

Date Started:	03/04/2020	Surface Elevation:	502.11 ft amsl	Well ID: IRZ-31
Date Completed:	03/07/2020	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Dual Rotary	Northing (NAD83):	2101940.23	Project: Final GW Remedy Phase 1
Driller Name:	Jon Martinez	Easting (NAD83):	7615789.13	Location: PG&E Topock, Needles, California
Drilling Asst:	A. & H. Amezcuita	Borehole Diameter:	16-18 inches	
Logger:	Ellen Redner	Static Water Level:	See Log for Depths	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	3/29/2020	
Total Depth:	128.83 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 - 48.2') 10" SHUR-GRIP SDR17 PVC Casing		
2					(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			NR				
5							
6							
7							
8							
9							
10					(0.0 - 20.6') 18.0" Borehole		
11							
12					(4.0 - 36.8') Portland Cement 3% Bentonite Type I, II and V with Hydrogel	(4.0 - 36.8') 299.1 gallons	(4.0 - 36.8') 316 gallons (106%) Note: Grout seal
13		Topock - Alluvium Deposits	GW				
14							
15							
16							
17							
18		Topock - Alluvium Deposits	SM				
19							
20							

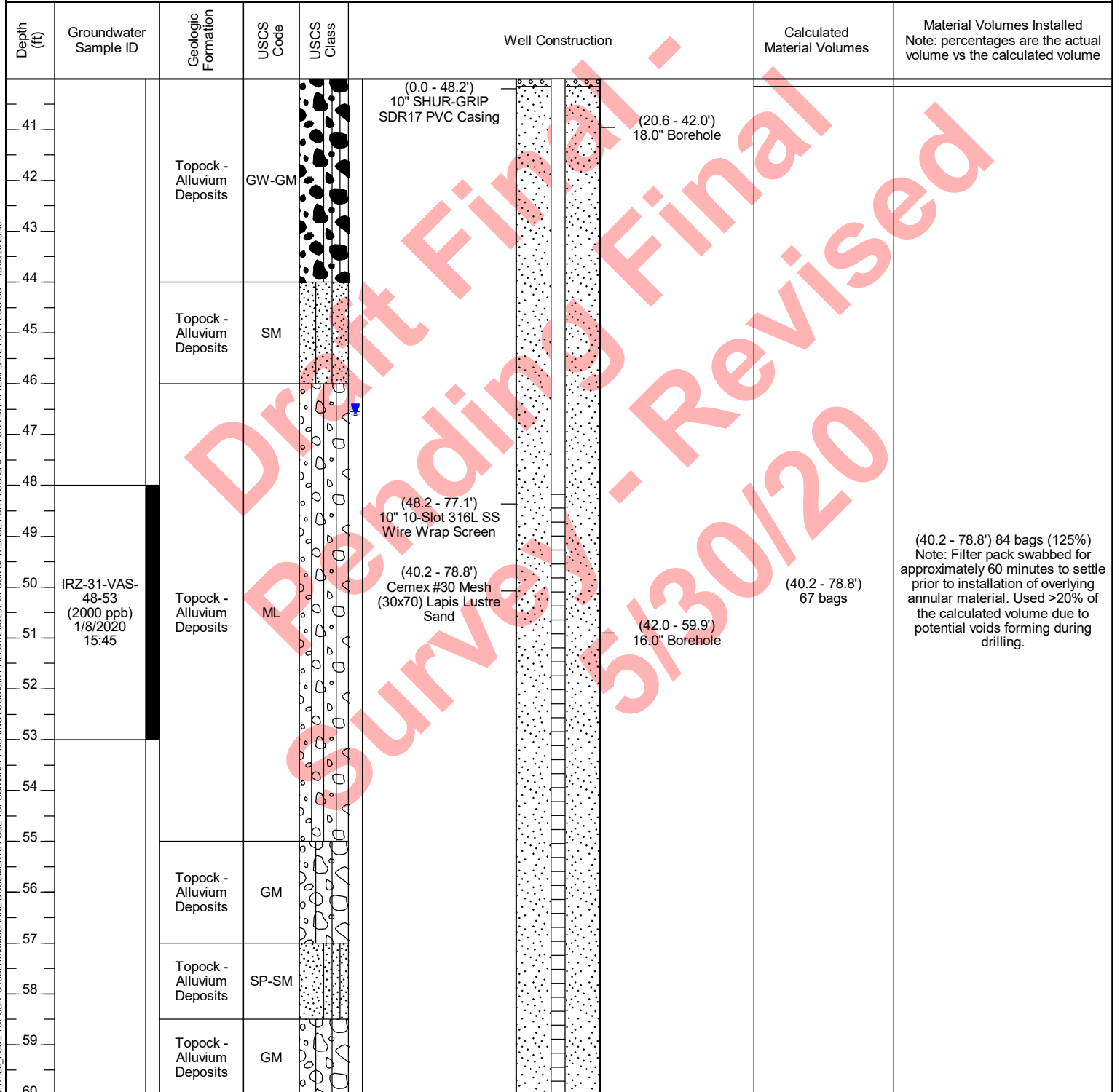
Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, NR = no recovery; Notes: solid blue and hollow blue water table marks represent depth to water (ft. bgs.) measured pre-specific capacity for the shallow and deep screens respectively

Date Started:	03/04/2020	Surface Elevation:	502.11 ft amsl	Well ID: IRZ-31
Date Completed:	03/07/2020	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Dual Rotary	Northing (NAD83):	2101940.23	Project: Final GW Remedy Phase 1
Driller Name:	Jon Martinez	Easting (NAD83):	7615789.13	Location: PG&E Topock, Needles, California
Drilling Asst:	A. & H. Amezguita	Borehole Diameter:	16-18 inches	
Logger:	Ellen Redner	Static Water Level:	See Log for Depths	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	3/29/2020	
Total Depth:	128.83 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 - Alluvium Deposits	SM		(0.0 - 48.2') 10" SHUR-GRIP SDR17 PVC Casing		(0.0 - 20.6') 18.0" Borehole	
22								
23								
24								
25								
26		Topock - Alluvium Deposits	SW-SM		(4.0 - 36.8') Portland Cement 3% Bentonite Type I, II and V with Hydrogel		(4.0 - 36.8') 299.1 gallons	(4.0 - 36.8') 316 gallons (106%) Note: Grout seal
27								
28								
29								
30								
31		Topock - Alluvium Deposits	GW		(34.5 - 35.5') Centralizer		(20.6 - 42.0') 18.0" Borehole	
32								
33								
34								
35								
36		Topock - Alluvium Deposits	GW-GM		(36.8 - 40.2') Cemex #60 Mesh (40x70) Lapis Lustre Sand		(36.8 - 40.2') 5.8 bags	(36.8 - 40.2') 8 bags (138%) Note: Transition sand. Used >20% of the calculated volume due to potential voids forming during drilling.
37								
38								
39								
40								

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, 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

Date Started: 03/04/2020	Surface Elevation: 502.11 ft amsl	<b>Well ID: IRZ-31</b>
Date Completed: 03/07/2020	Shallow Well Elevation: N/A	
Drilling Co.: Cascade	Deep Well Elevation: N/A	Client: PG&E
Drilling Method: Dual Rotary	Northing (NAD83): 2101940.23	Project: Final GW Remedy Phase 1
Driller Name: Jon Martinez	Easting (NAD83): 7615789.13	Location: PG&E Topock, Needles, California
Drilling Asst: A. & H. Amezcuita	Borehole Diameter: 16-18 inches	
Logger: Ellen Redner	Static Water Level: See Log for Depths	Project Number: RC000753.0051
Editor: Sean McGrane	Development End Date: 3/29/2020	
Total Depth: 128.83 ft bgs	Well Completion: <input type="checkbox"/> Flush <input type="checkbox"/> Stick-up <input checked="" type="checkbox"/> To Be Completed in Well Vault	



Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, 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

Date Started:	03/04/2020	Surface Elevation:	502.11 ft amsl	Well ID: IRZ-31
Date Completed:	03/07/2020	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Dual Rotary	Northing (NAD83):	2101940.23	Project: Final GW Remedy Phase 1
Driller Name:	Jon Martinez	Easting (NAD83):	7615789.13	Location: PG&E Topock, Needles, California
Drilling Asst:	A. & H. Amezcuita	Borehole Diameter:	16-18 inches	
Logger:	Ellen Redner	Static Water Level:	See Log for Depths	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	3/29/2020	
Total Depth:	128.83 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		Topock - Alluvium Deposits	GM		(48.2 - 77.1') 10" 10-Slot 316L SS Wire Wrap Screen		
62			SW-SM				
63							
64		Topock - Alluvium Deposits	GM				
65							
66							
67							
68		Topock - Alluvium Deposits	SM				
69							
70					(40.2 - 78.8') Cemex #30 Mesh (30x70) Lapis Lustre Sand	(40.2 - 78.8') 67 bags	(40.2 - 78.8') 84 bags (125%) Note: Filter pack swabbed for approximately 60 minutes to settle prior to installation of overlying annular material. Used >20% of the calculated volume due to potential voids forming during drilling.
71		Topock - Alluvium Deposits	GM				
72							
73							
74	IRZ-31-VAS-72-77 (480 ppb) 1/9/2020 13:10						
75							
76		Topock - Alluvium Deposits	GM				
77							
78					(77.1 - 92.1') 10" SHUR-GRIP SDR17 PVC Casing		
79		Topock - Alluvium Deposits	SW-SM		(78.8 - 79.9') Cemex #60 Mesh (40x70) Lapis Lustre Sand	(78.8 - 79.9') 1.9 bags	(78.8 - 79.9') 2 bags (105%) Note: Transition sand
80							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, 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

Date Started:	03/04/2020	Surface Elevation:	502.11 ft amsl	Well ID: IRZ-31
Date Completed:	03/07/2020	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Dual Rotary	Northing (NAD83):	2101940.23	Project: Final GW Remedy Phase 1
Driller Name:	Jon Martinez	Easting (NAD83):	7615789.13	Location: PG&E Topock, Needles, California
Drilling Asst:	A. & H. Amezcuita	Borehole Diameter:	16-18 inches	
Logger:	Ellen Redner	Static Water Level:	See Log for Depths	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	3/29/2020	
Total Depth:	128.83 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	GM		(77.1 - 92.1') 10" SHUR-GRIP SDR17 PVC Casing		
82							
83					(79.9 - 85.5') Bentonite seal pellets Pel-Plug (TR30) 3/8" Centralizer	(79.9 - 85.5') 7.7 buckets	(79.9 - 85.5') 8 buckets (104%) Note: Intermediate seal
84							
85		Topock - Alluvium Deposits	SM				
86							
87		Topock - Alluvium Deposits	SM				
88		Topock - Alluvium Deposits	SM				
89							
90		Topock - Alluvium Deposits	GM		(79.8 - 99.5') 16.0" Borehole		
91							
92							
93					(85.5 - 128.8') Cemex #60 Mesh (40x70) Lapis Lustre Sand	(85.5 - 128.8') 76.2 bags	(85.5 - 128.8') 78 bags (102%) Note: Filter pack swabbed for approximately 60 minutes to settle prior to installation of overlying annular material.
94		Topock - Alluvium Deposits	SM				
95							
96		Topock - Alluvium Deposits	GM				
97							
98		Topock - Alluvium Deposits	SM				
99		Topock - Alluvium Deposits	GM				
100					(99.5 - 119.4') 16.0" Borehole		

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, 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

Date Started:	03/04/2020	Surface Elevation:	502.11 ft amsl	Well ID: IRZ-31
Date Completed:	03/07/2020	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Dual Rotary	Northing (NAD83):	2101940.23	Project: Final GW Remedy Phase 1
Driller Name:	Jon Martinez	Easting (NAD83):	7615789.13	Location: PG&E Topock, Needles, California
Drilling Asst:	A. & H. Amezcuita	Borehole Diameter:	16-18 inches	
Logger:	Ellen Redner	Static Water Level:	See Log for Depths	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	3/29/2020	
Total Depth:	128.83 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			GM		(92.1 - 121.0') 10" 8-Slot 316L SS Wire Wrap Screen		
102							
103							
104	IRZ-31-VAS-102-107 (2300 ppb) 1/10/2020 10:35	Topock - Alluvium Deposits	GW				
105							
106							
107							
108							
109							
110		Topock - Alluvium Deposits	GM		(85.5 - 128.8') Cemex #60 Mesh (40x70) Lapis Lustre Sand	(99.5 - 119.4') 16.0" Borehole	(85.5 - 128.8') 78 bags (102%) Note: Filter pack swabbed for approximately 60 minutes to settle prior to installation of overlying annular material.
111							
112							
113							
114							
115							
116							
117	IRZ-31-VAS-115-120 (2500 ppb) 1/11/2020 11:33	Topock - Weathered Bedrock - conglomerate	SM				
118							
119							
120					(119.4 - 128.8') 16.0" Borehole		

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, 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



Date Started:	03/04/2020	Surface Elevation:	502.11 ft amsl	Well ID: IRZ-31
Date Completed:	03/07/2020	Shallow Well Elevation:	N/A	
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client: PG&E
Drilling Method:	Dual Rotary	Northing (NAD83):	2101940.23	Project: Final GW Remedy Phase 1
Driller Name:	Jon Martinez	Easting (NAD83):	7615789.13	Location: PG&E Topock, Needles, California
Drilling Asst:	A. & H. Amezguita	Borehole Diameter:	16-18 inches	
Logger:	Ellen Redner	Static Water Level:	See Log for Depths	Project Number: RC000753.0051
Editor:	Sean McGrane	Development End Date:	3/29/2020	
Total Depth:	128.83 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
121		Topock - Competent Bedrock - conglomerate				(92.1 - 121.0') 10" 8-Slot 316L SS Wire Wrap Screen		(85.5 - 128.8') 78 bags (102%) Note: Filter pack swabbed for approximately 60 minutes to settle prior to installation of overlying annular material.
122								
123								
124					(123.0 - 124.0') Centralizer			
125					(85.5 - 128.8') Cemex #60 Mesh (40x70) Lapis Lustre Sand	(119.4 - 128.8') 16.0" Borehole	(85.5 - 128.8') 76.2 bags	
126								
127						(121.0 - 126.8') Sump and SS End Cap		
128								
129								
130								
131								
132								
133								
134								
135								
136								
137								
138								
139								
140								

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, 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

Date Started:	02/25/2020	Surface Elevation:	502.11 ft amsl	Boring No.: <b>IRZ-31</b>	
Date Completed:	02/27/2020	Northing (NAD83):	2101940.23		
Drilling Co.:	Cascade	Easting (NAD83):	7615789.13	Client:	PG&E
Drilling Method:	Dual Rotary	Total Depth:	128.8 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 & 17.5 Tricone	Project Number:	RC000753.0051
Tool-Pusher:	A. Lamon	Depth to First Water:	47.3 ft bgs		
Rig Geologist:	Ellen Redner	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 - 8.0') No recovery (NR)	(0.0 - 10.0') Observed some Cemex #60 Mesh (40x70) and trace amounts of Cemex #3 MESH (8x10) Lapis Luster Sand in drill cuttings.	(0.0 - 20.6') 150 gallons of water used; 100 gallons of water recovered; 50 gallons of water lost
2							
3							
4							
5							
6							
7							
8		NR					
9					(8.0 - 17.0') Topock - Alluvium Deposits; Well graded gravel with sand (GW); yellowish brown / moderate yellowish brown (10YR 5/4)		
10	(0.0 - 20.6) 1.75 mins/ft			(0.0 - 20.6') 18.0" Steel Casing			
11							
12							
13		GW					
14							
15							
16							
17							
18					(17.0 - 27.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); yellowish brown / moderate yellowish brown (10YR 5/4)		
19		SM					
20							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, NR = no recovery; Notes: depth to water collected during the first VAS sample of the pilot borehole



# Drilling Log

Sheet: 2 of 7

Date Started:	02/25/2020	Surface Elevation:	502.11 ft amsl	<b>Boring No.: IRZ-31</b>	
Date Completed:	02/27/2020	Northing (NAD83):	2101940.23		
Drilling Co.:	Cascade	Easting (NAD83):	7615789.13	Client:	PG&E
Drilling Method:	Dual Rotary	Total Depth:	128.8 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 & 17.5 Tricone	Project Number:	RC000753.0051
Tool-Pusher:	A. Lamon	Depth to First Water:	47.3 ft bgs		
Rig Geologist:	Ellen Redner	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	(0.0 - 20.6) 1.75 mins/ft					(20.0') Observed some Cemex #3 MESH (8x10) Lapis Luster Sand in drill cuttings.	
22							(20.6 - 42.0') 120 gallons of water used; 75 gallons of water recovered; 45 gallons of water lost
23							
24		SM				(23.0 - 39.5') Soft drilling	
25							
26							
27							
28					(27.0 - 31.0') Topock - Alluvium Deposits; Well graded sand with silt and gravel (SW-SM); dark yellowish brown (10YR 4/4)		
29		SW-SM					
30	(20.6 - 42.0) 1.36 mins/ft			(20.6 - 42.0') 18.0" Steel Casing		(30.0') Observed trace amounts of Cemex #3 Mesh (8x20) Lapis Luster Sand in drill cuttings.	
31					(31.0 - 39.5') Topock - Alluvium Deposits; Well graded gravel with sand (GW); yellowish brown / moderate yellowish brown (10YR 5/4)		
32							
33							
34							
35		GW					
36							
37							
38							
39							
40		GW-GM			(39.5 - 44.0') Topock - Alluvium		

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, NR = no recovery; Notes: depth to water collected during the first VAS sample of the pilot borehole

Date Started:	02/25/2020	Surface Elevation:	502.11 ft amsl	<b>Boring No.: IRZ-31</b>	
Date Completed:	02/27/2020	Northing (NAD83):	2101940.23		
Drilling Co.:	Cascade	Easting (NAD83):	7615789.13	Client:	PG&E
Drilling Method:	Dual Rotary	Total Depth:	128.8 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 & 17.5 Tricone	Project Number:	RC000753.0051
Tool-Pusher:	A. Lamon	Depth to First Water:	47.3 ft bgs		
Rig Geologist:	Ellen Redner	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	(20.6 - 42.0) 1.36 mins/ft			(20.6 - 42.0') 18.0" Steel Casing	Deposits; Well graded gravel with silt and sand (GW-GM); brown (10YR 5/3)	(40.0') Observed little amounts of Cemex #3Mesh (8x20) Lapis Luster Sand in drill cuttings.	
42		GW-GM					
43							(42.0 - 59.9') 216 gallons of water used; 50 gallons of water recovered; 166 gallons of water lost
44					(44.0 - 46.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 5/4)		
45		SM					
46					(46.0 - 55.0') Topock - Alluvium Deposits; Silt with gravel (ML); brown (7.5YR 5/4)		
47							
48							
49							
50							
51	(42.0 - 59.9) 1.17 mins/ft	ML		(42.0 - 59.9') 16.0" Steel Casing		(50.0') Observed trace amounts of Cemex #3 Mesh (8x20) Lapis Luster Sand in drill cuttings.	
52							
53						(53.0 - 59.9') Smooth drilling	
54							
55					(55.0 - 57.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); brown (7.5YR 5/4)		
56		GM					
57					(57.0 - 58.5') Topock - Alluvium Deposits; Poorly graded sand with silt and gravel (SP-SM); brown (7.5YR 5/4)		
58		SP-SM					
59					(58.5 - 60.5') Topock - Alluvium Deposits; Silty gravel with sand (GM); brown (7.5YR 5/4)		
60		GM					

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, NR = no recovery; Notes: depth to water collected during the first VAS sample of the pilot borehole

Date Started:	02/25/2020	Surface Elevation:	502.11 ft amsl	<b>Boring No.: IRZ-31</b>	
Date Completed:	02/27/2020	Northing (NAD83):	2101940.23		
Drilling Co.:	Cascade	Easting (NAD83):	7615789.13	Client:	PG&E
Drilling Method:	Dual Rotary	Total Depth:	128.8 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 & 17.5 Tricone	Project Number:	RC000753.0051
Tool-Pusher:	A. Lamon	Depth to First Water:	47.3 ft bgs		
Rig Geologist:	Ellen Redner	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		GM				(60.0') Observed trace amounts of Cemex #3 Mesh (8x20) Lapis Luster Sand in drill cuttings.	(59.9 - 79.8') 100 gallons of water used; 90 gallons of water recovered; 10 gallons of water lost
62		SW-SM			(60.5 - 61.0') Topock - Alluvium Deposits; Well graded sand with silt (SW-SM); brown (7.5YR 5/4)		
63					(61.0 - 67.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); brown (7.5YR 5/4)		
64		GM					
65							
66							
67							
68		SM			(67.0 - 68.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 5/4)		
69					(68.0 - 74.5') Topock - Alluvium Deposits; Silty gravel with sand (GM); brown (7.5YR 5/4)		
70	(59.9 - 79.8) 1.15 mins/ft			(59.9 - 79.8') 16.0" Steel Casing		(70.0') Observed trace amounts of Cemex #3 Mesh (8x20) Lapis Luster Sand in drill cuttings.	
71		GM					
72							
73							
74					(73.5') greenish gray (GLE1 5/5GY)		
75					(74.5 - 78.5') Topock - Alluvium Deposits; Silty gravel with sand (GM); brown (7.5YR 5/4)		
76		GM					
77							
78							
79							
80		SW-SM			(78.5 - 80.0') Topock - Alluvium Deposits; Well graded sand with silt and gravel (SW-SM); brown (7.5YR 5/4)		

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, NR = no recovery; Notes: depth to water collected during the first VAS sample of the pilot borehole

# Drilling Log

Sheet: 5 of 7

Date Started:	02/25/2020	Surface Elevation:	502.11 ft amsl	<b>Boring No.: IRZ-31</b>	
Date Completed:	02/27/2020	Northing (NAD83):	2101940.23		
Drilling Co.:	Cascade	Easting (NAD83):	7615789.13	Client:	PG&E
Drilling Method:	Dual Rotary	Total Depth:	128.8 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 & 17.5 Tricone	Project Number:	RC000753.0051
Tool-Pusher:	A. Lamon	Depth to First Water:	47.3 ft bgs		
Rig Geologist:	Ellen Redner	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					(80.0 - 86.5') Topock - Alluvium Deposits; Silty gravel with sand (GM); brown (7.5YR 5/4)	(80.0') Observed trace amounts of Cemex #3 Mesh (8x20) Lapis Luster Sand in drill cuttings. (80.5 - 89.0') Drill rods chattering	(79.8 - 99.5') 216 gallons of water used; 800 gallons of water recovered; 584 gallons of water gained
82							
83							
84							
85							
86							
87					(86.5 - 88.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 5/4)		
88							
89					(88.0 - 91.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 5/4)		
90	(79.8 - 99.5) 1.37 mins/ft			(79.8 - 99.5') 16.0" Steel Casing		(90.0') Observed trace amounts of Cemex #3 Mesh (8x20) Lapis Luster Sand in drill cuttings.	
91							
92					(91.0 - 97.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); yellowish brown / moderate yellowish brown (10YR 5/4)	(92.0 - 95.0') Soft drilling	
93							
94							
95							
96							
97							
98					(97.0 - 98.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 5/4)		
99					(98.5 - 100.5') Topock - Alluvium Deposits; Silty gravel with sand (GM); brown (7.5YR 5/4)	(99.0') Observed trace amounts of Cemex #3 Mesh (8x20) Lapis Luster Sand in drill cuttings.	
100	(99.5 - 119.4) 1.90 mins/ft						(99.5 - 119.4') 150

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, NR = no recovery; Notes: depth to water collected during the first VAS sample of the pilot borehole

Date Started:	02/25/2020	Surface Elevation:	502.11 ft amsl	<b>Boring No.: IRZ-31</b>	
Date Completed:	02/27/2020	Northing (NAD83):	2101940.23		
Drilling Co.:	Cascade	Easting (NAD83):	7615789.13	Client:	PG&E
Drilling Method:	Dual Rotary	Total Depth:	128.8 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 & 17.5 Tricone	Project Number:	RC000753.0051
Tool-Pusher:	A. Lamon	Depth to First Water:	47.3 ft bgs		
Rig Geologist:	Ellen Redner	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		GM			(100.5 - 107.0') Topock - Alluvium Deposits; Well graded gravel with sand (GW); yellowish brown / moderate yellowish brown (10YR 5/4) (102') brown (7.5YR 5/4)	(100.0') Observed trace amounts of Cemex #3 Mesh (8x20) Lapis Luster Sand in drill cuttings.	gallons of water used; 1510 gallons of water recovered; 1360 gallons of water gained
102							
103							
104		GW					
105							
106							
107							
108					(107.0 - 114.0') Topock - Alluvium Deposits; Silty gravel with sand (GM)		
109							
110	(99.5 - 119.4) 1.90 mins/ft			(99.5 - 119.4') 16.0" Steel Casing		(110.0') Observed little to some amounts of Cemex #3 Mesh (8x20) Lapis Luster Sand in drill cuttings.	
111		GM			(111.5') grayish brown (10YR 5/2) (112') brown (7.5YR 5/4)	(110.1 - 119.0') Soft drilling	
112							
113							
114					(114.0 - 120.3') Topock - Weathered Bedrock - conglomerate; Silty sand with gravel (SM); reddish brown (2.5YR 4/4)		
115							
116							
117		SM					
118							
119							
120	(119.4 - 128.8) 2.66 mins/ft						(119.4 - 128.8') 70 gallons of water used;

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, NR = no recovery; Notes: depth to water collected during the first VAS sample of the pilot borehole

# Drilling Log

Sheet: 7 of 7



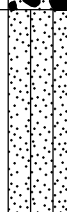
Date Started:	02/25/2020	Surface Elevation:	502.11 ft amsl	<b>Boring No.: IRZ-31</b>	
Date Completed:	02/27/2020	Northing (NAD83):	2101940.23		
Drilling Co.:	Cascade	Easting (NAD83):	7615789.13	Client:	PG&E
Drilling Method:	Dual Rotary	Total Depth:	128.8 ft bgs	Project:	Final GW Remedy Phase 1
Drill 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		
Drilling Asst:	A. & H. Amezguita	Drill Bit:	15.5 & 17.5 Tricone	Project Number: RC000753.0051	
Tool-Pusher:	A. Lamon	Depth to First Water:	47.3 ft bgs		
Rig Geologist:	Ellen Redner	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	(119.4 - 128.8) 2.66 mins/ft			(119.4 - 128.8') 16.0" Steel Casing	(120.3' - 128.8') Topock - Competent Bedrock - conglomerate; brown (7.5YR 5/4)	(120.0') Observed trace amounts of Cemex #3Mesh (8x20) and Cemex #2/12 Mesh (16x30) Lapis Luster Sand in drill cuttings. Cuttings are representative from approximately the previous 5 feet of drilling.	1070 gallons of water recovered; 1000 gallons of water gained
122							
123							
124							
125							
126							
127							
128							
129					End of Boring at 128.8 ft bgs.	(128.0') Observed trace amounts of Cemex #2/12 Mesh (16x30) Lapis Luster Sand in drill cuttings.	
130							
131							
132							
133							
134							
135							
136							
137							
138							
139							
140							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, NR = no recovery; Notes: depth to water collected during the first VAS sample of the pilot borehole



Date Started:	01/07/2020	Surface Elevation:	502.11 ft amsl	<b>Boring No.: IRZ-31 Pilot</b>	
Date Completed:	01/10/2020	Northing (NAD83):	2101940.23		
Drilling Co.:	Cascade	Easting (NAD83):	7615789.13	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	127 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Boart Longyear Track Mount	Borehole Diameter:	6-10 inches	Location:	PG&E Topock, Needles,
Driller Name:	Eddie Ramos	Depth to First Water:	47.3 ft bgs		California
Drilling Asst:	J. Candelaria / F. Sandoval	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	Joe Latham	Sampling Interval:	Continuous		
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
1	0				NR		(0.0 - 8.0') No recovery (NR); see drilling notes	(0.0 - 8.0') Core not collected during the installation of 10-inch conductor casing to 8 ft. bgs.	(0.0 - 127.0') No water used
2									
3									
4									
5									
6									
7									
8									
9	108			Topock - Alluvium Deposits	GW		(8.0 - 17.0') Topock - Alluvium Deposits; Well graded gravel with sand (GW); yellowish brown / moderate yellowish brown (10YR 5/4); granules to very large pebbles, angular to subround; and very fine to very coarse grained sand, angular to subround; trace silt; trace clay; little coarser clasts composed of metadiorite; dry to moist	(8.0 - 22.0') Normal drilling	
10									
11									
12									
13									
14									
15									
16									
17	120			Topock - Alluvium Deposits	SM		(17.0 - 27.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); yellowish brown / moderate yellowish brown (10YR 5/4); very fine grained to very coarse grained, angular to subround; some granules to large pebbles, angular to subround; little silt; trace clay; some coarser clasts composed of metadiorite; dry to moist; iron oxide staining		
18									
19									
20									











Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, NR = no recovery; Notes: depth to water measured during the collection of the first VAS interval; apparent partial recoveries can be the result of potential compaction of sediments in the core bag

Date Started:	01/07/2020	Surface Elevation:	502.11 ft amsl	<b>Boring No.: IRZ-31 Pilot</b>	
Date Completed:	01/10/2020	Northing (NAD83):	2101940.23		
Drilling Co.:	Cascade	Easting (NAD83):	7615789.13	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	127 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Boart Longyear Track Mount	Borehole Diameter:	6-10 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Eddie Ramos	Depth to First Water:	47.3 ft bgs	Project Number:	RC000753.0051
Drilling Asst:	J. Candelaria / F. Sandoval	Sampling Method:	4 inch x 10 ft Core Barrel		
Logger:	Joe Latham	Sampling Interval:	Continuous		
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
21	120			Topock - Alluvium Deposits	SM			(22.0 - 25.0') Soft drilling	
22									
23									
24									
25	120			Topock - Alluvium Deposits	SW-SM		(27.0 - 31.0') Topock - Alluvium Deposits; Well graded sand with silt and gravel (SW-SM); dark yellowish brown (10YR 4/4); very fine grained to very coarse grained, angular to subangular; and granules to large pebbles, angular to subangular; little silt; trace clay; some coarser clasts composed of metadiorite	(25.0 - 112.0') Rough drilling	
26									
27									
28									
29									
30									
31									
32									
33									
34									
35									
36									
37	120			Topock - Alluvium Deposits	GW		(31.0 - 39.5') Topock - Alluvium Deposits; Well graded gravel with sand (GW); yellowish brown / moderate yellowish brown (10YR 5/4); granules to large pebbles, angular; and very fine to very coarse grained sand, angular to subround; trace silt; trace clay; and coarser clasts composed of metadiorite; dry to moist		
38									
39									
40									
					GW-GM		(39.5 - 44.0') Topock - Alluvium Deposits; Well graded gravel with		

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, NR = no recovery; Notes: depth to water measured during the collection of the first VAS interval; apparent partial recoveries can be the result of potential compaction of sediments in the core bag

Date Started:	01/07/2020	Surface Elevation:	502.11 ft amsl	<b>Boring No.: IRZ-31 Pilot</b>	
Date Completed:	01/10/2020	Northing (NAD83):	2101940.23		
Drilling Co.:	Cascade	Easting (NAD83):	7615789.13	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	127 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Boart Longyear Track Mount	Borehole Diameter:	6-10 inches	Location:	PG&E Topock, Needles,
Driller Name:	Eddie Ramos	Depth to First Water:	47.3 ft bgs		California
Drilling Asst:	J. Candelaria / F. Sandoval	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	Joe Latham	Sampling Interval:	Continuous		
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
41	120			Topock - Alluvium Deposits	GW-GM		silt and sand (GW-GM); brown (10YR 5/3); granules to large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subangular; little silt; trace clay; trace mica; little coarser clasts composed of metadiorite; dry to moist; iron oxide staining		
42							(43'); iron oxide staining; 2-inch lense of light gray material, decrease in granules and pebbles, increase in sand		
43				Topock - Alluvium Deposits	SM		(44.0 - 46.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 5/4); fine grained to very coarse grained, subangular to subround; some granules to medium pebbles, angular; little silt; some coarser clasts composed of metadiorite; dry to moist		
44							(46.0 - 55.0') Topock - Alluvium Deposits; Silt with gravel (ML); brown (7.5YR 5/4); no plasticity; some granules to very large pebbles, angular to subangular; little very fine to very coarse grained sand, angular to subangular; little clay; little coarser clasts composed of metadiorite; dry to moist; iron oxide staining		
45	60	IRZ-31-SS-45-50 1/12/2020 08:28		Topock - Alluvium Deposits	ML		(47.0 - 52.0') Water production insufficient for sample collection.		
46							(52'); little granules to very large pebbles, angular to subangular; trace clay; moist		
47				Topock - Alluvium Deposits	GM		(55.0 - 57.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); brown (7.5YR 5/4); granules to large pebbles, angular; some silt; little very fine to very coarse grained sand, angular to subangular; trace clay; some coarser clasts composed of metadiorite; dry to moist; iron oxide staining		
48							(57.0 - 58.5') Topock - Alluvium Deposits; Poorly graded sand with silt and gravel (SP-SM); brown (7.5YR 5/4); very fine grained to fine grained, subangular to subround; some granules to large pebbles, angular; little silt; some coarser clasts composed of metadiorite; moist; iron oxide staining		
49	60	IRZ-31-VAS-48-53 (2000 ppb) 1/8/2020 15:45		Topock - Alluvium Deposits	SP-SM		(58.5 - 60.5') Topock - Alluvium Deposits; Silty gravel with sand (GM); brown (7.5YR 5/4); granules to very large pebbles, angular; some very fine to very coarse grained sand, angular to subangular; some silt; some coarser clasts composed of metadiorite; dry to moist; iron oxide staining		
50									
51				Topock - Alluvium Deposits	GM				
52									
53	120	IRZ-31-SS-50-55 1/12/2020 08:36		Topock - Alluvium Deposits	SP-SM				
54									
55				Topock - Alluvium Deposits	GM				
56									
57	120	IRZ-31-SS-55-60 1/12/2020 08:45		Topock - Alluvium Deposits	SP-SM				
58									
59				Topock - Alluvium Deposits	GM				
60									


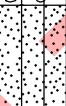



Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, NR = no recovery; Notes: depth to water measured during the collection of the first VAS interval; apparent partial recoveries can be the result of potential compaction of sediments in the core bag

Date Started:	01/07/2020	Surface Elevation:	502.11 ft amsl	<b>Boring No.: <u>IRZ-31 Pilot</u></b>	
Date Completed:	01/10/2020	Northing (NAD83):	2101940.23		
Drilling Co.:	Cascade	Easting (NAD83):	7615789.13	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	127 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Boart Longyear Track Mount	Borehole Diameter:	6-10 inches	Location:	PG&E Topock, Needles,
Driller Name:	Eddie Ramos	Depth to First Water:	47.3 ft bgs		California
Drilling Asst:	J. Candelaria / F. Sandoval	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	Joe Latham	Sampling Interval:	Continuous		
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
61	120	IRZ-31-SS-60-65 1/12/2020 09:01		Topock - Alluvium Deposits	GM	SW-SM	(60.5 - 61.0') Topock - Alluvium Deposits; Well graded sand with silt (SW-SM); brown (7.5YR 5/4); very fine grained to coarse grained, angular to subround; little granules to medium pebbles, angular to subangular; little silt; trace coarser clasts composed of metadiorite; moist to wet		
62				Topock - Alluvium Deposits	GM		(61.0 - 67.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); brown (7.5YR 5/4); granules to very large pebbles, angular to subangular; some very fine to very coarse grained sand, subangular to subround; some silt; some coarser clasts composed of metadiorite; moist to wet		
63				Topock - Alluvium Deposits	GM				
64	120	IRZ-31-SS-65-70 1/12/2020 09:13		Topock - Alluvium Deposits	SM		(67.0 - 68.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 5/4); very fine grained to very coarse grained, angular to subround; some granules to very large pebbles, angular to subangular; some silt; some coarser clasts composed of metadiorite; moist; iron oxide staining		
65				Topock - Alluvium Deposits	GM		(68.0 - 74.5') Topock - Alluvium Deposits; Silty gravel with sand (GM); brown (7.5YR 5/4); granules to very large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subround; some silt; some coarser clasts composed of metadiorite; trace mica; wet		
66				Topock - Alluvium Deposits	GM				
67	120	IRZ-31-SS-70-75 1/12/2020 09:20		Topock - Alluvium Deposits			(72.5'); dry to moist		
68				Topock - Alluvium Deposits			(73.5') greenish gray (GLE Y1 5/5GY); dry		
69				Topock - Alluvium Deposits					
70	120	IRZ-31-SS-75-80 1/12/2020 09:35		Topock - Alluvium Deposits	GM		(74.5 - 78.5') Topock - Alluvium Deposits; Silty gravel with sand (GM); brown (7.5YR 5/4); granules to very large pebbles, angular to subangular; some very fine to very coarse grained sand, subangular to subround; little silt; some coarser clasts composed of metadiorite; wet; iron oxide staining		
71				Topock - Alluvium Deposits					
72				Topock - Alluvium Deposits					
73	120			Topock - Alluvium Deposits	SW-SM		(78.5 - 80.0') Topock - Alluvium Deposits; Well graded sand with silt and gravel (SW-SM); brown (7.5YR 5/4); fine grained to very coarse grained, angular to subround; some granules to very large pebbles, angular; little silt; some coarser clasts composed of metadiorite; wet		
74				Topock - Alluvium Deposits					
75				Topock - Alluvium Deposits					

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, NR = no recovery; Notes: depth to water measured during the collection of the first VAS interval; apparent partial recoveries can be the result of potential compaction of sediments in the core bag

Date Started:	01/07/2020	Surface Elevation:	502.11 ft amsl	<b>Boring No.: IRZ-31 Pilot</b>	
Date Completed:	01/10/2020	Northing (NAD83):	2101940.23		
Drilling Co.:	Cascade	Easting (NAD83):	7615789.13	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	127 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Boart Longyear Track Mount	Borehole Diameter:	6-10 inches	Location:	PG&E Topock, Needles,
Driller Name:	Eddie Ramos	Depth to First Water:	47.3 ft bgs		California
Drilling Asst:	J. Candelaria / F. Sandoval	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	Joe Latham	Sampling Interval:	Continuous		
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
81	120	IRZ-31-SS-80-85 1/12/2020 09:39		Topock - Alluvium Deposits	GM		(80.0 - 86.5') Topock - Alluvium Deposits; Silty gravel with sand (GM); brown (7.5YR 5/4); granules to very large pebbles, angular; some fine to very coarse grained sand, angular to subround; some silt; some coarser clasts composed of metadiorite; wet; iron oxide staining		
82							(84'); dry to moist		
83									
84									
85	120	IRZ-31-SS-85-90 1/12/2020 09:48		Topock - Alluvium Deposits	SM		(86.5 - 88.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 5/4); very fine grained to very coarse grained, angular to subround; some granules to large pebbles, angular to subround; little silt; some coarser clasts composed of metadiorite; wet		
86									
87									
88									
89	120	IRZ-31-SS-90-95 1/12/2020 09:51		Topock - Alluvium Deposits	SM		(88.0 - 91.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 5/4); very fine grained to very coarse grained, subangular to subround; some small to very large pebbles, angular to round; little silt; trace small cobbles; moist; iron oxide staining		
90									
91									
92									
93	120	IRZ-31-SS-95-100 1/12/2020 09:53		Topock - Alluvium Deposits	GM		(91.0 - 97.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); yellowish brown / moderate yellowish brown (10YR 5/4); granules to very large pebbles, angular to subround; some very fine to very coarse grained sand, angular to subround; some silt; some coarser clasts composed of metadiorite; dry to moist		
94									
95									
96									
97	120	IRZ-31-SS-95-100 1/12/2020 09:53		Topock - Alluvium Deposits	SM		(97.0 - 98.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); brown (7.5YR 5/4); very fine grained to very coarse grained, subangular to subround; some silt; little granules to large pebbles, angular to subround; little coarser clasts composed of metadiorite; moist to wet; iron oxide staining		
98									
99									
100							(98.5 - 100.5') Topock - Alluvium Deposits; Silty gravel with sand (GM); brown (7.5YR 5/4); granules to very large pebbles, angular to subangular; and very fine to very coarse grained sand, subangular to subround; little silt; some coarser clasts composed of metadiorite; trace mica; moist; iron oxide staining		

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, NR = no recovery; Notes: depth to water measured during the collection of the first VAS interval; apparent partial recoveries can be the result of potential compaction of sediments in the core bag

Date Started:	01/07/2020	Surface Elevation:	502.11 ft amsl	<b>Boring No.: <u>IRZ-31 Pilot</u></b>	
Date Completed:	01/10/2020	Northing (NAD83):	2101940.23		
Drilling Co.:	Cascade	Easting (NAD83):	7615789.13	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	127 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Boart Longyear Track Mount	Borehole Diameter:	6-10 inches	Location:	PG&E Topock, Needles,
Driller Name:	Eddie Ramos	Depth to First Water:	47.3 ft bgs		California
Drilling Asst:	J. Candelaria / F. Sandoval	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	Joe Latham	Sampling Interval:	Continuous		
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
101					GM				
102		IRZ-31-SS-100-105 1/12/2020 09:58					(100.5 - 107.0') Topock - Alluvium Deposits; Well graded gravel with sand (GW); yellowish brown / moderate yellowish brown (10YR 5/4); granules to very large pebbles, angular to subangular; and very fine to very coarse grained sand, subangular to subround; trace silt; some coarser clasts composed of metadiorite; trace mica; dry to moist; iron oxide staining (102') brown (7.5YR 5/4); moist		
103									
104	120		IRZ-31-VAS-102-107 (2300 ppb) 1/10/2020 10:35	Topock - Alluvium Deposits	GW		(105.5'); dry to moist		
105									
106									
107		IRZ-31-SS-105-110 1/12/2020 10:10					(107.0 - 114.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); granules to very large pebbles, angular to subround; some very fine to very coarse grained sand, angular to subround; little silt; some coarser clasts composed of metadiorite; trace mica; moist to wet; iron oxide staining (108.5'); dry to moist		
108									
109							(109.5'); dry		
110					GM				
111				Topock - Alluvium Deposits			(111.5') grayish brown (10YR 5/2); dry		
112	120	IRZ-31-SS-110-115 1/12/2020 10:13					(112') brown (7.5YR 5/4); dry to moist	(112.0 - 114.0') Drill rods chattering	
113									
114									
115							(114.0 - 120.3') Topock - Weathered Bedrock - conglomerate; Silty sand with gravel (SM); reddish brown (2.5YR 4/4); very fine grained to very coarse grained, subangular to subround; some granules to very large pebbles, angular to subangular; little silt; some coarser clasts composed of metadiorite; moist; iron oxide staining (115'); wet	(114.0 - 120.0') Soft drilling	
116									
117		IRZ-31-SS-115-120 1/12/2020 10:15	IRZ-31-VAS-115-120 (2500 ppb) 1/11/2020 11:33	Topock - Weathered Bedrock - conglomerate	SM		(117.5'); moist		
118	120								
119									
120									


Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, NR = no recovery; Notes: depth to water measured during the collection of the first VAS interval; apparent partial recoveries can be the result of potential compaction of sediments in the core bag



# Boring Log

Sheet: 7 of 7

Date Started:	01/07/2020	Surface Elevation:	502.11 ft amsl	<b>Boring No.: IRZ-31 Pilot</b>	
Date Completed:	01/10/2020	Northing (NAD83):	2101940.23		
Drilling Co.:	Cascade	Easting (NAD83):	7615789.13	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	127 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Boart Longyear Track Mount	Borehole Diameter:	6-10 inches	Location:	PG&E Topock, Needles, California
Driller Name:	Eddie Ramos	Depth to First Water:	47.3 ft bgs	Project Number:	RC000753.0051
Drilling Asst:	J. Candelaria / F. Sandoval	Sampling Method:	4 inch x 10 ft Core Barrel		
Logger:	Joe Latham	Sampling Interval:	Continuous		
Editor:	Grant Willford	Converted to Well:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
121	120			Topock - Competent Bedrock - conglomerate			(120.3 - 127.0') Topock - Competent Bedrock - conglomerate; brown (7.5YR 5/4); dry, friable, pulverized	(120.0 - 122.0') Drill rods chattering	
122									
123									
124									
125									
126									
127									
End of Boring at 127.0 ft bgs.									
128									
129									
130									
131									
132									
133									
134									
135									
136									
137									
138									
139									
140									



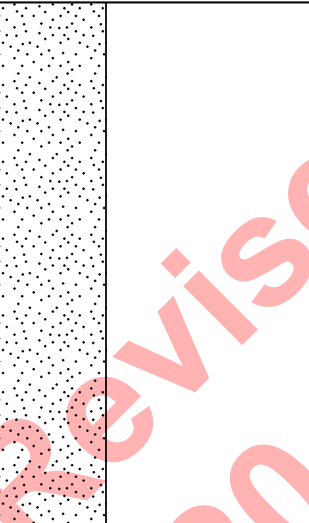

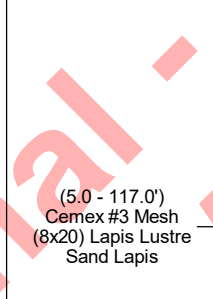
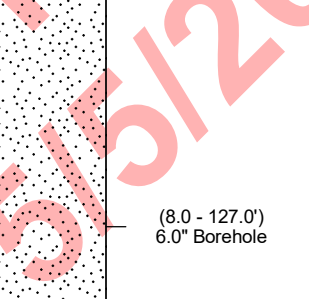


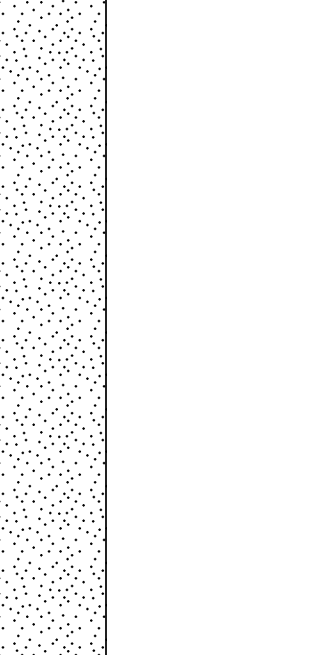



Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, NR = no recovery; Notes: depth to water measured during the collection of the first VAS interval; apparent partial recoveries can be the result of potential compaction of sediments in the core bag

Date Started:	01/11/2020	Surface Elevation:	502.11 ft amsl	<b>Well ID: IRZ-31 Pilot</b>
Date Completed:	01/11/2020	Northing (NAD83):	2101940.23	
Drilling Co.:	Cascade	Easting (NAD83):	7615789.13	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	127 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Eddie Ramos	Borehole Diameter:	6-10 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	J. Candelaria / F. Sandoval	Depth to First Water:	47.3 ft bgs	
Logger:	Joe Latham	Editor:	Grant Willford	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					(0.0 - 0.5') Steel Plate		Note: Steel plates with BMPs in place
2							
3					(0.5 - 5.0') Cemex #60 Mesh (40x70) Lapis Lustre Sand	(0.5 - 5.0') 4.9 bags	(0.5 - 5.0') 5 bags (102%) Note: Surface seal sand
4			NR				
5					(0.0 - 8.0') 10.0" Borehole		
6							
7							
8							
9							
10							
11							
12		Topock - Alluvium Deposits	GW		(5.0 - 117.0') Cemex #3 Mesh (8x20) Lapis Lustre Sand Lapis	(5.0 - 117.0') 46.1 bags	(5.0 - 117.0') 58 bags (126%) Note: Backfill sand, used >20% of the calculated volume due to potential voids forming during drilling
13							
14					(8.0 - 127.0') 6.0" Borehole		
15							
16							
17							
18		Topock - Alluvium Deposits	SM				
19							
20							

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, NR = no recovery; Notes: depth to water measured during the collection of the first VAS interval; granular backfill material was removed during overdrilling of the pilot borehole

Date Started:	01/11/2020	Surface Elevation:	502.11 ft amsl	<b>Well ID: IRZ-31 Pilot</b>
Date Completed:	01/11/2020	Northing (NAD83):	2101940.23	
Drilling Co.:	Cascade	Easting (NAD83):	7615789.13	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	127 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Eddie Ramos	Borehole Diameter:	6-10 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	J. Candelaria / F. Sandoval	Depth to First Water:	47.3 ft bgs	
Logger:	Joe Latham	Editor:	Grant Willford	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 - Alluvium Deposits	SM					
22								
23								
24								
25								
26		Topock - Alluvium Deposits	SW-SM					
27								
28								
29								
30								
31		Topock - Alluvium Deposits	GW				(5.0 - 117.0') Cemex #3 Mesh (8x20) Lapis Lustre Sand Lapis	(8.0 - 127.0') 6.0" Borehole
32								
33								
34								
35								
36								
37								
38								
39								
40								
			GW-GM					(5.0 - 117.0') 58 bags (126%) Note: Backfill sand, used >20% of the calculated volume due to potential voids forming during drilling

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, NR = no recovery; Notes: depth to water measured during the collection of the first VAS interval; granular backfill material was removed during overdrilling of the pilot borehole

Date Started:	01/11/2020	Surface Elevation:	502.11 ft amsl	Well ID: IRZ-31 Pilot
Date Completed:	01/11/2020	Northing (NAD83):	2101940.23	
Drilling Co.:	Cascade	Easting (NAD83):	7615789.13	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	127 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Eddie Ramos	Borehole Diameter:	6-10 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	J. Candelaria / F. Sandoval	Depth to First Water:	47.3 ft bgs	
Logger:	Joe Latham	Editor:	Grant Willford	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		Topock - Alluvium Deposits	GW-GM				
42							
43							
44		Topock - Alluvium Deposits	SM				
45							
46							
47		Topock - Alluvium Deposits	ML		(5.0 - 117.0') Cemex #3 Mesh (8x20) Lapis Lustre Sand Lapis	(8.0 - 127.0') 6.0" Borehole	(5.0 - 117.0') 46.1 bags
48							
49							
50	IRZ-31-VAS-48-53 (2000 ppb) 1/8/2020 15:45						
51							
52							
53							
54							
55		Topock - Alluvium Deposits	GM				
56							
57							
58		Topock - Alluvium Deposits	SP-SM				
59		Topock - Alluvium Deposits	GM				
60							

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, NR = no recovery; Notes: depth to water measured during the collection of the first VAS interval; granular backfill material was removed during overdrilling of the pilot borehole

Date Started:	01/11/2020	Surface Elevation:	502.11 ft amsl	<b>Well ID: IRZ-31 Pilot</b>
Date Completed:	01/11/2020	Northing (NAD83):	2101940.23	
Drilling Co.:	Cascade	Easting (NAD83):	7615789.13	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	127 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Eddie Ramos	Borehole Diameter:	6-10 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	J. Candelaria / F. Sandoval	Depth to First Water:	47.3 ft bgs	
Logger:	Joe Latham	Editor:	Grant Willford	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	GM				
62			SW-SM				
63							
64		Topock - Alluvium Deposits	GM				
65							
66							
67		Topock - Alluvium Deposits	SM				
68							
69							
70					(5.0 - 117.0') Cemex #3 Mesh (8x20) Lapis Lustre Sand Lapis	(8.0 - 127.0') 6.0" Borehole	(5.0 - 117.0') 46.1 bags
71		Topock - Alluvium Deposits	GM				(5.0 - 117.0') 58 bags (126%) Note: Backfill sand, used >20% of the calculated volume due to potential voids forming during drilling
72							
73							
74	IRZ-31-VAS-72-77 (480 ppb) 1/9/2020 13:10						
75							
76		Topock - Alluvium Deposits	GM				
77							
78							
79		Topock - Alluvium Deposits	SW-SM				
80							

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, NR = no recovery; Notes: depth to water measured during the collection of the first VAS interval; granular backfill material was removed during overdrilling of the pilot borehole

Date Started:	01/11/2020	Surface Elevation:	502.11 ft amsl	Well ID: IRZ-31 Pilot
Date Completed:	01/11/2020	Northing (NAD83):	2101940.23	
Drilling Co.:	Cascade	Easting (NAD83):	7615789.13	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	127 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Eddie Ramos	Borehole Diameter:	6-10 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	J. Candelaria / F. Sandoval	Depth to First Water:	47.3 ft bgs	
Logger:	Joe Latham	Editor:	Grant Willford	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	GM				
82							
83							
84							
85		Topock - Alluvium Deposits	SM				
86							
87		Topock - Alluvium Deposits	SM		(5.0 - 117.0') Cemex #3 Mesh (8x20) Lapis Lustre Sand Lapis	(8.0 - 127.0') 6.0" Borehole	(5.0 - 117.0') 46.1 bags
88							
89							
90		Topock - Alluvium Deposits	GM				(5.0 - 117.0') 58 bags (126%) Note: Backfill sand, used >20% of the calculated volume due to potential voids forming during drilling
91							
92							
93							
94							
95		Topock - Alluvium Deposits	SM				
96							
97							
98		Topock - Alluvium Deposits	GM				
99							
100							

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, NR = no recovery; Notes: depth to water measured during the collection of the first VAS interval; granular backfill material was removed during overdrilling of the pilot borehole



# Temporary Backfill Log

Date Started:	01/11/2020	Surface Elevation:	502.11 ft amsl	<b>Well ID: IRZ-31 Pilot</b>
Date Completed:	01/11/2020	Northing (NAD83):	2101940.23	
Drilling Co.:	Cascade	Easting (NAD83):	7615789.13	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	127 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Eddie Ramos	Borehole Diameter:	6-10 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	J. Candelaria / F. Sandoval	Depth to First Water:	47.3 ft bgs	
Logger:	Joe Latham	Editor:	Grant Willford	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			GM				
102							
103							
104	IRZ-31-VAS-102-107 (2300 ppb) 1/10/2020 10:35	Topock - Alluvium Deposits	GW				
105							
106							
107							
108							
109					(5.0 - 117.0') Cemex #3 Mesh (8x20) Lapis Lustre Sand Lapis	(5.0 - 117.0') 46.1 bags	(5.0 - 117.0') 58 bags (126%) Note: Backfill sand, used >20% of the calculated volume due to potential voids forming during drilling
110		Topock - Alluvium Deposits	GM		(8.0 - 127.0') 6.0" Borehole		
111							
112							
113							
114							
115							
116							
117	IRZ-31-VAS-115-120 (2500 ppb) 1/11/2020 11:33	Topock - Weathered Bedrock - conglomerate	SM				
118					(117.0 - 127.0') Cemex # 2/12 Mesh (16x30) Lapis Lustre Sand	(117.0 - 127.0') 3.9 bags	(117.0 - 127.0') 6 bags (154%) Note: Indicator sand, used >20% of the calculated volume due to potential voids forming during drilling
119							
120							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, BMP = Best Management Practices for stormwater, NR = no recovery; Notes: depth to water measured during the collection of the first VAS interval; granular backfill material was removed during overdrilling of the pilot borehole

Date Started:	01/11/2020	Surface Elevation:	502.11 ft amsl	<b>Well ID: IRZ-31 Pilot</b>
Date Completed:	01/11/2020	Northing (NAD83):	2101940.23	
Drilling Co.:	Cascade	Easting (NAD83):	7615789.13	Client: PG&E
Drilling Method:	Sonic Drilling	Total Depth:	127 ft bgs	Project: Final GW Remedy Phase 1
Driller Name:	Eddie Ramos	Borehole Diameter:	6-10 inches	Location: PG&E Topock, Needles, California
Drilling Asst:	J. Candelaria / F. Sandoval	Depth to First Water:	47.3 ft bgs	
Logger:	Joe Latham	Editor:	Grant Willford	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								
122								
123								
124		Topock - Competent Bedrock - conglomerate			(117.0 - 127.0') Cemex # 2/12 Mesh (16x30) Lapis Lustre Sand	(8.0 - 127.0') 6.0" Borehole	(117.0 - 127.0') 3.9 bags	(117.0 - 127.0') 6 bags (154%) Note: Indicator sand, used >20% of the calculated volume due to potential voids forming during drilling
125								
126								
127								
128								
129								
130								
131								
132								
133								
134								
135								
136								
137								
138								
139								
140								

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, NR = no recovery; Notes: depth to water measured during the collection of the first VAS interval; granular backfill material was removed during overdrilling of the pilot borehole