TOPOCK WELL COMPLETION AND ACCEPTANCE REPORT - REMEDIATION WELLS

Well Name: TWB-01 (Note: Documentation referencing TWB-1 is in reference to TWB-01.)

Screen Zone (feet below ground surface [bgs]): 85 – 106' and 110 – 129'

Dates of Pilot Borehole Drilling: 3/15/2022 – 3/30/2022

Dates of Temporary Well Installation (TWB-01-Temp): 3/31/2022

Dates of Temporary Well Development (TWB-01-Temp): 4/25/2022 - 4/27/2022

Dates of Temporary Well Decommissioning (TWB-01-Temp): 8/16/2022 – 8/20/2022 and 9/9/2022 – 9/12/2022. See the "Meets Design Criteria for Construction" section below for details.

Dates of Pilot Borehole Overdrilling: 8/16/2022 - 8/20/2022 and 9/8/2022

Dates of Well Installation (TWB-01): 9/09/2022 – 9/12/2022

Dates of Well Head Completion (TWB-01): The well vault was installed on 10/27/2022. The well casing stick-up will be cut down during the installation of the well head flange.

Dates of Well Development (TWB-01): 9/14/2022 – 9/29/2022 (Well development log [attached] includes some of the documentation associated with the specific capacity test.)

Note: Well Testing was completed successfully and in accordance with Well Specification 33 22 00 unless noted below.

Well Testing Conducted	Required (Y/N)	Dates	Comments
Alignment Test	Y	10/04/2022	None
Specific Capacity Test	Y	4/28/2022 (TWB-01-Temp) 9/28/2022 (TWB-01)	None
Injectivity Test	N	--	--
Plumbness Test (Gyroscope)	N	--	--
Spinner Log	N	--	--
Downhole Video	Y	12/02/2022	None
Other	--	--	--

Acceptance Criteria

☒ **Meets Design Criteria for Construction** - Well installed in accordance with well specifications and final design.
Comments: The as-built well construction for TWB-01 is consistent with the TWB-01 final well design (see Attached Design and Well Construction Log). The as-built well construction for TWB-01-Temp well was consistent with the TWB-01-Temp final well design prior to being decommissioned (see Attached Design and Well Construction Log).

The measured alluvial aquifer thickness observed from the pilot boring was approximately 6 feet and appeared to be low a water-producing aquifer. The observations related to thickness and water-bearing features suggested the location would not likely meet the total target design flow rate of approximately 25 gpm for the Transwestern Bench. Although the formation was low producing, the VAS sample results had higher than anticipated Cr (IV) concentrations. Due to the uncertainty of the location meeting the project objectives, a temporary well (TWB-01-Temp) was installed followed by well development and specific capacity testing. The results of the specific capacity testing indicated an extraction well installed in the borehole would produce an estimated sustainable pumping rate of 3 to 5 gpm. The specific capacity testing results suggested the borehole would be a viable option to install a low-producing extraction well. DoR designed the extraction well (TWB-01) and planned to decommission the temporary well (TWB-01-Temp) during the overdrilling of the temporary well and installation of TWB-01 in the same borehole.

Overdrilling of the pilot borehole for decommissioning TWB-01-Temp well and the installation of the TWB-01 began on 8/16/23 (see details on the attached logs). TWB-01-Temp well materials were observed in the drill cuttings from approximately 0 to 75 ft bgs. TWB-01-Temp well materials were no longer observed in the drilling cutting suggesting that the 10-inch diameter drill casing was not aligned with TWB-01-Temp below approximately 75 ft bgs. The boring was advanced to the design depth of approximately 137 ft bgs. A preliminary “Alignment Test” was conducted on the 9.5-inch inner diameter drill casing using the 8-inch outer diameter core barrel. The preliminary “Alignment Test” confirmed the borehole was properly aligned for the proposed installation of TWB-01.

PG&E requested the drill casing remain in the borehole while the drill rig moved to another Phase 2a drilling location to allow time to obtain agency-approval to proceed with TWB-01 well installation. The driller (Cascade) was concerned that the drill casing would become locked up in the formation while waiting for agency-approval. The 10-inch drill casing was retracked to approximately 115 ft bgs to minimize the potential for drill casing to lock up in the formation. The open borehole below the drill casing was temporary backfilled with Cemex #1/20 (20x40) Lapis Lustre Sand to support the drill casing prior to receiving agency-approval.

The agencies approved the installation of TWB-01 in the borehole and installation began on 9/9/2022. The sanitary grout seal used for the installation of the TWB-01 serves as the decommissioning sanitary seal for the decommissioning of the overdrilled portion of TWB-01-Temp well. The TWB-01-Temp well materials not removed during overdrilling below approximately 75 ft bgs are planned to be decommissioned in place during the future decommissioning of TWB-01. The TWB-01 extraction well and the TWB-01-Temp materials below approximately 75 feet bgs will be decommissioned by pressure grouting, during remedy closeout activities, as documented in the TWB-01 Well Construction Log (attached).

☒ **Meets Design Criteria for Extraction Rate**

Goal from 100% Design:	3 gpm
Tested Rates (gallons per minute [gpm]):	1.5, 3.0, 4.5, 6
Specific Injectivity	0.68 gpm/ft per 2.26 ft of drawdown at an extraction rate of ~1.5 gpm. 0.48 gpm/ft per 6.15 ft of drawdown at an extraction rate of ~3.0 gpm. 0.22 gpm/ft per 19.30 ft of drawdown at an extraction rate of ~4.5 gpm. 0.14 gpm/ft per 40.96 ft of drawdown at an extraction rate of ~6.0 gpm.
Comments	The tested rates exceeded the proposed 100% design rate of 3 gpm. Well meets the design criteria for extraction rates. See attached Well Testing Data Package.

☒ **Well Functions as Designed**

Comments: TWB-01 is free of blockages and meets the design criteria for the intended use.

☒ **Meets Design Criteria for Plumbness and Equipment Install** – The well was free of blockages and of sufficient plumbness and alignment to allow for well development, well testing, and well sampling and alignment test tool deployment to total depth.

Comments: Downhole equipment has not been installed as of the submittal of this Completion Report. Installation is planned to be completed 2023.

☒ **Meets Design Criteria for Turbidity (Turbidity less than 50 NTU)**

Comments: Turbidity following well development meets the design criteria.

Final Turbidity at End of Well Development

Screen Zone	Turbidity (NTUs)
85 – 106’ and 110 – 129’ (no seal between screens)	0.99

☒ **Other Water Quality Parameters**

Water Quality Parameters at end of development

Screen Depths	Temp (C)	pH	ORP (mV)	Cond (u*S*/cm)	DO
85 – 106’ and 110 – 129’’	31.1	7.78	235.3	10256	3.62

ATTACHMENTS

- Final Well Design
- Boring Log
- Drilling Log
- Well Construction Logs (TWB-01-Temp and TWB-01)
- Well Development Records (TWB-01-Temp and TWB-01)
- Specific Capacity Testing Package
- Photo Logs (TWB-01-Temp and TWB-01)
- Video Survey Report

NOTE: Field documentation for all phases of well installation, well development and testing are included in the Daily Well Construction Reports. The Daily Well Construction Reports and DoR Daily Well Construction Quality Control Reports are compiled and organized by date on AutodeskBuild. The parent folder for both daily reports are located on AutodeskBuild in the following location: Files/For the Field/DOR Drilling Quality Control/01 QC Documentation. Analytical reports are compiled and uploaded to AutodeskBuild in the same folder. The technical scopes were performed by or under the direct supervision of Designer of Record (DoR) Professional Geologists (see attached Certification Statement).

ACCEPTANCE APPROVAL

DoR Approver Name: Greg Foote

Approval Signature/Date:  February 16, 2023

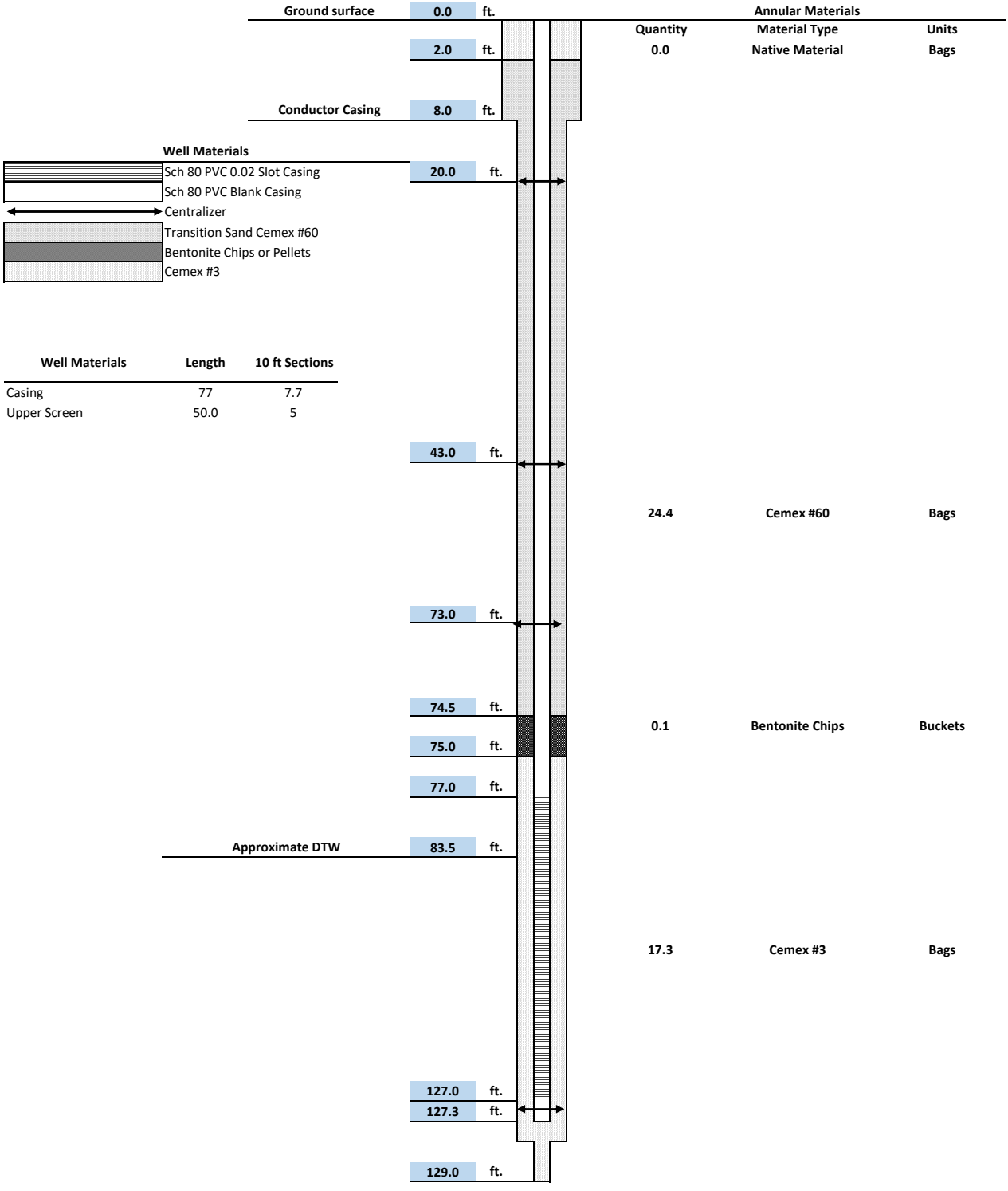
Attachment 1

Final Well Design

TWB-01 Temporay Final Well Design 3/31/22

Conductor casing Dia:	7	Well Casing Outer Diameter:	2.5
Drill casing Dia:	6	Well Casing Inner Diameter:	2
Rathole Dia:	4		

Surface Completion: TBD



Well Materials	Length	10 ft Sections
Casing	77	7.7
Upper Screen	50.0	5

Annular Materials

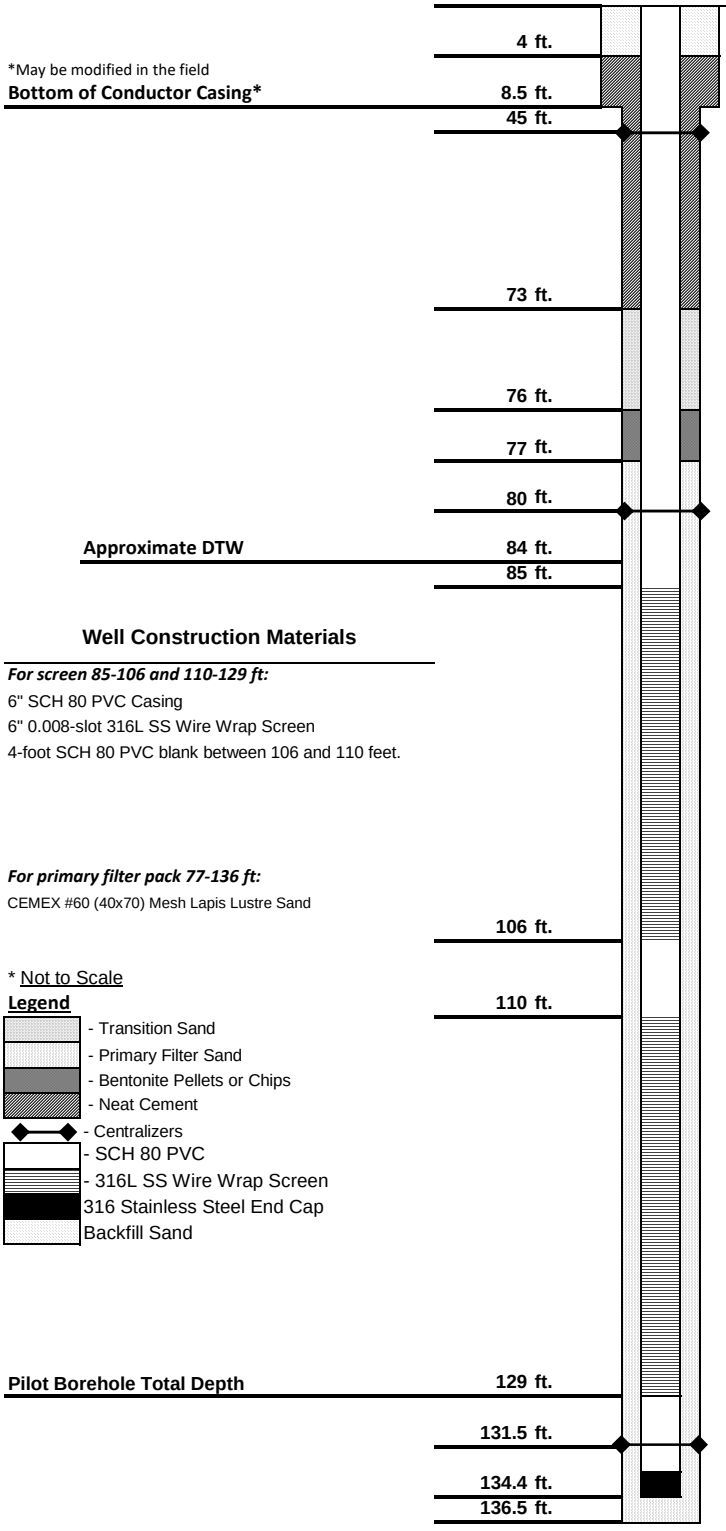
Quantity	Material Type	Units
0.0	Native Material	Bags
24.4	Cemex #60	Bags
0.1	Bentonite Chips	Buckets
17.3	Cemex #3	Bags

Final Well Design
TWB-01 (09/08/2022)

ARCADIS Design & Consultancy for natural and built assets

Well ID: TWB-01 **Well Purpose:** Remediation **Well Type:** Single Screened

Borehole Dia.: 10-12 in. **Well Diameter:** 6 in.



0 ft.
4 ft.
*May be modified in the field
Bottom of Conductor Casing* 8.5 ft.
45 ft.
73 ft.
76 ft.
77 ft.
80 ft.
Approximate DTW 84 ft.
85 ft.
106 ft.
110 ft.
Pilot Borehole Total Depth 129 ft.
131.5 ft.
134.4 ft.
136.5 ft.
- Transition Sand
- Primary Filter Sand
- Bentonite Pellets or Chips
- Neat Cement
- Centralizers
- SCH 80 PVC
- 316L SS Wire Wrap Screen
316 Stainless Steel End Cap
Backfill Sand

Backfill Volumes

Quantity	Material	Units
4.4	Temp Backfill Sand	Bags
211.5	Neat Cement	Gallons
2.4	Bentonite Chips	Bags
0.6	Bentonite Chips	Bags
48.5	Sand Pack	bags

Well Construction Materials

For screen 85-106 and 110-129 ft:
6" SCH 80 PVC Casing
6" 0.008-slot 316L SS Wire Wrap Screen
4-foot SCH 80 PVC blank between 106 and 110 feet.

For primary filter pack 77-136 ft:
CEMEX #60 (40x70) Mesh Lapis Lustre Sand

* Not to Scale

Legend

82-87 ft bgs
Results: 870 ug/L

87-92 ft bgs
Results: <0.025 ug/l

97-102 ft bgs
Results: 1,200 ug/l

110-115 ft bgs
Results: 4,300 ug/l

122-127 ft bgs
Results: 1,700 ug/l

Attachment 2

Boring Log

Boring Log

ARCADIS

Sheet: 1 of 7

Boring No.: TWB-01 Pilot

Date Started:	03/15/2022	Surface Elevation:	538.84 ft amsl	Client:	PG&E
Date Completed:	03/30/2022	Northing (NAD83):	2100941.12	Project:	Final GW Remedy Phase 2A
Drilling Co.:	Cascade	Easting (NAD83):	7615929.94	Location:	PG&E Topock, Needles California
Drilling Method:	Sonic Drilling	Total Depth:	129.5 ft bgs		
Drill Rig Type:	Boart Longyear drill head	Borehole Diameter:	4-7 inches		
Driller Name:	Matt Arnold	Depth to First Water:	82.0 ft bgs		
Drilling Asst:	D Hoeppner / R West	Sampling Method:	4 inch x 10 ft. Core Barrel	Project Number:	30126255
Logger:	S McGrane / G Willford	Sampling Interval:	Continuous		
Editor:	Sean McGrane	Converted to Well:	☒ Yes ☐ No		

Depth (ft)	Recovery (ft)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
0		No Sieve Samples Collected	No Groundwater Samples Collected	Fill	N/A		(0-0.5 ft) Grading for the drill pad.	(0.0 - 5.2') Air knifed for utility clearance. Logged soils disturbed.	(0.0 - 5.2') No drilling fluid used
1				Alluvium Deposits	SM		(0.5-3 ft) Silty sand with gravel (SM); brown (7.5YR 5/4); very fine to very coarse grained, angular to subround; little small to very large pebbles, angular to subangular; little silt; little granules, angular to subround; trace clay; dry; NOTE: Logged from air-knife cuttings.		
2									
3	5.2								
4				Alluvium Deposits	SW-SM		(3-5 ft) Well-graded sand with silt and gravel (SW-SM); brown (7.5YR 5/3); very fine to very coarse grained, angular to subround; little small to very large pebbles, angular to subround; little granules, angular to subround; little silt; trace clay; dry; NOTE: Logged from air-knife cuttings.		
5									
6	2			Alluvium Deposits	SW-SM		(5-7 ft) Well-graded sand with silt and gravel (SW-SM); brown (7.5YR 5/3); very fine to very coarse grained, angular to subround; little small to very large pebbles, angular to subround; little granules, angular to subround; little silt; dry.		
7									
8				Alluvium Deposits	SM		(7-11.75 ft) Silty sand with gravel (SM); brown (7.5YR 5/4); very fine to very coarse grained, angular to subround; some small to very large pebbles, angular to subangular; little granules, angular to subround; trace small cobbles, subangular; little silt; trace clay; dry.		
9									
10									
11	7.8								
12				Alluvium Deposits	GW-GM		(11.75-14 ft) Well-graded gravel with silt and sand (GW-GM); brown (7.5YR 4/3); small to very large pebbles, little granules, angular to subangular; and very fine to very coarse grained sand, angular to subround; little silt; dry.		
13									
14				Alluvium Deposits	ML		(14-15.5 ft) Sandy silt with gravel (ML); brown (10YR 5/3); low plasticity, no dilatancy; and very fine to very coarse grained sand, angular to subround; little small to large pebbles, angular to subangular; little granules, angular to subround; very soft; dry.		
15								(15.0') Hard drilling had to trip back in to collect 15 to 17 ft. bgs.	(15.0') No drilling fluid used
16	1.5			Alluvium Deposits	SW-SM		(15.5-17 ft) Well-graded sand with silt and gravel (SW-SM); brown (10YR 5/3); very fine to very coarse grained, angular to subround; little small to very large pebbles, angular; little granules, angular to subround; little silt; trace clay; dry.		
17									
18				Alluvium Deposits	SW-SM		(17-19.5 ft) Well-graded sand with silt and gravel (SW-SM); brown (10YR 5/3); very fine to very coarse grained, angular to subround; some small to very large pebbles, angular to subangular; little granules, angular to subangular; trace small cobbles, subangular; little silt; trace clay; dry.	(17.0 - 27.0') Hard drilling	(17.0 - 27.0') No drilling fluid used
19	8.8								
20				Alluvium	SM				

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, NR = No Recovery, N/A = Not Applicable, GW = groundwater, ppb = parts per billion, Notes: Solid blue and hollow blue water table marks represent depth to water (ft. bgs.) first encountered from logging and depth to water measured during the first VAS interval, respectively. Apparent partial recoveries can be the result of potential compaction of sediments in the core bag.

Boring Log

ARCADIS

Boring No.: TWB-01 Pilot

Date Started:	03/15/2022	Surface Elevation:	538.84 ft amsl		
Date Completed:	03/30/2022	Northing (NAD83):	2100941.12		
Drilling Co.:	Cascade	Easting (NAD83):	7615929.94	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	129.5 ft bgs	Project:	Final GW Remedy Phase 2A
Drill Rig Type:	Boart Longyear drill head	Borehole Diameter:	4-7 inches	Location:	PG&E Topock, Needles California
Driller Name:	Matt Arnold	Depth to First Water:	82.0 ft bgs		
Drilling Asst:	D Hoeppner / R West	Sampling Method:	4 inch x 10 ft. Core Barrel	Project Number:	30126255
Logger:	S McGrane / G Willford	Sampling Interval:	Continuous		
Editor:	Sean McGrane	Converted to Well:	☒ Yes ☐ No		

Depth (ft)	Recovery (ft)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
21		No Sieve Samples Collected	No Groundwater Samples Collected	Alluvium Deposits	SM		(19.5-22 ft) Silty sand with gravel (SM); yellowish brown (10YR 5/4); very fine to very coarse grained, angular to subround; some small to very large pebbles, angular to subangular; little granules, angular to subangular; little silt; dry.		
22									
23	8.8			Alluvium Deposits	SM		(22-27 ft) Silty sand with gravel (SM); brown (7.5YR 5/3); very fine to very coarse grained, angular to subround; some granules, angular to subangular; some small to very large pebbles, angular to subangular; little silt; dry; NOTE: Cementation with white matrix, potentially caliche.		
24									
25							(25 ft) Trace small cobble; subangular.		
26									
27									
28				Alluvium Deposits	SM		(27-29 ft) Silty sand with gravel (SM); brown (7.5YR 4/4); very fine to very coarse grained, angular to subround; some granules, angular to subround; some small to very large pebbles, angular to subangular; little silt; dry; NOTE: Some sediments moderately cemented with white matrix, potentially caliche.		
29									
30				Alluvium Deposits	SM		(29-33 ft) Silty sand with gravel (SM); brown (7.5YR 4/3); very fine to very coarse grained, angular to subround; some granules, angular to subround; little small to very large pebbles, subangular to subround; little silt; dry; NOTE: Some cementation with white matrix, potentially caliche.		
31									
32	7							(32.0 - 37.0') hard drilling	(32.0 - 37.0') No drilling fluid used
33									
34				Alluvium Deposits	SM		(33-37 ft) Silty sand with gravel (SM); brown (7.5YR 4/3); very fine to medium grained, some coarse to very coarse grained sand, angular to subround; some silt; some small to large pebbles, subangular to subround; trace granules, angular to subround; dry.		
35							(34.5 ft) Trace very large pebble; angular.		
36							(36 ft) Rip up clasts of weakly cemented sand with white matrix, potentially caliche.		
37									
38	2.9			Alluvium Deposits	SM		(37-40.5 ft) Silty sand with gravel (SM); brown (7.5YR 4/4); very fine to very coarse grained, angular to subround; some granules, angular to subround; little small to very large pebbles, angular to subround; little silt; dry; NOTE: Some weak cementation with white matrix, potentially caliche.		
39									
40									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, NR = No Recovery, N/A = Not Applicable, GW = groundwater, ppb = parts per billion, Notes: Solid blue and hollow blue water table marks represent depth to water (ft. bgs.) first encountered from logging and depth to water measured during the first VAS interval, respectively. Apparent partial recoveries can be the result of potential compaction of sediments in the core bag.

Boring Log

ARCADIS

Date Started:	03/15/2022	Surface Elevation:	538.84 ft amsl	**Boring No.:**	**TWB-01 Pilot**
Date Completed:	03/30/2022	Northing (NAD83):	2100941.12		
Drilling Co.:	Cascade	Easting (NAD83):	7615929.94	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	129.5 ft bgs	Project:	Final GW Remedy Phase 2A
Drill Rig Type:	Boart Longyear drill head	Borehole Diameter:	4-7 inches	Location:	PG&E Topock, Needles California
Driller Name:	Matt Arnold	Depth to First Water:	82.0 ft bgs		
Drilling Asst:	D Hoeppner / R West	Sampling Method:	4 inch x 10 ft. Core Barrel	Project Number:	30126255
Logger:	S McGrane / G Willford	Sampling Interval:	Continuous		
Editor:	Sean McGrane	Converted to Well:	☒ Yes ☐ No		

Depth (ft)	Recovery (ft)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
					SM				
41	2.9			Alluvium Deposits	SM		(40.5-42 ft) Silty sand with gravel (SM); brown (7.5YR 4/4); very fine to medium grained, and very fine to very coarse grained sand, angular to subround; and silt; little small to large pebbles, angular to subround; little granules, angular to subround; dry; NOTE: Some sands weakly cemented with white matrix, potentially caliche.		
42									
43				Alluvium Deposits	SM		(42-48.75 ft) Well-graded sand with silt and gravel (SW-SM); brown (7.5YR 4/4); very fine to very coarse grained, angular to subround; some granules, angular to subround; some small to very large pebbles, angular to subround; little silt; trace clay; dry; NOTE: Some weak cementation with white matrix, potentially caliche.		
44									
45									
46	5.5								
47								(47.0 - 50.0') Soft drilling	(47.0 - 50.0') No drilling fluid used
48									
49				Alluvium Deposits	SW		(48.75-50 ft) Well-graded sand with gravel (SW); brown (7.5YR 4/3); very fine to very coarse grained, angular to subround; some granules, angular to subround; some small to large pebbles, angular to subangular; trace silt; trace clay; dry.		
50		No Sieve Samples Collected	No Groundwater Samples Collected						
51				Alluvium Deposits	SM		(50-52 ft) Silty sand with gravel (SM); brown (7.5YR 4/3); very fine to medium grained, some coarse to very coarse grained sand, subangular to subround; and silt; little granules, subangular to subround; little small pebbles, subangular to subround; trace clay; dry; NOTE: Some weak cementation with white matrix, potentially caliche.		
52									
53				Alluvium Deposits	SM		(52-54.5 ft) Silty sand with gravel (SM); brown (7.5YR 4/4); very fine to medium grained, some coarse to very coarse grained sand, subangular to subround; and silt; little small to medium pebbles, angular to subround; trace granules, angular to subround; trace clay; dry; NOTE: Some weak cementation with white matrix, potentially caliche.	(53.0 - 57.0') Hard drilling	(53.0 - 57.0') No drilling fluid used
54	6.2								
55				Alluvium Deposits	SW-SM		(54.5-57 ft) Well-graded sand with silt and gravel (SW-SM); brown (7.5YR 5/3); very fine to very coarse grained, angular to subround; some small to very large pebbles, angular to subangular; little granules, angular to subround; little silt; trace clay; trace small cobbles, angular; dry; NOTE: Trace weak cementation with white matrix, potentially caliche.		
56									
57									
58				Alluvium Deposits	SW-SM		(57-62 ft) Well-graded sand with silt and gravel (SW-SM); brown (7.5YR 4/4); very fine to very coarse grained, angular to subround; some small to very large pebbles, angular to subround; little granules, angular to subround; little silt; trace clay; trace small cobbles, angular; dry.	(57.0 - 77.0') Normal drilling	(57.0 - 77.0') No drilling fluid used
59	7.7								
60									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, NR = No Recovery, N/A = Not Applicable, GW = groundwater, ppb = parts per billion, Notes: Solid blue and hollow blue water table marks represent depth to water (ft. bgs.) first encountered from logging and depth to water measured during the first VAS interval, respectively. Apparent partial recoveries can be the result of potential compaction of sediments in the core bag.

Boring Log

ARCADIS

Date Started:	03/15/2022	Surface Elevation:	538.84 ft amsl	**Boring No.:**	**TWB-01 Pilot**
Date Completed:	03/30/2022	Northing (NAD83):	2100941.12		
Drilling Co.:	Cascade	Easting (NAD83):	7615929.94	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	129.5 ft bgs	Project:	Final GW Remedy Phase 2A
Drill Rig Type:	Boart Longyear drill head	Borehole Diameter:	4-7 inches	Location:	PG&E Topock, Needles California
Driller Name:	Matt Arnold	Depth to First Water:	82.0 ft bgs		
Drilling Asst:	D Hoeppner / R West	Sampling Method:	4 inch x 10 ft. Core Barrel	Project Number:	30126255
Logger:	S McGrane / G Willford	Sampling Interval:	Continuous		
Editor:	Sean McGrane	Converted to Well:	☒ Yes ☐ No		

Depth (ft)	Recovery (ft)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
61				Alluvium Deposits	SW-SM		(57-62 ft) Well-graded sand with silt and gravel (SW-SM); brown (7.5YR 4/4); very fine to very coarse grained, angular to subround; some small to very large pebbles, angular to subround; little granules, angular to subround; little silt; trace clay; trace small cobbles, angular; dry.		
62				Alluvium Deposits	SM		(62-63.5 ft) Silty sand with gravel (SM); brown (7.5YR 4/4); very fine to very coarse grained, angular to subround; some granules, angular to subround; little small to very large pebbles, angular to subround; little silt; trace clay; dry; NOTE: Some weak cementation with white matrix, potentially caliche.		
63	7.7			Alluvium Deposits	SW		(63.5-64.5 ft) Well-graded sand with gravel (SW); reddish brown (5YR 4/4); very fine to very coarse grained, angular to subround; some granules, angular to subround; some small to large pebbles, trace very large pebbles, angular angular to subround; trace silt; trace clay; dry.		
64									
65				Alluvium Deposits	SM		(64.5-67 ft) Silty sand with gravel (SM); reddish yellow (5YR 6/6); very fine to very coarse grained, angular to subround; some small to very large pebbles, angular to subround; little granules, angular to subround; little silt; trace clay; dry; NOTE: Trace weak cementation with white matrix, potentially caliche.		
66									
67									
68		No Sieve Samples Collected	No Groundwater Samples Collected	Alluvium Deposits	SM		(67-70.5 ft) Silty sand with gravel (SM); brown (7.5YR 5/4); very fine to very coarse grained, angular to subround; little silt; little small to very large pebbles, angular to subround; little granules, angular to subround; trace clay; trace small cobbles, angular; dry.		
69									
70									
71				Alluvium Deposits	SW-SM		(70-72 ft) Well-graded sand with silt and gravel (SW-SM); reddish brown (5YR 4/4); very fine to very coarse grained, angular to subround; some granules, angular to subround; some small to large pebbles, angular to subround; little silt; trace clay; dry; NOTE: Some moderate cementation with white matrix, potentially caliche.		
72	7			Alluvium Deposits	SC		(71-72 ft) Clayey sand with gravel (SC); reddish brown (5YR 4/3); very fine to very coarse grained, angular to subround; little granules, angular to subround; little small to large pebbles, angular to subround; little clay; trace silt; dry.		
73				Alluvium Deposits	SM		(72-74.5 ft) Silty sand with gravel (SM); reddish brown (5YR 4/4); very fine to very coarse grained, angular to subround; some small to very large pebbles, angular to subround; little granules, angular to subround; little silt; trace clay; trace small cobbles, angular; dry.		
74									
75				Alluvium Deposits	SW-SM		(74.5-77 ft) Well-graded sand with silt and gravel (SW-SM); reddish brown (5YR 4/4); very fine to very coarse grained, angular to subround; some granules, angular to subround; some small to very large pebbles, angular to subround; trace silt; trace clay; trace small cobbles, subangular; dry.		
76									
77									
78	6.3	TWB-1-SS-77-83 3/31/2022 15:45		Alluvium Deposits	SM		(77-83 ft) Silty sand with gravel (SM); dark reddish gray (5YR 4/2); very fine to very coarse grained, angular to subround; some large to very large pebbles, angular to subround; little granules, angular to subround; little silt; little clay; trace small cobbles, angular; moist.	(77.0') Driller stated he things they drilled trough a boulder.	(77.0') No drilling fluid used
79									
80									

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Boring Log

ARCADIS

Sheet: 5 of 7

Date Started:	03/15/2022	Surface Elevation:	538.84 ft amsl	**Boring No.:**	**TWB-01 Pilot**
Date Completed:	03/30/2022	Northing (NAD83):	2100941.12		
Drilling Co.:	Cascade	Easting (NAD83):	7615929.94	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	129.5 ft bgs	Project:	Final GW Remedy Phase 2A
Drill Rig Type:	Boart Longyear drill head	Borehole Diameter:	4-7 inches	Location:	PG&E Topock, Needles California
Driller Name:	Matt Arnold	Depth to First Water:	82.0 ft bgs		
Drilling Asst:	D Hoeppner / R West	Sampling Method:	4 inch x 10 ft. Core Barrel	Project Number:	30126255
Logger:	S McGrane / G Willford	Sampling Interval:	Continuous		
Editor:	Sean McGrane	Converted to Well:	☒ Yes ☐ No		

Depth (ft)	Recovery (ft)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
81			No Groundwater Samples Collected	Alluvium Deposits	SM		(77-83 ft) Silty sand with gravel (SM); dark reddish gray (5YR 4/2); very fine to very coarse grained, angular to subround; some large to very large pebbles, angular to subround; little granules, angular to subround; little silt; little clay; trace small cobbles, angular; moist.		
82							(82 ft) Wet to moist		
83									
84	6.3	TWB-1-SS-83-84.5 3/31/2022 15:40	TWB-1-VAS-82-87 (870 ppb) 3/18/2022 10:51	Alluvium Deposits	SM		(83-84.5 ft) Silty sand with gravel (SM); dark reddish gray (5YR 4/2); very fine to very coarse grained, angular to subround; some granules, angular to subround; little silt; little small to very large pebbles, angular to subround; moist to wet; NOTE: Some moderate cementation white matrix, potentially caliche.		
85							(84.5-89.5 ft) Silty sand with gravel (SM); reddish brown (5YR 4/3); very fine to very coarse grained, angular to subangular; little granules, angular to subangular; little small to very large pebbles, angular to subangular; little silt; trace clay; moist to wet.		
86									
87		TWB-1-SS-84.5-89.5 3/31/2022 15:35		Alluvium Deposits	SM		(87 ft) Moist to wet.	(87.0 - 97.0') Hard drilling	(87.0 - 97.0') 30 gallons of water used; 0 gallons of water recovered; 30 gallons of water lost
88									
89			TWB-1-VAS-87-92 (<0.025 ppb) 3/20/2022 08:50						
90							(89.5-97 ft) Sedimentary Rock - Conglomerate; reddish brown (5YR 5/4); fine grained to coarse grained; angular; friable; dry. NOTE: Rock pulverized into mostly powder by the sonic drilling methodology.		
91									
92	7.3								
93		TWB-1-SS-89.5-97 3/31/2022 15:30		Competent Bedrock - Conglomerate	N/A				
94									
95									
96									
97									
98	8	TWB-1-SS-97-98 3/31/2022 15:25	TWB-1-VAS-97-102 (1200 ppb) 3/20/2022 16:26	Alluvium Deposits	SP-SM		(97-98 ft) Poorly graded sand with silt (SP-SM); reddish brown (5YR 5/4); very fine to medium grained, angular to subround; little silt; trace clay; wet.	(97.0 - 102.0') Core barrel got stuck had to use water and run casing over core barrel. Lost core sample down hole, tripped back in	(97.0 - 102.0') 50 gallons of water used; 0 gallons of water recovered; 50 gallons of water lost
99		TWB-1-SS-98-99.5 3/31/2022 15:20		Alluvium Deposits	SM		(98-99.5 ft) Silty sand with gravel (SM); reddish brown (5YR 5/4); very fine to very coarse grained, angular to subangular; little granules, angular to subangular; little small to very large pebbles, angular to subangular; little silt; wet.		
100					N/A				

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Boring Log

ARCADIS

Sheet: 6 of 7

Boring No.: TWB-01 Pilot

Date Started:	03/15/2022	Surface Elevation:	538.84 ft amsl		
Date Completed:	03/30/2022	Northing (NAD83):	2100941.12		
Drilling Co.:	Cascade	Easting (NAD83):	7615929.94	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	129.5 ft bgs	Project:	Final GW Remedy Phase 2A
Drill Rig Type:	Boart Longyear drill head	Borehole Diameter:	4-7 inches	Location:	PG&E Topock, Needles California
Driller Name:	Matt Arnold	Depth to First Water:	82.0 ft bgs		
Drilling Asst:	D Hoeppner / R West	Sampling Method:	4 inch x 10 ft. Core Barrel	Project Number:	30126255
Logger:	S McGrane / G Willford	Sampling Interval:	Continuous		
Editor:	Sean McGrane	Converted to Well:	☒ Yes ☐ No		

Depth (ft)	Recovery (ft)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
101							(99.5-106 ft) Sedimentary Rock - Conglomerate; reddish brown (5YR 5/4); fine grained to coarse grained, angular; highly weathered; moist; NOTE: Very dark gray to black staining.	to recover, core disturbed.	
102									
103	8	TWB-1-SS-99.5–106 3/31/2022 15:15		Weathered Bedrock - Conglomerate	N/A			(102.0 - 106.0') Drilled to 106 ft bgs to plug the core barrel and retrieve the 97 to 102 sample.	(102.0 - 106.0') No drilling fluid used
104									
105									
106									
107	4	TWB-1-SS-106-110 3/31/2022 15:10		Weathered Bedrock - Conglomerate	N/A		(106-110 ft) Sedimentary Rock - Conglomerate; reddish brown (5YR 5/4); fine grained to coarse grained, angular; moderately weathered; moist; NOTE: Rock clasts within conglomerate composed of mixed lithology.	(106.0 - 110.0') Very hard drilling could not advance a full 10 ft.	(106.0 - 110.0') No drilling fluid used
108									
109									
110									
111	5	TWB-1-SS-110-119 3/31/2022 15:05	TWB-1-VAS-110-115 (4300 ppb) 3/21/2022 11:16	Competent Bedrock - Conglomerate	N/A		(110-119 ft) Sedimentary Rock - Conglomerate; reddish brown (5YR 5/4); fine grained to coarse grained, angular; friable; dry; NOTE: Rock clasts within conglomerate composed of mixed lithology.		
112									
113									
114									
115									
116									
117									
118	1.5							(117.0') Depth 6-inch diameter casing was drilled 4-inch diamter rathole to 127 ft bgs. 6-inch diameter casing	(117.0') No drilling fluid used (117.1 - 119.0') No drilling fluid used
119									
120	6.5			Weathered Bedrock - Conglomerate	N/A				(119.0 - 124.5') No drilling fluid

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Boring Log

ARCADIS

Sheet: 7 of 7

Boring No.: TWB-01 Pilot

Date Started:	03/15/2022	Surface Elevation:	538.84 ft amsl		
Date Completed:	03/30/2022	Northing (NAD83):	2100941.12		
Drilling Co.:	Cascade	Easting (NAD83):	7615929.94	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	129.5 ft bgs	Project:	Final GW Remedy Phase 2A
Drill Rig Type:	Boart Longyear drill head	Borehole Diameter:	4-7 inches	Location:	PG&E Topock, Needles California
Driller Name:	Matt Arnold	Depth to First Water:	82.0 ft bgs		
Drilling Asst:	D Hoeppner / R West	Sampling Method:	4 inch x 10 ft. Core Barrel	Project Number:	30126255
Logger:	S McGrane / G Willford	Sampling Interval:	Continuous		
Editor:	Sean McGrane	Converted to Well:	☒ Yes ☐ No		

Depth (ft)	Recovery (ft)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Soil Description	Drilling Notes	Drilling Fluid
121		TWB-1-SS-119-123.25 3/31/2022 15:00		Weathered Bedrock - Conglomerate	N/A		(119-123.25 ft) Sedimentary Rock - Conglomerate; reddish brown (5YR 5/4); fine grained to coarse grained, angular; moderately weathered; moist; NOTE: Rock clasts within conglomerate composed of mixed lithology.	advanced to 127 ft. bgs on 3/30/22. (117.1 - 119.0') Auger bit locked up cut run short. (119.0 - 124.5') Very hard drilling	used
122									
123									
124	6.5		TWB-1-VAS-122-127 (1700 ppb) 3/21/2022 16:26						
125		TWB-1-SS-123.25-129 3/31/2022 14:55		Competent Bedrock - Conglomerate	N/A		(123.25-129.5 ft) Sedimentary Rock - Conglomerate; reddish brown (5YR 5/4); fine grained to coarse grained, angular; medium hard; friable; dry; NOTE: Rock clasts within conglomerate composed of mixed lithology.	(124.5 - 127.0') Drilling smoother. Casing remained in place from 3/22 until resumed on 3/30/22.	(124.5 - 127.0') No drilling fluid used
126									
127									
128	2		No Groundwater Samples Collected					(127.0 - 129.0') Drilled 4-inch diameter rathole for temp well installation.	(127.0 - 129.0') 350 gallons of water used; 350 gallons of water recovered; 0 gallons of water lost
129							End of Boring at 129.5 ft bgs.		
130									
131									
132									
133									
134									
135									
136									
137									
138									
139									
140									

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, NR = No Recovery, N/A = Not Applicable, GW = groundwater, ppb = parts per billion, Notes: Solid blue and hollow blue water table marks represent depth to water (ft. bgs.) first encountered from logging and depth to water measured during the first VAS interval, respectively. Apparent partial recoveries can be the result of potential compaction of sediments in the core bag.

Attachment 3

Drilling Log

ARCADIS Drilling Log

Date Started:	08/16/2022	Surface Elevation:	538.84 ft amsl	**Boring No.:**	**TWB-01**
Date Completed:	09/08/2022	Northing (NAD83):	2100941.12		
Drilling Co.:	Cascade	Easting (NAD83):	7615929.94	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	137.0 ft bgs	Project:	Final GW Remedy Phase 2A
Drill Rig Type:	Boart Longyear Sonic	Conductor Casing Diameter:	12 inches	Location:	PG&E Topock, Needles California
Driller Name:	Matt Arnold	Drill Casing Diameter:	10.5 inches		
Drilling Asst:	L.A. / I.S. / D.H.	Drill Bit:	8 & 10-inch Cutting Shoe	Project Number:	30126255
Tool-Pusher:	Arnold Lamon	Depth to First Water:	82.0 ft bgs		
Rig Geologist:	J.A. / K.L.	Converted to Well:	☒ Yes ☐ No		

Depth (ft)	Drilling Run (ft) and Average Penetration Rate	USCS Code	USCS Class	Description (See Pilot boring log for full geologic descriptions)	Drilling notes and observations during overdrilling for the decommissioning of TWB-01 Temp Well and borehole reaming for the installation of TWB-01 extraction well.	Drilling Fluid
0		N/A		(0-0.5 ft) Grading for the drill pad.	(0.0 - 7.0') Aligned drill casing so that the TWB-01 Temp Well casing was centered on DR drill casing. Observed Cemex #60 (40x70) Lapis Lustre Sand and formation sediment including fine to coarse grained sand with trace small pebbles. Removed approximately 7 ft of 2-inch Schedule 80 PVC well casing.	(0.0 - 7.0') No drilling fluid used
1		SM		(0.5-3 ft) Silty sand with gravel (SM); brown (7.5YR 5/4).		
2						
3	(0.0 - 7.0) 0.43 mins/ft	SW-SM		(3-5 ft) Well-graded sand with silt and gravel (SW-SM).		
4						
5		SW-SM		(5-7 ft) Well-graded sand with silt and gravel (SW-SM); brown (7.5YR 5/3).		
6						
7		SM		(7-11.75 ft) Silty sand with gravel (SM); brown (7.5YR 5/4).	(7.0 - 17.0') Observed Cemex #60 (40x70) Lapis Lustre Sand, and formation sediment including very fine to coarse grained sand with trace small pebbles. Removed approximately 10 feet of 2-inch Schedule 80 PVC well casing.	(7.0 - 17.0') No drilling fluid used
8						
9						
10						
11						
12	(7.0 - 17.0) 0.80 mins/ft	GW-GM		(11.75-14 ft) Well-graded gravel with silt and sand (GW-GM); brown (7.5YR 4/3).		
13						
14		ML		(14-15.5 ft) Sandy silt with gravel (ML); brown (10YR 5/3).		
15						
16		SW-SM		(15.5-17 ft) Well-graded sand with silt and gravel (SW-SM); brown (10YR 5/3).		
17						
18	(17.0 - 27.0) 0.70 mins/ft	SW-SM		(17-19.5 ft) Well-graded sand with silt and gravel (SW-SM); brown (10YR 5/3).	(17.0 - 27.0') Observed Cemex #60 (40x70) Lapis Lustre Sand, and formation sediment including very fine to coarse grained sand with trace small pebbles. Removed approximately 10 feet of 2-inch Schedule 80 PVC well casing.	(17.0 - 27.0') No drilling fluid used
19						
20		SM				

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, Notes: Solid blue water table marks represent depth to water (ft. bgs.) depth to water measured during the first VAS interval of the pilot borehole. TWB-01 Temp Well materials not removed by overdrilling below approximately 75 ft. bgs will be decommissioned in place when the TWB-01 extraction well is decommissioned by pressure grouting.

Drilling Log

Date Started:	08/16/2022	Surface Elevation:	538.84 ft amsl	**Boring No.:**	**TWB-01**
Date Completed:	09/08/2022	Northing (NAD83):	2100941.12		
Drilling Co.:	Cascade	Easting (NAD83):	7615929.94	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	137.0 ft bgs	Project:	Final GW Remedy Phase 2A
Drill Rig Type:	Boart Longyear Sonic	Conductor Casing Diameter:	12 inches	Location:	PG&E Topock, Needles California
Driller Name:	Matt Arnold	Drill Casing Diameter:	10.5 inches		
Drilling Asst:	L.A. / I.S. / D.H.	Drill Bit:	8 & 10-inch Cutting Shoe	Project Number:	30126255
Tool-Pusher:	Arnold Lamon	Depth to First Water:	82.0 ft bgs		
Rig Geologist:	J.A. / K.L.	Converted to Well:	☒ Yes ☐ No		

Depth (ft)	Drilling Run (ft) and Average Penetration Rate	USCS Code	USCS Class	Description (See Pilot boring log for full geologic descriptions)	Drilling notes and observations during overdrilling for the decommissioning of TWB-01 Temp Well and borehole reaming for the installation of TWB-01 extraction well.	Drilling Fluid
21		SM		(19.5-22 ft) Silty sand with gravel (SM); yellowish brown (10YR 5/4).		
22						
23	(17.0 - 27.0) 0.70 mins/ft	SM		(22-27 ft) Silty sand with gravel (SM); brown (7.5YR 5/3).		
24						
25				(25 ft) Trace small cobble; subangular.		
26						
27		SM		(27-29 ft) Silty sand with gravel (SM); brown (7.5YR 4/4).	(27.0 - 34.0') Observed Cemex #60 (40x70) Lapis Lustre Sand, and formation sediment including very fine to coarse grained sand with trace small pebbles. Removed approximately 7 feet of 2-inch Schedule 80 PVC well casing.	(27.0 - 34.0') No drilling fluid used
28						
29		SM		(29-33 ft) Silty sand with gravel (SM); brown (7.5YR 4/3).		
30	(27.0 - 34.0) 0.29 mins/ft					
31						
32						
33						
34		SM		(33-37 ft) Silty sand with gravel (SM); brown (7.5YR 4/3).		
35				(34.5 ft) Trace very large pebble; angular.	(34.0 - 44.0') Observed Cemex #60 (40x70) Lapis Lustre Sand, and formation sediment including fine to coarse grained sand with trace small to medium pebbles. 2-inch schedule 80 PVC was not observed when the core barrel was retrieved. The core barrel was tripped back in andr emoved approximately 7 feet of 2-inch Schedule 80 PVC well casing.	(34.0 - 44.0') No drilling fluid used
36				(36 ft) Rip up clasts of weakly cemented sand with white matrix, potentially caliche.		
37	(34.0 - 44.0) 0.50 mins/ft					
38		SM		(37-40.5 ft) Silty sand with gravel (SM); brown (7.5YR 4/4).		
39						
40						

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Drilling Log

Sheet: 3 of 7

Date Started:	08/16/2022	Surface Elevation:	538.84 ft amsl	**Boring No.:**	**TWB-01**
Date Completed:	09/08/2022	Northing (NAD83):	2100941.12		
Drilling Co.:	Cascade	Easting (NAD83):	7615929.94	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	137.0 ft bgs	Project:	Final GW Remedy Phase 2A
Drill Rig Type:	Boart Longyear Sonic	Conductor Casing Diameter:	12 inches	Location:	PG&E Topock, Needles California
Driller Name:	Matt Arnold	Drill Casing Diameter:	10.5 inches		
Drilling Asst:	L.A. / I.S. / D.H.	Drill Bit:	8 & 10-inch Cutting Shoe	Project Number:	30126255
Tool-Pusher:	Arnold Lamon	Depth to First Water:	82.0 ft bgs		
Rig Geologist:	J.A. / K.L.	Converted to Well:	☒ Yes ☐ No		

Depth (ft)	Drilling Run (ft) and Average Penetration Rate	USCS Code	USCS Class	Description (See Pilot boring log for full geologic descriptions)	Drilling notes and observations during overdrilling for the decommissioning of TWB-01 Temp Well and borehole reaming for the installation of TWB-01 extraction well.	Drilling Fluid
41		SM		(40.5-42 ft) Silty sand with gravel (SM); brown (7.5YR 4/4).		
42	(34.0 - 44.0) 0.50 mins/ft	SM		(42-48.75 ft) Well-graded sand with silt and gravel (SW-SM); brown (7.5YR 4/4).		
43						
44						
45						
46						
47					(47.0 - 54.0') Observed Cemex #60 (40x70) Lapis Lustre Sand, and formation sediment including fine to coarse grained sand with trace small pebbles. Removed approximately 7 feet of 2-inch Schedule 80 PVC well casing.	(47.0 - 54.0') No drilling fluid used
48						
49	(44.0 - 54.0) 0.80 mins/ft	SW		(48.75-50 ft) Well-graded sand with gravel (SW); brown (7.5YR 4/3).		
50		SM		(50-52 ft) Silty sand with gravel (SM); brown (7.5YR 4/3).		
51						
52						
53		SM		(52-54.5 ft) Silty sand with gravel (SM); brown (7.5YR 4/4).		
54						
55	(54.0 - 57.0) 4.33 mins/ft	SW-SM		(54.5-57 ft) Well-graded sand with silt and gravel (SW-SM); brown (7.5YR 5/3).	(54.0 - 57.0') Observed Cemex #60 (40x70) Lapis Lustre Sand, and formation sediment including fine to coarse grained sand with trace small to medium pebbles. Removed broken fragments of 2-inch Schedule 80 PVC w ell casing.	(54.0 - 57.0') No drilling fluid used
56						
57						
58	(57.0 - 67.0) 2.10 mins/ft	SW-SM		(57-62 ft) Well-graded sand with silt and gravel (SW-SM); brown (7.5YR 4/4).	(57.0 - 67.0') Observed Cemex #60 (40x70) Lapis Lustre Sand, and formation sediment including fine grained sand with trace small to medium pebbles. Removed broken fragments of 2-inch Schedule 80 PVC well casing.	(57.0 - 67.0') No drilling fluid used
59						
60						

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, Notes: Solid blue water table marks represent depth to water (ft. bgs.) depth to water measured during the first VAS interval of the pilot borehole. TWB-01 Temp Well materials not removed by overdrilling below approximately 75 ft. bgs will be decommissioned in place when the TWB-01 extraction well is decommissioned by pressure grouting.

Drilling Log

ARCADIS

Date Started:	08/16/2022	Surface Elevation:	538.84 ft amsl
Date Completed:	09/08/2022	Northing (NAD83):	2100941.12
Drilling Co.:	Cascade	Easting (NAD83):	7615929.94
Drilling Method:	Sonic Drilling	Total Depth:	137.0 ft bgs
Drill Rig Type:	Boart Longyear Sonic	Conductor Casing Diameter:	12 inches
Driller Name:	Matt Arnold	Drill Casing Diameter:	10.5 inches
Drilling Asst:	L.A. / I.S. / D.H.	Drill Bit:	8 & 10-inch Cutting Shoe
Tool-Pusher:	Arnold Lamon	Depth to First Water:	82.0 ft bgs
Rig Geologist:	J.A. / K.L.	Converted to Well:	[X] Yes [ ] No

Boring No.: TWB-01

Client: PG&E
Project: Final GW Remedy Phase 2A
Location: PG&E Topock, Needles California
Project Number: 30126255

Depth (ft)	Drilling Run (ft) and Average Penetration Rate	USCS Code	USCS Class	Description (See Pilot boring log for full geologic descriptions)	Drilling notes and observations during overdrilling for the decommissioning of TWB-01 Temp Well and borehole reaming for the installation of TWB-01 extraction well.	Drilling Fluid
61		SW-SM		(57-62 ft) Well-graded sand with silt and gravel (SW-SM); brown (7.5YR 4/4).		
62		SM		(62-63.5 ft) Silty sand with gravel (SM); brown (7.5YR 4/4).		
63	(57.0 - 67.0) 2.10 mins/ft					
64		SW		(63.5-64.5 ft) Well-graded sand with gravel (SW); reddish brown (5YR 4/4).		
65		SM		(64.5-67 ft) Silty sand with gravel (SM); reddish yellow (5YR 6/6).		
66						
67						
68		SM		(67-70.5 ft) Silty sand with gravel (SM); brown (7.5YR 5/4).	(67.0 - 72.0') Observed Cemex #60 (40x70) Lapis Lustre Sand, and formation sediment including fine to coarse grained sand with small to medium pebbles of weathered bedrock. Removed approximately 7 feet of 2-inch schedule 80 PVC well casing.	(67.0 - 72.0') No drilling fluid used
69	(67.0 - 72.0) 2.40 mins/ft					
70						
71		SW-SM		(70-72 ft) Well-graded sand with silt and gravel (SW-SM); reddish brown (5YR 4/4).		
72		SC		(71-72 ft) Clayey sand with gravel (SC); reddish brown (5YR 4/3).		
73		SM		(72-74.5 ft) Silty sand with gravel (SM); reddish brown (5YR 4/4).	(72.0 - 85.0') Observed Cemex #3 (8x20) Lapis Lustre Sand and formation sediment including fine to very coarse grained sand, granules and small to medium pebbles. 2-inch schedule 80 PVC well casing material was not observed. The lack of well casing materials observed in the drill cuttings suggest the overdrill casing was not aligned with the TWB-01-Temp well below approximately 75 feet bgs. Well casing materials not removed during overdrilling is planned to be decommissioned in place when the TWB-01 extraction well is decommissioned by pressure grouting.	(72.0 - 85.0') No drilling fluid used
74						
75		SW-SM		(74.5-77 ft) Well-graded sand with silt and gravel (SW-SM); reddish brown (5YR 4/4).		
76	(72.0 - 85.0) 1.00 mins/ft					
77						
78		SM		(77-83 ft) Silty sand with gravel (SM); dark reddish gray (5YR 4/2).		
79						
80						

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, Notes: Solid blue water table marks represent depth to water (ft. bgs.) depth to water measured during the first VAS interval of the pilot borehole. TWB-01 Temp Well materials not removed by overdrilling below approximately 75 ft. bgs will be decommissioned in place when the TWB-01 extraction well is decommissioned by pressure grouting.

Drilling Log

Date Started:	08/16/2022	Surface Elevation:	538.84 ft amsl	**Boring No.:**	**TWB-01**
Date Completed:	09/08/2022	Northing (NAD83):	2100941.12		
Drilling Co.:	Cascade	Easting (NAD83):	7615929.94	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	137.0 ft bgs	Project:	Final GW Remedy Phase 2A
Drill Rig Type:	Boart Longyear Sonic	Conductor Casing Diameter:	12 inches	Location:	PG&E Topock, Needles California
Driller Name:	Matt Arnold	Drill Casing Diameter:	10.5 inches		
Drilling Asst:	L.A. / I.S. / D.H.	Drill Bit:	8 & 10-inch Cutting Shoe	Project Number:	30126255
Tool-Pusher:	Arnold Lamon	Depth to First Water:	82.0 ft bgs		
Rig Geologist:	J.A. / K.L.	Converted to Well:	☒ Yes ☐ No		

Depth (ft)	Drilling Run (ft) and Average Penetration Rate	USCS Code	USCS Class	Description (See Pilot boring log for full geologic descriptions)	Drilling notes and observations during overdrilling for the decommissioning of TWB-01 Temp Well and borehole reaming for the installation of TWB-01 extraction well.	Drilling Fluid
81	(72.0 - 85.0) 1.00 mins/ft	SM		(77-83 ft) Silty sand with gravel (SM); dark reddish gray (5YR 4/2).		
82				(82 ft) Wet to moist		
83		SM		(83-84.5 ft) Silty sand with gravel (SM); dark reddish gray (5YR 4/2).		
84						
85		SM		(84.5-89.5 ft) Silty sand with gravel (SM); reddish brown (5YR 4/3).		
86	(85.0 - 87.0) 8.00 mins/ft				(85.0 - 87.0') Observed Cemex #3 (8x20) Lapis Lustre Sand and moist formation sediment including medium to very coarse grained sand, granules, and small to medium pebbles.	(85.0 - 87.0') No drilling fluid used
87				(87 ft) Moist to wet.		
88	(87.0 - 95.0) 1.13 mins/ft				(87.0 - 95.0') Observed Cemex #3 (8x20) Lapis Lustre Sand and moist formation sediment including medium to very coarse grained sand, granules, and small to medium pebbles.	(87.0 - 95.0') No drilling fluid used
89						
90		N/A		(89.5-97 ft) Sedimentary Rock; reddish brown (5YR 5/4).		
91						
92						
93						
94						
95						
96	(95.0 - 100.0) 1.80 mins/ft				(95.0 - 100.0') Observed Cemex #3 (8x20) Lapis Lustre Sand and moist formation sediment including medium to very coarse grained sand, small-medium pebble, granules, moist.	(95.0 - 100.0') No drilling fluid used
97		SP-SM		(97-98 ft) Poorly graded sand with silt (SP-SM); reddish brown (5YR 5/4).		
98		SM		(98-99.5 ft) Silty sand with gravel (SM); reddish brown (5YR 5/4).		
99						
100		N/A				

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, Notes: Solid blue water table marks represent depth to water (ft. bgs.) depth to water measured during the first VAS interval of the pilot borehole. TWB-01 Temp Well materials not removed by overdrilling below approximately 75 ft. bgs will be decommissioned in place when the TWB-01 extraction well is decommissioned by pressure grouting.

Drilling Log

Sheet: 6 of 7

Date Started:	08/16/2022	Surface Elevation:	538.84 ft amsl	**Boring No.:**	**TWB-01**
Date Completed:	09/08/2022	Northing (NAD83):	2100941.12		
Drilling Co.:	Cascade	Easting (NAD83):	7615929.94	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	137.0 ft bgs	Project:	Final GW Remedy Phase 2A
Drill Rig Type:	Boart Longyear Sonic	Conductor Casing Diameter:	12 inches	Location:	PG&E Topock, Needles California
Driller Name:	Matt Arnold	Drill Casing Diameter:	10.5 inches		
Drilling Asst:	L.A. / I.S. / D.H.	Drill Bit:	8 & 10-inch Cutting Shoe	Project Number:	30126255
Tool-Pusher:	Arnold Lamon	Depth to First Water:	82.0 ft bgs		
Rig Geologist:	J.A. / K.L.	Converted to Well:	☒ Yes ☐ No		

Depth (ft)	Drilling Run (ft) and Average Penetration Rate	USCS Code	USCS Class	Description (See Pilot boring log for full geologic descriptions)	Drilling notes and observations during overdrilling for the decommissioning of TWB-01 Temp Well and borehole reaming for the installation of TWB-01 extraction well.	Drilling Fluid
101	(100.0 - 107.0) 0.57 mins/ft	N/A		(99.5-106 ft) Sedimentary Rock - Conglomerate; reddish brown (5YR 5/4).	(100.0 - 107.0') Observed Cemex #3 (8x20) Lapis Lustre Sand and moist formation sediment including medium to coarse grained sand, silt, granules, and small to medium pebbles.	(100.0 - 107.0') No drilling fluid used
102						
103						
104						
105						
106						
107		N/A		(106-110 ft) Sedimentary Rock - Conglomerate; reddish brown (5YR 5/4).	(107.0 - 112.0') Observed moist formation sediment including medium to very coarse grained sand, silt, granules and small pebbles. Cemex #3 (8x20) Lapis Lustre Sand was not observed. The lack of Cemex #3 (8x20) Lapis Lustre Sand in the drill cutting suggests that the overdrill casing was not aligned with the TWB-01 Pilot borehole used to install the TWB-01-Temp well below approximately 107 feet bgs.	(107.0 - 112.0') No drilling fluid used
108						
109	(107.0 - 112.0) 2.40 mins/ft					
110						
111		N/A		(110-119 ft) Sedimentary Rock - Conglomerate; reddish brown (5YR 5/4).	(110.0') After reaching total depth PG&E requested the drill casing remain in the borehole during discussions with stakeholders to discuss options to determine a path forward for the decommissioning of TWB-01 Temp Well materials left in place below approximately 75 ft. bgs. Cascade had concerns that the 10-inch drill casing would lock up in the formation. To prevent the casing from becoming locked up the 10-inch casing was retracted to approximately 110 ft. bgs and the borehole below temporarily backfilled with Cemex #1/20 (20x40) Lapis Lustre Sand to support the casing and allow the rig to be moved to and alternate location until a path forward could be determined.	(112.0 - 120.0') No drilling fluid used
112						
113						
114					(112.0 - 120.0') Observed formation sediment including very fine to coarse grained sand, granules, and trace small pebbles.	
115					(115.0') Observed temporary backfill Cemex #1/20 (20x40) Lapis lustre sand in drill cuttings.	
116	(112.0 - 120.0) 2.13 mins/ft					
117						
118						
119						
120		N/A		(119-123.25 ft) Sedimentary Rock - Conglomerate; reddish brown (5YR 5/4).		

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, Notes: Solid blue water table marks represent depth to water (ft. bgs.) depth to water measured during the first VAS interval of the pilot borehole. TWB-01 Temp Well materials not removed by overdrilling below approximately 75 ft. bgs will be decommissioned in place when the TWB-01 extraction well is decommissioned by pressure grouting.

ARCADIS Drilling Log

Date Started:	08/16/2022	Surface Elevation:	538.84 ft amsl	**Boring No.:**	**TWB-01**
Date Completed:	09/08/2022	Northing (NAD83):	2100941.12		
Drilling Co.:	Cascade	Easting (NAD83):	7615929.94	Client:	PG&E
Drilling Method:	Sonic Drilling	Total Depth:	137.0 ft bgs	Project:	Final GW Remedy Phase 2A
Drill Rig Type:	Boart Longyear Sonic	Conductor Casing Diameter:	12 inches	Location:	PG&E Topock, Needles California
Driller Name:	Matt Arnold	Drill Casing Diameter:	10.5 inches		
Drilling Asst:	L.A. / I.S. / D.H.	Drill Bit:	8 & 10-inch Cutting Shoe	Project Number:	30126255
Tool-Pusher:	Arnold Lamon	Depth to First Water:	82.0 ft bgs		
Rig Geologist:	J.A. / K.L.	Converted to Well:	[X] Yes [ ] No		

Depth (ft)	Drilling Run (ft) and Average Penetration Rate	USCS Code	USCS Class	Description (See Pilot boring log for full geologic descriptions)	Drilling notes and observations during overdrilling for the decommissioning of TWB-01 Temp Well and borehole reaming for the installation of TWB-01 extraction well.	Drilling Fluid
121	(120.0 - 125.0) 1.80 mins/ft	N/A		(119-123.25 ft) Sedimentary Rock - Conglomerate; reddish brown (5YR 5/4).	(120.0 - 125.0') Observed moist formation sediment including medium to very coarse grained sand, silt, granules, small pebbles.	(120.0 - 125.0') No drilling fluid used
122						
123						
124		N/A		(123.25-129 ft) Sedimentary Rock - Conglomerate; reddish brown (5YR 5/4).		
125						
126	(125.0 - 131.0) 1.50 mins/ft				(125.0 - 131.0') Collect and logged from 129-131 feet bgs (see Description) to supplement TWB-01 Pilot Borehole Log drilled to approximately 129.5 bgs. The 8-inch diamter core barrel became stuck in the formation, flushed the 10-inch diameter drill casing over the core barrel to free it. The 10-inch diameter drill casing almost became stuck.	(125.0 - 131.0') Water used for drilling, volumes used and recovered not documented
127						
128					(126.0') Observed temporary backfill Cemex #1/20 (20x40) Lapis lustre sand in drill cuttings.	
129		N/A		(129-131 ft) Sedimentary Rock - Conglomerate; reddish brown (7.5YR 5/4); fine grained to coarse grained, subangular; weathering fresh; medium hard; rock clasts within conglomerate composed of mixed lithology; NOTE: Competent bedrock pulverized by drilling process.		
130						
131						
132	(131.0 - 136.0) 2.20 mins/ft	N/A		(131-136 ft) Sedimentary Rock - Conglomerate; reddish brown (7.5YR 5/4); fine grained to coarse grained, subangular; weathering fresh; medium hard; moderately fractured; massive; NOTE: Majority of larger clasts within matrix composed of metadiorite. From 131-132' the bedrock is fractured into 2-4 inch thick pieces.. (131-131.3 ft) Fracture, 90 degree vertical, smooth, fracture surface covered with silt. (132-133 ft) Mechanical fracture, horizontal, rough surface on fracture face. (133-134.16 ft) Mechanical fracture, horizontal, rough surface on fracture face. (134.2-135.08 ft) Mechanical fracture, horizontal, rough surface on fracture face. (135.08-136 ft) Mechanical fracture, horizontal, rough surface on fracture face.	(131.0 - 136.0') Collect and logged from 129-131 feet bgs (see Description) to supplement TWB-01 Pilot Borehole Log drilled to approximately 129.5 bgs.	(131.0 - 136.0') Water used for drilling, volumes used and recovered not documented
133						
134						
135						
136					(136.0') A preliminary alignment test was conducted by running 40 feet of 8-inch outer diameter core barrel within the 9.5-inch inner diameter of the drill casing to a depth of approximately 136 ft bgs. During the test Cascade did not encounter any resistance indicating that drill casing is likely plumb.	
137				End of Boring at 137 ft bgs.	(136.5') Flushed casing in preparation for well installation.	(136.5') 900 gallons of water used; 150 gallons of water recovered; 750 gallons of water lost
138						
139						
140						

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Attachment 4

Well Construction Logs (TWB-01 Temp and TWB-01)

Well Construction Log

ARCADIS

Sheet: 1 of 7

Date Started:	03/31/2022	Surface Elevation:	538.84 ft amsl	**Well ID:**	**TWB-01 Temp**
Date Completed:	03/31/2022	Shallow Well Elevation:	538.34 ft amsl		
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client:	PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	2100941.12	Project:	Final GW Remedy Phase 2A
Driller Name:	Matt Arnold	Easting (NAD83):	7615929.94	Location:	PG&E Topock, Needles California
Drilling Asst:	D Hoeppner / R West	Borehole Diameter:	4-7 inches		
Logger:	Ellen Redner	Static Water Level:	See Log for Depths	Project Number:	30126255
Editor:	Sean McGrane	Development End Date:	4/27/2022		
Total Depth:	129.5 ft bgs	Well Completion:	☒ Flush ☐ Stick-up ☐ To Be Completed in Well Vault		

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Construction Details	Calculated Material Volumes	Material Volumes Installed Note: percentages are the actual volume vs the calculated volume
0		Fill	N/A		(0.0 - 1.0') Temporary well vault; (0.0 - 8.0') 7" Diameter Borehole		Note: 12-inch diameter vault
1–2		Alluvium Deposits	SM		(0.3 - 76.7') 2" Sch. 80 PVC Casing		
3–4		Alluvium Deposits	SW-SM				
5–6		Alluvium Deposits	SW-SM				
7–10	No Groundwater Samples Collected	Alluvium Deposits	SM		(8.0 - 127.0') 6" Diameter Borehole; (1.0 - 70.5') Cemex #60 (40x70) Lapis Lustre Sand	(1.0 - 70.5') 23.5 bags	(1.0 - 70.5') 27 bags (115%) Note: Temporary sand seal
11–12		Alluvium Deposits	GW-GM				
13–14		Alluvium Deposits	ML				
15–16		Alluvium Deposits	SW-SM				
17–18		Alluvium Deposits	SW-SM				
19–20		Alluvium	SM				

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, SS = Stainless Steal, NR = No Recovery, N/A = Not Applicable, GW = groundwater, ppb = parts per billion, Notes: Hollow blue water table marks represent depth to water (ft. bgs.) measured post development.

Well Construction Log

ARCADIS

Date Started:	03/31/2022	Surface Elevation:	538.84 ft amsl	**Well ID:**	**TWB-01 Temp**
Date Completed:	03/31/2022	Shallow Well Elevation:	538.34 ft amsl		
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client:	PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	2100941.12	Project:	Final GW Remedy Phase 2A
Driller Name:	Matt Arnold	Easting (NAD83):	7615929.94	Location:	PG&E Topock, Needles California
Drilling Asst:	D Hoeppner / R West	Borehole Diameter:	4-7 inches		
Logger:	Ellen Redner	Static Water Level:	See Log for Depths	Project Number:	30126255
Editor:	Sean McGrane	Development End Date:	4/27/2022		
Total Depth:	129.5 ft bgs	Well Completion:	☒ Flush ☐ Stick-up ☐ To Be Completed in Well Vault		

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Construction Details	Calculated Material Volumes	Material Volumes Installed Note: percentages are the actual volume vs the calculated volume
21	No Groundwater Samples Collected	Deposits Alluvium Deposits	SM		(0.3 - 76.7') 2" Sch. 80 PVC Casing		
22							
23		Alluvium Deposits	SM				
24							
25							
26							
27		Alluvium Deposits	SM				
28							
29							
30		Alluvium Deposits	SM		(1.0 - 70.5') Cemex #60 (40x70) Lapis Lustre Sand	(1.0 - 70.5') 23.5 bags	(1.0 - 70.5') 27 bags (115%) Note: Temporary sand seal
31							
32							
33							
34		Alluvium Deposits	SM				
35							
36							
37							
38		Alluvium Deposits	SM				
39							
40							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, SS = Stainless Steal, NR = No Recovery, N/A = Not Applicable, GW = groundwater, ppb = parts per billion, Notes: Hollow blue water table marks represent depth to water (ft. bgs.) measured post development.

Well Construction Log

ARCADIS

Sheet: 3 of 7

Date Started:	03/31/2022	Surface Elevation:	538.84 ft amsl	**Well ID:**	**TWB-01 Temp**
Date Completed:	03/31/2022	Shallow Well Elevation:	538.34 ft amsl		
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client:	PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	2100941.12	Project:	Final GW Remedy Phase 2A
Driller Name:	Matt Arnold	Easting (NAD83):	7615929.94	Location:	PG&E Topock, Needles California
Drilling Asst:	D Hoeppner / R West	Borehole Diameter:	4-7 inches		
Logger:	Ellen Redner	Static Water Level:	See Log for Depths	Project Number:	30126255
Editor:	Sean McGrane	Development End Date:	4/27/2022		
Total Depth:	129.5 ft bgs	Well Completion:	☒ Flush ☐ Stick-up ☐ To Be Completed in Well Vault		

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Construction Details	Calculated Material Volumes	Material Volumes Installed Note: percentages are the actual volume vs the calculated volume
41	No Groundwater Samples Collected	Alluvium Deposits	SM		(0.3 - 76.7') 2" Sch. 80 PVC Casing		
42							
43							
44							
45							
46							
47							
48							
49		Alluvium Deposits	SW				
50					(1.0 - 70.5') Cemex #60 (40x70) Lapis Lustre Sand	(1.0 - 70.5') 23.5 bags	(1.0 - 70.5') 27 bags (115%) Note: Temporary sand seal
51		Alluvium Deposits	SM				
52							
53		Alluvium Deposits	SM				
54							
55		Alluvium Deposits	SW-SM				
56							
57							
58		Alluvium Deposits	SW-SM				
59							
60							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, SS = Stainless Steal, NR = No Recovery, N/A = Not Applicable, GW = groundwater, ppb = parts per billion, Notes: Hollow blue water table marks represent depth to water (ft. bgs.) measured post development.

Well Construction Log

ARCADIS

Date Started:	03/31/2022	Surface Elevation:	538.84 ft amsl	**Well ID:**	**TWB-01 Temp**
Date Completed:	03/31/2022	Shallow Well Elevation:	538.34 ft amsl		
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client:	PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	2100941.12	Project:	Final GW Remedy Phase 2A
Driller Name:	Matt Arnold	Easting (NAD83):	7615929.94	Location:	PG&E Topock, Needles California
Drilling Asst:	D Hoeppner / R West	Borehole Diameter:	4-7 inches		
Logger:	Ellen Redner	Static Water Level:	See Log for Depths	Project Number:	30126255
Editor:	Sean McGrane	Development End Date:	4/27/2022		
Total Depth:	129.5 ft bgs	Well Completion:	☒ Flush ☐ Stick-up ☐ To Be Completed in Well Vault		

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Construction Details	Calculated Material Volumes	Material Volumes Installed Note: percentages are the actual volume vs the calculated volume
61	No Groundwater Samples Collected	Alluvium Deposits	SW-SM		(0.3 - 76.7') 2" Sch. 80 PVC Casing		
62		Alluvium Deposits	SM				
63		Alluvium Deposits	SW				
64		Alluvium Deposits	SM				
65					(1.0 - 70.5') Cemex #60 (40x70) Lapis Lustre Sand	(1.0 - 70.5') 23.5 bags	(1.0 - 70.5') 27 bags (115%) Note: Temporary sand seal
66							
67		Alluvium Deposits	SM				
68							
69							
70		Alluvium Deposits	SW-SM				
71		Alluvium Deposits	SC		(70.5 - 72.0') Holeplug 3/8" Bentonite Chips	(70.5 - 72.0') 0.4 bags	(70.5 - 72.0') 0.5 bags (125%) Note: Benotnite seal
72		Alluvium Deposits	SM				
73							
74							
75		Alluvium Deposits	SW-SM				
76					(72.0 - 129.5') Cemex #3 (8x20) Lapis Lustre Sand	(72.0 - 129.5') 18.2 bags	(72.0 - 129.5') 27.5 bags (151%) Note: Filter pack, used >20% of the calculated volume due to potential voids forming during drilling.
77					(76.7 - 126.7') 2" 0.02-Slot Sch. 80 PVC Screen		
78		Alluvium Deposits	SM				
79							
80							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, SS = Stainless Steal, NR = No Recovery, N/A = Not Applicable, GW = groundwater, ppb = parts per billion, Notes: Hollow blue water table marks represent depth to water (ft. bgs.) measured post development.

Well Construction Log

ARCADIS

Date Started:	03/31/2022	Surface Elevation:	538.84 ft amsl	**Well ID:**	**TWB-01 Temp**
Date Completed:	03/31/2022	Shallow Well Elevation:	538.34 ft amsl		
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client:	PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	2100941.12	Project:	Final GW Remedy Phase 2A
Driller Name:	Matt Arnold	Easting (NAD83):	7615929.94	Location:	PG&E Topock, Needles California
Drilling Asst:	D Hoeppner / R West	Borehole Diameter:	4-7 inches		
Logger:	Ellen Redner	Static Water Level:	See Log for Depths	Project Number:	30126255
Editor:	Sean McGrane	Development End Date:	4/27/2022		
Total Depth:	129.5 ft bgs	Well Completion:	☒ Flush ☐ Stick-up ☐ To Be Completed in Well Vault		

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Construction Details	Calculated Material Volumes	Material Volumes Installed Note: percentages are the actual volume vs the calculated volume
81	No Groundwater Samples Collected	Alluvium Deposits	SM		(76.7 - 126.7') 2" 0.02-Slot Sch. 80 PVC Screen		
82							
83		Alluvium Deposits	SM				
84	TWB-1-VAS-82-87 (870 ppb) 3/18/2022 10:51						
85							
86		Alluvium Deposits	SM				
87							
88							
89	TWB-1-VAS-87-92 (<0.025 ppb) 3/20/2022 08:50						
90					(72.0 - 129.5') Cemex #3 (8x20) Lapis Lustre Sand	(72.0 - 129.5') 18.2 bags	(72.0 - 129.5') 27.5 bags (151%) Note: Filter pack, used >20% of the calculated volume due to potential voids forming during drilling.
91							
92							
93		Competent Bedrock - Conglomerate	N/A				
94							
95							
96							
97							
98	TWB-1-VAS-97-102 (1200 ppb) 3/20/2022 16:26	Alluvium Deposits	SP-SM				
99		Alluvium Deposits	SM				
100			N/A				

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, SS = Stainless Steal, NR = No Recovery, N/A = Not Applicable, GW = groundwater, ppb = parts per billion, Notes: Hollow blue water table marks represent depth to water (ft. bgs.) measured post development.

Well Construction Log

ARCADIS

Date Started:	03/31/2022	Surface Elevation:	538.84 ft amsl	**Well ID:**	**TWB-01 Temp**
Date Completed:	03/31/2022	Shallow Well Elevation:	538.34 ft amsl		
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client:	PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	2100941.12	Project:	Final GW Remedy Phase 2A
Driller Name:	Matt Arnold	Easting (NAD83):	7615929.94	Location:	PG&E Topock, Needles California
Drilling Asst:	D Hoeppner / R West	Borehole Diameter:	4-7 inches		
Logger:	Ellen Redner	Static Water Level:	See Log for Depths	Project Number:	30126255
Editor:	Sean McGrane	Development End Date:	4/27/2022		
Total Depth:	129.5 ft bgs	Well Completion:	☒ Flush ☐ Stick-up ☐ To Be Completed in Well Vault		

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Construction Details	Calculated Material Volumes	Material Volumes Installed Note: percentages are the actual volume vs the calculated volume
101					(76.7 - 126.7') 2" 0.02-Slot Sch. 80 PVC Screen		
102							
103		Weathered Bedrock - Conglomerate	N/A				
104							
105							
106							
107		Weathered Bedrock - Conglomerate	N/A				
108							
109							
110					(72.0 - 129.5') Cemex #3 (8x20) Lapis Lustre Sand	(72.0 - 129.5') 18.2 bags	(72.0 - 129.5') 27.5 bags (151%) Note: Filter pack, used >20% of the calculated volume due to potential voids forming during drilling.
111							
112	TWB-1-VAS-110-115 (4300 ppb) 3/21/2022 11:16						
113							
114		Competent Bedrock - Conglomerate	N/A				
115							
116							
117							
118							
119							
120		Weathered Bedrock - Conglomerate	N/A				

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, SS = Stainless Steal, NR = No Recovery, N/A = Not Applicable, GW = groundwater, ppb = parts per billion, Notes: Hollow blue water table marks represent depth to water (ft. bgs.) measured post development.

Well Construction Log

Sheet: 7 of 7

ARCADIS

Date Started:	03/31/2022	Surface Elevation:	538.84 ft amsl	**Well ID: TWB-01 Temp**	
Date Completed:	03/31/2022	Shallow Well Elevation:	538.34 ft amsl		
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client:	PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	2100941.12	Project:	Final GW Remedy Phase 2A
Driller Name:	Matt Arnold	Easting (NAD83):	7615929.94	Location:	PG&E Topock, Needles California
Drilling Asst:	D Hoeppner / R West	Borehole Diameter:	4-7 inches		
Logger:	Ellen Redner	Static Water Level:	See Log for Depths	Project Number:	30126255
Editor:	Sean McGrane	Development End Date:	4/27/2022		
Total Depth:	129.5 ft bgs	Well Completion:	☒ Flush ☐ Stick-up ☐ To Be Completed in Well Vault		

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Construction Details	Calculated Material Volumes	Material Volumes Installed Note: percentages are the actual volume vs the calculated volume
121		Weathered Bedrock - Conglomerate	N/A		(76.7 - 126.7') 2" 0.02-Slot Sch. 80 PVC Screen		
122							
123							
124	TWB-1-VAS-122-127 (1700 ppb) 3/21/2022 16:26	Competent Bedrock - Conglomerate	N/A		(72.0 - 129.5') Cemex #3 (8x20) Lapis Lustre Sand	(72.0 - 129.5') 18.2 bags	(72.0 - 129.5') 27.5 bags (151%) Note: Filter pack, used >20% of the calculated volume due to potential voids forming during drilling.
125							
126							
127					(126.7 - 126.9') SS End Cap		
128	No Groundwater Samples Collected				(127.0 - 129.0') 4" Diameter Rathole		
129							
130							
131							
132							
133							
134							
135							
136							
137							
138							
139							
140							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, SS = Stainless Steal, NR = No Recovery, N/A = Not Applicable, GW = groundwater, ppb = parts per billion, Notes: Hollow blue water table marks represent depth to water (ft. bgs.) measured post development.

Well Construction Log

ARCADIS

Sheet: 1 of 7

Date Started:	09/09/2022	Surface Elevation:	538.84 ft amsl	**Well ID: TWB-01**	
Date Completed:	09/12/2022	Shallow Well Elevation:	N/A		
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client:	PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	2100941.12	Project:	Final GW Remedy Phase 2A
Driller Name:	Matt Arnold	Easting (NAD83):	7615929.94	Location:	PG&E Topock, Needles California
Drilling Asst:	L.A. / I.S. / D.H.	Borehole Diameter:	10.5-12 inches		
Logger:	Kim Lapszynski	Static Water Level:	See Log for Depths	Project Number:	30126255
Editor:	Sean McGrane	Development End Date:	9/28/2022		
Total Depth:	137 ft bgs	Well Completion:	☐ Flush ☐ Stick-up ☒ Well Vault		

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Construction Details	Calculated Material Volumes	Material Volumes Installed Note: percentages are the actual volume vs the calculated volume
0		Fill	N/A				
1–3		Alluvium Deposits	SM		(0.0 - 4.0') Well Vault		Note: Well vault dimensions 4x5 feet by 4 feet deep.
3–5		Alluvium Deposits	SW-SM		(3.5 - 85.0') 6" Sch. 80 PVC Casing; (4.0 - 8.5') 12" Diameter Borehole		
5–7		Alluvium Deposits	SW-SM				
7–10	No Groundwater Samples Collected	Alluvium Deposits	SM		(4.0 - 11.0') Type I, II, and V Portland Cement with up to 6% Quik-Gel bentonite; (8.5 - 137.0') 10.5" Diameter Borehole	(4.0 - 11.0') 7.48 bags	(4.0 - 11.0') 6 bags (80%) Note: Grout seal third lift. Six bags of portland cement were added directly into the annular space and hydrated with water to top of the grout seal. The extraction well sanitary seal also serves as the sanitary seal for decommissioning of TWB-01 Temp Well from approximately 4 to 11 ft. bgs.
10–12		Alluvium Deposits	GW-GM				
12–14		Alluvium Deposits	ML		(13.0 - 14.0') Kwik-Zip Centralizer		Note: Kwik-Zip Centralizer had to be trimmed down to fit inside the sonic drill casing.
14–16		Alluvium Deposits	SW-SM		(11.0 - 32.0') Type I, II, and V Portland Cement with up to 6% Quik-Gel bentonite	(11.0 - 32.0') 62.8 gallons	(11.0 - 32.0') 100 gallons (159%) Note: Grout seal second lift, used >20% of the calculated volume due to potential voids that formed during drilling and grout migration into the formation. The extraction well sanitary seal also serves as the sanitary seal for decommissioning of TWB-01 Temp Well from approximately 11 to 32 ft. bgs.
16–20		Alluvium Deposits	SW-SM				

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, SS = Stainless Steel, NR = No Recovery, N/A = Not Applicable, GW = groundwater, ppb = parts per billion, Notes: Solid blue water table marks represent depth to water (ft. bgs.) measured post development.

Well Construction Log

ARCADIS

Well ID: TWB-01

Date Started:	09/09/2022	Surface Elevation:	538.84 ft amsl		
Date Completed:	09/12/2022	Shallow Well Elevation:	N/A		
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client:	PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	2100941.12	Project:	Final GW Remedy Phase 2A
Driller Name:	Matt Arnold	Easting (NAD83):	7615929.94	Location:	PG&E Topock, Needles California
Drilling Asst:	L.A. / I.S. / D.H.	Borehole Diameter:	10.5-12 inches		
Logger:	Kim Lapszynski	Static Water Level:	See Log for Depths	Project Number:	30126255
Editor:	Sean McGrane	Development End Date:	9/28/2022		
Total Depth:	137 ft bgs	Well Completion:	☐ Flush ☐ Stick-up ☒ Well Vault		

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Construction Details	Calculated Material Volumes	Material Volumes Installed Note: percentages are the actual volume vs the calculated volume
21	No Groundwater Samples Collected	Alluvium Deposits	SM		(3.5 - 85.0') 6" Sch. 80 PVC Casing		
22							
23		Alluvium Deposits	SM				
24							
25							
26					(11.0 - 32.0') Type I, II, and V Portland Cement with up to 6% Quik-Gel bentonite	(11.0 - 32.0') 62.8 gallons	(11.0 - 32.0') 100 gallons (159%) Note: Grout seal second lift, used >20% of the calculated volume due to potential voids that formed during drilling and grout migration into the formation. The extraction well sanitary seal also serves as the sanitary seal for decommissioning of TWB-01 Temp Well from approximately 11 to 32 ft. bgs.
27							
28		Alluvium Deposits	SM				
29							
30		Alluvium Deposits	SM				
31							
32							
33		Alluvium Deposits	SM				
34							
35							
36					(32.0 - 73.0') Type I, II, and V Portland Cement with up to 6% Quik-Gel bentonite	(32.0 - 73.0') 122.6 gallons	(32.0 - 73.0') 200 gallons (163%) Note: Grout seal first lift, used >20% of the calculated volume due to potential voids that formed during drilling and grout migration into the formation. The extraction well sanitary seal also serves as the sanitary seal for decommissioning of TWB-01 Temp Well from approximately 32 to 73 ft. bgs.
37							
38		Alluvium Deposits	SM				
39							
40							

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Well Construction Log

ARCADIS

Well ID: TWB-01

Date Started:	09/09/2022	Surface Elevation:	538.84 ft amsl		
Date Completed:	09/12/2022	Shallow Well Elevation:	N/A		
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client:	PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	2100941.12	Project:	Final GW Remedy Phase 2A
Driller Name:	Matt Arnold	Easting (NAD83):	7615929.94	Location:	PG&E Topock, Needles California
Drilling Asst:	L.A. / I.S. / D.H.	Borehole Diameter:	10.5-12 inches		
Logger:	Kim Lapszynski	Static Water Level:	See Log for Depths	Project Number:	30126255
Editor:	Sean McGrane	Development End Date:	9/28/2022		
Total Depth:	137 ft bgs	Well Completion:	☐ Flush ☐ Stick-up ☒ Well Vault		

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Construction Details	Calculated Material Volumes	Material Volumes Installed Note: percentages are the actual volume vs the calculated volume
41	No Groundwater Samples Collected	Alluvium Deposits	SM		(3.5 - 85.0') 6" Sch. 80 PVC Casing		
42							
43		Alluvium Deposits	SM				
44							
45							
46							
47							
48							
49		Alluvium Deposits	SW		(48.0 - 49.0') Kwik-Zip Centralizer		Note: Kwik-Zip Centralizer had to be trimmed down to fit inside the sonic drill casing.
50					(32.0 - 73.0') Type I, II, and V Portland Cement with up to 6% Quik-Gel bentonite	(32.0 - 73.0') 122.6 gallons	(32.0 - 73.0') 200 gallons (163%) Note: Grout seal first lift, used >20% of the calculated volume due to potential voids that formed during drilling and grout migration into the formation. The extraction well sanitary seal also serves as the sanitary seal for decommissioning of TWB-01 Temp Well from approximately 32 to 73 ft. bgs.
51		Alluvium Deposits	SM				
52							
53		Alluvium Deposits	SM				
54							
55		Alluvium Deposits	SW-SM				
56							
57							
58		Alluvium Deposits	SW-SM				
59							
60							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, SS = Stainless Steel, NR = No Recovery, N/A = Not Applicable, GW = groundwater, ppb = parts per billion, Notes: Solid blue water table marks represent depth to water (ft. bgs.) measured post development.

Well Construction Log

ARCADIS

Date Started:	09/09/2022	Surface Elevation:	538.84 ft amsl	**Well ID: TWB-01**	
Date Completed:	09/12/2022	Shallow Well Elevation:	N/A		
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client:	PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	2100941.12	Project:	Final GW Remedy Phase 2A
Driller Name:	Matt Arnold	Easting (NAD83):	7615929.94	Location:	PG&E Topock, Needles California
Drilling Asst:	L.A. / I.S. / D.H.	Borehole Diameter:	10.5-12 inches		
Logger:	Kim Lapszynski	Static Water Level:	See Log for Depths	Project Number:	30126255
Editor:	Sean McGrane	Development End Date:	9/28/2022		
Total Depth:	137 ft bgs	Well Completion:	☐ Flush ☐ Stick-up ☒ Well Vault		

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Construction Details	Calculated Material Volumes	Material Volumes Installed Note: percentages are the actual volume vs the calculated volume
61	No Groundwater Samples Collected	Alluvium Deposits	SW-SM		(3.5 - 85.0') 6" Sch. 80 PVC Casing		
62		Alluvium Deposits	SM				
63		Alluvium Deposits	SW				
64		Alluvium Deposits	SM				
65		Alluvium Deposits	SM		(32.0 - 73.0') Type I, II, and V Portland Cement with up to 6% Quik-Gel bentonite	(32.0 - 73.0') 122.6 gallons	(32.0 - 73.0') 200 gallons (163%) Note: Grout seal first lift, used >20% of the calculated volume due to potential voids that formed during drilling and grout migration into the formation. The extraction well sanitary seal also serves as the sanitary seal for decommissioning of TWB-01 Temp Well from approximately 32 to 73 ft. bgs.
66							
67							
68		Alluvium Deposits	SM				
69							
70		Alluvium Deposits	SW-SM				
71		Alluvium Deposits	SC				
72		Alluvium Deposits	SM				
73							
74					(73.0 - 76.0') Cemex #60 Mesh (40x70) Lapis Lustre Sand	(73.0 - 76.0') 2.4 bags	(73.0 - 76.0') 4 bags (167%) Note: Transition sand, used >20% of the calculated volume due to potential voids forming during drilling.
75		Alluvium Deposits	SW-SM				
76					(76.0 - 77.0') Pel-Plug Bentonite Pellets 3/8" (TR30)	(76.0 - 77.0') 0.6 buckets	(76.0 - 77.0') 0.5 buckets (83%) Note: Bentonite seal
77							
78		Alluvium Deposits	SM		(77.0 - 136.5') Cemex #60 Mesh (40x70) Lapis Lustre Sand	(77.0 - 136.5') 48.5 bags	(77.0 - 136.5') 58 bags (120%) Note: Filter pack, used >20% of the calculated volume due to potential voids forming during drilling or filter pack filling void space in the remaining temporary well screen. Swabbed the filter pack for approximately 60 minutes prior to the installation of the bentonite seal.
79							
80							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, SS = Stainless Steel, NR = No Recovery, N/A = Not Applicable, GW = groundwater, ppb = parts per billion, Notes: Solid blue water table marks represent depth to water (ft. bgs.) measured post development.

Well Construction Log

ARCADIS

Date Started:	09/09/2022	Surface Elevation:	538.84 ft amsl	**Well ID: TWB-01**	
Date Completed:	09/12/2022	Shallow Well Elevation:	N/A		
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client:	PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	2100941.12	Project:	Final GW Remedy Phase 2A
Driller Name:	Matt Arnold	Easting (NAD83):	7615929.94	Location:	PG&E Topock, Needles California
Drilling Asst:	L.A. / I.S. / D.H.	Borehole Diameter:	10.5-12 inches		
Logger:	Kim Lapszynski	Static Water Level:	See Log for Depths	Project Number:	30126255
Editor:	Sean McGrane	Development End Date:	9/28/2022		
Total Depth:	137 ft bgs	Well Completion:	☐ Flush ☐ Stick-up ☒ To Be Completed in Well Vault		

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Construction Details	Calculated Material Volumes	Material Volumes Installed Note: percentages are the actual volume vs the calculated volume
81	No Groundwater Samples Collected	Alluvium Deposits	SM		(80.0 - 81.0') Kwik-Zip Centralizer (3.5 - 85.0') 6" Sch. 80 PVC Casing		Note: Kwik-Zip Centralizer had to be trimmed down to fit inside the sonic drill casing.
82							
83		Alluvium Deposits	SM				
84	TWB-1-VAS-82-87 (870 ppb) 3/18/2022 10:51						
85					(85.0 - 106.0') 6" 8-Slot 316L SS Wire Wrap Screen		
86							
87		Alluvium Deposits	SM				
88							
89	TWB-1-VAS-87-92 (<0.025 ppb) 3/20/2022 08:50						(77.0 - 136.5') 58 bags (120%) Note: Filter pack, used >20% of the calculated volume due to potential voids forming during drilling or filter pack filling void space in the remaining temporary well screen. Swabbed the filter pack for approximately 60 minutes prior to the installation of the bentonite seal.
90					(77.0 - 136.5') Cemex #60 Mesh (40x70) Lapis Lustre Sand	(77.0 - 136.5') 48.5 bags	
91							
92							
93		Competent Bedrock - Conglomerate	N/A				
94							
95							
96							
97							
98	TWB-1-VAS-97-102 (1200 ppb) 3/20/2022 16:26	Alluvium Deposits	SP-SM				
99		Alluvium Deposits	SM				
100							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, SS = Stainless Steel, NR = No Recovery, N/A = Not Applicable, GW = groundwater, ppb = parts per billion, Notes: Solid blue water table marks represent depth to water (ft. bgs.) measured post development.

Well Construction Log

ARCADIS

Date Started:	09/09/2022	Surface Elevation:	538.84 ft amsl	**Well ID: TWB-01**	
Date Completed:	09/12/2022	Shallow Well Elevation:	N/A		
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client:	PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	2100941.12	Project:	Final GW Remedy Phase 2A
Driller Name:	Matt Arnold	Easting (NAD83):	7615929.94	Location:	PG&E Topock, Needles California
Drilling Asst:	L.A. / I.S. / D.H.	Borehole Diameter:	10.5-12 inches		
Logger:	Kim Lapszynski	Static Water Level:	See Log for Depths	Project Number:	30126255
Editor:	Sean McGrane	Development End Date:	9/28/2022		
Total Depth:	137 ft bgs	Well Completion:	☐ Flush ☐ Stick-up ☒ To Be Completed in Well Vault		

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Construction Details	Calculated Material Volumes	Material Volumes Installed Note: percentages are the actual volume vs the calculated volume
101	TWB-1-VAS-97-102 (1200 ppb) 3/20/2022 16:26	Weathered Bedrock - Conglomerate	N/A		(85.0 - 106.0') 6" 8-Slot 316L SS Wire Wrap Screen		
102							
103							
104							
105							
106					(106.0 - 110.0') 6" Sch. 80 PVC Casing		
107		Weathered Bedrock - Conglomerate	N/A				(77.0 - 136.5') 58 bags (120%) Note: Filter pack, used >20% of the calculated volume due to potential voids forming during drilling or filter pack filling void space in the remaining temporary well screen. Swabbed the filter pack for approximately 60 minutes prior to the installation of the bentonite seal.
108							
109							
110					(77.0 - 136.5') Cemex #60 Mesh (40x70) Lapis Lustre Sand	(77.0 - 136.5') 48.5 bags	
111					(110.0 - 129.0') 6" 8-Slot 316L SS Wire Wrap Screen		
112	TWB-1-VAS-110-115 (4300 ppb) 3/21/2022 11:16						
113							
114		Competent Bedrock - Conglomerate	N/A				
115							
116							
117							
118							
119							
120		Weathered Bedrock - Conglomerate	N/A				

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, SS = Stainless Steel, NR = No Recovery, N/A = Not Applicable, GW = groundwater, ppb = parts per billion, Notes: Solid blue water table marks represent depth to water (ft. bgs.) measured post development.

Well Construction Log

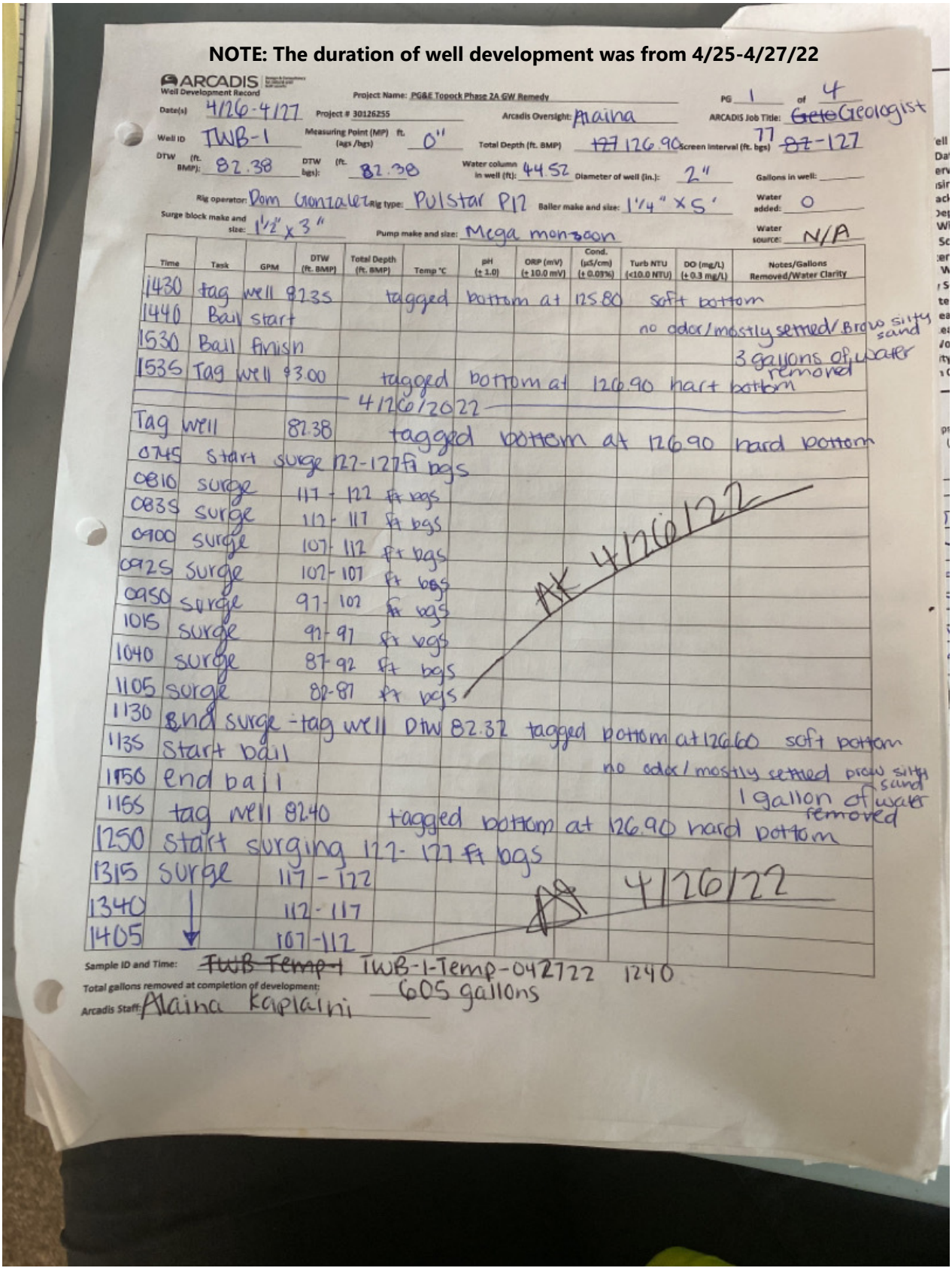
Date Started:	09/09/2022	Surface Elevation:	538.84 ft amsl	**Well ID: TWB-01**	
Date Completed:	09/12/2022	Shallow Well Elevation:	N/A		
Drilling Co.:	Cascade	Deep Well Elevation:	N/A	Client:	PG&E
Drilling Method:	Sonic Drilling	Northing (NAD83):	2100941.12	Project:	Final GW Remedy Phase 2A
Driller Name:	Matt Arnold	Easting (NAD83):	7615929.94	Location:	PG&E Topock, Needles California
Drilling Asst:	L.A. / I.S. / D.H.	Borehole Diameter:	10.5-12 inches		
Logger:	Kim Lapszynski	Static Water Level:	See Log for Depths	Project Number:	30126255
Editor:	Sean McGrane	Development End Date:	9/28/2022		
Total Depth:	137 ft bgs	Well Completion:	☐ Flush ☐ Stick-up ☒ To Be Completed in Well Vault		

Depth (ft)	Groundwater Sample ID	Geologic Formation	USCS Code	USCS Class	Construction Details	Calculated Material Volumes	Material Volumes Installed Note: percentages are the actual volume vs the calculated volume
121		Weathered Bedrock - Conglomerate	N/A		(110.0 - 129.0') 6" 8-Slot 316L SS Wire Wrap Screen		
122							
123							
124	TWB-1-VAS-122-127 (1700 ppb) 3/21/2022 16:26	Competent Bedrock - Conglomerate	N/A				
125							
126							
127							
128					(77.0 - 136.5') Cemex #60 Mesh (40x70) Lapis Lustre Sand	(77.0 - 136.5') 48.5 bags	(77.0 - 136.5') 58 bags (120%) Note: Filter pack, used >20% of the calculated volume due to potential voids forming during drilling or filter pack filling void space in the remaining temporary well screen. Swabbed the filter pack for approximately 60 minutes prior to the installation of the bentonite seal.
129		Competent Bedrock - Conglomerate	N/A				
130					(129.0 - 134.0') 6" Sch. 80 PVC Sump		
131	No Groundwater Samples Collected	Competent Bedrock - Conglomerate	N/A		(131.0 - 132.0') Kwik-Zip Centralizer		Note: Kwik-Zip Centralizer had to be trimmed down to fit inside the sonic drill casing.
132							
133							
134					(134.0 - 134.4') 6" 316L SS End Cap		
135							
136							
137					(136.5 - 137.0') Slough		Note: Formation not removed during borehole clean-out or material that settled in drill casing.
138							
139							
140							

Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, SS = Stainless Steel, NR = No Recovery, N/A = Not Applicable, GW = groundwater, ppb = parts per billion, Notes: Solid blue water table marks represent depth to water (ft. bgs.) measured post development.

Attachment 5

Well Development Records (TWB-01 Temp and TWB-01)



NOTE: The duration of well development was from 4/25-4/27/22

ARCADIS Well Development Record

Project Name: PG&E Topock Phase 2A GW Remedy — PG 1 of 4

Date(s): 4/26-4/27 — Project # 30126255 — Arcadis Oversight: Alaina — ARCADIS Job Title: ~~Geo~~Geologist

Well ID: TWB-1 — Measuring Point (MP) ft. (ags/bgs): 0" — Total Depth (ft. BMP): ~~127~~ 126.90 — Screen interval (ft. bgs): ~~87~~ 77-127

DTW (ft. BMP): 82.38 — DTW (ft. bgs): 82.38 — Water column in well (ft): 44.52 — Diameter of well (in.): 2" — Gallons in well:

Rig operator: Dom Gonzalez — Rig type: Pulstar P12 — Baller make and size: 1¼" x 5' — Water added: 0

Surge block make and size: 1½" x 3" — Pump make and size: Mega monsoon — Water source: N/A

Time	Task	GPM	DTW (ft. BMP)	Total Depth (ft. BMP)	Temp °C	pH (± 1.0)	ORP (mV) (± 10.0 mV)	Cond. (µS/cm) (± 0.03%)	Turb NTU (<10.0 NTU)	DO (mg/L) (± 0.3 mg/L)	Notes/Gallons Removed/Water Clarity
1430	tag well		82.35	tagged bottom at 125.80							soft bottom
1440	Bail start										no odor/mostly settled/ Brown silty sand
1530	Bail finish										3 gallons of water removed
1535	Tag well		83.00	tagged bottom at 126.90 hart bottom							
				4/26/2022							
Tag well			82.38	tagged bottom at 126.90 hard bottom							
0745	start surge			127-127 ft bgs							
0810	surge			117 - 122 ft bgs							
0835	surge			112 - 117 ft bgs							
0900	surge			107 - 112 ft bgs							
0925	surge			102 - 107 ft bgs							
0950	surge			97 - 102 ft bgs							
1015	surge			92 - 97 ft bgs							
1040	surge			87 - 92 ft bgs							
1105	surge			82 - 87 ft bgs							
1130	End surge - tag well		DTW 82.32	tagged bottom at 126.60							soft bottom
1135	start bail										no odor / mostly settled brown silty sand
1150	end bail										1 gallon of water removed
1155	tag well		82.40	tagged bottom at 126.90 hard bottom							
1250	start surging			122 - 127 ft bgs							
1315	surge			117 - 122							
1340	↓			112 - 117							
1405				107 - 112							

AK 4/26/22

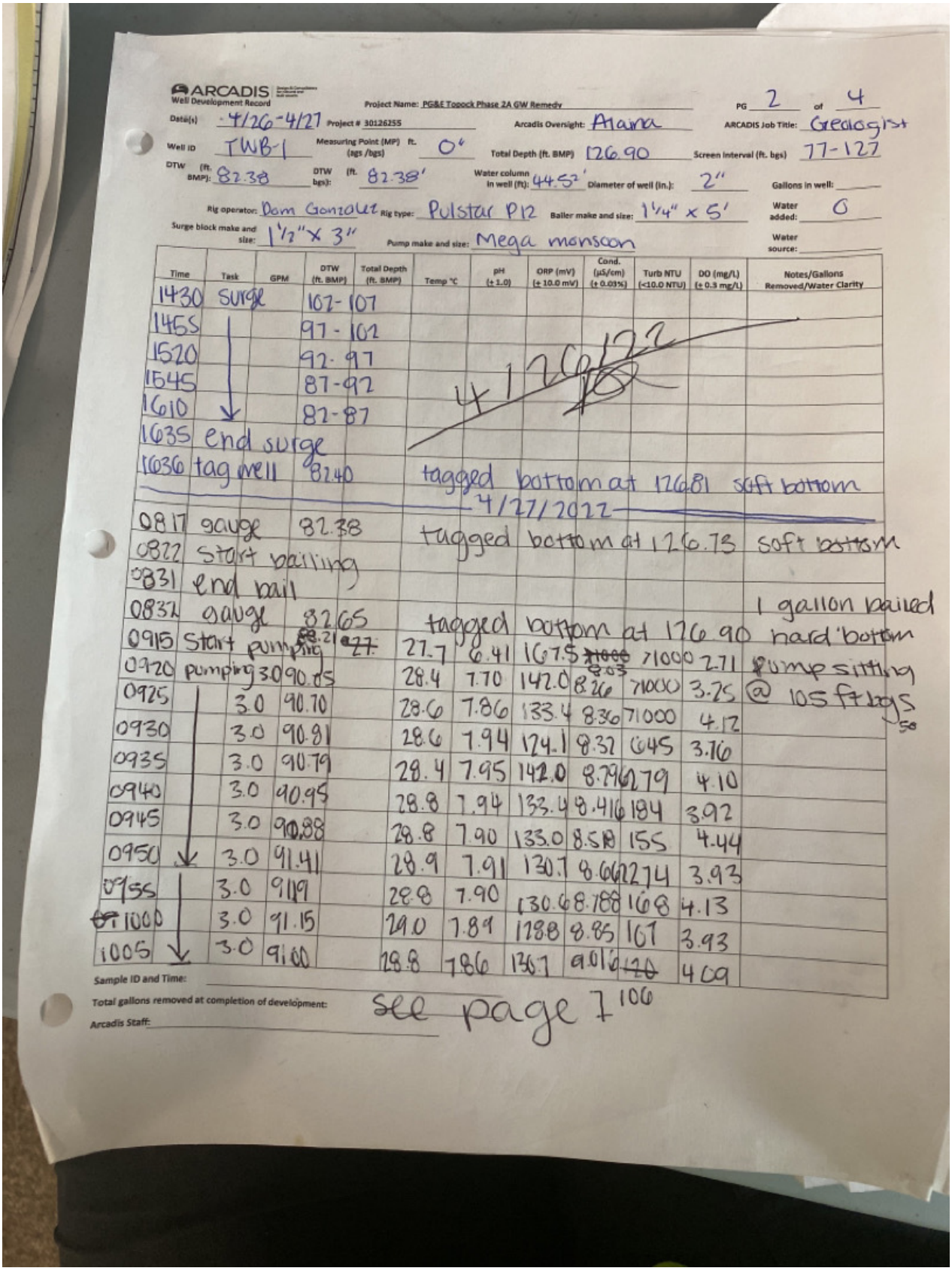
4/26/22

Sample ID and Time: ~~TWB Temp-1~~ TWB-1-Temp-042722 1240

Total gallons removed at completion of development: 605 gallons

Arcadis Staff: Alaina Kaplaini

TWB-1 Temp - Well development record



ARCADIS Well Development Record

Project Name: PG&E Topock Phase 2A GW Remedy — PG 2 of 4

Date(s): 4/26-4/27 — Project # 30126255 — Arcadis Oversight: Alaina — ARCADIS Job Title: Geologist

Well ID: TWB-1 — Measuring Point (MP) ft. (ags /bgs): 0' — Total Depth (ft. BMP): 126.90 — Screen interval (ft. bgs): 77-127

DTW (ft. BMP): 82.38 — DTW (ft. bgs): 82.38' — Water column in well (ft): 44.52' — Diameter of well (in.): 2" — Gallons in well:

Rig operator: Dom Gonzalez — Rig type: Pulstar P12 — Baller make and size: 1¼" x 5' — Water added: 6

Surge block make and size: 1½" x 3" — Pump make and size: Mega monsoon — Water source:

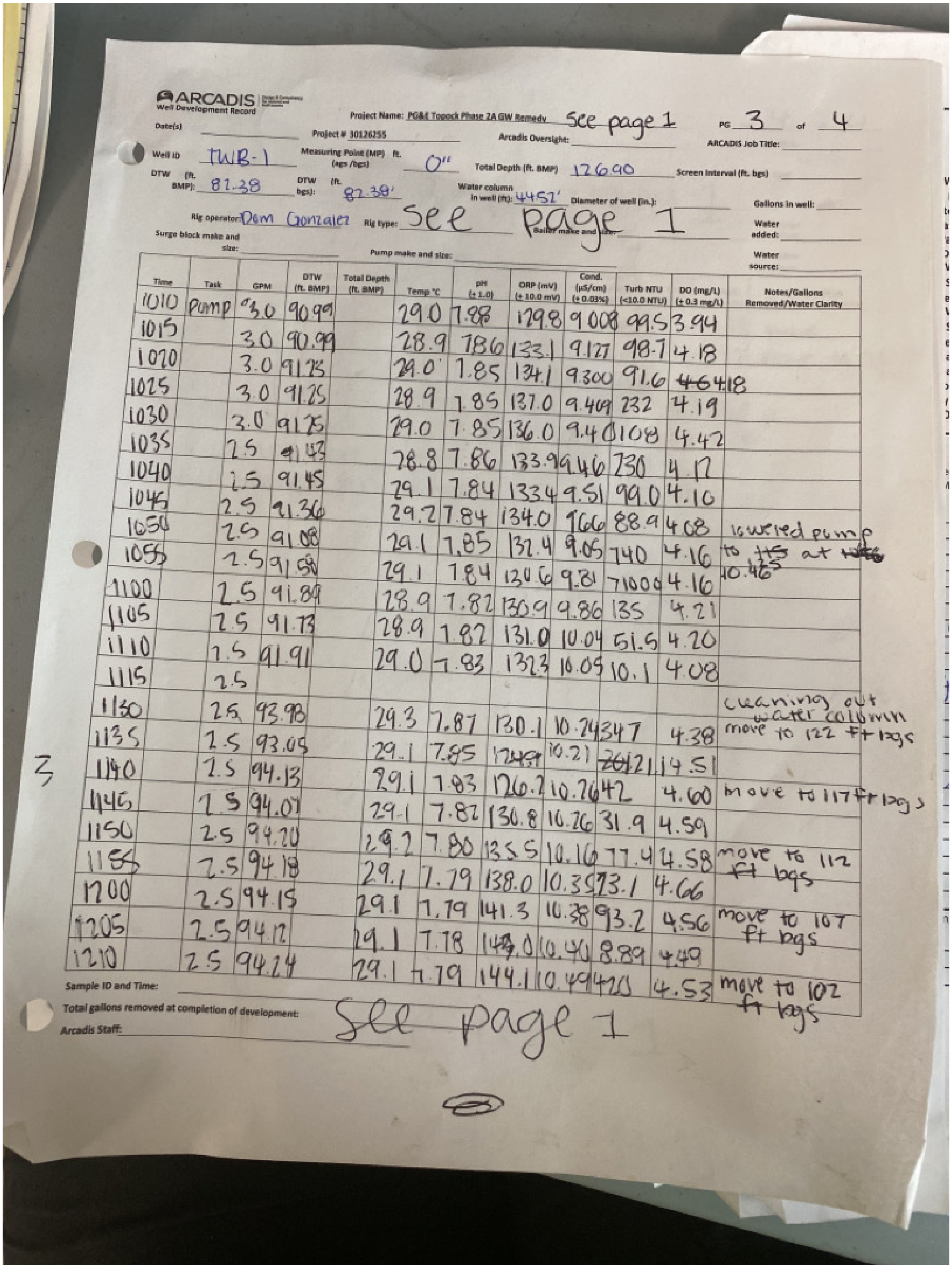
Time	Task	GPM	DTW (ft. BMP)	Total Depth (ft. BMP)	Temp °C	pH (± 1.0)	ORP (mV) (± 10.0 mV)	Cond. (µS/cm) (± 0.03%)	Turb NTU (<10.0 NTU)	DO (mg/L) (± 0.3 mg/L)	Notes/Gallons Removed/Water Clarity
1430	surge		107-107								
1455	↓		97-102								
1520			92-97								
1545			87-92								
1610	↓		82-87								
1635	end surge										
1636	tag well		82.40		tagged bottom at 126.81 soft bottom						
					4/27/2022						
0817	gauge		82.38		tagged bottom at 126.75 soft bottom						
0822	start bailing										
0831	end bail										1 gallon bailed
0832	gauge		82.65		tagged bottom at 126.90 hard bottom						
0915	Start pumping		~~82.21~~ 82.27		27.7	6.41	167.5	~~71000~~ 8.03	71000	2.71	pump sitting
0920	pumping	3.0	90.05		28.4	7.70	142.0	8.26	71000	3.25	@ 105 ft bgs
0925	↓	3.0	90.70		28.6	7.86	133.4	8.30	71000	4.12	50
0930		3.0	90.81		28.6	7.94	124.1	8.32	645	3.76	
0935		3.0	90.79		28.4	7.95	142.0	8.29	679	4.10	
0940		3.0	90.95		28.8	7.94	133.4	8.41	184	3.92	
0945		3.0	90.88		28.8	7.90	133.0	8.58	155	4.44	
0950	↓	3.0	91.41		28.9	7.91	130.7	8.66	274	3.93	
0955	↓	3.0	91.19		28.8	7.90	130.6	8.78	168	4.13	
~~07~~ 1000		3.0	91.15		29.0	7.89	128.8	8.85	161	3.93	
1005	↓	3.0	91.00		28.8	7.86	130.7	8.91	~~120~~	4.09	

Sample ID and Time:

Total gallons removed at completion of development: see page 7 106

Arcadis Staff:

TWB-1 Temp - Well development record



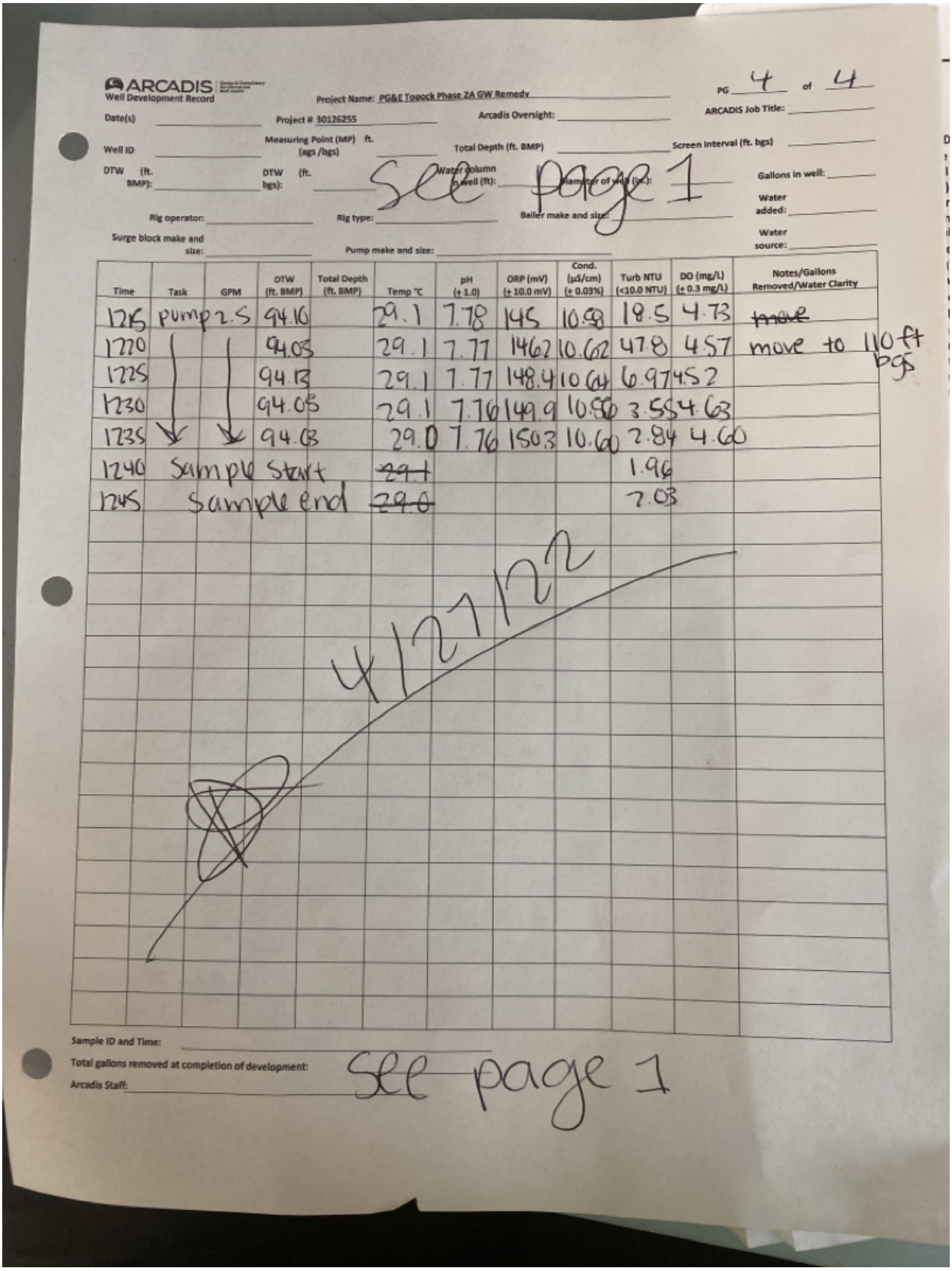
ARCADIS
Well Development Record

Project Name: PG&E Topock Phase 2A GW Remedy See page 1 PG 3 of 4
Date(s): ______ Project # 30126255 Arcadis Oversight: ______ ARCADIS Job Title: ______
Well ID: TWB-1 Measuring Point (MP) ft. (ags/bgs): 0" Total Depth (ft. BMP): 126.90 Screen Interval (ft. bgs): ______
DTW (ft. BMP): 81.38 DTW (ft. bgs): 82.38' Water column in well (ft): 44.52' Diameter of well (in.): ______ Gallons in well: ______
Rig operator: Dom Gonzalez Rig type: See page 1 Bailer make and size: ______ Water added: ______
Surge block make and size: ______ Pump make and size: ______ Water source: ______

Time	Task	GPM	DTW (ft. BMP)	Total Depth (ft. BMP)	Temp °C	pH (± 1.0)	ORP (mV) (± 10.0 mV)	Cond. (µS/cm) (± 0.03%)	Turb NTU (<10.0 NTU)	DO (mg/L) (± 0.3 mg/L)	Notes/Gallons Removed/Water Clarity
1010	Pump	3.0	90.99		29.0	7.88	129.8	9.008	99.5	3.94	
1015		3.0	90.99		28.9	7.86	133.1	9.127	98.7	4.18	
1020		3.0	91.23		29.0	7.85	134.1	9.300	91.6	~~4.64~~ 4.18	
1025		3.0	91.25		28.9	7.85	137.0	9.409	232	4.19	
1030		3.0	91.25		29.0	7.85	136.0	9.40	108	4.42	
1035		2.5	91.43		28.8	7.86	133.9	9.46	230	4.17	
1040		2.5	91.45		29.1	7.84	133.4	9.51	99.0	4.10	
1045		2.5	91.36		29.2	7.84	134.0	9.66	88.9	4.08	lowered pump to ~~115~~ at ~~[illegible]~~ 10.465
1050		2.5	91.08		29.1	7.85	132.4	9.05	740	4.16	
1055		2.5	91.58		29.1	7.84	130.6	9.81	71000	4.16	
1100		2.5	91.89		28.9	7.82	130.9	9.86	135	4.21	
1105		2.5	91.73		28.9	7.82	131.0	10.04	51.5	4.20	
1110		2.5	91.91		29.0	7.83	132.3	10.05	10.1	4.08	
1115		2.5									cleaning out water column
1130		2.5	93.98		29.3	7.87	130.1	10.24	347	4.38	move to 122 ft bgs
1135		2.5	93.05		29.1	7.85	~~124.9~~	10.21	~~261~~ 211.1	4.51	
1140		2.5	94.13		29.1	7.83	126.7	10.26	42	4.60	move to 117 ft bgs
1145		2.5	94.07		29.1	7.82	130.8	10.26	31.9	4.59	
1150		2.5	94.20		29.2	7.80	135.5	10.16	77.4	4.58	move to 112 ft bgs
1155		2.5	94.18		29.1	7.79	138.0	10.35	73.1	4.66	
1200		2.5	94.15		29.1	7.79	141.3	10.38	93.2	4.56	move to 107 ft bgs
1205		2.5	94.12		29.1	7.78	143.0	10.40	8.89	4.49	
1210		2.5	94.24		29.1	7.79	144.1	10.49	420	4.53	move to 102 ft bgs

Sample ID and Time: ______
Total gallons removed at completion of development: See page 1
Arcadis Staff: ______

TWB-1 Temp - Well development record



ARCADIS Well Development Record

Project Name: PG&E Topock Phase 2A GW Remedy — PG 4 of 4

Date(s) — Project # 30126255 — Arcadis Oversight: — ARCADIS Job Title:

Well ID — Measuring Point (MP) (ags /bgs) ft. — Total Depth (ft. BMP) — Screen Interval (ft. bgs)

DTW (ft. BMP): — DTW (ft. bgs): — Water Column in well (ft): — Diameter of well (in.): — Gallons in well:

Rig operator: — Rig type: — Bailer make and size: — Water added:

Surge block make and size: — Pump make and size: — Water source:

Time	Task	GPM	DTW (ft. BMP)	Total Depth (ft. BMP)	Temp °C	pH (± 1.0)	ORP (mV) (± 10.0 mV)	Cond. (µS/cm) (± 0.03%)	Turb NTU (<10.0 NTU)	DO (mg/L) (± 0.3 mg/L)	Notes/Gallons Removed/Water Clarity
1215	pump	2.5	94.10		29.1	7.78	145	10.58	18.5	4.73	~~move~~
1220	↓	↓	94.03		29.1	7.77	146.2	10.62	47.8	4.57	move to 110 ft bgs
1225			94.13		29.1	7.77	148.4	10.64	6.97	4.52	
1230			94.05		29.1	7.76	149.9	10.58	3.55	4.63	
1235	↓	↓	94.03		29.0	7.76	150.3	10.60	2.84	4.60	
1240	sample start				~~29.1~~				1.96		
1245	sample end				~~29.0~~				7.03		

4/27/22

Sample ID and Time:

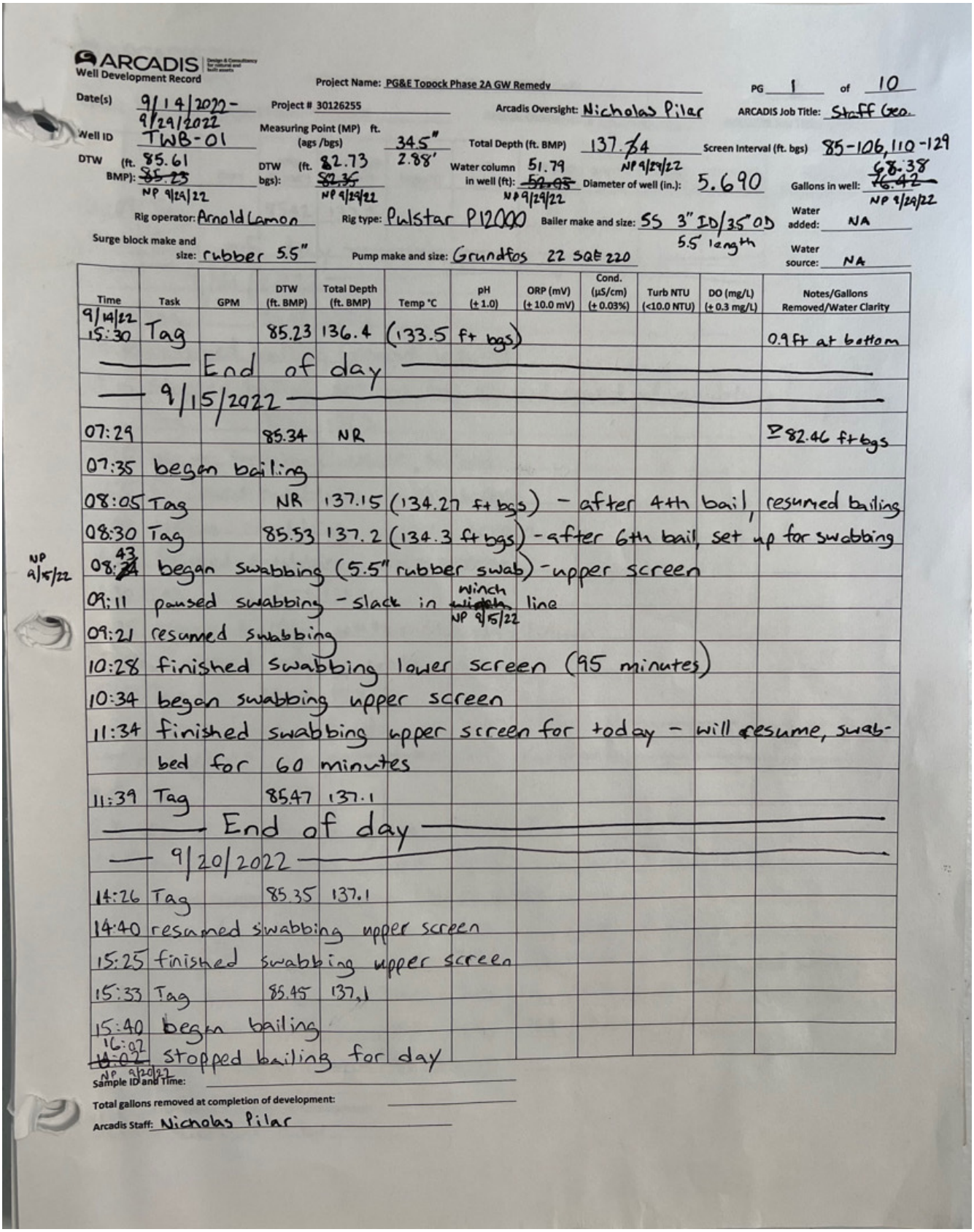
Total gallons removed at completion of development:

Arcadis Staff:

see page 1

see page 1

TWB-1 Temp - Well development record



ARCADIS Well Development Record

Project Name: PG&E Topock Phase 2A GW Remedy — PG 1 of 10

Date(s): 9/14/2022 - 9/29/2022 — Project # 30126255 — Arcadis Oversight: Nicholas Pilar — ARCADIS Job Title: Staff Geo.

Well ID: TWB-01 — Measuring Point (MP) ft. (ags /bgs): 34.5" / 2.88' — Total Depth (ft. BMP): ~~137.34~~ NP 9/29/22 — Screen Interval (ft. bgs): 85-106, 110-129

DTW (ft. BMP): ~~85.23~~ 85.61 NP 9/29/22 — DTW (ft. bgs): ~~82.35~~ 82.73 NP 9/29/22 — Water column in well (ft): ~~52.05~~ 51.79 NP 9/29/22 — Diameter of well (in.): 5.690 — Gallons in well: ~~16.42~~ 68.38 NP 9/29/22

Rig operator: Arnold Lamon — Rig type: Pulstar P12000 — Bailer make and size: SS 3" ID/3.5" OD 5.5' length — Water added: NA

Surge block make and size: rubber 5.5" — Pump make and size: Grundfos 22 SQE 220 — Water source: NA

Time	Task	GPM	DTW (ft. BMP)	Total Depth (ft. BMP)	Temp °C	pH (±1.0)	ORP (mV) (±10.0 mV)	Cond. (µS/cm) (±0.03%)	Turb NTU (<10.0 NTU)	DO (mg/L) (±0.3 mg/L)	Notes/Gallons Removed/Water Clarity
9/14/22 15:30	Tag		85.23	136.4	(133.5 ft bgs)						0.9 ft at bottom
	End of day										
	9/15/2022										
07:29			85.34	NR							∑ 82.46 ft bgs
07:35	began bailing										
08:05	Tag		NR	137.15	(134.27 ft bgs)						- after 4th bail, resumed bailing
08:30	Tag		85.53	137.2	(134.3 ft bgs)						- after 6th bail, set up for swabbing
08:~~34~~ 43 NP 9/5/22	began swabbing (5.5" rubber swab) - upper screen										
09:11	paused swabbing - slack in ~~winch~~ winch line NP 9/5/22										
09:21	resumed swabbing										
10:28	finished swabbing lower screen (95 minutes)										
10:34	began swabbing upper screen										
11:34	finished swabbing upper screen for today - will resume, swabbed for 60 minutes										
11:39	Tag		85.47	137.1							
	End of day										
	9/20/2022										
14:26	Tag		85.35	137.1							
14:40	resumed swabbing upper screen										
15:25	finished swabbing upper screen										
15:33	Tag		85.45	137.1							
15:40	began bailing										
~~16:02~~ 16:07 NP 9/20/22	stopped bailing for day										

Sample ID and Time:

Total gallons removed at completion of development:

Arcadis Staff: Nicholas Pilar

TWB-01 - Well Development Record

ARCADIS Design & Consultancy for natural and built assets

Well Development Record Project Name: PG&E Topock Phase 2A GW Remedy PG 2 of 10

Date(s) 9/14/2022-9/29/2022 Project # 30126255 Arcadis Oversight: Nicholas Pilar ARCADIS Job Title: Staff Geo.

Time	Task	GPM	DTW (ft. BMP)	Total Depth (ft. BMP)	Temp °C	pH (±1.0)	ORP (mV) (±10.0 mV)	Cond. (µS/cm) (±3%)	Turb NTU (<10.0 NTU)	DO (mg/L) (±0.3 mg/L)	Notes/Gallons Removed/Water Clarity
16:09	Tag		85.42	137.2							
	End of day										
	9/21/2022										
08:31	Tag		85.44	137.2							
08:40	resumed bailing (opaque brown)										
10:15	stopped bailing, set up for second round of swabbing (clearish brown)										
	Tag		85.61	137.2							
10:20	began swabbing lower screen										
11:55	finished swabbing lower screen										
12:40	began swabbing upper screen										
14:27	finished swabbing upper screen										
14:30	Tag		85.47	137.15							
14:35	began bailing, water opaque brown										
15:40	finished bailing, water brown										
15:48	Tag		85.60	137.2							
	End of day										
	9/22/2022										
8:15	Tag		85.45								
9:30	began pump/surge cycles - batch 0/total 239002										
9:55	finished 5 cycles - batch 17/total 239019 NP 9/22/22, reset batch										
10:00	began pumping at 5 gpm (95 ft bTOC)										
		5	–		32.7	7.74	101.9	8582	74.5	4.31	
10:07		4.88	92.18		30.4	7.86	56.9	7355	12.9	6.54	end pumping
10:22		4.92	91.82		29.4	7.84	-19.1	10037	120	3.12	start (100 ft bTOC)
10:27		4.74	93.50		30.0	7.95	-26.9	7576	35.5	4.62	
10:30	stop pumping (batch 82.88 gal)										

Sample ID and Time: –

Total gallons removed at completion of development: –

Arcadis Staff: Nicholas Pilar

TWB-01 - Well Development Record

ARCADIS Design & Consultancy for natural and built assets

Well Development Record

Project Name: PG&E Topock Phase 2A GW Remedy

PG 3 of 10

Date(s) 9/14/22-9/29/22 Project # 30126255 Arcadis Oversight: Nicholas Pilar ARCADIS Job Title: Staff Geo.

Time	Task	GPM	DTW (ft. BMP)	Total Depth (ft. BMP)	Temp °C	pH (± 1.0)	ORP (mV) (± 10.0 mV)	Cond. (µS/cm) (± 3%)	Turb NTU (<10.0 NTU)	DO (mg/L) (± 0.3 mg/L)	Notes/Gallons Removed/Water Clarity
10:42	pump set at 105 ft bTOC, ~85.55 ft bTOC										
10:48	pump on	5.16	91.3	-	29.1	7.88	28.5	11082	141	3.62	slightly cloudy
10:52		4.64	93.1	-	29.9	8.04	25.7	7463	43.9	4.03	clear
10:54	pump off, batch 117.09 gal										
11:04	pump set at 115 ft bTOC, ~2 ft below top of lower screen										
	tag		85.53	-							
11:05	pump on	4.55	90.35	-	30.5	8.01	43.2	7572	61.7	7.17	clear
11:10		4.72	93.35	-	30.2	8.00	64.3	8518	45.2	4.78	clear
11:12	pump off, batch 155.24 gal										
11:18	pump set at 125 ft bTOC										
11:25	tag		85.58	-							
11:30	pump on	4.52	93.2	-	29.5	7.90	83.0	16605	54.5	3.79	clear
11:35		4.84	94.9	-	30.1	8.00	66.4	9130	81.1	3.10	very slightly cloudy
11:40		4.72	-	-	29.9	8.02	81.8	8495	48.5	3.47	clear
11:56	pump off, batch 291.88 gal, swap water level meters										
11:58	~~swap~~ tag NP 9/22/22		91.87	-							
12:50	pump set at 130 ft bTOC, ~2 ft above bottom of lower screen										
	tag		85.46	-							
12:54	pump on	4.48	91.3	-	29.9	8.04	82.8	16905	56.4	3.16	clear
13:00		4.77	93.8	-	30.1	8.06	65.7	8977	55.1	4.52	clear
13:05		4.71	95.3	-	30.1	8.05	64.0	8318	30.7	4.32	clear
13:07	pump off, batch 349.29										
13:21	tag		85.56	-							
13:22	pump on	9.22	-	-	30.0	8.01	76.3	10560	38.4	4.19	clear
13:33		5.04	-	-	29.6	7.93	77.3	9837	453	~~453~~ NP 9/22/2022	cloudy brown
13:35	pump off, batch 470.49										

Sample ID and Time: -

Total gallons removed at completion of development: -

Arcadis Staff: Nicholas Pilar

TWB-01 - Well Development Record

ARCADIS Design & Consultancy for natural and built assets

Well Development Record

Project Name: PG&E Topock Phase 2A GW Remedy

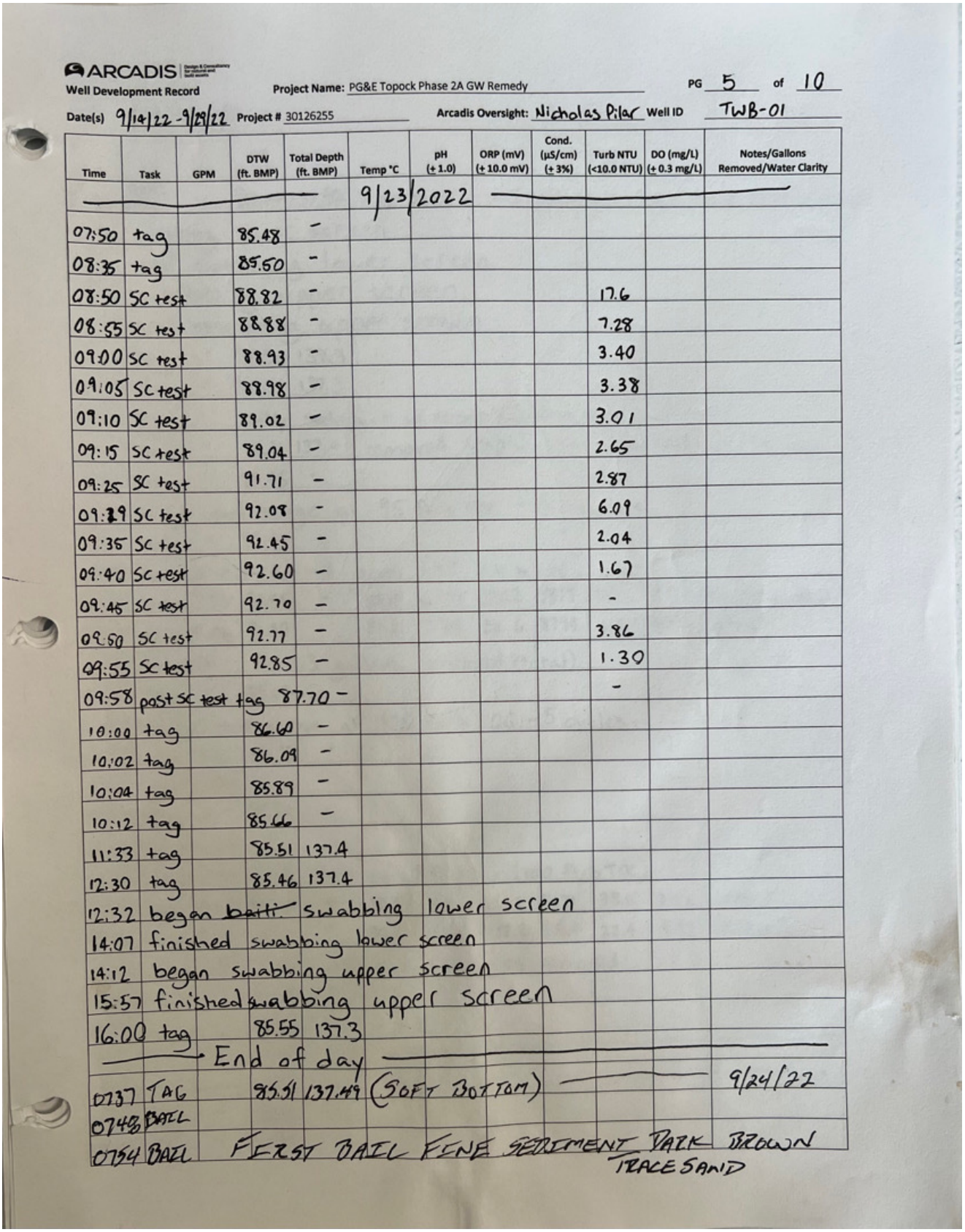
PG 4 of 10

Date(s) 9/14/22-9/[illegible]/22 Project # 30126255

Arcadis Oversight: Nicholas Pilar Well ID TWB-01

Time	Task	GPM	DTW (ft. BMP)	Total Depth (ft. BMP)	Temp °C	pH (±1.0)	ORP (mV) (±10.0 mV)	Cond. (µS/cm) (±3%)	Turb NTU (<10.0 NTU)	DO (mg/L) (±0.3 mg/L)	Notes/Gallons Removed/Water Clarity
14:31	tag		85.46	-							transducer deployed
14:42	~~pump on~~ tag	NP 9/22/22	85.44	-							at 126 ft bTOC
14:44			85.44								
14:45	pump on	-	86.69	14:45:08							
14:45		-	88.42	14:45							
14:45:23		-	88.97	14:4523							
14:45:31		-	89.49	31							
14:45:41		-	89.52	41							
14:45:49		-	89.62	49							
14:45:53		-	89.70	53							
14:45:66		-	89.77	66							
14:46:02		4.84	89 86	14:6:02							
14:47:05		4.96	90.09								
14:48:08		5.20	92.27								
14:49		4.96							225		
14:50:10		4.88	94:19	-	~~30.4~~ NP 9/22/2022	~~8.06~~			146		
14:55		5.04	98.38	-	29.8	8.17	81.5	8490	11.3	5.64	clear
15:00		4.98	102.00	-	29.9	8.09	89.3	9056	11.0	5.55	clear
15:05		4.94	104.78	-	29.8	8.07	90.2	9049	20.0	5.50	clear
15:10		4.94	107.28	-	29.5	8.08	96.9	8982	4.91	5.72	clear
15:15		4.91	109.42	-	29.8	8.06	92.7	9298	14.6	5.98	clear
15:20		4.88	111.81	-	29.7	8.07	98.1	9724	6.05	6.22	clear
15:25		4.84	113.88	-	29.8	8.07	105.2	9970	5.36	6.12	clear
15:30		4.82	115.38	-	29.8	8.05	98.4	9874	17.4	5.90	clear
15:35		4.76	117.18	-	29.8	8.03	96.5	10202	~~50.8~~ NP 9/22/22 6.85	5.26	clear
15:40		4.68	118.36	-	29.7	8.01	109.7	10410	10.9	5.68	clear
15:45		4.50	121.21		29.8	8.02	104.1	10140	11.7	5.73	clear - pump off
											batch 772.02
											~789 gallons removed
				End of day							
				9/29/22							

TWB-01 - Well Development Record



ARCADIS Design & Consultancy for natural and built assets

Well Development Record

Project Name: PG&E Topock Phase 2A GW Remedy

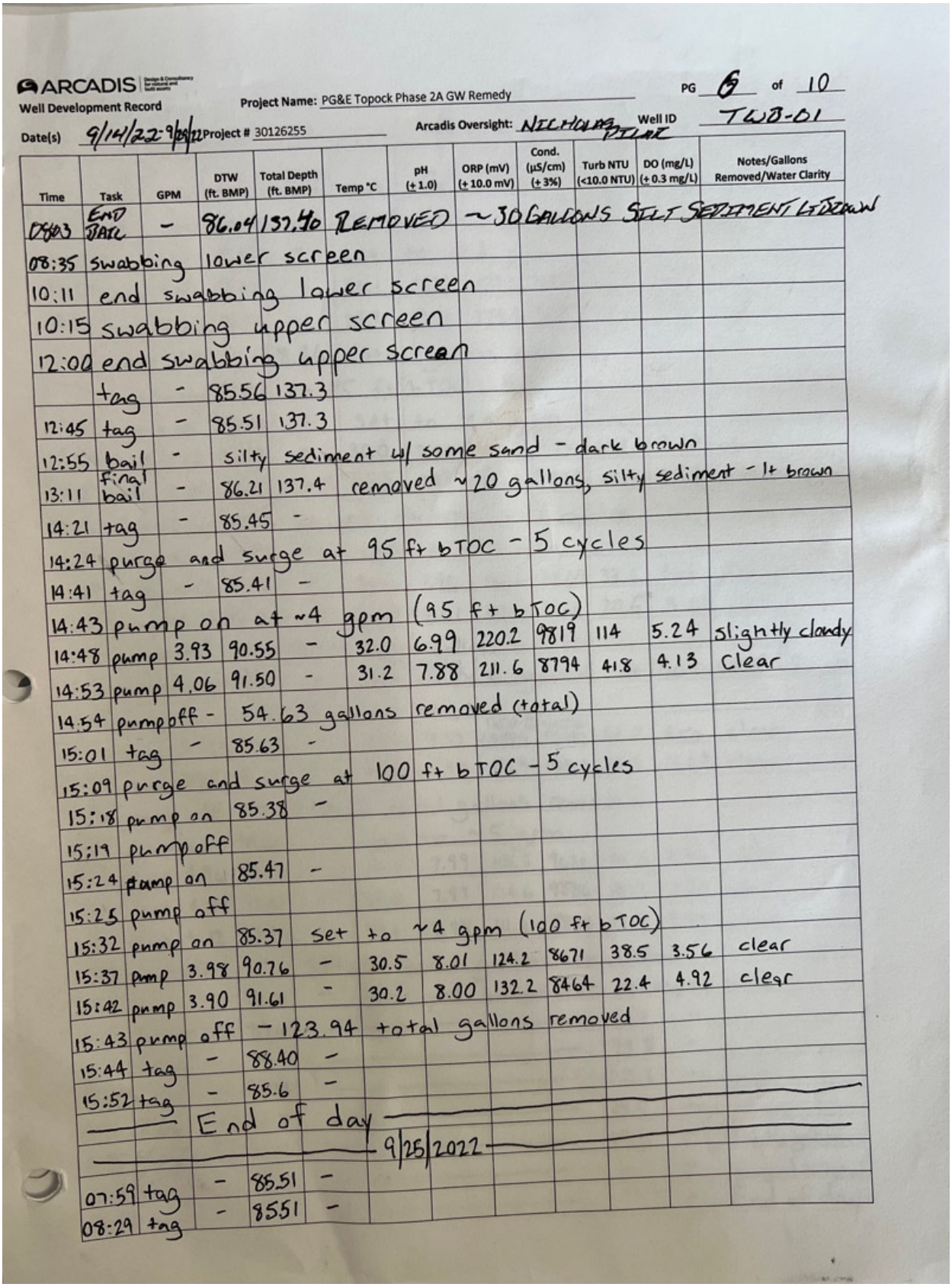
PG 5 of 10

Date(s) 9/14/22 - 9/29/22 Project # 30126255

Arcadis Oversight: Nicholas Pilar Well ID TWB-01

Time	Task	GPM	DTW (ft. BMP)	Total Depth (ft. BMP)	Temp °C	pH (±1.0)	ORP (mV) (±10.0 mV)	Cond. (µS/cm) (±3%)	Turb NTU (<10.0 NTU)	DO (mg/L) (±0.3 mg/L)	Notes/Gallons Removed/Water Clarity
					9/23/2022						
07:50	tag		85.48	-							
08:35	tag		85.50	-							
08:50	SC test		88.82	-					17.6		
08:55	SC test		88.88	-					7.28		
09:00	SC test		88.93	-					3.40		
09:05	SC test		88.98	-					3.38		
09:10	SC test		89.02	-					3.01		
09:15	SC test		89.04	-					2.65		
09:25	SC test		91.71	-					2.87		
09:29	SC test		92.08	-					6.09		
09:35	SC test		92.45	-					2.04		
09:40	SC test		92.60	-					1.67		
09:45	SC test		92.70	-					-		
09:50	SC test		92.77	-					3.86		
09:55	SC test		92.85	-					1.30		
09:58	post SC test tag		87.70	-					-		
10:00	tag		86.60	-							
10:02	tag		86.09	-							
10:04	tag		85.89	-							
10:12	tag		85.66	-							
11:33	tag		85.51	137.4							
12:30	tag		85.46	137.4							
12:32	began ~~baili~~ swabbing lower screen										
14:07	finished swabbing lower screen										
14:12	began swabbing upper screen										
15:57	finished swabbing upper screen										
16:00	tag		85.55	137.3							
	End of day										
0737	TAG		85.51	137.49	(SOFT BOTTOM)						9/24/22
0748	BAIL										
0754	BAIL		FIRST BAIL FINE SEDIMENT DARK BROWN TRACE SAND								

TWB-01 - Well Development Record



ARCADIS Design & Consultancy for natural and built assets

Well Development Record

Project Name: PG&E Topock Phase 2A GW Remedy

PG 6 of 10

Date(s) 9/14/22-9/15/22 Project # 30126255

Arcadis Oversight: NICHOLAS PILAR

Well ID TWB-01

Time	Task	GPM	DTW (ft. BMP)	Total Depth (ft. BMP)	Temp °C	pH (±1.0)	ORP (mV) (±10.0 mV)	Cond. (µS/cm) (±3%)	Turb NTU (<10.0 NTU)	DO (mg/L) (±0.3 mg/L)	Notes/Gallons Removed/Water Clarity
0803	END TAIL	-	86.04	137.46	REMOVED ~30 GALLONS SILT SEDIMENT LIGHT BROWN						
08:35	swabbing lower screen										
10:11	end swabbing lower screen										
10:15	swabbing upper screen										
12:00	end swabbing upper screen										
	tag	-	85.56	137.3							
12:45	tag	-	85.51	137.3							
12:55	bail	-	silty sediment w/ some sand - dark brown								
13:11	final bail	-	86.21	137.4	removed ~20 gallons, silty sediment - lt brown						
14:21	tag	-	85.45	-							
14:24	purge and surge at 95 ft bTOC - 5 cycles										
14:41	tag	-	85.41	-							
14:43	pump on at ~4 gpm (95 ft bTOC)										
14:48	pump	3.93	90.55	-	32.0	6.99	220.2	9819	114	5.24	slightly cloudy
14:53	pump	4.06	91.50	-	31.2	7.88	211.6	8794	41.8	4.13	clear
14:54	pump off - 54.63 gallons removed (total)										
15:01	tag	-	85.63	-							
15:09	purge and surge at 100 ft bTOC - 5 cycles										
15:18	pump on		85.38	-							
15:19	pump off										
15:24	pump on		85.47	-							
15:25	pump off										
15:32	pump on		85.37	set to ~4 gpm (100 ft bTOC)							
15:37	pump	3.98	90.76	-	30.5	8.01	124.2	8671	38.5	3.56	clear
15:42	pump	3.90	91.61	-	30.2	8.00	132.2	8464	22.4	4.92	clear
15:43	pump off - 123.94 total gallons removed										
15:44	tag	-	88.40	-							
15:52	tag	-	85.6	-							
	End of day										
	9/15/2022										
07:59	tag	-	85.51	-							
08:29	tag	-	8551	-							

TWB-01 - Well Development Record

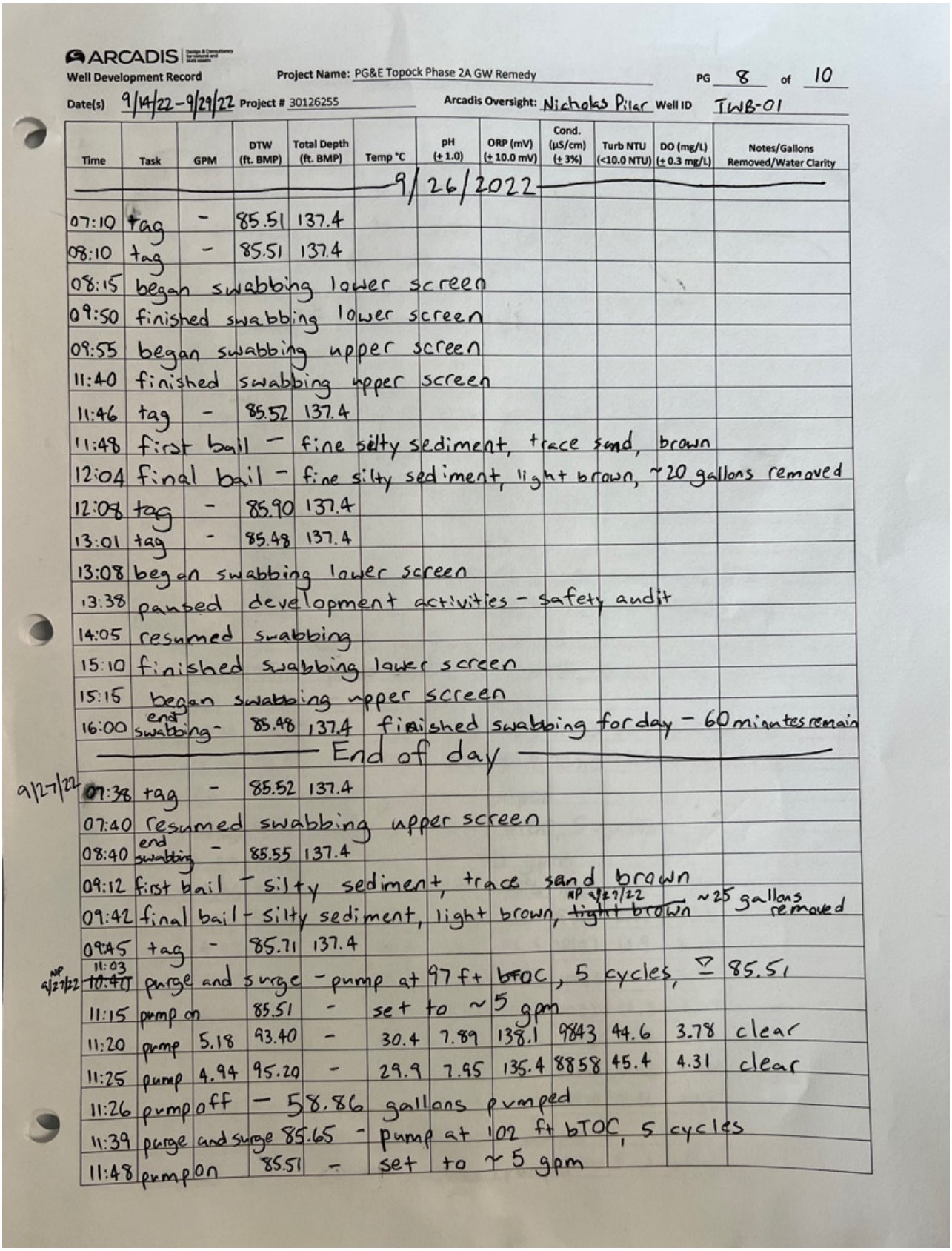
ARCADIS Design & Consultancy for natural and built assets

Well Development Record — Project Name: PG&E Topock Phase 2A GW Remedy — PG 7 of 10

Date(s) 9/14/22 - 9/29/22 — Project # 30126255 — Arcadis Oversight: Nicholas Pibar — Well ID TWB-01

Time	Task	GPM	DTW (ft. BMP)	Total Depth (ft. BMP)	Temp °C	pH (±1.0)	ORP (mV) (±10.0 mV)	Cond. (µS/cm) (±3%)	Turb NTU (<10.0 NTU)	DO (mg/L) (±0.3 mg/L)	Notes/Gallons Removed/Water Clarity
08:44	purge and surge at 105 ft bTOC - 5 cycles										
08:53	pump on		85.45	-	set to ~4 gpm						
08:58	pump	4.02	90.41	-	30.1	7.22	229.2	11051	16.5	3.58	clear
09:03	pump	4.00	91.59	-	29.9	7.71	229.4	9435	12.7	2.96	clear
09:04	pump off		-	58.46	total gallons removed						
09:13	purge and surge		85.57		at 115 ft bTOC - 5 cycles						
09:23	pump on		85.51	-	set to ~4 gpm						
09:28	pump	4.20	92.81	-	30.0	7.94	193.8	10054	21.2	3.20	clear
09:33	pump	4.00	93.16	-	30.0	7.99	171.4	9848	17.3	2.95	clear - pump off 09:34
09:56	purge and surge		85.61		at 125 ft bTOC - 5 cycles						
10:04	pump on		85.49	-	set to ~4 gpm						
10:09	pump	4.08	91.11	-	30.1	7.96	141.4	11660	33.6	3.10	clear
10:14	pump	4.05	92.11	-	30.0	8.01	127.7	9956	20.5	3.68	clear
10:15	pump off		-	183.17	total gallons removed						
10:28	purge and surge		85.61	-	~~set to ~4 gpm~~ NJP 9/15/22 at 130 ft						bTOC - 5 cycles
10:40	pump on		85.52	-	set to ~4 gpm						
10:45	pump	3.95	91.55	-	30.1	7.97	~~10089~~ 115.0 NJP 9/15/22	10089	54.0	4.50	clear
10:50	pump	3.95	91.81	-	30.2	7.97	116.9	10313	32.2	3.29	clear
10:51	pump off		-	244.36	total gallons removed						
11:05	pump on		85.61	-	set to ~5 gpm						
11:10	pump	4.96	92.86	-	30.1	7.99	106.5	9621	15.2	3.46	clear
11:15	pump	4.89	95.31	-	30.0	7.99	114.6	9886	18.3	3.30	clear
11:20	pump	5.12	97.91	-	30.1	7.98	111.3	9884	14.9	3.35	clear
11:22	pump off		-	329.26	total gallons removed						
11:28	tag	-	86.31	-	deployed transducer at 126 ft bTOC						
14:15	sCeval	2.96	89.65						67.1	-	
14:20	sCeval	-	-						73.8	-	
14:25	sCeval	2.98	90.04						22.1	-	
14:31	sCeval	2.95	90.17						25.0	-	
14:35	sCeval	2.93	90.21						29.6	-	114.16 gallons
14:45	~~sC~~ NJP 9/15/22 tag	-	85.74						-	-	pumped during eval
14:50	tag	-	85.66						-	-	End of day

TWB-01 - Well Development Record



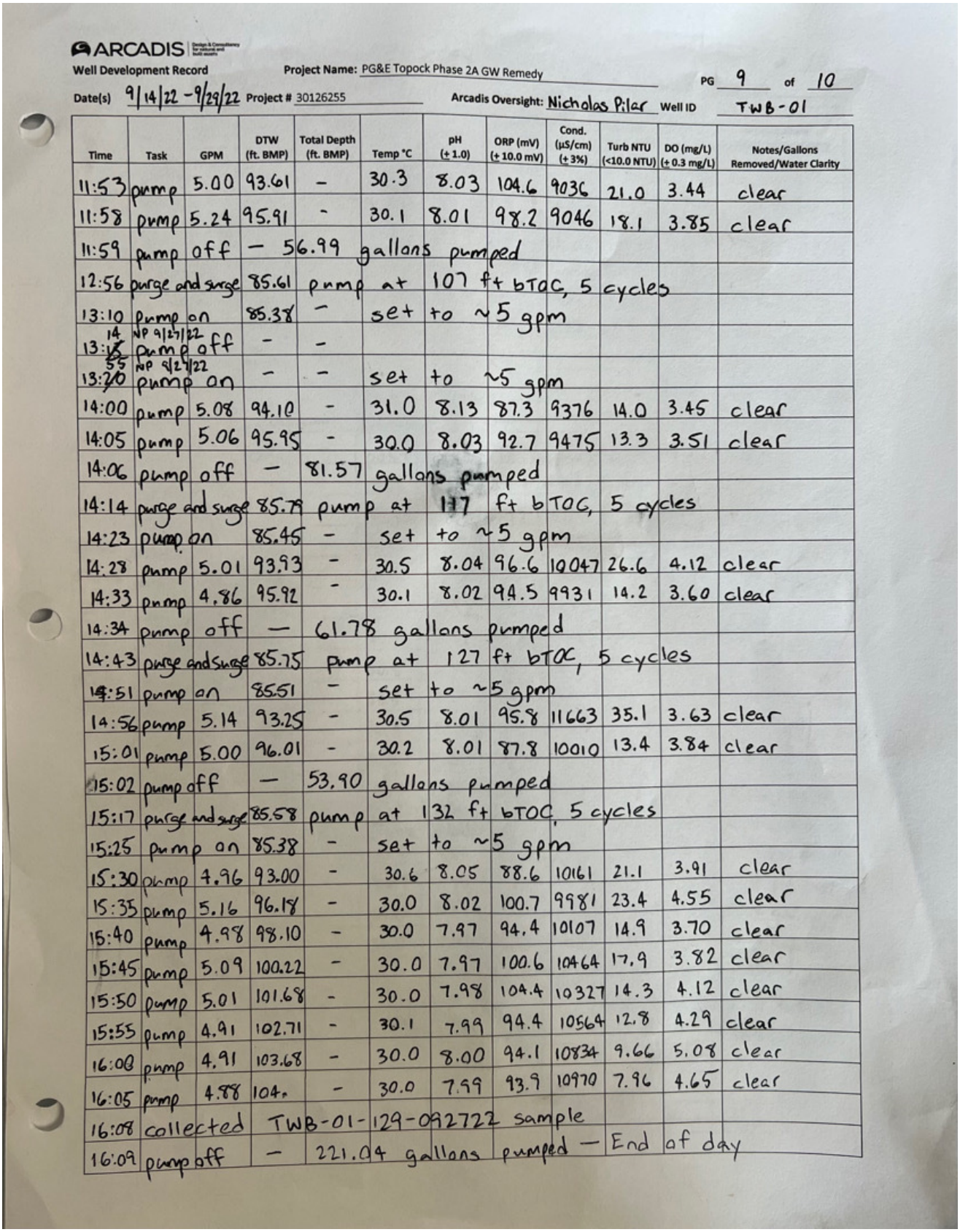
ARCADIS Design & Consultancy for natural and built assets

Well Development Record — Project Name: PG&E Topock Phase 2A GW Remedy — PG 8 of 10

Date(s) 9/14/22-9/29/22 Project # 30126255 — Arcadis Oversight: Nicholas Pilar — Well ID TWB-01

Time	Task	GPM	DTW (ft. BMP)	Total Depth (ft. BMP)	Temp °C	pH (±1.0)	ORP (mV) (±10.0 mV)	Cond. (µS/cm) (±3%)	Turb NTU (<10.0 NTU)	DO (mg/L) (±0.3 mg/L)	Notes/Gallons Removed/Water Clarity
					9/26/2022						
07:10	tag	-	85.51	137.4							
08:10	tag	-	85.51	137.4							
08:15	began swabbing lower screen										
09:50	finished swabbing lower screen										
09:55	began swabbing upper screen										
11:40	finished swabbing upper screen										
11:46	tag	-	85.52	137.4							
11:48	first bail	-	fine silty sediment, trace sand, brown								
12:04	final bail	-	fine silty sediment, light brown, ~20 gallons removed								
12:08	tag	-	85.90	137.4							
13:01	tag	-	85.48	137.4							
13:08	began swabbing lower screen										
13:38	paused development activities - safety audit										
14:05	resumed swabbing										
15:10	finished swabbing lower screen										
15:15	began swabbing upper screen										
16:00	end swabbing	-	85.48	137.4	finished swabbing for day - 60 minutes remain						
					End of day						
9/27/22 07:38	tag	-	85.52	137.4							
07:40	resumed swabbing upper screen										
08:40	end swabbing	-	85.55	137.4							
09:12	first bail	-	silty sediment, trace sand brown								
09:42	final bail	-	silty sediment, light brown, ~~tight brown~~ NP 9/27/22								~25 gallons removed
09:45	tag	-	85.71	137.4							
NP 9/27/22 ~~10:47~~ 11:03	purge and surge - pump at 97 ft bTOC, 5 cycles, ▽ 85.51										
11:15	pump on		85.51	-	set to ~5 gpm						
11:20	pump	5.18	93.40	-	30.4	7.89	138.1	9843	44.6	3.78	clear
11:25	pump	4.94	95.20	-	29.9	7.95	135.4	8858	45.4	4.31	clear
11:26	pump off	-	58.86 gallons pumped								
11:39	purge and surge		85.65	-	pump at 102 ft bTOC, 5 cycles						
11:48	pump on		85.51	-	set to ~5 gpm						

TWB-01 - Well Development Record



ARCADIS Design & Consultancy for natural and built assets

Well Development Record — Project Name: PG&E Topock Phase 2A GW Remedy — PG 9 of 10

Date(s) 9/14/22 - 9/29/22 — Project # 30126255 — Arcadis Oversight: Nicholas Pilar — Well ID TWB-01

Time	Task	GPM	DTW (ft. BMP)	Total Depth (ft. BMP)	Temp °C	pH (±1.0)	ORP (mV) (±10.0 mV)	Cond. (µS/cm) (±3%)	Turb NTU (<10.0 NTU)	DO (mg/L) (±0.3 mg/L)	Notes/Gallons Removed/Water Clarity
11:53	pump	5.00	93.61	-	30.3	8.03	104.6	9036	21.0	3.44	clear
11:58	pump	5.24	95.91	-	30.1	8.01	98.2	9046	18.1	3.85	clear
11:59	pump off	-	56.99	gallons pumped							
12:56	purge and surge		85.61	pump at 107 ft bTOC, 5 cycles							
13:10	pump on		85.38	-	set to ~5 gpm						
13:14	NP 9/27/22 pump off		-	-							
13:55	NP 9/27/22 pump on		-	-	set to ~5 gpm						
14:00	pump	5.08	94.10	-	31.0	8.13	87.3	9376	14.0	3.45	clear
14:05	pump	5.06	95.95	-	30.0	8.03	92.7	9475	13.3	3.51	clear
14:06	pump off	-	81.57	gallons pumped							
14:14	purge and surge		85.79	pump at 117 ft bTOC, 5 cycles							
14:23	pump on		85.45	-	set to ~5 gpm						
14:28	pump	5.01	93.93	-	30.5	8.04	96.6	10047	26.6	4.12	clear
14:33	pump	4.86	95.92	-	30.1	8.02	94.5	9931	14.2	3.60	clear
14:34	pump off	-	61.78	gallons pumped							
14:43	purge and surge		85.75	pump at 127 ft bTOC, 5 cycles							
14:51	pump on		85.51	-	set to ~5 gpm						
14:56	pump	5.14	93.25	-	30.5	8.01	95.8	11663	35.1	3.63	clear
15:01	pump	5.00	96.01	-	30.2	8.01	87.8	10010	13.4	3.84	clear
15:02	pump off	-	53.90	gallons pumped							
15:17	purge and surge		85.58	pump at 132 ft bTOC, 5 cycles							
15:25	pump on		85.38	-	set to ~5 gpm						
15:30	pump	4.96	93.00	-	30.6	8.05	88.6	10161	21.1	3.91	clear
15:35	pump	5.16	96.18	-	30.0	8.02	100.7	9981	23.4	4.55	clear
15:40	pump	4.98	98.10	-	30.0	7.97	94.4	10107	14.9	3.70	clear
15:45	pump	5.09	100.22	-	30.0	7.97	100.6	10464	17.9	3.82	clear
15:50	pump	5.01	101.68	-	30.0	7.98	104.4	10327	14.3	4.12	clear
15:55	pump	4.91	102.71	-	30.1	7.99	94.4	10564	12.8	4.29	clear
16:00	pump	4.91	103.68	-	30.0	8.00	94.1	10834	9.66	5.08	clear
16:05	pump	4.88	104.	-	30.0	7.99	93.9	10970	7.96	4.65	clear
16:08	collected		TWB-01-129-092722 sample								
16:09	pump off	-	221.04	gallons pumped					End of day		

TWB-01 - Well Development Record

ARCADIS Design & Consultancy for natural and built assets

Well Development Record

Project Name: PG&E Topock Phase 2A GW Remedy

PG 10 of 10

Date(s) 9/14/22-9/29/22 Project # 30126255 Arcadis Oversight: Nicholas Pilar Well ID TWB-01

Time	Task	GPM	DTW (ft. BMP)	Total Depth (ft. BMP)	Temp °C	pH (±1.0)	ORP (mV) (±10.0 mV)	Cond. (µS/cm) (±3%)	Turb NTU (<10.0 NTU)	DO (mg/L) (±0.3 mg/L)	Notes/Gallons Removed/Water Clarity
					9/28/2022						
07:40	tag	-	85.55								
09:02	tag	-	85.61								
10:44	~~7.56~~ SC test NP 9/29/22	1.5	87.87	-	33.9	7.61	197.8 NP 9/29/22	9713	3.27	4.36	clear
12:41	SC test	3	91.81	-	32.0	7.90	203.5	10239	1.77	4.27	clear
14:46	SC test	4.5	105.07	-	32.3	7.95	122.0	12133	1.57	4.63	clear
16:27	tag	-	85.68								
					End of day						
					9/29/2022						
08:25	pump on	~3	85.57	-	post specific capacity test sample						
08:30	purge	2.93	91.02	-	30.7	7.31	218.4	16908	5.39	3.60	13.8 gallons
08:35	purge	2.98	-	-	30.7	7.64	207.7	15334	5.18	1.99	25.76 gal purged
08:40	purge	3.20	92.30	-	30.6	7.69	203.4	13320	3.66	3.08	41.56 gal purged
08:45	purge	3.14	92.93	-	30.5	7.75	215.7	11569	3.73	3.64	57.40 gal purged
08:50	purge	3.10	93.34	-	30.5	7.73	220.1	10561	4.70	3.65	72.24 gal purged
08:55	purge	3.00	93.51	-	30.5	7.72	227.8	10758	3.07	3.74	89.34 gal purged
09:00	purge	3.26	94.20	-	30.5	7.75	229.9	10677	3.17	3.48	104.44 gal purged
09:05	purge	3.20	94.55	-	30.5	7.77	232.3	10425	3.03	3.44	120.16 gal purged
09:10	purge	3.18	94.77	-	30.4	7.79	231.3	10265	2.37	3.64	134.57 gal purged
09:15	purge	3.20	94.96	-	30.6	7.81	232.2	10203	3.01	4.33	151.38 gal purged
09:20	purge	3.00	94.78	-	30.4	7.80	239.5	10247	3.38	4.22	168.42 gal purged
09:25	purge	2.92	94.40	-	~~30.4~~ 28.1 NP 9/29/22	~~7.86~~ 7.88 NP 9/29/22	~~245.3~~ 309.5 NP 9/29/22	10319	3.23	5.04	181.74 gal purged
09:30	purge	2.92	94.15	-	30.5	7.81	246.3	10334	1.90	4.39	196.22 gal purged
09:35	purge	2.93	93.99	-	30.7	7.78	244.0	10341	1.45	4.07	210.38 gal purged
09:45	purge	2.90	93.81	-	31.0	7.77	241.3	10286	1.23	3.66	240.06 gal purged
09:50	purge	2.90	93.82	-	31.0	7.78	238.3	10249	1.32	3.63	254.86 gal purged
09:55	purge	2.90	93.81	-	31.1	7.78	235.3	10256	0.99	3.62	270.44 gal purged
09:57	stable - begin collecting sample								0.78 - post sampling turbidity		
10:01	sample TWB-01-SC-85-129 collected										297.70 gal purged
10:10	began tripping out pipe and pump										
10:49			85.65	137.4	tripped out dpe and pump						
					End of day						

TWB-01 - Well Development Record

Attachment 6

Specific Capacity Testing Package

Specific Capacity Test

Location/Well ID	**TWB-01-Temp**
Date	**4/28/2022**
Screened Interval Tested	**77 to 127 ft bgs**
Packer Set Depth	**N/A**
Packer Seal Test	**N/A**
Tests Conducted	three-step specific capacity test (1, 2, and 2.75 gpm)
Purpose	Well performance test
Summary	Specific capacity: ; 1 gpm = 1.01 gpm/ft, 2.0 gpm = 0.62 gpm/ft, and 2.75 gpm = 0.32 gpm/ft.
Notes	The third step of test started at 3 gpm but the pumping rate dropped to 2.75 gpm after the first 7 minutes because of rapid drawdown.
Oversight Signature	
Date	7/27/2022

Specific Capacity Test

Location/Well ID	TWB-01-Temp
Date	4/28/2022
Screened Interval	77 - 127 ft.
Pump Depth (ft btoc)	126
Packer Depth (ft btoc)	N/A
Packer Leak Test (Pass/Fail)	N/A
Initial Water Level (ft btoc)	82.45
Initial Totalizer Reading (gal)	N/A
Final Totalizer Reading (gal)	N/A
Approx Pumped Volume (gal)	580
Calculated Volume Purged (gal)	626.5
Difference in Volume Pumped vs. Calculated	-46.5
Number of Specific Capacity Steps	3
Pumping Rates (in order)	1, 2, and 2.75 gpm

Step 1 (1.0 GPM) Time (HR:MN:SEC)	Change in Time Between Measurements (min)	Elapsed Time (min)	Pumping Rate (gpm)	Total Volume Pumped (gal)	Depth to Water (ft)	Drawdown (ft)
8:00:36	0.00	0.00	0.00	0.00	82.45	0.00
8:51:00	50.40	0.00	1.00	0.00	82.45	0.00
8:52:00	1.00	1.00	1.00	1.00	82.45	0.00
8:52:26	0.43	1.43	1.00	1.43	83.85	1.40
8:52:50	0.40	1.83	1.00	1.83	83.60	1.15
8:53:14	0.40	2.23	1.00	2.23	83.55	1.10
8:53:30	0.27	2.50	1.00	2.50	83.50	1.05
8:53:44	0.23	2.73	1.00	2.73	83.50	1.05
8:54:14	0.50	3.23	1.00	3.23	83.50	1.05
8:55:00	0.77	4.00	1.00	4.00	83.49	1.04
8:56:00	1.00	5.00	1.00	5.00	83.56	1.11
8:57:00	1.00	6.00	1.00	6.00	83.45	1.00
8:58:00	1.00	7.00	1.00	7.00	83.40	0.95
8:59:00	1.00	8.00	1.00	8.00	83.34	0.89
9:00:00	1.00	9.00	1.00	9.00	83.35	0.90
9:01:00	1.00	10.00	1.00	10.00	83.34	0.89
9:02:00	1.00	11.00	1.00	11.00	83.37	0.92
9:04:00	2.00	13.00	1.00	13.00	83.35	0.90
9:06:00	2.00	15.00	1.00	15.00	83.36	0.91
9:08:00	2.00	17.00	1.00	17.00	83.35	0.90
9:10:00	2.00	19.00	1.00	19.00	83.34	0.89
9:12:00	2.00	21.00	1.00	21.00	83.33	0.88
9:14:00	2.00	23.00	1.00	23.00	83.33	0.88
9:16:00	2.00	25.00	1.00	25.00	83.33	0.88
9:18:00	2.00	27.00	1.00	27.00	83.33	0.88
9:20:00	2.00	29.00	1.00	29.00	83.32	0.87
9:22:00	2.00	31.00	1.00	31.00	83.33	0.88
9:24:00	2.00	33.00	1.00	33.00	83.34	0.89
9:26:00	2.00	35.00	1.00	35.00	83.36	0.91
9:30:00	4.00	39.00	1.00	39.00	83.33	0.88
9:32:00	2.00	41.00	1.00	41.00	83.33	0.88
9:34:00	2.00	43.00	1.00	43.00	83.33	0.88
9:40:00	6.00	49.00	1.00	49.00	83.36	0.91
9:45:00	5.00	54.00	1.00	54.00	83.36	0.91
9:50:00	5.00	59.00	1.00	59.00	83.34	0.89
10:00:00	10.00	69.00	1.00	69.00	83.38	0.93
10:10:00	10.00	79.00	1.00	79.00	83.42	0.97
10:20:00	10.00	89.00	1.00	89.00	83.45	1.00
10:30:00	10.00	99.00	1.00	99.00	83.44	0.99
10:37:00	7.00	106.00	1.00	106.00	83.44	0.99
Total Volume Pumped for Step 2 (gal)			**106.00**			
Average Pumping Rate (gpm)			**1.00**			
Specific Capacity (gpm/ft)			**1.01**			

Specific Capacity Test

Location/Well ID	TWB-01-Temp
Date	4/28/2022
Screened Interval	77 - 127 ft.
Pump Depth (ft btoc)	126
Packer Depth (ft btoc)	N/A
Packer Leak Test (Pass/Fail)	N/A
Initial Water Level (ft btoc)	82.45
Initial Totalizer Reading (gal)	N/A
Final Totalizer Reading (gal)	N/A
Approx Pumped Volume (gal)	580
Calculated Volume Purged (gal)	626.5
Difference in Volume Pumped vs. Calculated	-46.5
Number of Specific Capacity Steps	3
Pumping Rates (in order)	1, 2, and 2.75 gpm

Step 2 (2.0 GPM) Time (HR:MN:SEC)	Change in Time Between measurements (min)	Elapsed Time from Test Start (min)	Pumping Rate (gpm)	Total Volume Pumped (gal)	Depth to Water (ft)	Drawdown (ft)	Elapsed Time from Step 2 Start (min)
10:33:00	0.00	102.00	2.00	106.00	83.44	0.99	0.00
10:42:00	9.00	111.00	2.00	124.00	83.45	1.00	9.00
10:43:00	1.00	112.00	2.00	126.00	83.55	1.10	10.00
10:43:16	0.27	112.27	2.00	126.53	83.60	1.15	10.27
10:43:23	0.12	112.38	2.00	126.77	83.70	1.25	10.38
10:43:36	0.22	112.60	2.00	127.20	83.80	1.35	10.60
10:43:48	0.20	112.80	2.00	127.60	83.90	1.45	10.80
10:44:00	0.20	113.00	2.00	128.00	84.00	1.55	11.00
10:45:21	1.35	114.35	2.00	130.70	84.32	1.87	12.35
10:46:00	0.65	115.00	2.00	132.00	84.68	2.23	13.00
10:47:00	1.00	116.00	2.00	134.00	84.87	2.42	14.00
10:48:00	1.00	117.00	2.00	136.00	84.95	2.50	15.00
10:49:00	1.00	118.00	2.00	138.00	85.04	2.59	16.00
10:50:00	1.00	119.00	2.00	140.00	85.05	2.60	17.00
10:51:00	1.00	120.00	2.00	142.00	85.09	2.64	18.00
10:52:00	1.00	121.00	2.00	144.00	85.12	2.67	19.00
10:54:00	2.00	123.00	2.00	148.00	85.20	2.75	21.00
10:56:00	2.00	125.00	2.00	152.00	85.27	2.82	23.00
10:58:00	2.00	127.00	2.00	156.00	85.31	2.86	25.00
11:00:00	2.00	129.00	2.00	160.00	85.31	2.86	27.00
11:02:00	2.00	131.00	2.00	164.00	85.37	2.92	29.00
11:04:00	2.00	133.00	2.00	168.00	85.39	2.94	31.00
11:06:00	2.00	135.00	2.00	172.00	85.39	2.94	33.00
11:08:00	2.00	137.00	2.00	176.00	85.40	2.95	35.00
11:10:00	2.00	139.00	2.00	180.00	85.40	2.95	37.00
11:12:00	2.00	141.00	2.00	184.00	85.41	2.96	39.00
11:15:00	3.00	144.00	2.00	190.00	85.48	3.03	42.00
11:20:00	5.00	149.00	2.00	200.00	85.50	3.05	47.00
11:25:00	5.00	154.00	2.00	210.00	85.50	3.05	52.00
11:30:00	5.00	159.00	2.00	220.00	85.50	3.05	57.00
11:35:00	5.00	164.00	2.00	230.00	85.49	3.04	62.00
11:40:00	5.00	169.00	2.00	240.00	85.36	2.91	67.00
11:50:00	10.00	179.00	2.00	260.00	85.56	3.11	77.00
12:00:00	10.00	189.00	2.00	280.00	85.62	3.17	87.00
12:10:00	10.00	199.00	2.00	300.00	85.66	3.21	97.00
12:20:00	10.00	209.00	2.00	320.00	85.68	3.23	107.00
Total Volume Pumped for Step 2 (gal)			**214.00**				
Average Pumping Rate (gpm)			**2.00**				
Specific Capacity (gpm/ft)			**0.62**				

Specific Capacity Test

ARCADIS Design & Consultancy for natural and built assets

Location/Well ID	TWB-01-Temp
Date	4/28/2022
Screened Interval	77 - 127 ft.
Pump Depth (ft btoc)	126
Packer Depth (ft btoc)	N/A
Packer Leak Test (Pass/Fail)	N/A
Initial Water Level (ft btoc)	82.45
Initial Totalizer Reading (gal)	N/A
Final Totalizer Reading (gal)	N/A
Approx Pumped Volume (gal)	580
Calculated Volume Purged (gal)	626.5
Difference in Volume Pumped vs. Calculated	-46.5
Number of Specific Capacity Steps	3
Pumping Rates (in order)	1, 2, and 2.75 gpm

Step 3 (2.75 gpm) Time (HR:MN:SEC)	Change in Time Between Measurements (min)	Elapsed Time from Test Start (min)	Pumping Rate (gpm)	Total Volume Pumped (Gallons)	Depth to Water (ft)	Drawdown (ft)	Elapsed Time from Step 3 Start (min)
12:22:00	2.00	211.00	3.00	326.00	85.72	3.27	0.00
12:29:00	7.00	218.00	3.00	347.00	85.75	3.30	7.00
12:30:00	1.00	219.00	3.00	350.00	86.00	3.55	8.00
12:30:19	0.32	219.32	3.00	350.95	86.70	4.25	8.32
12:30:38	0.32	219.63	3.00	351.90	88.00	5.55	8.63
12:30:47	0.15	219.78	3.00	352.35	88.20	5.75	8.78
12:30:56	0.15	219.93	3.00	352.80	88.35	5.90	8.93
12:31:00	0.07	220.00	3.00	353.00	88.55	6.10	9.00
12:32:00	1.00	221.00	3.00	356.00	89.25	6.80	10.00
12:33:00	1.00	222.00	3.00	359.00	89.57	7.12	11.00
12:34:00	1.00	223.00	3.00	362.00	89.60	7.15	12.00
12:35:00	1.00	224.00	3.00	365.00	89.65	7.20	13.00
12:36:00	1.00	225.00	3.00	368.00	89.70	7.25	14.00
12:37:00	1.00	226.00	2.75	370.75	89.74	7.29	15.00
12:38:00	1.00	227.00	2.75	373.50	89.71	7.26	16.00
12:39:00	1.00	228.00	2.75	376.25	89.25	6.80	17.00
12:40:00	1.00	229.00	2.75	379.00	89.13	6.68	18.00
12:42:00	2.00	231.00	2.75	384.50	89.70	7.25	20.00
12:44:00	2.00	233.00	2.75	390.00	89.89	7.44	22.00
12:46:00	2.00	235.00	2.75	395.50	90.02	7.57	24.00
12:50:00	4.00	239.00	2.75	406.50	90.03	7.58	28.00
12:52:00	2.00	241.00	2.75	412.00	90.06	7.61	30.00
12:54:00	2.00	243.00	2.75	417.50	90.08	7.63	32.00
12:56:00	2.00	245.00	2.75	423.00	90.11	7.66	34.00
12:58:00	2.00	247.00	2.75	428.50	90.39	7.94	36.00
13:00:00	2.00	249.00	2.75	434.00	90.46	8.01	38.00
13:05:00	5.00	254.00	2.75	447.75	90.58	8.13	43.00
13:10:00	5.00	259.00	2.75	461.50	90.70	8.25	48.00
13:15:00	5.00	264.00	2.75	475.25	90.60	8.15	53.00
13:20:00	5.00	269.00	2.75	489.00	90.57	8.12	58.00
13:25:00	5.00	274.00	2.75	502.75	90.56	8.11	63.00
13:30:00	5.00	279.00	2.75	516.50	90.61	8.16	68.00
13:35:00	5.00	284.00	2.75	530.25	90.81	8.36	73.00
13:40:00	5.00	289.00	2.75	544.00	90.37	7.92	78.00
13:50:00	10.00	299.00	2.75	571.50	90.80	8.35	88.00
14:00:00	10.00	309.00	2.75	599.00	90.80	8.35	0.00
14:10:00	10.00	319.00	2.75	626.50	90.91	8.46	10.00
14:20:00	10.00	329.00	0.00	626.50	91.11	8.66	20.00
14:20:12	0.20	329.20	0.00	626.50	86.55	4.10	20.20
14:20:27	0.25	329.45	0.00	626.50	84.40	1.95	20.45
14:20:41	0.23	329.68	0.00	626.50	83.80	1.35	20.68
14:21:04	0.38	330.07	0.00	626.50	83.50	1.05	21.07
14:21:21	0.28	330.35	0.00	626.50	83.30	0.85	21.35
14:21:53	0.53	330.88	0.00	626.50	83.10	0.65	21.88
14:22:07	0.23	331.12	0.00	626.50	83.00	0.55	22.12
14:23:52	1.75	332.87	0.00	626.50	82.80	0.35	23.87
14:26:34	2.70	335.57	0.00	626.50	82.70	0.25	26.57
Total Volume Pumped for Step 3 (gal)			**306.50**				
Average Pumping Rate (gpm)			**2.75**				
Specific Capacity (gpm/ft)			**0.32**				

Acronyms & Abbreviations

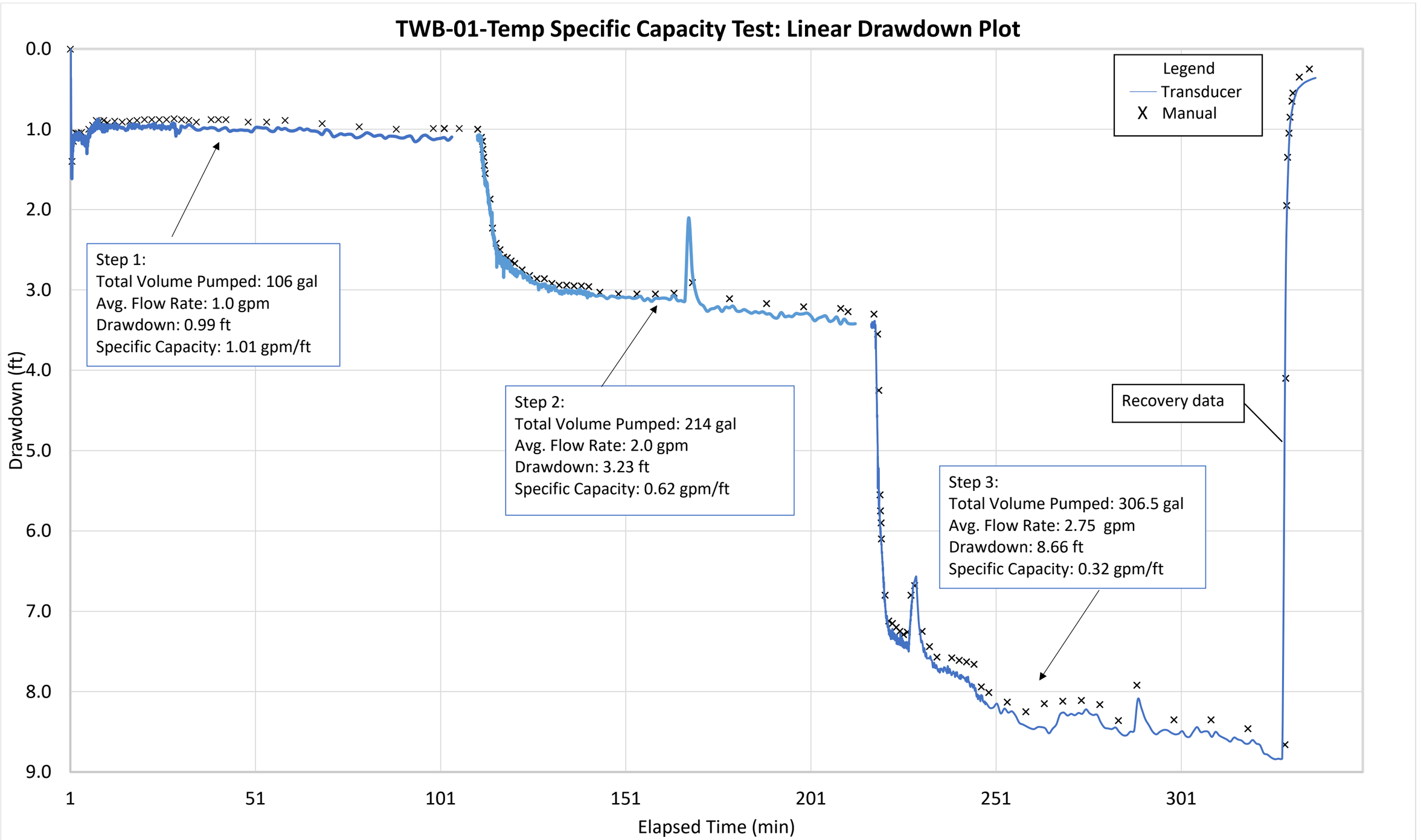
bgs = below ground surface
btoc = below top of casing
ft = feet
gal = gallons
gpm = gallons per minute

Specific Capacity Test

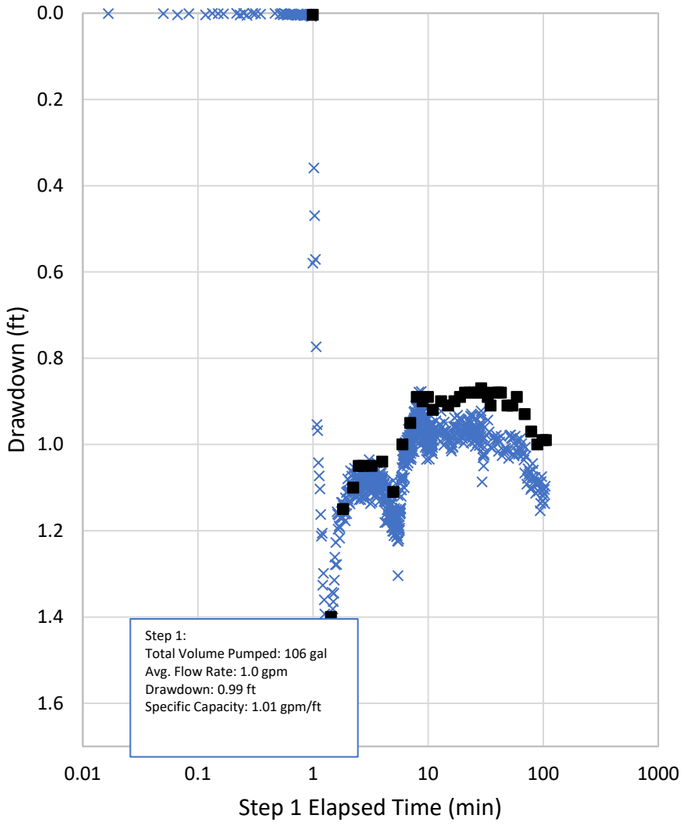
Location/Well ID	TWB-01-Temp
Date	4/28/2022
Screened Interval	77 - 127 ft.
Pump Depth (ft btoc)	126
Packer Depth (ft btoc)	N/A
Packer Leak Test (Pass/Fail)	N/A
Initial Water Level (ft btoc)	82.45
Initial Totalizer Reading (gal)	N/A
Final Totalizer Reading (gal)	N/A
Approx Pumped Volume (gal)	580
Calculated Volume Purged (gal)	626.5
Difference in Volume Pumped vs. Calculated	-46.5
Number of Specific Capacity Steps	3
Pumping Rates (in order)	1, 2, and 2.75 gpm

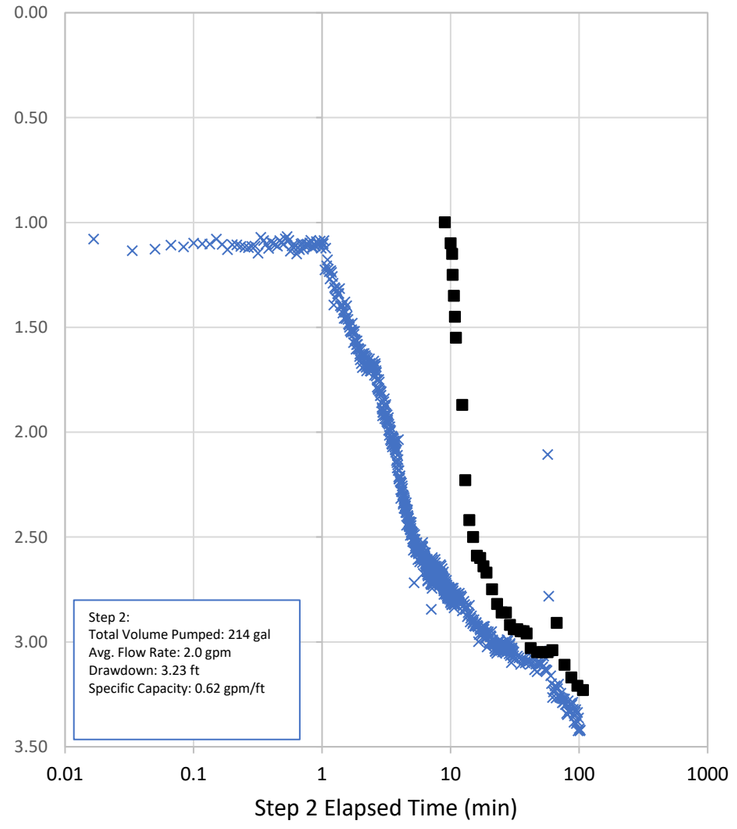
min = minutes

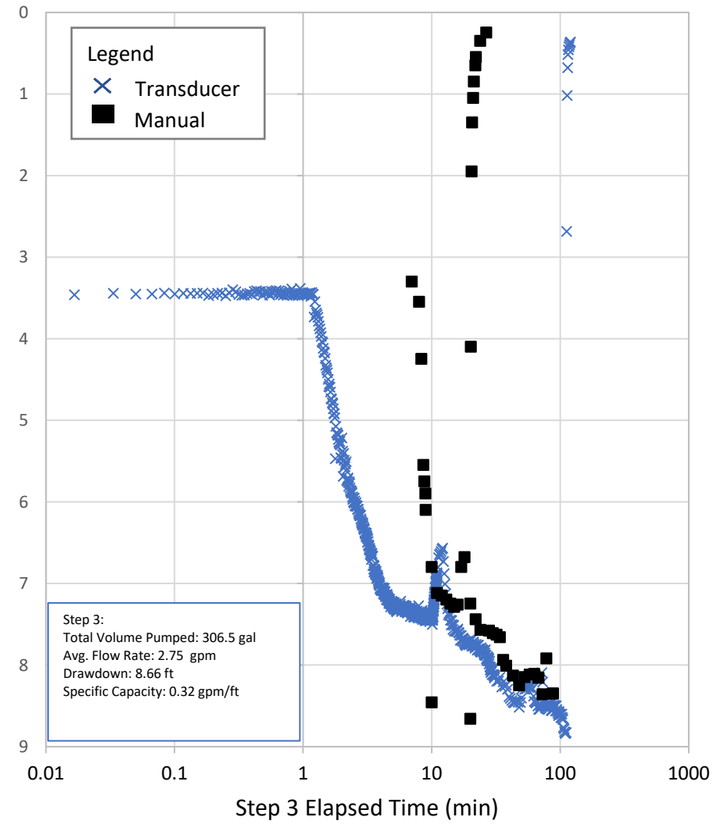
TWB-01-Temp Specific Capacity Test: Linear Drawdown Plot



TWB-01-Temp Specific Capacity: Semi-Log Drawdown Plot







Specific Capacity Test

ARCADIS Design & Consultancy for natural and built assets

Location/Well ID	**TWB-01**
Date	**9/28/2022**
Screened Interval Tested	**85-129 ft bgs**
Packer Set Depth	**N/A - Single Screen**
Packer Seal Test	**N/A - Single Screen**
Tests Conducted	Four-step specific capacity test (1.5, 3, 4.5, and 6 gpm)
Purpose	Specific Capacity Test
Summary	Specific capacity; 1.5 gpm = 0.68 gpm/ft, 3.0 gpm = 0.48 gpm/ft, 4.5 gpm = 0.22 gpm/ft, and 6.0 gpm = 0.14 gpm/ft.
Notes	Manual data and transducer data for TWB-01 match well. Transducer at MW-59 malfuctioned during test and did not record data. Manual measurements from MW-59 were collected and plotted.
Oversight Signature	
Date	10/14/2022

Specific Capacity Test

ARCADIS Design & Consultancy for natural and built assets

Location/Well ID	TWB-01
Date	9/28/2022
Screened Interval	85-129 bgs
Pump Depth (ft btoc)	132 ft bgs
Packer Depth (ft btoc)	N/A - Single Screen
Packer Leak Test (Pass/Fail)	N/A - Single Screen
Initial Water Level (ft btoc)	85.61
Initial Totalizer Reading (gal)	241290
Final Totalizer Reading (gal)	242549
Approx Pumped Volume (gal)	1187
Calculated Volume Purged (gal)	1259
Difference in Volume Pumped vs. Calculated	-72
Number of Specific Capacity Steps	4
Pumping Rates (in order)	1.5, 3, 4.5, and 6 gpm

Step 1 (1.5 GPM) Time (HR:MN:SEC)	Change in Time Between Measurements (min)	Elapsed Time (min)	Pumping Rate (gpm)	Total Volume Pumped (gal)	Depth to Water (ft)	Drawdown (ft)
	0.00	0.00	0.00	0.00	85.61	0.00
9:05:34	0.00	0.00	0.50	0.00	88.61	3.00
9:05:43	0.15	0.15	1.00	0.15	88.55	2.94
9:06:00	0.28	0.43	1.49	0.57	88.42	2.81
9:07:00	1.00	1.43	1.59	2.16	88.03	2.42
9:08:00	1.00	2.43	1.52	3.68	87.86	2.25
9:09:00	1.00	3.43	1.56	5.24	87.83	2.22
9:10:00	1.00	4.43	1.56	6.80	87.79	2.18
9:11:00	1.00	5.43	1.52	8.32	87.78	2.17
9:12:00	1.00	6.43	1.56	9.88	87.77	2.16
9:13:00	1.00	7.43	1.56	11.44	87.77	2.16
9:14:00	1.00	8.43	1.56	13.00	87.77	2.16
9:15:00	1.00	9.43	1.56	14.56	87.78	2.17
9:17:00	2.00	11.43	1.54	17.64	87.78	2.17
9:19:00	2.00	13.43	1.51	20.66	87.79	2.18
9:21:00	2.00	15.43	1.54	23.74	87.80	2.19
9:23:00	2.00	17.43	1.54	26.82	87.81	2.20
9:25:00	2.00	19.43	1.54	29.90	87.82	2.21
9:27:00	2.00	21.43	1.52	32.94	87.82	2.21
9:29:00	2.00	23.43	1.52	35.98	87.82	2.21
9:31:00	2.00	25.43	1.52	39.02	87.82	2.21
9:33:00	2.00	27.43	1.52	42.06	87.82	2.21
9:35:00	2.00	29.43	1.52	45.10	87.83	2.22
9:40:00	5.00	34.43	1.54	52.80	87.83	2.22
9:45:00	5.00	39.43	1.52	60.40	87.83	2.22
9:50:00	5.00	44.43	1.52	68.00	87.86	2.25
9:55:00	5.00	49.43	1.52	75.60	87.85	2.24
10:00:00	5.00	54.43	1.52	83.20	87.85	2.24
10:05:00	5.00	59.43	1.52	90.80	87.85	2.24
10:15:00	10.00	69.43	1.52	106.00	87.86	2.25
10:25:00	10.00	79.43	1.52	121.20	87.87	2.26
10:35:00	10.00	89.43	1.61	137.30	87.87	2.26
10:45:00	10.00	99.43	1.52	152.50	87.87	2.26
Total Volume Pumped for Step 1 (gal)			**152.50**			
Average Pumping Rate (gpm)			**1.54**			
Specific Capacity (gpm/ft)			**0.68**			

Specific Capacity Test

ARCADIS Design & Consultancy for natural and built assets

Location/Well ID	TWB-01
Date	9/28/2022
Screened Interval	85-129 bgs
Pump Depth (ft btoc)	132 ft bgs
Packer Depth (ft btoc)	N/A - Single Screen
Packer Leak Test (Pass/Fail)	N/A - Single Screen
Initial Water Level (ft btoc)	85.61
Initial Totalizer Reading (gal)	241290
Final Totalizer Reading (gal)	242549
Approx Pumped Volume (gal)	1187
Calculated Volume Purged (gal)	1259
Difference in Volume Pumped vs. Calculated	-72
Number of Specific Capacity Steps	4
Pumping Rates (in order)	1.5, 3, 4.5, and 6 gpm

Step 2 (3 GPM) Time (HR:MN:SEC)	Change in Time Between measurements (min)	Elapsed Time from Test Start (min)	Pumping Rate (gpm)	Total Volume Pumped (gal)	Depth to Water (ft)	Drawdown (ft)	Elapsed Time from Step 2 Start (min)
10:50:00	0.00	105.00	1.50	152.50			0.00
10:50:10	0.17	105.17		152.50	87.97	2.36	0.17
10:50:18	0.13	105.30		152.50	88.11	2.50	0.30
10:50:50	0.53	105.83		152.50	88.54	2.93	0.83
10:51:00	0.17	106.00	2.96	153.00	88.65	3.04	1.00
10:52:00	1.00	107.00	2.90	155.90	89.06	3.45	2.00
10:53:00	1.00	108.00	2.88	158.78	89.36	3.75	3.00
10:54:00	1.00	109.00	3.14	161.92	89.37	3.76	4.00
10:55:00	1.00	110.00	3.06	164.98	89.89	4.28	5.00
10:56:00	1.00	111.00	3.02	168.00	90.05	4.44	6.00
10:57:00	1.00	112.00	3.00	171.00	90.17	4.56	7.00
10:58:00	1.00	113.00	3.00	174.00	90.29	4.68	8.00
10:59:00	1.00	114.00	3.00	177.00	90.40	4.79	9.00
11:00:00	1.00	115.00	3.00	180.00	90.47	4.86	10.00
11:02:00	2.00	117.00	2.92	185.84	90.57	4.96	12.00
11:04:00	2.00	119.00	2.92	191.68	90.61	5.00	14.00
11:06:00	2.00	121.00	2.90	197.48	90.65	5.04	16.00
11:08:00	2.00	123.00	2.88	203.24	90.67	5.06	18.00
11:10:00	2.00	125.00	2.88	209.00	90.68	5.07	20.00
11:12:00	2.00	127.00	2.88	214.76	90.69	5.08	22.00
11:14:00	2.00	129.00	2.88	220.52	90.70	5.09	24.00
11:16:00	2.00	131.00	2.86	226.24	90.71	5.10	26.00
11:18:00	2.00	133.00	2.88	232.00	90.72	5.11	28.00
11:20:00	2.00	135.00	2.86	237.72	90.73	5.12	30.00
11:25:00	5.00	140.00	2.86	252.02	90.77	5.16	35.00
11:30:00	5.00	145.00	2.86	266.32	90.81	5.20	40.00
11:35:00	5.00	150.00	2.86	280.62	90.83	5.22	45.00
11:40:00	5.00	155.00	2.86	294.92	90.85	5.24	50.00
11:45:00	5.00	160.00	2.93	309.57	91.32	5.71	55.00
11:50:00	5.00	165.00	2.88	323.97	91.19	5.58	60.00
12:00:00	10.00	175.00	2.98	353.77	91.52	5.91	70.00
12:10:00	10.00	185.00	3.06	384.37	91.62	6.01	80.00
12:20:00	10.00	195.00	3.02	414.57	91.81	6.20	90.00
12:30:00	10.00	205.00	2.96	444.17	91.81	6.20	100.00
12:40:00	10.00	215.00	2.96	473.77	91.81	6.20	110.00
12:50:00	10.00	225.00	2.93	503.07	91.76	6.15	120.00
Total Volume Pumped for Step 2 (gal)			**350.56**				
Average Pumping Rate (gpm)			**2.94**				
Specific Capacity (gpm/ft)			**0.48**				

Specific Capacity Test

ARCADIS Design & Consultancy for natural and built assets

Location/Well ID	TWB-01
Date	9/28/2022
Screened Interval	85-129 bgs
Pump Depth (ft btoc)	132 ft bgs
Packer Depth (ft btoc)	N/A - Single Screen
Packer Leak Test (Pass/Fail)	N/A - Single Screen
Initial Water Level (ft btoc)	85.61
Initial Totalizer Reading (gal)	241290
Final Totalizer Reading (gal)	242549
Approx Pumped Volume (gal)	1187
Calculated Volume Purged (gal)	1259
Difference in Volume Pumped vs. Calculated	-72
Number of Specific Capacity Steps	4
Pumping Rates (in order)	1.5, 3, 4.5, and 6 gpm

Step 3 (4.5 gpm) Time (HR:MN:SEC)	Change in Time Between Measurements (min)	Elapsed Time from Test Start (min)	Pumping Rate (gpm)	Total Volume Pumped (Gallons)	Depth to Water (ft)	Drawdown (ft)	Elapsed Time from Step 3 Start (min)
12:55:00	0.00	230.00	3.00	503.07			0.00
12:55:12	0.20	230.20	3.19	503.70	91.65	6.04	0.20
12:55:21	0.15	230.35	3.37	504.21	91.93	6.32	0.35
12:55:34	0.22	230.57	3.56	504.98	92.18	6.57	0.57
12:55:40	0.10	230.67	3.74	505.35	92.27	6.66	0.67
12:55:44	0.07	230.73	3.93	505.61	92.35	6.74	0.73
12:55:51	0.12	230.85	4.11	506.09	92.41	6.80	0.85
12:55:54	0.05	230.90	4.30	506.31	92.48	6.87	0.90
12:56:00	0.10	231.00	4.48	506.76	92.61	7.00	1.00
12:57:00	1.00	232.00	4.47	511.23	93.38	7.77	2.00
12:58:00	1.00	233.00	4.45	515.68	94.02	8.41	3.00
12:59:00	1.00	234.00	4.44	520.12	94.64	9.03	4.00
13:00:00	1.00	235.00	4.44	524.56	95.15	9.54	5.00
13:01:00	1.00	236.00	4.40	528.96	95.65	10.04	6.00
13:02:00	1.00	237.00	4.38	533.34	96.01	10.40	7.00
13:03:00	1.00	238.00	4.37	537.71	96.51	10.90	8.00
13:04:00	1.00	239.00	4.37	542.08	96.89	11.28	9.00
13:05:00	1.00	240.00	4.37	546.45	97.24	11.63	10.00
13:07:00	2.00	242.00	4.36	555.17	97.85	12.24	12.00
13:09:00	2.00	244.00	4.34	563.85	98.40	12.79	14.00
13:11:00	2.00	246.00	4.32	572.49	98.90	13.29	16.00
13:13:00	2.00	248.00	4.25	580.99	99.32	13.71	18.00
13:15:00	2.00	250.00	4.25	589.49	99.69	14.08	20.00
13:17:00	2.00	252.00	4.20	597.89	99.97	14.36	22.00
13:19:00	2.00	254.00	4.22	606.33	100.20	14.59	24.00
13:21:00	2.00	256.00	4.22	614.77	100.40	14.79	26.00
13:23:00	2.00	258.00	4.20	623.17	100.56	14.95	28.00
13:25:00	2.00	260.00	4.20	631.57	100.71	15.10	30.00
13:30:00	5.00	265.00	4.18	652.47	101.04	15.43	35.00
13:35:00	5.00	270.00	4.20	673.47	101.33	15.72	40.00
13:40:00	5.00	275.00	4.38	695.37	102.15	16.54	45.00
13:45:00	5.00	280.00	4.34	717.07	102.74	17.13	50.00
13:50:00	5.00	285.00	4.25	738.32	102.99	17.38	55.00
13:55:00	5.00	290.00	4.15	759.07	103.00	17.39	60.00
14:05:00	10.00	300.00	4.47	803.77	102.75	17.14	70.00
14:15:00	10.00	310.00	4.57	849.47	104.40	18.79	80.00
14:25:00	10.00	320.00	4.34	892.87	105.12	19.51	90.00
14:35:00	10.00	330.00	4.28	935.67	105.17	19.56	100.00
14:45:00	10.00	340.00	4.22	977.87	105.07	19.46	110.00
14:55:00	10.00	350.00	4.20	1019.87	104.91	19.30	120.00
Total Volume Pumped for Step 3 (gal)			**516.80**				
Average Pumping Rate (gpm)			**4.32**				
Specific Capacity (gpm/ft)			**0.22**				

Specific Capacity Test

ARCADIS Design & Consultancy for natural and built assets

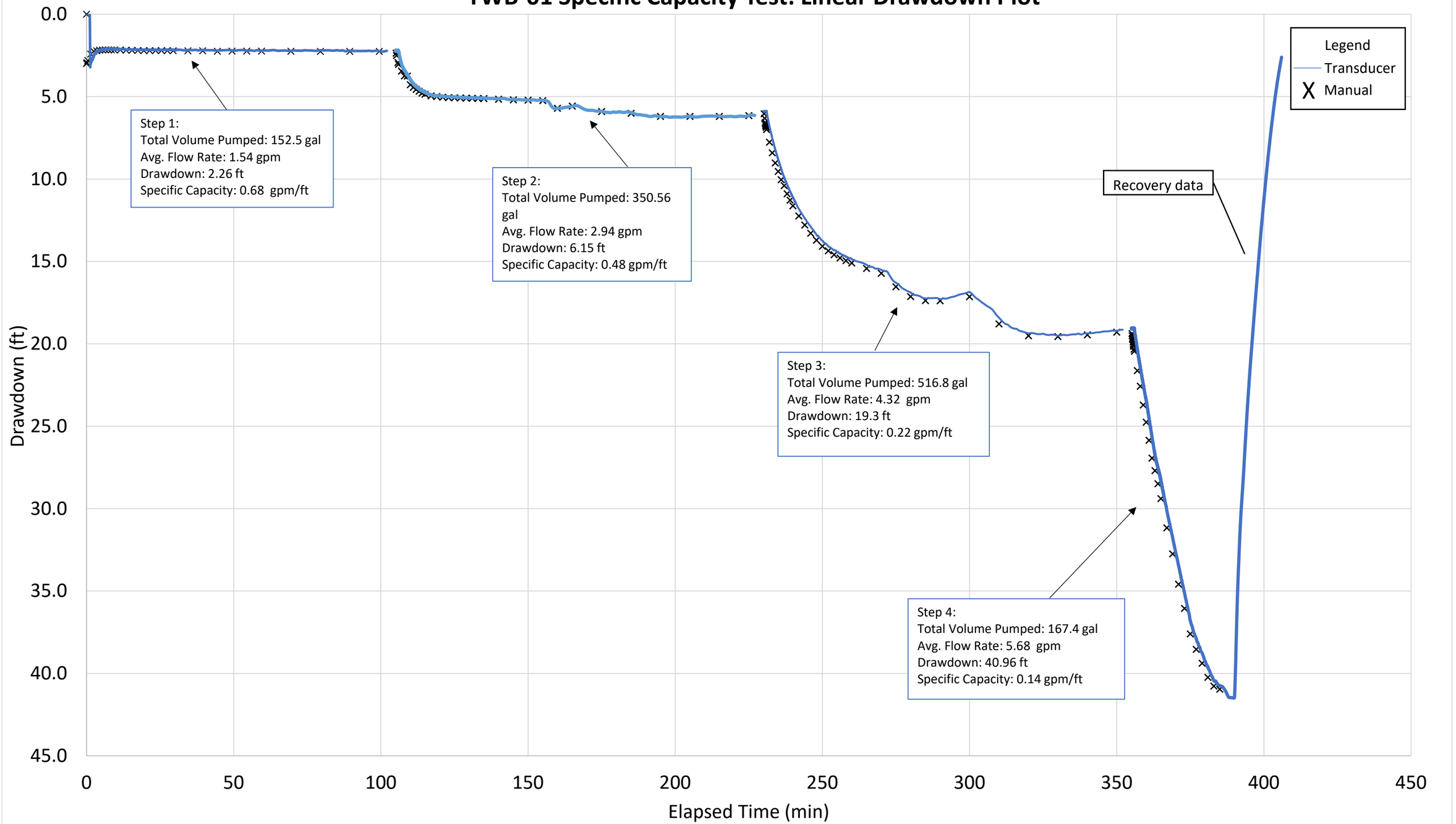
Location/Well ID	TWB-01
Date	9/28/2022
Screened Interval	85-129 bgs
Pump Depth (ft btoc)	132 ft bgs
Packer Depth (ft btoc)	N/A - Single Screen
Packer Leak Test (Pass/Fail)	N/A - Single Screen
Initial Water Level (ft btoc)	85.61
Initial Totalizer Reading (gal)	241290
Final Totalizer Reading (gal)	242549
Approx Pumped Volume (gal)	1187
Calculated Volume Purged (gal)	1259
Difference in Volume Pumped vs. Calculated	-72
Number of Specific Capacity Steps	4
Pumping Rates (in order)	1.5, 3, 4.5, and 6 gpm

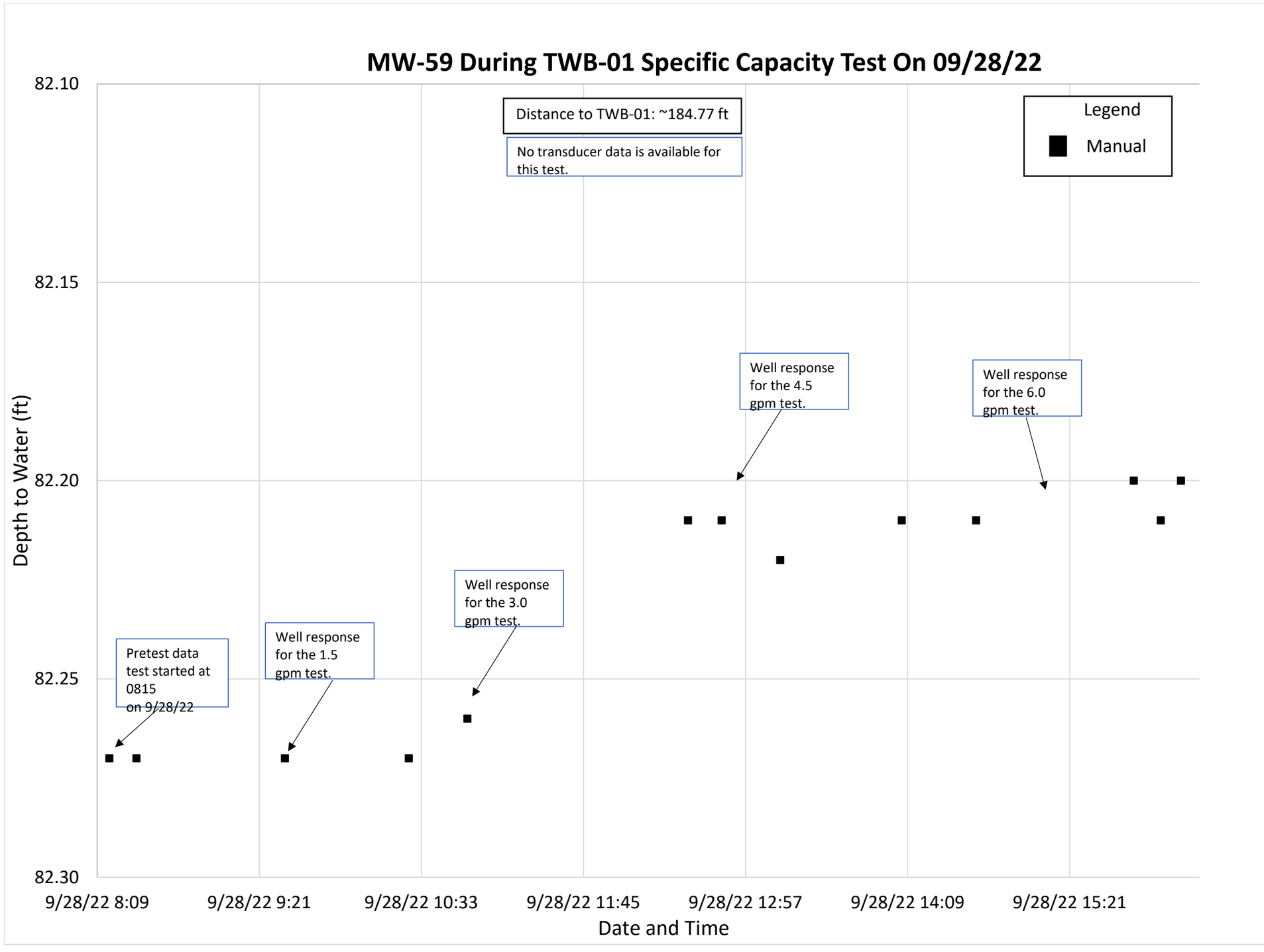
Step 4 (6 gpm) Time (HR:MN:SEC)	Change in Time Between Measurements (min)	Elapsed Time from Test Start (min)	Pumping Rate (gpm)	Total Volume Pumped (Gallons)	Depth to Water (ft)	Drawdown (ft)	Elapsed Time from Step 3 Start (min)
15:00:00	0.00	355.00	4.50	1019.87			0.00
15:00:11	0.18	355.18	4.65	1020.72	104.99	19.38	0.18
15:00:14	0.05	355.23	4.80	1020.96	105.12	19.51	0.23
15:00:20	0.10	355.33	4.95	1021.45	105.28	19.67	0.33
15:00:26	0.10	355.43	5.10	1021.96	105.35	19.74	0.43
15:00:33	0.12	355.55	5.25	1022.58	105.50	19.89	0.55
15:00:38	0.08	355.63	5.40	1023.03	105.63	20.02	0.63
15:00:42	0.07	355.70	5.55	1023.40	105.69	20.08	0.70
15:00:45	0.05	355.75	5.70	1023.68	105.76	20.15	0.75
15:00:54	0.15	355.90	5.85	1024.56	105.94	20.33	0.90
15:01:00	0.10	356.00	6.10	1025.17	106.06	20.45	1.00
15:02:00	1.00	357.00	6.04	1031.21	107.24	21.63	2.00
15:03:00	1.00	358.00	6.00	1037.21	108.19	22.58	3.00
15:04:00	1.00	359.00	5.96	1043.17	109.32	23.71	4.00
15:05:00	1.00	360.00	5.95	1049.12	110.37	24.76	5.00
15:06:00	1.00	361.00	5.92	1055.04	111.47	25.86	6.00
15:07:00	1.00	362.00	5.70	1060.74	112.55	26.94	7.00
15:08:00	1.00	363.00	5.44	1066.18	113.31	27.70	8.00
15:09:00	1.00	364.00	6.00	1072.18	114.10	28.49	9.00
15:10:00	1.00	365.00	5.96	1078.14	115.00	29.39	10.00
15:12:00	2.00	367.00	5.93	1090.00	116.78	31.17	12.00
15:14:00	2.00	369.00	5.92	1101.84	118.36	32.75	14.00
15:16:00	2.00	371.00	5.90	1113.64	120.20	34.59	16.00
15:18:00	2.00	373.00	5.90	1125.44	121.67	36.06	18.00
15:20:00	2.00	375.00	5.46	1136.36	123.21	37.60	20.00
15:22:00	2.00	377.00	5.30	1146.96	124.15	38.54	22.00
15:24:00	2.00	379.00	5.30	1157.56	125.00	39.39	24.00
15:26:00	2.00	381.00	5.21	1167.98	125.85	40.24	26.00
15:28:00	2.00	383.00	4.96	1177.90	126.38	40.77	28.00
15:30:00	2.00	385.00	4.69	1187.28	126.57	40.96	30.00
Total Volume Pumped for Step 4 (gal)			**167.41**				
Average Pumping Rate (gpm)			**5.68**				
Specific Capacity (gpm/ft)			**0.14**				

Acronyms & Abbreviations

bgs = below ground surface
btoc = below top of casing
ft = feet
gal = gallons
gpm = gallons per minute
min = minutes

TWB-01 Specific Capacity Test: Linear Drawdown Plot




MW-59 During TWB-01 Specific Capacity Test On 09/28/22
Distance to TWB-01: ~184.77 ft
No transducer data is available for this test.
Legend
Manual
Well response for the 4.5 gpm test.
Well response for the 6.0 gpm test.
Well response for the 3.0 gpm test.
Well response for the 1.5 gpm test.
Pretest data test started at 0815 on 9/28/22
82.10
82.15
82.20
82.25
82.30
Depth to Water (ft)
9/28/22 8:09
9/28/22 9:21
9/28/22 10:33
9/28/22 11:45
9/28/22 12:57
9/28/22 14:09
9/28/22 15:21
Date and Time

Attachment 7

Photo Logs (TWB-01 Temp and TWB-01)

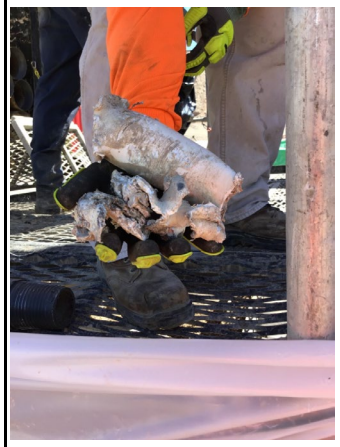
ARCADIS

CLIENT NAME: PG&E	**OVERDRILL PHOTO LOG:** **TWB-01-TEMP WELL/TWB-01 PILOT BOREHOLE**	**PROJECT NAME / LOCATION:** Topock Compressor Station, Needles, California
Arcadis PROJECT NO: 30126255	**TWB-01 0 to 136 ft**	**PHOTOS LAST ADDED:** 9/8/2022

Core Depth: 0 to 7
Description: TWB-01-Temp Well 2-inch diameter SCH 80 PVC removed by overdrilling
Date: 8/16/2022

Core Depth: 7 to 17
Description: TWB-01-Temp Well 2-inch diameter SCH 80 PVC removed by overdrilling
Date: 8/16/2022

Core Depth: 17 to 27
Description: Cemex #60 (40x70) Lapis Lustre Sand removed by overdrilling
Date: 8/16/2022



Core Depth: 17 to 27
Description: TWB-01-Temp Well 2-inch diameter SCH 80 PVC removed by overdrilling
Date: 8/16/2022

Core Depth: 17 to 27
Description: TWB-01-Temp Well 2-inch diameter SCH 80 PVC removed by overdrilling
Date: 8/16/2022

Core Depth: 27 to 34
Description: TWB-01-Temp Well 2-inch diameter SCH 80 PVC removed by overdrilling
Date: 8/16/2022

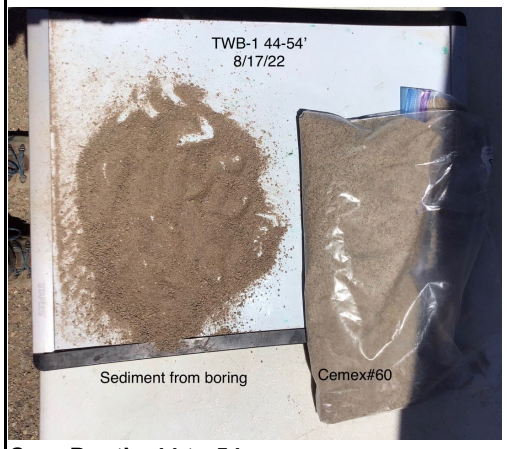
ARCADIS

CLIENT NAME: PG&E	**OVERDRILL PHOTO LOG:** **TWB-01-TEMP WELL/TWB-01 PILOT BOREHOLE**	**PROJECT NAME / LOCATION:** Topock Compressor Station, Needles, California
Arcadis PROJECT NO: 30126255	**TWB-01 0 to 136 ft**	**PHOTOS LAST ADDED:** 9/8/2022

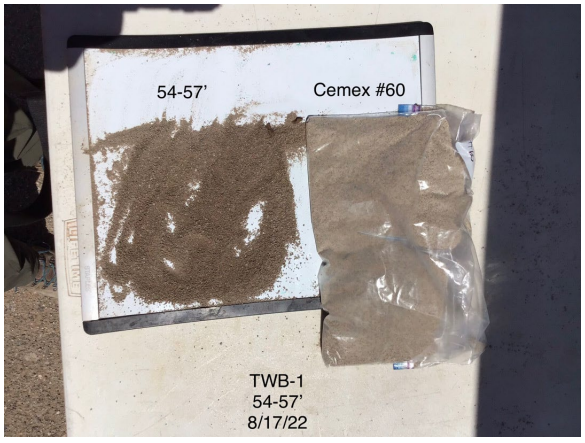
Core Depth: 34 to 44
Description: Cemex #60 (40x70) Lapis Lustre Sand removed by overdrilling
Date: 8/16/2022

Core Depth: 34 to 44
Description: TWB-01-Temp Well 2-inch diameter SCH 80 PVC removed by overdrilling
Date: 8/16/2022

Core Depth: 44 to 54
Description: TWB-01-Temp Well 2-inch diameter SCH 80 PVC removed by overdrilling
Date: 8/17/2022



Core Depth: 44 to 54
Description: Cemex #60 (40x70) Lapis Lustre Sand removed by overdrilling
Date: 8/17/2022

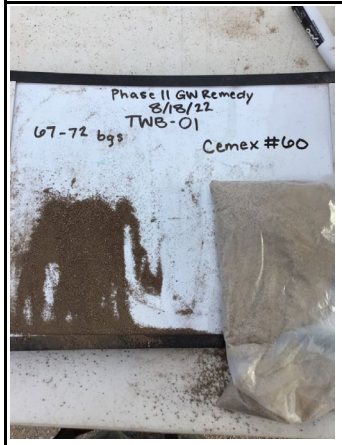


Core Depth: 54 to 57
Description: Cemex #60 (40x70) Lapis Lustre Sand removed by overdrilling
Date: 8/17/2022

Core Depth: 57 to 67
Description: Cemex #60 (40x70) Lapis Lustre Sand removed by overdrilling
Date: 8/17/2022

ARCADIS

CLIENT NAME: PG&E	**OVERDRILL PHOTO LOG:** **TWB-01-TEMP WELL/TWB-01 PILOT BOREHOLE**	**PROJECT NAME / LOCATION:** Topock Compressor Station, Needles, California
Arcadis PROJECT NO: 30126255	**TWB-01 0 to 136 ft**	**PHOTOS LAST ADDED:** 9/8/2022



Core Depth: 67 to 72
Description: Cemex #60 (40x70) Lapis Lustre Sand removed by overdrilling
Date: 8/18/2022

Core Depth: 67 to 72
Description: TWB-01-Temp Well 2-inch diameter SCH 80 PVC removed by overdrilling
Date: 8/18/2022

Core Depth: 72 to 85
Description: Formation material with no observed TWB-01-Temp Well materials in drill cutting
Date: 8/18/2022

Core Depth: 72 to 85
Description: Formation material with no observed TWB-01-Temp Well materials in drill cutting
Date: 8/18/2022

Core Depth: 85 to 87
Description: Formation material with no observed TWB-01-Temp Well materials in drill cutting
Date: 8/18/2022

Core Depth: 87 to 95
Description: Formation material with no observed TWB-01-Temp Well materials in drill cutting
Date: 8/18/2022

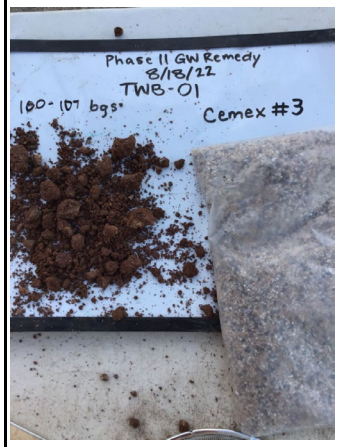
ARCADIS

CLIENT NAME: PG&E	**OVERDRILL PHOTO LOG:** **TWB-01-TEMP WELL/TWB-01 PILOT BOREHOLE**	**PROJECT NAME / LOCATION:** Topock Compressor Station, Needles, California
Arcadis PROJECT NO: 30126255	**TWB-01 0 to 136 ft**	**PHOTOS LAST ADDED:** 9/8/2022

Core Depth: 87 to 95
Description: Formation material with no observed TWB-01-Temp Well materials in drill cutting
Date: 8/18/2022

Core Depth: 95 to 100
Description: Formation material with no observed TWB-01-Temp Well materials in drill cutting
Date: 8/18/2022

Core Depth: 95 to 100
Description: Formation material with no observed TWB-01-Temp Well materials in drill cutting
Date: 8/18/2022



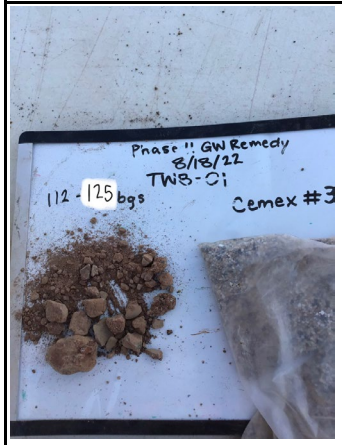
Core Depth: 100 to 107
Description: Formation material with no observed TWB-01-Temp Well materials in drill cutting
Date: 8/18/2022

Core Depth: 107 to 112
Description: Formation material with no observed TWB-01-Temp Well materials in drill cutting
Date: 8/18/2022

Core Depth: 107 to 112
Description: Formation material with no observed TWB-01-Temp Well materials in drill cutting
Date: 8/18/2022

ARCADIS

CLIENT NAME: PG&E	**OVERDRILL PHOTO LOG:** **TWB-01-TEMP WELL/TWB-01 PILOT BOREHOLE**	**PROJECT NAME / LOCATION:** Topock Compressor Station, Needles, California
Arcadis PROJECT NO: 30126255	**TWB-01 0 to 136 ft**	**PHOTOS LAST ADDED:** 9/8/2022



Core Depth: 112 to 125
Description: Formation material with no observed TWB-01-Temp Well materials in drill cutting
Date: 8/18/2022

Core Depth: 112 to 120
Description: Formation material with no observed TWB-01-Temp Well materials in drill cutting
Date: 8/18/2022

Core Depth: 120 to 125
Description: Formation material with no observed TWB-01-Temp Well materials in drill cutting
Date: 8/19/2022

Core Depth: 120 to 125
Description: Formation material with no observed TWB-01-Temp Well materials in drill cutting
Date: 8/19/2022

Core Depth: 125 to 131
Description: Core sample collected for logging
Date: 8/19/2022

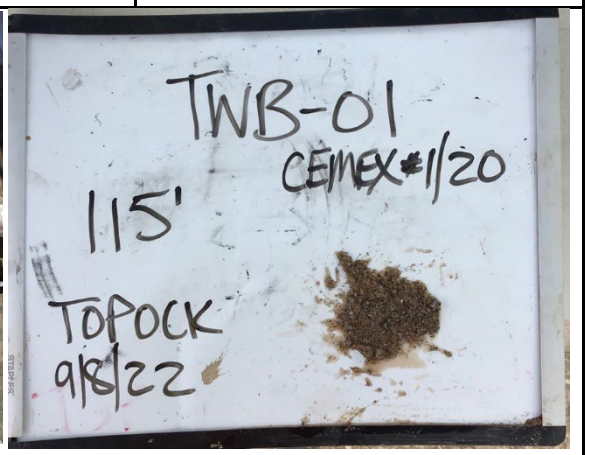
Core Depth: 129 to 131
Description: Core sample collected for logging
Date: 8/19/2022

ARCADIS

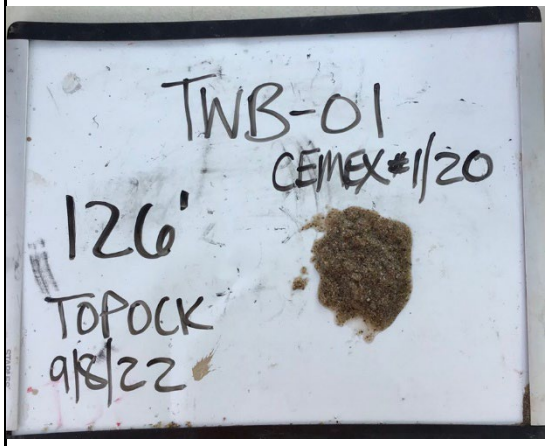
CLIENT NAME: PG&E	**OVERDRILL PHOTO LOG:** **TWB-01-TEMP WELL/TWB-01 PILOT BOREHOLE**	**PROJECT NAME / LOCATION:** Topock Compressor Station, Needles, California
Arcadis PROJECT NO: 30126255	**TWB-01 0 to 136 ft**	**PHOTOS LAST ADDED:** 9/8/2022

Core Depth: 133.5 to 136
Description: Core sample collected for logging
Date: 8/19/2022

Core Depth: 131 to 136
Description: Core sample collected for logging
Date: 8/19/2022



Core Depth: 115
Description: Confirmation that Cemex #1/20 used to support drill casing was removed from borehole
Date: 9/8/2022



Core Depth: 126
Description: Confirmation that Cemex #1/20 used to support drill casing was removed from borehole
Date: 9/8/2022

ARCADIS

CLIENT NAME: PG&E	**PILOT BOREHOLE CORE PHOTO LOG**	**PROJECT NAME / LOCATION:** Topock Compressor Station, Needles, California
Arcadis PROJECT NO: 30126255	**TWB-01 Pilot 0 to 129 ft**	**PHOTOS LAST ADDED:** 3/30/2022

Core Depth: 0 to 5.2 ft bgs
Description: Samples (0-5' bgs) previously collected for logging during air knifing activities.
Date: 3/15/2022

Core Depth: 0 to 5.2 ft bgs
Description: Samples (0-5' bgs) previously collected for logging during air knifing activities.
Date: 3/15/2022

Core Depth: 5 to 7 ft bgs
Date: 3/17/2022

Core Depth: 7 to 11 ft bgs
Date: 3/17/2022

Core Depth: 11 to 15 ft bgs
Date: 3/17/2022

Core Depth: 15 to 17 ft bgs
Date: 3/17/2022

ARCADIS

CLIENT NAME: PG&E	**PILOT BOREHOLE CORE PHOTO LOG**	**PROJECT NAME / LOCATION:** Topock Compressor Station, Needles, California
Arcadis PROJECT NO: 30126255	**TWB-01 Pilot 0 to 129 ft**	**PHOTOS LAST ADDED:** 3/30/2022

Core Depth: 17 to 22 ft bgs
Date: 3/17/2022

Core Depth: 22 to 27 ft bgs
Date: 3/17/2022

Core Depth: 27 to 32 ft bgs
Date: 3/17/2022

Core Depth: 32 to 37 ft bgs
Date: 3/17/2022

Core Depth: 37 to 42 ft bgs
Date: 3/17/2022

Core Depth: 42 to 47 ft bgs
Date: 3/17/2022

ARCADIS

CLIENT NAME: PG&E	**PILOT BOREHOLE CORE PHOTO LOG**	**PROJECT NAME / LOCATION:** Topock Compressor Station, Needles, California
Arcadis PROJECT NO: 30126255	**TWB-01 Pilot 0 to 129 ft**	**PHOTOS LAST ADDED:** 3/30/2022

Core Depth: 47 to 50 ft bgs
Date: 3/17/2022

Core Depth: 50 to 54.5 ft bgs
Date: 3/17/2022

Core Depth: 54.5 to 57 ft bgs
Date: 3/17/2022

Core Depth: 57 to 62 ft bgs
Date: 3/17/2022

Core Depth: 62 to 67 ft bgs
Date: 3/17/2022

Core Depth: 67 to 72 ft bgs
Date: 3/17/2022

ARCADIS

CLIENT NAME: PG&E	**PILOT BOREHOLE CORE PHOTO LOG**	**PROJECT NAME / LOCATION:** Topock Compressor Station, Needles, California
Arcadis PROJECT NO: 30126255	**TWB-01 Pilot 0 to 129 ft**	**PHOTOS LAST ADDED:** 3/30/2022

Core Depth: 72 to 77 ft bgs
Date: 3/17/2022

Core Depth: 77 to 82 ft bgs
Date: 3/17/2022

Core Depth: 82 to 87 ft bgs
Date: 3/17/2022

Core Depth: 87 to 92 ft bgs
Date: 3/19/2022

Core Depth: 92 to 97 ft bgs
Date: 3/19/2022

Core Depth: 97 to 102 ft bgs
Date: 3/20/2022

ARCADIS

CLIENT NAME: PG&E	**PILOT BOREHOLE CORE PHOTO LOG**	**PROJECT NAME / LOCATION:** Topock Compressor Station, Needles, California
Arcadis PROJECT NO: 30126255	**TWB-01 Pilot 0 to 129 ft**	**PHOTOS LAST ADDED:** 3/30/2022

Core Depth: 97 to 102 ft bgs
Date: 3/20/2022

Core Depth: 106 to 110 ft bgs
Date: 3/21/2022

Core Depth: 110 to 117 ft bgs
Date: 3/21/2022

Core Depth: 117 to 119 ft bgs
Date: 3/21/2022

Core Depth: 119 to 124.5 ft bgs
Date: 3/21/2022

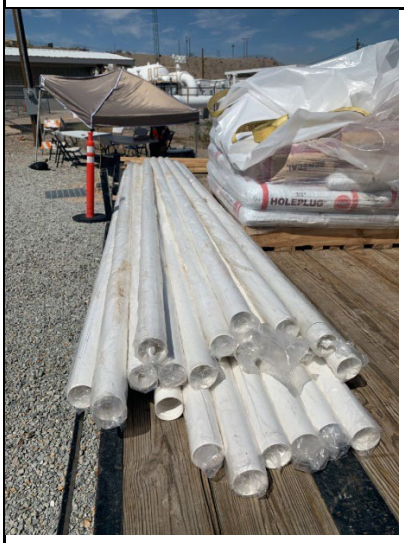
Core Depth: 122 to 127 ft bgs
Date: 3/21/2022

ARCADIS

CLIENT NAME: PG&E	**PILOT BOREHOLE CORE PHOTO LOG**	**PROJECT NAME / LOCATION:** Topock Compressor Station, Needles, California
Arcadis PROJECT NO: 30126255	**TWB-01 Pilot 0 to 129 ft**	**PHOTOS LAST ADDED:** 3/30/2022

Core Depth: 127 to 129
Date: 3/30/2022

CLIENT NAME: PG&E	**TEMP WELL CONSTRUCTION PHOTO LOG**	**PROJECT NAME / LOCATION:** Final Groundwater Remedy, PG&E Topock Compressor Station/Needles, CA
Arcadis PROJECT NO: 30126255		**WELL ID: TWB-01-Temp**



3/30/2022 – TWB-01-Temp:
2-inch diameter schedule 80 PVC casing and screen

3/30/2022 – TWB-01-Temp:
2-inch diameter schedule 80 PVC screen, 20-slot size confirmation

3/30/2022 – TWB-01-Temp:
2-inch diameter schedule 80 PVC screen, 20-slot size confirmation

CLIENT NAME: PG&E	TEMP WELL CONSTRUCTION PHOTO LOG	PROJECT NAME / LOCATION: Final Groundwater Remedy, PG&E Topock Compressor Station/Needles, CA
Arcadis PROJECT NO: 30126255		WELL ID: TWB-01-Temp

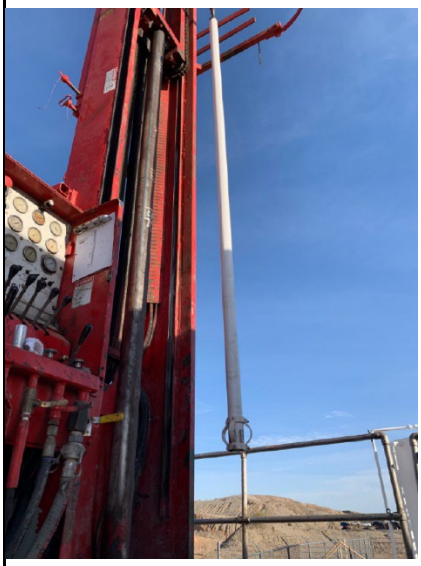
3/30/2022 – TWB-01-Temp:
Stainless steel centralizers

3/30/2022 – TWB-01-Temp:
2-inch diameter 316L stainless steel end caps

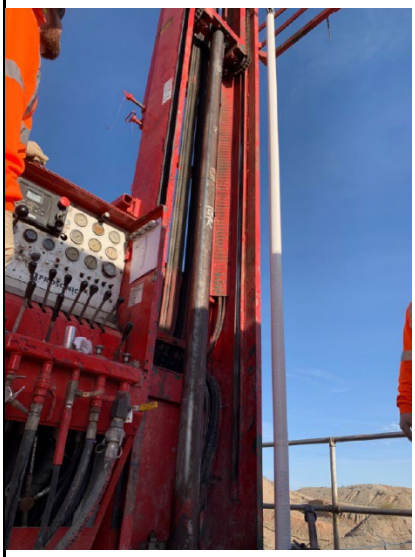
3/30/2022 – TWB-01-Temp:
Cemex #60 (40x70) Lapis Lustre Sand used for transition sand

CLIENT NAME: PG&E	TEMP WELL CONSTRUCTION PHOTO LOG	PROJECT NAME / LOCATION: Final Groundwater Remedy, PG&E Topock Compressor Station/Needles, CA
Arcadis PROJECT NO: 30126255		WELL ID: TWB-01-Temp

3/30/2022 – TWB-01-Temp:
Cemex #3 (8x20) Lapis Lustre Sand used for filter pack

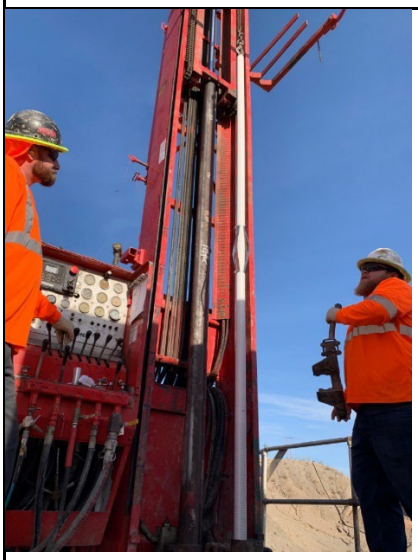


3/31/2022 – TWB-01-Temp:
Installing 2-inch diameter schedule 80 PVC 20-slot well screen, with centralizer and end cap



3/31/2022 – TWB-01-Temp:
Installing 2-inch diameter schedule 80 PVC 20-slot well screen

CLIENT NAME: PG&E	TEMP WELL CONSTRUCTION PHOTO LOG	PROJECT NAME / LOCATION: Final Groundwater Remedy, PG&E Topock Compressor Station/Needles, CA
Arcadis PROJECT NO: 30126255		WELL ID: TWB-01-TEMP



3/31/2022 – TWB-01-Temp:
Installing 2-inch diameter schedule 80 PVC casing with stainless steel centralizer

3/31/2022 – TWB-01-Temp:
Installing 2-inch diameter schedule 80 PVC casing

3/31/2022 – TWB-01-Temp:
Installing 2-inch diameter schedule 80 PVC casing

CLIENT NAME: PG&E	TEMP WELL CONSTRUCTION PHOTO LOG	PROJECT NAME / LOCATION: Final Groundwater Remedy, PG&E Topock Compressor Station/Needles, CA
Arcadis PROJECT NO: 30126255		WELL ID: TWB-01-Temp

3/31/2022 – TWB-01-Temp:
Halliburton 3/8" Holeplug Wyoming Bentonite chips used for bentonite seal

3/31/2022 – TWB-01-Temp:
Well installation complete

3/31/2022 – TWB-01-Temp:
Manhole cover for flush mount install

CLIENT NAME: PG&E	WELL CONSTRUCTION PHOTO LOG	PROJECT NAME / LOCATION: Final Groundwater Remedy, PG&E Topock Compressor Station/Needles, CA
Arcadis PROJECT NO: 30126255		WELL ID: TWB-01

9/9/2022 – TWB-01:
6-inch diameter schedule 80 PVC casing

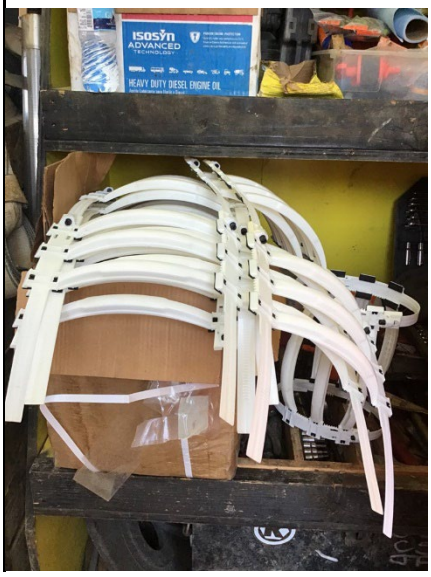
9/9/2022 – TWB-01:
6-inch diameter 8-slot 316L stainless steel wire wrap screen

9/9/2022 – TWB-01:
6-inch diameter 8-slot 316L stainless steel wire wrap screen staged over coring tooling

CLIENT NAME: PG&E	WELL CONSTRUCTION PHOTO LOG	PROJECT NAME / LOCATION: Final Groundwater Remedy, PG&E Topock Compressor Station/Needles, CA
Arcadis PROJECT NO: 30126255		WELL ID: TWB-01

9/9/2022 – TWB-01:
6-inch diameter 8-slot 316 L stainless steel wire wrap screen slot-size confirmation

9/9/2022 – TWB-01:
6-inch diameter Stainless Steel 316L end cap



9/9/2022 – TWB-01:
Kwik-Zip centralizers

CLIENT NAME: PG&E	WELL CONSTRUCTION PHOTO LOG	PROJECT NAME / LOCATION: Final Groundwater Remedy, PG&E Topock Compressor Station/Needles, CA
Arcadis PROJECT NO: 30126255		WELL ID: TWB-01

9/9/2022 – TWB-01:
Cemex #60 (40x70) Lapis Lustre Sand used for the filter pack sand

9/9/2022 – TWB-01:
Cemex #60 (40x70) Lapis Lustre Sand used for the filter pack sand

9/9/2022 – TWB-01:
Cemex #60 (40x70) Lapis Lustre Sand used for the filter pack sand

CLIENT NAME: PG&E	WELL CONSTRUCTION PHOTO LOG	PROJECT NAME / LOCATION: Final Groundwater Remedy, PG&E Topock Compressor Station/Needles, CA
Arcadis PROJECT NO: 30126255		WELL ID: TWB-01

9/9/2022 – TWB-01:
Stainless steel end cap on Schedule 80 PVC sump with Kwik-Zip centralizer

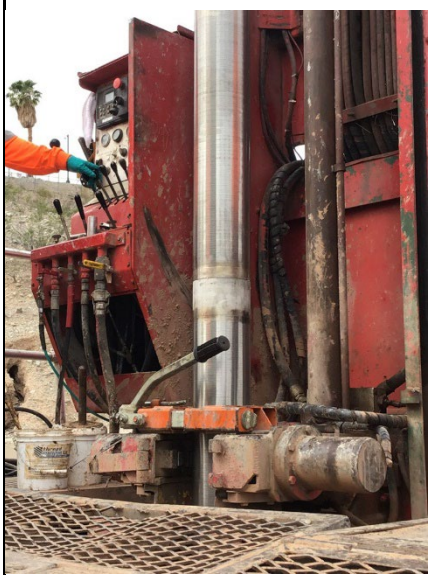
9/9/2022 – TWB-01:
Installing sump and stainless-steel screen

9/9/2022 – TWB-01:
Installing stainless steel screen

CLIENT NAME: PG&E	WELL CONSTRUCTION PHOTO LOG	PROJECT NAME / LOCATION: Final Groundwater Remedy, PG&E Topock Compressor Station/Needles, CA
Arcadis PROJECT NO: 30126255		WELL ID: TWB-01

9/9/2022 – TWB-01:
Installing blank between well screens

9/9/2022 – TWB-01:
Installing blank between well screens

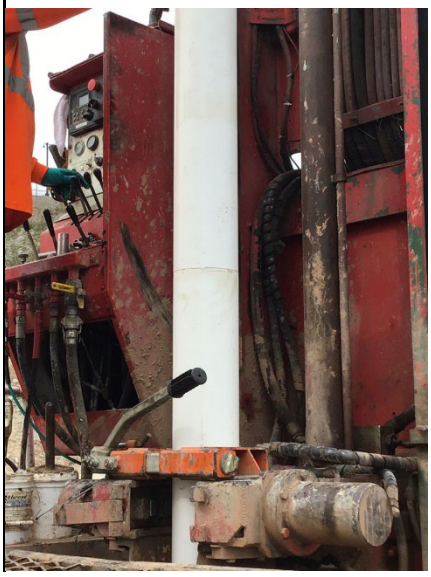


9/9/2022 – TWB-01:
Installing stainless steel screen

CLIENT NAME: PG&E	WELL CONSTRUCTION PHOTO LOG	PROJECT NAME / LOCATION: Final Groundwater Remedy, PG&E Topock Compressor Station/Needles, CA
Arcadis PROJECT NO: 30126255		WELL ID: TWB-01

9/9/2022 – TWB-01:
Installing stainless steel screen and schedule 80 PVC casing with Kwik-Zip Centralizer

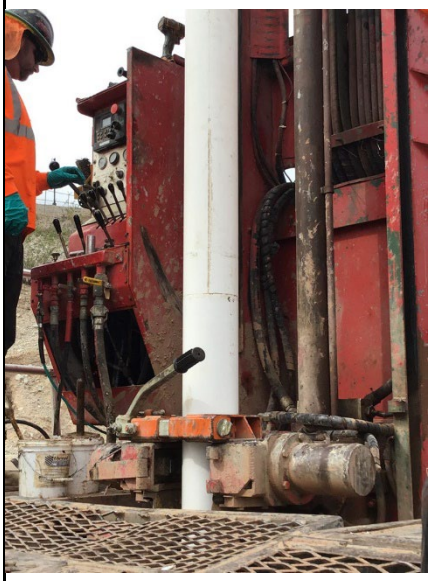
9/9/2022 – TWB-01:
Installing schedule 80 PVC casing



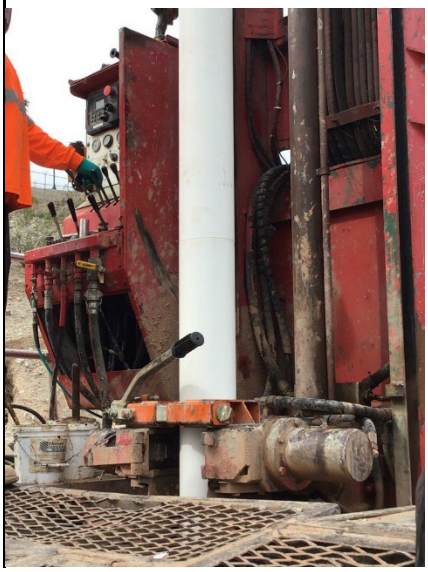
9/9/2022 – TWB-01:
Schedule 80 PVC casing joint to be lowered to approximately 65 feet bgs

CLIENT NAME: PG&E	WELL CONSTRUCTION PHOTO LOG	PROJECT NAME / LOCATION: Final Groundwater Remedy, PG&E Topock Compressor Station/Needles, CA
Arcadis PROJECT NO: 30126255		WELL ID: TWB-01

9/9/2022 – TWB-01:
Installing schedule 80 PVC casing with Kwik-Zip centralizer and joint at approximately 55 ft bgs



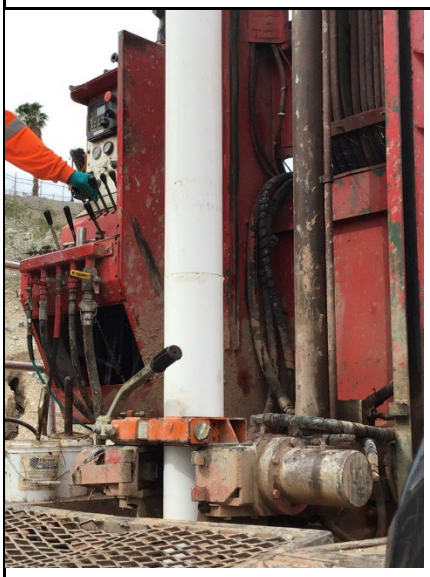
9/9/2022 – TWB-01:
Schedule 80 PVC casing joint to be lowered to approximately 55 ft bgs



9/9/2022 – TWB-01:
Schedule 80 PVC casing joint to be lowered to approximately 35 ft bgs

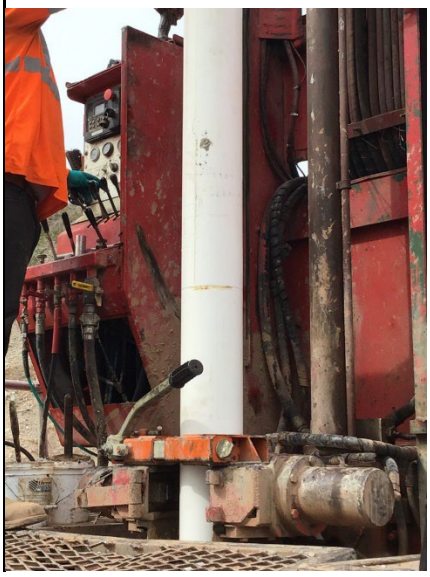
ARCADIS

CLIENT NAME: PG&E	WELL CONSTRUCTION PHOTO LOG	PROJECT NAME / LOCATION: Final Groundwater Remedy, PG&E Topock Compressor Station/Needles, CA
Arcadis PROJECT NO: 30126255		WELL ID: TWB-01



9/9/2022 – TWB-01:
Schedule 80 PVC casing joint to be lowered to approximately 25 ft bgs

9/9/2022 – TWB-01:
Installing schedule 80 PVC casing with Kwik-Zip centralizer at approximately 13 ft bgs



9/9/2022 – TWB-01:
Installing schedule 80 PVC casing

CLIENT NAME: PG&E	WELL CONSTRUCTION PHOTO LOG	PROJECT NAME / LOCATION: Final Groundwater Remedy, PG&E Topock Compressor Station/Needles, CA
Arcadis PROJECT NO: 30126255		WELL ID: TWB-01

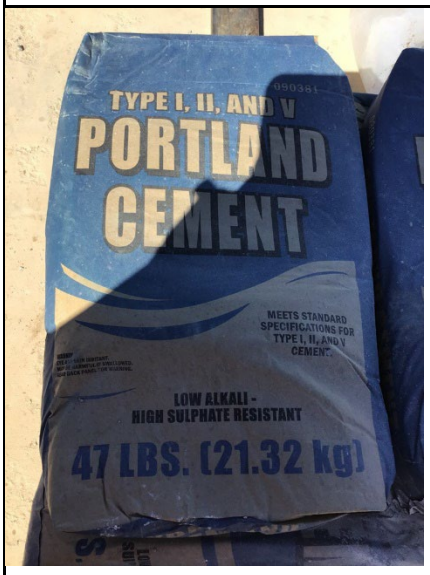
9/10/2022 – TWB-01:
Cemex #60 (40x70) Lapis Lustre Sand used for filter pack sand

9/10/2022 – TWB-01:
Pel-Plug Bentonite Pellets 3/8” TR30 used for bentonite seal

9/10/2022 – TWB-01:
Halliburton Quick-Gel High Yield Bentonite used in grout (up to 6%) mix

ARCADIS

CLIENT NAME: PG&E	WELL CONSTRUCTION PHOTO LOG	PROJECT NAME / LOCATION: Final Groundwater Remedy, PG&E Topock Compressor Station/Needles, CA
Arcadis PROJECT NO: 30126255		WELL ID: TWB-01



9/10/2022 – TWB-01:
Portland Cement Type I, II and V used for grout mix

9/10/2022 – TWB-01:
Cemex #2/12 (12x20) Lapis Lustre Sand, used as temporary backfill sand

10/4/2022 – TWB-01:
Measuring outer diameter of "Dummy Tool" used to conduct the well alignment test (5.154 inches)

CLIENT NAME: PG&E	WELL CONSTRUCTION PHOTO LOG	PROJECT NAME / LOCATION: Final Groundwater Remedy, PG&E Topock Compressor Station/Needles, CA
Arcadis PROJECT NO: 30126255		WELL ID: TWB-01

10/4/2022 – TWB-01:
Measuring outer diameter of "Dummy Tool" used to conduct the well alignment test (5.382 inches)

10/4/2022 – TWB-01:
Conducting the alignment test using the inductor drop pipe "Dummy Tool"

10/4/2022 – TWB-01:
Conducting the alignment test using the inductor drop pipe "Dummy Tool"

CLIENT NAME: PG&E	WELL CONSTRUCTION PHOTO LOG	PROJECT NAME / LOCATION: Final Groundwater Remedy, PG&E Topock Compressor Station/Needles, CA
Arcadis PROJECT NO: 30126255		WELL ID: TWB-01

10/4/2022 – TWB-01:
Secured well following installation

Attachment 8

Video Survey Report

Pacific Surveys

a full service geophysical well logging company

Video Survey Report

Company:	Cascade Drilling	**Date:**	02-Dec-22
Well:	TWB-01	**Run No.**	One
Field:	Topock	**Job Ticket:**	30505
State:	Arizona	**Total Depth:**	133.7 ft
Location:	145453 National Trails Hwy.	**Water Level:**	82.1 ft
		Oil on Water:	No
GPS:	34.7151844, -114.4907617	**Operator:**	Conner
Zero Datum:	Ground Level	**Tool Zero:**	Side-Scan
Reason for Survey:	New Well Construction	**Guides Set**	6 in

Truck PS-6

SWL

Amount: N/A

Dead Space 1.25 ft

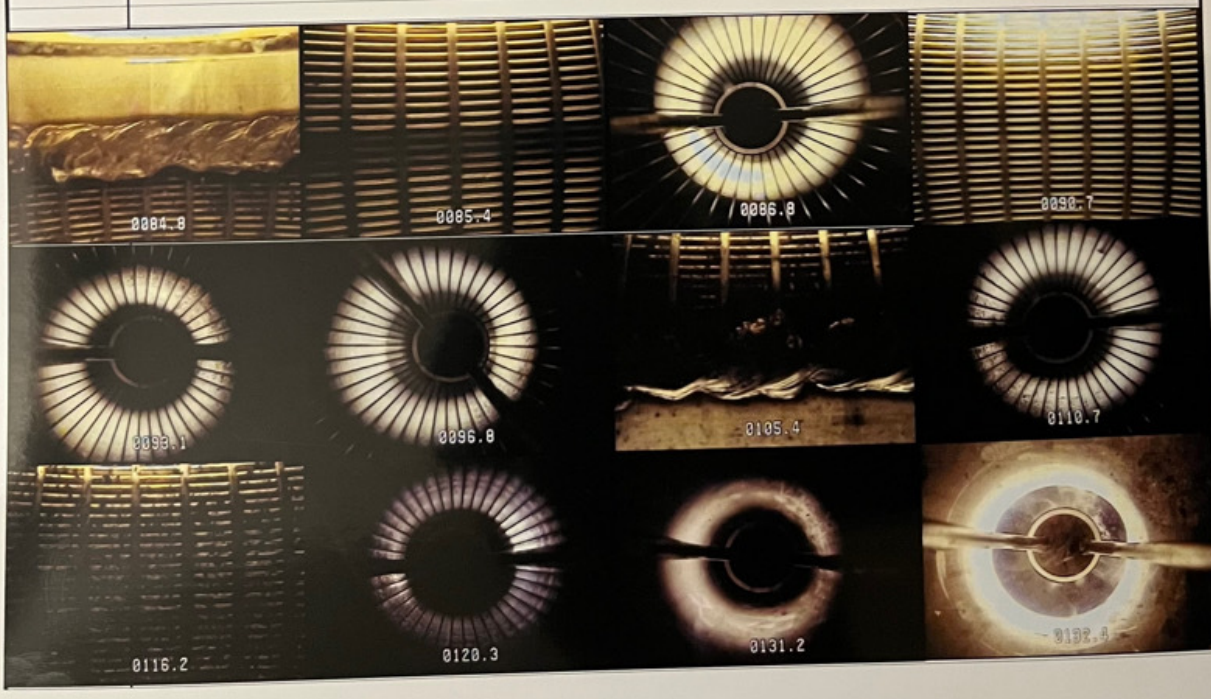
Depth	Observations
0.0 ft	Began survey at ground level.
4.8 ft	First joint in casing; appears to be tight and uniform.
14.8 ft	Second joint in casing; appears to be tight and uniform.
24.8 ft	Third joint in casing; appears to be tight and uniform.
82.1 ft	SWL; water is clear.
84.8 ft	Top of screened interval; appears to be open.
105.8 ft	Bottom of screened interval.
109.6 ft	Top of screened interval; appears to be open.
128.6 ft	Bottom of screened interval.
133.7 ft	Camera light bar tags bottom.
	Survey ends.

Well Details

Perforation:	From Survey
Wire-Wrap	85.00 ft to 106.00 ft
	110.00 ft to 129.00 ft

Casing Size (in)		From Survey
OD	ID	
6.000	N/A	0.00 ft to 134.40 ft

Casing Material	PVC
Screen Material	Stainless Steel



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TWB-01 - Pacific Surveys video log description