

Date Started: 01/29/2020	Surface Elevation: 501.24 ft amsl	Well ID: IRZ-27
Date Completed: 02/07/2020	Shallow Well Elevation: N/A	
Drilling Co.: Cascade	Deep Well Elevation: N/A	Client: PG&E
Drilling Method: Dual Rotary	Northing (NAD83): 2102236.81	Project: Final GW Remedy Phase 1
Driller Name: Jon Martinez	Easting (NAD83): 7615803.14	Location: PG&E Topock, Needles, California
Drilling Asst: A. & H. Amezguita	Borehole Diameter: 16-18 inches	
Logger: E. Redner / D. Cornell	Static Water Level: See Log for Depths	Project Number: RC000753.0051
Editor: Sean McGrane	Development End Date: 3/7/2020	
Total Depth: 144.3 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 - 52.0') 10" SHUR-GRIP SDR17 PVC Casing		
2		Topock - Fill	SM		(0.0 - 4.0') Cemex #60 Mesh (40x70) Lapis Lustre Sand	(0.0 - 4.0') 9.8 bags	(0.0 - 4.0') 9 bags (92%) Note: Temporary backfill sand to fill annular space prior to vault installation.
3							
4							
5		Topock - Fluvial Deposits	SW				
6		Topock - Fluvial Deposits	SW-SM				
7		Topock - Fluvial Deposits	SW-SM				
8		Topock - Fluvial Deposits	GP				
9		Topock - Fluvial Deposits	SC				
10		Topock - Fluvial Deposits	SW		(9.5 - 10.5') Centralizer		
11		Topock - Fluvial Deposits	GW-GM		(4.0 - 40.9') Portland Cement 3% Bentonite Type I, II and V with Hydrogel		
12		Topock - Fluvial Deposits	GP			(4.0 - 40.9') 337.3 gallons	(4.0 - 40.9') 354 gallons (105%) Note: Grout seal
13		Topock - Fluvial Deposits	SM				
14							
15		Topock - Fluvial Deposits	SW-SM				
16							
17		Topock - Fluvial Deposits	GW-GC				
18		Topock - Fluvial Deposits	GW-GM				
19		Topock - Fluvial Deposits	GM				
20							

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Driller Name: Jon Martinez	Easting (NAD83): 7615803.14	Location: PG&E Topock, Needles, California
Drilling Asst: A. & H. Amezcuita	Borehole Diameter: 16-18 inches	
Logger: E. Redner / D. Cornell	Static Water Level: See Log for Depths	Project Number: RC000753.0051
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21		Topock - Fluvial Deposits	GM		(0.0 - 52.0') 10" SHUR-GRIP SDR17 PVC Casing		
22		Topock - Fluvial Deposits	GW-GM				
23						(20.6 - 25.0') 18.0" Borehole	
24		Topock - Fluvial Deposits	SW-SM				
25							
26							
27							
28		Topock - Alluvium Deposits	SM		(4.0 - 40.9') Portland Cement 3% Bentonite Type I, II and V with Hydrogel	(4.0 - 40.9') 337.3 gallons	(4.0 - 40.9') 354 gallons (105%) Note: Grout seal
29							
30							
31		Topock - Alluvium Deposits	SM			(25.0 - 41.0') 18.0" Borehole	
32							
33							
34		Topock - Alluvium Deposits	SM				
35							
36							
37							
38							
39							
40							

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Drilling Co.: Cascade	Deep Well Elevation: N/A	Client: PG&E
Drilling Method: Dual Rotary	Northing (NAD83): 2102236.81	Project: Final GW Remedy Phase 1
Driller Name: Jon Martinez	Easting (NAD83): 7615803.14	Location: PG&E Topock, Needles, California
Drilling Asst: A. & H. Amezguita	Borehole Diameter: 16-18 inches	
Logger: E. Redner / D. Cornell	Static Water Level: See Log for Depths	Project Number: RC000753.0051
Editor: Sean McGrane	Development End Date: 3/7/2020	
Total Depth: 144.3 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					(0.0 - 52.0') 10" SHUR-GRIP SDR17 PVC Casing	(4.0 - 40.9') 337.3 gallons	(4.0 - 40.9') 354 gallons (105%) Note: Grout seal
42		Topock - Alluvium Deposits	SM		(40.9 - 43.9') Cemex #60 Mesh (40x70) Lapis Lustre Sand	(40.9 - 43.9') 5.1 bags	(40.9 - 43.9') 6 bags (118%) Note: Transition sand
43							
44							
45		Topock - Alluvium Deposits	SM				
46							
47							
48		Topock - Alluvium Deposits	ML				
49							
50					(49.5 - 50.5') Centralizer		
51						(41.0 - 60.2') 16.0" Borehole	
52					(43.9 - 69.1') Cemex #0/30 Mesh (30x50) Lapis Lustre Sand	(43.9 - 69.1') 42.7 bags	(43.9 - 69.1') 51 bags (119%) Note: Filter pack, swabbed filter pack for approximately 60 minutes.
53		Topock - Alluvium Deposits	GM		(52.0 - 67.0') 10" 10-Slot 316L SS Wire Wrap Screen		
54	IRZ-27-VAS-52-57-EB (4400 ppb) 3/15/2019 16:15						
55							
56							
57							
58		Topock - Alluvium Deposits	SM				
59							
60							

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Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Dual Rotary	Northing (NAD83):	2102236.81	Project: Final GW Remedy Phase 1
Driller Name:	Jon Martinez	Easting (NAD83):	7615803.14	Location: PG&E Topock, Needles, California
Drilling Asst:	A. & H. Amezguita	Borehole Diameter:	16-18 inches	
Logger:	E. Redner / D. Cornell	Static Water Level:	See Log for Depths	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	3/7/2020	
Total Depth:	144.3 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-27-VAS-72-77 (<0.033 U ppb) 3/17/2019 13:15	Topock - Alluvium Deposits	SM		(52.0 - 67.0') 10" 10-Slot 316L SS Wire Wrap Screen		
62		Topock - Alluvium Deposits	GM				
63		Topock - Alluvium Deposits	SM				
64		Topock - Alluvium Deposits	SM		(43.9 - 69.1') Cemex #0/30 Mesh (30x50) Lapis Lustre Sand	(43.9 - 69.1') 42.7 bags	(43.9 - 69.1') 51 bags (119%) Note: Filter pack, swabbed filter pack for approximately 60 minutes.
65		Topock - Alluvium Deposits	SM				
66		Topock - Alluvium Deposits	SM				
67	IRZ-27-VAS-72-77 (<0.033 U ppb) 3/17/2019 13:15	Topock - Alluvium Deposits	SW-SM		(67.0 - 77.0') 10" SHUR-GRIP SDR17 PVC Casing		
68		Topock - Alluvium Deposits	SW-SM				
69		Topock - Alluvium Deposits	SM		(69.5 - 70.5') Centralizer (69.1 - 72.9') Bentonite seal pellets Pel-Plug (TR30) 3/8"	(69.1 - 72.9') 5.2 buckets	(69.1 - 72.9') 6.5 buckets (125%) Note: Intermediate seal, used >20% of the calculated volume due to potential voids forming during drilling.
70		Topock - Alluvium Deposits	SM		(60.2 - 79.4') 16.0" Borehole		
71		Topock - Alluvium Deposits	SM		(72.9 - 74.1') Cemex #0/30 Mesh (30x50) Lapis Lustre Sand	(72.9 - 74.1') 2 bags	(72.9 - 74.1') 3 bags (150%) Note: Transition sand, used >20% of the calculated volume due to potential voids forming during drilling.
72		Topock - Alluvium Deposits	SM				
73	IRZ-27-VAS-72-77 (<0.033 U ppb) 3/17/2019 13:15	Topock - Alluvium Deposits	SM		(74.1 - 103.3') Cemex #2/16 Mesh (16x30) Lapis Lustre Sand	(74.1 - 103.3') 49.7 bags	(74.1 - 103.3') 70 bags (141%) Note: Filter pack, used >20% of the calculated volume due to potential voids forming during drilling. Swabbed filter pack for approximately 110 minutes.
74		Topock - Alluvium Deposits	SM				
75		Topock - Alluvium Deposits	SM				
76		Topock - Alluvium Deposits	SM				
77		Topock - Alluvium Deposits	SM		(77.0 - 99.9') 10" 20-Slot 316L SS Wire Wrap Screen		
78		Topock - Alluvium Deposits	SM				
79	IRZ-27-VAS-72-77 (<0.033 U ppb) 3/17/2019 13:15	Topock - Alluvium Deposits	SM		(79.4 - 99.5') 16.0" Borehole		
80		Topock - Alluvium Deposits	SM				

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Driller Name: Jon Martinez	Easting (NAD83): 7615803.14	Location: PG&E Topock, Needles, California
Drilling Asst: A. & H. Amezcuita	Borehole Diameter: 16-18 inches	
Logger: E. Redner / D. Cornell	Static Water Level: See Log for Depths	Project Number: RC000753.0051
Editor: Sean McGrane	Development End Date: 3/7/2020	
Total Depth: 144.3 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	SM				
82		Topock - Alluvium Deposits	SM				
83		Topock - Alluvium Deposits	SW-SM				
84		Topock - Alluvium Deposits	SW				
85							
86		Topock - Alluvium Deposits	SM				
87							
88							
89		Topock - Alluvium Deposits	SM				
90					(74.1 - 103.3') Cemex #2/16 Mesh (16x30) Lapis Lustre Sand	(74.1 - 103.3') 49.7 bags	(74.1 - 103.3') 70 bags (141%) Note: Filter pack, used >20% of the calculated volume due to potential voids forming during drilling. Swabbed filter pack for approximately 110 minutes.
91							
92							
93		Topock - Alluvium Deposits	SM				
94							
95							
96							
97							
98		Topock - Alluvium Deposits	SM				
99							
100		Topock - Alluvium Deposits	SM				
					(99.5 - 119.3') 16.0" Borehole		

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Drilling Method:	Dual Rotary	Northing (NAD83):	2102236.81	Project: Final GW Remedy Phase 1
Driller Name:	Jon Martinez	Easting (NAD83):	7615803.14	Location: PG&E Topock, Needles, California
Drilling Asst:	A. & H. Amezguita	Borehole Diameter:	16-18 inches	
Logger:	E. Redner / D. Cornell	Static Water Level:	See Log for Depths	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	3/7/2020	
Total Depth:	144.3 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
101	IRZ-27-VAS-102-107 (<0.17 U ppb) 3/18/2019 16:10	Topock - Alluvium Deposits	SM		(99.9 - 114.9') 10" SHUR-GRIP SDR17 PVC Casing		
102					(74.1 - 103.3') Cemex #2/16 Mesh (16x30) Lapis Lustre Sand	(74.1 - 103.3') 49.7 bags	(74.1 - 103.3') 70 bags (141%) Note: Filter pack, used $>20\%$ of the calculated volume due to potential voids forming during drilling. Swabbed filter pack for approximately 110 minutes.
103					(103.3 - 104.0') Cemex #0/30 Mesh (30x50) Lapis Lustre Sand	(103.3 - 104.0') 1.2 bags	(103.3 - 104.0') 2 bags (167%) Note: Transition sand, used $>20\%$ of the calculated volume due to potential voids forming during drilling.
104					(105.0 - 106.0') Centralizer (104.0 - 108.3') Bentonite seal pellets Pel-Plug (TR30) 3/8"	(104.0 - 108.3') 5.8 buckets	(104.0 - 108.3') 6.5 buckets (112%) Note: Intermediate seal
105		Topock - Alluvium Deposits	SM		(99.5 - 119.3') 16.0" Borehole		
106							
107							
108							
109							
110							
111							
112							
113							
114							
115							
116							
117							
118							
119							
120							
		Topock - Alluvium Deposits	SC		(108.3 - 144.3') Cemex #60 Mesh (40x70) Lapis Lustre Sand	(108.3 - 144.3') 63.3 bags	(108.3 - 144.3') 62.5 bags (99%) Note: Filter pack. Approximately 26.74 ft of sand was observed in the well casing after installation which entered the well through upper screens. Sand was air lifted out using ~1992 gallons of water with ~2154 gallons returned. Ran alignment test.
					(114.9 - 136.8') 10" 8-Slot 316L SS Wire Wrap Screen		
					(119.3 - 138.9') 16.0" Borehole		


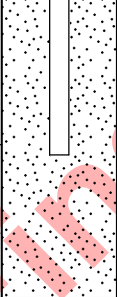
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Driller Name:	Jon Martinez	Easting (NAD83):	7615803.14	Location: PG&E Topock, Needles, California
Drilling Asst:	A. & H. Amezcuita	Borehole Diameter:	16-18 inches	
Logger:	E. Redner / D. Cornell	Static Water Level:	See Log for Depths	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	3/7/2020	
Total Depth:	144.3 ft bgs	Well Completion:	<input type="checkbox"/> Flush <input type="checkbox"/> Stick-up <input checked="" type="checkbox"/> To Be Completed in Well Vault	

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121		Topock - Alluvium Deposits	SC		(114.9 - 136.8') 10" 8-Slot 316L SS Wire Wrap Screen		
122							
123		Topock - Competent Bedrock - conglomerate					
124							
125							
126							
127		Topock - Weathered Bedrock - conglomerate	SM				
128							
129							
130					(108.3 - 144.3') Cemex #60 Mesh (40x70) Lapis Lustre Sand	(108.3 - 144.3') 63.3 bags	(108.3 - 144.3') 62.5 bags (99%) Note: Filter pack. Approximately 26.74 ft of sand was observed in the well casing after installation which entered the well through upper screens. Sand was air lifted out using ~1992 gallons of water with ~2154 gallons returned. Ran alignment test.
131							
132							
133	IRZ-27-VAS-132-137 (1300 ppb) 3/20/2019 15:30	Topock - Competent Bedrock - conglomerate					
134							
135							
136							
137							
138		Topock - Weathered Bedrock - conglomerate	GW-GM				
139							
140					(139.0 - 140.0') Centralizer		
					(138.9 - 144.3') 16.0" Borehole		

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Drilling Asst:	A. & H. Amezguita	Borehole Diameter:	16-18 inches	
Logger:	E. Redner / D. Cornell	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
141		Topock - Weathered Bedrock - conglomerate	GW-GM		(136.8 - 142.3') Sump and SS End Cap		(138.9 - 144.3') 16.0" Borehole	(108.3 - 144.3') 63.3 bags	(108.3 - 144.3') 62.5 bags (99%) Note: Filter pack. Approximately 26.74 ft of sand was observed in the well casing after installation which entered the well through upper screens. Sand was air lifted out using ~1992 gallons of water with ~2154 gallons returned. Ran alignment test.
142					(108.3 - 144.3') Cemex #60 Mesh (40x70) Lapis Lustre Sand				
143					End of Boring at 144.3 ft bgs.				
144									
145									
146									
147									
148									
149									
150									
151									
152									
153									
154									
155									
156									
157									
158									
159									
160									

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Drilling Log

Date Started:	01/24/2020	Surface Elevation:	501.24 ft amsl	Boring No.: <u>IRZ-27</u>	
Date Completed:	01/27/2020	Northing (NAD83):	2102236.81		
Drilling Co.:	Cascade	Easting (NAD83):	7615803.14	Client:	PG&E
Drilling Method:	Dual Rotary	Total Depth:	144.3 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Foremost DR-24HD	Conductor Casing Diameter:	18 inches	Location:	PG&E Topock, Needles,
Driller Name:	Jon Martinez	Drill Casing Diameter:	16 inches		California
Drilling Asst:	A. & H. Amezguita	Drill Bit:	15 5/8" & 17 5/8" Tricone	Project Number:	RC000753.0051
Tool-Pusher:	A. Lamon	Depth to First Water:	47.2 ft bgs		
Rig Geologist:	E. Redner / D. Cornell	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		


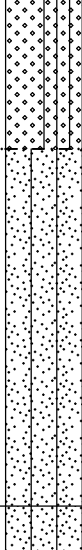
Depth (ft)	Drilling Run (ft) and Average Penetration Rate	USCS Code	USCS Class	Casing Diameter	Description (See Pilot boring log for full geologic descriptions)	Drilling notes and observations confirming presence of temporary backfill material in drill cuttings	Drilling Fluid
1					(0.0 - 5.0') Topock - Fill; Silty sand (SM); yellowish brown / moderate yellowish brown (10YR 5/4)		(0.0 - 20.6') 400 gallons of water used; 150 gallons of water recovered; 250 gallons of water lost
2						(2.0 - 20.5') Rough/hard drilling	
3		SM				(3.0') Observed trace to some amounts of Plastering Sand in drill cuttings.	
4							
5		SW			(5.0 - 5.5') Topock - Fluvial Deposits; Well graded sand with gravel (SW); brown (10YR 4/3)		
6		SW-SM			(5.5 - 6.5') Topock - Fluvial Deposits; Well graded sand with gravel (SW-SM); dark yellowish brown (10YR 4/4) to brown (10YR 4/3)		
7		SW-SM			(6.5 - 7.0') Topock - Fluvial Deposits; Well graded sand with gravel (SW-SM); dark yellowish brown (10YR 4/4)		
8		GP			(7.0 - 9.0') Topock - Fluvial Deposits; Poorly graded gravel (GP); weak red (2.5YR 5/2) to pale brown (10YR 6/3)		
9		SC			(9.0 - 9.5') Topock - Fluvial Deposits; Clayey sand with gravel (SC); dark yellowish brown (10YR 4/4)		
10	(0.0 - 20.6) 10.26 mins/ft	SW		(0.0 - 20.6') 18.0" Steel Casing	(9.5 - 10.8') Topock - Fluvial Deposits; Well graded sand with gravel (SW); brown (10YR 5/3)	(10.0') Observed trace amounts of Cal-Silica 1/4"-3/8" Pea Gravel in drill cuttings.	
11		GW-GM			(10.8 - 12.0') Topock - Fluvial Deposits; Well graded gravel with silt and sand (GW-GM); grayish brown (10YR 5/2)		
12		GP			(12.0 - 13.0') Topock - Fluvial Deposits; Poorly graded gravel (GP); gray (10YR 5/1)		
13		SM			(13.0 - 14.5') Topock - Fluvial Deposits; Silty sand with gravel (SM); brown (7.5YR 5/3)		
14					(14.5 - 17.0') Topock - Fluvial Deposits; Well graded sand with silt and gravel (SW-SM); brown (10YR 5/3)		
15		SW-SM			(17.0 - 18.5') Topock - Fluvial Deposits; Well graded gravel with clay and sand (GW-GC); brown (7.5YR 4/4)		
16					(18.5 - 19.5') Topock - Fluvial Deposits; Well graded gravel with silt and sand (GW-GM); dark grayish brown / dark yellowish brown (10YR 4/2)		
17		GW-GC					
18		GW-GM					
19		GM					
20							

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Drilling Log

Sheet: 2 of 8

Date Started:	01/24/2020	Surface Elevation:	501.24 ft amsl	Boring No.: <u>IRZ-27</u>	
Date Completed:	01/27/2020	Northing (NAD83):	2102236.81		
Drilling Co.:	Cascade	Easting (NAD83):	7615803.14	Client:	PG&E
Drilling Method:	Dual Rotary	Total Depth:	144.3 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Foremost DR-24HD	Conductor Casing Diameter:	18 inches	Location:	PG&E Topock, Needles,
Driller Name:	Jon Martinez	Drill Casing Diameter:	16 inches		California
Drilling Asst:	A. & H. Amezguita	Drill Bit:	15 5/8" & 17 5/8" Tricone	Project Number:	RC000753.0051
Tool-Pusher:	A. Lamon	Depth to First Water:	47.2 ft bgs		
Rig Geologist:	E. Redner / D. Cornell	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		


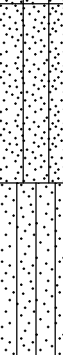



Depth (ft)	Drilling Run (ft) and Average Penetration Rate	USCS Code	USCS Class	Casing Diameter	Description (See Pilot boring log for full geologic descriptions)	Drilling notes and observations confirming presence of temporary backfill material in drill cuttings	Drilling Fluid	
21	(20.6 - 25.0) 15.57 mins/ft	GM		(20.6 - 25.0') 18.0" Steel Casing	(19.5 - 21.0') Topock - Fluvial Deposits; Silty gravel with sand (GM); grayish brown (10YR 5/2) to dark grayish brown / dark yellowish brown (10YR 4/2)	(20.0') Observed trace amounts of Cal-Silica 1/4"-3/8" Pea Gravel in drill cuttings.	(20.6 - 25.0') 133 gallons of water used; 30 gallons of water recovered; 103 gallons of water lost	
22		GW-GM			(21.0 - 22.0') Topock - Fluvial Deposits; Well graded gravel with silt and sand (GW-GM); brown (7.5YR 5/3) to brown (7.5YR 4/3)	(20.5 - 25.0') Rough/hard drilling. Stopped at approximately 25 ft bgs due to hardness and lack of advancement.		
23		SW-SM			(22.0 - 27.0') Topock - Fluvial Deposits; Well graded sand with silt and gravel (SW-SM); dark yellowish brown (10YR 4/4) to brown (10YR 5/3)			
24								
25	(25.0 - 41.0) 14.31 mins/ft	SM		(25.0 - 41.0') 18.0" Steel Casing	(27.0 - 32.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 4/4) with brown (7.5YR 5/2)	(25.0 - 41.0') Rough/hard drilling, driller's use magnet to check cuttings for metal shavings coming off of downhole equipment. Observations of metal shavings in cuttings was not documented in notes.	(25.0 - 41.0') 534 gallons of water used; 180 gallons of water recovered; 354 gallons of water lost	
26								
27								
28								
29								
30								
31								
32								
33					SM	(32.0 - 32.8') Topock - Alluvium Deposits; Silty sand (SM); reddish brown / moderate brown (5YR 4/4)		(30.0') Drilling not as hard. Observed trace amounts of Cal-Silica 1/4"-3/8" Pea Gravel in drill cuttings.
34					SM	(32.8 - 44.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 4/4) with brown (7.5YR 5/2)		
35								
36								
37								
38								
39								
40		(39.5') brown (10YR 5/3) to						

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Drilling Log

Sheet: 3 of 8

Date Started:	01/24/2020	Surface Elevation:	501.24 ft amsl	Boring No.: <u>IRZ-27</u>	
Date Completed:	01/27/2020	Northing (NAD83):	2102236.81		
Drilling Co.:	Cascade	Easting (NAD83):	7615803.14	Client:	PG&E
Drilling Method:	Dual Rotary	Total Depth:	144.3 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Foremost DR-24HD	Conductor Casing Diameter:	18 inches	Location:	PG&E Topock, Needles,
Driller Name:	Jon Martinez	Drill Casing Diameter:	16 inches		California
Drilling Asst:	A. & H. Amezcuita	Drill Bit:	15 5/8" & 17 5/8" Tricone	Project Number:	RC000753.0051
Tool-Pusher:	A. Lamon	Depth to First Water:	47.2 ft bgs		
Rig Geologist:	E. Redner / D. Cornell	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Drilling Run (ft) and Average Penetration Rate	USCS Code	USCS Class	Casing Diameter	Description (See Pilot boring log for full geologic descriptions)	Drilling notes and observations confirming presence of temporary backfill material in drill cuttings	Drilling Fluid		
41	(25.0 - 41.0) 14.31 mins/ft	SM		(25.0 - 41.0') 18.0" Steel Casing	pale brown (10YR 6/3)	(40.0') Observed trace amounts of Cal-Silica 1/4"-3/8" Pea Gravel in drill cuttings.	(41.0 - 60.2') 250 gallons of water used; 1400 gallons of water recovered; 1150 gallons of water gained		
42	(41.0 - 60.2) 2.77 mins/ft			SM		(41.0 - 60.2') 16.0" Steel Casing		(44.5 - 47.0') Topock - Alluvium Deposits; Silty sand (SM); brown (7.5YR 4/3)	(41.0 - 46.0') Rough/hard drilling
43									
44									
45									
46	ML		(47.0 - 49.5') Topock - Alluvium Deposits; Sandy silt with gravel (ML); brown (7.5YR 4/4)	(49.5 - 57.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); brown (7.5YR 4/3)	(50.0') Observed trace amounts of Cal-Silica 1/4"-3/8" Pea Gravel in drill cuttings.				
47									
48									
49									
50	GM		(54.5') brown (7.5YR 5/3) to brown (10YR 4/3)	(57.0 - 61.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 4/4)	(59.3 - 61.0') brown (7.5YR 4/4) and dark yellowish brown				
51									
52									
53									
54	SM		(59.3 - 61.0') brown (7.5YR 4/4) and dark yellowish brown	(59.3 - 61.0') brown (7.5YR 4/4) and dark yellowish brown	(59.3 - 61.0') brown (7.5YR 4/4) and dark yellowish brown				
55									
56									
57									
58									
59									
60									

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Date Started:	01/24/2020	Surface Elevation:	501.24 ft amsl	Boring No.: <u>IRZ-27</u>	
Date Completed:	01/27/2020	Northing (NAD83):	2102236.81		
Drilling Co.:	Cascade	Easting (NAD83):	7615803.14	Client:	PG&E
Drilling Method:	Dual Rotary	Total Depth:	144.3 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Foremost DR-24HD	Conductor Casing Diameter:	18 inches	Location:	PG&E Topock, Needles,
Driller Name:	Jon Martinez	Drill Casing Diameter:	16 inches		California
Drilling Asst:	A. & H. Amezguita	Drill Bit:	15 5/8" & 17 5/8" Tricone	Project Number:	RC000753.0051
Tool-Pusher:	A. Lamon	Depth to First Water:	47.2 ft bgs		
Rig Geologist:	E. Redner / D. Cornell	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Drilling Run (ft) and Average Penetration Rate	USCS Code	USCS Class	Casing Diameter	Description (See Pilot boring log for full geologic descriptions)	Drilling notes and observations confirming presence of temporary backfill material in drill cuttings	Drilling Fluid	
61	(60.2 - 79.4) 2.52 mins/ft	SM		(60.2 - 79.4') 16.0" Steel Casing	(10YR 4/4)	(60.0') Observed some Cal-Silica 1/4"-3/8" Pea Gravel in drill cuttings.	(60.2 - 79.4') 333 gallons of water used; 1660 gallons of water recovered; 1327 gallons of water gained	
62		GM			(61.0 - 62.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); brown (7.5YR 4/4)			
63		SM			(62.0 - 63.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 4/4) (62.75')	(62.0 - 63.0') Rough drilling		
64		SM			(63.5 - 68.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); yellowish red (5YR 4/6) to reddish brown / moderate brown (5YR 4/4) (65.25')			
65								
66								
67								
68								
69		SW-SM			(68.0 - 68.8') Topock - Alluvium Deposits; Well graded sand with silt and gravel (SW-SM); gray (5YR 5/1) to dark reddish gray (5YR 4/2)			
70		SM			(68.8 - 74.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); yellowish red (5YR 4/6) to reddish brown / moderate brown (5YR 4/4)	(70.0') Observed little to some Cal-Silica 1/4"-3/8" Pea Gravel in drill cuttings.		
71								
72								
73								
74								
75	SM		(74.0 - 75.5') Topock - Alluvium Deposits; Silty sand (SM); yellowish red (5YR 4/6) to reddish brown / moderate brown (5YR 4/4)					
76	SM		(75.5 - 82.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); yellowish red (5YR 4/6) to reddish brown / moderate brown (5YR 4/4)					
77								
78								
79								
80	(79.4 - 99.5) 1.84 mins/ft					(79.0') Observed little Cal-Silica 1/4"-3/8" Pea Gravel in drill cuttings.	(79.4 - 99.5') 317 gallons of water used;	

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Drilling Log

Sheet: 5 of 8

Date Started:	01/24/2020	Surface Elevation:	501.24 ft amsl	Boring No.: <u>IRZ-27</u>	
Date Completed:	01/27/2020	Northing (NAD83):	2102236.81		
Drilling Co.:	Cascade	Easting (NAD83):	7615803.14	Client:	PG&E
Drilling Method:	Dual Rotary	Total Depth:	144.3 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Foremost DR-24HD	Conductor Casing Diameter:	18 inches	Location:	PG&E Topock, Needles,
Driller Name:	Jon Martinez	Drill Casing Diameter:	16 inches		California
Drilling Asst:	A. & H. Amezguita	Drill Bit:	15 5/8" & 17 5/8" Tricone	Project Number:	RC000753.0051
Tool-Pusher:	A. Lamon	Depth to First Water:	47.2 ft bgs		
Rig Geologist:	E. Redner / D. Cornell	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		



Depth (ft)	Drilling Run (ft) and Average Penetration Rate	USCS Code	USCS Class	Casing Diameter	Description (See Pilot boring log for full geologic descriptions)	Drilling notes and observations confirming presence of temporary backfill material in drill cuttings	Drilling Fluid
81		SM				(80.0') Observed little Cal-Silica 1/4"-3/8" Pea Gravel in drill cuttings.	540 gallons of water recovered; 223 gallons of water gained
82		SM			(82.0 - 82.8') Topock - Alluvium Deposits; Silty sand (SM); brown (7.5YR 4/4)		
83		SW-SM			(82.8 - 83.5') Topock - Alluvium Deposits; Well graded sand with silt (SW-SM); brown (7.5YR 4/4)		
84		SW			(83.5 - 84.5') Topock - Alluvium Deposits; Well graded sand (SW); brown (7.5YR 4/4)		
85					(84.5 - 88.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (5YR 4/3) to reddish brown (5YR 5/3)		
86		SM					
87							
88							
89		SM			(88.5 - 89.5') Topock - Alluvium Deposits; Silty sand (SM); reddish brown (5YR 4/3) to reddish brown (5YR 5/3)		
90	(79.4 - 99.5) 1.84 mins/ft			(79.4 - 99.5') 16.0" Steel Casing	(89.5 - 97.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (5YR 4/3) to reddish brown (5YR 5/3)	(90.0') Observed little to some Cal-Silica 1/4"-3/8" Pea Gravel in drill cuttings.	
91							
92							
93		SM					
94							
95							
96					(95.3') reddish brown / moderate brown (5YR 4/4) to yellowish red (5YR 4/6)		
97							
98		SM			(97.0 - 98.0') Topock - Alluvium Deposits; Silty sand (SM); brown (7.5YR 4/4)		
99		SM			(98.0 - 107.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 4/4)		
100	(99.5 - 119.3)						(99.5 - 119.3') 200

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Drilling Log

Sheet: 6 of 8

Date Started:	01/24/2020	Surface Elevation:	501.24 ft amsl	Boring No.: <u>IRZ-27</u>	
Date Completed:	01/27/2020	Northing (NAD83):	2102236.81		
Drilling Co.:	Cascade	Easting (NAD83):	7615803.14	Client:	PG&E
Drilling Method:	Dual Rotary	Total Depth:	144.3 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Foremost DR-24HD	Conductor Casing Diameter:	18 inches	Location:	PG&E Topock, Needles,
Driller Name:	Jon Martinez	Drill Casing Diameter:	16 inches		California
Drilling Asst:	A. & H. Amezguita	Drill Bit:	15 5/8" & 17 5/8" Tricone	Project Number:	RC000753.0051
Tool-Pusher:	A. Lamon	Depth to First Water:	47.2 ft bgs		
Rig Geologist:	E. Redner / D. Cornell	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Drilling Run (ft) and Average Penetration Rate	USCS Code	USCS Class	Casing Diameter	Description (See Pilot boring log for full geologic descriptions)	Drilling notes and observations confirming presence of temporary backfill material in drill cuttings	Drilling Fluid
101	2.16 mins/ft	SM				(100.0') Observed little Cal-Silica 1/4"-3/8" Pea Gravel in drill cuttings.	gallons of water used; 1250 gallons of water recovered; 1050 gallons of water gained
102							
103							
104							
105							
106							
107							
108							
109							
110							
111							
112							
113							
114							
115							
116							
117							
118							
119	(119.3 - 138.9) 4.15 mins/ft	SC		(119.3 - 138.9') 16.0" Steel	(118.0 - 122.0') Topock - Alluvium Deposits; Clayey sand (SC); reddish brown / moderate brown (5YR 4/4) to yellowish red (5YR 4/6)	(118.0 - 137.0') represents water added/recovered during air-lifting of lower screen interval	(119.3 - 138.9') 633 gallons of water used;
120							

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Date Started:	01/24/2020	Surface Elevation:	501.24 ft amsl	Boring No.: <u>IRZ-27</u>	
Date Completed:	01/27/2020	Northing (NAD83):	2102236.81		
Drilling Co.:	Cascade	Easting (NAD83):	7615803.14	Client:	PG&E
Drilling Method:	Dual Rotary	Total Depth:	144.3 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Foremost DR-24HD	Conductor Casing Diameter:	18 inches	Location:	PG&E Topock, Needles,
Driller Name:	Jon Martinez	Drill Casing Diameter:	16 inches		California
Drilling Asst:	A. & H. Amezguita	Drill Bit:	15 5/8" & 17 5/8" Tricone	Project Number:	RC000753.0051
Tool-Pusher:	A. Lamon	Depth to First Water:	47.2 ft bgs		
Rig Geologist:	E. Redner / D. Cornell	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		


Depth (ft)	Drilling Run (ft) and Average Penetration Rate	USCS Code	USCS Class	Casing Diameter	Description (See Pilot boring log for full geologic descriptions)	Drilling notes and observations confirming presence of temporary backfill material in drill cuttings	Drilling Fluid
121		SC		Casing		(120.0') Observed little Cal-Silica 1/4"-3/8" Pea Gravel in drill cuttings.	5851 gallons of water recovered; 5218 gallons of water gained
122					(122.0' - 124.5') Topock - Competent Bedrock - conglomerate; reddish brown (2.5YR 4/4)		
123							
124							
125					(124.5' - 129.5') Topock - Weathered Bedrock - conglomerate; Silty sand (SM); reddish brown (2.5YR 4/4) to dark reddish brown (2.5YR 3/4)	(125.0' - 132.0') Rough drilling	
126							
127		SM					
128							
129							
130	(119.3 - 138.9) 4.15 mins/ft			(119.3 - 138.9') 16.0" Steel Casing	(129.5' - 137.0') Topock - Competent Bedrock - conglomerate; reddish brown (2.5YR 4/4)	(130.0') Observed little to some amounts of Cal-Silica 1/4"-3/8" Pea Gravel in drill cuttings.	
131							
132							
133							
134							
135						(135.0' - 142.0') Hard/rough drilling	
136							
137							
138					(137.0' - 144.3') Topock - Weathered Bedrock - conglomerate; Well graded gravel with silt and sand (GW-GM); reddish brown (2.5YR 4/4) to dark reddish brown (2.5YR 3/4)		
139		GW-GM					
140	(138.9 - 144.3) 2.04 mins/ft			(138.9 - 144.3') 16.0" Steel Casing			(138.9 - 144.3') 6.7 gallons of water used; 799 gallons of water

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Drilling Log

Sheet: 8 of 8

Date Started:	01/24/2020	Surface Elevation:	501.24 ft amsl	Boring No.: IRZ-27	
Date Completed:	01/27/2020	Northing (NAD83):	2102236.81		
Drilling Co.:	Cascade	Easting (NAD83):	7615803.14	Client:	PG&E
Drilling Method:	Dual Rotary	Total Depth:	144.3 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Foremost DR-24HD	Conductor Casing Diameter:	18 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Jon Martinez	Drill Casing Diameter:	16 inches	Project Number: RC000753.0051	
Drilling Asst:	A. & H. Amezguita	Drill Bit:	15 5/8" & 17 5/8" Tricone		
Tool-Pusher:	A. Lamon	Depth to First Water:	47.2 ft bgs		
Rig Geologist:	E. Redner / D. Cornell	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Drilling Run (ft) and Average Penetration Rate	USCS Code	USCS Class	Casing Diameter	Description (See Pilot boring log for full geologic descriptions)	Drilling notes and observations confirming presence of temporary backfill material in drill cuttings	Drilling Fluid
141	(138.9 - 144.3) 2.04 mins/ft	GW-GM		(138.9 - 144.3') 16.0" Steel Casing		(140.0') Observed some Cemex #3 Mesh (8x20) Lapis Luster Sand in drill cuttings.	recovered; 792.3 gallons of water gained
142							
143							
144							
End of Boring at 144.3 ft bgs.							
145	<div>Final 12/8/20</div>						
146							
147							
148							
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

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, U = not detected above the laboratory reporting limit, Notes: blue water table symbol collected during the first VAS interval of the pilot borehole, groundwater data collected during drilling of the pilot borehole

Date Started:	03/14/2019	Surface Elevation:	501.24 ft amsl	Boring No.: <u>IRZ-27-Pilot</u>	
Date Completed:	03/20/2019	Northing (NAD83):	2102236.81		
Drilling Co.:	Cascade	Easting (NAD83):	7615803.14	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	156 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	4-12 inches	Location:	PG&E Topock, Needles,
Driller Name:	Steve Vasquez	Depth to First Water:	47.2 ft bgs		California
Drilling Asst:	O. Flores / L. Amaya	Sampling Method:	4 inch x 10 ft. Core Barrel	Project Number:	RC000753.0051
Logger:	G. Jeffers / J. Wanner	Sampling Interval:	Continuous		
Editor:	Gantt Jeffers	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
1				Topock - Fill	SM		(0.0 - 5.0') Topock - Fill; Silty sand (SM); yellowish brown / moderate yellowish brown (10YR 5/4); very fine grained to very coarse grained, angular to subround; some silt; little clay; trace granules to small pebbles, angular to subround; trace subangular; dry	(0.0 - 5.0') Hand cleared for utility clearance.	
2									
3									
4									
5				Topock - Fluvial Deposits	SW		(5.0 - 5.5') Topock - Fluvial Deposits; Well graded sand with gravel (SW); brown (10YR 4/3); very fine grained to very coarse grained, angular to round; and very fine to very coarse grained sand; little granules to very large pebbles, angular to subround; trace silt; trace clay; dry		
6	32.4			Topock - Fluvial Deposits	SW-SM		(5.5 - 6.5') Topock - Fluvial Deposits; Well graded sand with gravel (SW-SM); dark yellowish brown (10YR 4/4) to brown (10YR 4/3); very fine grained to very coarse grained, angular to round; and granules to large pebbles, angular to subround; and very fine to very coarse grained sand, subangular to subround; trace subangular to round; trace silt; trace clay; dry		
7				Topock - Fluvial Deposits	SW-SM		(6.5 - 7.0') Topock - Fluvial Deposits; Well graded sand with gravel (SW-SM); dark yellowish brown (10YR 4/4); very fine grained to very coarse grained, subangular to round; little granules to large pebbles, subangular to round; trace silt; trace clay; dry		
8				Topock - Fluvial Deposits	GP		(7.0 - 9.0') Topock - Fluvial Deposits; Poorly graded gravel (GP); weak red (2.5YR 5/2) to pale brown (10YR 6/3); small cobbles to boulders, subangular to round; trace clay; dry; boulder of gneiss has been pulverized during drilling	(7.0 - 11.0') Drilled through boulder	(7.0 - 17.0') 200 gallons of water used; 200 gallons of water recovered; 0 gallons of water lost
9				Topock - Fluvial Deposits	SC		(9.0 - 9.5') Topock - Fluvial Deposits; Clayey sand with gravel (SC); dark yellowish brown (10YR 4/4); very fine grained to very coarse grained, angular to round; some granules to very large pebbles, subangular to round; little clay; trace subround; trace silt; dry		
10				Topock - Fluvial Deposits	SW		(9.5 - 10.8') Topock - Fluvial Deposits; Well graded sand with gravel (SW); brown (10YR 5/3); very fine grained to very coarse grained, angular to round; little granules to large pebbles, subangular to round; trace silt; dry		
11				Topock - Fluvial Deposits	SM		(10.8 - 12.0') Topock - Fluvial Deposits; Well graded gravel with silt and sand (GW-GM); grayish brown (10YR 5/2); granules to very large pebbles, angular to round; little very fine to very coarse grained sand, subangular to round; little silt; trace subround to round; trace clay; dry; cobbles have been pulverized		
12	134.4			Topock - Fluvial Deposits	GW-GM		(12.0 - 13.0') Topock - Fluvial Deposits; Poorly graded gravel (GP); gray (10YR 5/1); small pebbles to boulders, subround; dry; cobbles and boulders have been pulverized by drilling		
13				Topock - Fluvial Deposits	GP		(13.0 - 14.5') Topock - Fluvial Deposits; Silty sand with gravel (SM); brown (7.5YR 5/3); very fine grained to very coarse grained, subangular to round; some granules to very large pebbles, subangular to round; little silt; little clay; trace subangular to subround; dry; cobbles have been pulverized		
14				Topock - Fluvial Deposits	SW-SM		(14.5 - 17.0') Topock - Fluvial Deposits; Well graded sand with silt and gravel (SW-SM); brown (10YR 5/3); very fine grained to very coarse grained, subangular to round; some granules to very large pebbles, subangular to round; little silt; trace subangular to subround; trace clay; dry		
15				Topock - Fluvial Deposits	SM		(17.0 - 18.5') Topock - Fluvial Deposits; Well graded gravel with clay and sand (GW-GC); brown (7.5YR 4/4); granules to very large pebbles, subangular to round; little very fine to very coarse		
16				Topock - Fluvial Deposits	SW-SM				
17				Topock - Fluvial Deposits	GW-GC				
18				Topock - Fluvial Deposits	GW-GM				
19	60			Topock - Fluvial Deposits	GW-GM				
20				Topock - Fluvial Deposits	GM				(17.0 - 127.0') No used

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Date Started:	03/14/2019	Surface Elevation:	501.24 ft amsl	Boring No.: IRZ-27-Pilot	
Date Completed:	03/20/2019	Northing (NAD83):	2102236.81		
Drilling Co.:	Cascade	Easting (NAD83):	7615803.14	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	156 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	4-12 inches	Location:	PG&E Topock, Needles,
Driller Name:	Steve Vasquez	Depth to First Water:	47.2 ft bgs		California
Drilling Asst:	O. Flores / L. Amaya	Sampling Method:	4 inch x 10 ft. Core Barrel	Project Number:	RC000753.0051
Logger:	G. Jeffers / J. Wanner	Sampling Interval:	Continuous		
Editor:	Gantt Jeffers	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
21	60			Topock - Fluvial Deposits	GM		grained sand, angular to subround; little silt; trace subangular to subround; trace clay; dry		
22				Topock - Fluvial Deposits	GW-GM		(18.5 - 19.5') Topock - Fluvial Deposits; Well graded gravel with silt and sand (GW-GM); dark grayish brown / dark yellowish brown (10YR 4/2); granules to very large pebbles, subround to round; little very fine to very coarse grained sand, subangular to subround; little silt; trace subangular to subround; trace clay; trace mica; dry; fractured cobble to boulder fragments, larger clasts consist of metadiorite		
23				Topock - Fluvial Deposits	SW-SM		(19.5 - 21.0') Topock - Fluvial Deposits; Silty gravel with sand (GM); grayish brown (10YR 5/2) to dark grayish brown / dark yellowish brown (10YR 4/2); granules to very large pebbles, angular to subangular; some fine to medium grained sand, angular to subangular; little silt; little clay; trace angular; trace mica; dry; trace coarse to very coarse sand, larger clasts consist of metadiorite		
24	66						(21.0 - 22.0') Topock - Fluvial Deposits; Well graded gravel with silt and sand (GW-GM); brown (7.5YR 5/3) to brown (7.5YR 4/3); granules to very large pebbles, angular to subround; little silt; trace angular to subround; trace clay; little fractured cobble and boulder fragments		
25							(22.0 - 27.0') Topock - Fluvial Deposits; Well graded sand with silt and gravel (SW-SM); dark yellowish brown (10YR 4/4) to brown (10YR 5/3); very fine grained to very coarse grained, angular to round; some granules to very large pebbles, subangular to round; little subround to round; little silt; dry; little fractured cobble and boulder fragments, larger clasts consist of metadiorite		
26							(27.0 - 32.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 4/4) with brown (7.5YR 5/2); very fine grained to very coarse grained, angular to subangular; some granules to large pebbles, angular to subangular; little silt; trace mica; dry; larger clasts consist of metadiorite		
27				Topock - Alluvium Deposits	SM				
28							(32.0 - 32.8') Topock - Alluvium Deposits; Silty sand (SM); reddish brown / moderate brown (5YR 4/4); some silt; possible trace pyrite which is subangular, very fine to medium		
29	70.8			Topock - Alluvium Deposits	SM		(32.8 - 44.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 4/4) with brown (7.5YR 5/2); very fine grained to very coarse grained, angular to subangular; little granules to very large pebbles, angular to subangular; little silt; increase in granule and pebbles, color change		
30									
31									
32									
33				Topock - Alluvium Deposits	SM				
34	93.6								
35									
36									
37				Topock - Alluvium Deposits	SM				
38									
39	123.6								
40							(39.5') brown (10YR 5/3) to pale brown (10YR 6/3); some silt		

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Date Started:	03/14/2019	Surface Elevation:	501.24 ft amsl	Boring No.: IRZ-27-Pilot	
Date Completed:	03/20/2019	Northing (NAD83):	2102236.81		
Drilling Co.:	Cascade	Easting (NAD83):	7615803.14	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	156 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	4-12 inches	Location:	PG&E Topock, Needles,
Driller Name:	Steve Vasquez	Depth to First Water:	47.2 ft bgs		California
Drilling Asst:	O. Flores / L. Amaya	Sampling Method:	4 inch x 10 ft. Core Barrel	Project Number:	RC000753.0051
Logger:	G. Jeffers / J. Wanner	Sampling Interval:	Continuous		
Editor:	Gantt Jeffers	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
41									
42				Topock - Alluvium Deposits	SM				
43	123.6								
44									
45				Topock - Alluvium Deposits	SM		(44.5 - 47.0') Topock - Alluvium Deposits; Silty sand (SM); brown (7.5YR 4/3); very fine grained to very coarse grained, angular; some granules to very large pebbles, angular to subangular; little silt; trace		
46									
47				Topock - Alluvium Deposits	ML		(47.0 - 49.5') Topock - Alluvium Deposits; Sandy silt with gravel (ML); brown (7.5YR 4/4); low plasticity, no dilatency; some fine to medium grained sand, angular to subangular; little granules to very large pebbles, angular to subround; little clay; moist; stiff to very stiff; no staining; trace coarse to very coarse sand, larger clasts consist of meta-diorite.		
48									
49		IRZ-27-SS-47.0-52.0 3/21/2019 13:44							
50							(49.5 - 57.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); brown (7.5YR 4/3); granules to very large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subround; little silt; trace mica; dry; larger clasts consider of metadiorite		
51								(50.0') Approximate depth to water	
52	116.4			Topock - Alluvium Deposits	GM				
53									
54		IRZ-27-SS-52.01-57.0 3/21/2019 13:48	IRZ-27-VAS-52-57-EB (4400 ppb) 3/15/2019 16:15				(54.5') brown (7.5YR 5/3) to brown (10YR 4/3); color change		
55									
56									
57									
58	60	IRZ-27-SS-57.0-62.0 3/21/2019 13:50		Topock - Alluvium Deposits	SM		(57.0 - 61.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 4/4); very fine grained to very coarse grained, angular to subangular; some silt; little granules to very large pebbles, angular to subangular; trace angular; trace mica; moist; blocky; weak cementation; larger clasts consist of metadiorite		
59									
60							(59.3 - 61.0') brown (7.5YR 4/4) and dark yellowish brown (10YR 4/4); little clay; dry; mottling		

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Date Started:	03/14/2019	Surface Elevation:	501.24 ft amsl	Boring No.: IRZ-27-Pilot	
Date Completed:	03/20/2019	Northing (NAD83):	2102236.81		
Drilling Co.:	Cascade	Easting (NAD83):	7615803.14	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	156 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	4-12 inches	Location:	PG&E Topock, Needles,
Driller Name:	Steve Vasquez	Depth to First Water:	47.2 ft bgs		California
Drilling Asst:	O. Flores / L. Amaya	Sampling Method:	4 inch x 10 ft. Core Barrel	Project Number:	RC000753.0051
Logger:	G. Jeffers / J. Wanner	Sampling Interval:	Continuous		
Editor:	Gantt Jeffers	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
61	60	IRZ-27-SS-57.0-62.0 3/21/2019 13:50		Topock - Alluvium Deposits	SM				
62				Topock - Alluvium Deposits	GM		(61.0 - 62.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); brown (7.5YR 4/4); granules to very large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subround; some silt; dry; weak cementation; larger clasts consist of metadiorite		
63				Topock - Alluvium Deposits	SM		(62.0 - 63.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 4/4); very fine grained to very coarse grained, angular to subangular; little granules to medium pebbles, angular to subangular; little clay; dry; blocky; weak cementation; larger clasts consist of metadiorite		
64				Topock - Alluvium Deposits	SM		(62.75') trace clay; moist to wet; increase in sand, decrease in silt		
65							(63.5 - 68.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); yellowish red (5YR 4/6) to reddish brown / moderate brown (5YR 4/4); very fine grained to very coarse grained, angular to subangular; little granules to large pebbles, subangular to subround; little silt; wet; larger clasts consist of metadiorite (65.25'); some silt; trace angular		
66									
67									
68				Topock - Alluvium Deposits	SW-SM		(68.0 - 68.8') Topock - Alluvium Deposits; Well graded sand with silt and gravel (SW-SM); gray (5YR 5/1) to dark reddish gray (5YR 4/2); very fine grained to very coarse grained, angular; and granules to very large pebbles, angular to subangular; trace angular; trace silt; trace clay; wet; larger clasts consist of metadiorite		
69	180	IRZ-27-SS-67-72 4/3/2019 14:04							
70									
71				Topock - Alluvium Deposits	SM		(68.8 - 74.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); yellowish red (5YR 4/6) to reddish brown / moderate brown (5YR 4/4); very fine grained to very coarse grained, angular to subangular; little granules to very large pebbles, subround; little silt; trace subangular; trace clay; wet; moderate cementation; trace very large pebbles		
72									
73									
74		IRZ-27-SS-72-77 4/3/2019 16:09	IRZ-27-VAS-72-77 (<0.033 U ppb) 3/17/2019 13:15	Topock - Alluvium Deposits	SM		(74.0 - 75.5') Topock - Alluvium Deposits; Silty sand (SM); yellowish red (5YR 4/6) to reddish brown / moderate brown (5YR 4/4); very fine grained to very coarse grained, angular to subround; little granules to very large pebbles, angular; little silt; trace clay; wet		
75									
76									
77							(75.5 - 82.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); yellowish red (5YR 4/6) to reddish brown / moderate brown (5YR 4/4); very fine grained to very coarse grained, angular to subangular; some granules to very large pebbles, angular to subangular; little silt; trace angular; trace mica; wet		
78	235.2	IRZ-27-SS-77-82 4/3/2019 16:11		Topock - Alluvium Deposits	SM				
79									
80									

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Date Started:	03/14/2019	Surface Elevation:	501.24 ft amsl	Boring No.: IRZ-27-Pilot	
Date Completed:	03/20/2019	Northing (NAD83):	2102236.81		
Drilling Co.:	Cascade	Easting (NAD83):	7615803.14	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	156 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	4-12 inches	Location:	PG&E Topock, Needles,
Driller Name:	Steve Vasquez	Depth to First Water:	47.2 ft bgs		California
Drilling Asst:	O. Flores / L. Amaya	Sampling Method:	4 inch x 10 ft. Core Barrel	Project Number:	RC000753.0051
Logger:	G. Jeffers / J. Wanner	Sampling Interval:	Continuous		
Editor:	Gantt Jeffers	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
81		IRZ-27-SS-77-82 4/3/2019 16:11		Topock - Alluvium Deposits	SM				
82				Topock - Alluvium Deposits	SM		(82.0 - 82.8') Topock - Alluvium Deposits; Silty sand (SM); brown (7.5YR 4/4); very fine grained to very coarse grained, angular to subangular; little granules to medium pebbles, angular; little silt; trace angular; trace clay; wet		
83				Topock - Alluvium Deposits	SW-SM		(82.8 - 83.5') Topock - Alluvium Deposits; Well graded sand with silt (SW-SM); brown (7.5YR 4/4); very fine grained to very coarse grained, angular to subangular; little granules to very large pebbles, angular to subangular; little silt; wet; includes a very large pebble of conglomerate having angular aggregate to 9mm and strong cementation		
84		IRZ-27-SS-82-87 4/3/2019 16:17		Topock - Alluvium Deposits	SW				
85									
86				Topock - Alluvium Deposits	SM		(83.5 - 84.5') Topock - Alluvium Deposits; Well graded sand (SW); brown (7.5YR 4/4); very fine grained to very coarse grained, angular to subangular; trace granules to very large pebbles, angular to subangular; trace silt; wet		
87							(84.5 - 88.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (5YR 4/3) to reddish brown (5YR 5/3); very fine grained to very coarse grained, angular to subangular; some silt; little granules to very large pebbles, angular; trace clay; wet		
88	235.2								
89		IRZ-27-SS-87-92 4/3/2019 16:22		Topock - Alluvium Deposits	SM		(88.5 - 89.5') Topock - Alluvium Deposits; Silty sand (SM); reddish brown (5YR 4/3) to reddish brown (5YR 5/3); very fine grained to very coarse grained, angular to subangular; little silt; trace large to very large pebbles, angular; wet; trace sandy silt nodules		
90							(89.5 - 97.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (5YR 4/3) to reddish brown (5YR 5/3); very fine grained to very coarse grained, angular; some granules to very large pebbles, angular to subangular; little silt; little clay; trace angular; wet		
91									
92									
93				Topock - Alluvium Deposits	SM				
94		IRZ-27-SS-92-97 4/3/2019 16:23							
95									
96							(95.3') reddish brown / moderate brown (5YR 4/4) to yellowish red (5YR 4/6); little granules to very large pebbles, angular; color change, decrease in silt, no cobbles		
97									
98		IRZ-27-SS-97-102 4/3/2019 16:07		Topock - Alluvium Deposits	SM		(97.0 - 98.0') Topock - Alluvium Deposits; Silty sand (SM); brown (7.5YR 4/4); very fine grained to very coarse grained, angular to subangular; little silt; trace granules to medium pebbles, angular		
99	122.4			Topock - Alluvium Deposits	SM		(98.0 - 107.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 4/4); very fine grained to very coarse grained, angular; little granules to very large pebbles, angular; little silt; little clay; trace small cobbles, angular; wet		
100									

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Date Started:	03/14/2019	Surface Elevation:	501.24 ft amsl	Boring No.: IRZ-27-Pilot	
Date Completed:	03/20/2019	Northing (NAD83):	2102236.81		
Drilling Co.:	Cascade	Easting (NAD83):	7615803.14	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	156 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	4-12 inches	Location:	PG&E Topock, Needles,
Driller Name:	Steve Vasquez	Depth to First Water:	47.2 ft bgs		California
Drilling Asst:	O. Flores / L. Amaya	Sampling Method:	4 inch x 10 ft. Core Barrel	Project Number:	RC000753.0051
Logger:	G. Jeffers / J. Wanner	Sampling Interval:	Continuous		
Editor:	Gantt Jeffers	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
101		IRZ-27-SS-97-102 4/3/2019 16:07							
102									
103	122.4								
104		IRZ-27-SS-102-107 4/3/2019 16:19	IRZ-27-VAS-102-107 (<0.17 U ppb) 3/18/2019 16:10	Topock - Alluvium Deposits	SM				
105									
106									
107									
108							(107.0 - 118.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 4/4) to dark yellowish brown (10YR 4/4); very fine grained to very coarse grained, angular to subround; some granules to very large pebbles, angular; little silt; little clay; trace small cobbles, angular; dry		
109		IRZ-27-SS-107-112 4/3/2019 16:22							
110	96								
111									
112								(111.0 - 114.0') Rough drilling	
113				Topock - Alluvium Deposits	SM				
114		IRZ-27-SS-4/3/2019 16:20							
115	33.6								
116									
117									
118		IRZ-27-SS-117-122 4/3/2019 16:12							
119	62.4			Topock - Alluvium Deposits	SC		(118.0 - 122.0') Topock - Alluvium Deposits; Clayey sand (SC); reddish brown / moderate brown (5YR 4/4) to yellowish red (5YR 4/6); very fine grained to very coarse grained, angular to subround; some clay; trace granules to medium pebbles, angular; trace silt; coarser clasts composed of metadiorite; moist		
120									

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Date Started:	03/14/2019	Surface Elevation:	501.24 ft amsl	Boring No.: IRZ-27-Pilot	
Date Completed:	03/20/2019	Northing (NAD83):	2102236.81		
Drilling Co.:	Cascade	Easting (NAD83):	7615803.14	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	156 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	4-12 inches	Location:	PG&E Topock, Needles,
Driller Name:	Steve Vasquez	Depth to First Water:	47.2 ft bgs		California
Drilling Asst:	O. Flores / L. Amaya	Sampling Method:	4 inch x 10 ft. Core Barrel	Project Number:	RC000753.0051
Logger:	G. Jeffers / J. Wanner	Sampling Interval:	Continuous		
Editor:	Gantt Jeffers	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
121	62.4	IRZ-27-SS-117-122 4/3/2019 16:12		Topock - Alluvium Deposits	SC				
122							(122.0 - 124.5') Topock - Competent Bedrock - conglomerate; reddish brown (2.5YR 4/4); dry; moderate cementation; friable conglomerate bedrock	(122.0') Core barrel plugged off, driller thinks there was a formation change going back into wet soil material	
123				Topock - Competent Bedrock - conglomerate					
124	60	IRZ-27-SS-122-127 4/3/2019 16:08					(124.5 - 129.5') Topock - Weathered Bedrock - conglomerate; Silty sand (SM); reddish brown (2.5YR 4/4) to dark reddish brown (2.5YR 3/4); very fine grained to very coarse grained, angular to subround; little silt; little clay; trace granules, subangular; dry	(122.0 - 127.0') Core barrel got stuck, driller advanced casing using water to retrieve the core barrel. Conglomerate bedrock with alternating zones of fine grained matrix and coarser grained matrix, potential stratigraphic high point of the conglomerate or conglomerate.	
125				Topock - Weathered Bedrock - conglomerate	SM				
126							(129.5 - 137.0') Topock - Competent Bedrock - conglomerate; reddish brown (2.5YR 4/4); and very fine to very coarse grained sand, angular to subround; little silt; little clay; trace granules, subangular; dry; friable conglomerate bedrock		(127.0 - 156.0') 200 gallons of water used; 200 gallons of water recovered; 0 gallons of water lost
127									
128									
129		IRZ-27-SS-127-132 4/3/2019 16:02							
130									
131									
132	126								
133				Topock - Competent Bedrock - conglomerate				(132.0 - 137.0') Sample collected during the installation of temporary backfill.	
134		IRZ-27-SS-132-137 4/3/2019 16:04	IRZ-27-VAS-132-137 (1300 ppb) 3/20/2019 15:30						
135									
136									
137									
138	60	IRZ-27-SS-137-142 4/3/2019 15:58		Topock - Weathered Bedrock - conglomerate	GW-GM		(137.0 - 151.0') Topock - Weathered Bedrock - conglomerate; Well graded gravel with silt and sand (GW-GM); reddish brown (2.5YR 4/4) to dark reddish brown (2.5YR 3/4); granules to large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subangular; little silt; little clay; dry		
139									
140									


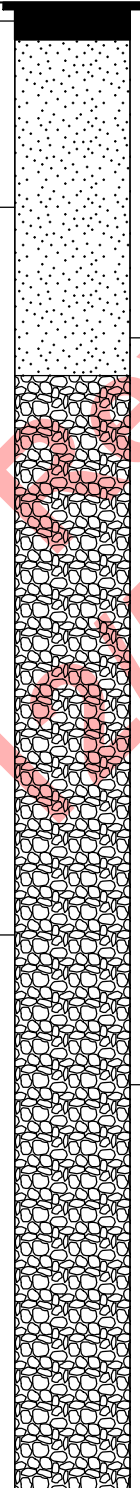

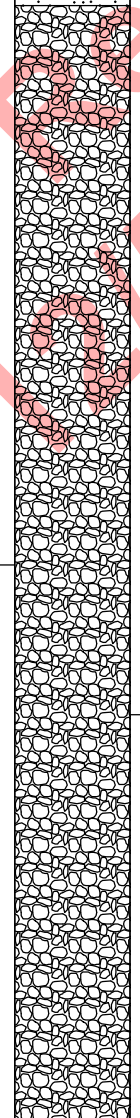












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Date Started:	03/14/2019	Surface Elevation:	501.24 ft amsl	Boring No.: IRZ-27-Pilot	
Date Completed:	03/20/2019	Northing (NAD83):	2102236.81		
Drilling Co.:	Cascade	Easting (NAD83):	7615803.14	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	156 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Prosonic Truck Mount	Borehole Diameter:	4-12 inches	Location:	PG&E Topock, Needles,
Driller Name:	Steve Vasquez	Depth to First Water:	47.2 ft bgs		California
Drilling Asst:	O. Flores / L. Amaya	Sampling Method:	4 inch x 10 ft. Core Barrel	Project Number:	RC000753.0051
Logger:	G. Jeffers / J. Wanner	Sampling Interval:	Continuous		
Editor:	Gantt Jeffers	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
141	60	IRZ-27-SS-137-142 4/3/2019 15:58							
142									
143									
144	69.6								
145				Topock - Weathered Bedrock - conglomerate	GW-GM				
146									
147									
148									
149									
150	31.2								
151									
152							(151.0 - 156.0') Topock - Competent Bedrock - conglomerate; reddish brown (2.5YR 4/4) to dark reddish brown (2.5YR 3/4); based on VAS interval that did not produce		
153		--no sample-- (Interval did not produce.) 3/20/2019 10:15		Topock - Competent Bedrock - conglomerate					
154	34.8								
155									
156									
End of Boring at 156.0 ft bgs.									
157									
158									
159									
160									

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Date Started:	03/20/2019	Surface Elevation:	501.24 ft amsl	Well ID: IRZ-27-Pilot
Date Completed:	03/21/2019	Northing (NAD83):	2102236.81	
Drilling Co.:	Cascade	Easting (NAD83):	7615803.14	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	156 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Steve Vasquez	Borehole Diameter:	4-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	O. Flores / L. Amaya	Depth to First Water:	47.2 ft bgs	
Logger:	G. Jeffers / J. Wanner	Editor:	Gantt Jeffers	Project Number: RC000753.0051

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		Topock - Fill	SM		(0.0 - 0.5') Steel Plate			Note: Steel plate BMPs in place				
2												
3									(0.5 - 5.0') Wildcat Washed Plastering Sand	(0.5 - 5.0') 7.9 bags	(0.5 - 5.0') 4 bags (51%) Note: Surface seal sand. Used <20% of the calculated volume due to potential formation collapse.	
4												
5		Topock - Fluvial Deposits	SW		(0.0 - 9.0') 12" Borehole							
6		Topock - Fluvial Deposits	SW-SM									
7		Topock - Fluvial Deposits	SW-SM									
8		Topock - Fluvial Deposits	GP									
9		Topock - Fluvial Deposits	SC									
10		Topock - Fluvial Deposits	SW									
11		Topock - Fluvial Deposits	GW-GM									
12		Topock - Fluvial Deposits	GP						(5.0 - 131.5') Cal-Silica 1/4"-3/8" pea gravel	(5.0 - 131.5') 54.4 bags	(5.0 - 131.5') 56 bags (103%) Note: Backfill gravel	
13		Topock - Fluvial Deposits	SM						(9.0 - 156.0') 6" Borehole			
14		Topock - Fluvial Deposits	SW-SM									
15		Topock - Fluvial Deposits	GW-GC									
16		Topock - Fluvial Deposits	GW-GM									
17		Topock - Fluvial Deposits	GM									

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Temporary Backfill Log

Date Started:	03/20/2019	Surface Elevation:	501.24 ft amsl	Well ID: IRZ-27-Pilot
Date Completed:	03/21/2019	Northing (NAD83):	2102236.81	
Drilling Co.:	Cascade	Easting (NAD83):	7615803.14	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	156 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Steve Vasquez	Borehole Diameter:	4-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	O. Flores / L. Amaya	Depth to First Water:	47.2 ft bgs	
Logger:	G. Jeffers / J. Wanner	Editor:	Gantt Jeffers	Project Number: RC000753.0051

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 - Fluvial Deposits	GM				
22		Topock - Fluvial Deposits	GW-GM				
23							
24		Topock - Fluvial Deposits	SW-SM				
25							
26							
27							
28							
29		Topock - Alluvium Deposits	SM		(5.0 - 131.5') Cal-Silica 1/4"-3/8" pea gravel	(9.0 - 156.0') 6" Borehole	(5.0 - 131.5') 54.4 bags
30							
31							
32		Topock - Alluvium Deposits	SM				
33							
34		Topock - Alluvium Deposits	SM				
35							
36							
37		Topock - Alluvium Deposits	SM				
38							
39							
40							

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Date Started:	03/20/2019	Surface Elevation:	501.24 ft amsl	Well ID: IRZ-27-Pilot
Date Completed:	03/21/2019	Northing (NAD83):	2102236.81	
Drilling Co.:	Cascade	Easting (NAD83):	7615803.14	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	156 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Steve Vasquez	Borehole Diameter:	4-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	O. Flores / L. Amaya	Depth to First Water:	47.2 ft bgs	
Logger:	G. Jeffers / J. Wanner	Editor:	Gantt Jeffers	Project Number: RC000753.0051

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							
42		Topock - Alluvium Deposits	SM				
43							
44							
45		Topock - Alluvium Deposits	SM				
46							
47							
48		Topock - Alluvium Deposits	ML				
49							
50					(5.0 - 131.5') Cal-Silica 1/4"-3/8" pea gravel	(9.0 - 156.0') 6" Borehole	(5.0 - 131.5') 54.4 bags
51							
52							
53		Topock - Alluvium Deposits	GM				
54	IRZ-27-VAS-52-57-EB (4400 ppb) 3/15/2019 16:15						
55							
56							
57							
58		Topock - Alluvium Deposits	SM				
59							
60							

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Date Started:	03/20/2019	Surface Elevation:	501.24 ft amsl	Well ID: IRZ-27-Pilot
Date Completed:	03/21/2019	Northing (NAD83):	2102236.81	
Drilling Co.:	Cascade	Easting (NAD83):	7615803.14	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	156 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Steve Vasquez	Borehole Diameter:	4-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	O. Flores / L. Amaya	Depth to First Water:	47.2 ft bgs	
Logger:	G. Jeffers / J. Wanner	Editor:	Gantt Jeffers	Project Number: RC000753.0051

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		Topock - Alluvium Deposits	SM				
62		Topock - Alluvium Deposits	GM				
63		Topock - Alluvium Deposits	SM				
64							
65							
66		Topock - Alluvium Deposits	SM				
67							
68		Topock - Alluvium Deposits	SW-SM				
69							
70					(5.0 - 131.5') Cal-Silica 1/4" - 3/8" pea gravel	(9.0 - 156.0') 6" Borehole	(5.0 - 131.5') 54.4 bags
71		Topock - Alluvium Deposits	SM				(5.0 - 131.5') 56 bags (103%) Note: Backfill gravel
72							
73							
74	IRZ-27-VAS-72-77 (<0.033 U ppb) 3/17/2019 13:15						
75		Topock - Alluvium Deposits	SM				
76							
77							
78		Topock - Alluvium Deposits	SM				
79							
80							

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Date Started:	03/20/2019	Surface Elevation:	501.24 ft amsl	Well ID: IRZ-27-Pilot
Date Completed:	03/21/2019	Northing (NAD83):	2102236.81	
Drilling Co.:	Cascade	Easting (NAD83):	7615803.14	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	156 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Steve Vasquez	Borehole Diameter:	4-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	O. Flores / L. Amaya	Depth to First Water:	47.2 ft bgs	
Logger:	G. Jeffers / J. Wanner	Editor:	Gantt Jeffers	Project Number: RC000753.0051

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	SM				
82		Topock - Alluvium Deposits	SM				
83		Topock - Alluvium Deposits	SW-SM				
84		Topock - Alluvium Deposits	SW				
85							
86		Topock - Alluvium Deposits	SM				
87							
88							
89		Topock - Alluvium Deposits	SM				
90					(5.0 - 131.5') Cal-Silica 1/4"-3/8" pea gravel	(9.0 - 156.0') 6" Borehole	(5.0 - 131.5') 54.4 bags
91							(5.0 - 131.5') 56 bags (103%) Note: Backfill gravel
92							
93		Topock - Alluvium Deposits	SM				
94							
95							
96							
97							
98		Topock - Alluvium Deposits	SM				
99		Topock - Alluvium Deposits	SM				
100							

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Date Started:	03/20/2019	Surface Elevation:	501.24 ft amsl	Well ID: IRZ-27-Pilot
Date Completed:	03/21/2019	Northing (NAD83):	2102236.81	
Drilling Co.:	Cascade	Easting (NAD83):	7615803.14	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	156 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Steve Vasquez	Borehole Diameter:	4-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	O. Flores / L. Amaya	Depth to First Water:	47.2 ft bgs	
Logger:	G. Jeffers / J. Wanner	Editor:	Gantt Jeffers	Project Number: RC000753.0051

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	IRZ-27-VAS-102-107 (<0.17 U ppb) 3/18/2019 16:10	Topock - Alluvium Deposits	SM				
102							
103							
104							
105							
106							
107							
108		Topock - Alluvium Deposits	SM		(5.0 - 131.5') Cal-Silica 1/4"-3/8" pea gravel	(9.0 - 156.0') 6" Borehole	(5.0 - 131.5') 54.4 bags
109							
110							
111							
112							
113							
114							
115							
116							
117							
118							
119							
120							
		Topock - Alluvium Deposits	SC				(5.0 - 131.5') 56 bags (103%) Note: Backfill gravel

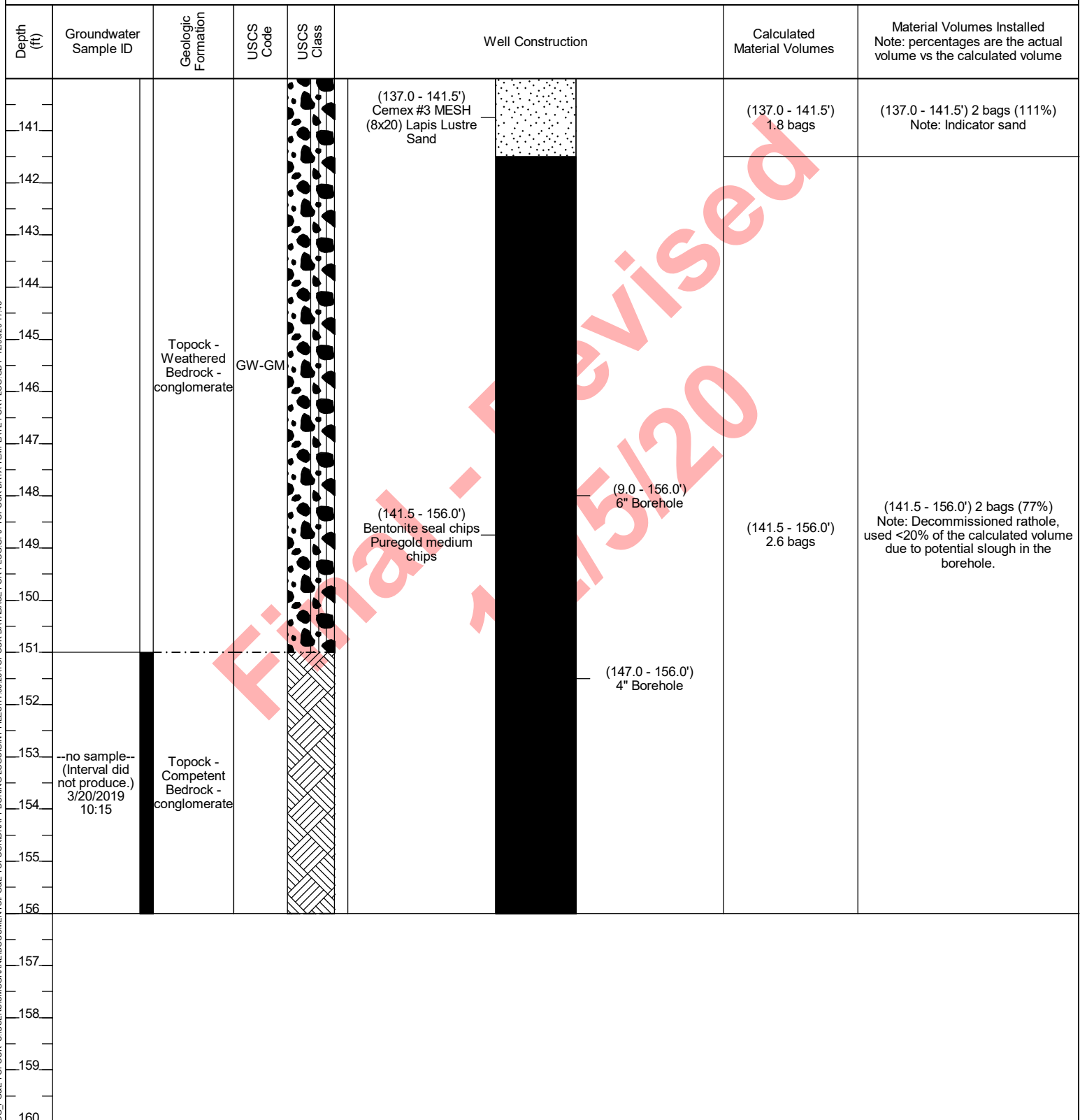
Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, BMP = Best Management Practices for stormwater, U = not detected above the laboratory reporting limit, NR = no recovery; Notes: blue water table symbol represents depth to water measured during the first VAS interval; granular backfill material was removed during overdrilling of the pilot borehole

Date Started:	03/20/2019	Surface Elevation:	501.24 ft amsl	Well ID: IRZ-27-Pilot
Date Completed:	03/21/2019	Northing (NAD83):	2102236.81	
Drilling Co.:	Cascade	Easting (NAD83):	7615803.14	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	156 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Steve Vasquez	Borehole Diameter:	4-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	O. Flores / L. Amaya	Depth to First Water:	47.2 ft bgs	
Logger:	G. Jeffers / J. Wanner	Editor:	Gantt Jeffers	Project Number: RC000753.0051

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	SC				
122							
123		Topock - Competent Bedrock - conglomerate					
124							
125							
126		Topock - Weathered Bedrock - conglomerate	SM		(5.0 - 131.5') Cal-Silica 1/4"-3/8" pea gravel	(5.0 - 131.5') 54.4 bags	(5.0 - 131.5') 56 bags (103%) Note: Backfill gravel
127							
128							
129							
130					(9.0 - 156.0') 6" Borehole		
131							
132	IRZ-27-VAS-132-137 (1300 ppb) 3/20/2019 15:30	Topock - Competent Bedrock - conglomerate			(131.5 - 137.0') Cemex #3 MESH (8x20) Lapis Lustre Sand	(131.5 - 137.0') 2.2 bags	(131.5 - 137.0') 3.5 bags (159%) Note: Indicator sand, used >20% of the calculated volume due to potential voids that formed during drilling.
133							
134							
135							
136							
137							
138		Topock - Weathered Bedrock - conglomerate	GW-GM		(137.0 - 141.5') Cemex #3 MESH (8x20) Lapis Lustre Sand	(137.0 - 141.5') 1.8 bags	(137.0 - 141.5') 2 bags (111%) Note: Indicator sand
139							
140							

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Date Started:	03/20/2019	Surface Elevation:	501.24 ft amsl	Well ID: IRZ-27-Pilot
Date Completed:	03/21/2019	Northing (NAD83):	2102236.81	
Drilling Co.:	Cascade	Easting (NAD83):	7615803.14	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	156 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Steve Vasquez	Borehole Diameter:	4-12 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	O. Flores / L. Amaya	Depth to First Water:	47.2 ft bgs	
Logger:	G. Jeffers / J. Wanner	Editor:	Gantt Jeffers	Project Number: RC000753.0051



Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, BMP = Best Management Practices for stormwater, U = not detected above the laboratory reporting limit, NR = no recovery; Notes: blue water table symbol represents depth to water measured during the first VAS interval; granular backfill material was removed during overdrilling of the pilot borehole