

Date Started: 11/05/2019	Surface Elevation: 480.26 ft amsl	Well ID: IRZ-17
Date Completed: 11/19/2019	Shallow Well Elevation: N/A	
Drilling Co.: Cascade	Deep Well Elevation: N/A	Client: PG&E
Drilling Method: Dual Rotary	Northing (NAD83): 2103000.19	Project: Final GW Remedy Phase 1
Driller Name: Jon Martinez	Easting (NAD83): 7615871.28	Location: PG&E Topock, Needles, California
Drilling Asst: A. & H. Amezquita	Borehole Diameter: 16-18 inches	
Logger: K. Keon / E. Redner	Static Water Level: See Log for Depths	Project Number: RC000753.0051
Editor: Sean McGrane	Development End Date: 1/24/2020	
Total Depth: 192 ft bgs	Well Completion: <input type="checkbox"/> Flush <input type="checkbox"/> Stick-up <input checked="" 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
1					(0.0 - 36.2') 10" SHUR-GRIP SDR17 PVC Casing		
2					(0.0 - 4.0') Cemex #0/30 MESH (30x50) Lapis Lustre Sand	(0.0 - 4.0') 9.8 bags	(0.0 - 4.0') 13 bags (133%) Note: Temporary backfill sand to fill annular space prior to vault installation. Used >20% of the calculated volume due to hole diameter increasing near surface.
3							
4							
5					(4.0 - 7.0') Bentonite seal chips Puregold medium chips	(4.0 - 7.0') 5.1 bags	(4.0 - 7.0') 20 bags (392%) Note: Chips were used to fill large void that formed during drilling, void resulted in the installation of >20% of the calculated volume.
6							
7							
8							
9							
10			NR				
11							
12					(7.0 - 18.3') Portland Cement 3% Bentonite Type I, II and V with Hydrogel	(7.0 - 18.3') 103.2 gallons	(7.0 - 18.3') 180 gallons (174%) Note: Grout seal second lift. Used >20% of the calculated volume due to voids that formed during drilling.
13							
14							
15							
16							
17							
18							
19					(18.3 - 25.5') Portland Cement 3% Bentonite Type I, II and V with Hydrogel	(18.3 - 25.5') 65.8 gallons	(18.3 - 25.5') 230 gallons (350%) Note: Grout seal. Used >20% of the calculated volume due to voids that formed during drilling. Stopped installation and let cure before adding second lift.
20		Topock - Fill	SP				

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J = estimated value, NR = no recovery; Notes: solid blue and hollow blue water table marks represent depth to water (ft. bgs.) measured pre-specific capacity for the shallow and deep screens respectively

WELL CONSTRUCTION DETAILS_PG&E_TOPOCK_TOPOCK BORING LOGS\GINT FILES\52720\TOPOCK DATABASE FOR PLOG.GPJ_TOPOCK DATA TEMPLATE FOR PLOG.GDT_05/27/20 14:07

Date Started: 11/05/2019	Surface Elevation: 480.26 ft amsl	Well ID: IRZ-17
Date Completed: 11/19/2019	Shallow Well Elevation: N/A	
Drilling Co.: Cascade	Deep Well Elevation: N/A	Client: PG&E
Drilling Method: Dual Rotary	Northing (NAD83): 2103000.19	Project: Final GW Remedy Phase 1
Driller Name: Jon Martinez	Easting (NAD83): 7615871.28	Location: PG&E Topock, Needles, California
Drilling Asst: A. & H. Amezcuita	Borehole Diameter: 16-18 inches	
Logger: K. Keon / E. Redner	Static Water Level: See Log for Depths	Project Number: RC000753.0051
Editor: Sean McGrane	Development End Date: 1/24/2020	
Total Depth: 192 ft bgs	Well Completion: <input type="checkbox"/> Flush <input type="checkbox"/> Stick-up <input checked="" 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
21		Topock - Fill	SP		(0.0 - 36.2') 10" SHUR-GRIP SDR17 PVC Casing		
22		Topock - Fluvial Deposits	SM		(18.3 - 25.5') Portland Cement 3% Bentonite Type I, II and V with Hydrogel	(18.3 - 25.5') 65.8 gallons	(18.3 - 25.5') 230 gallons (350%) Note: Grout seal. Used >20% of the calculated volume due to voids that formed during drilling. Stopped installation and let cure before adding second lift.
23					(24.5 - 25.5') Centralizer		
24		Topock - Fluvial Deposits	ML		(25.5 - 26.9') Bentonite seal chips Puregold medium chips	(25.5 - 26.9') 2.38 bags	(25.5 - 26.9') 2 bags (84%) Note: Seal between sand and grout
25					(26.9 - 27.9') Cemex #0/30 MESH (30x50) Lapis Lustre Sand	(26.9 - 27.9') 2.3 bags	(26.9 - 27.9') 2 bags (87%) Note: Transition sand
26		Topock - Fluvial Deposits	SM				
27		Topock - Fluvial Deposits	ML				
28					(19.9 - 40.6') 18.0" Borehole		
29		Topock - Fluvial Deposits	MH				
30							
31		Topock - Fluvial Deposits	SM		(27.9 - 59.9') Cemex #8 MESH (8x16) Lapis Lustre Sand	(27.9 - 59.9') 78.2 bags	(27.9 - 59.9') 81 bags (104%) Note: Filter pack. Swabbed upper screen for approximately 60 minutes.
32							
33							
34	IRZ-17-VAS-32-37 (67 ppb) 3/2/2019 13:14	Topock - Fluvial Deposits	SM				
35							
36		Topock - Alluvium Deposits	SM		(36.2 - 57.1') 10" 50-Slot 316 SS Wire Wrap Screen		
37							
38							
39		Topock - Alluvium Deposits	GM				
40							

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WELL CONSTRUCTION DETAILS_PG&E_TOPOCK C:\USERS\MCGRANE\DOCUMENTS\PG&E_TOPOCK\DRIFT BORING LOGS\GINT FILES\052720\TOPOCK DATABASE FOR PLOG.GPJ - TOPOCK DATA TEMPLATE FOR PLOG.GDT 05/27/20 14:07

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Drilling Co.: Cascade	Deep Well Elevation: N/A	Client: PG&E
Drilling Method: Dual Rotary	Northing (NAD83): 2103000.19	Project: Final GW Remedy Phase 1
Driller Name: Jon Martinez	Easting (NAD83): 7615871.28	Location: PG&E Topock, Needles, California
Drilling Asst: A. & H. Amezguita	Borehole Diameter: 16-18 inches	
Logger: K. Keon / E. Redner	Static Water Level: See Log for Depths	Project Number: RC000753.0051
Editor: Sean McGrane	Development End Date: 1/24/2020	
Total Depth: 192 ft bgs	Well Completion: <input type="checkbox"/> Flush <input type="checkbox"/> Stick-up <input checked="" 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					
41		Topock - Alluvium Deposits	GM		(36.2 - 57.1') 10" 50-Slot 316 SS Wire Wrap Screen							
42							(19.9 - 40.6') 18.0" Borehole					
43		Topock - Alluvium Deposits	SM		(27.9 - 59.9') Cemex #8 MESH (8x16) Lapis Lustre Sand	(27.9 - 59.9') 78.2 bags	(27.9 - 59.9') 81 bags (104%) Note: Filter pack. Swabbed upper screen for approximately 60 minutes.					
44												
45												
46		Topock - Alluvium Deposits	SW									
47												
48		Topock - Alluvium Deposits	SM									
49												
50		Topock - Alluvium Deposits	SW-SM									
51												
52		Topock - Alluvium Deposits	ML									
53												
54		Topock - Alluvium Deposits	SM									
55												
56		Topock - Alluvium Deposits	SM									
57												
58		Topock - Alluvium Deposits	ML									
59												
60		Topock - Alluvium Deposits	SM									
					(57.1 - 137.2') 10" SHUR-GRIP SDR17 PVC Casing							

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Date Completed: 11/19/2019	Shallow Well Elevation: N/A	
Drilling Co.: Cascade	Deep Well Elevation: N/A	Client: PG&E
Drilling Method: Dual Rotary	Northing (NAD83): 2103000.19	Project: Final GW Remedy Phase 1
Driller Name: Jon Martinez	Easting (NAD83): 7615871.28	Location: PG&E Topock, Needles, California
Drilling Asst: A. & H. Amezguita	Borehole Diameter: 16-18 inches	
Logger: K. Keon / E. Redner	Static Water Level: See Log for Depths	Project Number: RC000753.0051
Editor: Sean McGrane	Development End Date: 1/24/2020	
Total Depth: 192 ft bgs	Well Completion: <input type="checkbox"/> Flush <input type="checkbox"/> Stick-up <input checked="" 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
61	IRZ-17-VAS-62-67 (0.604 J ppb) 3/2/2019 15:50	Topock - Alluvium Deposits	SM	[Pattern]	(59.9 - 61.3') Cemex #0/30 MESH (30x50) Lapis Lustre Sand	(59.9 - 61.3') 3.4 bags	(59.9 - 61.3') / 7 bags (206%) Note: Transition sand. Used >20% of the calculated volume due to potential voids forming during drilling.
62					(40.6 - 61.8') 18.0" Borehole		
63					(57.1 - 137.2') 10" SHUR-GRIP SDR17 PVC Casing		
64		Topock - Alluvium Deposits	GM	[Pattern]			
65							
66							
67							
68		Topock - Alluvium Deposits	SM	[Pattern]	(69.5 - 70.5') Centralizer		
69							
70					(61.3 - 128.2') Bentonite seal pellets Pel-Plug (TR30) 3/8"	(61.3 - 128.2') 113.9 buckets	(61.3 - 128.2') 126 buckets (111%) Note: Intermediate seal
71							
72							
73							
74							
75							
76		Topock - Alluvium Deposits	ML	[Pattern]			
77							
78							
79							
80					(79.5 - 99.8') 18.0" Borehole		

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Drilling Co.: Cascade	Deep Well Elevation: N/A	Client: PG&E
Drilling Method: Dual Rotary	Northing (NAD83): 2103000.19	Project: Final GW Remedy Phase 1
Driller Name: Jon Martinez	Easting (NAD83): 7615871.28	Location: PG&E Topock, Needles, California
Drilling Asst: A. & H. Amezguita	Borehole Diameter: 16-18 inches	
Logger: K. Keon / E. Redner	Static Water Level: See Log for Depths	Project Number: RC000753.0051
Editor: Sean McGrane	Development End Date: 1/24/2020	
Total Depth: 192 ft bgs	Well Completion: <input type="checkbox"/> Flush <input type="checkbox"/> Stick-up <input checked="" 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
81		Topock - Alluvium Deposits	ML		(57.1 - 137.2') 10" SHUR-GRIP SDR17 PVC Casing		
82		Topock - Alluvium Deposits	SM				
83		Topock - Alluvium Deposits	ML				
84		Topock - Alluvium Deposits	ML				
85		Topock - Alluvium Deposits	ML				
86		Topock - Alluvium Deposits	SM				
87		Topock - Alluvium Deposits	SM				
88		Topock - Alluvium Deposits	SM				
89		Topock - Alluvium Deposits	SM				
90		Topock - Alluvium Deposits	ML		(61.3 - 128.2') Bentonite seal pellets Pel-Plug (TR30) 3/8"	(61.3 - 128.2') 113.9 buckets	(61.3 - 128.2') 126 buckets (111%) Note: Intermediate seal
91		Topock - Alluvium Deposits	ML				
92		Topock - Alluvium Deposits	ML				
93		Topock - Alluvium Deposits	ML				
94		Topock - Alluvium Deposits	ML				
95		Topock - Alluvium Deposits	ML				
96		Topock - Alluvium Deposits	ML				
97		Topock - Alluvium Deposits	SM				
98		Topock - Alluvium Deposits	SM				
99		Topock - Alluvium Deposits	SM				
100		Topock - Alluvium Deposits	SM				

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Drilling Co.: Cascade	Deep Well Elevation: N/A	Client: PG&E
Drilling Method: Dual Rotary	Northing (NAD83): 2103000.19	Project: Final GW Remedy Phase 1
Driller Name: Jon Martinez	Easting (NAD83): 7615871.28	Location: PG&E Topock, Needles, California
Drilling Asst: A. & H. Amezguita	Borehole Diameter: 16-18 inches	
Logger: K. Keon / E. Redner	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	
101					(57.1 - 137.2') 10" SHUR-GRIP SDR17 PVC Casing			
102	IRZ-17-VAS-102-107 (<0.17 U ppb) 3/3/2019 11:50	Topock - Alluvium Deposits	SM		(61.3 - 128.2') Bentonite seal pellets Pel-Plug (TR30) 3/8"	(99.8 - 121.1') 16.0" Borehole	(61.3 - 128.2') 113.9 buckets	(61.3 - 128.2') 126 buckets (111%) Note: Intermediate seal
103								
104								
105								
106								
107								
108								
109								
110								
111								
112								
113								
114								
115								
116								
117								
118								
119		Topock - Alluvium Deposits	ML		(119.5 - 120.5') Centralizer			
120								

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Drilling Co.: Cascade	Deep Well Elevation: N/A	Client: PG&E
Drilling Method: Dual Rotary	Northing (NAD83): 2103000.19	Project: Final GW Remedy Phase 1
Driller Name: Jon Martinez	Easting (NAD83): 7615871.28	Location: PG&E Topock, Needles, California
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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
121		Topock - Alluvium Deposits	ML		(99.8 - 121.1') 16.0" Borehole		
122					(57.1 - 137.2') 10" SHUR-GRIP SDR17 PVC Casing		
123		Topock - Alluvium Deposits	SM		(61.3 - 128.2') Bentonite seal pellets Pel-Plug (TR30) 3/8"	(61.3 - 128.2') 113.9 buckets	(61.3 - 128.2') 126 buckets (111%) Note: Intermediate seal
124							
125		Topock - Alluvium Deposits	SM		(128.2 - 128.7') Cemex #60 Mesh (40x70) Lapis Lustre Sand	(128.2 - 128.7') 0.9 bags	(128.2 - 128.7') 2 bags (222%) Note: Transition sand. Used >20% of the calculated volume due to potential voids forming during drilling.
126							
127		Topock - Alluvium Deposits	ML		(121.1 - 138.8') 16.0" Borehole		
128							
129		Topock - Alluvium Deposits	GM		(128.7 - 177.5') Cemex #1/20 MESH (20x40) Lapis Lustre Sand	(128.7 - 177.5') 88.5 bags	(128.7 - 177.5') 78.1 bags (88%) Note: Lapis Lustre Sand, swabbed lower screen for approximately 60 minutes.
130							
131		Topock - Alluvium Deposits	SM		(137.2 - 167.1') 10" 15-Slot 316 SS Wire Wrap Screen		
132							
133	IRZ-17VAS-132-137 (<0.17 U ppb) 3/13/2019 23:35	Topock - Alluvium Deposits	GM		(138.8 - 158.8') 16.0" Borehole		
134							
135		Topock - Alluvium Deposits	SM				
136							
137	IRZ-17-VAS-137-142 (<0.17 U ppb) 3/12/2019 14:50	Topock - Alluvium Deposits	SM				
138							
139							
140							

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Driller Name: Jon Martinez	Easting (NAD83): 7615871.28	Location: PG&E Topock, Needles, California
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141	IRZ-17-VAS-137-142 (<0.17 U ppb) 3/12/2019 14:50	Topock - Alluvium Deposits	SM		(137.2 - 167.1') 10" 15-Slot 316 SS Wire Wrap Screen		
144	IRV-17-VAS-142-147 (84 ppb) 3/4/2019 10:24						
149	IRZ-17-VAS-147-152 (<0.33 U ppb) 3/12/2019 10:50				(128.7 - 177.5') Cemex #1/20 MESH (20x40) Lapis Lustre Sand	(138.8 - 158.8') 16.0" Borehole	(128.7 - 177.5') 88.5 bags
154	IRZ-17-VAS-152-157 (7.0 ppb) 3/4/2019 13:46	Topock - Alluvium Deposits	ML				
158							
160					(158.8 - 178.8') 16.0" Borehole		

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161			ML		(137.2 - 167.1') 10" 15-Slot 316 SS Wire Wrap Screen		
162		Topock - Alluvium Deposits	SM				
163		Topock - Alluvium Deposits	GM				
164	IRZ-17-VAS-162-167 (<0.17 U ppb) 3/4/2019 17:01						
165							
166							
167							
168					(128.7 - 177.5') Cemex #1/20 MESH (20x40) Lapis Lustre Sand		
169					(168.5 - 169.5') Centralizer	(128.7 - 177.5') 88.5 bags	(128.7 - 177.5') 78.1 bags (88%) Note: Lapis Lustre Sand, swabbed lower screen for approximately 60 minutes.
170					(158.8 - 178.8') 16.0" Borehole		
171							
172		Topock - Alluvium Deposits	SM				
173					(167.1 - 172.8') Sump and PVC End Cap		
174	IRZ-17-VAS-172-177 (<0.17 U ppb) 3/5/2019 14:50						
175							
176							
177							
178							
179					(177.5 - 192.0') Bentonite seal pellets Pel-Plug (TR30) 3/8"	(177.5 - 192.0') 32.4 buckets	(177.5 - 192.0') 33 buckets (102%) Note: Decommissioned rathole
180					(178.8 - 192.0') 15.5" Borehole		

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WELL CONSTRUCTION DETAILS_PG&E_TOPOCK_DRAFT BORING LOGS\GINT FILES\52720\TOPOCK DATABASE FOR PLOG.GPJ_TOPOCK DATA TEMPLATE FOR PLOG.GDT_05/27/20 14:07

Date Started: 11/05/2019	Surface Elevation: 480.26 ft amsl	Well ID: IRZ-17
Date Completed: 11/19/2019	Shallow Well Elevation: N/A	
Drilling Co.: Cascade	Deep Well Elevation: N/A	Client: PG&E
Drilling Method: Dual Rotary	Northing (NAD83): 2103000.19	Project: Final GW Remedy Phase 1
Driller Name: Jon Martinez	Easting (NAD83): 7615871.28	Location: PG&E Topock, Needles, California
Drilling Asst: A. & H. Amezguita	Borehole Diameter: 16-18 inches	
Logger: K. Keon / E. Redner	Static Water Level: See Log for Depths	Project Number: RC000753.0051
Editor: Sean McGrane	Development End Date: 1/24/2020	
Total Depth: 192 ft bgs	Well Completion: <input type="checkbox"/> Flush <input type="checkbox"/> Stick-up <input checked="" 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	
181		Topock - Alluvium Deposits	SM					
182								
183		Topock - Alluvium Deposits	ML					
184								
185		Topock - Alluvium Deposits	SM		(177.5 - 192.0') Bentonite seal pellets Pel-Plug (TR30) 3/8"	(178.8 - 192.0') 15.5" Borehole	(177.5 - 192.0') 32.4 buckets	(177.5 - 192.0') 33 buckets (102%) Note: Decommissioned rathole
186								
187		Topock - Alluvium Deposits	ML					
188								
189		Topock - Alluvium Deposits	ML					
190								
191								
192								

193					End of Boring at 192.0 ft bgs.		
194							
195							
196							
197							
198							
199							
200							



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WELL CONSTRUCTION DETAILS_PG&E_TOPOCK_TOPOCKDRAFT BORING LOGS\GINT FILES\052720\TOPOCK DATABASE FOR PLOG.GPJ_TOPOCK DATA TEMPLATE FOR PLOG.GDT_05/27/20 14:07