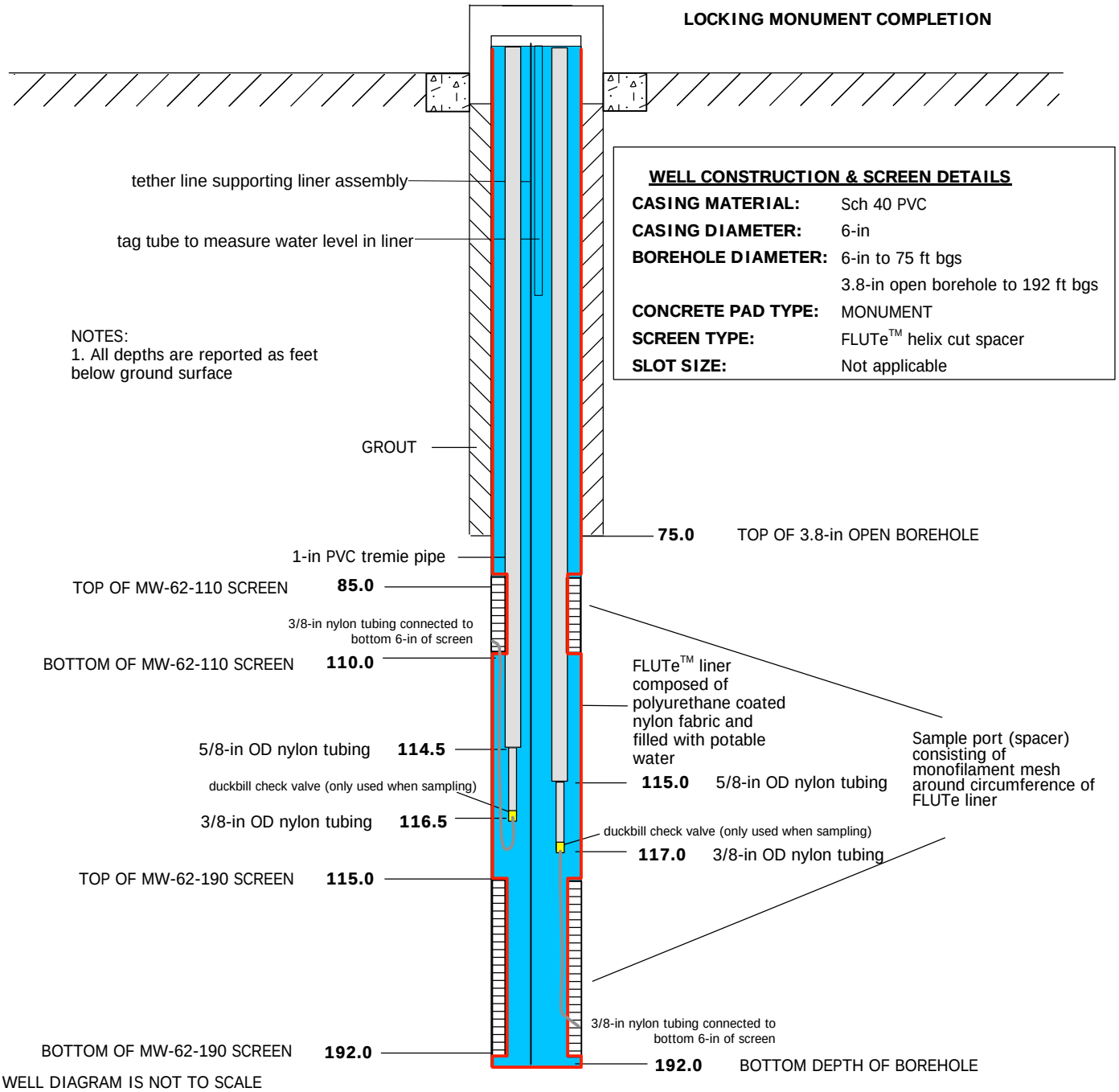
WELL COMPLETION DIAGRAM

PROJECT NO: 382653.FP.04.FW	**PROJECT:** PG&E Topock - ERGI	**WELL NO's:** ***MW-62-110*** ***MW-62-190***
LOCATION: Site E		

DRILLING CONTRACTOR: Boart Longyear (D. Roberts)	**DRILLING START:** 3/14/2009
DRILLING METHOD: Rotosonic	**DRILLING END:** 3/18/2009
LOGGER: A. Brewster (Northstar) and I. Wood	**WELL COMPLETION DATE:** 7/7/2009
GROUND SURFACE ELEVATION (NAVD 88): 504.05 ft AMSL	**GENERAL REMARKS:** 4-inch diameter, 2-port Guelph Water FLUTe™ multi-level system with helical screens installed into open 3.8-inch HQ borehole
NORTHING (CCS NAD 83 Z 5): 2101068.16 / **EASTING (CCS NAD 83 Z 5):** 7616550.88	



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

WELL CONSTRUCTION & SCREEN DETAILS

CASING MATERIAL:	Sch 40 PVC
CASING DIAMETER:	6-in
BOREHOLE DIAMETER:	6-in to 75 ft bgs
	3.8-in open borehole to 192 ft bgs
CONCRETE PAD TYPE:	MONUMENT
SCREEN TYPE:	FLUTe™ helix cut spacer
SLOT SIZE:	Not applicable

WELL DIAGRAM IS NOT TO SCALE

CH2MHILL

FLUTe™ Flexible Liner Underground Technologies, Ltd. L.C.
For a medley of innovative designs
6 Easy St., Santa Fe, NM 87506
505-455-1300, www.flut.com

As-Built Information

Job # 968-2

General:

Job Description:	192' 4"dia. 2 Port Guelph Water FLUTe
Customer:	CH2M Hill
Location:	155 Grand Ave. Suite 1000 Oakland, CA 94612
Well Designation:	MW-62BR
Hole Depth:	192'
Water Table:	47'
Drilling Method:	N/A
Casing Information:	N/A
Installation Method:	Water eversion
Bubbler / Tag:	47'

Liner:

Material:	210d Orange d/c 2 sleeve
Diameter:	4"
Material Above Casing:	3'
Uneverted Material:	4'
Rough Fabrication Legnth:	202'
Termination:	End Seal Knot
Knot Diameter Allowance:	2"
Markings on Liner:	Ink stamp indicating FLUTe TOC & FLUTe Job# 968-2
Spacer Design:	2 Material helix cut spacer Design (orange mesh) and Mylar

Spacer #	Spacer Bottom [ft]	Spacer Top [ft]
1	110'	85'
2	192'	155'

Tubing & Ports:							
			Tubing In Bundle:	NYLON			
			Tubing In Sleeves:	NYLON			
			Bubbler Details:	1/4 NYLON			
			Port Design:	Superthane feed thru			
			Port Locations:	6" @ bottom of spacer			
			Vent Design:	1/4 Superthane feed thru w/ 3/8 tygon tubing connected to duct			
			Vent Location:	202'			
Pump Assembly:							
Port #:	**Transducer Serial #:**	**Transducer Pressure Rating [psi]:**	**Diaphragm Depth [ft. btoc]**	**Cable Serial #:**	**Cable Length [ft.]**	**5/8 x 3/8**	**3/8 x 1/4**
1						114'.5"	116'.5"
2						115'	117'

Other Info:	
Transducer Type:	N/A
Kellum Design:	1" Friction Kellum wrap Below Unions 1" Webbing with blue hig
Kellum Locations:	1st kellum @ 18' btoc: others every 40 there afte
Tether:	1/4"
Marking on Tubing:	Port #'s and color code
Marking on Cables:	Port #'S
Bundle Sheating:	White 2.25" starting @ 1 116'
Marks on Bundle:	E.P. markings @ every 40'
Pump Tube:	202'
Reel / Packaging:	SF FLUTe
Casing Adapter Info:	ABQ FLUTe
Wellhead Info:	ABQ FLUTe
Vent Tube:	n/a
Clamps:	ABQ FLUTe
Shipped Via:	ABQ FLUTe
Other Notes:	Port # 1 Protrudes @ 114'.5"' Top Of Tube @ 111" W/ red cap
	Port # 2 Protrudes @ 115' Top Of Tube @ 113' W/ red cap

PROJECT NUMBER:	BORING NUMBER:
382653.FP.04.FW	MW-62 SHEET 1 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)	INTERVAL (ft)	RECOVERY (in)	LAB SAMPLE	USCS CODE/ LITHOLOGY	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
		COMPLETE		SM	**Silty Sand (SM)** 0.0-4.5' - dark yellowish brown, (10YR 4/4), dry, loose, 5% gravel, 80% sand, 15% fines, angular to subangular, poorly graded, no dominant mineralogy, matrix supported, max clast size = 30 mm		This log is the combination of two adjacent boreholes. Boring initially drilled to 21.0' bgs using Rotosonic tools up to 6-in in diameter. 6-in Rotosonic casing then used as temporary conductor casing to facilitate rotary core drilling. Boring drilled from 21.0' bgs to a total depth of 65.0' bgs using diamond bit rotary core tools (HQ-size, 3.8-in diameter) and then overdrilled to total depth using 6-in Rotosonic tools. Adjacent borehole (approximately 10' southeast) was drilled to 75' bgs using Rotosonic tools up to 10-in diameter. Permanent 6-in PVC conductor casing installed from ground surface to 75' bgs (portland cement grout). Boring drilled from 75' bgs to a total depth of 191.5' bgs using diamond bit rotary core tools (HQ-size, 3.8-in diameter).
5				Tmc	**Conglomerate (Tmc)** 4.5-21.0' - reddish brown, (5YR 4/4), dry, consolidated, no dominant clast mineralogy. Drilling method pulverizes most of the core.		
10							
15							
20							

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)	INTERVAL (ft)	RECOVERY (in)	LAB SAMPLE	USCS CODE/ LITHOLOGY	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
	21.0	COMPLETE		Tmc			Total depth of Rotosonic boring is 21.0 ft bgs. Begin rotary core drilling.
					Begin rock coring from 21.0 ft bgs See the next page for the rock core log.		
25							
30							
35							
40							

PROJECT NUMBER:	BORING NUMBER:
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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: R Q D (%)	DISCONTINUITIES: FRACTURES PER FOOT	DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS)	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.)
	21.0		0			**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	
	R1 5.5 ft 18%	0	0				
			0				
			0				
25			0				
	26.5		0				R1 = run time not available
			0				
			0				
			0				
30	R2 8 ft 28%	0	0				
			0				
			0				
			0				
	34.5		0				R2 = 45.0 min
35			0				
			0				
			0				
	R3 10 ft 100%	83	1	38.4' - Joint, 40 deg, rough, undulating, no staining, moderately tight			
40			0				
			0				

PROJECT NUMBER:	BORING NUMBER:
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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: R Q D (%)	DISCONTINUITIES: FRACTURES PER FOOT	DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS)	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.)
			0			**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	
			1	42.8' - Joint, 60 deg, rough, undulating, no staining, moderately tight			
			0				
	44.5		0				R3 = 27.0 min
45							
			0				
			0				
	R4 7 ft 100%	61	0				
			0				
			1	49' - Joint, 30 deg, rough, undulating to stepped, reddish staining, tight			
50							
			0				
	51.5		0				R4= 34.8 min
	R5 3 ft 70%	63	0				
			0				
	54.5		0				R5 = 5.0 min
55							
			0				
			0				
	R6 8.3 ft 100%	65	0				
			0				
60							
			0				

PROJECT NUMBER: 382653.FP.04.FW	BORING NUMBER: MW-62	SHEET 5 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: R Q D (%)	DISCONTINUITIES: FRACTURES PER FOOT	DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS)	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.)
			1	61.6' - Joint, 45 deg, rough, undulating, no staining, 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	R6 = 26.9 min
	62.8		0				
	R7 1.7 ft 100%	35	0				
	64.5		0				R7 = 3.7 min
65	COMPLETE					**Conglomerate(Tmc)** 64.5-75.0' - Rotosonic drilling method pulverizes core.	
70							
75	75.0					**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	
	R1 1 ft 0%						R1= 4.0 min
	76.0		0				
			0				
			0				
			0				
80			0				

PROJECT NUMBER:	BORING NUMBER:
382653.FP.04.FW	MW-62 SHEET 6 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: R Q D (%)	DISCONTINUITIES: FRACTURES PER FOOT	DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS)	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.)
		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 10 ft 65%						
			NR				
85							
	86.0						R2 = 80 min
			NR				
90	R3 10 ft 40%	40					
			0				
			0				
			1	94.6' - Joint, 30 deg, rough, planar, < 1 mm calcite infilling, reddish staining, tight			
95			0				
	96.0						
			0				R3 = 10 min
			0				
			0				
			0				
100			1				

PROJECT NUMBER:	BORING NUMBER:
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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: R Q D (%)	DISCONTINUITIES: FRACTURES PER FOOT	DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS)	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.)
	R4 10 ft 80%	60	1	100.7' - Joint, 50 deg, rough, undulating, reddish staining, tight 101.2' - Joint, 20 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	
			0				
			0				
105			0				
	106.0		0				R4 = 20 min
	R5 10 ft 100%	100	0				
			0				
			0				
110			0				
			0				
			0				
			0				
			0				
115			0				
	116.0		0				R5 = 20 min
			0				
			0				
			0				
120			0				
			0				

PROJECT NUMBER:	BORING NUMBER:
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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: R Q D (%)	DISCONTINUITIES: FRACTURES PER FOOT	DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS)	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.)
	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	
			0				
			0				
			0				
125			0				
	126.0						R6 = 20 min
	R7 10 ft 80%	100	0			126.0' - moderate brown, (5YR 3/4), matrix supported, friable, moderately weathered	
			0				
			0				
			0				
130			0				
			0				
			0				
			0				
			0				
135			0				
	136.0						R7 = 25 min
			0				
			0				
			0				
			0				
140			0				

PROJECT NUMBER:	BORING NUMBER:
382653.FP.04.FW	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: R Q D (%)	DISCONTINUITIES: FRACTURES PER FOOT	DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS)	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.)
	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'	
			0				
			0				
			0				
145			0				
	146.0						R8 = 20 min
	R9 10 ft 100%	100	0				146.0-156.0' add 300 gallons of water
			0				
			0				
			0				
150							
			0				
			0				
			0				
			0				
			0				
155							
			0			155.5' - moderate brown (5YR 4/4)	R9 = 20 min
	156.0						
	R10 4 ft 100%	100	0				
			0				
			0				
			0				
160	160.0						R10 = 7 min
	R11 1 ft 50%	100	0				
	161.0						R11 = 5 min

PROJECT NUMBER:	BORING NUMBER:
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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: R Q D (%)	DISCONTINUITIES: FRACTURES PER FOOT	DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS)	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.)
	R12 1 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	R12 = 10 min
162.0							
	R13 4 ft 90%	100	0				
			0				
			0				Add 300 gallons of water.
165							
			0				R13 = 15 min
166.0							
	R14 10 ft 100%	100	0				
			0				
			0			168.0-169.0' - slightly weathered	
			0				
170							
			0				
			0				
			0				
			0				
175							
			0				R14 = 20 min
176.0							
			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:	BORING NUMBER:
382653.FP.04.FW	MW-62 SHEET 11 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: R Q D (%)	DISCONTINUITIES: FRACTURES PER FOOT	DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS)	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.)
	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	
			0				
			0				
			0				
185			0				
	186.0						R15 = 20 min
	R16 5.5 ft 100%	100	0				
			0				
			0				
			0				
190			0				
	191.5		0				R16 = 8 min
						End Drilling on 4/22/2009 Total Borehole Depth: 191.5 ft bgs	
195							
200							