

Date Started: 09/08/2019	Surface Elevation: 478.7 ft amsl	Well ID: MW-77-46d, MW-77-102
Date Completed: 01/10/2020	Shallow Well Elevation: NA	
Drilling Co.: Cascade	Deep Well Elevation: 478.7 ft amsl	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): 2102928.3	Project: Final GW Remedy Phase 1
Driller Name: Dan O' Mara	Easting (NAD83): 7615965.2	Location: PG&E Topock, Needles, California
Drilling Asst: Jimmy Candelaria	Borehole Diameter: 10-18 inches	
Logger: Joe Latham/Grant Willford	Water Level Start: 25.48 ft bgs	Project Number: RC000753.0051
Editor: Grant Willford	Development End Date: 10/2/2019	
Total Depth: 107 ft bgs	Well Completion: <input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

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					(+0.2 - 2.2') Concrete Pad		(+0.2 - 2.2') 15 bags Note: 30" diameter concrete pad with 18" diameter lockable vault, King Kon-Crete 4000 PSI
1					(0.3 - 82.0') 2" PVC Sch 40 Casing		
2					Well Casing Abandoned Casing		
3					(2.0 - 15.0') 100% Portland		Note: Capped decommissioned well casing covered with concrete in side the well vault during the installation of the surface completion.
4							
5							
6							
7						(2.0 - 15.0') 3.58 gallons	(2.0 - 15.0') 4 gallons (112%) Note: Portland Type I, II and V installed on 11/16/19 to top of casing settled to 2 ft. bgs by 10/17/19. PVC casing was cut and a slip cap glued to the top of the casing.
8							
9					(2.2 - 15.0') Portland Cement 6% Bentonite		
10			NR		(9.5 - 10.5') Centralizer	(2.2 - 15.0') 72.1 gallons	(2.2 - 15.0') 98 gallons (136%) Note: Type I, II and V and Benseal, used >20% of the calculated volume due to potential voids forming during drilling and grout migration
11					(0.0 - 27.0') 12.0" Borehole		
12							
13							
14							
15							
16							
17							
18						(15.0 - 21.0') 8.9 bags	(15.0 - 21.0') 8 bags (90%) Note: Lapis Lustre Sand
19							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, groundwater samples collected during the drilling of MW-77d, depth to water post development.

WELL CONSTRUCTION DETAILS_PG&E_TOPOCK C:\USERS\SMC\GRANDOCUMENTS\PG&E_TOPOCK\DATABASE FOR PLOG.GPJ_TOPOCK DATA TEMPLATE FOR PLOG.GDT 04/17/20 15:13

Date Started: 09/08/2019	Surface Elevation: 478.7 ft amsl	Well ID: MW-77-46d, MW-77-102
Date Completed: 01/10/2020	Shallow Well Elevation: NA	
Drilling Co.: Cascade	Deep Well Elevation: 478.7 ft amsl	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): 2102928.3	Project: Final GW Remedy Phase 1
Driller Name: Dan O' Mara	Easting (NAD83): 7615965.2	Location: PG&E Topock, Needles, California
Drilling Asst: Jimmy Candelaria	Borehole Diameter: 10-18 inches	
Logger: Joe Latham/Grant Willford	Water Level Start: 25.48 ft bgs	Project Number: RC000753.0051
Editor: Grant Willford	Development End Date: 10/2/2019	
Total Depth: 107 ft bgs	Well Completion: <input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

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					(0.3 - 82.0') 2" PVC Sch 40 Casing		
21					Well Casing Abandoned Casing	(15.0 - 21.0') 8.9 bags	(15.0 - 21.0') 8 bags (90%) Note: Lapis Lustre Sand
22							
23			NR				
24					(0.0 - 27.0') 12.0" Borehole		
25							
26							
27							
28		Topock - Fluvial Deposits	SP				
29						(24.0 - 36.2') 2 gallons	(24.0 - 36.2') 4 gallons (200%) Note: 0.5 bags of cal-silica 3/8 x 1/4" pea gravel to a depth of 24 ft. bgs. Portland Cement Type I, II and V, installed on 10/15/19 to top of casing and settled to 24 ft. bgs by 10/16/19. Used >20% of the calculated volume due to migration into the filter pack and screen interval.
30		Topock - Fluvial Deposits	CL		(21.0 - 50.0') Cemex #3 MESH (8x10)		
31							
32	MW-D-VAS-30-35 (<0.17 U ppb) 8/10/2019 17:08						
33		Topock - Fluvial Deposits	ML			(21.0 - 50.0') 31.4 bags	(21.0 - 50.0') 45 bags (143%) Note: Lapis Lustre Sand, used >20% of the calculated volume due to potential voids forming during drilling.
34							
35							
36							
37							
38		Topock - Fluvial Deposits	CL				
39			GM				Note: Attempts to remove the formation and filter pack sand prior to decommissioning were unsuccessful and material was left in place.
					(27.0 - 107.0') 10.0" Borehole		

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WELL CONSTRUCTION DETAILS_PG&E_TOPOCK C:\USERS\SMC\GRANDDOCUMENTS\PG&E_TOPOCK\DRIFT BORING LOGS\GINT FILES\04.17.20\TOPOCK DATA TEMPLATE FOR PLOG.GDT 04/17/20 15:14

Date Started: 09/08/2019	Surface Elevation: 478.7 ft amsl	Well ID: MW-77-46d, MW-77-102
Date Completed: 01/10/2020	Shallow Well Elevation: NA	
Drilling Co.: Cascade	Deep Well Elevation: 478.7 ft amsl	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): 2102928.3	Project: Final GW Remedy Phase 1
Driller Name: Dan O' Mara	Easting (NAD83): 7615965.2	Location: PG&E Topock, Needles, California
Drilling Asst: Jimmy Candelaria	Borehole Diameter: 10-18 inches	
Logger: Joe Latham/Grant Willford	Water Level Start: 25.48 ft bgs	Project Number: RC000753.0051
Editor: Grant Willford	Development End Date: 10/2/2019	
Total Depth: 107 ft bgs	Well Completion: <input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

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		Topock - Fluvial Deposits	GM		(0.3 - 82.0') 2" PVC Sch 40 Casing				
41							Well Casing Abandoned Casing		
42									
43									
44		Topock - Fluvial Deposits	ML		(21.0 - 50.0') Cemex #3 MESH (8x10)	(21.0 - 50.0') 31.4 bags	(21.0 - 50.0') 45 bags (143%) Note: Lapis Lustre Sand, used >20% of the calculated volume due to potential voids forming during drilling.		
45		Topock - Fluvial Deposits	GM				Note: Attempts to remove the formation and filter pack sand prior to decommissioning were unsuccessful and material was left in place.		
46									
47					(46.5 - 47.5') Centralizer				
48	MW-D-VAS-46-51 (0.47 ppb) 8/11/2019 12:59								
49									
50					(27.0 - 107.0') 10.0" Borehole				
51									
52									
53			NR						
54									
55					(50.0 - 80.0') Bentonite seal chips	(50.0 - 80.0') 21.8 bags	(50.0 - 80.0') 24 bags (110%) Note: Puregold Medium Chips.		
56									
57									
58									
59									

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WELL CONSTRUCTION DETAILS_PG&E_TOPOCK_TOPOCKDRAFT BORING LOGS\GINT FILES\04.17.20\TOPOCK DATABASE FOR PLOG.GPJ_TOPOCK DATA TEMPLATE FOR PLOG.GPJ_04/17/20 15:14

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Drilling Method: Sonic Drilling	Northing (NAD83): 2102928.3	Project: Final GW Remedy Phase 1
Driller Name: Dan O' Mara	Easting (NAD83): 7615965.2	Location: PG&E Topock, Needles, California
Drilling Asst: Jimmy Candelaria	Borehole Diameter: 10-18 inches	
Logger: Joe Latham/Grant Willford	Water Level Start: 25.48 ft bgs	Project Number: RC000753.0051
Editor: Grant Willford	Development End Date: 10/2/2019	
Total Depth: 107 ft bgs	Well Completion: <input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

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					(0.3 - 82.0') 2" PVC Sch 40 Casing		
61					(60.5 - 61.5') Centralizer		
62							
63							
64							
65							
66							
67							
68							
69							
70			NR		(50.0 - 80.0') Bentonite seal chips	(50.0 - 80.0') 21.8 bags	(50.0 - 80.0') 24 bags (110%) Note: Puregold Medium Chips.
71					(27.0 - 107.0') 10.0" Borehole		
72							
73							
74							
75							
76							
77							
78							
79							

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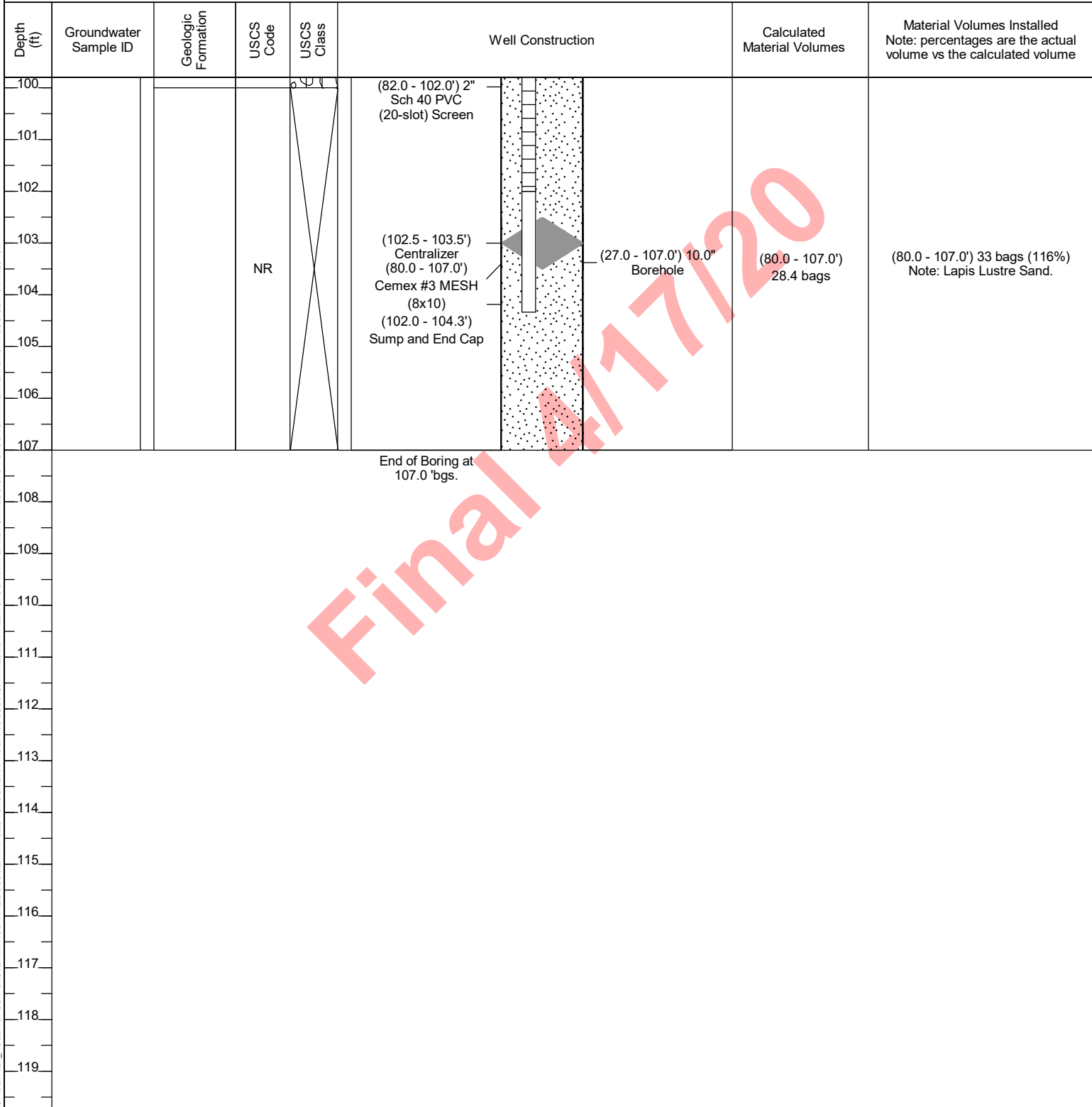
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Date Completed: 01/10/2020	Shallow Well Elevation: NA	
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Drilling Method: Sonic Drilling	Northing (NAD83): 2102928.3	Project: Final GW Remedy Phase 1
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Drilling Asst: Jimmy Candelaria	Borehole Diameter: 10-18 inches	
Logger: Joe Latham/Grant Willford	Water Level Start: 25.48 ft bgs	Project Number: RC000753.0051
Editor: Grant Willford	Development End Date: 10/2/2019	
Total Depth: 107 ft bgs	Well Completion: <input checked="" type="checkbox"/> Flush <input type="checkbox"/> Stick-up	

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					(0.3 - 82.0') 2" PVC Sch 40 Casing		
81							
82							
83			NR		(82.0 - 102.0') 2" Sch 40 PVC (20-slot) Screen		
84							
85							
86							
87		Topock - Alluvium Deposits	SM				
88							
89							
90					(80.0 - 107.0') Cemex #3 MESH (8x10)	(27.0 - 107.0') 10.0" Borehole	(80.0 - 107.0') 33 bags (116%) Note: Lapis Lustre Sand.
91						(80.0 - 107.0') 28.4 bags	
92							
93	MW-D-VAS-91-56 (<0.033 U ppb) 8/12/2019 10:38	Topock - Alluvium Deposits	GM				
94							
95							
96							
97							
98							
99							

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Date Completed: 01/10/2020	Shallow Well Elevation: NA	
Drilling Co.: Cascade	Deep Well Elevation: 478.7 ft amsl	Client: PG&E
Drilling Method: Sonic Drilling	Northing (NAD83): 2102928.3	Project: Final GW Remedy Phase 1
Driller Name: Dan O' Mara	Easting (NAD83): 7615965.2	Location: PG&E Topock, Needles, California
Drilling Asst: Jimmy Candelaria	Borehole Diameter: 10-18 inches	
Logger: Joe Latham/Grant Willford	Water Level Start: 25.48 ft bgs	Project Number: RC000753.0051
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Date Started:	09/06/2019	Surface Elevation:	478.7 ft amsl	Boring No.: MW-77s	
Date Completed:	09/07/2019	Northing (NAD83):	2102928.3		
Drilling Co.:	Cascade	Easting (NAD83):	7615965.2	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	107 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Terrasonic Track Mount	Borehole Diameter:	10-18 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Dan O' Mara	Depth to First Water:	28 ft bgs		
Drilling Asst:	Jimmy Candelaria	Sampling Method:	8 inch x 10 ft. Core Barrel	Project Number:	RC000753.0051
Logger:	Joe Latham	Sampling Interval:	Screen intervals		
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
1							(0.0 - 27.0') No recovery (NR); See lithology log for MW-Dd	(0.0 - 27.0') Did not collect or log core.	(0.0 - 102.0') No water used
2									
3									
4									
5									
6									
7									
8									
9									
10	0	No Sieve Samples Collected			NR				
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									

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SOIL BORING LOG_PG&E_TOPOCK_C:\USERS\MCGRANE\DOCUMENTS\PG&E_TOPOCK\DRIFT BORING LOGS\GINT FILES\04.17.20\TOPOCK DATABASE FOR PLOG.GPJ_TOPOCK DATA TEMPLATE FOR PLOG.GDT_04/17/20 14:38

Date Started:	09/06/2019	Surface Elevation:	478.7 ft amsl	Boring No.: MW-77s	
Date Completed:	09/07/2019	Northing (NAD83):	2102928.3		
Drilling Co.:	Cascade	Easting (NAD83):	7615965.2	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	107 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Terrasonic Track Mount	Borehole Diameter:	10-18 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Dan O' Mara	Depth to First Water:	28 ft bgs		
Drilling Asst:	Jimmy Candelaria	Sampling Method:	8 inch x 10 ft. Core Barrel	Project Number:	RC000753.0051
Logger:	Joe Latham	Sampling Interval:	Screen intervals		
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	0				NR				
22									
23									
24									
25									
26									
27									
28	No Sieve Samples Collected			Topock - Fluvial Deposits	SP		(27.0 - 30.0') Topock - Fluvial Deposits; Poorly graded sand (SP); dark yellowish brown (10YR 3/4); fine grained to medium grained, subround to round; dry to moist (28'); moist to wet (29') dark olive gray / olive gray (5Y 3/2)	(27.0 - 46.0') Top foot of core barrel was slough.	
29									
30									
31	228			Topock - Fluvial Deposits	CL		(30.0 - 31.2') Topock - Fluvial Deposits; Lean clay (CL); dark gray (10YR 4/1); medium plasticity; some silt; moist to wet	(30.0 - 39.2') Archeologists and tribal geologist where notified of clay units. Clay was not collected due to other sediment grains within the clay.	
32									
33									
34									
35				Topock - Fluvial Deposits	ML		(31.2 - 37.0') Topock - Fluvial Deposits; Silt (ML); dark grayish brown / dark yellowish brown (10YR 4/2); low plasticity; little clay; moist to wet (34.5') brown (10YR 5/3) (36') grayish brown (10YR 5/2)		
36									
37				Topock - Fluvial Deposits	CL		(37.0 - 39.2') Topock - Fluvial Deposits; Lean clay (CL); grayish brown (10YR 5/2); low plasticity; little silt; trace granules, angular to subangular; trace medium to very coarse grained sand, angular; moist to wet		
38									
39									
40				Topock - Fluvial Deposits	GM		(39.2 - 44.0') Topock - Fluvial Deposits; Silty gravel with sand (GM); yellowish brown / moderate yellowish brown (10YR 5/4);		

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SOIL BORING LOG - PG&E - TOPOCK - C:\USERS\MCGRANED\DOCUMENTS\PG&E TOPOCK\DRIFT BORING LOGS\GINT FILES\04.17.20\TOPOCK DATABASE FOR PLOG.GPJ TOPOCK DATA TEMPLATE FOR PLOG.GDT 04/17/20 14:38

Date Started:	09/06/2019	Surface Elevation:	478.7 ft amsl	Boring No.: MW-77s	
Date Completed:	09/07/2019	Northing (NAD83):	2102928.3		
Drilling Co.:	Cascade	Easting (NAD83):	7615965.2	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	107 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Terrasonic Track Mount	Borehole Diameter:	10-18 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Dan O' Mara	Depth to First Water:	28 ft bgs		
Drilling Asst:	Jimmy Candelaria	Sampling Method:	8 inch x 10 ft. Core Barrel	Project Number:	RC000753.0051
Logger:	Joe Latham	Sampling Interval:	Screen intervals		
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	228			Topock - Fluvial Deposits	GM		granules to very large pebbles, subangular to round; some medium to very coarse grained sand, angular to subround; little small cobbles, round; little silt; trace clay; some coarser clasts composed of metadiorite; wet		
42							(41.5') some coarser clasts composed of metadiorite; trace quartz and mica; increase in silt, decrease in sand		
43									
44				Topock - Fluvial Deposits	ML		(44.0 - 45.0') Topock - Fluvial Deposits; Gravelly silt (ML); pale brown (10YR 6/3); no plasticity; little granules to very large pebbles, angular; trace clay; little coarser clasts composed of metadiorite; trace quartz and mica; dry to moist		
45				Topock - Fluvial Deposits	GM		(45.0 - 46.0') Topock - Fluvial Deposits; Silty gravel with sand (GM); brown (10YR 5/3); granules to very large pebbles, subround to round; some fine to very coarse grained sand, subround to round; little silt; trace clay; some coarser clasts composed of metadiorite; trace mudstone, siltstone, quartzite, granite, mica; moist to wet	(46.0 - 86.0') Did not collect or log core.	
46						(46.0 - 86.0') No recovery (NR); See lithology log for MW-Dd			
47									
48			MW-D-VAS-46-51 (0.47 ppb) 8/11/2019 12:59						
49									
50		No Sieve Samples Collected							
51									
52									
53	0				NR				
54									
55									
56									
57									
58									
59									
60									

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Drilling Co.:	Cascade	Easting (NAD83):	7615965.2	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	107 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Terrasonic Track Mount	Borehole Diameter:	10-18 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Dan O' Mara	Depth to First Water:	28 ft bgs		
Drilling Asst:	Jimmy Candelaria	Sampling Method:	8 inch x 10 ft. Core Barrel	Project Number:	RC000753.0051
Logger:	Joe Latham	Sampling Interval:	Screen intervals		
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
61									
62									
63									
64									
65									
66									
67									
68									
69									
70	0	No Sieve Samples Collected			NR				
71									
72									
73									
74									
75									
76									
77									
78									
79									
80									

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Logger:	Joe Latham	Sampling Interval:	Screen intervals		
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	0				NR				
82									
83									
84									
85	No Sieve Samples Collected						(86.0 - 88.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); dark yellowish brown (10YR 4/4); fine grained to very coarse grained, angular to subround; little granules to very large pebbles, angular to subangular; little silt; trace small cobbles, subround; trace coarser clasts composed of metadiorite; trace mica and granite; wet		
86									
87									
88									
89									
90									
91									
92									
93									
94									
95	168	MW-D-VAS-91-56 (<0.033 U ppb) 8/12/2019 10:38		Topock - Alluvium Deposits	GM		(88.0 - 100.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); dark yellowish brown (10YR 4/4); granules to very large pebbles, angular to subround; and fine to very coarse grained sand, subangular to subround; little silt; some coarser clasts composed of metadiorite; trace mica; wet		
96									
97									
98									
99									
100									
							(98'); increase in silt content, decrease in sand and granules to very large pebbles		

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, NR = no recovery, groundwater samples and depth to water collected during the drilling of MW-77d

SOIL BORING LOG: PG&E TOPOCK C:\USERS\MCGRANED\DOCUMENTS\PG&E TOPOCK\DRIFT BORING LOGS\GINT FILES\04.17.20\TOPOCK DATABASE FOR PLOG.GPJ TOPOCK DATA TEMPLATE FOR PLOG.GDT 04/17/20 14:38

Date Started:	09/06/2019	Surface Elevation:	478.7 ft amsl	Boring No.: MW-77s	
Date Completed:	09/07/2019	Northing (NAD83):	2102928.3		
Drilling Co.:	Cascade	Easting (NAD83):	7615965.2	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	107 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Terrasonic Track Mount	Borehole Diameter:	10-18 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Dan O' Mara	Depth to First Water:	28 ft bgs		
Drilling Asst:	Jimmy Candelaria	Sampling Method:	8 inch x 10 ft. Core Barrel	Project Number:	RC000753.0051
Logger:	Joe Latham	Sampling Interval:	Screen intervals		
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	168	No Sieve Samples Collected			NR		(100.0 - 107.0') No recovery (NR)	(100.0 - 107.0') Sediments fell out of core barrel into hopper.	
102									
103									
104									
105									
106									
107							(102.0 - 107.0') 600 gallons of water used; 33 gallons of water recovered; 567 gallons of water lost; Flushed casing prior to the installation of the well.		

End of Boring at 107.0' bgs.

Final 4/17/20

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