

Date Started: 08/25/2019	Surface Elevation: 478.95 ft amsl	Well ID: MW-77-158, MW-77-187
Date Completed: 01/10/2020	Shallow Well Elevation: 478.70 ft amsl	
Drilling Co.: Cascade	Deep Well Elevation: 478.67 ft amsl	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): 2102933.93	Project: Final GW Remedy Phase 1
Driller Name: Dan O' Mara	Easting (NAD83): 7615962.52	Location: PG&E Topock, Needles, California
Drilling Asst: John DeMay	Borehole Diameter: 6-12 inches	
Logger: Joe Latham	Static Water Level: See Log for Depths	Project Number: RC000753.0051
Editor: Grant Willford	Development End Date: 9/25/2019	
Total Depth: 196 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					(+0.3 - 2.0') Surface Completion		(+0.3 - 2.0') 15 bags Note: 30" diameter concrete pad with 18" diameter lockable vault, King Kon-Crete 4000 PSI
1		Topock - Fill	SM		(0.3 - 167.0') 2" PVC Sch 80 Casing		
2							(0.2 - 137.9') 2" PVC Sch 80 Casing
3					(1.8 - 6.0') Portland Cement 6% Bentonite Type I, II, and V with Benseal	(0.0 - 7.0') 12.0" Borehole	(1.8 - 6.0') 45 gallons (136%) Note: Grout seal. Used >20% of the calculated volume due to potential voids forming during drilling and grout migration
4							
5			NR				
6					(6.0 - 10.9') Bentonite seal chips Puregold medium chips	(7.0 - 191.0') 10.0" Borehole	(1.8 - 6.0') 33 gallons
7		Topock - Fill	SM				
8							
9					(10.9 - 13.8') Portland Cement 6% Bentonite Type I, II, and V with Benseal	(7.0 - 191.0') 10.0" Borehole	(10.9 - 13.8') 40 gallons (367%) Note: Grout seal. Used >20% of the calculated volume due to potential voids formed during drilling and grout migration. Stopped grouting to prevent issues with heat of hydration.
10							
11			NR				
12					(13.8 - 20.0') Bentonite seal chips Puregold medium chips	(7.0 - 191.0') 10.0" Borehole	(10.9 - 13.8') 10.9 gallons
13		Topock - Fill	SM				
14							
15							
16							
17			NR				
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; Notes: solid blue and hollow blue water table marks represent depth to water (ft. bgs.) measured post development for the shallow well and deep well respectively; installed in MW-77d

WELL CONSTRUCTION DETAILS_PG&E_TOPOCK C:\USERS\MCGRANE\DOCUMENTS\PG&E_TOPOCK\DRIFT BORING LOGS\GINT FILES\05.05.20\TOPOCK DATABASE FOR PLOG.GPJ_TOPOCK DATA TEMPLATE FOR PLOG.GDT_05/05/20 17:14

Date Started: 08/25/2019	Surface Elevation: 478.95 ft amsl	Well ID: MW-77-158, MW-77-187
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Drilling Co.: Cascade	Deep Well Elevation: 478.67 ft amsl	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): 2102933.93	Project: Final GW Remedy Phase 1
Driller Name: Dan O' Mara	Easting (NAD83): 7615962.52	Location: PG&E Topock, Needles, California
Drilling Asst: John DeMay	Borehole Diameter: 6-12 inches	
Logger: Joe Latham	Static Water Level: See Log for Depths	Project Number: RC000753.0051
Editor: Grant Willford	Development End Date: 9/25/2019	
Total Depth: 196 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					(0.2 - 137.9') 2" PVC Sch 80 Casing		
21					(20.0 - 22.0') Portland Cement 6% Bentonite Type I, II, and V with Benseal	(20.0 - 22.0') 7.5 gallons	(20.0 - 22.0') 105 gallons (1400%) Note: Grout seal. Used >20% of the calculated volume due to large void and potential grout migration into the formation.
22							
23			NR				
24							
25							
26							
27		Topock - Fluvial Deposits	SM				
28							
29							
30					(7.0 - 191.0') 10.0" Borehole		
31					(22.0 - 99.7') Bentonite seal chips Puregold medium chips	(22.0 - 99.7') 54.1 bags	(22.0 - 99.7') 52 bags (96%) Note: Seal above filter pack
32	MW-D-VAS-30-35 (<0.17 U ppb) 8/10/2019 14:39						
33			NR				
34							
35							
36							
37		Topock - Fluvial Deposits	ML				
38							
39					(38.5 - 39.5') Centralizer		

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WELL CONSTRUCTION DETAILS_PG&E_TOPOCK C:\USERS\SMC\GRANDOCUMENTS\PG&E_TOPOCK\DATA\DATABASE FOR PLOG.GPJ_TOPOCK DATA TEMPLATE FOR PLOG.GDT_06/05/20 17:14

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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
40			ML		(0.2 - 137.9') 2" PVC Sch 80 Casing		
41							
42							
43		Topock - Alluvium Deposits	SM				
44							
45							
46							
47							
48	MW-D-VAS-46-51 (0.47 ppb) 8/11/2019 12:59	Topock - Alluvium Deposits	ML				
49							
50					(22.0 - 99.7') Bentonite seal chips Puregold medium chips	(22.0 - 99.7') 54.1 bags	(22.0 - 99.7') 52 bags (96%) Note: Seal above filter pack
51							
52							
53		Topock - Alluvium Deposits	SM				
54							
55							
56							
57							
58		Topock - Alluvium Deposits	SM				
59							

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Drilling Asst: John DeMay	Borehole Diameter: 6-12 inches	
Logger: Joe Latham	Static Water Level: See Log for Depths	Project Number: RC000753.0051
Editor: Grant Willford	Development End Date: 9/25/2019	
Total Depth: 196 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		(0.2 - 137.9') 2" PVC Sch 80 Casing		
61							
62							
63		Topock - Alluvium Deposits	ML				
64							
65							
66							
67							
68							
69							
70					(22.0 - 99.7') Bentonite seal chips Puregold medium chips	(22.0 - 99.7') 54.1 bags	(22.0 - 99.7') 52 bags (96%) Note: Seal above filter pack
71		Topock - Alluvium Deposits	SM				
72							
73							
74							
75							
76							
77		Topock - Alluvium Deposits	ML				
78							
79					(78.5 - 79.5') Centralizer		

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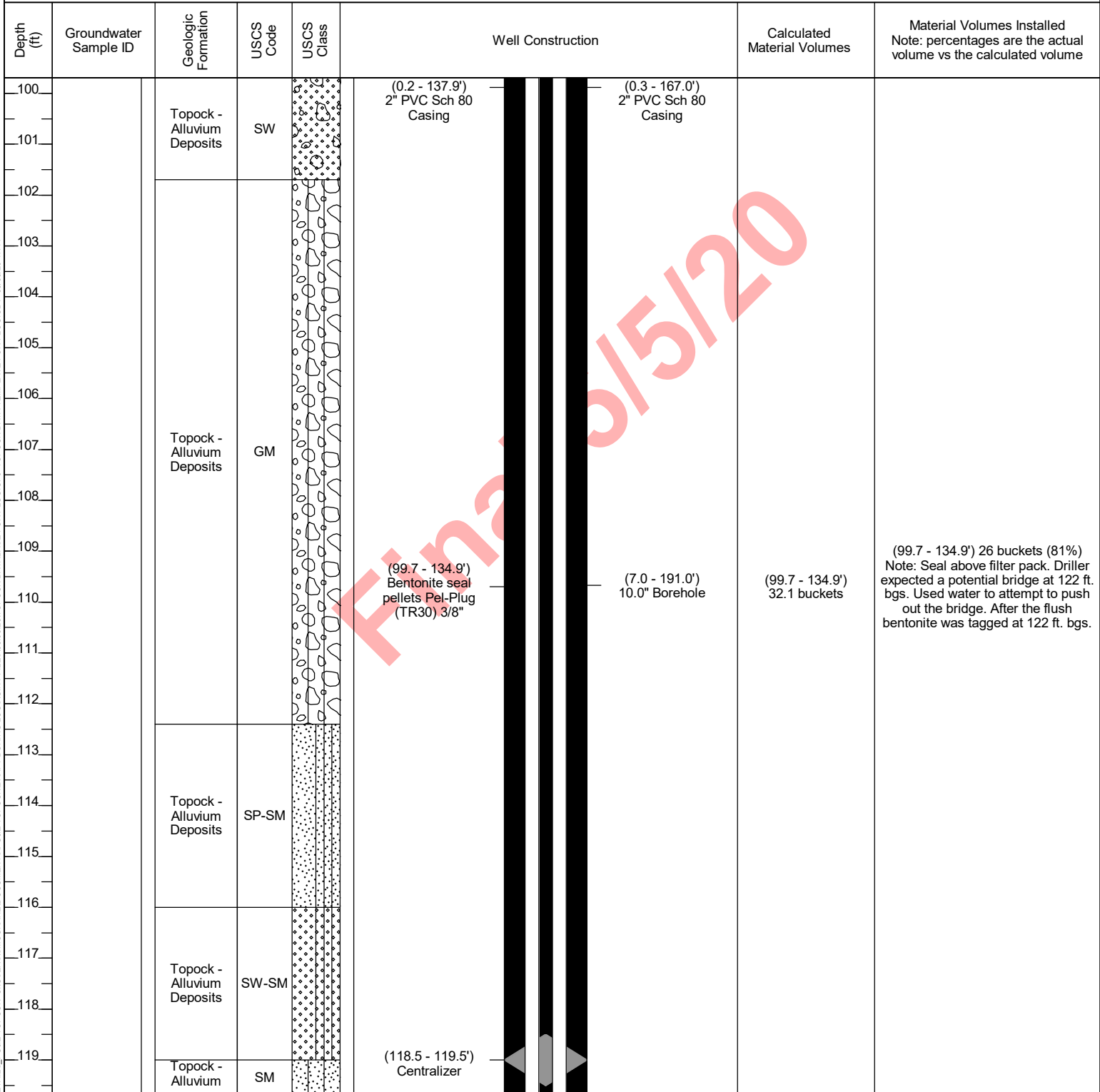
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Drilling Method: Sonic Drilling	Northing (NAD83): 2102933.93	Project: Final GW Remedy Phase 1
Driller Name: Dan O' Mara	Easting (NAD83): 7615962.52	Location: PG&E Topock, Needles, California
Drilling Asst: John DeMay	Borehole Diameter: 6-12 inches	
Logger: Joe Latham	Static Water Level: See Log for Depths	Project Number: RC000753.0051
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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
80		Topock - Alluvium Deposits	ML		(0.2 - 137.9') 2" PVC Sch 80 Casing		
81					(0.3 - 167.0') 2" PVC Sch 80 Casing		
82							
83							
84							
85							
86							
87							
88		Topock - Alluvium Deposits	ML				
89							
90					(22.0 - 99.7') Bentonite seal chips Puregold medium chips	(7.0 - 191.0') 10.0" Borehole	(22.0 - 99.7') 54.1 bags (22.0 - 99.7') 52 bags (96%) Note: Seal above filter pack
91							
92							
93	MW-D-VAS-91-96 (<0.033 U ppb) 8/12/2019 10:38	Topock - Alluvium Deposits	SM				
94							
95							
96							
97		Topock - Alluvium Deposits	SP-SM				
98							
99		Topock - Alluvium Deposits	SW				

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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
120		Deposits			(0.2 - 137.9') 2" PVC Sch 80 Casing		
121							
122							
123							
124		Topock - Alluvium Deposits	SM				
125							
126							
127					(99.7 - 134.9') Bentonite seal pellets Pel-Plug (TR30) 3/8"	(99.7 - 134.9') 32.1 buckets	(99.7 - 134.9') 26 buckets (81%) Note: Seal above filter pack. Driller expected a potential bridge at 122 ft. bgs. Used water to attempt to push out the bridge. After the flush bentonite was tagged at 122 ft. bgs.
128							
129		Topock - Alluvium Deposits	SW-SM				
130					(7.0 - 191.0') 10.0" Borehole		
131							
132							
133	MW-D-VAS-131-136 (<0.66 U ppb) 8/21/2019 13:32		NR				
134							
135							
136							
137		Topock - Alluvium Deposits	SW		(134.9 - 160.0') Cemex #3 MESH (8x10) Lapis Lustre Sand	(134.9 - 160.0') 26.6 bags	(134.9 - 160.0') 30 bags (113%) Note: Filter pack
138		Topock - Alluvium Deposits	SM		(137.9 - 158.0') 2" Sch 80 PVC (20-slot) Screen		
139			SW-SM				

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Logger: Joe Latham	Static Water Level: See Log for Depths	Project Number: RC000753.0051
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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
140 - 141		Topock - Alluvium Deposits	SW-SM	(137.9 - 158.0') 2" Sch 80 PVC (20-slot) Screen	(0.3 - 167.0') 2" PVC Sch 80 Casing		
141 - 143	MW-D-VAS-141-146 (<0.17 U ppb) 8/22/2019 10:04	Topock - Alluvium Deposits	SM				
143 - 145			NR				
145 - 151		Topock - Alluvium Deposits	GM	(134.9 - 160.0') Cemex #3 MESH (8x10) Lapis Lustre Sand	(7.0 - 191.0') 10.0" Borehole	(134.9 - 160.0') 26.6 bags	(134.9 - 160.0') 30 bags (113%) Note: Filter pack
151 - 153	MW-D-VAS-151-156 (<0.17 U ppb) 8/22/2019 15:16	Topock - Alluvium Deposits	SP-SM				
153 - 159		Topock - Alluvium	CL	(158.5 - 159.5') Centralizer			

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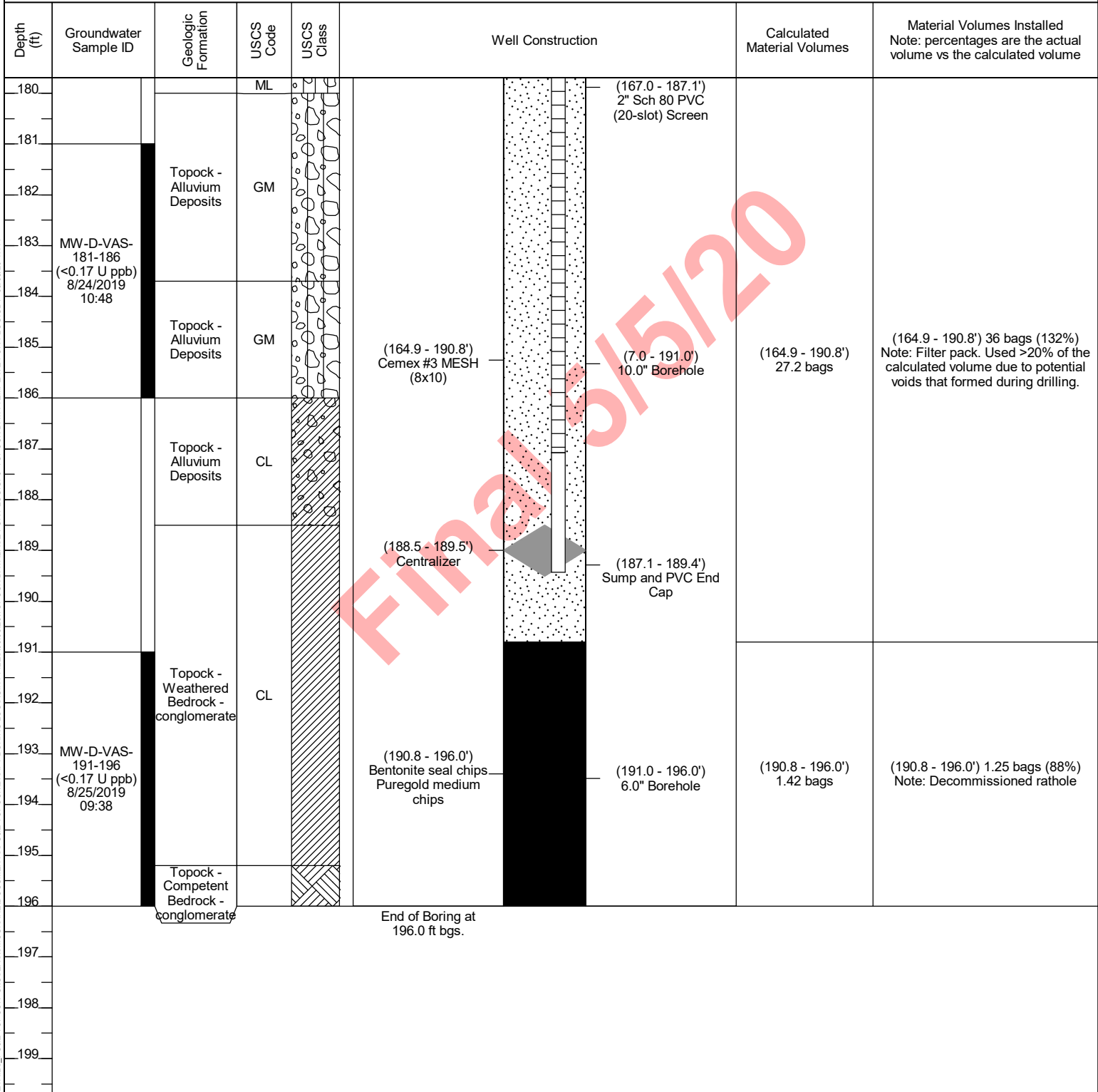
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160		Deposits			(158.0 - 160.4') Sump and PVC End Cap		
161		Topock - Alluvium Deposits	CL		(0.3 - 167.0') 2" PVC Sch 80 Casing		
162		Topock - Alluvium Deposits	GM		(160.0 - 164.9') Bentonite seal pellets Pel-Plug (TR30) 3/8"	(160.0 - 164.9') 4.7 buckets	(160.0 - 164.9') 5 buckets (106%) Note: Intermediate seal
163	MW-D-VAS-161-166 (<0.17 U ppb) 8/23/2019 10:36	Topock - Alluvium Deposits	SM				
164		Topock - Alluvium Deposits	ML		(167.0 - 187.1') 2" Sch 80 PVC (20-slot) Screen		
165		Topock - Alluvium Deposits	ML		(7.0 - 191.0') 10.0" Borehole		
166		Topock - Alluvium Deposits	ML				
167		Topock - Alluvium Deposits	SM		(164.9 - 190.8') Cemex #3 MESH (8x10)	(164.9 - 190.8') 27.2 bags	(164.9 - 190.8') 36 bags (132%) Note: Filter pack. Used >20% of the calculated volume due to potential voids that formed during drilling.
168		Topock - Alluvium Deposits	ML				
169		Topock - Alluvium Deposits	SM				
170		Topock - Alluvium Deposits	ML				
171		Topock - Alluvium Deposits	ML				
172	MW-D-VAS-171-176 (<0.17 U ppb) 8/23/2019 14:58	Topock - Alluvium Deposits	ML				
173		Topock - Alluvium Deposits	ML				
174		Topock - Alluvium Deposits	ML				
175		Topock - Alluvium Deposits	ML				
176		Topock - Alluvium Deposits	ML				
177		Topock - Alluvium Deposits	ML				
178		Topock - Alluvium Deposits	ML				
179		Topock - Alluvium Deposits	ML				

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Date Completed:	08/24/2019	Northing (NAD83):	2102933.93		
Drilling Co.:	Cascade	Easting (NAD83):	7615962.52	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	196 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:	28.0 ft bgs		
Drilling Asst:	John DeMay	Sampling Method:	4 inch x 10 ft. Core Barrel	Project Number:	RC000753.0051
Logger:	D. Luneau / J. 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	45.6			Topock - Fill	SM		(0.0 - 3.8') Topock - Fill; Silty sand (SM); very pale brown / grayish orange (10YR 7/4); very fine grained to fine grained, subangular to subround; little silt; moist	(0.0 - 3.0') Soft drilling	(0.0 - 186.0') No water used					
2														
3														
4														
5	44.4	No Sieve Samples Collected			NR		(3.8 - 6.0') No recovery (NR)	(3.8 - 6.0') Fine grained sands fell out of core barrel or pushed out into the formation by the core barrel during drilling.						
6														
7														
8														
9	37.2			Topock - Fill	SM		(6.0 - 9.7') Topock - Fill; Silty sand (SM); very pale brown / grayish orange (10YR 7/4); very fine grained to fine grained, subangular to subround; little silt; moist	(6.0 - 9.1') Soft drilling						
10														
11														
12														
13					NR		(9.7 - 16.0') No recovery (NR)	(9.1 - 16.0') Fine grained sands fell out of core barrel or pushed out into the formation by the core barrel during drilling.						
14														
15														
16														
17				Topock - Fill	SM		(16.0 - 19.1') Topock - Fill; Silty sand (SM); very pale brown / grayish orange (10YR 7/4); very fine grained to fine grained, subangular to subround; little silt; moist	(16.0 - 19.1') Soft drilling						
18														
19														
20					NR		(19.1 - 26.0') No recovery (NR)	(19.1 - 26.0') Fine grained sands fell out of						

Abbreviations: USCS = Unified Soil Classification System, ft = 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; Notes: depth to water measured during the first VAS interval; apparent partial recoveries can be the result of potential compaction of sediments in the core bag; wells MW-77-158, MW-77-187 installed in borehole

SOIL BORING LOG: PG&E-TOPOCK-C:\USERS\SMC\GRAND\DOCUMENTS\PG&E-TOPOCK\DRIFT BORING LOGS\GINT FILES\05_20\TOPOCK DATABASE FOR PLOG.GPJ TOPOCK DATA TEMPLATE FOR PLOG.GDT 05/05/20 17:02

Date Started:	08/10/2019	Surface Elevation:	478.95 ft amsl	Boring No.: MW-77d	
Date Completed:	08/24/2019	Northing (NAD83):	2102933.93		
Drilling Co.:	Cascade	Easting (NAD83):	7615962.52	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	196 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:	28.0 ft bgs		
Drilling Asst:	John DeMay	Sampling Method:	4 inch x 10 ft. Core Barrel	Project Number:	RC000753.0051
Logger:	D. Luneau / J. 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	37.2				NR			core barrel or pushed out into the formation by the core barrel during drilling.	
22									
23									
24									
25	64.8	No Sieve Samples Collected		Topock - Fluvial Deposits	SM		(26.0 - 31.4') Topock - Fluvial Deposits; Silty sand (SM); pale brown (10YR 6/3); fine grained to medium grained, subangular to subround; little silt; trace clay; wet	▼	
26									
27									
28									
29									
30									
31					NR		(31.4 - 36.0') No recovery (NR)		
32									
33									
34									
35	121.2			Topock - Fluvial Deposits	ML		(36.0 - 40.0') Topock - Fluvial Deposits; Silt with sand (ML); dark gray (7.5YR 4/1); medium plasticity; and fine to medium grained sand, subangular to subround; little clay; wet		
36									
37									
38									
39									
40									
36							(33.6 - 36.0') Fine grained sands fell out of core barrel or pushed out into the formation by the core barrel during drilling.		
36							(36.0 - 40.0') Soft drilling		

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SOIL BORING LOG: PG&E TOPOCK C:\USERS\SSM\GRANEDOCUMENTS\PG&E TOPOCK\DRIFT BORING LOGS\GINT FILES\05_20\TOPOCK DATABASE FOR PLOG.GPJ TOPOCK DATA TEMPLATE FOR PLOG.GDT 05/05/20 17:02

Date Started:	08/10/2019	Surface Elevation:	478.95 ft amsl	Boring No.: MW-77d	
Date Completed:	08/24/2019	Northing (NAD83):	2102933.93		
Drilling Co.:	Cascade	Easting (NAD83):	7615962.52	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	196 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:	28.0 ft bgs		
Drilling Asst:	John DeMay	Sampling Method:	4 inch x 10 ft. Core Barrel	Project Number:	RC000753.0051
Logger:	D. Luneau / J. 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	121.2			Topock - Alluvium Deposits	SM	[Pattern]	(40.0 - 46.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown / moderate brown (5YR 4/4); medium grained to very coarse grained, subangular to subround; some small to very large pebbles, subangular to round; little silt; little clay; trace small cobbles, subround; moist		
42									
43									
44									
45	122.4	No Sieve Samples Collected	MW-D-VAS-46-51 (0.47 ppb) 8/11/2019 12:59	Topock - Alluvium Deposits	ML	[Pattern]	(46.0 - 51.0') Topock - Alluvium Deposits; Sandy silt (ML); reddish brown / moderate brown (5YR 4/4); medium plasticity; some fine to medium grained sand, subangular to subround; little clay; trace medium to large pebbles, subangular to subround; wet	(46.0 - 50.0') Soft drilling	
46									
47									
48									
49									
50									
51	205.2			Topock - Alluvium Deposits	SM	[Pattern]	(51.0 - 56.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); dark brown (10YR 3/3); very fine grained to very coarse grained, subangular to subround; some small to large pebbles, subangular to subround; little silt; little clay; moist		
52									
53									
54									
55									
56				Topock - Alluvium Deposits	SM	[Pattern]	(56.0 - 61.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown / moderate brown (5YR 4/4); coarse grained to very coarse grained, subangular to subround; some silt; little medium to large pebbles, subangular; trace clay; moist		
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; Notes: depth to water measured during the first VAS interval; apparent partial recoveries can be the result of potential compaction of sediments in the core bag; wells MW-77-158, MW-77-187 installed in borehole

SOIL BORING LOG: PG&E TOPOCK C:\USERS\SSM\GRANED\DOCUMENTS\PG&E TOPOCK\DRIFT BORING LOGS\GINT FILES\05_20\TOPOCK DATABASE FOR PLOG.GPJ TOPOCK DATA TEMPLATE FOR PLOG.GDT 05/05/20 17:02

Date Started:	08/10/2019	Surface Elevation:	478.95 ft amsl	Boring No.: MW-77d	
Date Completed:	08/24/2019	Northing (NAD83):	2102933.93		
Drilling Co.:	Cascade	Easting (NAD83):	7615962.52	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	196 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:	28.0 ft bgs		
Drilling Asst:	John DeMay	Sampling Method:	4 inch x 10 ft. Core Barrel	Project Number:	RC000753.0051
Logger:	D. Luneau / J. 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				Topock - Alluvium Deposits	SM				
62				Topock - Alluvium Deposits	ML		(61.0 - 67.0') Topock - Alluvium Deposits; Sandy silt (ML); reddish brown / moderate brown (5YR 4/4); low plasticity; some very fine to very coarse grained sand, subangular to subround; little medium to large pebbles, subangular to subround; little clay; trace coarser clasts composed of metadiorite; moist		
63									
64									
65									
66									
67									
68	205.2			Topock - Alluvium Deposits	SM		(67.0 - 76.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown / moderate brown (5YR 4/4); medium grained to coarse grained, subangular; some medium to large pebbles, subangular; little silt; trace small cobbles, subangular to subround; trace clay; moist		
69									
70		No Sieve Samples Collected							
71									
72									
73									
74									
75									
76									
77				Topock - Alluvium Deposits	ML		(76.0 - 87.0') Topock - Alluvium Deposits; Sandy silt with gravel (ML); reddish brown / moderate brown (5YR 4/4); low plasticity; some medium to coarse grained sand, angular to subangular; little medium to large pebbles, subangular to subround; trace clay; little coarser clasts composed of metadiorite; moist		
78	212.4								
79									
80									

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Date Started:	08/10/2019	Surface Elevation:	478.95 ft amsl	Boring No.: MW-77d	
Date Completed:	08/24/2019	Northing (NAD83):	2102933.93		
Drilling Co.:	Cascade	Easting (NAD83):	7615962.52	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	196 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:	28.0 ft bgs		
Drilling Asst:	John DeMay	Sampling Method:	4 inch x 10 ft. Core Barrel	Project Number:	RC000753.0051
Logger:	D. Luneau / J. 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	ML				
82									
83				Topock - Alluvium Deposits	ML		(87.0 - 90.0') 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 medium to large pebbles, subangular to subround; little clay; little coarser clasts composed of metadiorite; moist		
84									
85									
86	212.4			Topock - Alluvium Deposits	ML		(90.0 - 96.0') 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 medium to large pebbles, subangular to subround; little silt; little clay; trace small cobbles, subangular; wet		
87									
88		No Sieve Samples Collected		Topock - Alluvium Deposits	SM		(96.0 - 98.0') Topock - Alluvium Deposits; Poorly graded sand with silt and gravel (SP-SM); yellowish brown (10YR 5/6); coarse grained to very coarse grained, angular to subround; little granules to large pebbles, angular to subround; little silt; trace small cobbles, subangular; little coarser clasts composed of metadiorite; moist to wet		
89									
90									
91									
92			MW-D-VAS-91-96 (<0.033 U ppb) 8/12/2019 10:38	Topock - Alluvium Deposits	SW		(98.0 - 101.7') Topock - Alluvium Deposits; Well graded sand with gravel (SW); dark brown (7.5YR 3/4); fine grained to very coarse grained, angular to subangular; some granules to very large pebbles, angular to subangular; trace silt; little coarser clasts composed of metadiorite; trace granite; moist to wet		
93									
94				Topock - Alluvium Deposits	SP-SM		(96.0 - 98.0') Topock - Alluvium Deposits; Poorly graded sand with silt and gravel (SP-SM); yellowish brown (10YR 5/6); coarse grained to very coarse grained, angular to subround; little granules to large pebbles, angular to subround; little silt; trace small cobbles, subangular; little coarser clasts composed of metadiorite; moist to wet	(97.0') Drill rig broke down	
95									
96				Topock - Alluvium Deposits	SW		(98.0 - 101.7') Topock - Alluvium Deposits; Well graded sand with gravel (SW); dark brown (7.5YR 3/4); fine grained to very coarse grained, angular to subangular; some granules to very large pebbles, angular to subangular; trace silt; little coarser clasts composed of metadiorite; trace granite; moist to wet		
97									
98	240			Topock - Alluvium Deposits	SW		(98.0 - 101.7') Topock - Alluvium Deposits; Well graded sand with gravel (SW); dark brown (7.5YR 3/4); fine grained to very coarse grained, angular to subangular; some granules to very large pebbles, angular to subangular; trace silt; little coarser clasts composed of metadiorite; trace granite; moist to wet		
99									
100									

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SOIL BORING LOG: PG&E-TOPOCK_C:\USERS\MCGRANED\DOCUMENTS\PG&E_TOPOCK\DRIFT BORING LOGS\GINT FILES\05_20\TOPOCK DATABASE FOR PLOG.GPJ TOPOCK DATA TEMPLATE FOR PLOG.GDT 05/05/20 17:02

Date Started:	08/10/2019	Surface Elevation:	478.95 ft amsl	Boring No.: MW-77d	
Date Completed:	08/24/2019	Northing (NAD83):	2102933.93		
Drilling Co.:	Cascade	Easting (NAD83):	7615962.52	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	196 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:	28.0 ft bgs		
Drilling Asst:	John DeMay	Sampling Method:	4 inch x 10 ft. Core Barrel	Project Number:	RC000753.0051
Logger:	D. Luneau / J. 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				Topock - Alluvium Deposits	SW						
102				Topock - Alluvium Deposits	GM		(101.7 - 112.4') Topock - Alluvium Deposits; Silty gravel with sand (GM); brown (7.5YR 5/4); granules to very large pebbles, angular to subangular; some silt; little fine to very coarse grained sand, angular to subangular; little clay; some coarser clasts composed of metadiorite; moist to wet				
103											
104											
105											
106	240										
107											
108											
109											
110		No Sieve Samples Collected									
111											
112											
113				Topock - Alluvium Deposits	SP-SM		(112.4 - 116.0') Topock - Alluvium Deposits; Poorly graded sand with silt and gravel (SP-SM); dark brown (7.5YR 3/4); very fine grained to medium grained, angular to subangular; some granules to very large pebbles, angular to subangular; little silt; some coarser clasts composed of metadiorite; moist				
114											
115											
116											
117				Topock - Alluvium Deposits	SW-SM		(116.0 - 119.0') Topock - Alluvium Deposits; Well graded sand with silt and gravel (SW-SM); dark brown (7.5YR 3/4); 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 (117'); lense of green color 0.2 ft. thick	(116.0 - 136.0') Core from run saturated at bottom			
118	180										
119				Topock - Alluvium Deposits	SM		(119.0 - 129.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); dark brown (7.5YR 3/4); fine grained to very coarse grained, angular to subangular; some silt; little granules to very large				
120											

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SOIL BORING LOG: PG&E-TOPOCK_C:\USERS\SMC\GRAND\DOCUMENTS\PG&E_TOPOCK\DRIFT BORING LOGS\GINT FILES\05_20\TOPOCK DATABASE FOR PLOG.GPJ TOPOCK DATA TEMPLATE FOR PLOG.GDT 05/05/20 17:02

Date Started:	08/10/2019	Surface Elevation:	478.95 ft amsl	Boring No.: MW-77d	
Date Completed:	08/24/2019	Northing (NAD83):	2102933.93		
Drilling Co.:	Cascade	Easting (NAD83):	7615962.52	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	196 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:	28.0 ft bgs		
Drilling Asst:	John DeMay	Sampling Method:	4 inch x 10 ft. Core Barrel	Project Number:	RC000753.0051
Logger:	D. Luneau / J. 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				Topock - Alluvium Deposits	SM		pebbles, angular; trace subround to round; little coarser clasts composed of metadiorite; moist		
122									
123									
124									
125									
126									
127									
128	180						(127.7'); lense of increased silt content and green color 0.2 ft. thick		
129									
130		No Sieve Samples Collected		Topock - Alluvium Deposits	SW-SM		(129.0 - 131.0') Topock - Alluvium Deposits; Well graded sand with silt and gravel (SW-SM); dark brown (7.5YR 3/4); 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		
131									
132							(131.0 - 136.0') No recovery (NR)	(131.0 - 136.0') Lost approximately 5 ft. of recovery due to potential heaving sands.	
133			MW-D-VAS-131-136 (<0.66 U ppb) 8/21/2019 13:32		NR				
134									
135									
136									
137				Topock - Alluvium Deposits	SW		(136.0 - 137.9') Topock - Alluvium Deposits; Well graded sand (SW); dark yellowish brown (10YR 3/4); fine grained to very coarse grained, angular to subangular; trace granules, angular to subangular; trace silt; trace coarser clasts composed of metadiorite; wet	(136.0 - 137.5') Core bag was observed to be heaving sands. Confirmed with drilled heaving sands were encountered when drilling.	
138	108								
139				Topock - Alluvium Deposits	SM		(137.9 - 139.4') Topock - Alluvium Deposits; Silty sand with gravel (SM); yellowish red (5YR 4/6); fine grained to medium grained, subangular to subround; some granules to large pebbles, angular to subangular; little silt; some coarser clasts composed of metadiorite; wet		
140					SW-SM		(139.4 - 142.7') Topock - Alluvium Deposits; Well graded sand with silt and gravel (SW-SM); dark yellowish brown (10YR 3/4);		

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, NR = no recovery; Notes: depth to water measured during the first VAS interval; apparent partial recoveries can be the result of potential compaction of sediments in the core bag; wells MW-77-158, MW-77-187 installed in borehole

SOIL BORING LOG: PG&E-TOPOCK_C:\USERS\SMC\GRANDOCUMENTS\PG&E_TOPOCK\DRIFT BORING LOGS\GINT FILES\05_20\TOPOCK DATABASE FOR PLOG.GPJ TOPOCK DATA TEMPLATE FOR PLOG.GDT 05/05/20 17:02

Date Started:	08/10/2019	Surface Elevation:	478.95 ft amsl	Boring No.: MW-77d	
Date Completed:	08/24/2019	Northing (NAD83):	2102933.93		
Drilling Co.:	Cascade	Easting (NAD83):	7615962.52	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	196 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:	28.0 ft bgs		
Drilling Asst:	John DeMay	Sampling Method:	4 inch x 10 ft. Core Barrel	Project Number:	RC000753.0051
Logger:	D. Luneau / J. 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	108			Topock - Alluvium Deposits	SW-SM		fine grained to very coarse grained, angular to subround; some granules to very large pebbles, angular to subangular; little silt; little coarser clasts composed of metadiorite; trace granite; wet				
142				Topock - Alluvium Deposits	SM		(142.7 - 144.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); dark reddish brown / moderate brown (5YR 3/4); very fine grained to medium grained, subangular to subround; some granules to very large pebbles, angular; little silt; some coarser clasts composed of metadiorite; wet				
143				MW-D-VAS-141-146 (<0.17 U ppb) 8/22/2019 10:04							
144											
145					NR		(144.5 - 146.0') No recovery (NR)	(144.5 - 146.0') Lost approximately 1.5 ft. of recovery due to potential heaving sands.			
146	120	No Sieve Samples Collected		Topock - Alluvium Deposits	GM		(146.0 - 156.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); dark reddish brown / moderate brown (5YR 3/4); 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; some coarser clasts composed of metadiorite; wet				
147											
148											
149											
150											
151				Topock - Alluvium Deposits	SP-SM		(156.0 - 159.0') Topock - Alluvium Deposits; Poorly graded sand with silt and gravel (SP-SM); dark reddish brown / grayish brown (5YR 3/2); medium grained to very coarse grained, angular; little granules to very large pebbles, angular to subangular; little silt; little coarser clasts composed of metadiorite; trace coarser clast composed of quartz; wet				
152											
153											
154		MW-D-VAS-151-156 (<0.17 U ppb) 8/22/2019 15:16									
155											
156											
157				Topock - Alluvium Deposits	CL		(158') greenish black (GLE Y1 2.5/10Y)				
158	120			Topock - Alluvium Deposits			(159.0 - 163.5') Topock - Alluvium Deposits; Sandy lean clay with gravel (CL); dark brown (7.5YR 3/4); low plasticity; little granules to very large pebbles, angular to subangular; little fine to medium	(159.0 - 163.5') Finer grained lithology may			
159											
160											

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Date Started:	08/10/2019	Surface Elevation:	478.95 ft amsl	Boring No.: MW-77d	
Date Completed:	08/24/2019	Northing (NAD83):	2102933.93		
Drilling Co.:	Cascade	Easting (NAD83):	7615962.52	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	196 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:	28.0 ft bgs		
Drilling Asst:	John DeMay	Sampling Method:	4 inch x 10 ft. Core Barrel	Project Number:	RC000753.0051
Logger:	D. Luneau / J. 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		MW-D-VAS-161-166 (<0.17 U ppb) 8/23/2019 10:36	Topock - Alluvium Deposits	CL		grained sand, subround; little silt; little coarser clasts composed of metadiorite; moist (161.8'); layer of strong cementation 0.8 ft. thick	correlate to finer grained lithology observed at similar depths at IRZ-16, IRZ-17 and MW-C.	
162				Topock - Alluvium Deposits	GM		(163.5 - 166.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); dark brown (7.5YR 3/4); granules to very large pebbles, angular; and very fine to very coarse grained sand, subangular to subround; little silt; some coarser clasts composed of metadiorite; moist to wet (163.7') black (5Y 2.5/1); layer 0.4 ft. thick		
163	120	No Sieve Samples Collected		Topock - Alluvium Deposits	SM		(166.0 - 167.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); dark reddish brown / moderate brown (5YR 3/4); very fine grained to very coarse grained, subangular to subround; some granules to very large pebbles, angular to subround; little silt; trace clay; some coarser clasts composed of metadiorite; trace mica; wet		
164				Topock - Alluvium Deposits	ML		(167.5 - 170.5') Topock - Alluvium Deposits; Gravelly silt with sand (ML); dark reddish brown / moderate brown (5YR 3/4); low plasticity; some granules to very large pebbles, angular to subangular; little very fine to very coarse grained sand, subangular to subround; little clay; some coarser clasts composed of metadiorite; trace mica; moist to wet		
165				Topock - Alluvium Deposits	ML		(170.5 - 172.0') Topock - Alluvium Deposits; Sandy silt (ML); dark reddish brown / moderate brown (5YR 3/4); low plasticity; some very fine to coarse grained sand, subangular to subround; little granules to small pebbles, angular to subround; trace coarser clasts composed of metadiorite; wet		
166				Topock - Alluvium Deposits	SM		(172.0 - 174.3') Topock - Alluvium Deposits; Silty sand with gravel (SM); dark reddish brown / moderate brown (5YR 3/4); very fine grained to very coarse grained, angular to subround; some silt; little granules to large pebbles, angular to subangular; little coarser clasts composed of metadiorite; wet		
167	120		MW-D-VAS-171-176 (<0.17 U ppb) 8/23/2019 14:58	Topock - Alluvium Deposits	ML		(174.3 - 180.0') Topock - Alluvium Deposits; Gravelly silt with sand (ML); dark reddish brown / moderate brown (5YR 3/4); low plasticity; some granules to very large pebbles, angular to subround; some very fine to very coarse grained sand, subangular to subround; some coarser clasts composed of metadiorite; wet		
168				Topock - Alluvium Deposits	ML				
169				Topock - Alluvium Deposits	ML				
170				Topock - Alluvium Deposits	ML				
171	120			Topock - Alluvium Deposits	ML				
172				Topock - Alluvium Deposits	ML				
173				Topock - Alluvium Deposits	ML				
174				Topock - Alluvium Deposits	ML				
175	120			Topock - Alluvium Deposits	ML				
176				Topock - Alluvium Deposits	ML				
177				Topock - Alluvium Deposits	ML				
178				Topock - Alluvium Deposits	ML				
179									
180									

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SOIL BORING LOG: PG&E-TOPOCK C:\USERS\SMC\GRAND\DOCUMENTS\PG&E-TOPOCK\DRIFT BORING LOGS\GINT FILES\05_20\TOPOCK DATABASE FOR PLOG.GPJ TOPOCK DATA TEMPLATE FOR PLOG.GDT 05/05/20 17:02

Date Started:	08/10/2019	Surface Elevation:	478.95 ft amsl	Boring No.: MW-77d	
Date Completed:	08/24/2019	Northing (NAD83):	2102933.93		
Drilling Co.:	Cascade	Easting (NAD83):	7615962.52	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	196 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:	28.0 ft bgs		
Drilling Asst:	John DeMay	Sampling Method:	4 inch x 10 ft. Core Barrel	Project Number:	RC000753.0051
Logger:	D. Luneau / J. 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	120		MW-D-VAS-181-186 (<0.17 U ppb) 8/24/2019 10:48	Topock - Alluvium Deposits	GM		(180.0 - 183.7') Topock - Alluvium Deposits; Silty gravel with sand (GM); dark reddish brown / moderate brown (5YR 3/4); granules to very large pebbles, angular to subround; some very fine to very coarse grained sand, subangular to round; little silt; some coarser clasts composed of metadiorite; trace mica; wet		
182				Topock - Alluvium Deposits	GM		(183.7 - 186.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); dark reddish brown / moderate brown (5YR 3/4); granules to very large pebbles, angular to subangular; some very fine to medium grained sand, subangular to subround; little silt; trace clay; some coarser clasts composed of metadiorite; trace mica and quartz; moist		
183	No Sieve Samples Collected			Topock - Alluvium Deposits	GM		(186.0 - 188.5') Topock - Alluvium Deposits; Gravelly lean clay with sand (CL); dark reddish brown / moderate brown (5YR 3/4); low plasticity; little granules to very large pebbles, subround to round; little fine to medium grained sand, subangular to round; trace silt; little coarser clasts composed of metadiorite; moist to dry	(186.0 - 195.0') Rough drilling	(186.0 - 191.0') 3100 gallons of water used; 2330 gallons of water recovered; 770 gallons of water lost; flushed casing prior to installation of the well
184				Topock - Alluvium Deposits	GM		(188.5 - 195.2') Topock - Weathered Bedrock - conglomerate; Lean clay (CL); dark reddish brown / moderate brown (5YR 3/4); low plasticity; little granules to medium pebbles, angular to subround; little fine to coarse grained sand, subangular to subround; trace silt; trace coarser clasts composed of metadiorite; moist		
185				Topock - Weathered Bedrock - conglomerate	CL				
186				Topock - Competent Bedrock - conglomerate	CL				
187	120		MW-D-VAS-191-196 (<0.17 U ppb) 8/25/2019 09:38	Topock - Weathered Bedrock - conglomerate	CL		(195.2 - 196.0') Topock - Competent Bedrock - conglomerate; dark reddish brown / moderate brown (5YR 3/4); dry; friable, contact added based on review of photo log and daily site visit report	(195.0 - 196.0') Very rough drilling. Drill bit was observed to be worn when retrieved.	
188				Topock - Weathered Bedrock - conglomerate	CL				
189				Topock - Competent Bedrock - conglomerate	CL				
190				Topock - Competent Bedrock - conglomerate	CL				
191	End of Boring at 196.0 ft bgs.								

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