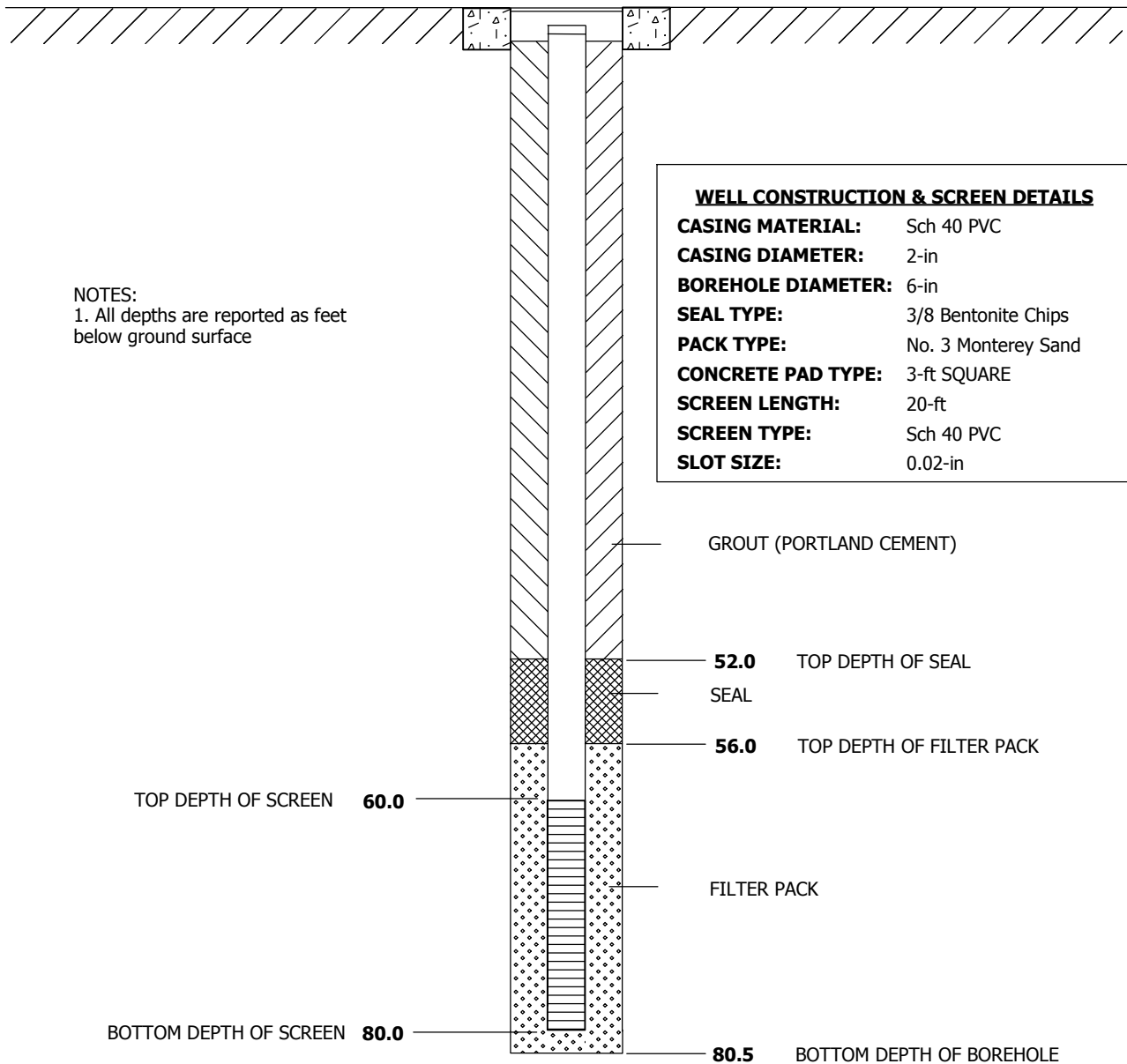


WELL COMPLETION DIAGRAM

PROJECT NO: 417981.ER.02.FW	PROJECT: ER-TCS Groundwater Investigation	WELL NO: <i>MW-73-80</i>
LOCATION: Site I		
DRILLING CONTRACTOR: Boart Longyear (R. Sawrey)	DRILLING START: 9/24/2011	
DRILLING METHOD: Rotosonic/Wireline Rotary Core	DRILLING END: 9/28/2011	
LOGGER: A. Brewster (Northstar)	WELL COMPLETION DATE: 9/29/2011	
GROUND SURFACE ELEVATION (NAVD 88): 506.3 ft AMSL	GENERAL REMARKS: Centralizers at 20, 40, and 60 feet bgs.	
NORTHING (CCS NAD 83 Z 5): 2100676.49		

12-IN DIAMETER WELL VAULT (FLUSH WITH GRADE)



WELL DIAGRAM IS NOT TO SCALE



PROJECT NUMBER: 417981.ER.02.FW	BORING NUMBER: BH-73	SHEET 1 OF 5
ROCK CORE LOG		

PROJECT : PG&E Topock, ER-TCS Investigation LOCATION : Site I (2100676.5 N, 7617554.9 E)
 ELEVATION : 506.3 ft DRILLING CONTRACTOR : Boart Longyear (R. Sawrey)
 CORING EQUIPMENT AND METHOD : HQ Wire-Line Rotary ORIENTATION : Vertical
 WATER LEVELS : Approx. 52 ft BGS START : 9/24/2011 END : 9/27/2011 LOGGER : R. Tweidt (Northstar)

DEPTH BELOW SURFACE (ft)	CORE RUN LENGTH AND RECOVERY (%)	DISCONTINUITIES				SYMBOLIC LOG	LITHOLOGY	COMMENTS
		R Q D (%)	FRACTURES PER FOOT	DESCRIPTION				
				DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS				
0-7.0						Silty Sand (SM) 0-7.0' - Fill-brown (10YR 5/3), metadiorite gravel and cobble, dry, no odor.		
7.0-11.5	R1 4.5 ft 98%	18	>10	8.5-9.5' - Mechanical breakage		Metadiorite 7.0-81.0' - very strong, dusky, yellow green (5GY 5/2), non-foliated, massive, fresh, competent, intensely to moderately fractured, phaneritic.		
11.5-14.0	R2 2.5 ft 96%	17	>10	10' - Joint, 30 deg				
14.0-16.0	R3 2 ft 92%	70	1	11.5-13.0' - Highly fractured zone				
16.0-18.0	R4 5 ft 100%	66	2	18' - Joint, 60 deg				
18.0-20.0			1	19.0-19.5' - Highly fractured zone				
20.0			>10				Stop drilling at 14 ft. on 9/24/2011. Resume drilling on 9/26/2011. R3=0.1 ft/min R4=0.1 ft/min	



PROJECT NUMBER: 417981.ER.02.FW	BORING NUMBER: BH-73	SHEET 2 OF 5
ROCK CORE LOG		

PROJECT : PG&E Topock, ER-TCS Investigation LOCATION : Site I (2100676.5 N, 7617554.9 E)
 ELEVATION : 506.3 ft DRILLING CONTRACTOR : Boart Longyear (R. Sawrey)
 CORING EQUIPMENT AND METHOD : HQ Wire-Line Rotary ORIENTATION : Vertical
 WATER LEVELS : Approx. 52 ft BGS START : 9/24/2011 END : 9/27/2011 LOGGER : R. Tweidt (Northstar)

DEPTH BELOW SURFACE (ft)	CORE RUN LENGTH AND RECOVERY (%)	DISCONTINUITIES				SYMBOLIC LOG	LITHOLOGY	COMMENTS
		R Q D (%)	FRACTURES PER FOOT	DESCRIPTION				
				DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS				
21.0	R5 2.5 ft 100%	0	>10	20' - Joint, 60 deg	Metadiorite 7.0-81.0' - very strong, dusky, yellow green (5GY 5/2), non-foliated, massive, fresh, competent, intensely to moderately fractured, phaneritic. 21.5-27' - Less competent zone with abundant oxidation along fractures, moderately decomposed.	R5=0.4 ft/min		
23.5			>10	21.5-23.5' - Moderately fractured zone				
			>10	22' - Joint, 60 deg				
25	R6 3.5 ft 91%	27	5	24' - Joint, 60 deg				
			7					
			>10					
27.0			>10	26.5' - Fracture, 60 deg				
				27' - Joint, 30 deg				
28.5	R7 1.5 ft 100%	83	1					
			5					
30	R8 2.5 ft 83%	0	>10	28.5-34.5' - Highly fractured zone	R8=0.4 ft/min			
			>10					
31.0			>10		R9=0.3 ft/min			
			>10					
			>10					
34.5	R9 3.5 ft 54%	0	>10					
35			1					
			1					
	R10 5 ft 100%	74	2	37.0-39.0' - Healed fractures				
			1	38.0-39.0' - Fracture, 80 deg	37.5-39.0' - Quartz and plagioclase-rich zone.			
39.5			3					
40								



PROJECT NUMBER: 417981.ER.02.FW	BORING NUMBER: BH-73	SHEET 3 OF 5
ROCK CORE LOG		

PROJECT : PG&E Topock, ER-TCS Investigation LOCATION : Site I (2100676.5 N, 7617554.9 E)
 ELEVATION : 506.3 ft DRILLING CONTRACTOR : Boart Longyear (R. Sawrey)
 CORING EQUIPMENT AND METHOD : HQ Wire-Line Rotary ORIENTATION : Vertical
 WATER LEVELS : Approx. 52 ft BGS START : 9/24/2011 END : 9/27/2011 LOGGER : R. Tweidt (Northstar)

DEPTH BELOW SURFACE (ft)	CORE RUN LENGTH AND RECOVERY (%)	DISCONTINUITIES		SYMBOLIC LOG	LITHOLOGY	COMMENTS	
		R Q D (%)	FRACTURES PER FOOT				DESCRIPTION
							DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS
45	R11 5 ft 100%	78	1	40.5' - Joint, 60 deg	Metadiorite 7.0-81.0' - very strong, dusky, yellow green (5GY 5/2), non-foliated, massive, fresh, competent, intensely to moderately fractured, phaneritic. 40.5-42.0' - Quartz and plagioclase-rich zone.	Stop drilling at 39.5 ft on 9/26/2011. Resume drilling on 9/27/2011. R11=0.36 ft/min	
			3				
			1				
			3	43' - Joint, 60 deg			
			4	44.25' - Joint, 80 deg			
	R12 5 ft 100%	90	1	45' - Fracture, 10 deg			R12=0.42 ft/min
			1	46' - Joint, 30 deg			
			1	47.5' - Joint, 30 deg			
			2	48.5' - Joint, 30 deg			
50	R13 5 ft 95%	27	1	50.25' - Joint, 30 deg		R13=0.3 ft/min	
			2				
			4				
			4				
			4				
55	R14 5 ft 100%	23	4	55' - Fracture, 80 deg	R14=0.25 ft/min		
			5				
			4	57.0-58.0' - Highly fractured zone			
			>10				
			>10	59' - Fracture, 80 deg			
60						R15=0.3 FPM	



PROJECT NUMBER: 417981.ER.02.FW	BORING NUMBER: BH-73	SHEET 4 OF 5
ROCK CORE LOG		

PROJECT : PG&E Topock, ER-TCS Investigation LOCATION : Site I (2100676.5 N, 7617554.9 E)
 ELEVATION : 506.3 ft DRILLING CONTRACTOR : Boart Longyear (R. Sawrey)
 CORING EQUIPMENT AND METHOD : HQ Wire-Line Rotary ORIENTATION : Vertical
 WATER LEVELS : Approx. 52 ft BGS START : 9/24/2011 END : 9/27/2011 LOGGER : R. Tweidt (Northstar)

DEPTH BELOW SURFACE (ft)	CORE RUN LENGTH AND RECOVERY (%)	DISCONTINUITIES			SYMBOLIC LOG	LITHOLOGY	COMMENTS	
		R Q D (%)	FRACTURES PER FOOT	DESCRIPTION				
				DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS				
64.5	R15 5 ft 100%	75	2			Metadiorite 7.0-81.0' - very strong, dusky, yellow green (5GY 5/2), non-foliated, massive, fresh, competent, intensely to moderately fractured, phaneritic.	R16=0.39 ft/min	
			0					
			1					
			3					
			0					
65	R16 5 ft 98%	94	1	65' - Fracture, 60 deg			R17=0.4 ft/min	
			1	66.25' - Fracture, 60 deg				
			1					
			1					
			1					
69.5	R17 2 ft 65%	85	1	70.5' - Fracture, 40 deg			R18=0.36 ft/min	
			2					
			3	72' - Fracture, 80 deg				
			4	73' - Fracture, 80 deg				
			3					
75	R18 5 ft 100%	62	0				R19 = 0.42 ft/min	
			2					75.5' - Fracture, 30 deg
			1					
			1					
			3					
76.5	R19 4.5 ft 100%	86	2					
			1					
			1					
			3					
			2					
80								



PROJECT NUMBER: 417981.ER.02.FW	BORING NUMBER: BH-73	SHEET 5 OF 5
ROCK CORE LOG		

PROJECT : PG&E Topock, ER-TCS Investigation LOCATION : Site I (2100676.5 N, 7617554.9 E)
 ELEVATION : 506.3 ft DRILLING CONTRACTOR : Boart Longyear (R. Sawrey)
 CORING EQUIPMENT AND METHOD : HQ Wire-Line Rotary ORIENTATION : Vertical
 WATER LEVELS : Approx. 52 ft BGS START : 9/24/2011 END : 9/27/2011 LOGGER : R. Tweidt (Northstar)

DEPTH BELOW SURFACE (ft)	CORE RUN LENGTH AND RECOVERY (%)	DISCONTINUITIES		SYMBOLIC LOG	LITHOLOGY	COMMENTS	
		R Q D (%)	FRACTURES PER FOOT				DESCRIPTION
							DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS
81.0			2		Metadiorite 7.0-81.0' - very strong, dusky, yellow green (5GY 5/2), non-foliated, massive, fresh, competent, intensely to moderately fractured, phaneritic. End Drilling on 9/27/2011 Total Borehole Depth: 81.0 ft bgs	This borehole was converted into the following monitoring well(s): MW-73-80	
			4				
85							
90							
95							
100							