

Date Started:	03/05/2019	Surface Elevation:	473.30 ft amsl	Well ID: MW-75-267d, MW-75-337
Date Completed:	10/16/2019	Shallow Well Elevation:	473.01 ft amsl	
Drilling Co.:	Cascade	Deep Well Elevation:	473.79 ft amsl	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	2103701.45	Project: Final GW Remedy Phase 1
Driller Name:	E. Ramos	Easting (NAD83):	7615559.26	Location: PG&E Topock, Needles, California
Drilling Asst:	T. Alymer/ J. Candelaria	Borehole Diameter:	6-12 inches	
Logger:	C. Bonessi / S. McGrane	Static Water Level:	See Log for Depths	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	9/7/2019	
Total Depth:	357 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up <input type="checkbox"/> To Be Completed in Well Vault	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed Note: percentages are the actual volume vs the calculated volume
0					(+0.5 - 2.0') Surface Completion		(+0.5 - 2.0') 17 bags Note: 30" diameter concrete pad with 18" diameter lockable vault, Quickcrete concrete mixed with buff colored concrete dye.
1							
2					(0.5 - 317.0') 2" PVC Sch 80 Casing		Note: Decommissioned well casing capped with a PVC slip cap glued to the top of casing. Cap and casing covered with concrete inside the well vault during the installation of the surface completion.
3							
4							
5							
6		Topock - Fill	SM				
7							
8					(1.7 - 14.0') Portland Cement 5% Bentonite Type I, II and V with Hydrogel	(1.7 - 14.0') 68.5 gallons	(1.7 - 14.0') 135 gallons (197%) Note: Grout seal. Used >20% of the calculated volume due to potential voids that formed during drilling.
9							
10					(1.6 - 16.5') Portland Cement 5% Bentonite Type I, II and V with Hydrogel	(1.6 - 16.5') 2.69 gallons	(1.6 - 16.5') 2.5 gallons (93%) Note: Grout decommissioning seal installed on 9/9/19.
11							
12		Topock - Alluvium Deposits	GM				
13							
14		Topock - Fluvial Deposits	GM				
15					(10.0 - 341.0') 10" Borehole	(14.0 - 20.0') 4.18 bags	(14.0 - 20.0') 17 bags (407%) Note: Installed to fill void and minimize grout migration. Used >20% of the calculated volume to fill void.
16							
17					(14.0 - 20.0') Bentonite seal chips Enviroplug medium chips		
18		Topock - Fluvial Deposits	GM		(16.5 - 135.0') 100% Portland Cement Type I, II and V	(16.5 - 135.0') 19.33 Gallons	(16.5 - 135.0') 30 Gallons (155%) Note: Decommissioning grout seal installed with tremie pipe to ~1 foot bgs on 9/4/19 and settled to 16.5 ft. bgs by 9/9/19. Used >20% of the calculated volume due to grout settling.
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; Notes: solid blue water table marks represent depth to water (ft. bgs.) measured post development, MW-75-267d was decommissioned due to high solids grout migrating in to the well screen; installed in MW-75d

Date Started:	03/05/2019	Surface Elevation:	473.30 ft amsl	Well ID: MW-75-267d, MW-75-337
Date Completed:	10/16/2019	Shallow Well Elevation:	473.01 ft amsl	
Drilling Co.:	Cascade	Deep Well Elevation:	473.79 ft amsl	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	2103701.45	Project: Final GW Remedy Phase 1
Driller Name:	E. Ramos	Easting (NAD83):	7615559.26	Location: PG&E Topock, Needles, California
Drilling Asst:	T. Alymer/ J. Candelaria	Borehole Diameter:	6-12 inches	
Logger:	C. Bonessi / S. McGrane	Static Water Level:	See Log for Depths	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	9/7/2019	
Total Depth:	357 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up <input type="checkbox"/> To Be Completed in Well Vault	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed Note: percentages are the actual volume vs the calculated volume
20		Topock - Fluvial Deposits	GM		(0.5 - 317.0') 2" PVC Sch 80 Casing		
21							
22		Topock - Fluvial Deposits	SC				
23		Topock - Fluvial 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					(16.5 - 135.0') 100% Portland Cement Type I, II and V	(16.5 - 135.0') 19.33 Gallons	(16.5 - 135.0') 30 Gallons (155%) Note: Decommissioning grout seal installed with tremie pipe to ~1 foot bgs on 9/4/19 and settled to 16.5 ft. bgs by 9/9/19. Used >20% of the calculated volume due to grout settling.
31							
32		Topock - Alluvium Deposits	SC		(10.0 - 341.0') 10" Borehole		
33							
34							
35					(20.0 - 235.1') High Solids Bentonite Grout Aqua Guard	(20.0 - 235.1') 806.6 gallons	(20.0 - 235.1') 950 gallons (118%) Note: Annular seal across the screen intervals of the well in MW-77s
36		Topock - Alluvium Deposits	SM				
37							
38							
39							

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Date Started:	03/05/2019	Surface Elevation:	473.30 ft amsl	Well ID: MW-75-267d, MW-75-337
Date Completed:	10/16/2019	Shallow Well Elevation:	473.01 ft amsl	
Drilling Co.:	Cascade	Deep Well Elevation:	473.79 ft amsl	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	2103701.45	Project: Final GW Remedy Phase 1
Driller Name:	E. Ramos	Easting (NAD83):	7615559.26	Location: PG&E Topock, Needles, California
Drilling Asst:	T. Alymer/ J. Candelaria	Borehole Diameter:	6-12 inches	
Logger:	C. Bonessi / S. McGrane	Static Water Level:	See Log for Depths	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	9/7/2019	
Total Depth:	357 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up <input type="checkbox"/> To Be Completed in Well Vault	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed Note: percentages are the actual volume vs the calculated volume
40					(0.5 - 317.0') 2" PVC Sch 80 Casing		
41							
42		Topock - Alluvium Deposits	SM				
43							
44							
45							
46							
47							
48		Topock - Alluvium Deposits	SM		(47.5 - 48.5') Centralizer		
49	MW-B-VAS-47-52 (<0.17 U ppb) 1/9/2019 10:15						
50							
51							
52							
53							
54							
55		Topock - Alluvium Deposits	SM		(20.0 - 235.1') High Solids Bentonite Grout Aqua Guard		
56							
57							
58							
59							

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Date Started:	03/05/2019	Surface Elevation:	473.30 ft amsl	Well ID: MW-75-267d, MW-75-337
Date Completed:	10/16/2019	Shallow Well Elevation:	473.01 ft amsl	
Drilling Co.:	Cascade	Deep Well Elevation:	473.79 ft amsl	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	2103701.45	Project: Final GW Remedy Phase 1
Driller Name:	E. Ramos	Easting (NAD83):	7615559.26	Location: PG&E Topock, Needles, California
Drilling Asst:	T. Alymer/ J. Candelaria	Borehole Diameter:	6-12 inches	
Logger:	C. Bonessi / S. McGrane	Static Water Level:	See Log for Depths	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	9/7/2019	
Total Depth:	357 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up <input type="checkbox"/> To Be Completed in Well Vault	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed Note: percentages are the actual volume vs the calculated volume
60		Topock - Alluvium Deposits	SM		(0.5 - 317.0') 2" PVC Sch 80 Casing		
61							
62							
63		Topock - Alluvium Deposits	ML				
64		Topock - Alluvium Deposits	GM				
65							
66						(16.5 - 135.0') 100% Portland Cement Type I, II and V	(16.5 - 135.0') 19.33 Gallons
67							
68	MW-B-VAS-67-72 (<0.17 U ppb) 1/9/2019 14:55	Topock - Alluvium Deposits	SM				
69							
70							
71							
72		Topock - Alluvium Deposits	GM				
73							
74							
75		Topock - Alluvium Deposits	GM		(20.0 - 235.1') High Solids Bentonite Grout Aqua Guard		
76							
77							
78		Topock - Alluvium Deposits	SM			(20.0 - 235.1') 806.6 gallons	(20.0 - 235.1') 950 gallons (118%) Note: Annular seal across the screen intervals of the well in MW-77s
79							

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Date Started:	03/05/2019	Surface Elevation:	473.30 ft amsl	Well ID: MW-75-267d, MW-75-337
Date Completed:	10/16/2019	Shallow Well Elevation:	473.01 ft amsl	
Drilling Co.:	Cascade	Deep Well Elevation:	473.79 ft amsl	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	2103701.45	Project: Final GW Remedy Phase 1
Driller Name:	E. Ramos	Easting (NAD83):	7615559.26	Location: PG&E Topock, Needles, California
Drilling Asst:	T. Alymer/ J. Candelaria	Borehole Diameter:	6-12 inches	
Logger:	C. Bonessi / S. McGrane	Static Water Level:	See Log for Depths	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	9/7/2019	
Total Depth:	357 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up <input type="checkbox"/> To Be Completed in Well Vault	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed Note: percentages are the actual volume vs the calculated volume
80					(0.5 - 317.0') 2" PVC Sch 80 Casing		
81							
82							
83							
84		Topock - Alluvium Deposits	SM				
85							
86							
87							
88							
89		Topock - Alluvium Deposits	GM				
90							
91							
92							
93							
94		Topock - Alluvium Deposits	SM				
95							
96					(20.0 - 235.1') High Solids Bentonite Grout Aqua Guard		
97							
98		Topock - Alluvium Deposits	ML				
99							





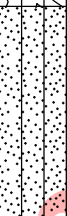







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Date Started:	03/05/2019	Surface Elevation:	473.30 ft amsl	Well ID: MW-75-267d, MW-75-337
Date Completed:	10/16/2019	Shallow Well Elevation:	473.01 ft amsl	
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Driller Name:	E. Ramos	Easting (NAD83):	7615559.26	Location: PG&E Topock, Needles, California
Drilling Asst:	T. Alymer/ J. Candelaria	Borehole Diameter:	6-12 inches	
Logger:	C. Bonessi / S. McGrane	Static Water Level:	See Log for Depths	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	9/7/2019	
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Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed Note: percentages are the actual volume vs the calculated volume
100		Topock - Alluvium Deposits	ML		(0.5 - 317.0') 2" PVC Sch 80 Casing		
101							
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							
111							
112							
113		Topock - Alluvium Deposits	SM				
114							
115					(20.0 - 235.1') High Solids Bentonite Grout Aqua Guard		
116						(20.0 - 235.1') 806.6 gallons	(20.0 - 235.1') 950 gallons (118%) Note: Annular seal across the screen intervals of the well in MW-77s
117							
118							
119							

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Date Started: 03/05/2019	Surface Elevation: 473.30 ft amsl	Well ID: MW-75-267d, MW-75-337
Date Completed: 10/16/2019	Shallow Well Elevation: 473.01 ft amsl	
Drilling Co.: Cascade	Deep Well Elevation: 473.79 ft amsl	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): 2103701.45	Project: Final GW Remedy Phase 1
Driller Name: E. Ramos	Easting (NAD83): 7615559.26	Location: PG&E Topock, Needles, California
Drilling Asst: T. Alymer/ J. Candelaria	Borehole Diameter: 6-12 inches	
Logger: C. Bonessi / S. McGrane	Static Water Level: See Log for Depths	Project Number: RC000753.0051
Editor: Sean McGrane	Development End Date: 9/7/2019	
Total Depth: 357 ft bgs	Well Completion: <input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up <input type="checkbox"/> To Be Completed in Well Vault	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction			Calculated Material Volumes	Material Volumes Installed Note: percentages are the actual volume vs the calculated volume	
120		Topock - Alluvium Deposits	SM		(0.5 - 317.0') 2" PVC Sch 80 Casing		(1.5 - 247.0') Decommissioned Well Casing			
121										
122										
123		Topock - Alluvium Deposits	GM							
124										
125										
126		Topock - Alluvium Deposits	SM				(16.5 - 135.0') 100% Portland Cement Type I, II and V		(16.5 - 135.0') 30 Gallons (155%) Note: Decommissioning grout seal installed with tremie pipe to ~1 foot bgs on 9/4/19 and settled to 16.5 ft. bgs by 9/9/19. Used >20% of the calculated volume due to grout settling.	
127										
128										
129		Topock - Alluvium Deposits	GM				(10.0 - 341.0') 10" Borehole			
130										
131										
132		Topock - Alluvium Deposits	GM		(20.0 - 235.1') High Solids Bentonite Grout Aqua Guard			(20.0 - 235.1') 806.6 gallons	(20.0 - 235.1') 950 gallons (118%) Note: Annular seal across the screen intervals of the well in MW-77s	
133										
134										
135		Topock - Alluvium Deposits	SM					(135.0 - 235.0') 100% Portland Cement Type I, II and V	(135.0 - 235.0') 16.31 Gallons	(135.0 - 235.0') 45 Gallons (276%) Note: Decommissioning grout seal installed with tremie pipe on 8/29/19. Used >20% of calculated volume due to grout migrating into pea gravel and through perforated sections of the well casing.
136										
137										
138										
139										

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Date Completed:	10/16/2019	Shallow Well Elevation:	473.01 ft amsl	
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Driller Name:	E. Ramos	Easting (NAD83):	7615559.26	Location: PG&E Topock, Needles, California
Drilling Asst:	T. Alymer/ J. Candelaria	Borehole Diameter:	6-12 inches	
Logger:	C. Bonessi / S. McGrane	Static Water Level:	See Log for Depths	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	9/7/2019	
Total Depth:	357 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up <input type="checkbox"/> To Be Completed in Well Vault	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed Note: percentages are the actual volume vs the calculated volume
140	MW-B-VAS-142-147 (<0.17 U ppb) 1/15/2019 14:25	Topock - Alluvium Deposits	SM		(0.5 - 317.0') 2" PVC Sch 80 Casing	(135.0 - 235.0') 16.31 Gallons	(135.0 - 235.0') 45 Gallons (276%) Note: Decommissioning grout seal installed with tremie pipe on 8/29/19. Used $>20\%$ of calculated volume due to grout migrating into pea gravel and through perforated sections of the well casing.
141					(1.5 - 247.0') Decommissioned Well Casing		
142		Topock - Alluvium Deposits	SM		(135.0 - 235.0') 100% Portland Cement Type I, II and V		
143							
144		Topock - Alluvium Deposits	SM		(20.0 - 235.1') High Solids Bentonite Grout Aqua Guard	(20.0 - 235.1') 806.6 gallons	(20.0 - 235.1') 950 gallons (118%) Note: Annular seal across the screen intervals of the well in MW-77s
145					(10.0 - 341.0') 10" Borehole		
146		Topock - Alluvium Deposits	GM				
147							
148		Topock - Alluvium Deposits	SM				
149							
150		Topock - Alluvium Deposits	GM				
151							
152		Topock - Alluvium Deposits	SM				
153							
154		Topock - Alluvium Deposits	GM				
155							
156		Topock - Alluvium Deposits	SM				
157							
158		Topock - Alluvium Deposits	GM				
159							

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Editor:	Sean McGrane	Development End Date:	9/7/2019	
Total Depth:	357 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up <input type="checkbox"/> To Be Completed in Well Vault	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed Note: percentages are the actual volume vs the calculated volume
160			GM		(0.5 - 317.0') 2" PVC Sch 80 Casing		
161							
162							
163		Topock - Alluvium Deposits	SM				
164						(135.0 - 235.0') 100% Portland Cement Type I, II and V	(135.0 - 235.0') 16.31 Gallons
165							
166							
167		Topock - Alluvium Deposits	GP				
168					(167.5 - 168.5') Centralizer		
169							
170		Topock - Alluvium Deposits	ML		(20.0 - 235.1') High Solids Bentonite Grout Aqua Guard	(10.0 - 341.0') 10" Borehole	(20.0 - 235.1') 806.6 gallons
171							
172							
173							
174							
175							
176		Topock - Alluvium Deposits	SM				
177							
178							
179							

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Drilling Asst:	T. Alymer/ J. Candelaria	Borehole Diameter:	6-12 inches	
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Editor:	Sean McGrane	Development End Date:	9/7/2019	
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Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed Note: percentages are the actual volume vs the calculated volume
180	MW-B-VAS-182-187 (<0.17 U ppb) 2/13/2019 10:30	Topock - Alluvium Deposits	SM		(0.5 - 317.0') 2" PVC Sch 80 Casing	(135.0 - 235.0') 16.31 Gallons	(135.0 - 235.0') 45 Gallons (276%) Note: Decommissioning grout seal installed with tremie pipe on 8/29/19. Used >20% of calculated volume due to grout migrating into pea gravel and through perforated sections of the well casing.
181					(1.5 - 247.0') Decommissioned Well Casing		
182		Topock - Alluvium Deposits	SM		(135.0 - 235.0') 100% Portland Cement Type I, II and V		
183							
184							
185		Topock - Alluvium Deposits	SM		(20.0 - 235.1') High Solids Bentonite Grout Aqua Guard	(20.0 - 235.1') 806.6 gallons	(20.0 - 235.1') 950 gallons (118%) Note: Annular seal across the screen intervals of the well in MW-77s
186					(10.0 - 341.0') 10" Borehole		
187		Topock - Alluvium Deposits	SM				
188							
189							
190		Topock - Alluvium Deposits	SM				
191							
192		Topock - Alluvium Deposits	SM				
193							
194		Topock - Alluvium Deposits	SM				
195							
196							
197		Topock - Alluvium Deposits	SM				(175.0- 253.0') Note: Casing perforated by making 1 to 2 foot cuts on both side of the casing every 5 feet.
198							
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, J - estimated value, NR = no recovery; Notes: solid blue water table marks represent depth to water (ft. bgs.) measured post development, MW-75-267d was decommissioned due to high solids grout migrating in to the well screen; installed in MW-75d

Date Started:	03/05/2019	Surface Elevation:	473.30 ft amsl	Well ID: MW-75-267d, MW-75-337
Date Completed:	10/16/2019	Shallow Well Elevation:	473.01 ft amsl	
Drilling Co.:	Cascade	Deep Well Elevation:	473.79 ft amsl	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	2103701.45	Project: Final GW Remedy Phase 1
Driller Name:	E. Ramos	Easting (NAD83):	7615559.26	Location: PG&E Topock, Needles, California
Drilling Asst:	T. Alymer/ J. Candelaria	Borehole Diameter:	6-12 inches	
Logger:	C. Bonessi / S. McGrane	Static Water Level:	See Log for Depths	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	9/7/2019	
Total Depth:	357 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up <input type="checkbox"/> To Be Completed in Well Vault	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed Note: percentages are the actual volume vs the calculated volume
200		Topock - Alluvium Deposits	SM		(0.5 - 317.0') 2" PVC Sch 80 Casing		
201							
202							
203							
204			NR				
205							
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 - 235.1') High Solids Bentonite Grout Aqua Guard	(135.0 - 235.0') 100% Portland Cement Type I, II and V 16.31 Gallons	(135.0 - 235.0') 45 Gallons (276%) Note: Decommissioning grout seal installed with tremie pipe on 8/29/19. Used >20% of calculated volume due to grout migrating into pea gravel and through perforated sections of the well casing.
211							
212							
213							
214							
215							
216							
217		Topock - Alluvium Deposits	SM			(10.0 - 341.0') 10" Borehole	(20.0 - 235.1') 806.6 gallons (175.0 - 253.0') Note: Casing perforated by making 1 to 2 foot cuts on both side of the casing every 5 feet.
218							
219							

Abbreviations: USCS = Unified Soil Classification System, ft = 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; Notes: solid blue water table marks represent depth to water (ft. bgs.) measured post development, MW-75-267d was decommissioned due to high solids grout migrating in to the well screen; installed in MW-75d

Date Started:	03/05/2019	Surface Elevation:	473.30 ft amsl	Well ID: MW-75-267d, MW-75-337
Date Completed:	10/16/2019	Shallow Well Elevation:	473.01 ft amsl	
Drilling Co.:	Cascade	Deep Well Elevation:	473.79 ft amsl	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	2103701.45	Project: Final GW Remedy Phase 1
Driller Name:	E. Ramos	Easting (NAD83):	7615559.26	Location: PG&E Topock, Needles, California
Drilling Asst:	T. Alymer/ J. Candelaria	Borehole Diameter:	6-12 inches	
Logger:	C. Bonessi / S. McGrane	Static Water Level:	See Log for Depths	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	9/7/2019	
Total Depth:	357 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up <input type="checkbox"/> To Be Completed in Well Vault	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed Note: percentages are the actual volume vs the calculated volume
220			SM		(0.5 - 317.0') 2" PVC Sch 80 Casing		
221							
222							
223		Topock - Alluvium Deposits	SM				
224					(1.5 - 247.0') Decommissioned Well Casing		
225						(135.0 - 235.0') 16.31 Gallons	(135.0 - 235.0') 45 Gallons (276%) Note: Decommissioning grout seal installed with tremie pipe on 8/29/19. Used >20% of calculated volume due to grout migrating into pea gravel and through perforated sections of the well casing.
226							
227							
228			NR				
229							
230					(20.0 - 235.1') High Solids Bentonite Grout Aqua Guard	(20.0 - 235.1') 806.6 gallons	(20.0 - 235.1') 950 gallons (118%) Note: Annular seal across the screen intervals of the well in MW-77s
231							
232							
233		Topock - Alluvium Deposits	SM				(175.0- 253.0') Note: Casing perforated by making 1 to 2 foot cuts on both side of the casing every 5 feet.
234							
235							
236					(235.0 - 245.0') Bentonite seal pellets Pel-Plug (TR30) 3/8"	(235.0 - 245.0') 8.02 buckets	(235.0-245.0') 10 buckets (125%) Note: Seal between filter pack and high solids bentonite grout. Used >20% due to potential voids that formed during drilling.
237							
238		Topock - Alluvium Deposits	ML		(235.0 - 269.0') Well screen decommissioned with a combination of Cal-Silica 3/8"x1/4" pea gravel, 100% Portland Type I, II and V and High Solids Bentonite Grout Aqua Guard	(235.0 - 269.0') 0.7 bags	(235.0 - 269.0') 0.5 bags (71%) Note: High solids bentonite grout observed in well casing at ~235 ft. bgs. removed to a depth of ~258 ft. by flushing with water before adding Pea Gravel, used <20% of the calculated volume due to high solids grout in the well casing.
239					(237.5 - 238.5') Centralizer		

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Date Started:	03/05/2019	Surface Elevation:	473.30 ft amsl	Well ID: MW-75-267d, MW-75-337
Date Completed:	10/16/2019	Shallow Well Elevation:	473.01 ft amsl	
Drilling Co.:	Cascade	Deep Well Elevation:	473.79 ft amsl	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	2103701.45	Project: Final GW Remedy Phase 1
Driller Name:	E. Ramos	Easting (NAD83):	7615559.26	Location: PG&E Topock, Needles, California
Drilling Asst:	T. Alymer/ J. Candelaria	Borehole Diameter:	6-12 inches	
Logger:	C. Bonessi / S. McGrane	Static Water Level:	See Log for Depths	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	9/7/2019	
Total Depth:	357 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up <input type="checkbox"/> To Be Completed in Well Vault	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed Note: percentages are the actual volume vs the calculated volume
240		Topock - Alluvium Deposits	ML		(0.5 - 317.0') 2" PVC Sch 80 Casing		
241							
242					(235.0 - 245.0') Bentonite seal pellets Pel-Plug (TR30) 3/8"	(235.0 - 245.0') 8.02 buckets	(235.0-245.0') 10 buckets (125%) Note: Seal between filter pack and high solids bentonite grout. Used >20% due to potential voids that formed during drilling.
243							
244							
245		Topock - Alluvium Deposits	ML				
246							
247					(1.5 - 247.0') Decommissioned Well Screen		
248							
249	MW-B-VAS-247-252 (<0.83 U ppb) 2/17/2019 11:25				(235.0 - 269.0') Well screen decommissioned with a combination of Cal-Silica 3/8"x1/4" pea gravel, 100% Portland Type I, II and V and High Solids Bentonite Grout Aqua Guard	(235.0 - 269.0') 0.7 bags	(235.0 - 269.0') 0.5 bags (71%) Note: High solids bentonite grout observed in well casing at ~235 ft. bgs. removed to a depth of ~258 ft. by flushing with water before adding Pea Gravel, used <20% of the calculated volume due to high solids grout in the well casing.
250		Topock - Alluvium Deposits	MH				
251							
252					(10.0 - 341.0') 10" Borehole		
253							
254					(246.9 - 271.0') Cemex #3 MESH (8x10) Lapis Lustre Sand	(235.1 - 269.0') 0.7 bags	(246.9 - 271.0') 34 bags (133%) Note: Filter Pack. Used >20% due to potential voids that formed during drilling.
255		Topock - Alluvium Deposits	MH				
256							
257							
258							
259							

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Date Started:	03/05/2019	Surface Elevation:	473.30 ft amsl	Well ID: MW-75-267d, MW-75-337
Date Completed:	10/16/2019	Shallow Well Elevation:	473.01 ft amsl	
Drilling Co.:	Cascade	Deep Well Elevation:	473.79 ft amsl	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	2103701.45	Project: Final GW Remedy Phase 1
Driller Name:	E. Ramos	Easting (NAD83):	7615559.26	Location: PG&E Topock, Needles, California
Drilling Asst:	T. Alymer/ J. Candelaria	Borehole Diameter:	6-12 inches	
Logger:	C. Bonessi / S. McGrane	Static Water Level:	See Log for Depths	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	9/7/2019	
Total Depth:	357 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up <input type="checkbox"/> To Be Completed in Well Vault	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed Note: percentages are the actual volume vs the calculated volume
260					(0.5 - 317.0') 2" PVC Sch 80 Casing		
261							
262							
263							
264		Topock - Alluvium Deposits	MH		(246.9 - 271.0') Cemex #3 MESH (8x10) Lapis Lustre Sand	(235.0 - 269.0') 0.7 bags	(235.0 - 269.0') 0.5 bags (71%) Note: High solids bentonite grout observed in well casing at ~235 ft. bgs. removed to a depth of ~258 ft. by flushing with water before adding Pea Gravel, used <20% of the calculated volume due to high solids grout in the well casing.
265							
266	MW-B-VAS-264-269 (<0.33 U ppb) 2/18/2019 14:00						
267							
268					(267.5 - 268.5') Centralizer		
269							
270		Topock - Alluvium Deposits	ML				
271							
272							
273							
274							
275		Topock - Alluvium Deposits	ML		(271.0 - 314.9') Bentonite seal pellets Pel-Plug (TR30) 3/8"	(271.0 - 314.9') 36.8 buckets	(271.0 - 314.9') 42 buckets (114%) Note: Intermediate seal
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, J - estimated value, NR = no recovery; Notes: solid blue water table marks represent depth to water (ft. bgs.) measured post development, MW-75-267d was decommissioned due to high solids grout migrating in to the well screen; installed in MW-75d

Date Started:	03/05/2019	Surface Elevation:	473.30 ft amsl	Well ID: MW-75-267d, MW-75-337
Date Completed:	10/16/2019	Shallow Well Elevation:	473.01 ft amsl	
Drilling Co.:	Cascade	Deep Well Elevation:	473.79 ft amsl	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	2103701.45	Project: Final GW Remedy Phase 1
Driller Name:	E. Ramos	Easting (NAD83):	7615559.26	Location: PG&E Topock, Needles, California
Drilling Asst:	T. Alymer/ J. Candelaria	Borehole Diameter:	6-12 inches	
Logger:	C. Bonessi / S. McGrane	Static Water Level:	See Log for Depths	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	9/7/2019	
Total Depth:	357 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up <input type="checkbox"/> To Be Completed in Well Vault	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed Note: percentages are the actual volume vs the calculated volume
280					(0.5 - 317.0') 2" PVC Sch 80 Casing		
281		Topock - Alluvium Deposits	ML				
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						
290		Topock - Alluvium Deposits	ML		(271.0 - 314.9') Bentonite seal pellets Pel-Plug (TR30) 3/8"	(10.0 - 341.0') 10" Borehole	(271.0 - 314.9') 36.8 buckets
291							(271.0 - 314.9') 42 buckets (114%) Note: Intermediate seal
292							
293							
294		Topock - Alluvium Deposits	GM				
295							
296		Topock - Alluvium Deposits	ML				
297							
298							
299		Topock - Alluvium Deposits	SM				

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Date Started:	03/05/2019	Surface Elevation:	473.30 ft amsl	Well ID: MW-75-267d, MW-75-337
Date Completed:	10/16/2019	Shallow Well Elevation:	473.01 ft amsl	
Drilling Co.:	Cascade	Deep Well Elevation:	473.79 ft amsl	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	2103701.45	Project: Final GW Remedy Phase 1
Driller Name:	E. Ramos	Easting (NAD83):	7615559.26	Location: PG&E Topock, Needles, California
Drilling Asst:	T. Alymer/ J. Candelaria	Borehole Diameter:	6-12 inches	
Logger:	C. Bonessi / S. McGrane	Static Water Level:	See Log for Depths	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	9/7/2019	
Total Depth:	357 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up <input type="checkbox"/> To Be Completed in Well Vault	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed Note: percentages are the actual volume vs the calculated volume
300		Topock - Alluvium Deposits	GM		(0.5 - 317.0') 2" PVC Sch 80 Casing		
301							
302							
303							
304							
305							
306							
307		Topock - Alluvium Deposits	MH		(271.0 - 314.9') Bentonite seal pellets Pel-Plug (TR30) 3/8"	(271.0 - 314.9') 36.8 buckets	(271.0 - 314.9') 42 buckets (114%) Note: Intermediate seal
308							
309							
310					(10.0 - 341.0') 10" Borehole		
311							
312							
313							
314							
315							
316		Topock - Alluvium Deposits	SM				
317					(314.9 - 341.0') Cemex #3 MESH (8x10) Lapis Lustre Sand	(314.9 - 341.0') 27.3 bags	(314.9 - 341.0') 31.5 bags (115%) Note: Filter pack
318	MW-B-VAS-317-322 (<0.17 U ppb) 2/21/2019 11:00				(317.0 - 337.0') 2" Sch 80 PVC (20-slot) Screen		
319							

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Date Started:	03/05/2019	Surface Elevation:	473.30 ft amsl	Well ID: MW-75-267d, MW-75-337
Date Completed:	10/16/2019	Shallow Well Elevation:	473.01 ft amsl	
Drilling Co.:	Cascade	Deep Well Elevation:	473.79 ft amsl	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	2103701.45	Project: Final GW Remedy Phase 1
Driller Name:	E. Ramos	Easting (NAD83):	7615559.26	Location: PG&E Topock, Needles, California
Drilling Asst:	T. Alymer/ J. Candelaria	Borehole Diameter:	6-12 inches	
Logger:	C. Bonessi / S. McGrane	Static Water Level:	See Log for Depths	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	9/7/2019	
Total Depth:	357 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up <input type="checkbox"/> To Be Completed in Well Vault	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed Note: percentages are the actual volume vs the calculated volume
320	MW-B-VAS-317-322 (<0.17 U ppb) 2/21/2019 11:00	Topock - Alluvium Deposits	SM		(317.0 - 337.0') 2" Sch 80 PVC (20-slot) Screen		
321			ML				
322							
323		Topock - Alluvium Deposits	ML				
324							
325							
326							
327							
328							
329							
330					(314.9 - 341.0') Cemex #3 MESH (8x10) Lapis Lustre Sand	(10.0 - 341.0') 10" Borehole	(314.9 - 341.0') 31.5 bags (115%) Note: Filter pack
331							
332							
333		Topock - Weathered Bedrock - conglomerate	SC				
334							
335							
336							
337							
338					(337.5 - 338.5') Centralizer		
339					(337.0 - 339.3') Sump and PVC End Cap		

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Date Started:	03/05/2019	Surface Elevation:	473.30 ft amsl	Well ID: MW-75-267d, MW-75-337
Date Completed:	10/16/2019	Shallow Well Elevation:	473.01 ft amsl	
Drilling Co.:	Cascade	Deep Well Elevation:	473.79 ft amsl	Client: PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	2103701.45	Project: Final GW Remedy Phase 1
Driller Name:	E. Ramos	Easting (NAD83):	7615559.26	Location: PG&E Topock, Needles, California
Drilling Asst:	T. Alymer/ J. Candelaria	Borehole Diameter:	6-12 inches	
Logger:	C. Bonessi / S. McGrane	Static Water Level:	See Log for Depths	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	9/7/2019	
Total Depth:	357 ft bgs	Well Completion:	<input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up <input type="checkbox"/> To Be Completed in Well Vault	

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction			Calculated Material Volumes	Material Volumes Installed Note: percentages are the actual volume vs the calculated volume	
340	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) Lapis Lustre Sand	(10.0 - 341.0') 10" Borehole	(314.9 - 341.0') 27.3 bags	(314.9 - 341.0') 31.5 bags (115%) Note: Filter pack		
341										
342										
343										
344	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 (102%) Note: Decommissioned rathole		
345										
346										
347										
348										
349										
350										
351										
352	Topock - Weathered Bedrock - conglomerate	SC								
353	MW-B-VAS-352-357 (<0.33 U ppb) 2/28/2019 15:05	Topock - Weathered Bedrock - conglomerate	SC							
354										
355										
356										
357		Topock - Weathered Bedrock - conglomerate	SC							
End of Boring at 357.0 ft bgs.										
358										
359										

Abbreviations: USCS = Unified Soil Classification System, ft = 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; Notes: solid blue water table marks represent depth to water (ft. bgs.) measured post development, MW-75-267d was decommissioned due to high solids grout migrating in to the well screen; installed in MW-75d

Date Started:	01/04/2019	Surface Elevation:	473.30 ft amsl	Boring No.: <u>MW-75d</u>
Date Completed:	03/05/2019	Northing (NAD83):	2103701.45	
Drilling Co.:	Cascade	Easting (NAD83):	7615559.26	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	357 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:	N. Petrone / E. Ramos	Depth to First Water:	21.1 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 - 162.0') No water used
2									
3									
4	39.6								
5									
6				Topock - Fill	SM				
7									
8									
9									
10		Sieve Samples Not Collected							
11									
12	120								
13				Topock - Alluvium Deposits	GM		(12.0 - 13.5') Topock - Alluvium Deposits; Silty gravel with sand (GM); dark greenish gray (GLEY1 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									
15				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 angular to subround; dry; gravel composed of mixed lithology		
16									
17									
18									
19	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		
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; Notes: depth to water was measured during first VAS interval; apparent partial recoveries can be the result of potential compaction of sediments in the core bag; wells MW-75-267d, MW-75-337 installed in borehole

Date Started:	01/04/2019	Surface Elevation:	473.30 ft amsl	Boring No.: <u>MW-75d</u>	
Date Completed:	03/05/2019	Northing (NAD83):	2103701.45		
Drilling Co.:	Cascade	Easting (NAD83):	7615559.26	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	357 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:	N. Petrone / E. Ramos	Depth to First Water:	21.1 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		(21.5 - 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 (22.5 - 24.0') Topock - Fluvial Deposits; Fat clay with gravel (CH); reddish yellow (5YR 6/8); high plasticity; little subangular to subround; trace very fine grained sand, subangular to subround; trace silt; moist (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	(21.0') Approximate depth to water table	
22				Topock - Fluvial Deposits	SC				
23				Topock - Fluvial Deposits	CH				
24				Topock - Alluvium Deposits	SM				
25	60	Sieve Samples Not Collected	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 (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 subangular; wet		
30									
31									
32									
33				Topock - Alluvium Deposits	SM				
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; Notes: depth to water was measured during first VAS interval; apparent partial recoveries can be the result of potential compaction of sediments in the core bag; wells MW-75-267d, MW-75-337 installed in borehole

Date Started:	01/04/2019	Surface Elevation:	473.30 ft amsl	Boring No.: <u>MW-75d</u>	
Date Completed:	03/05/2019	Northing (NAD83):	2103701.45		
Drilling Co.:	Cascade	Easting (NAD83):	7615559.26	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	357 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:	N. Petrone / E. Ramos	Depth to First Water:	21.1 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				
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 subangular to subround; little silt; little clay; wet		
46									
47	120			Topock - Alluvium Deposits	SM				
48									
49									
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 subangular to subround; moist to wet		
54									
55									
56	120			Topock - Alluvium Deposits	SM				
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; Notes: depth to water was measured during first VAS interval; apparent partial recoveries can be the result of potential compaction of sediments in the core bag; wells MW-75-267d, MW-75-337 installed in borehole

Date Started:	01/04/2019	Surface Elevation:	473.30 ft amsl	Boring No.: <u>MW-75d</u>
Date Completed:	03/05/2019	Northing (NAD83):	2103701.45	
Drilling Co.:	Cascade	Easting (NAD83):	7615559.26	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	357 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:	N. Petrone / E. Ramos	Depth to First Water:	21.1 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				
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 - Alluvium Deposits	GM		(64.5 - 65.5') Topock - Alluvium 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 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 subangular to subround; trace clay; moist to wet		
68									
69				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:	473.30 ft amsl	Boring No.: MW-75d
Date Completed:	03/05/2019	Northing (NAD83):	2103701.45	
Drilling Co.:	Cascade	Easting (NAD83):	7615559.26	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	357 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:	N. Petrone / E. Ramos	Depth to First Water:	21.1 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	Sieve Samples Not Collected		Topock - Alluvium Deposits	SM				
82									
83									
84									
85									
86									
87	120								
88				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		
89									
90				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 angular to subangular; trace clay; wet; gravel composed of mixed lithology		
91									
92									
93									
94	60								
95				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		
96									
97									
98									
99	120								
100									

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Date Started:	01/04/2019	Surface Elevation:	473.30 ft amsl	Boring No.: <u>MW-75d</u>	
Date Completed:	03/05/2019	Northing (NAD83):	2103701.45		
Drilling Co.:	Cascade	Easting (NAD83):	7615559.26	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	357 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:	N. Petrone / E. Ramos	Depth to First Water:	21.1 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				
102									
103	120		MW-B-VAS-102-107 (<0.17 U ppb) 1/10/2019 13:00	Topock - Alluvium Deposits	SM		(102.0 - 107.0') Topock - Alluvium Deposits; Silty sand (SM); strong brown (7.5YR 5/6); very fine grained to very coarse grained, subangular to subround; some silt; little granules to medium pebbles, subangular to subround; trace clay; wet		
104									
105									
106									
107									
108							(107.0 - 122.0') 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 subangular; trace clay; moist to wet		
109									
110		Sieve Samples Not Collected							
111									
112	120								
113				Topock - Alluvium Deposits	SM				
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; Notes: depth to water was measured during first VAS interval; apparent partial recoveries can be the result of potential compaction of sediments in the core bag; wells MW-75-267d, MW-75-337 installed in borehole

Date Started:	01/04/2019	Surface Elevation:	473.30 ft amsl	Boring No.: <u>MW-75d</u>	
Date Completed:	03/05/2019	Northing (NAD83):	2103701.45		
Drilling Co.:	Cascade	Easting (NAD83):	7615559.26	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	357 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:	N. Petrone / E. Ramos	Depth to First Water:	21.1 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				Topock - Alluvium Deposits	SM				
122									
123	120			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 subangular to subround; trace clay; moist		
124									
125									
126									
127				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 subangular; trace clay; moist to wet		
128									
129									
130		Sieve Samples Not Collected							
131				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 angular; trace clay; moist; moderate cementation		
132	120								
133									
134									
135									
136									
137				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 subangular; trace clay; moist		
138	120								
139									
140									

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Date Started:	01/04/2019	Surface Elevation:	473.30 ft amsl	Boring No.: <u>MW-75d</u>	
Date Completed:	03/05/2019	Northing (NAD83):	2103701.45		
Drilling Co.:	Cascade	Easting (NAD83):	7615559.26	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	357 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:	N. Petrone / E. Ramos	Depth to First Water:	21.1 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									
142				Topock - Alluvium Deposits	SM				
143	120								
144			MW-B-VAS-142-147 (<0.17 U ppb) 1/15/2019 14:25						
145				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				Topock - Alluvium Deposits	SM		(147.0 - 152.5') 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 silt; little granules to large pebbles, subangular to round; trace clay; moist to wet		
149									
150									
151									
152	120								
153				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									
158	120			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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Date Started:	01/04/2019	Surface Elevation:	473.30 ft amsl	Boring No.: MW-75d
Date Completed:	03/05/2019	Northing (NAD83):	2103701.45	
Drilling Co.:	Cascade	Easting (NAD83):	7615559.26	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	357 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:	N. Petrone / E. Ramos	Depth to First Water:	21.1 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	Sieve Samples Not Collected		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		(162.0 - 292.0') 700 gallons of water used; 250 gallons of water recovered; 450 gallons of water lost
162									
163									
164									
165									
166	120	Sieve Samples Not Collected		Topock - Alluvium Deposits	GP		(167.0 - 168.0') Topock - Alluvium Deposits; Poorly graded gravel (GP); greenish gray (GLE2 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	Sieve Samples Not Collected		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	Sieve Samples Not Collected		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; Notes: depth to water was measured during first VAS interval; apparent partial recoveries can be the result of potential compaction of sediments in the core bag; wells MW-75-267d, MW-75-337 installed in borehole

SOIL BORING LOG: PG&E TOPOCK C:\USERS\MCGRANE\DOCUMENTS\PG&E TOPOCK\DRIFT BORING LOGS\GINT FILES\05.06.20\TOPOCK DATABASE FOR PLOG.GPJ TOPOCK DATA TEMPLATE FOR PLOG.GDT 05/06/20 15:31

Date Started:	01/04/2019	Surface Elevation:	473.30 ft amsl	Boring No.: MW-75d
Date Completed:	03/05/2019	Northing (NAD83):	2103701.45	
Drilling Co.:	Cascade	Easting (NAD83):	7615559.26	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	357 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:	N. Petrone / E. Ramos	Depth to First Water:	21.1 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
181	120	Sieve Samples Not Collected	MW-B-VAS-182-187 (<0.17 U ppb) 2/13/2019 10:30	Topock - Alluvium Deposits	SM				
182				Topock - Alluvium Deposits	SM				
183									
184									
185									
186									
187	114		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 angular to subangular; trace clay; wet			
188									
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 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	60	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 subangular; trace clay; moist				
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; Notes: depth to water was measured during first VAS interval; apparent partial recoveries can be the result of potential compaction of sediments in the core bag; wells MW-75-267d, MW-75-337 installed in borehole

Date Started:	01/04/2019	Surface Elevation:	473.30 ft amsl	Boring No.: <u>MW-75d</u>	
Date Completed:	03/05/2019	Northing (NAD83):	2103701.45		
Drilling Co.:	Cascade	Easting (NAD83):	7615559.26	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	357 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:	N. Petrone / E. Ramos	Depth to First Water:	21.1 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				
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 angular to subangular; trace clay; moist; gravel composed of mixed lithology		
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, J = estimated value, NR = no recovery; Notes: depth to water was measured during first VAS interval; apparent partial recoveries can be the result of potential compaction of sediments in the core bag; wells MW-75-267d, MW-75-337 installed in borehole

Date Started:	01/04/2019	Surface Elevation:	473.30 ft amsl	Boring No.: MW-75d
Date Completed:	03/05/2019	Northing (NAD83):	2103701.45	
Drilling Co.:	Cascade	Easting (NAD83):	7615559.26	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	357 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:	N. Petrone / E. Ramos	Depth to First Water:	21.1 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 angular to subangular; some silt; trace clay; moist to wet		
222									
223									
224									
225									
226	96	Sieve Samples Not Collected		Topock - Alluvium Deposits	SM		(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							(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 angular to subangular; trace clay; wet		
231									
232									
233									
234									
235									
236	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	
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; Notes: depth to water was measured during first VAS interval; apparent partial recoveries can be the result of potential compaction of sediments in the core bag; wells MW-75-267d, MW-75-337 installed in borehole

Date Started:	01/04/2019	Surface Elevation:	473.30 ft amsl	Boring No.: <u>MW-75d</u>
Date Completed:	03/05/2019	Northing (NAD83):	2103701.45	
Drilling Co.:	Cascade	Easting (NAD83):	7615559.26	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	357 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:	N. Petrone / E. Ramos	Depth to First Water:	21.1 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				
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 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		Sieve Samples Not Collected							
251							(251'); 2 inch lense of slight saturation		
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 subround; medium to high plasticity		
260									

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Date Started:	01/04/2019	Surface Elevation:	473.30 ft amsl	Boring No.: <u>MW-75d</u>	
Date Completed:	03/05/2019	Northing (NAD83):	2103701.45		
Drilling Co.:	Cascade	Easting (NAD83):	7615559.26	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	357 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:	N. Petrone / E. Ramos	Depth to First Water:	21.1 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								
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							(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		
270		Sieve Samples Not Collected		Topock - Alluvium Deposits	ML		(271'); strong cementation; 0.4 foot dry lense		
271									
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 subangular to subround; moist		
274									
275									
276	120			Topock - Alluvium Deposits	ML			(275.0 - 276.0') Drill rods chattering	
277									
278									
279									
280									


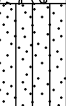
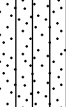
Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J = estimated value, NR = no recovery; Notes: depth to water was measured during first VAS interval; apparent partial recoveries can be the result of potential compaction of sediments in the core bag; wells MW-75-267d, MW-75-337 installed in borehole

Date Started:	01/04/2019	Surface Elevation:	473.30 ft amsl	Boring No.: <u>MW-75d</u>
Date Completed:	03/05/2019	Northing (NAD83):	2103701.45	
Drilling Co.:	Cascade	Easting (NAD83):	7615559.26	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	357 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:	N. Petrone / E. Ramos	Depth to First Water:	21.1 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
281	120			Topock - Alluvium Deposits	ML				
282									
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		
284									
285				Topock - Alluvium Deposits	ML				
286									
287	120								
288									
289							(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 subround; moist; strong cementation		
290									
291				Topock - Alluvium Deposits	ML				
292									
293								(292.0 - 297.0') Drill rods chattering	(292.0 - 297.0') No water used
294				Topock - Alluvium Deposits	GM		(293.0 - 295.0') Topock - Alluvium Deposits; 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 subangular to subround; dry		
295	60								
296				Topock - Alluvium Deposits	ML		(295.0 - 298.0') Topock - Alluvium Deposits; Gravelly 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									
299	120			Topock - Alluvium Deposits	SM		(298.0 - 299.5') Topock - Alluvium Deposits; 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 - Alluvium Deposits; Silty gravel with sand	(297.0 - 301.0') Rough drilling	(297.0 - 307.0') 200 gallons of water used; 160 gallons of water recovered; 40 gallons of water lost

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Date Started:	01/04/2019	Surface Elevation:	473.30 ft amsl	Boring No.: <u>MW-75d</u>
Date Completed:	03/05/2019	Northing (NAD83):	2103701.45	
Drilling Co.:	Cascade	Easting (NAD83):	7615559.26	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	357 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:	N. Petrone / E. Ramos	Depth to First Water:	21.1 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 - Alluvium Deposits	GM		(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 angular to round; trace clay; wet		
302				Topock - Alluvium Deposits	MH		(301.5 - 313.5') Topock - Alluvium Deposits; Sandy elastic silt with gravel (MH); yellowish red (5YR 4/6); high plasticity; some granules to large pebbles, angular to subround; some 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									
307	180	Sieve Samples Not Collected		Topock - Alluvium Deposits	SM		(313.5 - 320.0') Topock - Alluvium Deposits; 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 subangular to subround	(307.0 - 322.0') 400 gallons of water used; 380 gallons of water recovered; 20 gallons of water lost	
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, J = estimated value, NR = no recovery; Notes: depth to water was measured during first VAS interval; apparent partial recoveries can be the result of potential compaction of sediments in the core bag; wells MW-75-267d, MW-75-337 installed in borehole

Date Started:	01/04/2019	Surface Elevation:	473.30 ft amsl	Boring No.: <u>MW-75d</u>	
Date Completed:	03/05/2019	Northing (NAD83):	2103701.45		
Drilling Co.:	Cascade	Easting (NAD83):	7615559.26	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	357 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:	N. Petrone / E. Ramos	Depth to First Water:	21.1 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 - Alluvium Deposits	ML		(320.0 - 322.0') 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 subround; moist; strong cementation		
322							(322.0 - 337.0') Topock - Alluvium Deposits; 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 subround; moist	(322.0 - 335.5') Tight hard drilling	(322.0 - 337.0') 300 gallons of water used; 300 gallons of water recovered; 0 gallons of water lost
323									
324									
325									
326									
327									
328							(328'); 0.4-0.6 foot dry lense		
329									
330	180	Sieve Samples Not Collected		Topock - Alluvium Deposits	ML				
331							(331'); 0.4-0.6 foot dry lense		
332									
333							(333'); 0.4-0.6 foot dry lense		
334									
335							(335'); 0.4-0.6 foot dry lense		
336								(335.5 - 337.0') Soft drilling	
337									
338				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 subround; dry to moist; strong cementation		(337.0 - 347.0') No water used
339	120								
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; Notes: depth to water was measured during first VAS interval; apparent partial recoveries can be the result of potential compaction of sediments in the core bag; wells MW-75-267d, MW-75-337 installed in borehole

Date Started:	01/04/2019	Surface Elevation:	473.30 ft amsl	Boring No.: <u>MW-75d</u>
Date Completed:	03/05/2019	Northing (NAD83):	2103701.45	
Drilling Co.:	Cascade	Easting (NAD83):	7615559.26	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	357 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:	N. Petrone / E. Ramos	Depth to First Water:	21.1 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				
342									
343									
344									
345				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									
349	108	Sieve Samples Not Collected		Topock - Weathered Bedrock - conglomerate	SC		(347.0 - 356.0') Topock - Weathered Bedrock - conglomerate; Clayey sand with gravel (SC); reddish brown (2.5YR 4/3) 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 gallons of water used; 380 gallons of water recovered; 20 gallons of water lost
350									
351									
352									
353									
354									
355									
356									
357									
358									
359									
360									
End of Boring at 357.0 ft 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, J = estimated value, NR = no recovery; Notes: depth to water was measured during first VAS interval; apparent partial recoveries can be the result of potential compaction of sediments in the core bag; wells MW-75-267d, MW-75-337 installed in borehole