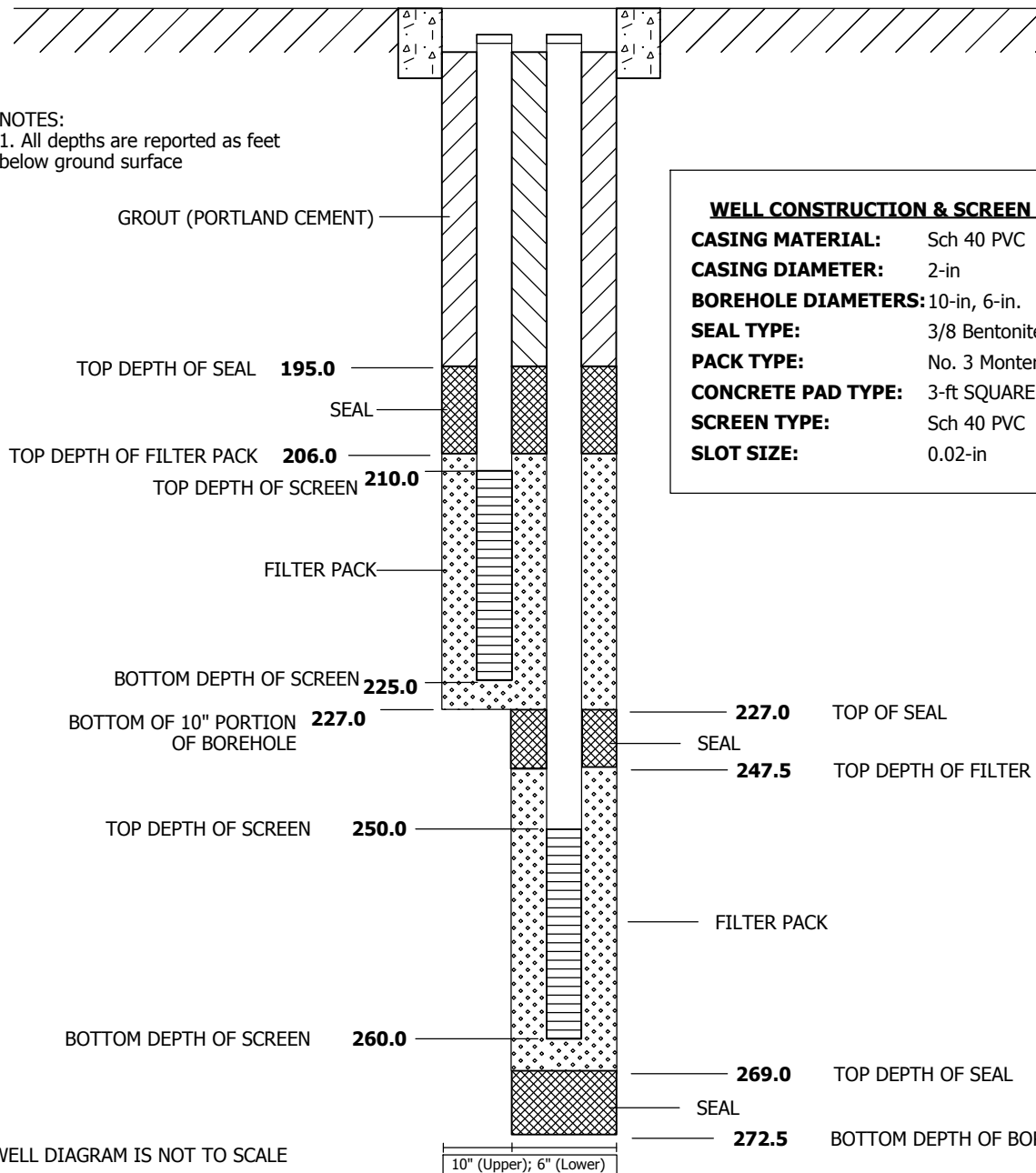


WELL COMPLETION DIAGRAM

PROJECT NO: 417981.ER.02.FW	PROJECT: ER-TCS Groundwater Investigation	WELL NO: <i>MW-67-225</i> <i>MW-67-260</i>
LOCATION: Site 2		
DRILLING CONTRACTOR: Boart Longyear (R. Sawrey)	DRILLING START: 4/29/2011	
DRILLING METHOD: Rotosonic	DRILLING END: 5/2/2011	
LOGGER: A. Brewster (Northstar)	WELL COMPLETION DATE: 5/10/2011	
GROUND SURFACE ELEVATION (NAVD 88): 626.3 ft AMSL	GENERAL REMARKS: Centralizers at 10, 25, 40, 55, 70, 85, 100, 115, 130, 145, 160, 175, 190, 205, and 245ft bgs.	
NORTHING (CCS NAD 83 Z 5): 2101047.85		

12-in DIAMETER WELL VAULT (FLUSH WITH GRADE)

NOTES:
1. All depths are reported as feet below ground surface



WELL CONSTRUCTION & SCREEN DETAILS

CASING MATERIAL:	Sch 40 PVC
CASING DIAMETER:	2-in
BOREHOLE DIAMETERS:	10-in, 6-in.
SEAL TYPE:	3/8 Bentonite Chips
PACK TYPE:	No. 3 Monterey Sand
CONCRETE PAD TYPE:	3-ft SQUARE
SCREEN TYPE:	Sch 40 PVC
SLOT SIZE:	0.02-in

WELL DIAGRAM IS NOT TO SCALE



PROJECT NUMBER: 417981.ER.02.FW	BORING NUMBER: BH-67	SHEET 1 OF 14
SOIL BORING LOG		

PROJECT : PG&E Topock, ER-TCS Investigation LOCATION : Site 2 (2101040.2 N, 7615335.5 E)
 ELEVATION : 626.2 ft DRILLING CONTRACTOR : Boart Longyear (R. Sawrey)
 DRILLING EQUIPMENT AND METHOD : RS-350, Rotosonic ORIENTATION : Vertical
 WATER LEVELS : Approx. 170 ft BGS START : 4/29/2011 END : 5/3/2011 LOGGER : A. Brewster (Northstar)

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)		RECOVERY (in)	LAB SAMPLE	USCS CODE/ LITHOLOGY	SOIL DESCRIPTION	SYMBOLIC LOG	COMMENTS	
	RECOVERY (in)								
0.0			COMPLETE	10201	SP	Poorly Graded Sand (SP) 0.0-21.0' - light yellowish brown, (10YR 6/4), dry, loose, subangular to subrounded, poorly graded, predominantly quartz.		Start 04/29/2011 at 0800	
1.0									Soil sample collected between 0.0 and 1.0 ft bgs.
2.0				10202					Soil sample collected between 2.0 and 3.0 ft bgs.
3.0									
5.0				10203					Soil sample collected between 5.0 and 6.0 ft bgs.
6.0									
9.0			10204		Soil sample collected between 9.0 and 10.0 ft bgs.				
10.0									
14.0			10205		Soil sample collected between 14.0 and 15.0 ft bgs.				
15.0									
19.0			10206		Soil sample collected between 19.0 and 20.0 ft bgs.				
20.0									



PROJECT NUMBER: 417981.ER.02.FW	BORING NUMBER: BH-67 SHEET 2 OF 14
<h2 style="margin: 0;">SOIL BORING LOG</h2>	

PROJECT : PG&E Topock, ER-TCS Investigation	LOCATION : Site 2 (2101040.2 N, 7615335.5 E)
ELEVATION : 626.2 ft	DRILLING CONTRACTOR : Boart Longyear (R. Sawrey)
DRILLING EQUIPMENT AND METHOD : RS-350, Rotasonic	ORIENTATION : Vertical
WATER LEVELS : Approx. 170 ft BGS	START : 4/29/2011 END : 5/3/2011 LOGGER : A. Brewster (Northstar)

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)		RECOVERY (in)	LAB SAMPLE	USCS CODE/ LITHOLOGY	SOIL DESCRIPTION	SYMBOLIC LOG	COMMENTS
						SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY		DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
25		COMPLETE			SP	Poorly Graded Sand (SP) 0.0-21.0' - light yellowish brown, (10YR 6/4), dry, loose, subangular to subrounded, poorly graded, predominantly quartz.	•••••	
					SW	Well Graded Sand (SW) 21.0-24.0' - yellowish brown, (10YR 5/4), dry, loose, subangular to subrounded, predominantly quartz.	•••••	
						Boulder 24.0-28.0' - Unknown pulverized boulder.	•••••	
30	29.0 30.0			10207		Silty Sand (SM) 28.0-40.0' - yellowish brown, (10YR 5/4), dry, loose to partially consolidated, 10% gravel, 75% sand, 15% fines, subangular, poorly graded, predominantly quartz.	•••••	Soil sample collected between 29.0 and 30.0 ft bgs.
40	39.0 40.0			10208, 50006	SM		•••••	Soil sample collected between 39.0 and 40.0 ft bgs.



PROJECT NUMBER: 417981.ER.02.FW	BORING NUMBER: BH-67	SHEET 3 OF 14
SOIL BORING LOG		

PROJECT : PG&E Topock, ER-TCS Investigation LOCATION : Site 2 (2101040.2 N, 7615335.5 E)
 ELEVATION : 626.2 ft DRILLING CONTRACTOR : Boart Longyear (R. Sawrey)
 DRILLING EQUIPMENT AND METHOD : RS-350, Rotosonic ORIENTATION : Vertical
 WATER LEVELS : Approx. 170 ft BGS START : 4/29/2011 END : 5/3/2011 LOGGER : A. Brewster (Northstar)

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)		RECOVERY (in)	LAB SAMPLE	USCS CODE/ LITHOLOGY	SOIL DESCRIPTION	SYMBOLIC LOG	COMMENTS
	RECOVERY (in)							
	LAB SAMPLE							
45			COMPLETE		SP	Poorly Graded Sand (SP) 40.0-47.0' - yellowish brown, (10YR 5/4), dry, loose, 5% gravel, 90% sand, 5% fines, subangular to subrounded, poorly graded, predominantly quartz.		
50	49.0	50.0		10209	SM	Silty Sand With Gravel (SM) 47.0-52.0' - yellowish brown, (10YR 5/4), dry, loose, 15% gravel, 65% sand, 20% fines, subangular to angular, poorly graded, no predominant mineral.		Soil sample collected between 49.0 and 50.0 ft bgs.
55					SP	Poorly Graded Sand (SP) 52.0-53.0' - light yellowish brown, (10YR 6/4), dry, loose, subangular to subrounded, poorly graded, predominantly quartz.		
60	59.0	60.0		10210	CL	Lean Clay (CL) 53.0-63.0' - brown, (7.5YR 4/4), moist, stiff, slow dilatancy, poorly graded		Soil sample collected between 59.0 and 60.0 ft bgs.



PROJECT NUMBER: 417981.ER.02.FW	BORING NUMBER: BH-67	SHEET 4 OF 14
SOIL BORING LOG		

PROJECT : PG&E Topock, ER-TCS Investigation LOCATION : Site 2 (2101040.2 N, 7615335.5 E)
 ELEVATION : 626.2 ft DRILLING CONTRACTOR : Boart Longyear (R. Sawrey)
 DRILLING EQUIPMENT AND METHOD : RS-350, Rotosonic ORIENTATION : Vertical
 WATER LEVELS : Approx. 170 ft BGS START : 4/29/2011 END : 5/3/2011 LOGGER : A. Brewster (Northstar)

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)		USCS CODE/ LITHOLOGY	SOIL DESCRIPTION	SYMBOLIC LOG	COMMENTS
	RECOVERY (in)	LAB SAMPLE				
			CL	Lean Clay (CL) 53.0-63.0' - brown, (7.5YR 4/4), moist, stiff, slow dilatancy, poorly graded		
			SP	Poorly Graded Sand (SP) 63.0-64.0' - light yellowish brown, (10YR 6/4), dry, loose, subangular to subrounded, poorly graded, predominantly quartz.		
65			CL	Lean Clay (CL) 64.0-73.0' - brown, (7.5YR 4/4), moist, stiff, slow dilatancy, rusty staining on some surfaces.		
70	69.0 70.0	10211				Soil sample collected between 69.0 and 70.0 ft bgs.
75			ML	Silt (ML) 73.0-92.0' - brown, (7.5YR 4/4), dry, stiff to medium stiff, moderate dilatancy, friable in spots.		
80	79.0 80.0	10212				Soil sample collected between 79.0 and 80.0 ft bgs.



PROJECT NUMBER: 417981.ER.02.FW	BORING NUMBER: BH-67	SHEET 5 OF 14
SOIL BORING LOG		

PROJECT : PG&E Topock, ER-TCS Investigation LOCATION : Site 2 (2101040.2 N, 7615335.5 E)
 ELEVATION : 626.2 ft DRILLING CONTRACTOR : Boart Longyear (R. Sawrey)
 DRILLING EQUIPMENT AND METHOD : RS-350, Rotosonic ORIENTATION : Vertical
 WATER LEVELS : Approx. 170 ft BGS START : 4/29/2011 END : 5/3/2011 LOGGER : A. Brewster (Northstar)

DEPTH BELOW EXISTING GRADE (ft)		RECOVERY (in)	LAB SAMPLE	USCS CODE/ LITHOLOGY	SOIL DESCRIPTION	SYMBOLIC LOG	COMMENTS
INTERVAL (ft)	DEPTH BELOW EXISTING GRADE (ft)						
		COMPLETE			Silt (ML) 73.0-92.0' - brown, (7.5YR 4/4), dry, stiff to medium stiff, moderate dilatancy, friable in spots.		
85				ML			
	89.0 - 90.0		10213				Soil sample collected between 89.0 and 90.0 ft bgs.
90							
	99.0 - 100.0		10214		Well Graded Gravel (GW) 92.0-197.0' - dark greyish brown, (10YR 4/2), dry, loose to partially consolidated, 40% gravel, 40% sand, 20% fines, angular to subangular, poorly graded, no dominant mineralogy.		
95				GW			
							Soil sample collected between 99.0 and 100.0 ft bgs.
100							



PROJECT NUMBER: 417981.ER.02.FW	BORING NUMBER: BH-67	SHEET 6 OF 14
SOIL BORING LOG		

PROJECT : PG&E Topock, ER-TCS Investigation LOCATION : Site 2 (2101040.2 N, 7615335.5 E)
 ELEVATION : 626.2 ft DRILLING CONTRACTOR : Boart Longyear (R. Sawrey)
 DRILLING EQUIPMENT AND METHOD : RS-350, Rotasonic ORIENTATION : Vertical
 WATER LEVELS : Approx. 170 ft BGS START : 4/29/2011 END : 5/3/2011 LOGGER : A. Brewster (Northstar)

DEPTH BELOW EXISTING GRADE (ft)		USCS CODE/ LITHOLOGY	SOIL DESCRIPTION	SYMBOLIC LOG	COMMENTS
INTERVAL (ft)	RECOVERY (in)				
	COMPLETE		Well Graded Gravel (GW) 92.0-197.0' - dark greyish brown, (10YR 4/2), dry, loose to partially consolidated, 40% gravel, 40% sand, 20% fines, angular to subangular, poorly graded, no dominant mineralogy.		DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
105					
109.0 110.0	10215	GW			
115					
119.0 120.0	10216				Soil sample collected between 119.0 and 120.0 ft bgs.



PROJECT NUMBER: 417981.ER.02.FW	BORING NUMBER: BH-67	SHEET 7 OF 14
SOIL BORING LOG		

PROJECT : PG&E Topock, ER-TCS Investigation LOCATION : Site 2 (2101040.2 N, 7615335.5 E)
 ELEVATION : 626.2 ft DRILLING CONTRACTOR : Boart Longyear (R. Sawrey)
 DRILLING EQUIPMENT AND METHOD : RS-350, Rotasonic ORIENTATION : Vertical
 WATER LEVELS : Approx. 170 ft BGS START : 4/29/2011 END : 5/3/2011 LOGGER : A. Brewster (Northstar)

DEPTH BELOW EXISTING GRADE (ft)		RECOVERY (in)	LAB SAMPLE	USCS CODE/ LITHOLOGY	SOIL DESCRIPTION	SYMBOLIC LOG	COMMENTS	
INTERVAL (ft)								
		COMPLETE			Well Graded Gravel (GW) 92.0-197.0' - dark greyish brown, (10YR 4/2), dry, loose to partially consolidated, 40% gravel, 40% sand, 20% fines, angular to subangular, poorly graded, no dominant mineralogy.		DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION	
125								
129.0	130.0		10217	GW				Stop 04/29/2011 at 1645 at 127 ft bgs. Resume on 4/30/2011 at 0700. Soil sample collected between 129.0 and 130.0 ft bgs.
139.0	140.0		10218, 50007					Soil sample collected between 139.0 and 140.0 ft bgs.



PROJECT NUMBER: 417981.ER.02.FW	BORING NUMBER: BH-67	SHEET 8 OF 14
SOIL BORING LOG		

PROJECT : PG&E Topock, ER-TCS Investigation LOCATION : Site 2 (2101040.2 N, 7615335.5 E)
 ELEVATION : 626.2 ft DRILLING CONTRACTOR : Boart Longyear (R. Sawrey)
 DRILLING EQUIPMENT AND METHOD : RS-350, Rotosonic ORIENTATION : Vertical
 WATER LEVELS : Approx. 170 ft BGS START : 4/29/2011 END : 5/3/2011 LOGGER : A. Brewster (Northstar)

DEPTH BELOW EXISTING GRADE (ft)		RECOVERY (in)	LAB SAMPLE	USCS CODE/ LITHOLOGY	SOIL DESCRIPTION	SYMBOLIC LOG	COMMENTS
INTERVAL (ft)	DEPTH BELOW EXISTING GRADE (ft)						
		COMPLETE			Well Graded Gravel (GW) 92.0-197.0' - dark greyish brown, (10YR 4/2), dry, loose to partially consolidated, 40% gravel, 40% sand, 20% fines, angular to subangular, poorly graded, no dominant mineralogy.		
145							
149.0	150.0		10219	GW			Soil sample collected between 149.0 and 150.0 ft bgs.
150							
155							
157					157' - Change to moist.		
159.0	160.0		10220				Soil sample collected between 159.0 and 160.0 ft bgs.
160							



PROJECT NUMBER: 417981.ER.02.FW	BORING NUMBER: BH-67	SHEET 9 OF 14
SOIL BORING LOG		

PROJECT : PG&E Topock, ER-TCS Investigation LOCATION : Site 2 (2101040.2 N, 7615335.5 E)
ELEVATION : 626.2 ft DRILLING CONTRACTOR : Boart Longyear (R. Sawrey)
DRILLING EQUIPMENT AND METHOD : RS-350, Rotosonic ORIENTATION : Vertical
WATER LEVELS : Approx. 170 ft BGS START : 4/29/2011 END : 5/3/2011 LOGGER : A. Brewster (Northstar)

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (in)	LAB SAMPLE	USCS CODE/ LITHOLOGY	SOIL DESCRIPTION	SYMBOLIC LOG	COMMENTS
					SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY		DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
165		COMPLETE			Well Graded Gravel (GW) 92.0-197.0' - dark greyish brown, (10YR 4/2), dry, loose to partially consolidated, 40% gravel, 40% sand, 20% fines, angular to subangular, poorly graded, no dominant mineralogy, matrix-supported. 160.5-161.0' - Metadiorite boulder.		
170				GW	169' - Change to saturated, color change to brown (10YR 5/3).		
175							
180							



PROJECT NUMBER: 417981.ER.02.FW	BORING NUMBER: BH-67
SHEET 12 OF 14	
SOIL BORING LOG	

PROJECT : PG&E Topock, ER-TCS Investigation LOCATION : Site 2 (2101040.2 N, 7615335.5 E)
 ELEVATION : 626.2 ft DRILLING CONTRACTOR : Boart Longyear (R. Sawrey)
 DRILLING EQUIPMENT AND METHOD : RS-350, Rotosonic ORIENTATION : Vertical
 WATER LEVELS : Approx. 170 ft BGS START : 4/29/2011 END : 5/3/2011 LOGGER : A. Brewster (Northstar)

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (in)	LAB SAMPLE	USCS CODE/ LITHOLOGY	SOIL DESCRIPTION	SYMBOLIC LOG	COMMENTS
225	227.0	COMPLETE	BH-67-20202	SW	Well Graded Sand With Gravel (SW) 211.0-221.0' - dark brown, (7.5YR 3/4), saturated, loose, 35% gravel, 55% sand, 10% fines, subangular to subrounded, no dominant mineralogy. Silt With Gravel (ML) 221.0-258.5' - dark brown, (7.5YR 3/4), saturated, stiff, 40% gravel, 5% sand, 55% fines, slow to moderate dilatancy, subangular to angular, poorly graded, no dominant mineralogy. 225' - increase in proportion of metadiorite gravel.		
230				ML			
235							
240							



PROJECT NUMBER: 417981.ER.02.FW	BORING NUMBER: BH-67	SHEET 13 OF 14
SOIL BORING LOG		

PROJECT : PG&E Topock, ER-TCS Investigation LOCATION : Site 2 (2101040.2 N, 7615335.5 E)
 ELEVATION : 626.2 ft DRILLING CONTRACTOR : Boart Longyear (R. Sawrey)
 DRILLING EQUIPMENT AND METHOD : RS-350, Rotosonic ORIENTATION : Vertical
 WATER LEVELS : Approx. 170 ft BGS START : 4/29/2011 END : 5/3/2011 LOGGER : A. Brewster (Northstar)

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)			USCS CODE/ LITHOLOGY	SOIL DESCRIPTION	SYMBOLIC LOG	COMMENTS		
	RECOVERY (in)	LAB SAMPLE							
		DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION							
245	COMPLETE			ML	Well Graded Sand With Gravel (SW) 258.5-259.5' - dark brown, (7.5YR 3/4), saturated, loose, 40% gravel, 50% sand, 10% fines, subangular to subrounded, predominantly quartz sand and metadiorite gravel.		Grab groundwater sample collected from borehole between 247.0 and 257.0 ft bgs.		
247.0									
250									
255									
257.0					Silt With Gravel (ML) 221.0-258.5' - dark brown, (7.5YR 3/4), saturated, stiff, 40% gravel, 5% sand, 55% fines, slow to moderate dilatancy, subangular to angular, poorly graded, no dominant mineralogy.		Stop 05/01/2011 at 1700 at 257 ft bgs. Resume 05/02/2011 at 1400.		
260				Well Graded Sand With Gravel (SW) 258.5-259.5' - dark brown, (7.5YR 3/4), saturated, loose, 40% gravel, 50% sand, 10% fines, subangular to subrounded, predominantly quartz sand and metadiorite gravel.					



PROJECT NUMBER: 417981.ER.02.FW	BORING NUMBER: BH-67	SHEET 14 OF 14
SOIL BORING LOG		

PROJECT : PG&E Topock, ER-TCS Investigation LOCATION : Site 2 (2101040.2 N, 7615335.5 E)
 ELEVATION : 626.2 ft DRILLING CONTRACTOR : Boart Longyear (R. Sawrey)
 DRILLING EQUIPMENT AND METHOD : RS-350, Rotosonic ORIENTATION : Vertical
 WATER LEVELS : Approx. 170 ft BGS START : 4/29/2011 END : 5/3/2011 LOGGER : A. Brewster (Northstar)

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (in)	LAB SAMPLE	USCS CODE/ LITHOLOGY	SOIL DESCRIPTION	SYMBOLIC LOG	COMMENTS
					SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY		DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
				ML	Silt With Gravel (ML) 259.5-264.0' - dark brown, (7.5YR 3/4), saturated, stiff to moderately stiff, 40% gravel, 5% sand, 55% fines, moderate dilatancy, subangular to angular, poorly graded, predominantly metadiorite gravel.		
265				Tmc	Conglomerate (Tmc) 264.0-271.0' - Miocene conglomerate; yellowish red (5YR 4/6) from 264.0-265.0', red (2.5YR 4/6) from 265.0-271.0'.		Stop 05/02/2011 at 1600 at 264 ft bgs, refusal with 6" conductor at 254.0 ft bgs. Resume 05/03/2011 at 1330.
270				pTbr	Metadiorite (pTbr) 271.0-272.5' - Metadiorite bedrock.		
275					End Drilling on 5/3/2011 Total Borehole Depth: 272.5 ft bgs		This borehole was converted into the following monitoring well(s): MW-67-185, MW-67-225, and MW-67-260
280							