SA	<b>IRCA</b>	DIS for nature built ass	ral and ets		Well Cons	truction Log	;	Sheet: 1 of 21	
Date St	arted:	07/31/2019			_Surface Elevation:	465.4 ft amsl	Well ID: M\	N-91-170, MW-91-320	
Date Co	ompleted:	09/23/2019			_Shallow Well Elevation	n: <u>465.4 ft amsl</u>			
Drilling	Co.:	Cascade			_Deep Well Elevation:	465.3 ft amsl	Client: PG&E	<u> </u>	
Drilling	Method:	Sonic Drilling			_Northing (NAD83):	2103798.1	Project: <u>Final</u>	GW Remedy Phase 1	
Driller N	lame:	E. Ramos / S	. Vasqı	ıez	_Easting (NAD83):	7616739.7	Location: PG&E	E Topock, Needles, California	
Drilling .	Asst:	O. Flores / L.	Amaya		_Borehole Diameter:	6-12 inches			
Logger:	:	GJ/SM/CS	3 / DC /	AM	_Water Level Start:	10.5 ft bgs	Project Number: <u>RC000753.0051</u>		
Editor:		Grant Willford	t		_Development End Dat	te: 11/23/2019			
Total D	epth:	417 ft bgs			_Well Completion:				
Depth (ft)	Groundwat Sample IE		USCS	USCS	Well	Construction	Calculated Material Volumes	Material Volumes Installed	
0 1 2					(0.0 - 150.8') 2" PVC Sch 80 Casing (+0.5 - 1.0') Concrete Pad	(0.1 - 300.8') 2" PVC Sch 80 Casing		(+0.5 - 1.0') 22 bags Note: 30-inch Diameter Concrete Pad with 18-inch Diameter Lockable Vault, Quickcrete Concrete Mix with Buff dye	
3 3 5 4 5 5					(2.2 - 5.0') Bentonite seal chips		(2.2 - 5.0') 2.92	(2.2 - 5.0') 7 (140%) Note: Puregold Medium Chips, installed due to void and heat of hydration concerns, installed >20% of calculated volume to fill void	
8 — 9 — 10 — 11 — 11 — 12 — 12 — 12 — 12 — 12		Topock - Fil	SP		(5.0 - 16.9') Portland Cement 6% Bentonite	(0.0 - 42.0') 12.0" Borehole	(5.0 - 16.9') 66 gallons	(5.0 - 16.9') 100 gallons (52%) Note: Type I, Il and V and Benseal, used >20% of the calculated volume due to potential voids forming during flushing of the 10-inch casing	
15	MW-X-VAS- 12-17 (<0.033 U ppb) 6/25/2019 15:10		NR						
5 — 17 — 5 — 18 — 18 — —		Topock - Fil	SW		(16.9 - 118.2') Bentonite seal chips		(16.9 - 118.2') 78.93 bags	(16.9 - 118.2') 77 bags (-2%) Note: Puregold Medium Chips	
Abbrevi	iatione: II			A-V-V-V	ion System ft - feet ha	rs = helow around surface or	msl = ahove mean	⊥ sea level, GW = groundwater,	
·					· · · · · · · · · · · · · · · · · · ·	ng limit, NR = no recovery	mai – above medii	Sca level, GVV - groundwater,	

9/	ARCA	DIS for natura built asse	l and ts		Well Const	ruction Log	S	Sheet: 2 of 21
Date S	tarted:	07/31/2019			_Surface Elevation:	465.4 ft amsl	Well ID: MV	V-91-170, MW-91-320
Date C	ompleted:	09/23/2019			_Shallow Well Elevation:	465.4 ft amsl		V-31-170, MVV-31-320
Drilling		Cascade			_Deep Well Elevation:	465.3 ft amsl	Client: PG&E	
_		Sonic Drilling			_Northing (NAD83):	2103798.1	Project: Final (	GW Remedy Phase 1
Driller N		E. Ramos / S.	. Vasqı	uez	_Easting (NAD83):	7616739.7	•	Topock, Needles, California
Drilling	Asst:	O. Flores / L.	Amaya	ì	_Borehole Diameter:	6-12 inches	<u></u>	•
Logger		GJ/SM/CS			_ _Water Level Start:	10.5 ft bgs	Project Number	: RC000753.0051
Editor:		Grant Willford			_Development End Date:	11/23/2019		
Total D	epth:	417 ft bgs			_Well Completion:			
		.p G						
Depth (ft)	Groundwat Sample ID		USCS	USCS	Well C	onstruction	Calculated Material Volumes	Material Volumes Installed
		Ge	50					
20					(19.5 - 20.5')	— (0.1 - 300.8') 2" PVC Sch 80 Casing		
					Centralizer	1 vo con co cacing		
21				******	(0.0 - 150.8') 2" PVC Sch 80 Casing			
					PVC Scil 60 Casing			
├ <u>.</u> . ┤								
22								
$\vdash$ $\dashv$								
23								
<u> </u>								
24								
25								
26				******				
07								
27								
28		Topock - Fill	SW					
29								
					(16.9 - 118.2')	(0.0 - 42.0') 12.0" Borehole	(16.9 - 118.2') 78.93	(16.9 - 118.2') 77 bags (-2%)
_30_					Bentonite seal chips	Borchold	bags	Note: Puregold Medium Chips
31								
32								
33								
_ 33 _								
<b>├</b>	MW-X-VAS-							
34	32-37							
<del> </del>	(<0.033 U ppb)							
35	6/26/2019 11:45							
<b>├</b>				<b>*</b>				
36								
L J				******				
37								
38		Topock -	0111	0,0000				
_ 55 _		Fluvial Deposits	SW					
39								
Abbrev	iatione: II	SCS - Unified	Soil C	laccificat	tion System ft - feet has	- below ground surface a	mel – ahove mean s	sea level GW = groundwater

9/-	ARCA	DIS Design & for natura built asset	Consultancy al and ets		Well Const	ruction Log	5	Sheet: 3 of 21
Date S	started:	07/31/2019			_Surface Elevation:	465.4 ft amsl	Well ID: MV	V-91-170, MW-91-320
	•	09/23/2019			_Shallow Well Elevation:	465.4 ft amsl		
Drilling		Cascade			_Deep Well Elevation:	465.3 ft amsl	Client: PG&E	
Drilling	Method:	Sonic Drilling			_Northing (NAD83):	2103798.1	Project: Final 0	GW Remedy Phase 1
Driller I	Name:	E. Ramos / S	<u>. Vasqı</u>	ıez	_Easting (NAD83):	7616739.7	Location: PG&E	Topock, Needles, California
Drilling	Asst:	O. Flores / L.	Amaya	1	_Borehole Diameter:	6-12 inches		
Loggei	r:	GJ/SM/CS	3 / DC /	AM	_Water Level Start:	10.5 ft bgs	Project Number	:: RC000753.0051
Editor:		Grant Willford			Development End Date:	11/23/2019		
Total D	Depth:	417 ft bgs			_Well Completion:			
Depth (ft)	Groundwate Sample ID		USCS	USCS Class	Well C	onstruction	Calculated Material Volumes	Material Volumes Installed
40			SW	*****	(0.0 - 150.8') 2" — PVC Sch 80 Casing	— (0.1 - 300.8') 2" PVC Sch 80 Casing		
				1	_			
41				\ /		(0.0 - 42.0') 12.0" Borehole		
				\ /				
42				$  \setminus    $				
42				$  \setminus    $				
L 40				$  \setminus / \mid$				
43				$  \ \   \ \  $			Y	
			NR					
44				/\				
				$  \   \   \  $				
45				I / I				
				1/\				
46				1/ \1				
				/ \				
47				/ /				
		Topock -		******				
10		Fluvial Deposits	SW					
48		Deposits		******				
49		Topock -	0144					
		Fluvial Deposits	GW		(16.9 - 118.2') — Bentonite seal chips		(16.9 - 118.2') 78.93 bags	(16.9 - 118.2') 77 bags (-2%) Note: Puregold Medium Chips
_50_					Demonite sear crips			
						(42.0 - 324.0') 10.0"		
51						Borehole		
52		Topock -		, \$\$				
		Fluvial Deposits	SW					
		Deposits						
53								
$\vdash$ $\dashv$			L					
54								
55		Topock -						
		Fluvial	SP					
56		Deposits						
L _l								
57								
				******				
  -  -								
58		Topock - Fluvial	SW					
<b>⊢</b>		Deposits						
59								

9/	ARCA	DIS for natura built asse	Consultancy al and ts		Well Const	ruction Log	S	Sheet: 4 of 21
Date S		07/31/2019			_Surface Elevation:	465.4 ft amsl	Well ID: MV	V-91-170, MW-91-320
	-	09/23/2019			_Shallow Well Elevation:	465.4 ft amsl		·
Drilling		Cascade			_Deep Well Elevation:	465.3 ft amsl	Client: PG&E	
_		Sonic Drilling			_Northing (NAD83):	2103798.1	•	GW Remedy Phase 1
Driller N		E. Ramos / S			_Easting (NAD83):	7616739.7	Location: <u>PG&amp;E</u>	Topock, Needles, California
Drilling		O. Flores / L.	-		_Borehole Diameter:	6-12 inches	<u> </u>	
Logger		GJ/SM/CS		AM	Water Level Start: 10.5 ft bgs		Project Number	:: RC000753.0051
Editor:		Grant Willford			_Development End Date:			
Total D	eptn:	417 ft bgs	1		_Well Completion:			
Depth (ft)	Groundwate Sample ID		USCS	USCS Class		onstruction	Calculated Material Volumes	Material Volumes Installed
60		Topock - Fluvial Deposits  Topock - Fluvial Deposits  Topock - Fluvial Deposits	DSN SW SP		(16.9 - 118.2') Bentonite seal chips  (69.5 - 70.5') Centralizer	(0.1 - 300.8') 2" PVC Sch 80 Casing (42.0 - 324.0') 10.0" Borehole		
76 77		Topock - Fluvial Deposits	SP					
78 79		Topock - Fluvial Deposits	SW					pool lovel, CW = groundwater

9/	ARCA	DIS Design & for natura built asset	Consultancy al and ets		Well Const	ruction Log	:	Sheet: 5 of 21		
Date Started: <u>07/31/2019</u> Date Completed: <u>09/23/2019</u>					_Surface Elevation:	465.4 ft amsl	Well ID: M\	N-91-170, MW-91-320		
	-	09/23/2019			_Shallow Well Elevation:	465.4 ft amsl				
Drilling		Cascade			_Deep Well Elevation:	465.3 ft amsl	Client: PG&I	Ē		
Drilling	Method:	Sonic Drilling			_Northing (NAD83):	2103798.1	Project: <u>Final</u>	GW Remedy Phase 1		
Driller N	Name:	E. Ramos / S	<u>. Vasqι</u>	ıez	_Easting (NAD83):	7616739.7	Location: <u>PG&amp;I</u>	E Topock, Needles, California		
Drilling	Asst:	O. Flores / L.	Amaya		_Borehole Diameter:	6-12 inches				
Logger	:	GJ/SM/CS	S / DC /	AM	_Water Level Start:	10.5 ft bgs	Project Numbe	r: RC000753.0051		
Editor:	itor: Grant Willford			Development End Date:	11/23/2019					
Total D	Total Depth: 417 ft bgs				_Well Completion:					
Depth (ft)	Groundwat Sample ID		USCS Code	USCS Class	Well C	onstruction	Calculated Material Volumes	Material Volumes Installed		
		Topock - Fluvial Deposits  Topock - Fluvial Deposits	SW-SM SW-SM SP SW NR		(0.0 - 150.8') 2" — PVC Sch 80 Casing  (16.9 - 118.2') — Bentonite seal chips	— (0.1 - 300.8') 2" PVC Sch 80 Casing  _ (42.0 - 324.0') 10.0 Borehole		(16.9 - 118.2') 77 bags (-2%) Note: Puregold Medium Chips		
99										

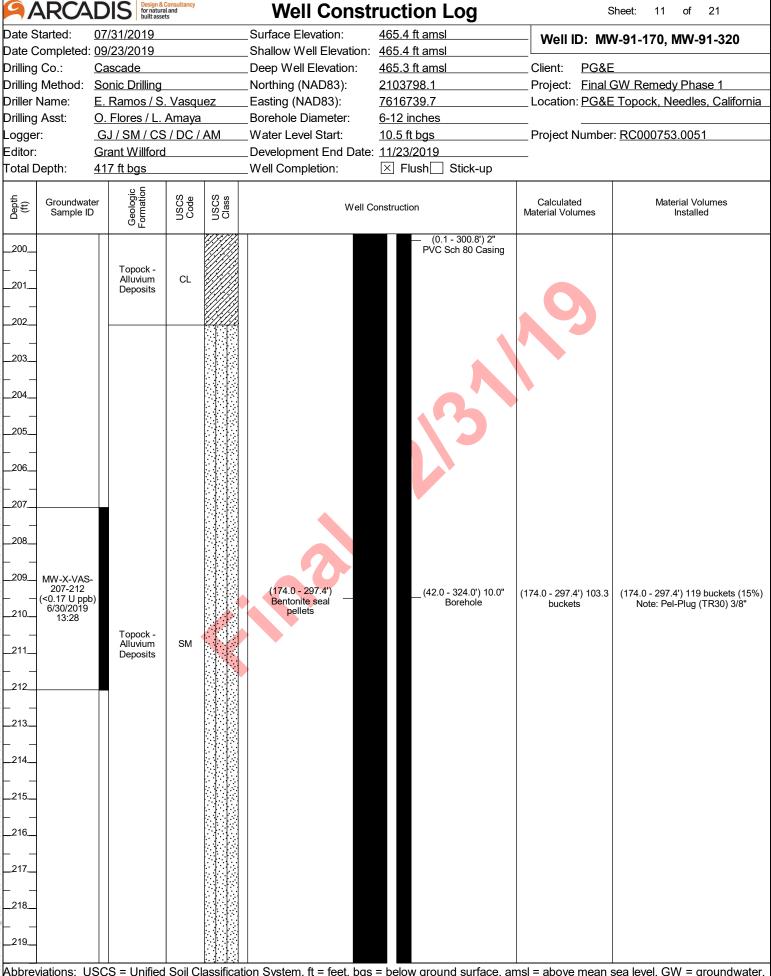
ARCA	DIS for natura built asse	Consultancy all and ts		Well Consti	ruction Log	S	Sheet: 6 of 21
Date Started:	te Started: 07/31/2019 te Completed: 09/23/2019 lling Co.: Cascade lling Method: Sonic Drilling			_Surface Elevation:	465.4 ft amsl	Well ID: MV	V-91-170, MW-91-320
				_Shallow Well Elevation:			·
Orilling Co.:				_Deep Well Elevation:	465.3 ft amsl	Client: PG&E	
Orilling Method:	_			_Northing (NAD83):	2103798.1	•	GW Remedy Phase 1
riller Name:	E. Ramos / S	•		_Easting (NAD83):	7616739.7	Location: <u>PG&amp;E</u>	Topock, Needles, California
rilling Asst:	O. Flores / L.	<u>Amaya</u>		_Borehole Diameter:	6-12 inches		
ogger:	GJ/SM/CS	/ DC /	AM	_Water Level Start:	10.5 ft bgs	Project Number	: RC000753.0051
ditor:	Grant Willford			_Development End Date:	11/23/2019		
otal Depth:	417 ft bgs			_Well Completion:			
Groundwat Sample II		USCS	USCS Class	Well Co	onstruction	Calculated Material Volumes	Material Volumes Installed
	Topock - Fluvial Deposits	sw		(0.0 - 150.8') 2" — PVC Sch 80 Casing	— (0.1 - 300.8') 2" PVC Sch 80 Casing	<b>1 9</b>	
_104	Topock - Fluvial Deposits	sw			(3)		
.106	Topock - Fluvial Deposits	SW					
107	Topock - Fluvial Deposits	GW					
109 MW-X-VAS 107-112 (<0.033 U ppb) 6/27/2019 15:04	Topock - Fluvial Deposits	SM		(16.9 - 118.2') Bentonite seal chips	(42.0 - 324.0') 10.0" Borehole	(16.9 - 118.2') 78.93 bags	(16.9 - 118.2') 77 bags (-2' Note: Puregold Medium Ch
112 113 114 MW-X-VAS	Topock - Fluvial Deposits	GW					
112-117 (<0.033 U ppb) 6/28/2019 09:56	Topock - Fluvial Deposits	SM					
	Topock - Alluvium Deposits	SM		(118.2 - 146.8') Bentonite seal — pellets		(118.2 - 146.8') 22.9 buckets	(118.2 - 146.8') 25 buckets ( Note: Pel-Plug (TR30) 3/8

<b>ARC</b>	Design & Of for natura built asset	Consultancy I and ts		Well Const	ruction Log	S	Sheet: 7 of 21
Date Started:	07/31/2019			_Surface Elevation:	465.4 ft amsl	Well ID: MV	V-91-170, MW-91-320
Date Completed	: <u>09/23/2019</u>			_Shallow Well Elevation:	465.4 ft amsl		
Drilling Co.:	Cascade			_Deep Well Elevation:	465.3 ft amsl	Client: PG&E	
Drilling Method:	Sonic Drilling			_Northing (NAD83):	2103798.1	Project: Final 0	GW Remedy Phase 1
Driller Name:	E. Ramos / S.	. Vasqu	ez	_Easting (NAD83):	7616739.7	Location: PG&E	Topock, Needles, California
Drilling Asst:	O. Flores / L.	<u>Amaya</u>		_Borehole Diameter:	6-12 inches		
Logger:	GJ/SM/CS	/ DC /	AM	_Water Level Start:	10.5 ft bgs	Project Number	: RC000753.0051
Editor:	Grant Willford			_Development End Date:	11/23/2019		
Total Depth:	417 ft bgs		_Well Completion:				
Groundwa Sample I			USCS Class	Well C	onstruction	Calculated Material Volumes	Material Volumes Installed
	Topock - Alluvium Deposits	OSO SM	Olas	(119.5 - 120.5') Centralizer  (0.0 - 150.8') 2" PVC Sch 80 Casing  (118.2 - 146.8') Bentonite seal pellets			
138							
139		0 11 01		in Contact to the fact have		pmal = above mean	sea level, GW = groundwater,

77 11 10	ADIS for natural built ass	ets		Well Consti	delion Log		Sheet: 8 of 21	
Date Started:	07/31/2019			_Surface Elevation:	465.4 ft amsl	Well ID: MV	V-91-170, MW-91-320	
Date Completed				_Shallow Well Elevation:				
rilling Co.:	Cascade			_Deep Well Elevation:	465.3 ft amsl	Client: PG&E		
Prilling Method:	_			_Northing (NAD83):	2103798.1		GW Remedy Phase 1	
riller Name:	E. Ramos / S	-		_Easting (NAD83):	7616739.7	Location: <u>PG&amp;E Topock, Needles, Californi</u>		
rilling Asst:	O. Flores / L.	-		_Borehole Diameter:	6-12 inches			
ogger:	GJ/SM/C		AM	_Water Level Start:	10.5 ft bgs	Project Number	:: RC000753.0051	
ditor:	Grant Willford	b		_Development End Date:		<u> </u>		
otal Depth:	417 ft bgs	<u> </u>		_Well Completion:				
Groundwa Sample		USCS	USCS Class	Well C	onstruction	Calculated Material Volumes	Material Volumes Installed	
				(0.0 - 150.8') 2" — PVC Sch 80 Casing  (118.2 - 146.8') Bentonite seal pellets	— (0.1 - 300.8') 2" PVC Sch 80 Casing	(118.2 - 146.8') 22.9 buckets	(118.2 - 146.8') 25 buckets (9% Note: Pel-Plug (TR30) 3/8"	
	Topock - Alluvium Deposits	SM		(150.8 - 170.8') 2" ———————————————————————————————————	(42.0 - 324.0') 10.0" Borehole	(146.8 - 174.0') 26.6 bags	(146.8 - 174.0') 34 bags (28% Note: Lapis Lustre Sand	
				tion System, ft = feet, bgs /e the laboratory reporting		amsl = above mean	sea level, GW = groundwat	

<b>1</b>	4KCA	DIS for natura built asse	al and ts		Well Const	ruction Log	Sheet: 9 of 21		
Date S		07/31/2019			_Surface Elevation:	465.4 ft amsl	Well ID: MV	V-91-170, MW-91-320	
l l	-	09/23/2019			_Shallow Well Elevation:				
Drilling		Cascade			_Deep Well Elevation:	465.3 ft amsl	Client: PG&E		
_		Sonic Drilling			_Northing (NAD83):	2103798.1		GW Remedy Phase 1	
Driller I		E. Ramos / S	-		_Easting (NAD83):	7616739.7	Location: <u>PG&amp;E</u>	Topock, Needles, California	
Drilling		O. Flores / L.			_Borehole Diameter:	6-12 inches			
Logge		GJ/SM/CS		AM	Water Level Start: 10.5 ft bgs		Project Number: RC000753.0051		
Editor:		Grant Willford			Development End Date: 11/23/2019				
Total D	eptn:	417 ft bgs			_Well Completion:		T	I	
Depth (ft)	Groundwat Sample II		USCS	USCS	Well C	onstruction	Calculated Material Volumes	Material Volumes Installed	
160			NR		(150.8 - 170.8') 2" — : : : : : : : : : : : : : : : : : :	(0.1 - 300.8') 2" PVC Sch 80 Casing			
161									
162		Topock - Alluvium Deposits	CL		(146.8 - 174.0') Cemex #3 MESH		(146.8 - 174.0') 26.6 bags	(146.8 - 174.0') 34 bags (28%) Note: Lapis Lustre Sand	
168 169 170 171 172 173 174		Topock - Alluvium Deposits	CL		(170.5 - 172.0') Centralizer  (170.8 - 173.2') Sump and End Cap	(42.0 - 324.0') 10.0" Borehole			
175 176 177 177 178		Topock - Alluvium Deposits  Topock - Alluvium Deposits	SM GP		(174.0 - 297.4') Bentonite seal pellets		(174.0 - 297.4') 103.3 buckets	(174.0 - 297.4') 119 buckets (15%) Note: Pel-Plug (TR30) 3/8"	
Abbrev	<i>i</i> iations: U	SCS = Unified	Soil C	lassificat	tion System, ft = feet, bas	= below ground surface, a	msl = above mean :	sea level, GW = groundwater,	

9/	4KC4	DIS for natura built asset	al and ts		Well Const	ruction Log	5	Sheet: 10 of 21
Date S	Started:	07/31/2019			_Surface Elevation:	465.4 ft amsl	Well ID: MV	V-91-170, MW-91-320
Date C	Completed:	09/23/2019			_Shallow Well Elevation:	465.4 ft amsl		1 31 170, 1111 31 323
Drilling	Co.:	Cascade			_Deep Well Elevation:	465.3 ft amsl	Client: PG&E	<u> </u>
Drilling	Method:	Sonic Drilling			_Northing (NAD83):	2103798.1	Project: Final 0	GW Remedy Phase 1
Driller I	Name:	E. Ramos / S	. Vasqu	ıez	_Easting (NAD83):	7616739.7	Location: PG&E Topock, Needles, California	
Drilling	Asst:	O. Flores / L.	<u>Amaya</u>		_Borehole Diameter:	6-12 inches		
Logge	r:	GJ/SM/CS	/ DC /	AM	_Water Level Start:			r: RC000753.0051
Editor:		Grant Willford			_Development End Date:	11/23/2019		
Total D	Depth:	417 ft bgs			_Well Completion:			
Depth (ft)	Groundwat Sample II		USCS Code	USCS	Well C	onstruction	Calculated Material Volumes	Material Volumes Installed
180			NR	X		— (0.1 - 300.8') 2" PVC Sch 80 Casing		
181	MW-X-VAS 182-187 (<0.17 U ppt 6/29/2019 15:28	Topock - Alluvium Deposits  Topock - Alluvium Deposits	SM SC ML SM CL MH		(174.0 - 297.4') Bentonite seal pellets	(42.0 - 324.0') 10.0" Borehole	(174.0 - 297.4') 103.3 buckets	(174.0 - 297.4') 119 buckets (15%) Note: Pel-Plug (TR30) 3/8"
198   199		Alluvium Deposits	ML CL					
Abbrox	iations: II	SCS - Unified		V//////	ion System ft - feet has	= bolow ground surface of	amel = above mean	sea level_GW = groundwater



9 ARC	ADIS for natura	Consultancy al and ets		Well Constr	uction Log	Sr	neet: 12 of 21
Date Started: Date Completed Drilling Co.: Drilling Method: Driller Name: Drilling Asst: Logger: Editor: Fotal Depth:	Cascade Sonic Drilling E. Ramos / S O. Flores / L. GJ / SM / CS Grant Willford	09/23/2019 Cascade Sonic Drilling E. Ramos / S. Vasquez O. Flores / L. Amaya GJ / SM / CS / DC / AM Grant Willford 417 ft bgs		_Northing (NAD83): _Easting (NAD83):	465.3 ft amsl 2103798.1 7616739.7 6-12 inches 10.5 ft bgs	Client: PG&E Project: Final G Location: PG&E	Y-91-170, MW-91-320 EW Remedy Phase 1 Topock, Needles, Californ RC000753.0051
Groundwa Sample I	atter odic	USCS	USCS Class	·	nstruction	Calculated Material Volumes	Material Volumes Installed
	Topock - Alluvium Deposits	SM			— (0.1 - 300.8') 2" PVC Sch 80 Casing		
	Topock - Alluvium Deposits	SM		(174.0 - 297.4') Bentonite seal pellets  (229.5 - 230.5') Centralizer	(42.0 - 324.0') 10.0' Borehole	(174.0 - 297.4') 103.3 buckets	(174.0 - 297.4') 119 buckets (1: Note: Pel-Plug (TR30) 3/8"
				ion System, ft = feet, bgs			

9/	ARC4	DIS Desi	gn & Consultancy atural and assets		Well Const	ruction Log	5	Sheet: 13 of 21
	Started:	07/31/2019			Surface Elevation:	465.4 ft amsl	Well ID: MV	V-91-170, MW-91-320
		09/23/2019	)		Shallow Well Elevation:			·
Drilling		Cascade			Deep Well Elevation:	465.3 ft amsl	Client: PG&E	
_		Sonic Drilling	-		Northing (NAD83):	2103798.1	•	GW Remedy Phase 1
	Name:	E. Ramos /	-		Easting (NAD83):	7616739.7	Location: <u>PG&amp;E</u>	Topock, Needles, California
Drilling		O. Flores /	-		Borehole Diameter:	6-12 inches	<u> </u>	
Logge		GJ/SM/		<u>AM</u>	Water Level Start:	10.5 ft bgs	Project Number	:: RC000753.0051
Editor:		Grant Willfo	ord		_ Development End Date: 11/23/2019			
Total D	Jeptn:	417 ft bgs			Well Completion:     Stick-up		1	
Depth (ft)	Groundwat Sample II		OSCS Code	USCS Class	Well C	onstruction	Calculated Material Volumes	Material Volumes Installed
_240			SM			— (0.1 - 300.8') 2" PVC Sch 80 Casing		
241	MW-X-VAS 245-255	Topock Alluviun Deposit	n SM			PVC Scil 60 Cashing		
248 249 250 251 252 253 254	249-293 (<0.033 U ppb) 7/1/2019 13:35	Topock Alluviun Deposit	n SM		(174.0 - 297.4') Bentonite seal pellets	(42.0 - 324.0') 10.0" Borehole	(174.0 - 297.4') 103.3 buckets	(174.0 - 297.4') 119 buckets (15%) Note: Pel-Plug (TR30) 3/8"
255256	viations:	Topock Alluviun Deposit	n SM		tion System ft - feet has		mel = above mess	sea level GW = groundwater

Date Started: Date Completed:	07/31/2019			_Surface Elevation:	405.46		Sheet: 14 of 21				
Jako Ourripiekeu.	00/23/2010			_Shallow Well Elevation:	465.4 ft amsl	Well ID: MW-91-170, MW-91-320					
Drilling Co.: <u>Cascade</u>					465.3 ft amsl	Client: PG&E					
-				_Deep Well Elevation:		Client: PG&E Project: Final GW Remedy Phase 1					
-	illing Method: Sonic Drilling			_Northing (NAD83):	2103798.1	-					
	E. Ramos / S	-		_Easting (NAD83):	7616739.7	Location: <u>PG&amp;E</u>	Topock, Needles, Califor				
	_			_Borehole Diameter:	6-12 inches						
ogger: <u>GJ/SM/CS/DC/AM</u>		AM	_Water Level Start:	10.5 ft bgs	Project Number:	RC000753.0051					
	Grant Willford			_Development End Date:		<u></u>					
Γotal Depth:	417 ft bgs			_Well Completion:							
Groundwate Sample ID	Geologic Formation	Geologic Formation USCS Code USCS Class		Well Co	onstruction	Calculated Material Volumes	Material Volumes Installed				
	Topock - Alluvium Deposits	SM		(174.0 - 297.4') Bentonite seal pellets	— (0.1 - 300.8') 2" PVC Sch 80 Casin						
	Topock - Alluvium Deposits	SM		(269.5 - 270.5') — Centralizer	(42.0 - 324.0') 10.0 Borehole	0" (174.0 - 297.4') 103.3 buckets	(174.0 - 297.4') 119 buckets (1: Note: Pel-Plug (TR30) 3/8"				
Appreviations: U				ion System, ft = feet, bgs	= below ground surface limit, NR = no recovery		ea ievei, GW = groundwa				

ARO	for natural built assets	and s	Well Const	ruction Log	Sheet: 15 of 21			
Date Started:	07/31/2019		_Surface Elevation:	465.4 ft amsl	Well ID: MV	V-91-170, MW-91-320		
Date Completed:	09/23/2019		_Shallow Well Elevation:	465.4 ft amsl		7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7		
Drilling Co.:	Cascade		Deep Well Elevation:	465.3 ft amsl	Client: PG&E	<u> </u>		
Drilling Method:	Sonic Drilling		_Northing (NAD83):	2103798.1	Project: Final 0	GW Remedy Phase 1		
Driller Name:	E. Ramos / S.	Vasquez	Easting (NAD83):	7616739.7	Location: PG&E	Topock, Needles, California		
Drilling Asst:	O. Flores / L. A	Amaya	Borehole Diameter:	6-12 inches	<u></u>			
Logger:	GJ/SM/CS		Water Level Start:	10.5 ft bgs	Project Number	: RC000753.0051		
Editor:	Grant Willford		Development End Date:	11/23/2019				
Total Depth:	417 ft bgs		Well Completion:					
	is e	(0)						
Groundwa Sample II		USCS Code USCS Class	Well C	onstruction	Calculated Material Volumes	Material Volumes Installed		
_280				— (0.1 - 300.8') 2" PVC Sch 80 Casing				
					. 0			
_282								
285								
286								
287								
<b>-</b> -								
_288			(174.0 - 297.4')		(474.0, 007.41) 400.0	(474.0007.41) 440.111. (450())		
<b>-</b> -			Bentonite seal		(174.0 - 297.4') 103.3 buckets	(174.0 - 297.4') 119 buckets (15%) Note: Pel-Plug (TR30) 3/8"		
_289	Topock -		pellets					
<u> </u>	Alluvium	SM		(42.0 - 324.0') 10.0" Borehole				
_290	Deposits							
<u> </u>								
_291								
292								
_293								
L J								
294 MW-X-VAS	_							
292-297 (<0.17 U ppl								
295. 7/2/2019 14:45								
14.45								
			(297.4 - 324.0')		(297.4 - 324.0') 28	(297.4 - 324.0') 33 bags (18%)		
200			Cemex #3 MESH (8x10)		bags	Note: Lapis Lustre Sand		
_299								
Abbreviations: L	ISCS = Unified	Soil Classifica	ation System, ft = feet, bgs	= below ground surface, a	msl = above mean :	sea level, GW = groundwater,		

		al and ts		well Consti	•	Sheet: 16 of 21				
Date Started: <u>07/31/2019</u>				_Surface Elevation:	465.4 ft amsl	Well ID: MV	/-91-170, MW-91-320			
Date Completed: (				_Shallow Well Elevation:	•		·			
•	<u>Cascade</u>			_Deep Well Elevation:	465.3 ft amsl	Client: PG&E				
-	Sonic Drilling			_Northing (NAD83):	2103798.1		SW Remedy Phase 1			
	E. Ramos / S.	-		_Easting (NAD83):	7616739.7	Location: PG&E Topock, Needles, Californ				
-	O. Flores / L.	-		_Borehole Diameter:	6-12 inches					
• •	GJ/SM/CS		<u>AM</u>	_Water Level Start:	10.5 ft bgs	Project Number: RC000753.0051				
ditor: Grant Willford			_Development End Date:		<del></del>					
otal Depth: 417 ft bgs			_Well Completion:		1					
Depth (ft) (Geologic Pormation Of Geologic P		USCS	USCS Class	Well Co	onstruction	Calculated Material Volumes	Material Volumes Installed			
	Topock - Alluvium Deposits	SM		(297.4 - 324.0°) Cemex #3 MESH (8x10)	(42.0 - 324.0') 10.0"  (42.0 - 324.0') 10.0"  Borehole	(297.4 - 324.0') 28 bags	(297.4 - 324.0') 33 bags (18%) Note: Lapis Lustre Sand			

-	1110-	DIS for nature built ass	ets		Well Constr	action Log		Sheet: 17 of 21			
Date Started: 07/31/2019					_Surface Elevation:	465.4 ft amsl	Well ID: M\	N-91-170, MW-91-320			
	•	09/23/2019			_Shallow Well Elevation:			·			
rilling		Cascade			_Deep Well Elevation:	465.3 ft amsl	Client: PG&E				
_	Method: Name:	Sonic Drilling		107	_Northing (NAD83): _Easting (NAD83):	2103798.1 7616739.7	Project: Final GW Remedy Phase 1 Location: PG&E Topock, Needles, Californ				
	ng Asst: <u>O. Flores / L. Amaya</u> ger: <u>GJ / SM / CS / DC / AM</u>			Borehole Diameter:	6-12 inches	Location: <u>PG&amp;E_Lopock, Needles, Califor</u> Project Number: <u>RC000753.0051</u>					
ogger				_Water Level Start:	10.5 ft bgs						
Editor:				_ _Development End Date:		, 					
Total D	epth:	417 ft bgs			_Well Completion:						
Depth (ft)	Groundwat Sample II		USCS	USCS Class	Well Co	onstruction	Calculated Material Volumes	Material Volumes Installed			
320		Topock - Alluvium Deposits	SM		(320.5 - 321.5')	(42.0 - 324.0') 10.0"  (320.8 - 323.2')  Substituting the state of the	(297.4 - 324.0') 28 bags	(297.4 - 324.0') 33 bags (18% Note: Lapis Lustre Sand			
_324  _325  _326  _327						13					
328		Topock - Alluvium Deposits	МН								
329		Topock - Alluvium Deposits	SM		100						
		Topock - Alluvium Deposits	МН		(324.0 - 417.0') Bentonite seal chips	(324.0 - 414.0') 6.0" Borehole	(324.0 - 417.0') 24.9 bags	(324.0 - 417.0') 34 bags (37% Note: Puregold Medium Chips, u >20% of the calculated volume to potential voids that formed du drilling			
335 336 		Topock - Alluvium Deposits	МН								
	MW-X-VAS	Topock -	ML								
_338	337-342 (<0.17 U ppt 7/11/2019	Alluvium Deposits	$\vdash$	4							
339	7/11/2019 11:30	Alluvium	ML								
		Deposits		600							

	DIS Design & for natura built asse	Consultancy Il and ts		Well Consti	uction Log	;	Sheet: 18 of 21			
Date Started: <u>07/31/2019</u> Date Completed: <u>09/23/2019</u>				_Surface Elevation: _Shallow Well Elevation:	465.4 ft amsl 465.4 ft amsl	Well ID: MV	N-91-170, MW-91-320			
rilling Co.:	Cascade			_Deep Well Elevation:	465.3 ft amsl	Client: PG&E	<u> </u>			
-	-			_Northing (NAD83):	2103798.1	Project: Final GW Remedy Phase 1				
-			ez	_Easting (NAD83):	7616739.7		E Topock, Needles, Californi			
	O. Flores / L.	-		Borehole Diameter:	6-12 inches		,			
-	GJ/SM/CS	-	AM	_ _Water Level Start:	10.5 ft bgs	Project Numbe	r: RC000753.0051			
				_Development End Date:	_					
otal Depth: 417 ft bgs				_Well Completion:						
Groundwate Sample ID		USCS	USCS Class	Well Co	enstruction	Calculated Material Volumes	Material Volumes Installed			
_340 MW-X-VAS- - 337-342 (<0.17 U ppb 7/11/2019	Topock - Alluvium Deposits	ML								
342	Topock - Alluvium Deposits	GM				70				
.343  .344  .345	Topock - Alluvium Deposits	SM								
	Topock - Alluvium Deposits	ML								
.348	Topock - Alluvium Deposits	MH								
. — .350 . — .351 . —	Topock - Alluvium Deposits	ML		(324.0 - 417.0') — Bentonite seal chips	(324.0 - 414.0') 6.0" Borehole	(324.0 - 417.0') 24.9 bags	(324.0 - 417.0') 34 bags (37%) Note: Puregold Medium Chips, us >20% of the calculated volume of to potential voids that formed dur drilling			
.352	Topock - Alluvium Deposits	SW-SM								
	Topock - Weathered Bedrock - conglomerate	МН								
	Topock - Weathered Bedrock - conglomerate	ML								
1		ML								

PARCADIS Design & Consultancy for natural and built assets				Well Consti	uction Log	Sheet: 19 of 21					
Date Started:	07/31/2019			_Surface Elevation:	465.4 ft amsl	Well ID: M	W-91-170, MW-91-320				
Date Completed	I: <u>09/23/2019</u>			_Shallow Well Elevation:		TAGILID. IVI					
Orilling Co.:	Cascade			_Deep Well Elevation:	465.3 ft amsl	Client: PG&	<u>E</u>				
Orilling Method:	Sonic Drilling			_Northing (NAD83):	2103798.1	Project: Final	GW Remedy Phase 1				
Oriller Name:	E. Ramos / S	. Vasqı	ıez	_Easting (NAD83):	7616739.7		Location: PG&E Topock, Needles, Californ Project Number: RC000753.0051				
Orilling Asst:	O. Flores / L.	Amaya		_Borehole Diameter:	6-12 inches						
_ogger:	GJ/SM/CS	/ DC /	AM	_Water Level Start:	10.5 ft bgs	Project Numbe					
Editor:	itor: <u>Grant Willford</u>			_Development End Date:	11/23/2019						
Γotal Depth:	417 ft bgs			_Well Completion:	$oxed{ imes}$ Flush $oxed{ o}$ Stick-up						
Groundwa Sample		USCS	USCS Class	Well Co	onstruction	Calculated Material Volumes	Material Volumes Installed				
	Topock - Weathered Bedrock - conglomerate  Topock - Weathered Bedrock - conglomerate  Topock - Weathered Bedrock - conglomerate Topock - Weathered Bedrock - conglomerate Topock - Conglomerate Conglomerate Conglomerate Conglomerate Conglomerate Conglomerate Conglomerate	SM GW-GM		(324.0 - 417.0') — Bentonite seal chips	(324.0 - 414.0') 6. Borehole	bags	(324.0 - 417.0') 34 bags (379) Note: Puregold Medium Chips, > 20% of the calculated volume to potential voids that formed dudrilling				

	DIS   Design & Of for natura built asset	ts		Well Consti	9		Sheet: 20 of 21				
Date Started: <u>07/31/2019</u>				_Surface Elevation:	465.4 ft amsl	Well ID: M	W-91-170, MW-91-320				
Date Completed:	: 09/23/2019			_Shallow Well Elevation:	465.4 ft amsl						
Orilling Co.:	Cascade			_Deep Well Elevation:	465.3 ft amsl	Client: PG&	<u>E</u>				
Orilling Method:	Sonic Drilling			_Northing (NAD83):	2103798.1	Project: <u>Final</u>	GW Remedy Phase 1				
Oriller Name:	E. Ramos / S.	. Vasqı	uez	_Easting (NAD83):	7616739.7	Location: PG&	Location: PG&E Topock, Needles, Californ				
Orilling Asst:	O. Flores / L.	Amaya	1	_Borehole Diameter:	6-12 inches						
_ogger:	GJ/SM/CS	/ DC /	AM	_Water Level Start:	10.5 ft bgs	Project Numbe	er: RC000753.0051				
Editor:	Grant Willford			_Development End Date:	11/23/2019						
Γotal Depth:	417 ft bgs			_Well Completion:	$oxed{ imes}$ Flush $oxed{ o}$ Stick-up						
Groundwar Sample II		USCS	USCS Class	Well Co	onstruction	Calculated Material Volumes	Material Volumes Installed				
	Topock - Weathered Bedrock - conglomerate	GM				, 1, 9)					
383		CL		(324.0 - 417.0') — Bentonite seal chips	(324.0 - 414.0') 6. Borehole	0" (324.0 - 417.0') 24.9 bags	(324.0 - 417.0') 34 bags (37%) Note: Puregold Medium Chips, u >20% of the calculated volume d to potential voids that formed dur				
	Topock - Weathered Bedrock - conglomerate	CL					drilling				
_399											
hhreviations: I	ISCS = Unified	Soil C	laccificat	tion System ft = feet has	= below ground surface	e. amsl = above mean	sea level, GW = groundwat				

9/-	ARCA	DIS   Design & C   for natura built asset	Consultancy l and ts		Well Const	ruction Log	;	Sheet: 21 of 21		
	started:	07/31/2019			_Surface Elevation:	465.4 ft amsl	Well ID: M\	N-91-170, MW-91-320		
Date C	completed:	09/23/2019			_Shallow Well Elevation:	465.4 ft amsl				
Drilling	Co.:	Cascade			_Deep Well Elevation:	465.3 ft amsl	Client: PG&	<u> </u>		
Drilling	Method:	Sonic Drilling			_Northing (NAD83):	2103798.1	Project: Final	GW Remedy Phase 1		
Driller I	Name:	E. Ramos / S.	Vasqu	ıez	_Easting (NAD83):	7616739.7	Location: PG&	E Topock, Needles, California		
Drilling	Asst:	O. Flores / L.	Amaya	l	_Borehole Diameter:	6-12 inches				
_oggei	r:	GJ/SM/CS	/ DC /	AM	_Water Level Start:	10.5 ft bgs	Project Number: RC000753.0051			
Editor:		<b>Grant Willford</b>			_Development End Date:	11/23/2019				
Total D	Depth:	417 ft bgs			_Well Completion:					
Depth (ft)	Groundwat Sample II		USCS	USCS Class	Well C	Well Construction		Material Volumes Installed		
_400			CL							
		Topock - Weathered	CL							
401		Bedrock -								
		conglomerate Topock -								
		Weathered Bedrock -	GC							
_402		conglomerate				_				
-		Topock - Weathered		[1040]						
_403		Bedrock -	ML	Palol						
		conglomerate Topock -								
_404		Weathered	GC							
		Bedrock - /								
_405		Topock - Weathered	SM							
		Bedrock -								
_406		conglomerate								
		Topock -								
407		Weathered Bedrock -	CL			(324.0 - 414.0') 6.0" Borehole				
407		conglomerate Topock -				Bololiolo				
		Weathered	SM					(324.0 - 417.0') 34 bags (37%)		
408		Bedrock - conglomerate			(324.0 - 417.0')		(324.0 - 417.0') 24.9	Note: Puregold Medium Chips, used >20% of the calculated volume due		
					Bentonite seal chips		bags	to potential voids that formed during		
409		Topock -						drilling		
_		Weathered Bedrock -	GC							
_410		conglomerate		16/19/2						
_										
_411				7/8						
412										
		Tans-li								
		Topock - Weathered	SM							
413		Bedrock - conglomerate								
-										
414	MW-X-VAS- 412-417	•								
	(<0.17 U ppb 7/15/2019	) <b>(</b>								
_415	7/15/2019 12:43			HY H						
_		Topock -		15 HJd		(414.0 - 417.0') 4.0" Borehole				
_416		Weathered Bedrock -	GM	46		Doleliole				
		conglomerate		607						
417_				[9]	F 1 (5)					
					End of Boring at 417.0 'bgs.					
418										
<u> </u>										
_419										
					<u> </u>	-	amsl = above mean	sea level, GW = groundwater,		
ppb =	parts per b	oillion, U = not	detect	ed abov	e the laboratory reporting	g limit, NR = no recovery				

Sample ID Sample	9/	<b>ARC</b>	ADIS	Design & Consultancy for natural and built assets		Во	ring	Log		Sh	neet: 1 of	21
Northing (NADEs)   2019   20	Date S	Started:	06/20/			Surface	Elevation	on: 465.4 ft amsl	Borin	na No	· MW-91d	
Dilling Matthock   Dilling Age   Project   Final GW Remedy Phase 1   Dilling Asset   Dillin	Date C	Comple	ted: <u>07/31/</u>	2019		Northing	g (NAD8	33): <u>2103798.1</u>		_	. <u>10100 0 10</u>	
Delit Type:   Prosonic Truck Mount   Sorehole Diameter: 6-12 inches   Location: PG&E Topock, Needles, Californic Drilling Asst.   Californic PG&E (S. Amaya)   Sample   Samp	_					_	•	•				
Deller Manne: Delling Assit: Q. Chrose JL. Amayus.  G.J. SMJ (C.S. / D.C. / AM Cara Willford Converted to Welk: ☑ Yes ☐ No Continuous  Continuous  Garand-Malford Converted to Welk: ☑ Yes ☐ No Description  Sampling Interval:  Continuous  Continuo				_			-		-		•	
Defiling Asset: Q. Flores / L. Armaya. Cangere: GJ / SM / CS / DC / AM Sampling Interval: Commissions.  Set Service GJ / SM / CS / DC / AM Sampling Interval: Q / Yes   No    Set Service GJ / SM / CS / DC / AM Sampling Interval: Q / Yes   No   Solid Description   Drilling Fluid Solid Description									Location:	: PG&E	Topock, Needle	es, California
Cognet   Carl Willford   Converted to Well:   Yes   No				-		•			Droiget N		DC000752 006	 5.1
Editor: Grant Wilford Converted to Well: Yes No  Grant Wilford Converted to Well: Yes Interest of No  Grant Wilford Converted to Well: Yes Interest of No  Grant Wilford Converted to Well: Yes Interest of No  Grant Wilford Converted to Well: Yes Interest of No  Grant Wilford Converted to Well: Yes Interest of No  Grant Wilford Converted to Well: Yes Interest of No  Grant Wilford Converted to Well: Yes No  Grant Wilford Converted to Well: Yes Interest of No  Grant Wilford Converted to Well: Yes Interest of No  Grant Wilford Converted to Well: Yes Interest of No  Grant Wilford Converted to Well: Yes Interest of No  Grant Wilford Converted to Well: Yes Interest of No  Grant Wilford Converted to Well: Yes Interest of No  Grant Wilford Converted to Well: Yes Interest of No  Grant Wilford Converted to Well: Yes Interest of No  Grant Wilford Converted to Well: Yes Interest of No  Grant Wilford Converted to Well Yes Interest of No  Grant Wilford Converted to Well: Yes Intere	_			-		-	-		Fiojectiv	iuiiibei.	<u>KC000733.000</u>	)
Simple   D   Constitution   D   Semple   D   Constitution   D   Constitu						-	-					
1				T		1	T					
1	Depth (ft)	Recovery (in)			Geologic	USCS	USCS Class	Soil Description			Drilling Notes	Drilling Fluid
Topock - Fill  SW  Topock - Fill  Topock - Fill  SW  Topock - Fill  Topock - Fill  SW  Topock - Fill  Topo	1	96	Samples	12-17 (<0.033 U ppb) 6/25/2019		I SP		(8'); trace clay; trace organics; no wood particled (ay @ 8.0' bgs (5Y 4/1)	to subround	trace	Formation was collapsing at the surface during the installation of the 12-inch conductor casing. Used bentonite to stop the colloapse at the surface. Bentonite was mixed into the core during installation of the 12-inch casing to 7 ft bgs.  (8.0 - 17.0') Soft drilling, low recovery due to soft dregde sands compacting or falling out of core barrel.	1600 gallons of water recovered; 3500 gallons of
Topock - Fill SW (19.0 - 36.5') Topock - Fill; Well graded sand (SW); yellowish formation collapse coarse grained, subangular to subround; little mica; trace observed on	10						/ \				during clean out	
								brown / moderate yellowish brown (10YR 5/4); coarse grained, subangular to subround; little	; fine grained mica; trace	d to	Heaving sands formation collapse observed on	

AR	<b>CA</b>	DIS	Design & Consultancy for natural and built assets		Во	ring Lo	g		SI	neet: 2 of	21
Date Starte		06/20/2			Surface	Elevation:	465.4 ft ar	nsl	Boring No.	: MW-91d	
Date Comp						g (NAD83):	2103798.				
Drilling Co.		Cascad			-	(NAD83):	<u>7616739.7</u>		_ Client: PG&E		
Drilling Met		Sonic E	•		Total De	-	417 ft bgs		-	GW Remedy Ph	
Drill Rig Ty Driller Nam	-		ic Truck Mou			e Diameter: o First Water	6-12 inche	<u>s</u>	_ Location: <u>PG&amp;E</u>	Topock, Needle	es, California
Drilling Ass			nos / S. Vasq es / L. Amaya		-	g Method:	_	0 ft Core Barrel	 _ Project Number:	RC000753 004	 51
Logger:			M / CS / DC /			ig Interval:	Continuou			110000700.00	01
Editor:		Grant V			•	ed to Well:		No	_		
				0 5							
Depth (ft) Recovery	Sai	Sieve mple ID	Groundwater Sample ID	Geologic Formation	Code	USCS		Soil Description		Drilling Notes	Drilling Fluid
						organi	cs; wet; no odd		9	(19.0 - 27.0') Soft drilling.	
	Sar Coll	Sieve mples lected	MW-X-VAS- 32-37 (<0.033 U ppb) 6/26/2019 11:45	Topock - Fil	SW		: increase orga	nics - Fluvial Deposits; Well	graded sand (SW):	(32.0 - 37.0') Heaving sands.	
37			Inificial C-11 C	Topock - Fluvial Deposits	SW	grayis suban trace ( wet; o (37');	n brown (10YR gular to round; ound; little mic ganic odor no granules and ; trace granule:	5/2); fine grained to ver little granules to very la a; coarser clast consists	y coarse grained, rge pebbles, round; s of quartz and basalt; subround to round	(38.0') Druring reaming with the 10-inch casing, the 12-inch conductor casing began to	

9/	<b>ARC</b>	ADIS	Design & Consultancy for natural and built assets		Во	ring Lo	g		She	et: 3 of	21
Date S					Surface	Elevation:	465.4 ft amsl	Boring	No.:	MW-91d	
	•	ted: <u>07/31/2</u>			-	g (NAD83):	2103798.1				
Drilling		Cascac			_	(NAD83):	7616739.7		G&E		
Drilling			•		Total De	•	417 ft bgs	•		N Remedy Ph	
Drill Ri Driller			<u>ic Truck Mou</u> nos / S. Vasq			e Diameter: o First Water:	6-12 inches	_ Location: <u>P</u>	G&E I	opock, Needle	es, Calliornia
Drilling			<u>es / L. Amaya</u>			g Method:	4 Inch X 10 ft Core Barrel	- Proiect Nun	nber: F	RC000753.005	 51
Logge			M / CS / DC		•	ig Interval:	Continuous	<b>. ,</b>			-
Editor:		Grant V	Villford		Convert	ed to Well:					
Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS	USCS	Soil Description			Drilling Notes	Drilling Fluid
41 42 43 44 45 46 47	36				NR		· 47.0') No recovery (NR)	9		slip below ground surface. The 12-inch was advanced to 38 ft bgs to stablize the borehole.  (42.0') Final depth of conductor casing after installing deeper to fix mud tub seal.	
48				Topock - Fluvial Deposits	SW	grayis	48.2') Topock - Fluvial Deposits; Well h brown (10YR 5/2); fine grained to ver gular to round; trace granules to large coarser clast composed of quartz; wet	y coarse grained	,		
49 50		No Sieve Samples Collected		Topock - Fluvial Deposits	GW	sand (suban suban granite	50.5') Topock - Fluvial Deposits; Well GW); grayish brown (10YR 5/2); granu gular to round; some fine to coarse gra gular to round; trace mica; coarser clas e and basalt; wet	les to small cobb ined sand, st composed of	oles,		
51 52 53 	120			Topock - Fluvial Deposits	SW	gravel graine pebble	• 53.8') Topock - Fluvial Deposits; Well (SW); grayish brown (10YR 5/2); fine of d, subangular to subround; little granul as, subangular to subround; trace round composed of granite and basalt; wet	grained to very co es to very large	oarse		
54 55 56 57				Topock - Fluvial Deposits	SP	brown	- 57.0') Topock - Fluvial Deposits; Poor (10YR 5/3); very fine grained to fine gr trace granules to very large pebbles, s	ained, subround	to		
58	120			Topock - Fluvial Deposits	SW	• ¸ • ¸ • ¸ • brown	-62.2') Topock - Fluvial Deposits; Well (10YR 5/3); very fine grained to coarse nica; wet	graded sand (SI grained, round;	W);		

9/	<b>ARC</b>	AD	IS	Design & Consultancy for natural and built assets		Во	ring l	Log	)		She	eet: 4 of	21	
Date S	Started:	06	/20/2	2019		Surface	Elevatio	n:	465.4 ft amsl	Bori	na No.:	MW-91d		
Date C	Comple	ted: <u>07</u>	/31/2	2019		Northing	g (NAD8	3):	2103798.1			<u> 6 1 a</u>		
Drilling			ascad	le		Easting	(NAD83	):	7616739.7	Client:	PG&E			
Drilling				Drilling		Total De	epth:		417 ft bgs	Project:		nal GW Remedy Phase 1		
Drill Ri				<u>ic Truck Mou</u>			le Diame		6-12 inches	Locatio	n: <u>PG&amp;E</u> ]	&E Topock, Needles, California		
Driller				ios / S. Vasqu					9.6 ft bgs					
Drilling				es / L. Amaya		•	ng Metho		4 Inch X 10 ft Core Barrel	Project	Number: 1	RC000753.005	51	
Logge				M/CS/DC/	AM	-	ng Interva		Continuous	-				
Editor:		Gr	ant v	Villford		Conver	ed to We	ell:			1			
Depth (ft)	Recovery (in)	Sieve Sample		Groundwater Sample ID	Geologic Formation	SOSO	USCS Class		Soil Description			Drilling Notes	Drilling Fluid	
61 61 62					Topock - Fluvial Deposits	sw		(e.) 0	63.5') Topock - Fluvial Deposits; Poo <mark>r</mark> l	C	and (CD):			
63	120				Topock - Fluvial Deposits	SP	È	orown ( mica; v	10YR 5/3); very fine grained to fine gravet	ained, roun	d; trace			
64656667686970717273	120	No Siev Sample Collecte	es	MW-X-VAS- 71-76 (<0.033 U ppb) 6/27/2019	Topock - Fluvial Deposits	SW		gravel ( grained subang	75.5') Topock - Fluvial Deposits; Well SW); brown (10YR 5/3); very fine grain, subangular to round; little granules to ular to round; trace subangular to subreclast composed of basalt, granite, and	ned to very o very large round; trace	coarse pebbles, e mica;	(71.0 - 77.0') A foot of heaving sands in the casing resulted in the groundwater sample interval to be adjusted from 72 to 77 ft. bgs to 71 to 76		
74 75 76 77 78 79	120			6/27/2019 08:52	Topock - Fluvial Deposits  Topock - Fluvial Deposits	SP	r	77.0 -	77.0') Topock - Fluvial Deposits; Poorl 7.5YR 5/3); very fine grained to fine grace mica; wet 83.5') Topock - Fluvial Deposits; Well 10YR 5/3); very fine grained to very coular to subround; trace mica; wet	graded sar	angular to	ft. bgs.		
80							******							

ARCADIS Design & Consultancy for natural and built assets				у	Во	ring	Log		She	eet: 5 of	21
Date S	tarted:	06/2	0/2019		Surface	Elevati	on: 465.4 ft amsl	Borin	a No .	MW-91d	
Date C	omple	ted: <u>07/3</u>	1/2019		Northing	g (NAD	33): <u>2103798.1</u>		9 110	<u> </u>	
Drilling	Co.:	Case	cade		Easting	(NAD8	3): <u>7616739.7</u>	_ Client:	PG&E		
Drilling	Metho	d: <u>Son</u>	ic Drilling		Total De	epth:	417 ft bgs	_ Project:	Final G\	N Remedy Ph	ase 1
Drill Ri		: <u>Pros</u>	onic Truck M	ount	Borehol	e Diam	eter: 6-12 inches	Location:	PG&E 1	<u> Fopock, Needl</u>	es, California
Driller I			amos / S. Vas		•		Vater: <u>9.6 ft bgs</u>	-			
Drilling			lores / L. Ama	-	Samplin	-		Project N	umber: <u>I</u>	RC000753.00	51
Logge			/ SM / CS / DO	C / AM	Samplin	•		-			
Editor:		<u>Grar</u>	nt Willford		Convert	ed to W	/ell: ⊠ Yes □ No				T
Depth (ft)	Recovery (in)	Sieve Sample II	Groundwate Sample ID		USCS	USCS	Soil Description			Drilling Notes	Drilling Fluid
81 82 83 	120			Topock - Fluvial Deposits	SW		(83.5 - 87.0') Topock - Fluvial Deposits; Well	graded sand	with		
84 85 86 87				Topock - Fluvial Deposits	SW		gravel (SW); brown (10YR 5/3); very fine graingrained; little granules to very large pebbles, it trace subround to round; trace mica; coarse of granite, basalt, and quartz; wet; granules and with depth	ned to very co subangular to clasts compos pebbles incre	parse pround; sed of ease		
88 89 90 91 92 93	108	No Sieve Samples Collected		Topock - Fluvial Deposits	SW-SM		(87.0 - 93.0') Topock - Fluvial Deposits; Well (SW-SM); brown (10YR 5/3); very fine grained grained, subangular to round; little granules to subround to round; little silt; trace mica; coars of metadiorite; wet	d to very coar o large pebble	se es,		
 94				Topock - Fluvial Deposits Topock - Fluvial	GW-GM		(93.0 - 94.0') Topock - Fluvial Deposits; Well silt and sand (GW-GM); brown (10YR 5/3); grobbles, subangular to round; and very fine to sand, subangular to subround; little silt; trace composed of metadiorite; wet  (94.0 - 95.0') Topock - Fluvial Deposits: Poor	ranules to sm o very coarse mica; coarse	all grained er clasts		
95				Deposits		\$	(94.0 - 95.0') Topock - Fluvial Deposits; Poorl strong brown (7.5YR 4/6); very fine grained to subround to round; trace silt; trace mice; wet		_ (), /		
<u> </u>				Topock - Fluvial	sw	\$ . \$ . \$ . \$ . \$ . \$	subround to round; trace silt; trace mica; wet (95.0 - 96.0') Topock - Fluvial Deposits; Well	graded sand			
96				Deposits			gravel (SW); brown (10YR 5/3); very fine graingrained, subangular to round; some granules	ned to mediu			
-					NR	$ \times $	pebbles, subround to round; trace subround t trace mica; coarser clasts composed of meta	o round; trace			
97 98 99	96			Topock - Fluvial Deposits	sw		cobble/boulder fragments within formation  (96.0 - 97.0') No recovery (NR)  (97.0 - 104.0') Topock - Fluvial Deposits; We brown (10YR 5/3); very fine grained to very csubangular to subround; trace granules to sm subround to round; trace mica; wet	Il graded san			
_100 _	iotions	LICCO	- Unified Cail	Classification	n Cuatan	1 * * * * * * 1	ot has - helew ground surface amo	al = abaya	maan aa	a layed CVV =	uraupdwatar

ARCADIS Design & Consultancy for natural and built assets			Во	ring	Log	Sh	neet: 6 of	21		
Date S	tarted:	06/	20/2019		Surface	Elevati	on: <u>465.4 ft amsl</u>	Boring No.	· MW-91d	
Date C	omple	ted: <u>07/</u>	31/2019		Northing	g (NAD	83): <u>2103798.1</u>	_ Borning No.	. <u>IVIVV-514</u>	
Drilling	Co.:	<u>Cas</u>	scade		Easting	(NAD8	3): <u>7616739.7</u>	_ Client: PG&E		
Drilling	Metho	od: <u>Sor</u>	nic Drilling		Total De	epth:	417 ft bgs	_ Project: Final G	W Remedy Ph	ase 1
Drill Ri	д Туре	: <u>Pro</u>	sonic Truck Mo	<u>unt</u>	Borehol	le Diam	eter: <u>6-12 inches</u>	Location: PG&E	Topock, Needle	es, California
Driller I	Name:	<u>E. F</u>	Ramos / S. Vasc	quez	Depth to	o First V	Vater: <u>9.6 ft bgs</u>			
Drilling	Asst:	<u>O. I</u>	Flores / L. Amay	<u>a</u>	Samplin	ng Meth	od: 4 Inch X 10 ft Core Barrel	_ Project Number:	RC000753.005	51
Loggei	r:	<u>_GJ</u>	/SM/CS/DC	/ AM	Samplin	ng Interv	al: <u>Continuous</u>	_		
Editor:		Gra	nt Willford		Convert	ted to W	/ell: ⊠ Yes □ No			
Depth (ft)	Recovery (in)	Sieve Sample	Groundwater ID Sample ID	Geologic Formation	USCS	USCS Class	Soil Description		Drilling Notes	Drilling Fluid
	96			Topock - Fluvial Deposits  Topock - Fluvial Deposits	SW	σ	(104.0 - 105.0') Topock - Fluvial Deposits; W gravel (SW); dark grayish brown / dark yellow 4/2); very fine grained to very coarse grained.	vish brown (10YR , subround to round;	(102.0 - 105.0') Tight formation.	
105 106 107 108				Topock - Fluvial Deposits  Topock - Fluvial Deposits	SW		and granules to very large pebbles, subangul subround to round; trace silt; trace mica; coa of metadiorite; wet; fractured cobbles/ boulde formation  (105.0 - 107.0') Topock - Fluvial Deposits; W (SW); brown (10YR 5/3); very fine grained to subangular to subround; little granules to sm to round; trace silt; trace mica; wet  (107.0 - 108.0') Topock - Fluvial Deposits; W sand (GW); brown (10YR 4/3); granules to w subround to round; some very fine to very coa	ar to round; trace rser clasts composed er fragments within  ell graded sand very coarse grained, all pebbles, subround  ell graded gravel with ery large pebbles, arse grained sand,		
109 110 111 112	84	No Sieve Samples Collected	6/27/2019	Topock - Fluvial Deposits	SM		subangular to round; trace silt; trace mica; composed of metadiorite, granite, basalt, que (108.0 - 112.0') Topock - Fluvial Deposits; (SM); dark grayish brown / dark yellowish bro fine grained to coarse grained, subangular to granules to very large pebbles, subround to rsubround to round; trace mica; trace organic coarser clasts composed of metadiorite and cobble/boulder fragments observed (109') brown (10YR 5/3); little silt; no organic	artz; wet Ity sand with gravel wn (10YR 4/2); very or ound; some ound; some silt; little s; wet; organic odor; granite, pulverized		
113			MW-X-VAS-	Topock - Fluvial Deposits	GW		(112.0 - 114.0') Topock - Fluvial Deposits; W sand (GW); dark gray (10YR 4/1); very fine g cobbles, subangular to round; little very fine t sand, subangular to round; trace silt; trace cl coarser clasts composed of metadiorite; wet;	rained to small to very coarse grained ay; trace organics;	(112.0 - 117.0') Rough drilling, collect gorundwater sample across fluvial / alluvium contact.	
115	60		112-117 (<0.033 U ppb) 6/28/2019 09:56	Topock - Fluvial Deposits	SM		(114.0 - 116.0') Topock - Fluvial Deposits; Si (SM); brown (10YR 4/3); very fine grained to subangular to round; some granules to very I subangular to round; little silt; trace subround mica; trace organics; wet; organic odor; coar of metadiorite	very coarse grained, arge pebbles, d to round; trace		
116 117 118 119 120_	120			Topock - Alluvium Deposits	SM		(116.0 - 157.0') Topock - Alluvium Deposits; (SM); brown (7.5YR 4/4) trace red / moderate 4/6); very fine grained to very coarse grained, some granules to very large pebbles, angular silt; trace subangular; trace mica; coarser clametadiorite; wet; mottled (117') reddish brown / moderate brown (5YR moderate reddish brown (10R 4/6); some silt granules and pebbles, no cobbles (118'); little silt; increase in sand, weathered	e reddish brown (10R, angular to subround; r to subangular; little asts composed of 4/4) little red / ;; decrease in granules and pebbles		

9/	ARCADIS Design & Consultancy for natural and built assets				Во	ring L	og		Shee	et: 7 of	21
Date S						Elevation:		Borir	na No.:	MW-91d	
	-	ted: <u>07/31/2</u>				g (NAD83)		_			
Drilling		Cascad			-	(NAD83):	7616739.7	_ Client:	PG&E		
Drilling					Total De	-	417 ft bgs	_ Project:		V Remedy Ph	
Drill Ri Driller			<u>iic Truck Mou</u> nos / S. Vasqı			e Diamete	r: 6-12 inches er: 9.6 ft bgs	_ Location	: PG&E I	opock, Needl	es, Calitornia
Drilling			es / L. Amaya		-	g Method:	_	<ul><li>Project N</li></ul>	Jumber: F	RC000753.00	 51
Logge			<u>M / CS / DC /</u>		-	ig Interval:	Continuous	_ 1 10,0011	14111001. <u>1</u>	10000700.00	J 1
Editor:		Grant V				ed to Well:					
	2			io P							
Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS	Class	Soil Description			Drilling Notes	Drilling Fluid
	120										
128	120	No Sieve Samples Collected	•	Topock - Alluvium Deposits	SM		8'); some silt; little granules to very large angular; decrease in sand	pebbles, angu	ılar to		
133 134 135 136						(13	4'); little silt; increase sand, increase in g	ıranules and p	ebbles		
137										(407.00 5	
ļ -										(137.0') During reaming with the 10-inch	
138						(13	8'); some granules to very large pebbles,	angular to		casing, drilling	
-	120					sub	angular; slight decrease in silt	J		became difficult due to	
139										increased friction.	
-										Reinstalled 6-casing and	
140_ Abbrev	viations	: USCS = L	Inified Soil CI	Lassification	n Svsten	<u>)                                    </u>	bgs = below ground surface, am	ısl = above	mean ses	started flushing	l groundwater

9/	Pote Standard 200/20140				Во	ring Lo	g		Sh	eet: 8 of	21
Date S	Started:	06/20/2	2019		Surface	Elevation:	465.4 ft amsl	Borin	a No.:	: <u>MW-91d</u>	
l l	-	ted: <u>07/31/2</u>	2019			g (NAD83):	2103798.1	_	_	<u> </u>	
Drilling		Cascad			_	(NAD83):	7616739.7	_ Client:	PG&E		
Drilling			•		Total D	-	417 ft bgs	_ Project:		W Remedy Pha	
Drill Ri			ic Truck Mou			le Diameter:	6-12 inches	_ Location:	PG&E	Topock, Needle	es, California
Drilling	Name:		nos / S. Vasq es / L. Amaya			o First Water: ng Method:	4 Inch X 10 ft Core Barrel	– Project N		RC000753.005	 51
Logge			M / CS / DC /			ng Interval:	Continuous	_ 1 10]60111	iumber.	10000733.000	<i>)</i>
Editor:		Grant V		7 (17)	-	ted to Well:		_			
				0 5	1						
Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS	USCS	Soil Description			Drilling Notes	Drilling Fluid
141										10-inch over the 6-inch.	
_ 142_											
_143_											
144	120						- 1				
145							100				
146	-										
	_										
-				Topock - Alluvium Deposits	SM	(148');	and silt; moist to wet; decrease in san	nd			
149	-	N. O'		Берозна							
150	-	No Sieve Samples Collected									
151			4							(151.0 - 157.0') Heaving sands	
_152_	120									came into casing during clean out to set the sample	
153										screen from 152 to 157 ft. bgs. Sampler	
154			MW-X-VAS- 152-157 (<0.17 U							screen was clogged with sand and had to	
155	-		ppb) 6/29/2019			(155)	some granules to very large pebbles,	angular to		be reinstalled.	
156			09:19			suban	gular; little silt; wet; increase in sand	angulal IU			
157 						(157.0	- 161.0') No recovery (NR)			(157.0 - 167.0') Loose sands	
158						$  \setminus /  $				fell out of core barrel into	
	72				NR					hopper when bagging core, 165 to 167 drlling got hard.	
160	4	. 11000	Initial O. I. C.	ie- "	n C:	/ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	a - halam arrang da C	al — -l-		lavel OW	
- Appre	viations	s: USUS = U	minea Soil Cl	assiticatioi	n Systen	$\eta$ , $\pi$ = reet, bo	s = below ground surface, am:	sı = above I	rnean se	ea ievel, GVV = 0	proundwater,

ARCADIS built assets					Bo	ring	Log		She	et: 9 of	21
Date S					Surface			Borir	na No.:	MW-91d	
	•	ted: <u>07/31/2</u>			Northin		•	_			
Drilling		Cascad			Easting		•	_ Client:	PG&E		
Drilling			<u> Drilling</u> iic Truck Mou		Total De Boreho	•	eter: 6-12 inches	_ Project:		V Remedy Phopock, Needl	
Drill Ri Driller			nos / S. Vasq				Water: 9.6 ft bgs	_ Location	. PG&E I	ороск, мееал	es, Calliornia
Drilling		·	es / L. Amaya		Samplin		_	- Proiect N	 Number: F	RC000753.00	 51
Logge			M/CS/DC		Samplir	-		<b>,</b>	_		
Editor:		Grant V	Willford		Conver	-					
Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic	USCS	USCS Class	Soil Description			Drilling Notes	Drilling Fluid
					NR	X					
161				<b></b>			(161.0 - 167.0') Topock - Alluvium Deposits;	Sandy lean c	lay with		
 _162_							gravel (CL); brown (7.5YR 4/4); medium plas to very coarse grained sand, angular to subar	ngular: little d	ranules		
102							to very large pebbles, angular to subangular, clasts composed of metadiorite; moist; hard;	blocky; some	rser		
163							meta-diorite clasts are weathered				
	72										
164				Topock - Alluvium	CL						
				Deposits							
165											
166											
 167											
107							(167. <mark>0 - 174.5') Topock - Alluvium Deposits;</mark> gravel (CL); reddish brown / moderate brown			(167.0 - 177.0') Smooth drilling.	
168							plasticity; some very fine to very coarse grain subangular; little granules to very large pebbl	ed sand, ang	ular to	eg.	
							subangular; little silt; coarser clasts compose moist; some meta-diorite clasts are weathere	ed of metadic			
169							mote, como mote dione ciacto are weathere	, u			
-		Na Ciava									
170		No Sieve Samples Collected		•							
		Collected		Topock - Alluvium	CL						
171			•	Deposits							
172											
	120										
173											
_											
174							(173.5'); moist to wet				
-							(174.5 - 177.0') Topock - Alluvium Deposits;	Silty sand (S	M)-		
175							reddish brown / moderate brown (5YR 4/4); very coarse grained, angular to subround; so	ery fine gràir	ned to		
-				Topock - Alluvium	SM		to medium pebbles, angular to subangular; li to very large pebbles, angular to subangular;	ttle clay; trac	e large		
176				Deposits	OW		to very rarge perbles, angular to subangular,	Wet			
477											
177				Topock - Alluvium	GP		(177.0 - 177.5') Topock - Alluvium Deposits;	Poorly grade	d gravel	(177.0 - 187.0') Normal drilling.	(177.0 - 327.0') 5395 gallons of
178				Deposits	٠	<u> </u>	(GP); boulders; wet (177.5 - 180.5') No recovery (NR)			Normal urlling.	water used; 4465 gallons of
	84					$  \setminus /  $					water
179	04				NR	X					recovered; 930 gallons of water
L _						$ / \setminus  $					lost
180	<u> </u>	. 11000	I:E 1 O " C:	: <b>c</b> ··		\ \ \	and have a bade of the	-1 - '		James Ott	
Appre	viations	s: USUS = L	ınıtıea Soll Cl	assiticatioi	n Systen	$n, \pi = te$	eet, bgs = below ground surface, ams	sı = above	mean sea	i ievei, GVV =	groundwater,

9/-	١RC	ADIS	Design & Consultancy for natural and built assets		Во	ring	Log	g		Sh	eet: 10 of	21
Date S	tarted:	06/20	/2019	_	Surface	Elevati	ion:	465.4 ft amsl	Borin	ua No .	: MW-91d	
Date C	omple	ted: <u>07/31</u>	/2019		Northing	g (NAD	83):	2103798.1	Doin	ig 110	<u> </u>	
Drilling	Co.:	Casca	ade		Easting	(NAD8	3):	7616739.7	Client:	PG&E		
Drilling			Drilling		Total De	•		•	Project:		W Remedy Ph	
Drill Ri			nic Truck Mou		Borehol				Location	PG&E	Topock, Needle	es, California
Driller I			mos / S. Vasq					9.6 ft bgs	<b>5</b>	. —	D0000750 00	- 4
Drilling			ores / L. Amaya		Samplin	•			Project N	lumber:	RC000753.00	51
Logge Editor:			SM / CS / DC / Willford	AIVI	Samplin Convert	•		Continuous				
Luitoi.		Giani	VVIIIIOIU		T	Eu io v	v Cii.					
Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	Code	USCS Class		Soil Description			Drilling Notes	Drilling Fluid
				L	NR	$\geq$						
181 182 183 184 185 186	84	MW-X-VAS- 182-187 (<0.17 U ppb) 6/29/2019 15:28			SM		(SM); r to very mediur subang subang (183.5' subang	- 187.0') Topock - Alluvium Deposits; Si eddish brown / moderate brown (5YR 4/coarse grained, angular to subround; litting pebbles, subangular to subround; litting pular; trace clay; trace large to very large gular; wet  ); little granules to very large pebbles, angular; little clay ); little granules to large pebbles, angular lay	/4); very fine tle granules e silt; trace e pebbles	e grained to		
187 188 189 190 191 192 193 	120	No Sieve Samples Collected		Topock - Alluvium Deposits  Topock - Alluvium Deposits  Topock - Alluvium Deposits  Topock - Alluvium Deposits  Topock - Alluvium Deposits			gravel coarse large p compoo pebble (188.0 (ML); rocoarse pebble compoo (189.5 (SM); r 3/4); we some s subrou moist t (190.0 gravel very fin granule very stit (191.5	- 189.5') Topock - Alluvium Deposits; Saed (2.5YR 4/6); medium plasticity; some grained sand, angular to subround; little s, angular to subangular; little clay; coarsed of metadiorite; moist to wet; very stii - 190.0') Topock - Alluvium Deposits; Sieddish brown (2.5YR 4/4) to dark reddis ryr fine grained to very coarse grained, a silt; little granules to very large pebbles, and; little clay; coarser clasts composed to owet - 191.5') Topock - Alluvium Deposits; Sa (CL); reddish brown (2.5YR 4/4); mediur te to very coarse grained sand, angular to set to small pebbles, angular to subround ff - 192.5') Topock - Alluvium Deposits; Sa (TL); reddish brown (2.5YR 4/4); mediur te to very coarse grained sand, angular to subround ff - 192.5') Topock - Alluvium Deposits; Sa	ne grained tay; little grar coarser clas metadiorit andy silt with early fine to be granules to ser clasts fill sand with brown (2. angular to si angular to of metadior andy lean clasticity; to subround dright little silt; randy elasticity; andy elasticity; and elastic	o very jules to sts te h gravel o very o large h gravel 5YR ubround; ite; ay with some ; little moist; silt with	(187.0 - 197.0') Normal drilling.	
194 195 196 197 198 199	120			Topock - Alluvium Deposits  Topock - Alluvium Deposits	ML ML		fine to granule coarse (192.5 (ML); li very comediur compo	(MH); reddish brown (2.5YR 4/4); high p very coarse grained sand, angular to subset to medium pebbles, angular to subrour clasts composed of metadiorite; moist; – 197.0') Topock - Alluvium Deposits; Saght red (2.5YR 7/6); medium plasticity; sharse grained sand, angular to subround; n pebbles, angular to subangular; little csed of metadiorite; moist; green staining – 199.0') Topock - Alluvium Deposits; Saght red (2.5YR 4/4); low plasticity; n grained sand, angular to subangular; little charse grained sand angular to subangular; little charse grained sand angular to subangular.	bround; little und; little cla ;; very stiff ;; very stiff some very fil ;; little granu- clay; coarse g andy silt wit ;; some very tle granules clay; trace c	h gravel ine to alles to r clasts  h gravel fine to to oarse to		
200	iations	· 11808 -	Unified Soil C	Topock - Alluvium Deposits	CL		gravel very fin	- 202.0') Topock - Alluvium Deposits; Sa (CL); reddish brown (2.5YR 4/4); mediur e to very coarse grained sand, angular t	m plasticity; to subround	; some ; little	ea level GW -	groundwater

9/	PARCADIS Design & Consultancy for natural and built assets			Во	ring	Log	S	heet: 11 of	21	
	Started:			•	Surface		•	Boring No	.: <u>MW-91d</u>	
		ted: <u>07/31/</u>			Northing	- '	·			
Drilling		Casca			Easting	•	•	Client: PG&E		
_	Metho		Drilling		Total De Borehol	•	417 ft bgs	Project: Final ( Location: PG&E	GW Remedy Ph	
	ig Type Name:		<u>nic Truck Mou</u> nos / S. Vasqı				eter: <u>6-12 inches</u> Vater: <u>9.6 ft bgs</u>	Location. PG&E	: Topock, Needi	es, Calliornia
Drilling			res / L. Amaya		Samplin		_	Proiect Number	: RC000753.00	 51
Logge			SM / CS / DC /		Samplin	•				-
Editor		Grant '	Willford		Convert	ed to V	/ell: ⊠ Yes □ No			
Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	Code	USCS Class	Soil Description		Drilling Notes	Drilling Fluid
 _201_ 				Topock - Alluvium Deposits	CL		granules to large pebbles, angular to subroun clasts composed of metadiorite; moist; very si			
202 203 204 205 206 207	120					(202.0 - 227.0') Topock - Alluvium Deposits; S(SM); red (2.5YR 4/6); very fine grained to ver angular to subround; some silt; little granules angular to subround; little clay; coarser clasts metadiorite; moist  (204'); little silt; trace clay; moist to wet  (204.5'); some silt; trace very large pebbles, s subangular; moist to wet	y coarse grained, to large pebbles, composed of	(207.0. 247.01)		
208	- 108	No Sieve Samples Collected	MW-X-VAS- 207-212 (<0.17 U ppb) 6/30/2019 13:28	Topock - Alluvium Deposits	SM		(209'); some silt; moist to wet; no clay, weather pebbles  (210.5'); little clay; moist to wet; decrease in s	Ü	(207.0 - 217.0") Normal drilling, approximately 6 inchs of sample fell out of core barrel at ~208.5 during bagging, material was the same as in the core. Groundwater sample interval 207 to 212 ft. bgs screened across sandy zone 207 to 209 ft bgs.	

ARCADIS Design & Consultancy for natural and built assets					Во	ring Lo	g		Shee	et: 12 of	21
Date S						Elevation:	465.4 ft amsl	Borin	g No.:	MW-91d	
	-	ted: <u>07/31/2</u>			-	g (NAD83):	2103798.1	_			
Drilling		Cascac			_	(NAD83):	7616739.7	_ Client:	PG&E		
Drilling			<u> Drilling</u> iic Truck Mou		Total De	epth: e Diameter:	417 ft bgs	_ Project:		V Remedy Phopock, Needle	
Drill Ri		· · · · · · · · · · · · · · · · · · ·	nos / S. Vasqu			e Diameter: o First Water	6-12 inches	_ Location:	PG&E I	ороск, ічееці	es, Calliornia
Drilling			es / L. Amaya		-	g Method:	4 Inch X 10 ft Core Barrel	<ul> <li>Project N</li> </ul>	umber: F	RC000753.00	 51
Logge			M / CS / DC /		-	g Interval:	Continuous		<u>.</u>		
Editor:		Grant V			-	ed to Well:					
	2			is E	1						
Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS	Class	Soil Description			Drilling Notes	Drilling Fluid
	114			Topock - Alluvium Deposits	SM						
228 229 230 231 231 232 233 234 235 236 237	111.6	No Sieve Samples Collected		Topock - Alluvium Deposits	SM	reddis grainin pebbl comp granu (230')	2 - 240.0') Topock - Alluvium Deposits; sh brown (2.5YR 4/4); very fine grained ed, angular to subround; some silt; little es, angular to subangular; trace clay; cosed of metadiorite; moist; iron oxide s les and pebbles  ; increase in silt, decrease in sand  ; moist to wet	to very coarse granules to la oarser clasts	arge	(237.0 - 237.0') Normal drilling. (232.0 - 237.0') Hard drilling. (237.0 - 245.0') Normal drilling.	
_238_ 239 240_	114						go = below ground surface am				

ARCADIS formation of the control of				Во	ring	Log			She	et: 13 of	21	
Date S					Surface	Elevat		4 ft amsl	Borir	na No.:	MW-91d	
	•	ted: <u>07/31/</u>			Northin		,	3798.1	_			
Drilling		Casca			Easting		•	6739.7 * ·	_ Client:	PG&E		
Drilling					Total D	•		ft bgs	_ Project:		N Remedy Ph	
Drill Ri Driller			<u>nic Truck Mou</u> mos / S. Vasq		Boreho		eter: <u>6-12</u> Vater: <u>9.6 f</u>	t has	_ Location	: PG&E I	opock, Needl	es, California
Drilling			res / L. Amaya		Samplin			ch X 10 ft Core Barrel	– Project N	Jumher F	RC000753.00	 51
Logge			SM / CS / DC		Samplir	-		tinuous	_ 1 10,00011	diliber. <u>I</u>	10000100.00	01
Editor:			Willford	, , , , , , , , , , , , , , , , , , , ,	Conver	-			_			
	>			ی ج								
Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS	USCS		Soil Description			Drilling Notes	Drilling Fluid
241 242 243 244 245	114		Topock - Alluvium Deposits	SM		(SM); reddish grained, angul large pebbles, composed of reduced of	l') Topock - Alluvium Deposits; brown (2.5YR 4/4); very fine gr lar to subround; some silt; little angular; trace content of the subrangular; trace content of the subrangular of the sub	rained to very granules to v clay; coarser of granules and	coarse erry clasts pebbles			
246 246 			MW-X-VAS- 245-255				(247 0. 254 0	N. Torrek Allusium Denesite.	Silty cond (Si	(4):	(245.0 - 247.0') Hard drilling.	
248	120	No Sieve Samples Collected	243-255 (<0.033 U ppb) 7/1/2019 13:35	Topock - Alluvium Deposits	SM		reddish brown grained, angul large pebbles, coarser clasts granules and		to very coarsi granules to v ay; trace mica sist; weathered	e ery a; I	(247.0 - 257.0') Normal drilling.	
255 256 257 258 259	5			Topock - Alluvium Deposits	SM		(SM); reddish to very coarse granules to ve moist; mottled pebbles (256'); wet	i') Topock - Alluvium Deposits; brown (2.5YR 4/4) little (7.5R a grained, angular to subround; bry large pebbles, angular to sul d; iron oxide staining; weathered	4/6); very fine some silt; littl bangular; trad d granules an	e grained e ce clay; d	(257.0 - 267.0') Normal drilling, water was observed to contain more bubbles during drilling. Possibly due to increased	
260					SM		(259.5 - 269.0	') Topock - Alluvium Deposits;	Silty sand (Si	M);	specfic conductivity or	
	viations	· USCS =	Unified Soil C	assification	n Systen	2 ft = fe	et has = he	elow ground surface am	sl = ahove	mean sea		aroundwater

	ARC	ADIS	Design & Consultancy for natural and built assets		Во	ring	Log	g			She	eet: 14 of	21
Date	Started	06/20/2	2019		Surface	Elevati	ion:	465.4 ft ams	sl	Borii	na No.:	MW-91d	
	-	ted: <u>07/31/2</u>			Northing			2103798.1		_			
	ng Co.:	<u>Cascac</u>			Easting	•	3):	<u>7616739.7</u>		_ Client:	PG&E		
	ng Metho		•		Total De	-		417 ft bgs		_ Project:		W Remedy Ph	
	Rig Type		ic Truck Mou		Borehol			6-12 inches		_ Location	: <u>PG&amp;E</u>	Topock, Needle	es, California
I	er Name:		nos / S. Vasq		-			9.6 ft bgs	ft Core Barrel	- Droiget N		RC000753.005	<u> </u>
Log	ng Asst:		es / L. Amaya M / CS / DC		Samplin Samplin	-		Continuous	IL COIE Dallel	_ Projecti	vullibel.	KC000755.000	)
Edit		Grant V		AIVI	Convert	•		× Yes	No	_			
					1								
Depth	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	Code	USCS		(0.5)(0.4)	Soil Description			Drilling Notes	Drilling Fluid
	- 120 - 120 - 33 - 120 - 33 120 - 33 120 - 34 120	No Sieve Samples Collected	Sample ID	Topock - Alluvium Deposits  Topock - Alluvium Deposits	SM	SU E	(269.0 (SM); r grainec granule little clamoist;	- 327.0') Topock eddish brown (2. d to very coarse g es to very large pay; trace angular; mottled; weather	a Alluvium Deposits; coarser clasts comped granules and pebbers, angular to subside granules and pebbers, angular to subside granules to small of granules	Silty sand wi ge pebbles, a posed of met oles  Silty sand wi R 4/6); very file bround; som bangular; soi osed of meta cobbles	th gravel ne e me silt; adiorite;	salinity.  (267.0 - 277.0') Normal drilling, during reaming with 10-inch removed 6-inch casing and attempted to dry drill due to reduce water use.	
	, , _												
279 279 280	120												

9/	4RC	ADIS	Design & Consultancy for natural and built assets		Во	ring Lo	g	She	eet: 15 of	21
Date S	Started:	06/20/2	2019		Surface	Elevation:	465.4 ft amsl	Boring No.:	MW-91d	
	•	ted: <u>07/31/2</u>	2019		Northing	g (NAD83):	2103798.1		<u></u>	
Drilling	-	<u>Cascac</u>			_	(NAD83):	<u>7616739.7</u>	_ Client: <u>PG&amp;E</u>		
	Metho		•		Total De	-	417 ft bgs	-	W Remedy Pha	
	ig Type		ic Truck Mou			e Diameter:	6-12 inches	_ Location: <u>PG&amp;E</u>	Topock, Needle	es, California
Drilling	Name:		nos / S. Vasq es / L. Amaya		-	อ First wate ig Method:	r: 9.6 ft bgs 4 Inch X 10 ft Core Barrel	_	DC000753 006	
Logge			M / CS / DC /		-	ig interiod. ig Interval:	Continuous	_ Froject Number.	<u>KC000733.000</u>	)
Editor		Grant V		7 (17)	-	ed to Well:		_		
				٥٥						
Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS Code	Class	Soil Description		Drilling Notes	Drilling Fluid
							1	0	(281.0 - 287.0') Rough drilling.	
_283_	4					(202	0 - 285.0'); dry			
	120					(265.	0 - 265.0 ), diy			
285	-						.0			
	_									
288_							red / moderate reddish brown (10R 4// R 4/4); trace clay; dry to moist; decreas		(287.0 - 297.0') Rough drilling.	
289_							•			
		No Sieve		Topock -						
	_	Samples Collected		Alluvium Deposits	SIVI					
292	]			X		(291'	); decrease in silt, increase in sand			
	120									
293_			MW-X-VAS-			(293'	); moist to wet			
_294_	1		292-297 (<0.17 U							
_295_			ppb) 7/2/2019 14:45							
296										
									(297.0 - 307.0')	
									Rough drilling.	
	120									
300						(299.	5') reddish brown (2.5YR 4/4) some red	I / moderate reddish		
	viotions	·· IISCS = I	Inified Soil Cl	accificatio	n Syston	tt = foot b	as = below around surface, am	el = abovo moan eo	a lovol GW = c	roundwater

9/	<b>ARC</b>	ADIS	Design & Consultancy for natural and built assets		Во	ring	Log	g			She	eet: 16 of	21
Date S	Started	06/20/2	2019		Surface	Elevati	ion:	465.4 ft amsl		Borin	na No.:	MW-91d	
l l	-	ted: <u>07/31/2</u>			Northing			2103798.1		_			
Drilling		<u>Cascad</u>			Easting	•	3):	7616739.7		_ Client:	PG&E		
Drilling			•		Total De	-		417 ft bgs		Project:		N Remedy Ph	
Drill Ri			ic Truck Mou		Borehol			6-12 inches		Location	: PG&E	Fopock, Needle	es, California
Driller Drilling			nos / S. Vasq es / L. Amaya		Samplin			9.6 ft bgs 4 Inch X 10 ft C	ore Barrel	- Project N	lumber: I	RC000753.005	51
Logge			M / CS / DC /		Samplin	-		Continuous	OIC Ballel	_ 1 10,0001	diriber. <u>i</u>	110000133.000	<i>)</i>
Editor		Grant V		7 (17)	Convert	-		× Yes □ No	 0	-			
				0 5									
Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS	USCS	<b></b>		oil Description			Drilling Notes	Drilling Fluid
	120	No Sieve Samples Collected		Topock - Alluvium Deposits	SM		(303'); little sil	(10R 4/6); some grangular; decrease sand little granules to very t; increase sand some granules to very ular; trace angular to brown (10R 4/6); so the brown (10R 4/6); so	ry large pebbles, and ry large pebbles, and by subangular; dry to suba	angular to sub	angular;	(307.0 - 317.0') Rough drilling.	
318_ 318_ 319_ 320_	120											g	
/1 <sup>-</sup> -			<del></del>										

9/	<b>ARC</b>	<b>ADIS</b>	Design & Consultancy for natural and built assets		Во	ring	Log		Sheet: 17 of	21
Date S	Started:	06/20/	/2019		Surface	Elevat	ion: 465.4 ft amsl	Boring	No.: <u>MW-91d</u>	
Date C	Date Completed: <u>07/31/2019</u>			Northing	g (NAD	83): <u>2103798.1</u>	Donnig	140 <u>14144-314</u>		
Drilling Co.: <u>Cascade</u> I			Easting	(NAD8	33): <u>7616739.7</u>	Client: PO	G&E			
Drilling	Metho	od: <u>Sonic</u>	Drilling		Total De	epth:	417 ft bgs	Project: Fi	<u>nal GW Remedy Ph</u>	ase 1
Drill Ri	ig Type		<u>nic Truck Mo</u>		Borehol			Location: Po	G&E Topock, Needle	es, California
	Name:		mos / S. Vasq	•	•		Water: <u>9.6 ft bgs</u>	-		
Drilling			res / L. Amay		Samplin	•		Project Num	ber: <u>RC000753.00</u>	51
Logge			SM / CS / DC	<u>/ AM</u>	Samplin	-		-		
Editor:		Grant	Willford		Convert	ed to V	Vell: ⊠ Yes □ No			
Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS	USCS	Soil Description		Drilling Notes	Drilling Fluid
	120			Topock - Alluvium Deposits	SM		(321'); little silt; dry to moist; iron oxide staining	9	(323.0 - 326.0') Rough drilling. (326.0 - 327.0') Normal drilling.	
328				Topock - Alluvium Deposits	МН		(327.0 - 328.2') Topock - Alluvium Deposits; ( with sand (MH), reddish brown (2.5YR 4/4); m some granules to very large pebbles, angular very fine to very coarse grained sand, subang little clay; some coarser clasts composed of r	nedium plasticity; to subround; little ular to subround;	Normal Drilling.	(327.0 - 412.0') No water used
329 		No Sieve		Topock - Alluvium Deposits	SM		medium stiff; moderate cementation (328.2 - 329.9') Topock - Alluvium Deposits; S (SM); reddish brown (2.5YR 4/4); very fine gra- cobbles, subangular to subround; low plastici- granules to large pebbles, angular to subroun	ained to small tv: some silt: little	,	
331	1200	Samples Collected		Topock - Alluvium Deposits	МН		weak cementation (329.9 - 334.0') Topock - Alluvium Deposits; ( with sand (MH); reddish brown (2.5YR 4/4); r some granules to large pebbles, angular to su fine to very coarse grained sand, subangular to clay, moist; medium stiff; weak cementation (331'); trace clay; increase in granules and pe silt and clay	nedium plasticity; ubangular; little ve to subround; little	ery	
_333_										
_334_						╁╂╂╂	(334.0 - 337.5') Topock - Alluvium Deposits; S	Sandy elastic silt	with	
							gravel (MH); reddish brown (2.5YR 4/4); medi fine to very coarse grained sand, subangular	to subround; little	.	
_335_							granules to very large pebbles, angular to sub moist; medium stiff; weak cementation	oangular; trace cla	ay;	
_ 336_				Topock - Alluvium	МН					
				Deposits						
337										
აა/				i					(337.0 - 345.0')	
220			MW-X-VAS-	Topock - Alluvium	ML		(337.5 - 338.0') Topock - Alluvium Deposits; (			
_338_			337-342 (<0.17 U	Deposits	/	4.4.	(ML); reddish brown (2.5YR 4/4); low plasticit very large pebbles, angular to subangular; little	e very fine to very	y   100.00g	
_339_	96		ppb) 7/11/2019 11:30	Topock - Alluvium Deposits	ML		coarse grained sand, subangular to subround medium stiff; weak cementation (338.0 - 341.0') Topock - Alluvium Deposits; ( (ML); reddish brown (2.5/R 4/4); medium pla granules to very large pebbles, angular to sub	Gravelly silt with s	sand	
340 Abbre	viations	: USCS = !	Unified Soil C	lassification	 n Systen	<u> [d  b  ]</u> า ft = fe	eet. bas = below ground surface. ams		<u> </u>	roundwater

9/	<b>ARC</b>	ADIS	Design & Consultancy for natural and built assets		Во	ring	g Log	SI	heet: 18 of	21
Date S	tarted:	06/20	/2019		Surface	Elevat	tion: 465.4 ft amsl	Boring No.	· MW-91d	
•			Northing	g (NAD	D83): <u>2103798.1</u>	_ Borning No	<u></u>			
I		Easting	(NAD8	83): <u>7616739.7</u>	_ Client: PG&E					
Drilling Method: <u>Sonic Drilling</u> T			Total De	epth:	417 ft bgs	•	GW Remedy Ph			
Drill Rig Type: <u>Prosonic Truck Mount</u> E			Borehol			_ Location: <u>PG&amp;E</u>	Topock, Needle	es, California		
Driller I			mos / S. Vasq		•		Water: 9.6 ft bgs	_		
Drilling			res / L. Amaya		Samplin	•		_ Project Number:	RC000753.00	51
Logger			SM / CS / DC	<u>/ AM</u>	Samplin	-		_		
Editor:		<u>Grant</u>	Willford		Convert	ed to V	Well: ⊠ Yes □ No			
Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	SOSO	USCS Class	Soil Description		Drilling Notes	Drilling Fluid
			MW-X-VAS- 337-342 (<0.17 U	Topock - Alluvium Deposits	ML		Ifine to very coarse grained sand, subangula clay; moist; stiff; moderate cementation (339'); wet to moist; weak cementation; dec pebbles, increase in silt			
			ppb) 7/11/2019 11:30	Topock - Alluvium Deposits	GM		(341.0 - 342.5') Topock - Alluvium Deposits (GM); reddish brown (2.5YR 4/4); granules angular to subround; some fine to very coar subangular to subround; little silt; trace clay	to very large pebbles, se grained sand,		
343 	96			Topock - Alluvium Deposits	SM		(342.5 - 345.0') Topock - Alluvium Deposits (SM); reddish brown (2.5YR 4/4); medium g grained, angular to subround; some granule pebbles, angular to subround; little silt; trace cementation	rained to very coarse as to very large		
345				Topock - Alluvium Deposits	ML		cementation	city; some small to e to coarse grained soft; weak	(345.0 - 352.0') Normal drilling.	
_348_  _349_				Topock - Alluvium Deposits	MH		(348.0 - 348.3') Topock - Alluvium Deposits with sand (MH); light brown (7.5YR 6/4); me clay; little granules to medium pebbles, ang very fine to fine grained sand, subangular to cementation	dium plasticity; some ular to subround; trace round; dry; soft; weak		
_350	144	No Sieve Samples Collected		Topock - Alluvium Deposits	ML		(348.3 - 352.0') Topock - Alluvium Deposits (ML); reddish brown (2.5YR 4/4); low plastic large pebbles, angular to subround; little finsand, subangular to subround; moist to dry; cementation	city; some small to e to coarse grained		
352 353 354				Topock - Alluvium Deposits	SW-SM		(352.0 - 355.0') Topock - Alluvium Deposits with silt and gravel (SW-SM); reddish browr grained to medium grained, subangular to s granules to very large pebbles, angular to si clay; trace small cobbles, subangular; mois	n (2.5YK 4/4); very fine ubround; little ubround; little silt; little	(352.0 - 357.0') Rough drilling.	
355 356 				Topock - Weathered Bedrock - conglomerat	IVIH		(355.0 - 357.0') Topock - Weathered Bedror Gravelly elastic silt with sand (MH); reddish medium plasticity; some granules to very lar subround; little very fine to fine grained sand subround; little clay; little coarser clasts con dry to moist; stiff; moderate cementation	brown (2.5YR 4/4); rge pebbles, angular to d, subangular to		
358	60			Topock - Weathered Bedrock - conglomera	IVIL		. (357.0 - 359.0') Topock - Weathered Bedroi Sandy silt with gravel (ML); reddish brown (2 plasticity; some very fine to medium grained subround; little granules to very large pebble subround; little clay; moist; medium stiff; we	2.5YR 4 <sup>7</sup> 4); low I sand, subangular to es, angular to aak cementation	(357.0 - 362.0') Rough drilling, slough in 4-inch rathole advance 6-inch for clean out.	
	dation-	. 11000	Unified Coll O	Topock - Weathered Bedrock -	IVIL		(359.0 - 374.0') Topock - Weathered Bedron Sandy silt with gravel (ML); reddish brown (2 plasticity; some very fine to very coarse grain	2.5YR 4/4); low ned sand, subangular	and lovel CW =	

9/	ARC	ADIS	Design & Consultancy for natural and built assets		Во	ring	Log	J		She	eet: 19 of	21
Date S	Started:	06/20/2	2019		Surface	Elevat	ion:	465.4 ft amsl	Borin	u No .	MW-91d	
Date C	Comple	ted: <u>07/31/2</u>	2019		Northing	g (NAD	83):	2103798.1	Воли	ı <b>g</b> 110	<u> </u>	
Drilling	Co.:	Cascac	de		Easting	(NAD8	3):	7616739.7	Client:	PG&E		
Drilling Method: Sonic Drilling				Total De	epth:		417 ft bgs	Project:	Final G	W Remedy Ph	ase 1	
Drill Ri			<u>ic Truck Μοι</u>		Borehol			6-12 inches	Location:	PG&E	<u> Topock, Needle</u>	es, California
Driller			<u>ios / S. Vasq</u>		•			9.6 ft bgs		-		
Drilling			es / L. Amaya		Samplin	-		4 Inch X 10 ft Core Barrel	Project N	lumber: .	RC000753.005	51
					Samplin	-		Continuous	:			
Editor:		Grant V	Villford		Convert	ed to V	Vell:					
Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS	USCS		Soil Description			Drilling Notes	Drilling Fluid
361 362 363	60			conglomerat	e		subroun metadio (361'); n (361.5'); decreas	ound; little granules to very large pebbl d; little clay; trace coarser clasts com- prite; dry to moist; soft moist to wet ; moist to wet; soft; weak cementation te in silt  dry to moist	posed of		(362.0 - 367.0') Soft drilling, slough in 4-inch rathole advance 6-inch for clean	
364 365 366 367	120			Topock - Weathered Bedrock -	IVIL		1	7/3/			(367.0 - 372.0')	
368		No Sieve Samples Collected		conglomerat	e		(369'); c decreas	dry to moist; soft; weak cementation; ir e in silt	ncrease in sa	ind,	(372.0 - 377.0')	
373 374 375 376	60			Topock - Weathered Bedrock - conglomerat	SIVI		Silty sar grained granules	377.0') Topock - Weathered Bedrock nd with gravel (SM); reddish brown (2.: to very coarse grained, subangular to s to very large pebbles, angular to sub nedium dense; moderate cementation	5YR 4/4); find subround; so round; trace	e ome	Normal drilling.	
377 378 379 380 Abbrev	60	· 1 909 - 1	Initiad Soil C	Topock - Weathered Bedrock - conglomerat Topock - Weathered Bedrock - conglomerat	GM e		Well gra (2.5YR a very fine little silt; (377.5 - Silty gra to very li coarse of trace co	377.5') Topock - Weathered Bedrock aded gravel with silt and sand (GW-GI 4/4); granules to boulders, subangular to very coarse grained sand, subang; dry to moist; weak cementation 382.0') Topock - Weathered Bedrock wel with sand (GM); reddish brown (2. arge pebbles, angular to subround; litt grained sand, subangular to subround parser clasts composed of metadiorite as = below ground surface, ams	M); reddish b to subround ular to subro conglomer 5YR 4/4); gra de very fine to ; little silt; tra ; dry to moist	ate; anules o very ce clay;	(377.0 - 382.0') Normal drilling.	nroundwater

9/	<b>ARC</b>	ADIS	Design & Consultancy for natural and built assets		Bo	ring	Log	Sh	neet: 20 of	21
Date S	Started:	06/20/	2019		Surface	Elevati	on: 465.4 ft amsl	Boring No.	: MW-91d	
Date Completed: <u>07/31/2019</u>					Northin					
Drilling Co.: Cascade					Easting	•	•	Client: PG&E		
•					Total D	•	417 ft bgs	•	SW Remedy Ph	
Driller	• • •		<u>nic Truck Mou</u> nos / S. Vasq		Boreho		eter: <u>6-12 inches</u> Vater: <u>9.6 ft bgs</u>	Location: PG&E	тороск, мееаю	es, California
Drilling			res / L. Amay		Samplin			Project Number	RC000753 005	 51
Logge			SM / CS / DC		Samplir	•		r reject rtamber.	110000100.000	· ·
Editor:			Willford		Conver	-				
_	2			is e						
Depth (ft)	Recovery (in)	Sieve Sample ID	Groundwater Sample ID	Geologic Formation	USCS	USCS	Soil Description  moderate cementation		Drilling Notes	Drilling Fluid
	60			Topock - Weathered Bedrock -	GIVI		moderate cementation			
382				conglomerat	le	500	(000 0 000 0) T		(000.0000.01)	
_ 383_							(382.0 - 390.0") Topock - Weathered Bedrock Gravelly lean clay with sand (CL); reddish bro medium plasticity; some granules to very large subround; little fine to coarse grained sand, su subround; little silt; moist to wet; soft; weak ce	wn (2.5YR 4/4); e pebbles, angular to ubangular to	(382.0 - 390.0') Normal drilling.	
384			MW-X-VAS- 382-387							
_ 385_			(<0.17 U ppb) 7/13/2019 14:43					*		
			14.43	Topock - Weathered						
	132			Bedrock - conglomerat	CL		(386'); moist to wet; soft; weak cementation; d and pebbles and sand, increase in silt and cla			
_387										
_388										
_389_										
390		No Sieve Samples		•			(390.0 - 400.0') Topock - Weathered Bedrock	- conglomerate:	(390.0 - 393.0')	
		Collected					Gravelly lean clay with sand (CL); reddish bromedium plasticity; some silt; little granules to angular to subround; little fine to very coarse of	wn (2.5YR 4/4); large pebbles,	Rough drilling.	
				X			subangular to subround; moist; soft; weak cen	nentation		
_392_							(392'); moist; soft; weak cementation; increase pebbles, decrease in clay	e in granules and		
_393_							(392.7'); moist; soft; weak cementation (393'); moist; soft; weak cementation; increase pebbles, decrease in sand and clay	e in granules and	(393.0 - 403.0') Normal drilling.	
_394_										
_395_				Topock - Weathered Bedrock -	CL					
396				conglomerat	e					
	162						(396.5'); moist; soft; weak cementation; decre pebbles, increase in silt and clay	ase in granules and		
							possible, mercade in one and day			
_398_										
_399_							(398.5'); moist; soft to medium stiff; weak cem granules and pebbles, decrease in silt	nentation; increase in		
400										
400 Abbres	viations	: LISCS = I	Inified Soil C	lassification	Systen	<u> </u>	et has = helow around surface ams	l = ahove mean s	a level GW - (	uroundwater

Date Completed: 05/20/2019	9/	<b>ARC</b>	CADIS	Design & Consultancy for natural and built assets		Во	ring	Log		She	eet: 21 of	21
Drilling Method: Drilling Asset: Drilli									Borin	g No.:	MW-91d	
Dalling Method: Dallier Name:							- '	•		DOSE		
Driller Name:  E. Ramos / S. V. Saeguez  Drilling Asst: Conger: G. L. Ramos / S. V. Saeguez  O. Einces / L. Annaya. Sampling Method: All n. N. 10 ft Core Barrel Project Number: RC000753,0051  Sampling Interval: Continuous  Continuous  Sampling Interval: Continuous  Sampling Interval: Continuous  Sampling Interval: Continuous  Continuous  Sampling Interval: Continuous  Continu						-	•	•	_		A/ Dave adv Db	1
Deller Name:  C. Delines J. A. Manaya  Sampling Method:  Gara Willford  Converted to Welk:  Service Sample Countwister  Service Sample Countw	_						•	G	-		-	
Dalling Asst. Q. Flores /L Annaya. Sampling Internal. Continuous Sampling Internal. Continuous Sampling Internal. Sampling Inte		• • •							_ Location.	PG&E I	гороск, пееак	es, Calliornia
Logger: GLISM/CSI/DCIAM Sample D Converted to Well: Ves No  Simple D Converted to Well: Ves No  Sample D Converted to Well: Ves No  Converted to Well: Ves No  Solution of Converted to Well: Ves No  Occupation of Converted to						•			- Project N	umber l	RC000753 004	 51
Editor: Grant Willford Converted to Well: Very Sold Sold Description  Size Sample D Converted to Well: Very Sold Description  From Stample D Converted to Well: Very	_			•		•	•		_ 1 10,00011	umber. <u>i</u>	10000733.000	<i>7</i> I
Simple D Groundwaler Sample D Groundwaler GL Ground							•		=			
Topock   Weathered Call						1	1	T				
Weighbrook Bedrock - Components of the properties of the propertie	Depth (ft)	Recovery (in)				USCS	USCS	Soil Description			Drilling Notes	Drilling Fluid
Topock- Weathered GC Onglomerate Topock- Weathered Betrox - Conglomerate Topock- Debrox - Conglomerate Topock- Weathered Betrox - Conglomerate Topock- Debrox - Conglomerate Topock- Debrox - Conglomerate Topock- Weathered Betrox - Conglomerate Top	401				Weathered Bedrock -			Gravelly lean clay with sand (CL); reddish bro medium plasticity; some silt; little granules to	own (2.5YR 4/ large pebbles	4); s,		
Bedrook- programmerated Topock- Westhered Topock- Westhered SM Bedrook- Performerate A00.  162  A01.  A02.  A03.  A04.  A05.  A06.  A07.  A08.  A09.  A09. A					Topock -	1		subangular to subround; trace small cobbles,				
Weathered Beforck	402				Bedrock - conglomerate			(401.0 - 402.2') Topock - Weathered Bedrock Clayey gravel with sand (GC); reddish brown	(2.5YŘ 4/4);			
Declared to the configuration of the configuration	403				Weathered	M	600	very coarse grained sand, subangular to subr	ound; little sil	t; little		
Golden	_403_								orite; moist; v	veak		
Bedrock donolomerate Topock Weathered Education Configurate Complements Topock Weathered Samples Conjugrate Complements Topock Weathered Samples Conjugrate Conjugrat	404	162				GC	62X				Soft drilling.	
405.  406.  407.  408.  AND Sieve Samples Collected Bedrock - Meathered Bedrock - conglomerate Samples Collected Bedrock - Conglomerate Collected Bedrock - Conglomerate Samples to subround; little sit; little clay, mist, weak comentation of the Samples Collected Bedrock - Conglomerate Collecting Samples Coll					Bedrock -			plasticity; some granules to very large pebble	s, angular to			
Weathered Bedrock- Conglomerate Topock- Weathered Bedrock- Conglomerate SM  A08.  No Sieve Samples Collected  A10.  A11.  A12.  A12.  A13.  A14.  A14.  A14.  A15.  A16.  A17.  A17.  A18.  A17.  A18.  A18.  A19.  A20.  A20. A20.	405				Topock -			to subround; little clay; moist; soft; weak cem	entation			
406. 407. 408. No Sieve Samples Collected Page Collected Bedrock - Conglomerate Bedrock - Conglomerate Bedrock - Conglomerate Bedrock - Conglomerate State Bedroc						SM				ate;		
Composition	406					e						
407  408  No Sieve Samples Collected  A10  410  A11  A12  411  412  415  A17  A18  Bedrook - Conglomerate Collected  AWA-XA/S- 412-417 (-0.17 U ppb) 7/15/2319 12/43  Topock - Weathered Bedrook - conglomerate Congl	5					01		clay; little coarser clasts composed of metadi				
Topock- Weathered Bedrock conglomerate  410  411  412  414  415  416  417  418  And Silva and with grave (SL): propock - Weathered Bedrock - conglomerate; Silv sand with grave (CL): propock - Weathered Bedrock - conglomerate Bedrock - conglomerate Samples Collected  Topock - Weathered Bedrock - conglomerate; Silv sand with grave (CL): propock - Weathered Bedrock - conglomerate; Silv sand with grave (Sl): propock - Weathered Bedrock - conglomerate; Silv sand with grave (Sl): propock - Weathered Bedrock - conglomerate; Silv sand with grave (Sl): propock - Weathered Bedrock - conglomerate; Silv sand with grave (Sl): propock - Weathered Bedrock - conglomerate; Silv sand with grave (Sl): propock - Weathered Bedrock - conglomerate; Silv sand with grave (Sl): propock - Weathered Bedrock - conglomerate; Silv sand with grave (Sl): propock - Weathered Bedrock - conglomerate; Silv sand with grave (Sl): propock - Weathered Bedrock - conglomerate; Silv sand with grave (Sl): propock - Weathered Bedrock - conglomerate; Silv sand with grave (Sl): propock - Weathered Bedrock - conglomerate; Silv sand with grave (Sl): propock - Weathered Bedrock - conglomerate; Silv sand with grave (Sl): propock - Weathered Bedrock - conglomerate; Silv sand with grave (Sl): propock - Weathered Bedrock - conglomerate; Silv sand with grave (Sl): propock - Weathered Bedrock - conglomerate; Silv sand with grave (Sl): propock - Weathered Bedrock - conglomerate; Silv sand with grave (Sl): propock - Weathered Bedrock - conglomerate; Silv sand with grave (Sl): propock - Weathered Bedrock - conglomerate; Silv sand with grave (Sl): propock - Weathered Bedrock - conglomerate; Silv sand with grave (Sl): propock - Weathered Bedrock - conglomerate; Silv sand with grave (Sl): propock - Weathered Bedrock - conglomerate; Silv sand with grave (Sl): propock - Weathered Bedrock - conglomerate; Silv sand with grave (Sl): propock - Weathered Bedrock - conglomerate; Silv sand with grave (Sl): propock - Weathered Bedrock - conglomerate; Silv sand with grave (Sl): propo	407_				Bedrock -			(404.0 - 406.1') Topock - Weathered Bedrock				
Weathered Bedrock- conglomerate  409  410  410  410  411  412  412  414  415  416  417  418  Weathered Bedrock- conglomerate  Bedrock- conglomerate  Soll standard Bedrock- conglomerate  Bedrock- conglomerate  Soll standard Bedrock- conglomerate  Soll standard Bedrock- conglomerate  417  418  Weathered Bedrock- conglomerate  419  410  411  411  411  412  414  415  416  Bedrock- Conglomerate  Bedrock- Conglomerate  Bedrock- Conglomerate  Soll standard B					Topock -			grained to very coarse grained, subangular to	subround; so	me		
Samples Collected  Conglomerate  Collected  Conglomerate  Collected  Conglomerate  Conglomerate  Collected  Collected  Collected  Conglomerate  Collected  Co	_408_				Bedrock -			clay; little coarser clasts composed of metadi				
Collected  Collected  Topock-Weathered Bedrock - Conglomerate Bedrock - Conglomerate Silty same from inoits; soft; weak cementation - Collecting and the property of the prope	5				conglomerate	æ{			c - conglomer	ate:		
Weathered Bedrock conglomerate  410  411  412  412  414  415  416  Weathered Bedrock conglomerate  Topock Weathered Bedrock conglomerate, Silty sand commentation  Weathered Bedrock conglomerate, Silty sand with gravel (SM); reddish brown (2.5YR 44); granules to subround; little silt; little clay, moist, weak cementation  (408.0 + 11.0) Topock - Weathered Bedrock - conglomerate; Silty sand with gravel (SM); reddish brown (2.5YR 44); granules to subround; some fine to very coarse grained, subangular to subround; low plasticity, some granules to subround; some fine to very coarse grained, subangular to subround; low plasticity, some granules to subround; some fine to very coarse grained subround; some fine to very coarse grained subround; low plasticity, some granules to subround; some filter sample subround; and the use of three filters.  414.  MW-X-VAS-  415.  416.  MW-X-VAS-  Topock Weathered Bedrock - conglomerate; Silty sand with gravel (SM); reddish brown (2.5YR 44); granules to subround; low plasticity, some granules to subround; low plasticity, some granules on granules and place three granules on three filters.  416.  MW-X-VAS-  Yopock Weathered Bedrock - conglomerate; Silty sand with gravel (SM); reddish brown (2.5YR 44); granules to subround; low plasticity, some granules on granules and place turbidity by the use of three filters.  417.  418.  419.  419.  420.  Weathered Bedrock - conglomerate; Silty sand with gravel (SM); reddish brown (2.5YR 44); granules to subround; low plasticity, some granules on granules and place turbidity by the use of three filters.  418.  End of Boring at 417.0 bgs.	_409_				Topook			Sandy lean clay with gravel (CL); reddish brow	wn (2.5YR 4/4	);		
Subangular to subround; miss, six, wan deferred Bedrock - conglomerate; Silty sand with grave (SM); reddish brown (2.5YR 44); fine grained to very coarse grained, subangular to subround; low plasticity; some granules to very large pebbles, angular to subround; little silt; little clay, moist; weak cementation (408.0 - 411.0) Topock - Weathered Bedrock - conglomerate; Clayey gravel with sand (SM); reddish brown (2.5YR 44); fine grained to very coarse grained sand, subangular to subround; little silt; little clay, moist, weak cementation (408.0 - 411.0) Topock - Weathered Bedrock - conglomerate; Silty sand with gravel (SM); reddish brown (2.5YR 44); fine grained to very coarse grained, subangular to subround; low plants to very large pebbles, angular to subround; low plants to very large pebbles, angular to subround; low plants to very large pebbles, angular to subround; low plants to very large pebbles, angular to subround; low plants to very large pebbles, angular to subround; low plants to very large pebbles, angular to subround; low plants to very large pebbles, angular to subround; low plants to very large pebbles, angular to subround; low plants to very large pebbles, angular to subround; low plants to very large pebbles, angular to subround; low plants to very large pebbles, angular to subround; low plants to very large pebbles, angular to subround; low plants to very large pebbles, angular to subround; low plants to subround; low plants to subround; low plants to very large pebbles, angular to subround; low plants to low low plants to low low plants to subround; low plants to subro				Weathered	GC 6		subangular to subround; little fine to very coal	pular to subround; little fine to very coarse grained sand, pular to subround; moist; soft; weak cementation - 408.0') Topock - Weathered Bedrock - conglomerate;				
grained to very coarse grained, subangular to subround; low subround; sure filters with gravel (SM); reddish brown (2.5 YR 4/4); granules to small cobbles, angular to subround; some fine to very coarse grained sand, subangular to subround; some fine to very coarse grained sand, subangular to subround; some fine to very coarse grained sand, subangular to subround; some fine to very coarse grained sand, subangular to subround; some fine to very coarse grained sand, subangular to subround; some fine to very coarse grained sand, subangular to subround; some fine to very coarse grained sand, subangular to subround; some fine to very coarse grained sand; subangular to subround; some fine to very coarse grained sand; subangular to subround; some fine to very coarse grained sand; subangular to subround; some fine to very coarse grained sand; subangular to subround; some fine to very coarse grained sand; subangular to subround; some fine to very coarse grained sand; subangular to subround; some fine to very coarse grained sand; subangular to subround; some fine to very coarse grained sand, subangular to subround; some fine to very coarse grained sand, subangular to subround; some fine to very coarse grained sand, subangular to subround; some fine to very coarse grained sand, subangular to subround; some fine to very coarse grained sand, subangular to subround; some fine to very coarse grained sand, subangular to subround; some fine to very coarse grained sand, subangular to subround; some fine to very coarse grained sand, subangular to subround; some fine to very coarse grained sand, subangular to subround; some fine to very coarse grained sand and subangular to subround; some fine to very coarse grained sand and subangular to subround; some fine to very coarse grained sand subangular to subround; some fine to very coarse grained sand subangular to subround; some fine to very coarse grained sand subangular to subround; some fine to very coarse grained sand subangular to subround; some fine to very coarse grained sand to	_410_						(407.0 - 408.0') Topock - Weathered Bedrock					
plasticity, some granules to very large pebbles, angular to subround; tittle dialy, moist; weak cementation  412.							68X9721	grained to very coarse grained, subangular to	to very coarse grained, subangular to subround; low			
412 120  413 Topock - Weathered Bedrock - conglomerate:  414 MW-X-VAS- 415 Year 148	_411_							plasticity; some granules to very large pebble	s, angular to			
412 120  413 Topock - Weathered Bedrock - Conglomerate  414 MW-X-VAS - 412-417 (-0.17 U ppb)  415 Topock - Weathered Bedrock - Conglomerate  416 GM  417 Topock - Weathered Bedrock - Conglomerate  418 A18 A19						•		(408.0 - 411.0') Topock - Weathered Bedrock	c - conglomera	ate;		
Topock - Weathered Bedrock - conglomerate  MW-X-VAS- 412-417 (<0.17 U ppb) 7/15/2019 12:43  Topock - Weathered Bedrock - conglomerate  MW-X-VAS- 416  Bedrock - conglomerate  MW-X-VAS- 417  MILL to use of three filters  Topock - Weathered Bedrock - conglomerate; SIM gravel (SM); reddish brown (2.57K 4/4); fine graules to very large pebbles, angular to subround; low plasticity, some granules to very large pebbles, angular to subround; some silt; little clay; moist; weak cementation  (413.3'); moist; weak cementation (413.3'); moist; weak cementation (413.3'); moist; weak cementation (413.3'); moist; weak cementation (413.3'); moist; weak cementation (413.4'); granules and pebbles and clay (414.8 - 417.0') Topock - Weathered Bedrock - conglomerate; Silty gravel with sand (GM); reddish brown (2.57K 4/4); granules to very large pebbles, angular to subround; some fine to very very granules to very large pebbles, angular to subround; some fine to very care pebbles, angular to su	_412_	120						granules to small cobbles, angular to subrour	nd; some fine		(412.0 417.0')	(412.0 417.0"
Bedrock-conglomerate  MW-X-VAS-412-417 (<0.17 U ppb) 7/15/2019 12:43  Redrock-conglomerate  MW-athered Bedrock - conglomerate  Bedrock - conglomerate  MW-x-VAS-412-417 (<0.17 U ppb) 7/15/2019 12:43  Topock - Weathered Bedrock - conglomerate; Silty gravel with sand (GM); reddish brown (2.5YR 4/4); granules to very large pebbles, angular to subround; some fine to very large pebbles, angular to subround; some fine to very large pebbles, angular to subround; some fine to very some coarse grained sand, subangular to subround; little silt; little clay; sample. Used water to flush the casing of fines prior to the bentonite seal.  End of Boring at 417.0 'bgs.									i; little silt; littl	e clay;	`Groundwater´	375 gallons of
grained to very coarse grained, subangular to subround; low with the use of three filters.  412-417  415  416  417  418  AND X-VAS-412-417  (Co.17 U ppb)  12:43  Topock - Weathered Bedrock - conglomerate  Bedrock - conglomerate  A18  A19  420  GM  A18  GM  A18  GM  A19  GM  A19  A19  A19  A20  GM  A19  A20  GM  A20	_413_					SM		(411.0 - 414.8') Topock - Weathered Bedrock	c - conglomera	ate;	could not get	gallons of wate
www.x-vas- 412-417 (<0.17 U ppb) 7/15/2019 12:43  Topock - Weathered Bedrock - conglomerate (Sitty gravel with sand (GM); reddish brown (2.5YR 4/4); granules to very large pebbles, angular to subround; tittle sitt; little clay, some coarser clasts composed of metadiorite; moist; moderate cementation (413.9) - 418.  End of Boring at 417.0 'bgs.  www.x-vas- (413.9); moist; weak cementation (413.9); moist; weak cementation (413.9); moist; weak cementation (413.9); moist; weak cementation (413.9); moist; weak cementation increase in granules and pebbles and sand, decrease in silt and clay (418.9); prior to collecting sample. Used water of flush the casing of fines prior to the installation of the bentonite seal.		-			conglomerate	Э		grained to very coarse grained, subangular to	subround; lo	w		
415	_414_							subround; some silt; little clay; moist; weak co	ementation			lost
Topock-Weathered Bedrock-conglomerate  12:43  Topock-Weathered Bedrock-conglomerate  GM  Topock-Weathered Bedrock-conglomerate  Topock-Weathered Bedrock-conglomerate  GM  Topock-Weathered Bedrock-conglomerate  Silty gravel with sand (GM); reddish brown (2.5YR 4/4); granules to subround; some fine to very coarse grained sand, subangular to subround; some fine to very coarse grained sand, subangular to subround; some fine to very coarse grained sand, subangular to subround; some fine to very coarse grained sand, subangular to subround; some fine to very coarse grained sand, subangular to subround; some fine to very coarse grained sand, subangular to subround; some fine to very coarse grained sand, subangular to subround; some fine to very coarse grained sand, subangular to subround; some fine to very coarse grained sand, subangular to subround; some fine to very coarse grained sand, subangular to subround; some fine to very coarse grained sand, subangular to subround; some fine to very coarse grained sand, subangular to subround; some fine to very coarse grained sand, subangular to subround; some fine to very coarse grained sand, subangular to subround; some fine to very coarse grained sand, subangular to subround; some fine to very coarse grained sand, subangular to subround; some fine to f	<u> </u>	-		(<0.17 U					n granules an	a		
Topock - Weathered Bedrock - conglomerate  416  417  Topock - Weathered Bedrock - conglomerate  End of Boring at 417.0 'bgs.  Topock - Weathered Bedrock - conglomerate  Topock - Weathered Bedrock - conglower -	_415_			7/15/2019 12:43							collecting	
Bedrock - conglomerate  417  End of Boring at 417.0 'bgs.  End of Boring at 417.0 'bgs.				.2				to very large pebbles, angular to subround; so	ome fine to ve	ry	water to flush	
End of Boring at 417.0 'bgs.  End of Boring at 417.0 'bgs.	_416_				Bedrock -		P P P	some coarser clasts composed of metadiorite			fines prior to	
End of Boring at 417.0 'bgs.  - 418 - 419 - 420		_			conglomerate	9	P 410	cementation			of the bentonite	
	417_						ΙΦΉ	End of Boring at 417.0 'ba	IS.		seal.	
		-										
420	418_											
420												
-	419_											
420   Abbreviations: USCS = Unified Soil Classification System. ft = feet. bgs = below ground surface. amsl = above mean sea level. GW = groundwater.		-										
	Abbre	viations	s: USCS = I	Jnified Soil C	lassification	Systen	n. ft = fe	eet, bas = below ground surface, ams	sl = above r	nean sea	a level. GW = o	groundwater