u>N/A</u>	Boring No.: <u>MW-Ld</u>
Date Completed: <u>12/02/2018</u>	Northing (NAD83): <u>N/A</u>	
Drilling Co.: <u>Cascade</u>	Easting (NAD83): <u>N/A</u>	Client: <u>PG&E</u>
Drilling Method: <u>Sonic Drilling</u>	Total Depth: <u>315 ft bgs</u>	Location: <u>Groundwater Remedy Phase I</u>
Driller Name: <u>Dan O'Mara</u>	Borehole Diameter: <u>10 in</u>	<u>Needles, California</u>
Drilling Asst: <u>E. Huellmantel / J. Campbell</u>	Depth to First Water: <u>N/A</u>	
Logger: <u>Sean McGrane</u>	Sampling Method: <u>10 ft Core Barrel</u>	Project Number: <u>Topock</u>
Editor: <u>Sean McGrane</u>	Sampling Interval: <u>Continuous</u>	
Weather: <u>78 to 84° Partly Cloudy</u>	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Description	Drilling Notes	Drilling Fluid
41	96			Topock - Alluvium Deposits	SM		subangular; trace clay; moist		
42									
43				Topock - Alluvium Deposits	SW		(43.0 - 46.0') Topock - Alluvium Deposits; Well graded sand (SW); brown (7.5YR 5/3); very fine grained to very coarse grained, subangular to subround; trace granule to very large pebbles, angular to subround; trace cobbles, subround; trace silt; dry		
44	120								
45									
46									
47				Topock - Alluvium Deposits	SM		(46.0 - 51.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (10YR 4/3); very fine grained to very coarse grained, subangular to subround; little granule to very large pebbles, subangular to subround; little silt; trace cobbles, subangular to subround; trace clay; trace mica; dry; gravel coursening downward in formation.		
48									
49									
50									
51									
52				Topock - Alluvium Deposits	SW-SM		(51.5 - 52.0') Topock - Alluvium Deposits; Well graded sand with silt (SW-SM); brown (10YR 5/3); very fine grained to medium grained, angular to subround; trace silt; little mica; dry		
53									
54				Topock - Alluvium Deposits	SW		(52.0 - 59.0') Topock - Alluvium Deposits; Well graded sand with gravel (SW); very dark grayish brown (10YR 3/2); very fine grained to very coarse grained, angular to subangular; and granule to very large pebbles, subangular to round; trace cobbles, subangular to subround; some mica; dry		
55									
56									
57									
58									
59				Topock - Alluvium Deposits	SM		(59.0 - 62.0') Topock - Alluvium Deposits; Silty sand (SM); brown (10YR 5/3); very fine grained to very coarse grained, angular to subround; little silt; little clay; trace granule to large pebbles, angular to		
60									

Notes: NR = No Recovery, USCS = Unified Soil Classification System

Date Started: <u>10/03/2018</u>		Surface Elevation: <u>N/A</u>		Boring No.: <u>MW-Ld</u>	
Date Completed: <u>12/02/2018</u>		Northing (NAD83): <u>N/A</u>			
Drilling Co.: <u>Cascade</u>		Easting (NAD83): <u>N/A</u>		Client: <u>PG&E</u>	
Drilling Method: <u>Sonic Drilling</u>		Total Depth: <u>315 ft bgs</u>		Location: <u>Groundwater Remedy Phase I</u>	
Driller Name: <u>Dan O'Mara</u>		Borehole Diameter: <u>10 in</u>		<u>Needles, California</u>	
Drilling Asst: <u>E. Huellmantel / J. Campbell</u>		Depth to First Water: <u>N/A</u>			
Logger: <u>Sean McGrane</u>		Sampling Method: <u>10 ft Core Barrel</u>		Project Number: <u>Topock</u>	
Editor: <u>Sean McGrane</u>		Sampling Interval: <u>Continuous</u>			
Weather: <u>78 to 84° Partly Cloudy</u>		Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No			

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Description	Drilling Notes	Drilling Fluid
61	120			Topock - Alluvium Deposits	SM		subround; dry		
62									
63				Topock - Alluvium Deposits	GW		(62.0 - 65.5') Topock - Alluvium Deposits; Well graded gravel with sand (GW); light brownish gray / pale yellowish brown(10YR 6/2); granules to small cobbles, angular to subround; little very fine to very coarse grained sand, angular to subround; trace boulders, angular to subangular; dry		
64									
65									
66				Topock - Alluvium Deposits	SM		(65.5 - 67.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); dark grayish brown / dark yellowish brown(10YR 4/2); very fine grained to very coarse grained, angular to subround; little granule to large pebbles, angular to subangular; little silt; little clay; trace cobbles, angular; dry		
67									
68				Topock - Alluvium Deposits	SW-SM		(67.0 - 69.0') Topock - Alluvium Deposits; Well graded gravel with silt (SW-SM); light brownish gray / pale yellowish brown(10YR 6/2); very fine grained to very coarse grained, angular to subangular; little silt; trace granule to medium pebbles, subangular to round; dry		
69									
70									
71	120								
72									
73									
74				Topock - Alluvium Deposits	SM		(69.0 - 79.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 5/3); fine grained to very coarse grained, subangular to subround; little granule to very large pebbles, subangular to round; little silt; trace cobbles, angular to subangular; trace boulders, subangular to well-round; little mica; dry		
75									
76									
77									
78									
79									
80									
				Topock - Alluvium Deposits	SM		(72.5') olive / moderate olive brown(5Y 4/4); some granule to very large pebbles (74') dark grayish brown / dark yellowish brown(10YR 4/2) (75') dark brown (7.5YR 3/4); moist (76') brown (7.5YR 4/3); and granule to very large pebbles, subangular to round; little silt; trace cobbles, subangular to round; wet; water table	Approximate depth of water table	60 gal of water used
				Topock - Alluvium Deposits	ML		(79.5 - 80.0') Topock - Alluvium Deposits; Sandy silt with gravel (ML);		

Notes: NR = No Recovery, USCS = Unified Soil Classification System

Date Started: <u>10/03/2018</u>	Surface Elevation: <u>N/A</u>	Boring No.: <u>MW-Ld</u>
Date Completed: <u>12/02/2018</u>	Northing (NAD83): <u>N/A</u>	
Drilling Co.: <u>Cascade</u>	Easting (NAD83): <u>N/A</u>	Client: <u>PG&E</u>
Drilling Method: <u>Sonic Drilling</u>	Total Depth: <u>315 ft bgs</u>	Location: <u>Groundwater Remedy Phase I</u>
Driller Name: <u>Dan O'Mara</u>	Borehole Diameter: <u>10 in</u>	<u>Needles, California</u>
Drilling Asst: <u>E. Huellmantel / J. Campbell</u>	Depth to First Water: <u>N/A</u>	
Logger: <u>Sean McGrane</u>	Sampling Method: <u>10 ft Core Barrel</u>	Project Number: <u>Topock</u>
Editor: <u>Sean McGrane</u>	Sampling Interval: <u>Continuous</u>	
Weather: <u>78 to 84° Partly Cloudy</u>	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Description	Drilling Notes	Drilling Fluid
81	120		MW-L-VAS-76-81 (31 ppb)	Deposits			reddish brown(2.5YR 4/3) with reddish brown (5YR 5/3); no plasticity, no dilatency; some very fine to very coarse grained sand, subangular to subround; little granule to very large pebbles, subround to round; wet		
82				Topock - Alluvium Deposits	SM		(80.0 - 82.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); dark grayish brown / dark yellowish brown(10YR 4/2); very fine grained to very coarse grained, angular to subangular; some granule to large pebbles, angular to subround; some silt; wet		
83							(82.5 - 86.0') Topock - Alluvium Deposits; Silty sand (SM); grayish brown (10YR 5/2); very fine grained to very coarse grained, angular to subangular; and silt; trace granule to very large pebbles, angular to subangular; trace cobbles, angular; trace clay; some caliche; dry; strong cementation		60 gal of water used
84				Topock - Alluvium Deposits	SM				
85									
86									
87							(86.0 - 93.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); dark grayish brown / dark yellowish brown(10YR 4/2); very fine grained to very coarse grained, angular to subangular; some silt; little granule to very large pebbles, angular to subangular; little clay; moist; moderate cementation		
88									
89									
90				Topock - Alluvium Deposits	SM		(89.5'); decrease in granules to large pebbles, increase in silt		
91	120								20 gal of water used
92									
93									
94				Topock - Alluvium Deposits	ML		(93.5 - 94.0') Topock - Alluvium Deposits; Sandy silt with gravel (ML); grayish brown (2.5Y 5/2); no plasticity, no dilatency; some very fine to very coarse grained sand, angular to subround; little granule to large pebbles, angular to subround; little silt; little clay; wet; weak cementation		
95				Topock - Alluvium Deposits	SM				
96							(94.0 - 95.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); dark grayish brown / dark yellowish brown(10YR 4/2); very fine grained to very coarse grained, angular to subangular; some silt; little granule to large pebbles, angular to subangular; little clay; trace cobbles, angular to subangular; moist; moderate cementation		
97							(95.0 - 112.0') Topock - Alluvium Deposits; Sandy silt with gravel (ML); grayish brown (2.5Y 5/2); no plasticity, no dilatency; some very fine to very coarse grained sand, angular to subangular; little granule to very large pebbles, angular to subangular; trace clay; trace mica; wet; strong cementation		
98				Topock - Alluvium Deposits	ML		(96'); moist to dry; increase in granules to very large pebbles, decrease in sand, increase in silt, decrease in clay		50 gal of water used
99									
100									

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Date Started: <u>10/03/2018</u>	Surface Elevation: <u>N/A</u>	Boring No.: <u>MW-Ld</u>
Date Completed: <u>12/02/2018</u>	Northing (NAD83): <u>N/A</u>	
Drilling Co.: <u>Cascade</u>	Easting (NAD83): <u>N/A</u>	Client: <u>PG&E</u>
Drilling Method: <u>Sonic Drilling</u>	Total Depth: <u>315 ft bgs</u>	Location: <u>Groundwater Remedy Phase I</u>
Driller Name: <u>Dan O'Mara</u>	Borehole Diameter: <u>10 in</u>	<u>Needles, California</u>
Drilling Asst: <u>E. Huellmantel / J. Campbell</u>	Depth to First Water: <u>N/A</u>	
Logger: <u>Sean McGrane</u>	Sampling Method: <u>10 ft Core Barrel</u>	Project Number: <u>Topock</u>
Editor: <u>Sean McGrane</u>	Sampling Interval: <u>Continuous</u>	
Weather: <u>78 to 84° Partly Cloudy</u>	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Description	Drilling Notes	Drilling Fluid
101	120			Topock - Alluvium Deposits	ML		(106'); wet; moderate cementation; decrease in granules to large pebbles, increase in sand (107'); moist to dry; strong cementation; increase in granules to large pebbles, decrease in sand		50 gal of water used
102									
103									
104									
105									
106									
107									
108									
109									
110									
111			MW-L-VAS-106-111 (<0.84 ppb)	Topock - Alluvium Deposits	ML		(112.0 - 114.0') Topock - Alluvium Deposits; Sandy silt with gravel (ML); brown (10YR 5/3) little dark reddish brown (2.5YR 3/4); no plasticity, no dilatency; some granule to very large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subangular; trace clay; trace mica; little caliche; moist to dry; strong cementation		100 gal of water used
112									
113									
114									
115									
116									
117									
118									
119									
120									
				Topock - Alluvium Deposits	ML		(116') brown (10YR 4/3); no caliche; iron oxide staining		130 gal of water used

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Date Started: <u>10/03/2018</u>	Surface Elevation: <u>N/A</u>	Boring No.: <u>MW-Ld</u>
Date Completed: <u>12/02/2018</u>	Northing (NAD83): <u>N/A</u>	
Drilling Co.: <u>Cascade</u>	Easting (NAD83): <u>N/A</u>	Client: <u>PG&E</u>
Drilling Method: <u>Sonic Drilling</u>	Total Depth: <u>315 ft bgs</u>	Location: <u>Groundwater Remedy Phase I</u>
Driller Name: <u>Dan O'Mara</u>	Borehole Diameter: <u>10 in</u>	<u>Needles, California</u>
Drilling Asst: <u>E. Huellmantel / J. Campbell</u>	Depth to First Water: <u>N/A</u>	
Logger: <u>Sean McGrane</u>	Sampling Method: <u>10 ft Core Barrel</u>	Project Number: <u>Topock</u>
Editor: <u>Sean McGrane</u>	Sampling Interval: <u>Continuous</u>	
Weather: <u>78 to 84° Partly Cloudy</u>	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Description	Drilling Notes	Drilling Fluid
121	108			Topock - Alluvium Deposits	ML				
122				Topock - Alluvium Deposits	ML		(121.0 - 126.0') Topock - Alluvium Deposits; Sandy silt with gravel (ML); brown (10YR 4/3) and reddish brown / moderate brown(5YR 4/4); no plasticity, no dilatency; some granule to very large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subangular; trace mica; trace caliche; moist; strong cementation; iron oxide staining		130 gal of water used
123									
124									
125									
126	182.4			Topock - Alluvium Deposits	ML		(126.0 - 131.0') Topock - Alluvium Deposits; Sandy silt with gravel (ML); dark grayish brown / dark yellowish brown(10YR 4/2); no plasticity, no dilatency; some granule to very large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subangular; trace clay; little mica; moist; weak cementation; iron oxide staining		140 gal of water used
127									
128									
129									
130				Topock - Alluvium Deposits	ML		(131.0 - 139.5') Topock - Alluvium Deposits; Sandy silt with gravel (ML); dark yellowish brown (10YR 4/4); no plasticity, slow dilatency; some very fine to very coarse grained sand, angular to subangular; little granule to large pebbles, angular to subangular; little clay; little mica; wet; iron oxide staining (132'); no dilatency; some granule to large pebbles, angular to subangular; trace clay; iron oxide staining; decrease sand, increase silt		
131									
132									
133									
134									
135									
136							(136'); iron oxide staining; increase gravel, decrease silt		
137									
138									
139									
140					ML		(139.5 - 146.0') Topock - Alluvium Deposits; Gravelly silt with sand		60 gal of water used









Notes: NR = No Recovery, USCS = Unified Soil Classification System

Date Started: 10/03/2018	Surface Elevation: N/A	Boring No.: MW-Ld
Date Completed: 12/02/2018	Northing (NAD83): N/A	
Drilling Co.: Cascade	Easting (NAD83): N/A	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 315 ft bgs	Location: Groundwater Remedy Phase I
Driller Name: Dan O'Mara	Borehole Diameter: 10 in	Needles, California
Drilling Asst: E. Huellmantel / J. Campbell	Depth to First Water: N/A	
Logger: Sean McGrane	Sampling Method: 10 ft Core Barrel	Project Number: Topock
Editor: Sean McGrane	Sampling Interval: Continuous	
Weather: 78 to 84° Partly Cloudy	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Description	Drilling Notes	Drilling Fluid
141							(ML); brown (10YR 4/3); no plasticity, no dilatency; some granule to very large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subangular; trace mica; wet; iron oxide staining		
142									
143			MW-L-VAS-141-146 (<0.33 ppb)	Topock - Alluvium Deposits	ML				60 gal of water used
144									
145									
146									
147							(146.0 - 151.0') Topock - Alluvium Deposits; Sandy silt with gravel (SM); dark grayish brown / dark yellowish brown(10YR 4/2); very fine grained to very coarse grained, angular to subangular; some granule to very large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subangular; little silt; trace cobbles, angular; trace mica; dry; weak cementation; iron oxide staining; (0,70,30,0)	seepage from outside conductor casing. pull 6" conductor casing and install 12" conductor casing. while reinstalling 6" casing to 146' bgs, 100 gallons of water added from 116' to 126' bgs, 100 gallons added from 126' to 136' bgs and 60 gall	
148				Topock - Alluvium Deposits	SM				
149									
150									
151	120								
152				Topock - Alluvium Deposits	SM		(151.0 - 153.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (10YR 4/3); very fine grained to very coarse grained, angular to subround; some granule to very large pebbles, angular to subangular; some silt; little clay; trace cobbles, angular; trace mica; wet; weak cementation; iron oxide staining; (25,30,25,20)		40 gal of water used
153									
154				Topock - Alluvium Deposits	GM		(153.0 - 154.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); brown (10YR 4/3); granules to very large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subangular; some silt; trace mica; moist; weak cementation; iron oxide staining		
155				Topock - Alluvium Deposits	SM		(154.0 - 155.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (10YR 4/3); very fine grained to very coarse grained, angular to subround; some granule to very large pebbles, angular to subangular; some silt; little clay; trace cobbles, angular; trace mica; wet; moderate cementation		
156				Topock - Alluvium Deposits	ML				
157				Topock - Alluvium Deposits	GM		(155.0 - 156.0') Topock - Alluvium Deposits; Sandy silt with gravel (ML); brown (10YR 4/3); low plasticity, no dilatency; some granule to very large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subangular; little clay; trace mica; moist; strong cementation	refill casing (110 gallons) after sampling from 261-266ft bgs	
158							(156.0 - 157.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); brown (10YR 4/3); granules to very large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subangular; little silt; little clay; trace mica; wet; weak cementation; iron oxide staining		50 gal of water used
159				Topock - Alluvium Deposits	SM		(157.0 - 163.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (10YR 4/3); very fine grained to very coarse grained, angular to subround; some granule to very large pebbles, angular to subangular; some silt; little clay; trace mica; moist; strong		
160									

Notes: NR = No Recovery, USCS = Unified Soil Classification System

Date Started: <u>10/03/2018</u>	Surface Elevation: <u>N/A</u>	Boring No.: <u>MW-Ld</u>
Date Completed: <u>12/02/2018</u>	Northing (NAD83): <u>N/A</u>	
Drilling Co.: <u>Cascade</u>	Easting (NAD83): <u>N/A</u>	Client: <u>PG&E</u>
Drilling Method: <u>Sonic Drilling</u>	Total Depth: <u>315 ft bgs</u>	Location: <u>Groundwater Remedy Phase I</u>
Driller Name: <u>Dan O'Mara</u>	Borehole Diameter: <u>10 in</u>	<u>Needles, California</u>
Drilling Asst: <u>E. Huellmantel / J. Campbell</u>	Depth to First Water: <u>N/A</u>	
Logger: <u>Sean McGrane</u>	Sampling Method: <u>10 ft Core Barrel</u>	Project Number: <u>Topock</u>
Editor: <u>Sean McGrane</u>	Sampling Interval: <u>Continuous</u>	
Weather: <u>78 to 84° Partly Cloudy</u>	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Description	Drilling Notes	Drilling Fluid
161	120			Topock - Alluvium Deposits	SM		cementation; iron oxide staining		50 gal of water used
162									
163									
164				Topock - Alluvium Deposits	SM		(163.0 - 166.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (5YR 5/4); very fine grained to very coarse grained, angular to subangular; some granule to very large pebbles, angular to subangular; some silt; little clay; little mica; wet; weak cementation; iron oxide staining		
165	120								45 gal of water used
166									
167				Topock - Alluvium Deposits	GM		(166.0 - 167.5') Topock - Alluvium Deposits; Silty gravel with sand (GM); brown (10YR 4/3); granules to boulders, angular to subangular; some very fine to very coarse grained sand, angular to subangular; little silt; little clay; some mica; wet; strong cementation; iron oxide staining		
168									
169				Topock - Alluvium Deposits	SM		(167.5 - 170.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (10YR 4/3); very fine grained to very coarse grained, angular to subround; some granule to very large pebbles, angular to subangular; some silt; little clay; trace mica; wet; strong cementation; iron oxide staining		
170									
171				Topock - Alluvium Deposits	GM		(170.0 - 174.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); brown (10YR 5/3); granules to boulders, angular to subangular; some very fine to very coarse grained sand, angular to subangular; little silt; trace clay; some mica; wet; strong cementation; iron oxide staining		
172									
173									20 gal of water used
174									
175				Topock - Alluvium Deposits	GM		(174.0 - 176.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); dark grayish brown / dark yellowish brown (10YR 4/2); granules to very large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subangular; some silt; little clay; some mica; wet; strong cementation; iron oxide staining		
176									
177				Topock - Alluvium Deposits	SM		(176.0 - 177.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 5/3); very fine grained to very coarse grained, angular to subangular; some small to very large pebbles, angular to subangular; some silt; little clay; little mica; wet; strong cementation; iron oxide staining		20 gal of water used
178									
179				Topock - Alluvium Deposits	SM		(177.5 - 181.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 5/3); very fine grained to very coarse grained, angular to subangular; some silt; little small to very large pebbles, angular to subangular; trace clay; little mica; wet; moderate cementation; iron oxide staining		
180									

Notes: NR = No Recovery, USCS = Unified Soil Classification System

Date Started: <u>10/03/2018</u>	Surface Elevation: <u>N/A</u>	Boring No.: <u>MW-Ld</u>
Date Completed: <u>12/02/2018</u>	Northing (NAD83): <u>N/A</u>	
Drilling Co.: <u>Cascade</u>	Easting (NAD83): <u>N/A</u>	Client: <u>PG&E</u>
Drilling Method: <u>Sonic Drilling</u>	Total Depth: <u>315 ft bgs</u>	Location: <u>Groundwater Remedy Phase I</u>
Driller Name: <u>Dan O'Mara</u>	Borehole Diameter: <u>10 in</u>	<u>Needles, California</u>
Drilling Asst: <u>E. Huellmantel / J. Campbell</u>	Depth to First Water: <u>N/A</u>	
Logger: <u>Sean McGrane</u>	Sampling Method: <u>10 ft Core Barrel</u>	Project Number: <u>Topock</u>
Editor: <u>Sean McGrane</u>	Sampling Interval: <u>Continuous</u>	
Weather: <u>78 to 84° Partly Cloudy</u>	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Description	Drilling Notes	Drilling Fluid
181	134.4			Topock - Alluvium Deposits	SM				
182							(181.5 - 184.5') Topock - Alluvium Deposits; Sandy silt with gravel (ML); brown (10YR 5/3); medium plasticity, slow dilatancy; some granule to very large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subround; wet; iron oxide staining		20 gal of water used
183				Topock - Alluvium Deposits	ML				
184			MW-L-VAS-181-186 (3.3 ppb)						
185				Topock - Alluvium Deposits	SM		(184.5 - 186.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (10YR 5/3); very fine grained to very coarse grained, angular to subround; some small to very large pebbles, angular to subangular; some silt; trace clay; some mica; wet; weak cementation		
186									
187				Topock - Alluvium Deposits	ML		(186.5 - 188.5') Topock - Alluvium Deposits; Sandy silt with gravel (ML); brown (7.5YR 4/3); no plasticity, no dilatancy; some granule to very large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subangular; little clay; moist; strong cementation; iron oxide staining		
188									
189							(188.5 - 195.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 5/4); very fine grained to very coarse grained, angular to subangular; some granule to very large pebbles, angular to subangular; some silt; little clay; some mica; dry to moist; strong cementation; iron oxide staining		
190									
191	120			Topock - Alluvium Deposits	SM				35 gal of water used
192									
193									
194									
195									
196							(195.0 - 201.0') Topock - Alluvium Deposits; Sandy silt with gravel (ML); reddish brown / moderate brown(5YR 4/4) and brown (10YR 4/3); low plasticity, no dilatancy; some granule to very large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subangular; trace clay; some mica; wet; stiff; mottled; weak cementation; iron oxide staining		
197				Topock - Alluvium Deposits	ML				20 gal of water used
198									
199									
200									

Notes: NR = No Recovery, USCS = Unified Soil Classification System

Date Started: <u>10/03/2018</u>	Surface Elevation: <u>N/A</u>	Boring No.: <u>MW-Ld</u>
Date Completed: <u>12/02/2018</u>	Northing (NAD83): <u>N/A</u>	
Drilling Co.: <u>Cascade</u>	Easting (NAD83): <u>N/A</u>	Client: <u>PG&E</u>
Drilling Method: <u>Sonic Drilling</u>	Total Depth: <u>315 ft bgs</u>	Location: <u>Groundwater Remedy Phase I</u>
Driller Name: <u>Dan O'Mara</u>	Borehole Diameter: <u>10 in</u>	<u>Needles, California</u>
Drilling Asst: <u>E. Huellmantel / J. Campbell</u>	Depth to First Water: <u>N/A</u>	
Logger: <u>Sean McGrane</u>	Sampling Method: <u>10 ft Core Barrel</u>	Project Number: <u>Topock</u>
Editor: <u>Sean McGrane</u>	Sampling Interval: <u>Continuous</u>	
Weather: <u>78 to 84° Partly Cloudy</u>	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Description	Drilling Notes	Drilling Fluid
201	120			Topock - Alluvium Deposits	ML				20 gal of water used
202				Topock - Alluvium Deposits	SM		(201.0 - 205.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (10YR 5/3); very fine grained to very coarse grained, angular to subround; some granule to very large pebbles, angular to subround; some silt; trace clay; some mica; dry to moist; moderate cementation; iron oxide staining		
203									
204									
205									
206	133.2			Topock - Alluvium Deposits	ML		(205.0 - 206.5') Topock - Alluvium Deposits; Sandy silt with gravel (ML); brown (10YR 5/3) and reddish brown / moderate brown(5YR 4/4); no plasticity, no dilatency; some granule to very large pebbles; some very fine to very coarse grained sand, angular to subangular; trace clay; little mica; wet; medium stiff; mottled; weak cementation; iron oxide staining		40 gal of water used
207				Topock - Alluvium Deposits	GM		(206.5 - 208.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); dark grayish brown / dark yellowish brown(10YR 4/2); granules to very large pebbles, angular to subangular; some silt; little very fine to very coarse grained sand, angular to subangular; little clay; trace mica; moist; moderate cementation; iron oxide staining		
208				Topock - Alluvium Deposits	GM		(208.0 - 215.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); dark grayish brown / dark yellowish brown(10YR 4/2); granules to very large pebbles, angular to subangular; no plasticity, no dilatency; some very fine to very coarse grained sand, angular to subangular; some silt; little clay; trace mica; moist; moderate cementation; iron oxide staining		
209									
210									
211									
212									
213									
214									
215									
216				Topock - Older Alluvium Deposits	SM		(215.0 - 216.0') Topock - Older Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 4/4) and reddish brown (5YR 5/4); very fine grained to very coarse grained, angular to subangular; some granule to very large pebbles, angular to subangular; some silt; trace mica; moist; mottled; weak cementation; iron oxide staining		
217			MW-L-VAS-218-223 (66 ppb)	Topock - Older Alluvium Deposits	SM		(216.0 - 219.5') Topock - Older Alluvium Deposits; Silty sand with gravel (SM); reddish brown / moderate brown(5YR 4/4); very fine grained to very coarse grained, angular to subangular; some granule to very large pebbles, angular to subangular; some silt; little mica; wet; iron oxide staining		20 gal of water used
218									
219									
220					GM		(219.5 - 222.0') Topock - Older Alluvium Deposits; Silty gravel with		





Notes: NR = No Recovery, USCS = Unified Soil Classification System

Date Started:	10/03/2018	Surface Elevation:	N/A	Boring No.: MW-Ld	
Date Completed:	12/02/2018	Northing (NAD83):	N/A		
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	315 ft bgs	Location:	Groundwater Remedy Phase I
Driller Name:	Dan O'Mara	Borehole Diameter:	10 in	Needles, California	
Drilling Asst:	E. Huellmantel / J. Campbell	Depth to First Water:	N/A		
Logger:	Sean McGrane	Sampling Method:	10 ft Core Barrel	Project Number:	Topock
Editor:	Sean McGrane	Sampling Interval:	Continuous		
Weather:	78 to 84° Partly Cloudy	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Description	Drilling Notes	Drilling Fluid
221	111.6		MW-L-VAS-218-223 (66 ppb)	Topock - Older Alluvium Deposits	GM		sand (GM); reddish brown / moderate brown(5YR 4/4); granules to very large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subround; some silt; little mica; wet; iron oxide staining		
222									
223							(222.0 - 227.5') Topock - Older Alluvium Deposits; Sandy silt with gravel (ML); reddish brown (5YR 5/4) with gray / light olive gray(5Y 6/1); no plasticity, no dilatancy; some granule to very large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subangular; trace clay; little mica; moist; stiff to very stiff; mottled; moderate cementation; iron oxide staining		20 gal of water used
224				Topock - Older Alluvium Deposits	ML				
225									
226									
227									
228							(227.5 - 236.0') Topock - Older Alluvium Deposits; Sandy silt with gravel (ML); reddish brown (5YR 5/4); no plasticity, no dilatancy; some granules to very large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subangular; little clay; little mica; moist; stiff to very stiff; moderate cementation; iron oxide staining		
229									
230									
231	120						(230') yellowish red (5YR 4/6); dry; very stiff; strong cementation; iron oxide staining		
232				Topock - Older Alluvium Deposits	ML				
233									
234							(233.5'); trace clay; iron oxide staining; increase in sand and silt		1125 gal used
235									
236									
237							(236.0 - 240.0') Topock - Older Alluvium Deposits; Sandy silt with gravel (ML); reddish brown (5YR 5/4); no plasticity, no dilatancy; some granule to very large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subangular; trace cobbles, subangular; trace clay; little mica; moist to wet; weak cementation; iron oxide staining		
238				Topock - Older Alluvium Deposits	ML				
239									
240									

Notes: NR = No Recovery, USCS = Unified Soil Classification System

Date Started: <u>10/03/2018</u>	Surface Elevation: <u>N/A</u>	Boring No.: <u>MW-Ld</u>
Date Completed: <u>12/02/2018</u>	Northing (NAD83): <u>N/A</u>	
Drilling Co.: <u>Cascade</u>	Easting (NAD83): <u>N/A</u>	Client: <u>PG&E</u>
Drilling Method: <u>Sonic Drilling</u>	Total Depth: <u>315 ft bgs</u>	Location: <u>Groundwater Remedy Phase I</u>
Driller Name: <u>Dan O'Mara</u>	Borehole Diameter: <u>10 in</u>	<u>Needles, California</u>
Drilling Asst: <u>E. Huellmantel / J. Campbell</u>	Depth to First Water: <u>N/A</u>	
Logger: <u>Sean McGrane</u>	Sampling Method: <u>10 ft Core Barrel</u>	Project Number: <u>Topock</u>
Editor: <u>Sean McGrane</u>	Sampling Interval: <u>Continuous</u>	
Weather: <u>78 to 84° Partly Cloudy</u>	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Description	Drilling Notes	Drilling Fluid
241	120			Topock - Older Alluvium Deposits	SM		(240.0 - 244.0') Topock - Older Alluvium Deposits; Silty sand with gravel (SM); reddish brown / moderate brown(5YR 4/4); very fine grained to very coarse grained, angular to subangular; some granule to very large pebbles, angular to subround; some silt; trace cobbles, subangular; little mica; wet; iron oxide staining		
242									
243									
244									
245	114			Topock - Older Alluvium Deposits	ML		(244.0 - 254.0') Topock - Older Alluvium Deposits; Sandy silt with gravel (ML); reddish brown / moderate brown(5YR 4/4); no plasticity, no dilatency; some granule to very large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subangular; little mica; moist to wet; medium stiff to stiff; iron oxide staining		1125 gal used 1100 gal of water used 1100 gal of water used
246									
247									
248									
249									
250									
251									
252									
253									
254									
255									
256									
257				Topock - Older Alluvium Deposits	ML		(254.0 - 258.0') Topock - Older Alluvium Deposits; Sandy silt with gravel (ML); reddish brown / moderate brown(5YR 4/4); no plasticity, no dilatency; some granule to very large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subangular; trace cobbles, angular; trace clay; little mica; moist; medium stiff to stiff; weak cementation; iron oxide staining		40 gal of water used
258									
259									
260									
				Topock - Older Alluvium Deposits	ML		(258.0 - 262.5') Topock - Older Alluvium Deposits; Sandy silt with gravel (ML); reddish brown / moderate brown(5YR 4/4); medium plasticity, no dilatency; some granule to very large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subangular; little clay; little mica; moist; medium stiff to stiff; weak cementation; iron oxide staining		140 gal of water used

Notes: NR = No Recovery, USCS = Unified Soil Classification System

Boring Log

Sheet: 14 of 16

Date Started: 10/03/2018	Surface Elevation: N/A	Boring No.: MW-Ld
Date Completed: 12/02/2018	Northing (NAD83): N/A	
Drilling Co.: Cascade	Easting (NAD83): N/A	Client: PG&E
Drilling Method: Sonic Drilling	Total Depth: 315 ft bgs	Location: Groundwater Remedy Phase I
Driller Name: Dan O'Mara	Borehole Diameter: 10 in	Needles, California
Drilling Asst: E. Huellmantel / J. Campbell	Depth to First Water: N/A	
Logger: Sean McGrane	Sampling Method: 10 ft Core Barrel	Project Number: Topock
Editor: Sean McGrane	Sampling Interval: Continuous	
Weather: 78 to 84° Partly Cloudy	Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Description	Drilling Notes	Drilling Fluid
261	108			Topock - Older Alluvium Deposits	ML		(261'); dry to moist; moderate cementation; iron oxide staining		
262									
263			MW-L-VAS-261-266 (<0.17 ppb)				(262.5 - 283.0') Topock - Older Alluvium Deposits; Sandy silt with gravel (ML); dark reddish brown (2.5YR 3/4); medium plasticity, no dilatency; some granule to very large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subangular; little clay; little mica; wet; medium stiff; iron oxide staining		140 gal of water used
264									
265									
266									
267									30 gal of water used
268							(268'); some clay; little granule to very large pebbles, angular to subangular; little very fine to very coarse grained sand, angular to subangular; moist; stiff; weak cementation; iron oxide staining		
269									
270									
271	138			Topock - Older Alluvium Deposits	ML				40 gal of water used
272									
273									
274									
275									
276									
277									
278									
279									
280									

Notes: NR = No Recovery, USCS = Unified Soil Classification System

Boring Log

Sheet: 15 of 16

Date Started:	10/03/2018	Surface Elevation:	N/A	Boring No.: MW-Ld	
Date Completed:	12/02/2018	Northing (NAD83):	N/A		
Drilling Co.:	Cascade	Easting (NAD83):	N/A	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	315 ft bgs	Location:	Groundwater Remedy Phase I
Driller Name:	Dan O'Mara	Borehole Diameter:	10 in	Needles, California	
Drilling Asst:	E. Huellmantel / J. Campbell	Depth to First Water:	N/A		
Logger:	Sean McGrane	Sampling Method:	10 ft Core Barrel	Project Number: Topock	
Editor:	Sean McGrane	Sampling Interval:	Continuous		
Weather:	78 to 84° Partly Cloudy	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Description	Drilling Notes	Drilling Fluid
281	120			Topock - Older Alluvium Deposits	ML				
282									
283							(283.0 - 299.0') Topock - Older Alluvium Deposits; Gravelly silt with sand (ML); reddish brown / moderate brown(5YR 4/4); medium plasticity, no dilatency; some granule to very large pebbles, angular to subangular; little very fine to very coarse grained sand, angular to subangular; little silt; little clay; trace mica; moist; stiff; strong cementation; iron oxide staining		
284									
285									
286									
287									
288									
289									
290									
291	120			Topock - Older Alluvium Deposits	ML				
292									
293									
294									
295									
296									
297								lost core down hole.	
298									
299									
300			MW-L-VAS-299-304 (Did not		NR		(299.0 - 306.0') (NR); No Recovery, sample fell out of core barrel.	Attempted to collect GW sample but formation was	

Notes: NR = No Recovery, USCS = Unified Soil Classification System

Date Started: <u>10/03/2018</u>		Surface Elevation: <u>N/A</u>		Boring No.: <u>MW-Ld</u>	
Date Completed: <u>12/02/2018</u>		Northing (NAD83): <u>N/A</u>			
Drilling Co.: <u>Cascade</u>		Easting (NAD83): <u>N/A</u>		Client: <u>PG&E</u>	
Drilling Method: <u>Sonic Drilling</u>		Total Depth: <u>315 ft bgs</u>		Location: <u>Groundwater Remedy Phase I</u>	
Driller Name: <u>Dan O'Mara</u>		Borehole Diameter: <u>10 in</u>		<u>Needles, California</u>	
Drilling Asst: <u>E. Huellmantel / J. Campbell</u>		Depth to First Water: <u>N/A</u>			
Logger: <u>Sean McGrane</u>		Sampling Method: <u>10 ft Core Barrel</u>		Project Number: <u>Topock</u>	
Editor: <u>Sean McGrane</u>		Sampling Interval: <u>Continuous</u>			
Weather: <u>78 to 84° Partly Cloudy</u>		Converted to Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No			

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Description	Drilling Notes	Drilling Fluid
301	36		produce)					non-permeable and produced no water.	
302			MW-L-VAS-299-304 (Did not produce)		NR				
303									
304									
305								Drill rods chattering	
306									
307	18						(306.0 - 311.0') Topock - Weathered Bedrock - conglomerate; Sandy silt (ML); dark reddish brown(2.5YR 3/3); medium plasticity, no dilatency; some fine to medium grained sand, subangular to subround; trace granule to small pebbles, angular to subround; trace coarse-grained sand; trace mica; dry; very stiff; strong cementation; iron oxide staining		
308				Topock - Weathered Bedrock - conglomerate	ML				
309									
310									
311									
312	84						(311.0 - 315.0') Topock - Bedrock - metadiorite; dry; Partially Weathered Metadiorite	Rough drilling	
313				Topock - Bedrock - metadiorite					
314								Core barrel stuck down hole. Pulled both core barrel and 6" casing.	
315							End of Boring at 315.0 'bgs.		
316									
317									
318									
319									
320									

Notes: NR = No Recovery, USCS = Unified Soil Classification System



PROJECT NUMBER 707614CH.01.01	BORING NUMBER: AOC13-GRBS-B-01 SHEET 1 OF 2
SOIL BORING LOG	

PROJECT : PG&E Topock; Pipeline F Retaining Wall	LOCATION : 34° 42' 50.64", - 114° 29' 31.92"
ELEVATION : 608.0	DRILLING CONTRACTOR : Cascade Drilling
DRILLING METHOD AND EQUIPMENT : CME95 HSA with 140# autohammer, 30-inch drop	

WATER LEVELS : Not Encountered	START : 10/8/2018	END : 10/8/2018	LOGGER : D. Jankly
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DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)		#TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
	RECOVERY (ft)					
	1.0				4" Asphalt Concrete	
		4.0	1		<u>Poorly-graded SAND with GRAVEL (SP)</u> , light brown; dry; fine to coarse grained, ~10% GRAVEL to 2" diameter. [FILL]	CR, M=4% (Bulk), Hand Auger to 5'
	4.0					
5	5.0					
	6.5	1.2	2	3-5-7 (12)	Loose.	M=2%, PA (Ring)
10	10.0				~20% GRAVEL to 1" diameter	M=4% (SPT)
	11.5	1.0	3	2-4-8 (12)		
					<u>Poorly-graded SAND (SP)</u> , light brown; moist; medium dense; fine grained; micaceous; homogenous. [NATIVE]	
15	15.0					
	16.5		4	8-10-14 (24)		PA (SPT)
					<u>Fat CLAY with SAND (CH)</u> , brown; moist; very stiff; ~25% fine to medium SAND. horizontal laminations.	
20	20.0					
	21.5	1.5	5	6-10-10 (20)	<u>Poorly-graded SAND (SP)</u> , light brown; moist; medium dense; fine grained; micaceous; homogenous.	(SPT), PP = 4.0 tsf
25	25.0					
	26.5	0.1	6	6-7-10 (17)		(SPT)
					<u>Fat CLAY (CH)</u> , reddish brown; moist; hard; horizontal laminations.	
30						

SOIL BORING LOG; JACOBS-GEOTECH_SG.GLB; TOPOCK BORINGS.GPJ; CH2M GEOTECH.GDT; 11/9/18



PROJECT NUMBER 707614CH.01.01	BORING NUMBER: AOC13-GRBS-B-01 SHEET 2 OF 2
SOIL BORING LOG	

PROJECT : PG&E Topock; Pipeline F Retaining Wall LOCATION : (34° 42' 50.64", - 114° 29' 31.92")
ELEVATION : 608.0 DRILLING CONTRACTOR : Cascade Drilling
DRILLING METHOD AND EQUIPMENT : CME95 HSA with 140# autohammer, 30-inch drop

WATER LEVELS : Not Encountered START: 10/8/2018 END: 10/8/2018 LOGGER : D. Jankly

DEPTH BELOW GROUND SURFACE (ft)		INTERVAL (ft)		STANDARD PENETRATION TEST RESULTS	SOIL DESCRIPTION	COMMENTS	
		RECOVERY (ft)	#TYPE		6"-6"-6" (N)	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
	30.0		7	5-7-9 (16)		(SPT), PP > 4.5 tsf	
	31.5				Total Depth: 31.5', No Groundwater Encountered, Backfilled with Portland Cement Grout, Concrete Patch at Surface.		
	</						

SOIL BORING LOG; JACOBS-GEOTECH_SG.GLB; TOPOCK BORINGS.GPJ; CH2M GEOTECH.GDT; 11/9/18



PROJECT NUMBER
707614CH.01.01

BORING NUMBER:
AOC13-GRBS-B-02 SHEET 1 OF 2

SOIL BORING LOG

PROJECT : PG&E Topock; Pipeline F Retaining Wall

LOCATION : (34° 42' 50.68", -114° 29' 30.59")

ELEVATION : 597.0

DRILLING CONTRACTOR : Cascade Drilling

DRILLING METHOD AND EQUIPMENT : CME95 HSA with 140# autohammer, 30-inch drop

WATER LEVELS : Not Encountered

START: 10/8/2018

END: 10/8/2018

LOGGER : D. Jankly

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)		STANDARD PENETRATION TEST RESULTS	SOIL DESCRIPTION	COMMENTS		
	RECOVERY (ft)	#TYPE				SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
5	1.0				4" Asphalt Concrete	CR, PA (Bulk); Hand Auger to 5'	
					Poorly-graded SAND with SILT and GRAVEL (SP-SM) brown; dry; fine sand, ~37% GRAVEL; ~10% COBBLES to 12" diameter. [FILL]		
		4.0	1		Many COBBLES at 3 to 5 feet.		
					Medium Dense.		(Ring)
	5.0						
		1.0	2	5-10-15 (25)	SANDY SILTY CLAY (CL-ML) brown; medium dense; moist. [NATIVE]		DS, PI, M=17%, UW=100 pcf
					Fat CLAY (CH) brown; moist; very stiff; homogenous.		
10	10.0					M=24%, PI (SPT); PP=3.5 tsf.	
		1.5	3	3-6-11 (17)	Poorly-graded Sand (SP) Light brown; moist; fine grained; homogenous.		
					Fat CLAY (CH) brown; moist; very stiff; homogenous; few fine SAND; laminations <1/8" thick.		
15	15.0					DS, M=23%, UW=102 pcf (Ring); PP=3.5 tsf.	
		1.3	4	6-6-10 (16)			
20	20.0					M=24% (SPT)	
25	21.5	1.5	5	5-6-7 (13)	SILTY CLAY (CL-ML) brown; wet; soft; saturated; homogenous.	PI (SPT); PP=4.0 tsf.	
					Fat CLAY (CH) brown; moist; very stiff; homogenous; few fine SAND; laminations <1/8" thick.		
30	25.0					PI (SPT); PP=4.0 tsf.	
30	26.5	1.5	6	4-6-12 (18)	Hard.	PI (SPT); PP=4.0 tsf.	

SOIL BORING LOG; JACOBS-GEOTECH_SG.GLB; TOPOCK BORINGS.GPJ; CH2M GEOTECH.GDT; 11/9/18



PROJECT NUMBER
707614CH.01.01

BORING NUMBER:
AOC13-GRBS-B-02 SHEET 2 OF 2

SOIL BORING LOG

PROJECT : PG&E Topock; Pipeline F Retaining Wall

LOCATION : (34° 42' 50.68", -114° 29' 30.59")

ELEVATION : 597.0

DRILLING CONTRACTOR : Cascade Drilling

DRILLING METHOD AND EQUIPMENT : CME95 HSA with 140# autohammer, 30-inch drop

WATER LEVELS : Not Encountered

START: 10/8/2018

END: 10/8/2018

LOGGER : D. Jankly

DEPTH BELOW GROUND SURFACE (ft)				STANDARD PENETRATION TEST RESULTS	SOIL DESCRIPTION	COMMENTS	
INTERVAL (ft)		RECOVERY (ft)	#TYPE		6"-6"-6" (N)	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
	30.0		7	7-10-20 (30)		(SPT); PP=4.5 tsf.	
	31.5				Total Depth: 31.5', No Groundwater Encountered, Backfilled with Portland Cement Grout, Concrete Patch at Surface.		
35							
40							
45							
50							
55							
60							

SOIL BORING LOG; JACOBS-GEOTECH_SG.GLB; TOPOCK BORINGS.GPJ; CH2M GEOTECH.GDT; 11/9/18



PROJECT NUMBER 707614CH.01.01	BORING NUMBER: AOC13-GRBS-B-03 SHEET 1 OF 2
SOIL BORING LOG	

PROJECT : PG&E Topock; Pipeline F Retaining Wall LOCATION : (34° 42' 50.82", -114° 29' 29.34")

ELEVATION : 587.0 DRILLING CONTRACTOR : Cascade Drilling

DRILLING METHOD AND EQUIPMENT : CME95 HSA with 140# autohammer, 30-inch drop

WATER LEVELS : Not Encountered START: 10/9/2018 END: 10/9/2018 LOGGER : D. Jankly

DEPTH BELOW GROUND SURFACE (ft)		INTERVAL (ft)		STANDARD PENETRATION TEST RESULTS		SOIL DESCRIPTION		COMMENTS	
		RECOVERY (ft)							
		#TYPE		6"-6"-6" (N)					
5	1.0					4" Asphalt Concrete			
		3.0	1			Poorly-graded SAND with GRAVEL (SP), brown; moist; medium dense; mostly fine to medium sand, GRAVEL to 3" diameter. [FILL]		(Bulk), Hand Auger to 5'	
	4.0								
10	5.0								
		1.3	2	6-7-15 (22)		SILTY SAND (SM), light brown; moist; medium dense; fine grained; homogeneous. [NATIVE]		(Ring) PA, M=9%, UW=99 pcf DS, M=14%, UW=111 psf, PP=4.0 tsf	
	6.5					Fat CLAY (CH), brown; moist; hard; massive; homogeneous			
15	10.0								
		1.5	3	3-5-6 (11)				CR, M=23%, PI (SPT); PP=4.0 tsf	
	11.5					SANDY SILTY CLAY (CL-ML), brown; wet; very soft; some fine SAND.		PI	
20						Fat CLAY (CH), brown; moist; hard; massive; homogeneous			
	15.0								
		1.5	4	3-5-6 (11)		SANDY SILTY CLAY (CL-ML), brown; wet; very soft; some fine sand.		(SPT); PP=4.25 tsf.	
25	16.5					Fat CLAY (CH), brown; moist; hard; massive; homogeneous			
	20.0								
		1.5	5	4-5-10 (15)				(SPT); PP=4.5 tsf.	
30	21.5								
	25.0								
		1.5	6	4-10-20 (30)		Interbedded with SILTY SAND (SM); moist; medium dense; fine grained; homogeneous. Beds are 2 to 4 inches thick.		(SPT)	
	26.5								

SOIL BORING LOG; JACOBS-GEOTECH_SG.GLB; TOPOCK BORINGS.GPJ; CH2M GEOTECH.GDT; 11/9/18



PROJECT NUMBER
707614CH.01.01

BORING NUMBER:
AOC13-GRBS-B-03 SHEET 2 OF 2

SOIL BORING LOG

PROJECT : PG&E Topock; Pipeline F Retaining Wall

LOCATION : (34° 42' 50.82", -114° 29' 29.34")

ELEVATION : 587.0

DRILLING CONTRACTOR : Cascade Drilling

DRILLING METHOD AND EQUIPMENT : CME95 HSA with 140# autohammer, 30-inch drop

WATER LEVELS : Not Encountered

START: 10/9/2018

END: 10/9/2018

LOGGER : D. Jankly

DEPTH BELOW GROUND SURFACE (ft)				STANDARD PENETRATION TEST RESULTS	SOIL DESCRIPTION	COMMENTS	
INTERVAL (ft)		RECOVERY (ft)	#TYPE		6"-6"-6" (N)	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
30.0	1.0	7	8-16-32 (48)		Poorly-graded GRAVEL with SAND and COBBLES (GP) gray; moist; dense; fine to coarse GRAVEL; medium to coarse SAND. Total Depth: 31.5'; No Groundwater Encountered, Backfilled with Portland Cement Grout, Concrete Patch at Surface.	(SPT)	
31.5							
35							
40							
45							
50							
55							
60							

SOIL BORING LOG; JACOBS-GEOTECH_SG.GLB; TOPOCK BORINGS.GPJ; CH2M GEOTECH.GDT; 11/9/18



PROJECT NUMBER:
707614CH.01.01

TEST PIT NUMBER:
AOC13-GRBS-TP-1 SHEET 1 OF 1

TEST PIT LOG

PROJECT: PG&E Topock; Pipeline F Retaining Wall

LOCATION: (34° 42' 50.82", -114° 29' 30.58")

ELEVATION: 601.0 ft

CONTRACTOR: Phillips Excavating Inc.

EXCAVATION EQUIPMENT: Backhoe with 24-inch bucket

DATE EXCAVATED: 10/8/2018

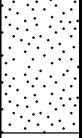
LOGGER: D. Jankly

WATER LEVELS: Not Encountered

LENGTH:

WIDTH:

DEPTH:

SOIL DESCRIPTION				COMMENTS	
DEPTH BELOW SURFACE	#TYPE	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	GRAPHIC LOG	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION	
1	1	Poorly-graded SAND with GRAVEL (SP) light brown; dry; very loose; massive; GRAVEL ~ 30% to 3" diameter; COBBLES to 12" diameter ~ 20%. Local areas of poorly-graded GRAVEL with SAND and COBBLES; unit has occasional rootlets to 1 ft below bgs. [FILL]		CP, DS, PA (Bulk)	
2					
3					
4		Total Depth=3 feet. No Groundwater Encountered Backfilled with soil cuttings			
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PROJECT NUMBER:
707614CH.01.01

TEST PIT NUMBER:
AOC13-GRBS-TP-2 SHEET 1 OF 1

TEST PIT LOG

PROJECT: PG&E Topock; Pipeline F Retaining Wall

LOCATION: (34° 42' 50.96", -114° 29' 29.39")

ELEVATION: 589.0 ft

CONTRACTOR: Phillips Excavating Inc.

EXCAVATION EQUIPMENT: Backhoe with 24-inch bucket

DATE EXCAVATED: 10/8/2018


LOGGER: D. Jankly

WATER LEVELS: Not Encountered

LENGTH:

WIDTH:

DEPTH:

SOIL DESCRIPTION			COMMENTS	
DEPTH BELOW SURFACE	#TYPE	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	GRAPHIC LOG	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
1	1	At 0 to 0.3 feet: Poorly-graded GRAVEL with SAND and COBBLES (GP) , brown; dry; very loose. Predominantly coarse gravel and cobbles to 8-inch diameter. [FILL]		CP, DS, PA (Bulk)
2		At 0.3 to 3.5 feet: Poorly-graded SAND (SP) , light brown; dry; loose; fine grained with 1-2" thick poorly-graded, fine GRAVEL with SAND (GP) interbeds; horizontally dipping. [NATIVE]		
3				
4		Total Depth=3.5 feet. No Groundwater Encountered Backfilled with soil cuttings		
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PROJECT NUMBER:

BORING NUMBER:

SHEET 1 OF 1

BORING LOG EXPLANATION

PROJECT: PG&E Topock; Pipeline F Retaining Wall

LOCATION :

ELEVATION :

DRILLING CONTRACTOR :

DRILLING METHOD AND EQUIPMENT :

WATER LEVELS : --

START :

END :

LOGGER :

WATER LEVELS :		START :		END :		LOGGER :	
DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)		STANDARD PENETRATION TEST RESULTS		SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS	
	RECOVERY (ft)	#TYPE	6"-6"-6" (N)	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION			
	1.0				Sample Interval: Top/Bottom (ft. bgs) Amount of Sample Recovered (ft) bgs = below ground surface Sample Type - Sample Number (SPT) Standard split-spoon drive sampler, 2.0-inch (51-mm) outside diameter, 1.4-inch (35-mm) inside diameter, (without liners) (Ring) Modified California split-spoon drive sampler, 3.0-inch (76-mm) outside diameter, 2.4-inch (64-mm) inside diameter (with ring liners) (B) Bulk sample collected from drill cuttings Standard Penetration Test Results Number of blows required to advance driven sampler over three 6-inch (152-mm) increments. Number in parenthesis is the total number of blows required to advance the sampler 12-inch (305 mm) beyond the first 6-inch (152-mm) interval. Drive samplers advanced using a 140 lb (63.5 kg) Hammer with the 30-inch (762-mm) drop. The blow counts given have not been modified to account for field and/or depth conditions. General Notes 1) Soil classifications are based on the Unified Soil Classification System. Classifications and descriptions made in the field have been modified based on the results of laboratory testing. The relative density / consistency presented on the logs are based on blow counts corrected for the Cal Modified sampler, and for N60 2) Boring logs depict subsurface conditions only at the specific locations and times the boring was made. Logs do not necessarily reflect strata variations that may exist between boring locations.	Comments Comments and observations regarding drilling or sampling made by the driller or field personnel. PP=Pocket Penetrometer in tons/sqft Laboratory tests include the following: M Moisture Content (ASTM D-2216) UW Dry Unit Weight (ASTM D-2937) in pounds per cubic foot (pcf) PA Grain Size analysis (ASTM D-422) with or without hydrometer analysis PI Atterberg Limits (ASTM D-4318) DS Direct Shear (ASTM D-3080) CR Corrosion Suite (California Test Methods 532, 643, 417, 422) CP Max Density/Opt Moisture (ASTM D-1557)	
	2.5	1.5					
	3.5						
5	5.0		1				
10							
15	15.0						
	16.5			3-5-6 (11)			