Well Construction Log

ARCADIS Design & Consultancy for natural and built assets

Date Started:	09/08/2019	Surface Elevation:	466.88 ft amsl	**Well ID: RB-3**	
Date Completed:	06/30/2020	Shallow Well Elevation:	467.13 ft amsl		
Drilling Co.:	Cascade	Deep Well Elevation:	NA ft amsl	Client:	PG&E
Drilling Method:	Dual Rotary	Northing (NAD83):	2103173.56	Project:	Final GW Remedy Phase 1
Driller Name:	Jon Martinez	Easting (NAD83):	7616213.59	Location:	PG&E Topock, Needles, California
Drilling Asst:	A. & H. Amezguita	Borehole Diameter:	16 inches		
Logger:	A. Mack / E. Redner	Static Water Level:	See Log for Depths	Project Number:	RC000753.0051
Editor:	Sean McGrane	Development End Date:	6/16/2020		
Total Depth:	224 ft bgs	Well Completion:	☒ Flush ☐ Stick-up ☐ To Be Completed in Well Vault		

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed Note: percentages are the actual volume vs the calculated volume
0					(+1.0 - 2.5') Temporary surface completion		(+1.0 - 2.5') 21.5 bags Note: 30 inch diameter Quickrete and Kon-Crete cement pad dyed buff with 18 inch diameter lockable vault.
1					(+0.3 - 25.0') 8" SHUR-GRIP SDR17 PVC Casing		Note: 12 inch diameter sonotube around well casing filled with native sand.
2					(0.0 - 3.0') 18.0" Borehole		
3					(2.5 - 3.8') Formation Collapse		
4		Topock - Fill	SP				
5							
6							
7							
8					(3.8 - 11.9') Portland Cement 3% Bentonite Type I, II and V with Hydrogel	(3.8 - 11.9') 86.9 gallons	(3.8 - 11.9') 120 gallons (138%) Note: Grout seal, used >20% of the calculated volume due to potential grout migration and voids forming during drilling.
9							
10					(9.5 - 10.5') Centralizer		
11			NR		(3.0 - 21.1') 18.0" Borehole		
12							
13					(11.9 - 14.0') Bentonite seal pellets Pel-Plug (TR30) 3/8"	(11.9 - 14.0') 4.8 buckets	(11.9 - 14.0') 5 buckets (104%) Note: Seal between transition sand and grout seal.
14							
15					(14.0 - 17.1') Cemex #60 Mesh (40x70) Lapis Lustre Sand	(14.0 - 17.1') 8.6 bags	(14.0 - 17.1') 8 bags (93%) Note: Transition sand
16	RB-3-VAS-15-20 (<0.033 U ppb) 4/26/2019 15:35						
17		Topock - Fill	SP				
18					(17.1 - 93.9') Cemex #0/30 Mesh (30x70) Lapis Lustre Sand	(17.1 - 93.9') 217.7 bags	(17.1 - 93.9') 204.5 bags (94%) Note: Filter pack, swabbed for approximately 1.0 hour prior to installing additional annular materials.
			NR				

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

Well Construction Log

ARCADIS Design & Consultancy for natural and built assets

Date Started:	09/08/2019	Surface Elevation:	466.88 ft amsl	**Well ID: RB-3**	
Date Completed:	06/30/2020	Shallow Well Elevation:	467.13 ft amsl		
Drilling Co.:	Cascade	Deep Well Elevation:	NA ft amsl	Client:	PG&E
Drilling Method:	Dual Rotary	Northing (NAD83):	2103173.56	Project:	Final GW Remedy Phase 1
Driller Name:	Jon Martinez	Easting (NAD83):	7616213.59	Location:	PG&E Topock, Needles, California
Drilling Asst:	A. & H. Amezguita	Borehole Diameter:	16 inches		
Logger:	A. Mack / E. Redner	Static Water Level:	See Log for Depths	Project Number:	RC000753.0051
Editor:	Sean McGrane	Development End Date:	6/16/2020		
Total Depth:	224 ft bgs	Well Completion:	☒ Flush ☐ Stick-up ☐ To Be Completed in Well Vault		

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed Note: percentages are the actual volume vs the calculated volume
20			NR		(+0.3 - 25.0') 8" SHUR-GRIP SDR17 PVC Casing; (3.0 - 21.1') 18.0" Borehole		
21							
22							
23							
24							
25					(25.0 - 53.0') 8" 10-Slot 316 SS Wire Wrap Screen		
26		Topock - Fill	SP				
27							
28							
29					(17.1 - 93.9') Cemex #0/30 Mesh (30x70) Lapis Lustre Sand	(17.1 - 93.9') 217.7 bags	(17.1 - 93.9') 204.5 bags (94%) Note: Filter pack, swabbed for approximately 1.0 hour prior to installing additional annular materials.
30					(21.1 - 41.3') 18.0" Borehole		
31							
32							
33							
34			NR				
35							
36							
37		Topock - Fill	SP				
38							

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

Well Construction Log

ARCADIS Design & Consultancy for natural and built assets

Date Started:	09/08/2019	Surface Elevation:	466.88 ft amsl	**Well ID: RB-3**	
Date Completed:	06/30/2020	Shallow Well Elevation:	467.13 ft amsl		
Drilling Co.:	Cascade	Deep Well Elevation:	NA ft amsl	Client:	PG&E
Drilling Method:	Dual Rotary	Northing (NAD83):	2103173.56	Project:	Final GW Remedy Phase 1
Driller Name:	Jon Martinez	Easting (NAD83):	7616213.59	Location:	PG&E Topock, Needles, California
Drilling Asst:	A. & H. Amezguita	Borehole Diameter:	16 inches		
Logger:	A. Mack / E. Redner	Static Water Level:	See Log for Depths	Project Number:	RC000753.0051
Editor:	Sean McGrane	Development End Date:	6/16/2020		
Total Depth:	224 ft bgs	Well Completion:	☒ Flush ☐ Stick-up ☐ 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
40		Topock - Fill	SP		(25.0 - 53.0') 8" 10-Slot 316 SS Wire Wrap Screen		
41		Topock - Fluvial Deposits	SW		(21.1 - 41.3') 18.0" Borehole		
42							
43							
44			NR				
45		Topock - Fluvial Deposits	SW				
46							
47		Topock - Fluvial Deposits	GW		(17.1 - 93.9') Cemex #0/30 Mesh (30x70) Lapis Lustre Sand	(17.1 - 93.9') 217.7 bags	(17.1 - 93.9') 204.5 bags (94%) Note: Filter pack, swabbed for approximately 1.0 hour prior to installing additional annular materials.
48							
49							
50		Topock - Fluvial Deposits	SP		(41.3 - 61.2') 18.0" Borehole		
51							
52	RB-3-VAS-50-55 (0.100 J ppb) 4/27/2019 11:10						
53			NR		(53.0 - 63.0') 8" SHUR-GRIP SDR17 PVC Casing		
54							
55							
56		Topock - Fluvial Deposits	GW				
57					(56.5 - 57.5') Centralizer		
58		Topock - Fluvial Deposits	ML				

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

Well Construction Log

ARCADIS Design & Consultancy for natural and built assets

Date Started:	09/08/2019	Surface Elevation:	466.88 ft amsl	**Well ID: RB-3**	
Date Completed:	06/30/2020	Shallow Well Elevation:	467.13 ft amsl		
Drilling Co.:	Cascade	Deep Well Elevation:	NA ft amsl	Client:	PG&E
Drilling Method:	Dual Rotary	Northing (NAD83):	2103173.56	Project:	Final GW Remedy Phase 1
Driller Name:	Jon Martinez	Easting (NAD83):	7616213.59	Location:	PG&E Topock, Needles, California
Drilling Asst:	A. & H. Amezguita	Borehole Diameter:	16 inches		
Logger:	A. Mack / E. Redner	Static Water Level:	See Log for Depths	Project Number:	RC000753.0051
Editor:	Sean McGrane	Development End Date:	6/16/2020		
Total Depth:	224 ft bgs	Well Completion:	☒ Flush ☐ Stick-up ☐ To Be Completed in Well Vault		

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Well Construction	Calculated Material Volumes	Material Volumes Installed Note: percentages are the actual volume vs the calculated volume
60			ML		(53.0 - 63.0') 8" SHUR-GRIP SDR17 PVC Casing; (41.3 - 61.2') 18.0" Borehole		
61							
62		Topock - Alluvium Deposits	ML				
63					(63.0 - 91.0') 8" 10-Slot 316 SS Wire Wrap Screen		
64							
65		Topock - Alluvium Deposits	GM				
66							
67							
68							
69					(17.1 - 93.9') Cemex #0/30 Mesh (30x70) Lapis Lustre Sand	(17.1 - 93.9') 217.7 bags	(17.1 - 93.9') 204.5 bags (94%) Note: Filter pack, swabbed for approximately 1.0 hour prior to installing additional annular materials.
70							
71		Topock - Alluvium Deposits	SM				
72							
73							
74							
75							
76							
77					(61.2 - 81.1') 18.0" Borehole		
78		Topock - Alluvium Deposits	ML				

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

Well Construction Log

ARCADIS Design & Consultancy for natural and built assets

Date Started:	09/08/2019	Surface Elevation:	466.88 ft amsl	**Well ID: RB-3**	
Date Completed:	06/30/2020	Shallow Well Elevation:	467.13 ft amsl		
Drilling Co.:	Cascade	Deep Well Elevation:	NA ft amsl	Client:	PG&E
Drilling Method:	Dual Rotary	Northing (NAD83):	2103173.56	Project:	Final GW Remedy Phase 1
Driller Name:	Jon Martinez	Easting (NAD83):	7616213.59	Location:	PG&E Topock, Needles, California
Drilling Asst:	A. & H. Amezguita	Borehole Diameter:	16 inches		
Logger:	A. Mack / E. Redner	Static Water Level:	See Log for Depths	Project Number:	RC000753.0051
Editor:	Sean McGrane	Development End Date:	6/16/2020		
Total Depth:	224 ft bgs	Well Completion:	☒ Flush ☐ Stick-up ☐ 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
80					(63.0 - 91.0') 8" 10-Slot 316 SS Wire Wrap Screen; (61.2 - 81.1') 18.0" Borehole		
81							
82	RB-3-VAS-80-85 (0.132 J ppb) 4/27/2019 15:18						
83							
84		Topock - Alluvium Deposits	SM				
85							
86					(17.1 - 93.9') Cemex #0/30 Mesh (30x70) Lapis Lustre Sand	(17.1 - 93.9') 217.7 bags	(17.1 - 93.9') 204.5 bags (94%) Note: Filter pack, swabbed for approximately 1.0 hour prior to installing additional annular materials.
87							
88							
89							
90		Topock - Alluvium Deposits	ML		(81.1 - 101.5') 18.0" Borehole		
91							
92					(91.0 - 111.0') 8" SHUR-GRIP SDR17 PVC Casing		
93		Topock - Alluvium Deposits	SM				
94					(93.9 - 94.9') Cemex #60 Mesh (40x70) Lapis Lustre Sand	(93.9 - 94.9') 2.8 bags	(93.9 - 94.9') 2 bags (71%) Note: Lapis Lustre Sand, used <20% of the calculated volume due to potential formation collapse when puling the casing
95							
96							
97		Topock - Alluvium Deposits	GM		(94.9 - 100.5') Bentonite seal pellets Pel-Plug (TR30) 3/8"	(94.9 - 100.5') 12.8 buckets	(94.9 - 100.5') 10 buckets (78%) Note: Intermediate seal, used <20% of the calculated volume due to potential formation collapse when puling the casing
98							

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

Well Construction Log

ARCADIS Design & Consultancy for natural and built assets

Date Started:	09/08/2019	Surface Elevation:	466.88 ft amsl	**Well ID: RB-3**	
Date Completed:	06/30/2020	Shallow Well Elevation:	467.13 ft amsl		
Drilling Co.:	Cascade	Deep Well Elevation:	NA ft amsl	Client:	PG&E
Drilling Method:	Dual Rotary	Northing (NAD83):	2103173.56	Project:	Final GW Remedy Phase 1
Driller Name:	Jon Martinez	Easting (NAD83):	7616213.59	Location:	PG&E Topock, Needles, California
Drilling Asst:	A. & H. Amezguita	Borehole Diameter:	16 inches		
Logger:	A. Mack / E. Redner	Static Water Level:	See Log for Depths	Project Number:	RC000753.0051
Editor:	Sean McGrane	Development End Date:	6/16/2020		
Total Depth:	224 ft bgs	Well Completion:	☒ Flush ☐ Stick-up ☐ 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
100		Topock - Alluvium Deposits	GM		(94.9 - 100.5') Bentonite seal pellets Pel-Plug (TR30) 3/8" (91.0 - 111.0') 8" SHUR-GRIP SDR17 PVC Casing (81.1 - 101.5') 18.0" Borehole	(94.9 - 100.5') 12.8 buckets	(94.9 - 100.5') 10 buckets (78%) Note: Intermediate seal, used <20% of the calculated volume due to potential formation collapse when puling the casing
101							
102		Topock - Alluvium Deposits	SM				
103							
104							
105		Topock - Alluvium Deposits	GM				
106					(105.5 - 106.5') Centralizer (101.5 - 110.6') 18.0" Borehole		
107							
108		Topock - Alluvium Deposits	SM				
109		Topock - Alluvium Deposits	GM		(100.5 - 224.0') Cemex #60 Mesh (40x70) Lapis Lustre Sand	(100.5 - 224.0') 267.4 bags	(100.5 - 224.0') 285 bags (107%) Note: Filter pack, swabbed for approximately 3.5 hours prior to installing additional annular materials.
110							
111					(111.0 - 193.9') 8" 8-Slot 316 SS Wire Wrap Screen		
112							
113							
114							
115					(110.6 - 120.8') 16.0" Borehole		
116							
117		Topock - Alluvium Deposits	SM				
118							

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

Well Construction Log

ARCADIS Design & Consultancy for natural and built assets

Date Started:	09/08/2019	Surface Elevation:	466.88 ft amsl	**Well ID: RB-3**	
Date Completed:	06/30/2020	Shallow Well Elevation:	467.13 ft amsl		
Drilling Co.:	Cascade	Deep Well Elevation:	NA ft amsl	Client:	PG&E
Drilling Method:	Dual Rotary	Northing (NAD83):	2103173.56	Project:	Final GW Remedy Phase 1
Driller Name:	Jon Martinez	Easting (NAD83):	7616213.59	Location:	PG&E Topock, Needles, California
Drilling Asst:	A. & H. Amezguita	Borehole Diameter:	16 inches		
Logger:	A. Mack / E. Redner	Static Water Level:	See Log for Depths	Project Number:	RC000753.0051
Editor:	Sean McGrane	Development End Date:	6/16/2020		
Total Depth:	224 ft bgs	Well Completion:	☒ Flush ☐ Stick-up ☐ 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
120					(111.0 - 193.9') 8" 8-Slot 316 SS Wire Wrap Screen; (110.6 - 120.8') 16.0" Borehole		
121							
122	RB-3-VAS-120-125 (<0.17 U ppb) 4/28/2019 11:29						
123							
124							
125							
126		Topock - Alluvium Deposits	SM				
127							
128							
129					(100.5 - 224.0') Cemex #60 Mesh (40x70) Lapis Lustre Sand	(100.5 - 224.0') 267.4 bags	(100.5 - 224.0') 285 bags (107%) Note: Filter pack, swabbed for approximately 3.5 hours prior to installing additional annular materials.
130							
131							
132							
133							
134							
135					(120.8 - 140.5') 16.0" Borehole		
136							
137		Topock - Alluvium Deposits	GM				
138							

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

Well Construction Log

ARCADIS Design & Consultancy for natural and built assets

Date Started:	09/08/2019	Surface Elevation:	466.88 ft amsl	**Well ID: RB-3**	
Date Completed:	06/30/2020	Shallow Well Elevation:	467.13 ft amsl		
Drilling Co.:	Cascade	Deep Well Elevation:	NA ft amsl	Client:	PG&E
Drilling Method:	Dual Rotary	Northing (NAD83):	2103173.56	Project:	Final GW Remedy Phase 1
Driller Name:	Jon Martinez	Easting (NAD83):	7616213.59	Location:	PG&E Topock, Needles, California
Drilling Asst:	A. & H. Amezguita	Borehole Diameter:	16 inches		
Logger:	A. Mack / E. Redner	Static Water Level:	See Log for Depths	Project Number:	RC000753.0051
Editor:	Sean McGrane	Development End Date:	6/16/2020		
Total Depth:	224 ft bgs	Well Completion:	☒ Flush ☐ Stick-up ☐ 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
140		Topock - Alluvium Deposits	GM		(111.0 - 193.9') 8" 8-Slot 316 SS Wire Wrap Screen (120.8 - 140.5') 16.0" Borehole		
141							
142							
143							
144							
145		Topock - Alluvium Deposits	SM				
146							
147							
148							
149					(100.5 - 224.0') Cemex #60 Mesh (40x70) Lapis Lustre Sand	(100.5 - 224.0') 267.4 bags	(100.5 - 224.0') 285 bags (107%) Note: Filter pack, swabbed for approximately 3.5 hours prior to installing additional annular materials.
150		Topock - Alluvium Deposits	GM				
151							
152	RB-3-VAS-150-155 (<0.17 U ppb) 4/29/2019 10:13						
153		Topock - Alluvium Deposits	SM				
154							
155					(140.5 - 161.6') 16.0" Borehole		
156							
157		Topock - Weathered Bedrock - conglomerate	ML				
158							

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

Well Construction Log

ARCADIS Design & Consultancy for natural and built assets

Date Started:	09/08/2019	Surface Elevation:	466.88 ft amsl	**Well ID: RB-3**	
Date Completed:	06/30/2020	Shallow Well Elevation:	467.13 ft amsl		
Drilling Co.:	Cascade	Deep Well Elevation:	NA ft amsl	Client:	PG&E
Drilling Method:	Dual Rotary	Northing (NAD83):	2103173.56	Project:	Final GW Remedy Phase 1
Driller Name:	Jon Martinez	Easting (NAD83):	7616213.59	Location:	PG&E Topock, Needles, California
Drilling Asst:	A. & H. Amezguita	Borehole Diameter:	16 inches		
Logger:	A. Mack / E. Redner	Static Water Level:	See Log for Depths	Project Number:	RC000753.0051
Editor:	Sean McGrane	Development End Date:	6/16/2020		
Total Depth:	224 ft bgs	Well Completion:	☒ Flush ☐ Stick-up ☐ 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
160					(111.0 - 193.9') 8" 8-Slot 316 SS Wire Wrap Screen; (140.5 - 161.6') 16.0" Borehole		
161							
162							
163							
164							
165							
166							
167							
168							
169		Topock - Weathered Bedrock - conglomerate	ML		(100.5 - 224.0') Cemex #60 Mesh (40x70) Lapis Lustre Sand	(100.5 - 224.0') 267.4 bags	(100.5 - 224.0') 285 bags (107%) Note: Filter pack, swabbed for approximately 3.5 hours prior to installing additional annular materials.
170							
171					(161.6 - 181.8') 16.0" Borehole		
172							
173							
174							
175							
176							
177							
178							

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

Well Construction Log

ARCADIS Design & Consultancy for natural and built assets

Date Started:	09/08/2019	Surface Elevation:	466.88 ft amsl	**Well ID: RB-3**	
Date Completed:	06/30/2020	Shallow Well Elevation:	467.13 ft amsl		
Drilling Co.:	Cascade	Deep Well Elevation:	NA ft amsl	Client:	PG&E
Drilling Method:	Dual Rotary	Northing (NAD83):	2103173.56	Project:	Final GW Remedy Phase 1
Driller Name:	Jon Martinez	Easting (NAD83):	7616213.59	Location:	PG&E Topock, Needles, California
Drilling Asst:	A. & H. Amezguita	Borehole Diameter:	16 inches		
Logger:	A. Mack / E. Redner	Static Water Level:	See Log for Depths	Project Number:	RC000753.0051
Editor:	Sean McGrane	Development End Date:	6/16/2020		
Total Depth:	224 ft bgs	Well Completion:	☒ Flush ☐ Stick-up ☐ 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
180					(111.0 - 193.9') 8" 8-Slot 316 SS Wire Wrap Screen (161.6 - 181.8') 16.0" Borehole		
181							
182	RB-3-VAS-180-185 (<0.033 U ppb) 4/29/2019 15:38						
183							
184							
185		Topock - Weathered Bedrock - conglomerate	ML				
186							
187							
188							
189					(100.5 - 224.0') Cemex #60 Mesh (40x70) Lapis Lustre Sand	(100.5 - 224.0') 267.4 bags	(100.5 - 224.0') 285 bags (107%) Note: Filter pack, swabbed for approximately 3.5 hours prior to installing additional annular materials.
190							
191					(181.8 - 201.2') 16.0" Borehole		
192							
193		Topock - Weathered Bedrock - conglomerate	SM				
194					(193.9 - 194.4') PVC plug		Note: Installed to repair well.
195							
196					(194.4 - 216.1') 8" 8-Slot 316 SS Wire Wrap Screen filled with Cal-Silica 1/4"-3/8" pea gravel	(194.4 - 222.0') 19.3 bags	(194.4 - 222.0') 17 bags (88%) Note: Pea gravel installed to backfill sump and screen above damaged and twisted section at 198 to 205 ft bgs.
197		Topock - Weathered Bedrock - conglomerate	ML				
198							

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

Well Construction Log

Sheet: 11 of 12

Date Started:	09/08/2019	Surface Elevation:	466.88 ft amsl	**Well ID: RB-3**	
Date Completed:	06/30/2020	Shallow Well Elevation:	467.13 ft amsl		
Drilling Co.:	Cascade	Deep Well Elevation:	NA ft amsl	Client:	PG&E
Drilling Method:	Dual Rotary	Northing (NAD83):	2103173.56	Project:	Final GW Remedy Phase 1
Driller Name:	Jon Martinez	Easting (NAD83):	7616213.59	Location:	PG&E Topock, Needles, California
Drilling Asst:	A. & H. Amezguita	Borehole Diameter:	16 inches		
Logger:	A. Mack / E. Redner	Static Water Level:	See Log for Depths	Project Number:	RC000753.0051
Editor:	Sean McGrane	Development End Date:	6/16/2020		
Total Depth:	224 ft bgs	Well Completion:	☒ Flush ☐ Stick-up ☐ 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
200					(181.8 - 201.2') 16.0" Borehole		
201							
202							
203							
204							
205							
206		Topock - Weathered Bedrock - conglomerate	ML				
207	RB-3-VAS-205-210 (<0.17 U ppb) 4/30/2019 15:15						
208					(100.5 - 224.0') Cemex #60 Mesh (40x70) Lapis Lustre Sand	(100.5 - 224.0') 267.4 bags	(100.5 - 224.0') 285 bags (107%) Note: Filter pack, swabbed for approximately 3.5 hours prior to installing additional annular materials.
209							
210					(201.2 - 220.5') 16.0" Borehole		
211					(194.4 - 216.1') 8" 8-Slot 316 SS Wire Wrap Screen filled with Cal-Silica 1/4"-3/8" pea gravel		
212						(194.4 - 222.0') 19.3 bags	(194.4 - 222.0') 17 bags (88%) Note: Pea gravel installed to backfill sump and screen above damaged and twisted section at 198 to 205 ft bgs.
213							
214							
215		Topock - Weathered Bedrock - conglomerate	SM				
216							
217					(216.1 - 222.0') 8" SHUR-GRIP SDR17 PVC Sump and End Cap filled Cal-Silica 1/4"-3/8" pea gravel		
218		Topock - Weathered Bedrock -	ML		(218.0 - 219.0') Centralizer		

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

Well Construction Log

ARCADIS Design & Consultancy for natural and built assets

Date Started:	09/08/2019	Surface Elevation:	466.88 ft amsl	**Well ID: RB-3**	
Date Completed:	06/30/2020	Shallow Well Elevation:	467.13 ft amsl		
Drilling Co.:	Cascade	Deep Well Elevation:	NA ft amsl	Client:	PG&E
Drilling Method:	Dual Rotary	Northing (NAD83):	2103173.56	Project:	Final GW Remedy Phase 1
Driller Name:	Jon Martinez	Easting (NAD83):	7616213.59	Location:	PG&E Topock, Needles, California
Drilling Asst:	A. & H. Amezguita	Borehole Diameter:	16 inches		
Logger:	A. Mack / E. Redner	Static Water Level:	See Log for Depths	Project Number:	RC000753.0051
Editor:	Sean McGrane	Development End Date:	6/16/2020		
Total Depth:	224 ft bgs	Well Completion:	☒ Flush ☐ Stick-up ☐ 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
220		conglomerate			(201.2 - 220.5') 16.0" Borehole	(194.4 - 216.1') 19.3 bags	(194.4 - 222.0') 17 bags (88%) Note: Pea gravel installed to backfill sump and screen aboved amaged and twisted section at 198 to 205 ft bgs.
221		Topock - Weathered Bedrock - conglomerate	ML		(216.1 - 222.0') 8" SHUR-GRIP SDR17 PVC Sump and End Cap filled Cal-Silica 1/4"-3/8" pea gravel		
222					(220.5 - 224.0') 16.0" Borehole	(100.5 - 224.0') 267.4 bags	(100.5 - 224.0') 285 bags (107%) Note: Filter pack, swabbed for approximately 3.5 hours prior toi nstalling additional annular materials.
223							
224					End of Boring at 224.0 ft bgs.		
225							
226							
227							
228							
229							
230							
231							
232							
233							
234							
235							
236							
237							
238							

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

ARCADIS Design & Consultancy for natural and built assets

Drilling Log

Boring No.: RB-3

Date Started:	08/24/2019	Surface Elevation:	466.3 ft amsl		
Date Completed:	09/07/2019	Northing (NAD83):	2103172.5		
Drilling Co.:	Cascade	Easting (NAD83):	7616213.0	Client:	PG&E
Drilling Method:	Dual Rotary	Total Depth:	224 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 inch & 17.5 Tricone	Project Number:	RC000753.0051
Tool-Pusher:	Scott Johnson	Depth to First Water:	11.35 ft bgs		
Rig Geologist:	A. Mack / E. Redner	Converted to Well:	☒ Yes ☐ No		

Depth (ft)	Drilling Run and Average Penetration Rate	USCS Code	USCS Class	Casing Diameter	Description (See Pilot boring log for full geologic descriptions)	Drilling Notes	Drilling Fluid
1	(0.0 - 3.0) 968.21 mins/ft	SP		(0.0 - 3.0') 18.0" Steel Casing	(0.0 - 8.0') Topock - Fill; Poorly graded sand (SP)	(0.0 - 10.0') Drilled with water.	(0.0 - 21.1') 3589.76 gallons of water used; 91.2 gallons of water recovered; 3498.56 gallons of water lost
2							
3						(3.0') Drilling stopped due to a clogged discharge hose.	
4							
5							
6							
7							
8					(8.0 - 15.0') No recovery (NR)		
9							
10						(10.0') Observed trace amounts of Cemex #3 MESH (8x10) Lapis Luster Sand in drill cuttings (see photo log).	
11	(3.0 - 21.1) 3.30 mins/ft	NR		(3.0 - 21.1') 18.0" Steel Casing		(10.0 - 21.1') Drilled with water.	
12							
13							
14							
15					(15.0 - 18.0') Topock - Fill; Poorly graded sand (SP)		
16		SP					
17							
18					(18.0 - 20.0') No recovery (NR)		
19		NR					
20							

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

Remarks: NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval for RB-3 Pilot

ARCADIS Design & Consultancy for natural and built assets

Drilling Log

Boring No.: RB-3

Date Started:	08/24/2019	Surface Elevation:	466.3 ft amsl		
Date Completed:	09/07/2019	Northing (NAD83):	2103172.5		
Drilling Co.:	Cascade	Easting (NAD83):	7616213.0	Client:	PG&E
Drilling Method:	Dual Rotary	Total Depth:	224 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 inch & 17.5 Tricone	Project Number:	RC000753.0051
Tool-Pusher:	Scott Johnson	Depth to First Water:	11.35 ft bgs		
Rig Geologist:	A. Mack / E. Redner	Converted to Well:	☒ Yes ☐ No		

Depth (ft)	Drilling Run and Average Penetration Rate	USCS Code	USCS Class	Casing Diameter	Description (See Pilot boring log for full geologic descriptions)	Drilling Notes	Drilling Fluid
21	(3.0 - 21.1) 3.30 mins/ft			(3.0 - 21.1') 18.0" Steel Casing	(20.0 - 33.0') Topock - Fill; Poorly graded sand (SP)	(20.0') Observed trace amounts of Cemex #3 MESH (8x10) Lapis Luster Sand in drill cuttings (see photo log).	
22						(21.0 - 41.3') Drilled with water.	(21.1 - 61.2') 6417.18 gallons of water used; 3705.6 gallons of water recovered; 2711.58 gallons of water lost
23							
24							
25							
26							
27		SP					
28							
29							
30	(21.1 - 41.3) 1.93 mins/ft			(21.1 - 41.3') 18.0" Steel Casing		(30.0') Drilled with water.	
31							
32							
33					(33.0 - 35.0') No recovery (NR)		
34		NR					
35					(35.0 - 39.5') Topock - Fill; Poorly graded sand (SP)		
36							
37		SP					
38							
39							
40		SW			(39.5 - 44.0') Topock - Fluvial	(39.6 - 59.2') Drill rods chattering.	

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

Remarks: NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval for RB-3 Pilot

ARCADIS Design & Consultancy for natural and built assets

Drilling Log

Boring No.: RB-3

Date Started:	08/24/2019	Surface Elevation:	466.3 ft amsl		
Date Completed:	09/07/2019	Northing (NAD83):	2103172.5		
Drilling Co.:	Cascade	Easting (NAD83):	7616213.0	Client:	PG&E
Drilling Method:	Dual Rotary	Total Depth:	224 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 inch & 17.5 Tricone	Project Number:	RC000753.0051
Tool-Pusher:	Scott Johnson	Depth to First Water:	11.35 ft bgs		
Rig Geologist:	A. Mack / E. Redner	Converted to Well:	☒ Yes ☐ No		

Depth (ft)	Drilling Run and Average Penetration Rate	USCS Code	USCS Class	Casing Diameter	Description (See Pilot boring log for full geologic descriptions)	Drilling Notes	Drilling Fluid
41	(21.1 - 41.3) 1.93 mins/ft	SW		(21.1 - 41.3') 18.0" Steel Casing	Deposits; Well graded sand (SW)	(40.0') Observed trace amounts of Cemex #3 MESH (8x10) Lapis Luster Sand in drill cuttings (see photo log).	
42						(41.3 - 61.2') Drill rods chattering.	
43							
44		NR			(44.0 - 45.0') No recovery (NR)		
45		SW			(45.0 - 47.0') Topock - Fluvial Deposits; Well graded sand (SW)		
46							
47		GW			(47.0 - 50.0') Topock - Fluvial Deposits; Well graded gravel with sand (GW)		
48							
49							
50	(41.3 - 61.2) 3.34 mins/ft	SP		(41.3 - 61.2') 18.0" Steel Casing	(50.0 - 51.0') Topock - Fluvial Deposits; Poorly graded sand (SP)	(50.0') Observed trace amounts of Cemex #3 MESH (8x10) Lapis Luster Sand in drill cuttings (see photo log).	
51					(51.0 - 55.0') No recovery (NR)		
52		NR					
53							
54							
55		GW			(55.0 - 57.0') Topock - Fluvial Deposits; Well graded gravel with sand (GW)		
56							
57		ML			(57.0 - 59.5') Topock - Fluvial Deposits; Silt with sand (ML)		
58							
59							
60		ML			(59.5 - 65.0') Topock - Alluvium		

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

Remarks: NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval for RB-3 Pilot

ARCADIS Design & Consultancy for natural and built assets

Drilling Log

Date Started:	08/24/2019	Surface Elevation:	466.3 ft amsl	**Boring No.:**	**RB-3**
Date Completed:	09/07/2019	Northing (NAD83):	2103172.5		
Drilling Co.:	Cascade	Easting (NAD83):	7616213.0	Client:	PG&E
Drilling Method:	Dual Rotary	Total Depth:	224 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 inch & 17.5 Tricone	Project Number:	RC000753.0051
Tool-Pusher:	Scott Johnson	Depth to First Water:	11.35 ft bgs		
Rig Geologist:	A. Mack / E. Redner	Converted to Well:	☒ Yes ☐ No		

Depth (ft)	Drilling Run and Average Penetration Rate	USCS Code	USCS Class	Casing Diameter	Description (See Pilot boring log for full geologic descriptions)	Drilling Notes	Drilling Fluid
61	(41.3 - 61.2) 3.34 mins/ft	ML		(41.3 - 61.2') 18.0" Steel Casing	Deposits; Sandy silt with gravel (ML)	(60.0') Observed trace amounts of Cemex #3 MESH (8x10) Lapis Luster Sand in drill cuttings (see photo log).	
62						(61.2 - 81.2') Drilled with water.	(61.2 - 101.1') 24063.76 gallons of water used; 25318.84 gallons of water recovered; 1255.08 gallons of water gained
63							
64							
65		GM			(65.0 - 66.0') Topock - Alluvium Deposits; Silty gravel with sand (GM)		
66					(66.0 - 77.0') Topock - Alluvium Deposits; Silty sand with gravel (SM)		
67							
68							
69							
70	(61.2 - 81.1) 8.77 mins/ft			(61.2 - 81.1') 18.0" Steel Casing		(70.0') Observed trace amounts of Cemex #3 MESH (8x10) Lapis Luster Sand in drill cuttings (see photo log).	
71		SM					
72							
73							
74							
75							
76							
77		ML			(77.0 - 79.0') Topock - Alluvium Deposits; Sandy silt with gravel (ML)		
78							
79		SM			(79.0 - 89.0') Topock - Alluvium Deposits; Silty sand with gravel (SM)		
80							

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

Remarks: NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval for RB-3 Pilot

Drilling Log

Date Started:	08/24/2019	Surface Elevation:	466.3 ft amsl	**Boring No.:**	**RB-3**
Date Completed:	09/07/2019	Northing (NAD83):	2103172.5		
Drilling Co.:	Cascade	Easting (NAD83):	7616213.0	Client:	PG&E
Drilling Method:	Dual Rotary	Total Depth:	224 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 inch & 17.5 Tricone	Project Number:	RC000753.0051
Tool-Pusher:	Scott Johnson	Depth to First Water:	11.35 ft bgs		
Rig Geologist:	A. Mack / E. Redner	Converted to Well:	☒ Yes ☐ No		

Depth (ft)	Drilling Run and Average Penetration Rate	USCS Code	USCS Class	Casing Diameter	Description (See Pilot boring log for full geologic descriptions)	Drilling Notes	Drilling Fluid
81	(61.2 - 81.1) 8.77 mins/ft	SM		(61.2 - 81.1') 18.0" Steel Casing		(80.0') Observed trace amounts of Cemex #3 MESH (8x10) Lapis Luster Sand in drill cuttings (see photo log).	
82						(81.2 - 101.1') Drilled with water.	
83							
84							
85							
86							
87							
88							
89							
90	(81.1 - 101.5) 3.91 mins/ft	ML		(81.1 - 101.5') 18.0" Steel Casing	(89.0 - 91.0') Topock - Alluvium Deposits; Sandy silt with gravel (ML)	(90.0') Observed trace amounts of Cemex #3 MESH (8x10) Lapis Luster Sand in drill cuttings (see photo log).	
91							
92		SM			(91.0 - 95.0') Topock - Alluvium Deposits; Silty sand with gravel (SM)		
93							
94							
95		GM			(95.0 - 101.5') Topock - Alluvium Deposits; Silty gravel with sand (GM)		
96							
97							
98							
99							
100							

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

Remarks: NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval for RB-3 Pilot

Drilling Log

Date Started:	08/24/2019	Surface Elevation:	466.3 ft amsl	**Boring No.:**	**RB-3**
Date Completed:	09/07/2019	Northing (NAD83):	2103172.5		
Drilling Co.:	Cascade	Easting (NAD83):	7616213.0	Client:	PG&E
Drilling Method:	Dual Rotary	Total Depth:	224 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 inch & 17.5 Tricone	Project Number:	RC000753.0051
Tool-Pusher:	Scott Johnson	Depth to First Water:	11.35 ft bgs		
Rig Geologist:	A. Mack / E. Redner	Converted to Well:	☒ Yes ☐ No		

Depth (ft)	Drilling Run and Average Penetration Rate	USCS Code	USCS Class	Casing Diameter	Description (See Pilot boring log for full geologic descriptions)	Drilling Notes	Drilling Fluid
101	(81.1 - 101.5) 3.91 mins/ft	GM		(81.1 - 101.5') 18.0" Steel Casing		(100.0') Observed trace amounts of Cemex #3 MESH (8x10) Lapis Luster Sand in drill cuttings (see photo log).	
102					(101.5 - 105.0') Topock - Alluvium Deposits; Silty sand with gravel (SM)	(101.5 - 116.6') Drilled with water.	(101.5 - 110.6') 773.24 gallons of water used; 1258.92 gallons of water recovered; 485.68 gallons of water gained
103		SM					
104							
105					(105.0 - 108.0') Topock - Alluvium Deposits; Silty gravel with sand (GM)		
106	(101.5 - 110.6) 3.92 mins/ft	GM		(101.5 - 110.6') 18.0" Steel Casing			
107							
108					(108.0 - 109.0') Topock - Alluvium Deposits; Silty sand with gravel (SM)		
109		SM			(109.0 - 115.0') Topock - Alluvium Deposits; Silty gravel with sand (GM)		
110						(110.0') Observed trace amounts of Cemex #3 MESH (8x10) Lapis Luster Sand in drill cuttings (see photo log), stopped drilling to formation collapse around borehole and under rig.	
111						(110.6 - 120.8') Drilled with water.	(110.6 - 120.8') 6010 gallons of water used; 1802 gallons of water recovered; 4208 gallons of water lost
112		GM					
113							
114							
115	(110.6 - 120.8) 2.43 mins/ft			(110.6 - 120.8') 16.0" Steel Casing	(115.0 - 135.0') Topock - Alluvium Deposits; Silty sand with gravel (SM)		
116							
117		SM				(116.6 - 124.8') Drilled with water.	(116.6 - 124.8') 6010 gallons of water used; 1802 gallons of water recovered; 4208 gallons of water lost
118							
119							
120							

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

Remarks: NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval for RB-3 Pilot

ARCADIS Design & Consultancy for natural and built assets

Drilling Log

Boring No.: RB-3

Date Started:	08/24/2019	Surface Elevation:	466.3 ft amsl		
Date Completed:	09/07/2019	Northing (NAD83):	2103172.5		
Drilling Co.:	Cascade	Easting (NAD83):	7616213.0	Client:	PG&E
Drilling Method:	Dual Rotary	Total Depth:	224 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 inch & 17.5 Tricone	Project Number:	RC000753.0051
Tool-Pusher:	Scott Johnson	Depth to First Water:	11.35 ft bgs		
Rig Geologist:	A. Mack / E. Redner	Converted to Well:	☒ Yes ☐ No		

Depth (ft)	Drilling Run and Average Penetration Rate	USCS Code	USCS Class	Casing Diameter	Description (See Pilot boring log for full geologic descriptions)	Drilling Notes	Drilling Fluid
	(110.6 - 120.8) 2.43 mins/ft					(120.0') Observed trace amounts of Cemex #3 MESH (8x10) Lapis Luster Sand in drill cuttings (see photo log).	
121						(120.8 - 140.5') Drilled with water.	(120.8 - 201.2') 16966 gallons of water used; 8868.8 gallons of water recovered; 8097.2 gallons of water lost
122							
123							
124							
125						(124.8 - 144.8') Drilled with water.	(124.8 - 204.8') 17466 gallons of water used; 12871.6 gallons of water recovered; 4594.4 gallons of water lost
126							
127		SM					
128							
129							
130	(120.8 - 140.5) 2.49 mins/ft			(120.8 - 140.5') 16.0" Steel Casing		(130.0') Observed trace amounts of Cemex #3 MESH (8x10) Lapis Luster Sand in drill cuttings (see photo log).	
131						(131.0') Drill rods chattering.	
132							
133							
134							
135					(135.0 - 144.5') Topock - Alluvium Deposits; Silty gravel with sand (GM)		
136							
137		GM					
138							
139							
140							

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

Remarks: NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval for RB-3 Pilot

Drilling Log

Date Started:	08/24/2019	Surface Elevation:	466.3 ft amsl	**Boring No.:**	**RB-3**
Date Completed:	09/07/2019	Northing (NAD83):	2103172.5		
Drilling Co.:	Cascade	Easting (NAD83):	7616213.0	Client:	PG&E
Drilling Method:	Dual Rotary	Total Depth:	224 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 inch & 17.5 Tricone	Project Number:	RC000753.0051
Tool-Pusher:	Scott Johnson	Depth to First Water:	11.35 ft bgs		
Rig Geologist:	A. Mack / E. Redner	Converted to Well:	[X] Yes [ ] No		

Depth (ft)	Drilling Run and Average Penetration Rate	USCS Code	USCS Class	Casing Diameter	Description (See Pilot boring log for full geologic descriptions)	Drilling Notes	Drilling Fluid
141		GM				(140.0') Observed trace amounts of Cemex #3 MESH (8x10) Lapis Luster Sand in drill cuttings (see photo log). (140.5 - 161.6') Drilled with water.	
142							
143							
144							
145		SM			(144.5 - 149.0') Topock - Alluvium Deposits; Silty sand with gravel (SM)	(144.8 - 164.8') Drilled with water.	
146							
147							
148							
149		GM			(149.0 - 152.0') Topock - Alluvium Deposits; Silty gravel with sand (GM)		
150	(140.5 - 161.6) 1.52 mins/ft			(140.5 - 161.6') 16.0" Steel Casing		(150.0') Observed trace amounts of Cemex #3 MESH (8x10) Lapis Luster Sand in drill cuttings (see photo log).	
151							
152		SM			(152.0 - 155.0') Topock - Alluvium Deposits; Silty sand with gravel (SM)		
153							
154							
155		ML			(155.0 - 191.5') Topock - Weathered Bedrock - conglomerate; Sandy silt with gravel (ML)		
156							
157							
158							
159							
160							

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

Remarks: NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval for RB-3 Pilot

Date Started:	08/24/2019	Surface Elevation:	466.3 ft amsl	**Boring No.:**	**RB-3**
Date Completed:	09/07/2019	Northing (NAD83):	2103172.5		
Drilling Co.:	Cascade	Easting (NAD83):	7616213.0	Client:	PG&E
Drilling Method:	Dual Rotary	Total Depth:	224 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 inch & 17.5 Tricone	Project Number:	RC000753.0051
Tool-Pusher:	Scott Johnson	Depth to First Water:	11.35 ft bgs		
Rig Geologist:	A. Mack / E. Redner	Converted to Well:	☒ Yes ☐ No		

Depth (ft)	Drilling Run and Average Penetration Rate	USCS Code	USCS Class	Casing Diameter	Description (See Pilot boring log for full geologic descriptions)	Drilling Notes	Drilling Fluid
161	(140.5 - 161.6) 1.52 mins/ft	ML		(140.5 - 161.6') 16.0" Steel Casing		(160.0') Observed trace amounts of Cemex #3 MESH (8x10) Lapis Luster Sand in drill cuttings (see photo log).	
162						(161.6 - 181.5') Drilled with water.	
163						(163.0') Drill rods chattering.	
164							
165						(164.8 - 184.8') Drilled with water.	
166							
167							
168							
169							
170						(170.0') Observed trace amounts of Cemex #3 MESH (8x10) Lapis Luster Sand in drill cuttings (see photo log).	
171	(161.6 - 181.8) 1.93 mins/ft			(161.6 - 181.8') 16.0" Steel Casing			
172							
173							
174							
175							
176							
177							
178							
179							
180							

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

Remarks: NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval for RB-3 Pilot

ARCADIS Design & Consultancy for natural and built assets

Drilling Log

Date Started:	08/24/2019	Surface Elevation:	466.3 ft amsl	**Boring No.:**	**RB-3**
Date Completed:	09/07/2019	Northing (NAD83):	2103172.5		
Drilling Co.:	Cascade	Easting (NAD83):	7616213.0	Client:	PG&E
Drilling Method:	Dual Rotary	Total Depth:	224 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 inch & 17.5 Tricone	Project Number:	RC000753.0051
Tool-Pusher:	Scott Johnson	Depth to First Water:	11.35 ft bgs		
Rig Geologist:	A. Mack / E. Redner	Converted to Well:	☒ Yes ☐ No		

Depth (ft)	Drilling Run and Average Penetration Rate	USCS Code	USCS Class	Casing Diameter	Description (See Pilot boring log for full geologic descriptions)	Drilling Notes	Drilling Fluid
181	(161.6 - 181.8) 1.93 mins/ft	ML		(161.6 - 181.8') 16.0" Steel Casing		(180.0') Observed trace amounts of Cemex #3 MESH (8x10) Lapis Luster Sand in drill cuttings (see photo log).	
182						(181.8 - 201.2') Drilled with water.	
183							
184							
185						(184.8 - 204.8') Drilled with water.	
186							
187							
188							
189							
190						(190.0') Observed trace amounts of Cemex #3 MESH (8x10) Lapis Luster Sand in drill cuttings (see photo log).	
191	(181.8 - 201.2) 1.34 mins/ft			(181.8 - 201.2') 16.0" Steel Casing			
192		SM			(191.5 - 196.0') Topock - Weathered Bedrock - conglomerate; Silty sand with gravel (SM)		
193							
194							
195							
196		ML			(196.0 - 212.5') Topock - Weathered Bedrock - conglomerate; Sandy silt with gravel (ML)		
197							
198							
199							
200							

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

Remarks: NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval for RB-3 Pilot

Drilling Log

Date Started:	08/24/2019	Surface Elevation:	466.3 ft amsl	**Boring No.:**	**RB-3**
Date Completed:	09/07/2019	Northing (NAD83):	2103172.5		
Drilling Co.:	Cascade	Easting (NAD83):	7616213.0	Client:	PG&E
Drilling Method:	Dual Rotary	Total Depth:	224 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 inch & 17.5 Tricone	Project Number:	RC000753.0051
Tool-Pusher:	Scott Johnson	Depth to First Water:	11.35 ft bgs		
Rig Geologist:	A. Mack / E. Redner	Converted to Well:	[X] Yes [ ] No		

Depth (ft)	Drilling Run and Average Penetration Rate	USCS Code	USCS Class	Casing Diameter	Description (See Pilot boring log for full geologic descriptions)	Drilling Notes	Drilling Fluid
201	(181.8 - 201.2) 1.34 mins/ft			(181.8 - 201.2') 16.0" Steel Casing		(200.0') Observed trace amounts of Cemex #3 MESH (8x10) Lapis Luster Sand in drill cuttings (see photo log).	
202						(201.2 - 224.0') Drilled with water.	(201.2 - 222.0') 10065 gallons of water used; 8360.8 gallons of water recovered; 1704.2 gallons of water lost
203							
204							
205							
206		ML					
207							
208						(208.0') Hole plugged up.	
209							
210						(210.0') Observed trace amounts of Cemex #3 MESH (8x10) Lapis Luster Sand in drill cuttings (see photo log).	
211	(201.2 - 220.5) 2.54 mins/ft			(201.2 - 220.5') 16.0" Steel Casing			
212							
213					(212.5 - 218.0') Topock - Weathered Bedrock - conglomerate; Silty sand with gravel (SM)		
214							
215		SM					
216							
217							
218					(218.0 - 224.0') Topock - Weathered Bedrock - conglomerate; Sandy silt with gravel (ML)		
219		ML					
220							

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

Remarks: NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval for RB-3 Pilot

ARCADIS Design & Consultancy for natural and built assets

Drilling Log

Boring No.: RB-3

Date Started:	08/24/2019	Surface Elevation:	466.3 ft amsl		
Date Completed:	09/07/2019	Northing (NAD83):	2103172.5		
Drilling Co.:	Cascade	Easting (NAD83):	7616213.0	Client:	PG&E
Drilling Method:	Dual Rotary	Total Depth:	224 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 inch & 17.5 Tricone	Project Number:	RC000753.0051
Tool-Pusher:	Scott Johnson	Depth to First Water:	11.35 ft bgs		
Rig Geologist:	A. Mack / E. Redner	Converted to Well:	☒ Yes ☐ No		

Depth (ft)	Drilling Run and Average Penetration Rate	USCS Code	USCS Class	Casing Diameter	Description (See Pilot boring log for full geologic descriptions)	Drilling Notes	Drilling Fluid
221						(220.0') Observed trace amounts of washed plastering sand in drill cuttings (see photo log).	
222	(220.5 - 224.0) 2.57 mins/ft	ML		(220.5 - 224.0') 16.0" Steel Casing			
223							
224					End of Boring at 224.0 'bgs.		
225							
226							
227							
228							
229							
230							
231							
232							
233							
234							
235							
236							
237							
238							
239							
240							

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

Remarks: NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval for RB-3 Pilot

Boring Log

ARCADIS Design & Consultancy for natural and built assets

Sheet: 1 of 13

Boring No.: RB-3 Pilot

Date Started:	04/25/2019	Surface Elevation:	466.3 ft amsl		
Date Completed:	05/07/2019	Northing (NAD83):	2103172.5		
Drilling Co.:	Cascade	Easting (NAD83):	7616213.0	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	245 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Terrasonic track mount	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Topock, California
Driller Name:	Dan O'Mara	Depth to First Water:	11.35 ft bgs		
Drilling Asst:	E. Huellmantel / J. Pacheco	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	Gantt Jeffers	Sampling Interval:	Continuous		
Editor:	Grant Willford	Converted to Well:	☒ Yes ☐ No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
1–4	0			Topock - Fill	SP		(0.0 - 8.0') Topock - Fill; Poorly graded sand (SP); pale brown (10YR 6/3); fine grained to medium grained, subangular to round; trace mica; dry; roots and wood fragments present	(0.0 - 4.0') No recovery due to loose dredge sands.	
4–5	12								
5–8	36						(5') very fine grained to medium grained; trace silt; decrease in grain size (6.5'); moist; iron oxide staining; no roots or fragments of wood	(5.0 - 10.0') Poor recovery due to loose dredge sands.	
8–15					NR		(8.0 - 15.0') No recovery (NR)	(11.5') Approximate Depth to Water	
15–18	36	RB-3-SS-15-18 5/2/2019 09:19	RB-3-VAS-15-20 (<0.033 U) 4/26/2019 15:35	Topock - Fill	SP		(15.0 - 18.0') Topock - Fill; Poorly graded sand (SP); dark grayish brown / dark yellowish brown(10YR 4/2); very fine grained to medium grained, subangular to round; trace silt; trace organics; trace mica; wet; organic odor		
18–20					NR		(18.0 - 20.0') No recovery (NR)		

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

ARCADIS Design & Consultancy for natural and built assets

Boring Log

Boring No.: RB-3 Pilot

Date Started:	04/25/2019	Surface Elevation:	466.3 ft amsl		
Date Completed:	05/07/2019	Northing (NAD83):	2103172.5		
Drilling Co.:	Cascade	Easting (NAD83):	7616213.0	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	245 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Terrasonic track mount	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Topock, California
Driller Name:	Dan O'Mara	Depth to First Water:	11.35 ft bgs		
Drilling Asst:	E. Huellmantel / J. Pacheco	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	Gantt Jeffers	Sampling Interval:	Continuous		
Editor:	Grant Willford	Converted to Well:	☒ Yes ☐ No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
21							(20.0 - 33.0') Topock - Fill; Poorly graded sand (SP); dark grayish brown / dark yellowish brown(10YR 4/2) little black (5Y 2.5/1); very fine grained to fine grained, subangular to round; little organics; trace mica; wet; organic odor		
22	60	RB-3-SS-20-25 5/2/2019 09:21							
23									
24									
25									(25.0 - 35.0') 10 gallons of water used; 0 gallons of water recovered; 10 gallons of water lost
26				Topock - Fill	SP		(25') brown (7.5YR 4/2); very fine grained; no organics; decrease in sand grain size, color change		
27		RB-3-SS-25-30 5/2/2019 09:24							
28							(27.5') dark grayish brown / dark yellowish brown(10YR 4/2); very fine grained to fine grained; no organics; increase in sand grain size, color change		
29									
30	96						(29.5') very fine grained to medium grained; increase in grain size sand		
31		RB-3-SS-30-33 5/2/2019 09:26							
32									
33									
34					NR		(33.0 - 35.0') No recovery (NR)		
35									
36							(35.0 - 39.5') Topock - Fill; Poorly graded sand (SP); dark grayish brown / dark yellowish brown(10YR 4/2); very fine grained to medium grained, subangular to round; trace mica; wet		(35.0 - 45.0') 15 gallons of water used; 0 gallons of water recovered; 15 gallons of water lost
37									
38	108	RB-3-SS-35-40 5/2/2019 09:39		Topock - Fill	SP				
39									
40					SW		(39.5 - 44.0') Topock - Fluvial Deposits; Well graded sand (SW);		

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

ARCADIS Design & Consultancy for natural and built assets

Boring Log

Sheet: 3 of 13

Date Started:	04/25/2019	Surface Elevation:	466.3 ft amsl	**Boring No.:**	**RB-3 Pilot**
Date Completed:	05/07/2019	Northing (NAD83):	2103172.5		
Drilling Co.:	Cascade	Easting (NAD83):	7616213.0	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	245 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Terrasonic track mount	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Topock, California
Driller Name:	Dan O'Mara	Depth to First Water:	11.35 ft bgs		
Drilling Asst:	E. Huellmantel / J. Pacheco	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	Gantt Jeffers	Sampling Interval:	Continuous		
Editor:	Grant Willford	Converted to Well:	☒ Yes ☐ 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	108	RB-3-SS-40-44 5/2/2019 09:41		Topock - Fluvial Deposits	SW		brown (10YR 5/3); very fine grained to very coarse grained, subround to round; trace granules to large pebbles, round; trace mica; wet		(35.0 - 45.0') 15 gallons of water used; 0 gallons of water recovered; 15 gallons of water lost
43									
44					NR		(44.0 - 45.0') No recovery (NR)		
45				Topock - Fluvial Deposits	SW		(45.0 - 47.0') Topock - Fluvial Deposits; Well graded sand (SW); brown (10YR 5/3); very fine grained to very coarse grained, subround to round; trace granules to large pebbles, round; trace mica; wet		(45.0 - 55.0') 10 gallons of water used; 0 gallons of water recovered; 10 gallons of water lost
46									
47		RB-3-SS-45-50 5/2/2019 09:43							
48				Topock - Fluvial Deposits	GW		(47.0 - 50.0') Topock - Fluvial Deposits; Well graded gravel with sand (GW); dark grayish brown / dark yellowish brown(10YR 4/2); granules to small cobbles, subround to round; some very fine to very coarse grained sand, subangular to round; trace silt; some coarser clasts composed of metadiorite; trace mica; wet		
49									
50	72			Topock - Fluvial Deposits	SP		(50.0 - 51.0') Topock - Fluvial Deposits; Poorly graded sand (SP); brown (10YR 5/3); fine grained, subround to round; trace mica; wet		
51									
52		RB-3-SS-50-56 5/2/2019 09:45	RB-3-VAS-50-55 (0.100 J) 4/27/2019 11:10		NR		(51.0 - 55.0') No recovery (NR)		
53									
54									
55				Topock - Fluvial Deposits	GW		(55.0 - 57.0') Topock - Fluvial Deposits; Well graded gravel with sand (GW); dark grayish brown / dark yellowish brown(10YR 4/2); granules to small cobbles, subround to round; some very fine to very coarse grained sand, subangular to round; trace silt; some coarser clasts composed of metadiorite; trace mica; wet		(55.0 - 65.0') 15 gallons of water used; 0 gallons of water recovered; 15 gallons of water lost
56									
57									
58	120	RB-3-SS-56-60 5/2/2019 09:53		Topock - Fluvial Deposits	ML		(57.0 - 59.5') Topock - Fluvial Deposits; Silt with sand (ML); brown (7.5YR 5/4); medium plasticity, slow dilatency; little very fine to very coarse grained sand, subangular to subround; little clay; trace small to very large pebbles, subround to round; trace subround; trace organics; trace mica; wet; soft to medium stiff		
59									
60					ML		(59.5 - 65.0') Topock - Alluvium Deposits; Sandy silt with gravel (ML);		

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Boring Log

ARCADIS Design & Consultancy for natural and built assets

Date Started:	04/25/2019	Surface Elevation:	466.3 ft amsl	**Boring No.:**	**RB-3 Pilot**
Date Completed:	05/07/2019	Northing (NAD83):	2103172.5		
Drilling Co.:	Cascade	Easting (NAD83):	7616213.0	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	245 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Terrasonic track mount	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Topock, California
Driller Name:	Dan O'Mara	Depth to First Water:	11.35 ft bgs		
Drilling Asst:	E. Huellmantel / J. Pacheco	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	Gantt Jeffers	Sampling Interval:	Continuous		
Editor:	Grant Willford	Converted to Well:	☒ Yes ☐ No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
61							brown (7.5YR 4/3) trace weak red (2.5YR 4/2); low plasticity, no dilatency; some granules to very large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subround; coarser clasts composed of metadiorite; trace mica; moist; very stiff; weak cementation; interbeded silt and granule to very large pebble lenses, weathered pebbles		(55.0 - 65.0') 15 gallons of water used; 0 gallons of water recovered; 15 gallons of water lost
62	120	RB-3-SS-60-65 5/2/2019 09:58		Topock - Alluvium Deposits	ML				
63									
64									
65									
66				Topock - Alluvium Deposits	GM		(65.0 - 66.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); brown (7.5YR 4/3); granules to very large pebbles, angular to subangular; and very fine to very coarse grained sand, angular to subround; little silt; coarser clasts composed of metadiorite; trace mica; wet	(65.0 - 75.0') Rough drilling	(65.0 - 75.0') 15 gallons of water used; 0 gallons of water recovered; 15 gallons of water lost
67		RB-3-SS-65-70 5/2/2019 10:01					(66.0 - 77.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (5YR 5/4) trace red (2.5YR 4/6); fine grained to very coarse grained, angular to subangular; some granules to very large pebbles, angular to subangular; some silt; trace subangular; trace clay; coarser clasts composed of metadiorite; trace mica; dry to moist; weak cementation; interbedded silt and granule to very large pebble lenses, weathered pebbles		
68									
69									
70	120								
71				Topock - Alluvium Deposits	SM				
72		RB-3-SS-70-75 5/2/2019 10:06					(72'); little silt; increase in granules and pebbles		
73									
74							(74'); some silt; decrease granules and pebbles		
75									
76									
77									
78	120	RB-3-SS-75-80 5/2/2019 10:10		Topock - Alluvium Deposits	ML		(77.0 - 79.0') Topock - Alluvium Deposits; Sandy silt with gravel (ML); reddish brown (5YR 5/4) trace red (2.5YR 4/6); no plasticity, no dilatency; some granules to very large pebbles, angular to subangular; some angular to subangular; trace clay; coarser clasts composed of metadiorite; trace mica; wet; very stiff; weak cementation; weathered pebbles		
79									
80				Topock - Alluvium Deposits	SM		(79.0 - 89.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (5YR 5/4) trace red (2.5YR 4/6); fine grained to very coarse grained, angular to subangular; some granules to very large		

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Boring Log

ARCADIS Design & Consultancy for natural and built assets

Date Started:	04/25/2019	Surface Elevation:	466.3 ft amsl	**Boring No.:**	**RB-3 Pilot**
Date Completed:	05/07/2019	Northing (NAD83):	2103172.5		
Drilling Co.:	Cascade	Easting (NAD83):	7616213.0	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	245 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Terrasonic track mount	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Topock, California
Driller Name:	Dan O'Mara	Depth to First Water:	11.35 ft bgs		
Drilling Asst:	E. Huellmantel / J. Pacheco	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	Gantt Jeffers	Sampling Interval:	Continuous		
Editor:	Grant Willford	Converted to Well:	☒ Yes ☐ No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
81							pebbles, angular to subangular; some silt; coarser clasts composed of metadiorite; trace mica; wet; weak cementation; interbedded silt and granule to very large pebble lenses, weathered pebbles	(80.0 - 85.0') Geology osberved good interval to collect a sample	
82	120	RB-3-SS-80-85 5/2/2019 10:18	RB-3-VAS-80-85 (0.132 J) 4/27/2019 15:18	Topock - Alluvium Deposits	SM		(81.5'); and granules to very large pebbles, angular to subangular; little silt; none cementation		
83									
84									
85									
86									(85.0 - 95.0') 20 gallons of water used; 0 gallons of water recovered; 20 gallons of water lost
87		RB-3-SS-85-90 5/2/2019 10:21					(87') reddish brown / moderate brown(5YR 4/4); some granules to very large pebbles, angular to subangular; some silt; trace clay; weak cementation; color change		
88									
89									
90	120			Topock - Alluvium Deposits	ML		(89.0 - 91.0') Topock - Alluvium Deposits; Sandy silt with gravel (ML); reddish brown / moderate brown(5YR 4/4) trace red (2.5YR 4/6); no plasticity, no dilatency; some very fine to very coarse grained sand, angular to subround; little granules to very large pebbles, angular to subangular; trace subangular; trace clay; trace mica; coarser clasts composed of metadiorite; moist; weak cementation; interbedded very fine to very coarse sand and granule to very large pebble lenses, weathered pebbles		
91									
92		RB-3-SS-90-95 5/2/2019 11:09		Topock - Alluvium Deposits	SM		(91.0 - 95.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown / moderate brown(5YR 4/4) trace red (2.5YR 4/6); fine grained to very coarse grained, angular to subangular; some granules to very large pebbles, angular to subangular; some silt; coarser clasts composed of metadiorite; trace mica; wet; interbedded silt and granule to very large pebble lenses, weathered pebbles		
93									
94									
95									
96							(95.0 - 101.5') Topock - Alluvium Deposits; Silty gravel with sand (GM); reddish brown / moderate brown(5YR 4/4) trace red (2.5YR 4/6); granules to very large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subround; little silt; coarser clasts composed of metadiorite; trace mica; wet; interbedded silt and very fine to very coarse sand lenses, weathered pebbles		(95.0 - 105.0') 25 gallons of water used; 0 gallons of water recovered; 25 gallons of water lost
97									
98	120	RB-3-SS-95-100 5/2/2019 11:11		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, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Boring Log

ARCADIS Design & Consultancy for natural and built assets

Date Started:	04/25/2019	Surface Elevation:	466.3 ft amsl	**Boring No.:**	**RB-3 Pilot**
Date Completed:	05/07/2019	Northing (NAD83):	2103172.5		
Drilling Co.:	Cascade	Easting (NAD83):	7616213.0	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	245 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Terrasonic track mount	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Topock, California
Driller Name:	Dan O'Mara	Depth to First Water:	11.35 ft bgs		
Drilling Asst:	E. Huellmantel / J. Pacheco	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	Gantt Jeffers	Sampling Interval:	Continuous		
Editor:	Grant Willford	Converted to Well:	☒ Yes ☐ No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
101	120	RB-3-SS-100-105 5/2/2019 11:16		Topock - Alluvium Deposits	GM				(95.0 - 105.0') 25 gallons of water used; 0 gallons of water recovered; 25 gallons of water lost
102									
103				Topock - Alluvium Deposits	SM		(101.5 - 105.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown / moderate brown(5YR 4/4) trace red (2.5YR 4/6); fine grained to very coarse grained, subangular to subround; some granules to very large pebbles, angular to subangular; little silt; coarser clasts composed of metadiorite; trace mica; wet; weak cementation; interbedded silt and granule to very large pebble lenses, weathered pebbles (102.5'); some silt (103.5'); trace clay		
104									
105									
106	120	RB-3-SS-105-107 5/2/2019 11:18		Topock - Alluvium Deposits	GM		(105.0 - 108.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); reddish brown / moderate brown(5YR 4/4) little red (2.5YR 4/6); granules to very large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subround; little silt; coarser clasts composed of metadiorite; trace mica; wet; interbedded silt and very fine to very coarse sand lenses, weathered pebbles		(105.0 - 115.0') 25 gallons of water used; 0 gallons of water recovered; 25 gallons of water lost
107									
108				Topock - Alluvium Deposits	SM		(108.0 - 109.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown / moderate brown(5YR 4/4) little red (2.5YR 4/6); fine grained to very coarse grained, subangular to subround; some granules to very large pebbles, angular to subangular; some silt; coarser clasts composed of metadiorite; trace mica; wet; interbedded silt and granule to very large pebble lenses, weathered pebbles		
109									
110				Topock - Alluvium Deposits	GM		(109.0 - 115.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); reddish brown / moderate brown(5YR 4/4) trace red (2.5YR 4/6); granules to very large pebbles, angular to subangular; and very fine to very coarse grained sand, angular to subangular; little silt; coarser clasts composed of metadiorite; trace mica; wet; interbedded silt and very fine to very coarse sand lenses, weathered pebbles		
111		RB-3-SS-110-115 5/2/2019 11:21							
112									
113									
114									
115									
116	120	RB-3-SS-115-120 5/2/2019 11:24		Topock - Alluvium Deposits	SM		(115.0 - 135.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown / moderate brown(5YR 4/4) little red (2.5YR 4/6); fine grained to very coarse grained, subangular to subround; some granules to very large pebbles, angular to subangular; some silt; trace angular; coarser clasts composed of metadiorite; trace mica; wet; interbedded silt and granule to very large pebble lenses, weathered pebbles		
117									
118									
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, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

ARCADIS Design & Consultancy for natural and built assets

Boring Log

Boring No.: RB-3 Pilot

Date Started:	04/25/2019	Surface Elevation:	466.3 ft amsl		
Date Completed:	05/07/2019	Northing (NAD83):	2103172.5		
Drilling Co.:	Cascade	Easting (NAD83):	7616213.0	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	245 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Terrasonic track mount	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Topock, California
Driller Name:	Dan O'Mara	Depth to First Water:	11.35 ft bgs		
Drilling Asst:	E. Huellmantel / J. Pacheco	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	Gantt Jeffers	Sampling Interval:	Continuous		
Editor:	Grant Willford	Converted to Well:	☒ Yes ☐ No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
121							(120.5'); weak cementation; increase in silt, decrease in granule to pebbles		
122									
123	120	RB-3-SS-120-125 5/2/2019 11:31	RB-3-VAS-120-125 (<0.17 U) 4/28/2019 11:29						
124									
125									(125.0 - 135.0') 25 gallons of water used; 0 gallons of water recovered; 25 gallons of water lost
126									
127		RB-3-SS-125-130 5/2/2019 11:44		Topock - Alluvium Deposits	SM		(127.5'); none cementation; increase in granule to pebbles, decrease silt		
128									
129									
130	120								
131									
132		RB-3-SS-130-135 5/2/2019 11:46							
133									
134									
135									
136				Topock - Alluvium Deposits	GM		(135.0 - 144.5') Topock - Alluvium Deposits; Silty gravel with sand (GM); reddish brown / moderate brown(5YR 4/4) trace red (2.5YR 4/6); granules to small cobbles, angular to subangular; and very fine to very coarse grained sand, angular to subangular; little silt; coarser clasts composed of metadiorite; trace mica; wet; interbedded silt and very fine to very coarse sand lenses, weathered pebbles		(135.0 - 145.0') 25 gallons of water used; 0 gallons of water recovered; 25 gallons of water lost
137									
138	120	RB-3-SS-135-140 5/2/2019 11:50							
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, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Boring Log

Boring No.: RB-3 Pilot

Date Started:	04/25/2019	Surface Elevation:	466.3 ft amsl		
Date Completed:	05/07/2019	Northing (NAD83):	2103172.5		
Drilling Co.:	Cascade	Easting (NAD83):	7616213.0	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	245 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Terrasonic track mount	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Topock, California
Driller Name:	Dan O'Mara	Depth to First Water:	11.35 ft bgs		
Drilling Asst:	E. Huellmantel / J. Pacheco	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	Gantt Jeffers	Sampling Interval:	Continuous		
Editor:	Grant Willford	Converted to Well:	☒ Yes ☐ No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
141–145	120	RB-3-SS-140-145 5/2/2019 11:54		Topock - Alluvium Deposits	GM				(135.0 - 145.0') 25 gallons of water used; 0 gallons of water recovered; 25 gallons of water lost
145–150	120	RB-3-SS-145-150 5/2/2019 11:57		Topock - Alluvium Deposits	SM		(144.5 - 149.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown / moderate brown(5YR 4/4) trace red (2.5YR 4/6); fine grained to very coarse grained, subangular to subround; some granules to very large pebbles, angular to subangular; some silt; coarser clasts composed of metadiorite; trace mica; wet; interbedded silt and granule to very large pebble lenses		(145.0 - 155.0') 35 gallons of water used; 0 gallons of water recovered; 35 gallons of water lost
150–151				Topock - Alluvium Deposits	GM		(149.0 - 152.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); reddish brown / moderate brown(5YR 4/4) trace red (2.5YR 4/6); granules to small cobbles, angular to subangular; some very fine to very coarse grained sand, angular to subangular; some silt; coarser clasts composed of metadiorite; trace mica; wet; interbedded silt and sand very fine to very coarse sand lenses		
151–155		RB-3-SS-150-155 5/2/2019 12:05	RB-3-VAS-150-155 (<0.17 U) 4/29/2019 10:13	Topock - Alluvium Deposits	SM		(152.0 - 155.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown / moderate brown(5YR 4/4) trace red (2.5YR 4/6); fine grained to very coarse grained, angular to subround; some granules to very large pebbles, angular to subangular; some silt; coarser clasts composed of metadiorite; trace mica; wet; interbedded silt and granule to very large pebble lenses		
155–160	120	RB-3-SS-155-160 5/2/2019 12:11		Topock - Weathered Bedrock - conglomerate	ML		(155.0 - 191.5') Topock - Weathered Bedrock - conglomerate; Sandy silt with gravel (ML); reddish brown (2.5YR 4/4) trace dark red (2.5YR 3/6); low plasticity, no dilatency; some very fine to very coarse grained sand, subangular to subround; little granules to very large pebbles, angular to subangular; trace angular to subangular; trace clay; coarser clasts composed of metadiorite; trace mica; moist; very stiff to hard; weak cementation; interbedded very fine to very coarse sand and granule to very large pebble lenses	(155.0 - 165.0') Core is moderately cemented groundwater sample to be collected above	

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Boring Log

ARCADIS Design & Consultancy for natural and built assets

Boring No.: RB-3 Pilot

Date Started:	04/25/2019	Surface Elevation:	466.3 ft amsl	Client:	PG&E
Date Completed:	05/07/2019	Northing (NAD83):	2103172.5	Project:	Final GW Remedy Phase 1
Drilling Co.:	Cascade	Easting (NAD83):	7616213.0	Location:	PG&E Topock, Topock, California
Drilling Method:	Sonic Drilling	Total Depth:	245 ft bgs		
Drill Rig Type:	Terrasonic track mount	Borehole Diameter:	6-12 inches		
Driller Name:	Dan O'Mara	Depth to First Water:	11.35 ft bgs		
Drilling Asst:	E. Huellmantel / J. Pacheco	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	Gantt Jeffers	Sampling Interval:	Continuous		
Editor:	Grant Willford	Converted to Well:	☒ Yes ☐ No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
161							(160'); dry	(155.0 - 165.0') Core is moderately cemented groundwater sample to be collected above	
162									
163	120	RB-3-SS-160-165 5/2/2019 12:13							
164									
165									
166								(165.0 - 175.0') Rough drilling	(165.0 - 175.0') 30 gallons of water used; 10 gallons of water recovered; 20 gallons of water lost
167		RB-3-SS-165-170 5/2/2019 12:14							
168									
169							(169'); dry		
170	120			Topock - Weathered Bedrock - conglomerate	ML				
171									
172		RB-3-SS-170-175 5/2/2019 12:18							
173									
174									
175									
176									
177									
178	120	RB-3-SS-175-180 5/2/2019 12:20							
179									
180									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Boring Log

ARCADIS Design & Consultancy for natural and built assets

Date Started:	04/25/2019	Surface Elevation:	466.3 ft amsl	**Boring No.:**	**RB-3 Pilot**
Date Completed:	05/07/2019	Northing (NAD83):	2103172.5		
Drilling Co.:	Cascade	Easting (NAD83):	7616213.0	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	245 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Terrasonic track mount	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Topock, California
Driller Name:	Dan O'Mara	Depth to First Water:	11.35 ft bgs		
Drilling Asst:	E. Huellmantel / J. Pacheco	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	Gantt Jeffers	Sampling Interval:	Continuous		
Editor:	Grant Willford	Converted to Well:	☒ Yes ☐ No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
181									
182									
183	120	RB-3-SS-180-185 5/2/2019 12:22	RB-3-VAS-180-185 (<0.033 U <0.033 U) 4/29/2019 15:38						
184									
185									
186				Topock - Weathered Bedrock - conglomerate	ML				
187		RB-3-SS-185-190 5/2/2019 12:24							
188									
189									
190	120						(190'); dry		
191									
192		RB-3-SS-190-195 5/2/2019 12:28		Topock - Weathered Bedrock - conglomerate	SM		(191.5 - 196.0') Topock - Weathered Bedrock - conglomerate; Silty sand with gravel (SM); reddish brown (2.5YR 4/4) trace red (2.5YR 4/6); fine grained to very coarse grained, angular to subangular; some granules to very large pebbles, angular to subangular; some silt; trace angular; trace clay; coarser clasts composed of metadiorite; trace mica; wet		
193									
194									
195								(195.0 - 215.0') Rough drilling	
196									
197							(196.0 - 212.5') Topock - Weathered Bedrock - conglomerate; Sandy silt with gravel (ML); reddish brown (2.5YR 4/4) trace dark red (2.5YR 3/6); no plasticity, no dilatency; some granules to very large pebbles, angular to subangular; some very fine to very coarse grained sand, subangular to subround; trace angular to subangular; trace clay; coarser clasts composed of metadiorite; trace mica; moist; very stiff to hard; weak cementation; interbedded very fine to very coarse sand and granule to very large pebble lenses (197.5'); low plasticity; little granules to very large pebbles, angular to subangular; increase in silt, decrease in sand, no cobbles		
198	120	RB-3-SS-195-200 5/2/2019 12:37		Topock - Weathered Bedrock - conglomerate	ML				
199							(199'); no plasticity; some granules to very large pebbles, angular to subangular; decrease in silt, increase in sand		
200									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Date Started:	04/25/2019	Surface Elevation:	466.3 ft amsl	**Boring No.:**	**RB-3 Pilot**
Date Completed:	05/07/2019	Northing (NAD83):	2103172.5		
Drilling Co.:	Cascade	Easting (NAD83):	7616213.0	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	245 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Terrasonic track mount	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Topock, California
Driller Name:	Dan O'Mara	Depth to First Water:	11.35 ft bgs		
Drilling Asst:	E. Huellmantel / J. Pacheco	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	Gantt Jeffers	Sampling Interval:	Continuous		
Editor:	Grant Willford	Converted to Well:	☒ Yes ☐ No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
201								(195.0 - 215.0') Rough drilling	
202									
203	120	RB-3-SS-200-205 5/2/2019 12:39							
204									
205									
206				Topock - Weathered Bedrock - conglomerate	ML			(205.0') Sample interval chosen based on lithology	
207		RB-3-SS-205-210 5/2/2019 12:41	RB-3-VAS-205-210 (<0.17 U) 4/30/2019 15:15						
208									
209									
210	120								
211									
212		RB-3-SS-210-215 5/2/2019 12:43							
213				Topock - Weathered Bedrock - conglomerate	SM		(212.5 - 218.0') Topock - Weathered Bedrock - conglomerate; Silty sand with gravel (SM); reddish brown (2.5YR 4/4) trace red (2.5YR 4/6); fine grained to very coarse grained, angular to subangular; some granules to very large pebbles, angular to subangular; some silt; trace clay; coarser clasts composed of metadiorite; trace mica; dry to moist; weak cementation; interbeded silt and granules to pebbles, weathered pebbles		
214									
215									
216									
217		RB-3-SS-215-220 5/2/2019 12:44							
218	120								
219				Topock - Weathered Bedrock - conglomerate	ML		(218.0 - 227.0') Topock - Weathered Bedrock - conglomerate; Sandy silt with gravel (ML); reddish brown (2.5YR 4/4) trace dark red (2.5YR 3/6); low plasticity, no dilatency; some granules to very large pebbles, angular to subangular; some very fine to very coarse grained sand, subangular to subround; trace clay; coarser clasts composed of metadiorite; trace mica; moist; very stiff; weak cementation; interbedded sand very fine to very coarse sand and granule to very		
220									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Boring Log

ARCADIS Design & Consultancy for natural and built assets

Boring No.: RB-3 Pilot

Date Started:	04/25/2019	Surface Elevation:	466.3 ft amsl		
Date Completed:	05/07/2019	Northing (NAD83):	2103172.5		
Drilling Co.:	Cascade	Easting (NAD83):	7616213.0	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	245 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Terrasonic track mount	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Topock, California
Driller Name:	Dan O'Mara	Depth to First Water:	11.35 ft bgs		
Drilling Asst:	E. Huellmantel / J. Pacheco	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	Gantt Jeffers	Sampling Interval:	Continuous		
Editor:	Grant Willford	Converted to Well:	☒ Yes ☐ No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
221							large pebble lenses, weathered pebbles		
222									
223	120			Topock - Weathered Bedrock - conglomerate	ML				
224									
225									
226									
227									
228							(227.0 - 245.0') Topock - Weathered Bedrock - conglomerate; Silty sand with gravel (SM); reddish brown (2.5YR 4/4) trace red (2.5YR 4/6); fine grained to very coarse grained, angular to subangular; some granules to very large pebbles, angular to subangular; some silt; trace angular to subangular; trace clay; coarser clasts composed of metadiorite; trace mica; moist; weak cementation; interbeded silt and granules to pebbles		
229									
230	120								
231									
232									
233				Topock - Weathered Bedrock - conglomerate	SM		(233'); dry to moist; some dry lenses		
234									
235									
236									
237									
238	120								
239									
240									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Boring Log

ARCADIS Design & Consultancy for natural and built assets

Boring No.: RB-3 Pilot

Date Started:	04/25/2019	Surface Elevation:	466.3 ft amsl		
Date Completed:	05/07/2019	Northing (NAD83):	2103172.5		
Drilling Co.:	Cascade	Easting (NAD83):	7616213.0	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	245 ft bgs	Project:	Final GW Remedy Phase 1
Drill Rig Type:	Terrasonic track mount	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Topock, California
Driller Name:	Dan O'Mara	Depth to First Water:	11.35 ft bgs		
Drilling Asst:	E. Huellmantel / J. Pacheco	Sampling Method:	4 inch x 10 ft Core Barrel	Project Number:	RC000753.0051
Logger:	Gantt Jeffers	Sampling Interval:	Continuous		
Editor:	Grant Willford	Converted to Well:	☒ Yes ☐ No		

Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
241							(241'); dry to moist; some dry lenses		
242	120		--no sample-- (Interval did not produce.) 5/1/2019 14:00	Topock - Weathered Bedrock - conglomerate	SM				
243									
244									
245							End of Boring at 245.0 'bgs.		
246									
247									
248									
249									
250									
251									
252									
253									
254									
255									
256									
257									
258									
259									
260									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval

Temporary Backfill Log

ARCADIS Design & Consultancy for natural and built assets

Date Started:	04/25/2019	Surface Elevation:	466.3 ft amsl	**Well ID: RB-3 Pilot**	
Date Completed:	05/07/2019	Northing (NAD83):	2103172.5		
Drilling Co.:	Cascade	Easting (NAD83):	7616213.0	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	245 ft bgs	Project:	Final GW Remedy Phase I
Driller Name:	Dan O'Mara	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Needles, California
Drilling Asst:	E. Huellmantel / J. Pacheco	Depth to First Water:	11.35 ft bgs		
Logger:	Gantt Jeffers	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
1–4		Topock - Fill	SP		(0.0 - 4.5') Choker Sand Seal; (0.0 - 4.0') 12" Borehole	(0.0 - 4.5') 7.1 bags	(0.0 - 4.5') 6 bags (-15%) Note: Wildcat Washed Plastering
5–15			NR		(4.5 - 210.0') Cemex #3 MESH (8x10); (4.0 - 245.0') 6" Borehole	(4.5 - 210.0') 80.7 bags	(4.5 - 210.0') 94 bags (16%) Note: Lapis Lustre Sand
15–17	RB-3-VAS-15-20 (<0.033 U) 4/26/2019 15:35	Topock - Fill	SP				
18–20			NR				

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

ARCADIS Design & Consultancy for natural and built assets

Temporary Backfill Log

Sheet: 2 of 13

Date Started:	04/25/2019	Surface Elevation:	466.3 ft amsl	**Well ID: RB-3 Pilot**	
Date Completed:	05/07/2019	Northing (NAD83):	2103172.5		
Drilling Co.:	Cascade	Easting (NAD83):	7616213.0	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	245 ft bgs	Project:	Final GW Remedy Phase I
Driller Name:	Dan O'Mara	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Needles, California
Drilling Asst:	E. Huellmantel / J. Pacheco	Depth to First Water:	11.35 ft bgs		
Logger:	Gantt Jeffers	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
21							
22							
23							
24							
25							
26		Topock - Fill	SP				
27							
28							
29							
30					(4.5 - 210.0') Cemex #3 MESH (8x10)	(4.5 - 210.0') 80.7 bags	(4.5 - 210.0') 94 bags (16%) Note: Lapis Lustre Sand
31							
32							
33							
34			NR				
35							
36							
37		Topock - Fill	SP				
38							
39							
40			SW				

(4.0 - 245.0') 6" Borehole

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

ARCADIS Design & Consultancy for natural and built assets

Temporary Backfill Log

Sheet: 3 of 13

Date Started:	04/25/2019	Surface Elevation:	466.3 ft amsl	**Well ID: RB-3 Pilot**	
Date Completed:	05/07/2019	Northing (NAD83):	2103172.5		
Drilling Co.:	Cascade	Easting (NAD83):	7616213.0	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	245 ft bgs	Project:	Final GW Remedy Phase I
Driller Name:	Dan O'Mara	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Needles, California
Drilling Asst:	E. Huellmantel / J. Pacheco	Depth to First Water:	11.35 ft bgs		
Logger:	Gantt Jeffers	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
41		Topock - Fluvial Deposits	SW				
42							
43							
44			NR				
45		Topock - Fluvial Deposits	SW				
46							
47		Topock - Fluvial Deposits	GW				
48							
49							
50		Topock - Fluvial Deposits	SP		(4.5 - 210.0') Cemex #3 MESH (8x10)	(4.5 - 210.0') 80.7 bags	(4.5 - 210.0') 94 bags (16%) Note: Lapis Lustre Sand
51					(4.0 - 245.0') 6" Borehole		
52	RB-3-VAS-50-55 (0.100 J) 4/27/2019 11:10						
53			NR				
54							
55							
56		Topock - Fluvial Deposits	GW				
57							
58		Topock - Fluvial Deposits	ML				
59							
60			ML				

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

ARCADIS Design & Consultancy for natural and built assets

Temporary Backfill Log

Well ID: RB-3 Pilot

Date Started:	04/25/2019	Surface Elevation:	466.3 ft amsl	Client:	PG&E
Date Completed:	05/07/2019	Northing (NAD83):	2103172.5		
Drilling Co.:	Cascade	Easting (NAD83):	7616213.0	Project:	Final GW Remedy Phase I
Drilling Method:	Sonic Drilling	Total Depth:	245 ft bgs	Location:	PG&E Topock, Needles, California
Driller Name:	Dan O'Mara	Borehole Diameter:	6-12 inches		
Drilling Asst:	E. Huellmantel / J. Pacheco	Depth to First Water:	11.35 ft bgs		
Logger:	Gantt Jeffers	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
61		Topock - Alluvium Deposits	ML				
62							
63							
64							
65		Topock - Alluvium Deposits	GM				
66		Topock - Alluvium Deposits	SM				
67							
68							
69							
70					(4.5 - 210.0') Cemex #3 MESH (8x10)	(4.0 - 245.0') 6" Borehole; (4.5 - 210.0') 80.7 bags	(4.5 - 210.0') 94 bags (16%) Note: Lapis Lustre Sand
71							
72							
73							
74							
75							
76							
77		Topock - Alluvium Deposits	ML				
78							
79		Topock - Alluvium Deposits	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, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

Temporary Backfill Log

Sheet: 5 of 13

Well ID: RB-3 Pilot

Date Started:	04/25/2019	Surface Elevation:	466.3 ft amsl	Client:	PG&E
Date Completed:	05/07/2019	Northing (NAD83):	2103172.5		
Drilling Co.:	Cascade	Easting (NAD83):	7616213.0	Project:	Final GW Remedy Phase I
Drilling Method:	Sonic Drilling	Total Depth:	245 ft bgs	Location:	PG&E Topock, Needles, California
Driller Name:	Dan O'Mara	Borehole Diameter:	6-12 inches		
Drilling Asst:	E. Huellmantel / J. Pacheco	Depth to First Water:	11.35 ft bgs		
Logger:	Gantt Jeffers	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
81							
82	RB-3-VAS-80-85 (0.132 J) 4/27/2019 15:18						
83							
84		Topock - Alluvium Deposits	SM				
85							
86							
87							
88							
89		Topock - Alluvium Deposits	ML		(4.5 - 210.0') Cemex #3 MESH (8x10)	(4.5 - 210.0') 80.7 bags	(4.5 - 210.0') 94 bags (16%) Note: Lapis Lustre Sand
90					(4.0 - 245.0') 6" Borehole		
91							
92		Topock - Alluvium Deposits	SM				
93							
94							
95							
96		Topock - Alluvium Deposits	GM				
97							
98							
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, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

ARCADIS Design & Consultancy for natural and built assets

Temporary Backfill Log

Sheet: 6 of 13

Well ID: RB-3 Pilot

Date Started:	04/25/2019	Surface Elevation:	466.3 ft amsl	Client:	PG&E
Date Completed:	05/07/2019	Northing (NAD83):	2103172.5		
Drilling Co.:	Cascade	Easting (NAD83):	7616213.0	Project:	Final GW Remedy Phase I
Drilling Method:	Sonic Drilling	Total Depth:	245 ft bgs	Location:	PG&E Topock, Needles, California
Driller Name:	Dan O'Mara	Borehole Diameter:	6-12 inches		
Drilling Asst:	E. Huellmantel / J. Pacheco	Depth to First Water:	11.35 ft bgs		
Logger:	Gantt Jeffers	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
101		Topock - Alluvium Deposits	GM				
102							
103		Topock - Alluvium Deposits	SM				
104							
105							
106		Topock - Alluvium Deposits	GM				
107							
108		Topock - Alluvium Deposits	SM				
109							
110		Topock - Alluvium Deposits	GM		(4.5 - 210.0') Cemex #3 MESH (8x10) (4.0 - 245.0') 6" Borehole	(4.5 - 210.0') 80.7 bags	(4.5 - 210.0') 94 bags (16%) Note: Lapis Lustre Sand
111							
112							
113							
114							
115		Topock - Alluvium Deposits	SM				
116							
117							
118							
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, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

ARCADIS Design & Consultancy for natural and built assets

Temporary Backfill Log

Well ID: RB-3 Pilot

Date Started:	04/25/2019	Surface Elevation:	466.3 ft amsl	Client:	PG&E
Date Completed:	05/07/2019	Northing (NAD83):	2103172.5	Project:	Final GW Remedy Phase I
Drilling Co.:	Cascade	Easting (NAD83):	7616213.0	Location:	PG&E Topock, Needles, California
Drilling Method:	Sonic Drilling	Total Depth:	245 ft bgs		
Driller Name:	Dan O'Mara	Borehole Diameter:	6-12 inches		
Drilling Asst:	E. Huellmantel / J. Pacheco	Depth to First Water:	11.35 ft bgs		
Logger:	Gantt Jeffers	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
121							
122	RB-3-VAS-120-125 (<0.17 U) 4/28/2019 11:29						
123							
124							
125							
126							
127		Topock - Alluvium Deposits	SM				
128							
129							
130					(4.5 - 210.0') Cemex #3 MESH (8x10)	(4.5 - 210.0') 80.7 bags	(4.5 - 210.0') 94 bags (16%) Note: Lapis Lustre Sand
131							
132							
133							
134							
135							
136							
137		Topock - Alluvium Deposits	GM				
138							
139							
140							

(4.0 - 245.0') 6" Borehole

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

ARCADIS Design & Consultancy for natural and built assets

Temporary Backfill Log

Well ID: RB-3 Pilot

Date Started:	04/25/2019	Surface Elevation:	466.3 ft amsl	Client:	PG&E
Date Completed:	05/07/2019	Northing (NAD83):	2103172.5		
Drilling Co.:	Cascade	Easting (NAD83):	7616213.0	Project:	Final GW Remedy Phase I
Drilling Method:	Sonic Drilling	Total Depth:	245 ft bgs	Location:	PG&E Topock, Needles, California
Driller Name:	Dan O'Mara	Borehole Diameter:	6-12 inches		
Drilling Asst:	E. Huellmantel / J. Pacheco	Depth to First Water:	11.35 ft bgs		
Logger:	Gantt Jeffers	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
141		Topock - Alluvium Deposits	GM				
142							
143							
144							
145		Topock - Alluvium Deposits	SM				
146							
147							
148							
149							
150		Topock - Alluvium Deposits	GM		(4.5 - 210.0') Cemex #3 MESH (8x10)	(4.5 - 210.0') 80.7 bags	(4.5 - 210.0') 94 bags (16%) Note: Lapis Lustre Sand
151							
152	RB-3-VAS-150-155 (<0.17 U) 4/29/2019 10:13	Topock - Alluvium Deposits	SM				
153							
154							
155		Topock - Weathered Bedrock - conglomerate	ML				
156							
157							
158							
159							
160							

(4.0 - 245.0') 6" Borehole

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

ARCADIS Design & Consultancy for natural and built assets

Temporary Backfill Log

Well ID: RB-3 Pilot

Date Started:	04/25/2019	Surface Elevation:	466.3 ft amsl		
Date Completed:	05/07/2019	Northing (NAD83):	2103172.5		
Drilling Co.:	Cascade	Easting (NAD83):	7616213.0	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	245 ft bgs	Project:	Final GW Remedy Phase I
Driller Name:	Dan O'Mara	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Needles, California
Drilling Asst:	E. Huellmantel / J. Pacheco	Depth to First Water:	11.35 ft bgs		
Logger:	Gantt Jeffers	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
161							
162							
163							
164							
165							
166							
167							
168							
169							
170		Topock - Weathered Bedrock - conglomerate	ML		(4.5 - 210.0') Cemex #3 MESH (8x10)	(4.5 - 210.0') 80.7 bags	(4.5 - 210.0') 94 bags (16%) Note: Lapis Lustre Sand
171							
172							
173							
174							
175							
176							
177							
178							
179							
180							

(4.0 - 245.0') 6" Borehole

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

ARCADIS Design & Consultancy for natural and built assets

Temporary Backfill Log

Date Started:	04/25/2019	Surface Elevation:	466.3 ft amsl	**Well ID: RB-3 Pilot**	
Date Completed:	05/07/2019	Northing (NAD83):	2103172.5		
Drilling Co.:	Cascade	Easting (NAD83):	7616213.0	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	245 ft bgs	Project:	Final GW Remedy Phase I
Driller Name:	Dan O'Mara	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Needles, California
Drilling Asst:	E. Huellmantel / J. Pacheco	Depth to First Water:	11.35 ft bgs		
Logger:	Gantt Jeffers	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
181							
182	RB-3-VAS-180-185 (<0.033 U <0.033 U) 4/29/2019 15:38						
183							
184							
185		Topock - Weathered Bedrock - conglomerate	ML				
186							
187							
188							
189							
190					(4.5 - 210.0') Cemex #3 MESH (8x10)	(4.0 - 245.0') 6" Borehole	(4.5 - 210.0') 80.7 bags	(4.5 - 210.0') 94 bags (16%) Note: Lapis Lustre Sand
191							
192		Topock - Weathered Bedrock - conglomerate	SM				
193							
194							
195							
196		Topock - Weathered Bedrock - conglomerate	ML				
197							
198							
199							
200							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

ARCADIS Design & Consultancy for natural and built assets

Temporary Backfill Log

Date Started:	04/25/2019	Surface Elevation:	466.3 ft amsl	**Well ID: RB-3 Pilot**	
Date Completed:	05/07/2019	Northing (NAD83):	2103172.5		
Drilling Co.:	Cascade	Easting (NAD83):	7616213.0	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	245 ft bgs	Project:	Final GW Remedy Phase I
Driller Name:	Dan O'Mara	Borehole Diameter:	6-12 inches	Location:	PG&E Topock, Needles, California
Drilling Asst:	E. Huellmantel / J. Pacheco	Depth to First Water:	11.35 ft bgs		
Logger:	Gantt Jeffers	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
201							
202							
203							
204							
205		Topock - Weathered Bedrock - conglomerate	ML		(4.5 - 210.0') Cemex #3 MESH (8x10)	(4.5 - 210.0') 80.7 bags	(4.5 - 210.0') 94 bags (16%) Note: Lapis Lustre Sand
206							
207	RB-3-VAS-205-210 (<0.17 U) 4/30/2019 15:15						
208							
209							
210					(4.0 - 245.0') 6" Borehole		
211							
212							
213		Topock - Weathered Bedrock - conglomerate	SM		(210.0 - 221.0') Indicator Sand	(210.0 - 221.0') 4.3 bags	(210.0 - 221.0') 5 bags (16%) Note: Wildcat Washed Plastering
214							
215							
216							
217							
218		Topock - Weathered Bedrock - conglomerate	ML				
219							
220							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

ARCADIS Design & Consultancy for natural and built assets

Temporary Backfill Log

Sheet: 12 of 13

Well ID: RB-3 Pilot

Date Started:	04/25/2019	Surface Elevation:	466.3 ft amsl	Client:	PG&E
Date Completed:	05/07/2019	Northing (NAD83):	2103172.5		
Drilling Co.:	Cascade	Easting (NAD83):	7616213.0	Project:	Final GW Remedy Phase I
Drilling Method:	Sonic Drilling	Total Depth:	245 ft bgs	Location:	PG&E Topock, Needles, California
Driller Name:	Dan O'Mara	Borehole Diameter:	6-12 inches		
Drilling Asst:	E. Huellmantel / J. Pacheco	Depth to First Water:	11.35 ft bgs		
Logger:	Gantt Jeffers	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
221		Topock - Weathered Bedrock - conglomerate	ML		(210.0 - 221.0') Indicator Sand	(210.0 - 221.0') 4.3 bags	(210.0 - 221.0') 5 bags (16%) Note: Wildcat Washed Plastering
222							
223							
224							
225							
226							
227							
228		Topock - Weathered Bedrock - conglomerate	SM				
229							
230					(4.0 - 245.0') 6" Borehole		
231					(221.0 - 245.0') Bentonite seal chips	(221.0 - 245.0') 6.5 bags	(221.0 - 245.0') 7.5 bags (15%) Note: Puregold Medium Chips
232							
233							
234							
235							
236							
237							
238							
239							
240							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.

ARCADIS Design & Consultancy for natural and built assets

Temporary Backfill Log

Sheet: 13 of 13

Well ID: RB-3 Pilot

Date Started:	04/25/2019	Surface Elevation:	466.3 ft amsl	Client:	PG&E
Date Completed:	05/07/2019	Northing (NAD83):	2103172.5		
Drilling Co.:	Cascade	Easting (NAD83):	7616213.0	Project:	Final GW Remedy Phase I
Drilling Method:	Sonic Drilling	Total Depth:	245 ft bgs	Location:	PG&E Topock, Needles, California
Driller Name:	Dan O'Mara	Borehole Diameter:	6-12 inches		
Drilling Asst:	E. Huellmantel / J. Pacheco	Depth to First Water:	11.35 ft bgs		
Logger:	Gantt Jeffers	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
241							
242	--no sample-- (Interval did not produce.) 5/1/2019 14:00	Topock - Weathered Bedrock - conglomerate	SM		(221.0 - 245.0') Bentonite seal chips; (4.0 - 245.0') 6" Borehole	(221.0 - 245.0') 6.5 bags	(221.0 - 245.0') 7.5 bags (15%) Note: Puregold Medium Chips
243							
244							
245							
246							
247							
248							
249							
250							
251							
252							
253							
254							
255							
256							
257							
258							
259							
260							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery, blue water table symbol represents depth to water measured during the first VAS interval Note: Granule backfill material will be excavated from the pilot borehole during drilling for the construction of the well.