

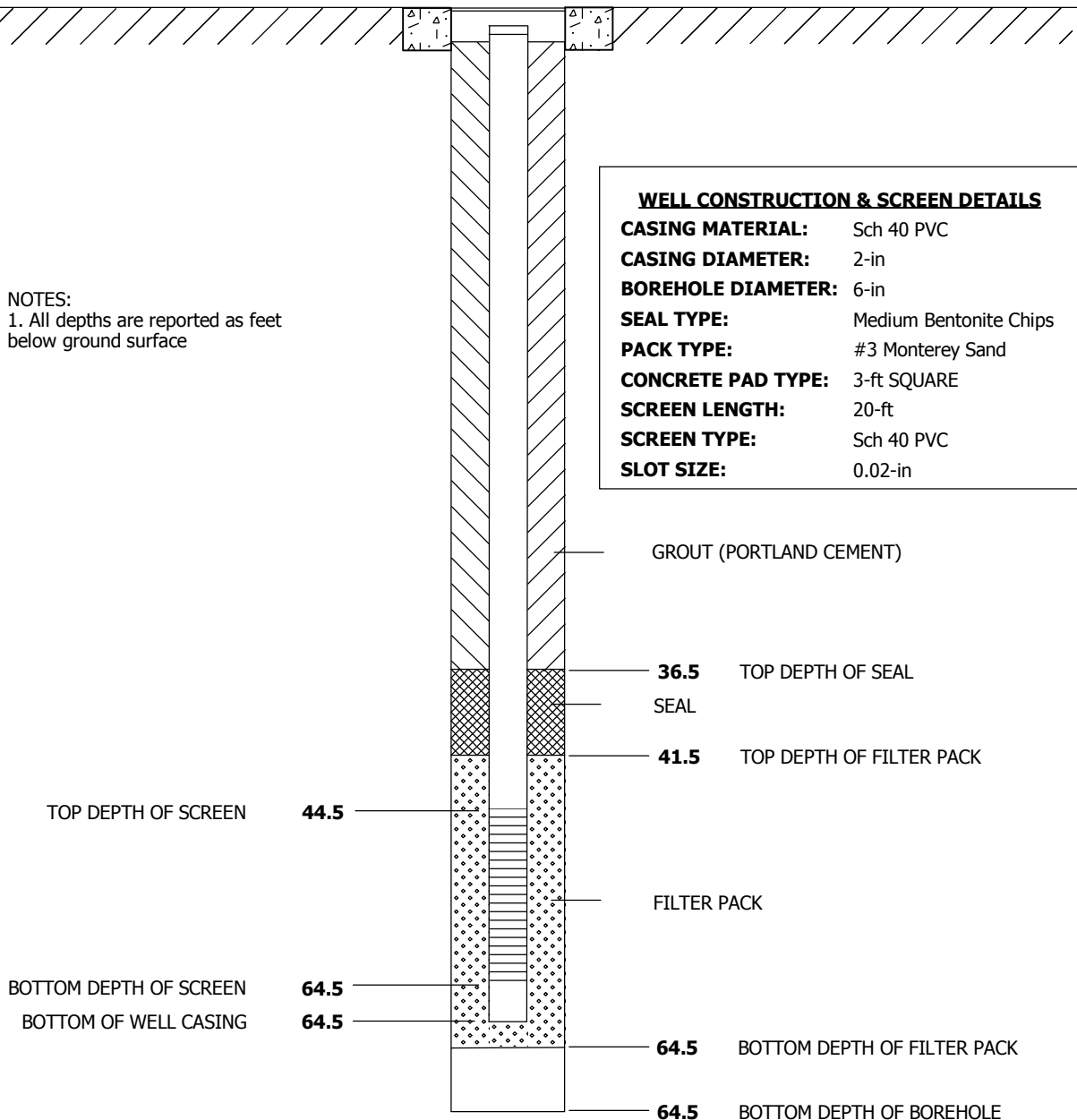
WELL COMPLETION DIAGRAM

PROJECT NO: 382653.FP.04.FW	PROJECT: PG&E Topock - ERGI	WELL NO: <i>MW-62-065</i>
LOCATION: Site E		
DRILLING CONTRACTOR: Boart Longyear (D. Roberts)	DRILLING START: 3/14/2009	
DRILLING METHOD: Rotary Core (HQ) - Rotosonic overdrill	DRILLING END: 3/18/2009	
LOGGER: A. Brewster (Northstar)	WELL COMPLETION DATE: 3/18/2009	
GROUND SURFACE ELEVATION (NAVD 88): 503.55 ft AMSL	GENERAL REMARKS: Alias during field work: MW-62	
NORTHING (CCS NAD 83 Z 5): 2101064.51	EASTING (CCS NAD 83 Z 5): 7616560.96	

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 DIAMETER:	6-in
SEAL TYPE:	Medium Bentonite Chips
PACK TYPE:	#3 Monterey Sand
CONCRETE PAD TYPE:	3-ft SQUARE
SCREEN LENGTH:	20-ft
SCREEN TYPE:	Sch 40 PVC
SLOT SIZE:	0.02-in



WELL DIAGRAM IS NOT TO SCALE



PROJECT NUMBER: 382653.FP.04.FW	BORING NUMBER: MW-62	SHEET 2 OF 11
SOIL BORING LOG		

PROJECT : PG&E Topock - ERGI LOCATION : Site E (2101068.3 N, 7616551.0 E)

ELEVATION : 503.6 ft DRILLING CONTRACTOR : Boart Longyear (D. Roberts)

DRILLING EQUIPMENT AND METHOD : Track-mounted Rig, Rotosonic drill head and tools ORIENTATION : Vertical

WATER LEVELS : Approx. 47 ft BGS START : 3/14/2009 END : 4/22/2009 LOGGER : A. Brewster/C. Kreller (Northstar)

DEPTH BELOW EXISTING GRADE (ft)	SOIL DESCRIPTION			USCS CODE/ LITHOLOGY	SYMBOLIC LOG	COMMENTS
	INTERVAL (ft)	RECOVERY (in)	LAB SAMPLE			
	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY					
21.0	COMPLETE			Tmc		Total depth of Rotosonic boring is 21.0 ft bgs. Begin rotary core drilling.
25						
30						
35						
40						



PROJECT NUMBER:
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BORING NUMBER:
MW-62 SHEET 3 OF 11

ROCK CORE LOG

PROJECT : PG&E Topock - ERGI

LOCATION : Site E (2101068.3 N, 7616551.0 E)

ELEVATION : 503.6 ft

DRILLING CONTRACTOR : Boart Longyear (D. Roberts)

CORING EQUIPMENT AND METHOD : Track-mounted Rig, LF-70 Drill Head and HQ-sized tools (diamond bit)

ORIENTATION : Vertical

WATER LEVELS : Approx. 47 ft BGS

START : 3/14/2009

END : 4/22/2009 LOGGER : A. Brewster/C. Kreller (Northstar)

DEPTH AND ELEVATION BELOW SURFACE (ft)	CORE RUN LENGTH AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DISCONTINUITIES		SYMBOLIC LOG	LITHOLOGY		COMMENTS			
				DESCRIPTION			ROCK TYPE, COLOR, MINERALOGY, TEXTURE, HARDNESS, WEATHERING, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.				
				DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS								
21.0	R1 5.5 ft 18%	0	0			<p>Conglomerate(Tmc) 21.0-64.5' - moderate reddish brown, (10R 4/6), no dominant clast mineralogy, strong (R4), hard, unweathered, fine matrix, coarse sand to coarse gravel sized clasts, massive</p>		R1 = run time not available				
22.5			0									
24.0			0									
25.5			0									
27.0			0									
28.5			0									
26.5	R2 8 ft 28%	0	0									R2 = 45.0 min
28.0			0									
29.5			0									
31.0			0									
32.5			0									
34.0			0									
34.5	R3 10 ft 100%	83	0				R2 = 45.0 min					
36.0			0									
37.5			0									
39.0			0									
40.5			1									
38.4			38.4' - Joint, 40 deg, rough, undulating, no staining, moderately tight					0				
41.0	0											
42.0	0											
43.0	0											
44.0	0											
45.0	0											
46.0	0											
47.0	0											



PROJECT NUMBER:
382653.FP.04.FW

BORING NUMBER:
MW-62 SHEET 4 OF 11

ROCK CORE LOG

PROJECT : PG&E Topock - ERGI

LOCATION : Site E (2101068.3 N, 7616551.0 E)

ELEVATION : 503.6 ft

DRILLING CONTRACTOR : Boart Longyear (D. Roberts)

CORING EQUIPMENT AND METHOD : Track-mounted Rig, LF-70 Drill Head and HQ-sized tools (diamond bit)

ORIENTATION : Vertical

WATER LEVELS : Approx. 47 ft BGS

START : 3/14/2009

END : 4/22/2009 LOGGER : A. Brewster/C. Kreller (Northstar)

DEPTH AND ELEVATION BELOW SURFACE (ft)	CORE RUN LENGTH AND RECOVERY (%)	DISCONTINUITIES			SYMBOLIC LOG	LITHOLOGY	COMMENTS
		RQD (%)	FRACTURES PER FOOT	DESCRIPTION			
				DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS			
45	44.5 R4 7 ft 100%	61	0 1 0 0 0 0 0	42.8' - Joint, 60 deg, rough, undulating, no staining, moderately tight	Conglomerate(Tmc) 21.0-64.5' - moderate reddish brown, (10R 4/6), no dominant clast mineralogy, strong (R4), hard, unweathered, fine matrix, coarse sand to coarse gravel sized clasts, massive	R3 = 27.0 min	
50	51.5	63	1 0 0 0	49' - Joint, 30 deg, rough, undulating to stepped, reddish staining, tight			R4= 34.8 min
55	54.5	65	0 0 0 0 0 0				R5 = 5.0 min
60							



PROJECT NUMBER: 382653.FP.04.FW	BORING NUMBER: MW-62	SHEET 6 OF 11
<h1>ROCK CORE LOG</h1>		

PROJECT : PG&E Topock - ERGI LOCATION : Site E (2101068.3 N, 7616551.0 E)

ELEVATION : 503.6 ft DRILLING CONTRACTOR : Boart Longyear (D. Roberts)

CORING EQUIPMENT AND METHOD : Track-mounted Rig, LF-70 Drill Head and HQ-sized tools (diamond bit) ORIENTATION : Vertical

WATER LEVELS : Approx. 47 ft BGS START : 3/14/2009 END : 4/22/2009 LOGGER : A. Brewster/C. Kreller (Northstar)

DEPTH AND ELEVATION BELOW SURFACE (ft)	CORE RUN LENGTH AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DISCONTINUITIES		SYMBOLIC LOG	LITHOLOGY		COMMENTS
				DESCRIPTION			ROCK TYPE, COLOR, MINERALOGY, TEXTURE, HARDNESS, WEATHERING, AND ROCK MASS CHARACTERISTICS		
				DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS					
85	R2 10 ft 65%	0	0				Conglomerate(Tmc) 75.0-191.5' - moderate brown, (5YR 4/4), no dominant clast mineralogy, strong (R4), unweathered, fine matrix, coarse sand to coarse gravel sized clasts, massive		R2 = 80 min
86.0			NR						
90	R3 10 ft 40%	40	NR						
			0						
			0						
95			1	94.6' - Joint, 30 deg, rough, planar, < 1 mm calcite infilling, reddish staining, tight					
96.0			0						
			0						
			0						
100			1						
								R3 = 10 min	



PROJECT NUMBER:
382653.FP.04.FW

BORING NUMBER:
MW-62

SHEET 7 OF 11

ROCK CORE LOG

PROJECT : PG&E Topock - ERGI

LOCATION : Site E (2101068.3 N, 7616551.0 E)

ELEVATION : 503.6 ft

DRILLING CONTRACTOR : Boart Longyear (D. Roberts)

CORING EQUIPMENT AND METHOD : Track-mounted Rig, LF-70 Drill Head and HQ-sized tools (diamond bit)

ORIENTATION : Vertical

WATER LEVELS : Approx. 47 ft BGS

START : 3/14/2009

END : 4/22/2009

LOGGER : A. Brewster/C. Kreller (Northstar)

DEPTH AND ELEVATION BELOW SURFACE (ft)	CORE RUN LENGTH AND RECOVERY (%)	DISCONTINUITIES				SYMBOLIC LOG	LITHOLOGY ROCK TYPE, COLOR, MINERALOGY, TEXTURE, HARDNESS, WEATHERING, AND ROCK MASS CHARACTERISTICS	COMMENTS SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
		R Q D (%)	FRACTURES PER FOOT	DESCRIPTION				
				DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS				
	R4 10 ft 80%	60	1	100.7' - Joint, 50 deg, rough, undulating, reddish staining, tight		Conglomerate(Tmc) 75.0-191.5' - moderate brown, (5YR 4/4), no dominant clast mineralogy, strong (R4), unweathered, fine matrix, coarse sand to coarse gravel sized clasts, massive	R4 = 20 min	
105			0	101.2' - Joint, 20 deg, rough, undulating, reddish staining, tight				
			0					
106.0			0					
			0					
			0					
110	R5 10 ft 100%	100	0					
			0					
			0					
115			0					
			0					
116.0			0					
			0					
			0					
			0					
120			0					
			0					
			0					



PROJECT NUMBER:
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BORING NUMBER:
MW-62 SHEET 8 OF 11

ROCK CORE LOG

PROJECT : PG&E Topock - ERGI LOCATION : Site E (2101068.3 N, 7616551.0 E)

ELEVATION : 503.6 ft DRILLING CONTRACTOR : Boart Longyear (D. Roberts)

CORING EQUIPMENT AND METHOD : Track-mounted Rig, LF-70 Drill Head and HQ-sized tools (diamond bit) ORIENTATION : Vertical

WATER LEVELS : Approx. 47 ft BGS START : 3/14/2009 END : 4/22/2009 LOGGER : A. Brewster/C. Kreller (Northstar)

DEPTH AND ELEVATION BELOW SURFACE (ft)	CORE RUN LENGTH AND RECOVERY (%)	DISCONTINUITIES				SYMBOLIC LOG	LITHOLOGY	COMMENTS
		RQD (%)	FRACTURES PER FOOT	DESCRIPTION				
				DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS				
125	R6 10 ft 100%	100	0			Conglomerate(Tmc) 76.0-191.5' - moderate brown, (5YR 4/4), no dominant clast mineralogy, strong (R4), unweathered, fine matrix, coarse sand to coarse gravel sized clasts, massive	R6 = 20 min	
126.0		0	0		126.0' - moderate brown, (5YR 3/4), matrix supported, friable, moderately weathered			
130	R7 10 ft 80%	100	0					
135		0	0					
136.0		0	0				R7 = 25 min	
140		0	0					
		0	0					
		0	0					
		0	0					
		0	0					



PROJECT NUMBER:
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BORING NUMBER:
MW-62 SHEET 9 OF 11

ROCK CORE LOG

PROJECT : PG&E Topock - ERGI

LOCATION : Site E (2101068.3 N, 7616551.0 E)

ELEVATION : 503.6 ft

DRILLING CONTRACTOR : Boart Longyear (D. Roberts)

CORING EQUIPMENT AND METHOD : Track-mounted Rig, LF-70 Drill Head and HQ-sized tools (diamond bit)

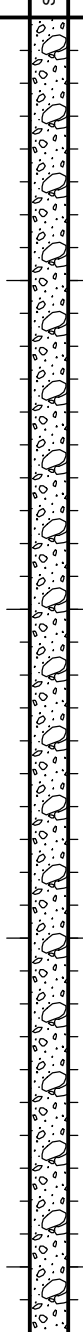
ORIENTATION : Vertical

WATER LEVELS : Approx. 47 ft BGS

START : 3/14/2009

END : 4/22/2009

LOGGER : A. Brewster/C. Kreller (Northstar)

DEPTH AND ELEVATION BELOW SURFACE (ft)	CORE RUN LENGTH AND RECOVERY (%)	DISCONTINUITIES		SYMBOLIC LOG	LITHOLOGY	COMMENTS
		RQD (%)	FRACTURES PER FOOT			
DESCRIPTION						
DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS						
145	R8 10 ft 100%	100	0		Conglomerate(Tmc) 76.0-191.5' - moderate brown, (5YR 3/4), from 126.0', no dominant clast mineralogy, matrix supported and friable from 126.0', moderately weathered from 126.0'	R8 = 20 min 146.0-156.0' add 300 gallons of water
			0			
			0			
			0			
			0			
			0			
			0			
			0			
			0			
			0			
			0			
			0			
			0			
			0			
			0			
150	R9 10 ft 100%	100	0	155.5' - moderate brown (5YR 4/4)	R9 = 20 min	
			0			
			0			
			0			
			0			
			0			
			0			
			0			
			0			
			0			
			0			
155	R10 4 ft 100%	100	0		R10 = 7 min	
			0			
			0			
			0			
160	R11 1 ft 50%	100	0		R11 = 5 min	



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BORING NUMBER:
MW-62

SHEET 10 OF 11

ROCK CORE LOG

PROJECT : PG&E Topock - ERGI

LOCATION : Site E (2101068.3 N, 7616551.0 E)

ELEVATION : 503.6 ft

DRILLING CONTRACTOR : Boart Longyear (D. Roberts)

CORING EQUIPMENT AND METHOD : Track-mounted Rig, LF-70 Drill Head and HQ-sized tools (diamond bit)

ORIENTATION : Vertical

WATER LEVELS : Approx. 47 ft BGS

START : 3/14/2009

END : 4/22/2009 LOGGER : A. Brewster/C. Kreller (Northstar)

DEPTH AND ELEVATION 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				
	R12 1 ft 162.0/100%	100	0			Conglomerate(Tmc) 76.0-191.5' - moderate brown, (5YR 4/4), no dominant clast mineralogy, strong (R4), unweathered, fine matrix, coarse sand to coarse gravel sized clasts, massive 168.0-169.0' - slightly weathered	R12 = 10 min	
			0					
	R13 4 ft 90%	100	0				Add 300 gallons of water.	
165			0					
	166.0		0				R13 = 15 min	
			0					
			0					
170			0					
	R14 10 ft 100%	100	0					
			0					
			0					
			0					
175			0					
	176.0		0				R14 = 20 min	
			0					
			1	177' - Joint, 80 deg, rough, planar, < 1 mm calcite infilling, reddish staining, tight				
			0					
			1	179.5' - Joint, 40 deg, rough, planar, < 1 mm calcite infilling, no staining, tight				
180			0					



PROJECT NUMBER: 382653.FP.04.FW	BORING NUMBER: MW-62
SHEET 11 OF 11	
<h2 style="margin: 0;">ROCK CORE LOG</h2>	

PROJECT : PG&E Topock - ERGI	LOCATION : Site E (2101068.3 N, 7616551.0 E)
ELEVATION : 503.6 ft	DRILLING CONTRACTOR : Boart Longyear (D. Roberts)
CORING EQUIPMENT AND METHOD : Track-mounted Rig, LF-70 Drill Head and HQ-sized tools (diamond bit)	ORIENTATION : Vertical
WATER LEVELS : Approx. 47 ft BGS	START : 3/14/2009
	END : 4/22/2009
	LOGGER : A. Brewster/C. Kreller (Northstar)

DEPTH AND ELEVATION BELOW SURFACE (ft)	CORE RUN LENGTH AND RECOVERY (%)	DISCONTINUITIES			SYMBOLIC LOG	LITHOLOGY	COMMENTS
		R Q D (%)	FRACTURES PER FOOT	DESCRIPTION		ROCK TYPE, COLOR, MINERALOGY, TEXTURE, HARDNESS, WEATHERING, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
				DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS			
185	R15 10 ft 100%	95	0			Conglomerate(Tmc) 76.0-191.5' - moderate brown, (5YR 4/4), no dominant clast mineralogy, strong (R4), unweathered, fine matrix, coarse sand to coarse gravel sized clasts, massive	R15 = 20 min
186.0			0				
			0				
			0				
			0				
190	R16 5.5 ft 100%	100	0				
			0				
			0				
			0				
			0				R16 = 8 min
					End Drilling on 4/22/2009 Total Borehole Depth: 191.5 ft bgs		
195							
200							