### WELL COMPLETION DIAGRAM **PROJECT:** PG&E Topock - ERGI **PROJECT NO:** 382653.FP.04.FW WELL NO: MW-57-185 LOCATION: Site B DRILLING CONTRACTOR: Boart Longyear (D. Roberts) DRILLING START: 1/14/2009 DRILLING METHOD: Rotosonic / Rotary Core (HQ) **DRILLING END:** 1/20/2009 LOGGER: A. Brewster (Northstar) WELL COMPLETION DATE: 2/16/2009 GENERAL REMARKS: Alias during field work: MW-57BR GROUND SURFACE ELEVATION (NAVD 88): 508.97 ft AMSL NORTHING (CCS NAD 83 Z 5): EASTING (CCS NAD 83 Z 5): 2100899.56 7616389.44 12-IN DIAMETER WELL VAULT (FLUSH WITH GRADE) **WELL CONSTRUCTION & SCREEN DETAILS** CASING MATERIAL: Sch 40 PVC CASING DIAMETER: 5-in to 70.0 ft bgs (conductor casing) 3-in to 184.0 ft bgs (well casing) BOREHOLE DIAMETER: 10-in to 70.0 ft bgs 3.8-in borehole to 192.0 ft bgs NOTES: collapsed to 184 ft bgs 1. All depths are reported as feet CONCRETE PAD TYPE: 3-ft SQUARE below ground surface SCREEN TYPE: Sch 40 PVC SLOT SIZE: 0.03-in GROUT (PORTLAND CEMENT) TOP OF 3.8-IN BOREHOLE TOP OF SCREEN 70.0 70.0 184.0 BOTTOM OF SCREEN COLLAPSED 192.0 BOTTOM DEPTH OF BOREHOLE WELL DIAGRAM IS NOT TO SCALE CH2MHILL



BORING NUMBER:

MW-57 SHEET 1 OF 11

# **SOIL BORING LOG**

PROJECT : PG&E Topock - ERGI LOCATION : Site B (2100899.6 N, 7616389.4 E)

ELEVATION: 509.0 ft DRILLING CONTRACTOR: Boart Longyear (D. Roberts)

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

ORIENTATION: Vertical

LAB   SAMPLE   Sandy   0.0-3.0   gravel, graded   clast si	Rotosonic drill head and tools	ORIENTATION : Vertical
INTERVAL (ft)   USCS   CODE/ LITHOLOGY   SCOODE/ CON	START: 1/14/2009 END: 1	/20/2009 LOGGER : A. Brewster (Northstar)
RECOVERY (in)   USCS   CODE   LITHOLOGY   SC   MO   CON	SOIL DESCRIPTION	COMMENTS
3.0   10:10   Silty G   3.0-46   gravel, graded clast si   5	OIL NAME, USCS GROUP SYMBOL, COLOR, DISTURE CONTENT, RELATIVE DENSITY OR ISISTENCY, SOIL STRUCTURE, MINERALOGY	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
10:10  3.0-46 gravel, graded clast si  11:00, 14:00 (FD)  10	r Silt With Gravel (ML) D' - dark brown, (7.5YR 3/3), dry, loose, 20%, 30% sand, 50% fines, angular gravel, poorly d, no dominant mineralogy, matrix-supported, max ize = 10 mm	Boring initially drilled to 70' bgs using Rotosonic tools up to 10-in in diameter. Permanent 5-in PVC conductor casing installed from ground surface to 70' bgs (portland cement grout). Boring drilled from 70' bgs to total depth of 192' bgs using diamond bit rotary core tools (HQ-size, 3.8-in diameter)
5	Gravel (GM)  .0' - dark brown, (7.5YR 3/3), dry, loose, 40%, , 20% sand, 40% fines, angular gravel, poorly d, no dominant mineralogy, matrix-supported, max	
20	ize = 100 mm	



BORING NUMBER:

**MW-57** 

SHEET 2 OF 11

### **SOIL BORING LOG**

LOCATION: Site B (2100899.6 N, 7616389.4 E) PROJECT: PG&E Topock - ERGI

ELEVATION: 509.0 ft DRILLING CONTRACTOR: Boart Longyear (D. Roberts)

DRILLING EQUIPMENT AND METHOD : Track-mounted Rig, Rotosonic drill head and tools ORIENTATION: Vertical WATER LEVELS: Approx. 52 ft BGS START: 1/14/2009 END: 1/20/2009 LOGGER: A. Brewster (Northstar) DEPTH BELOW EXISTING GRADE (ft) SOIL DESCRIPTION COMMENTS LOG INTERVAL (ft) USCS CODE/ LITHOLOGY SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY SYMBOLIC DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION RECOVERY (in) LAB SAMPLE Silty Gravel (GM) 3.0-46.0' - dark brown, (7.5YR 3/3), dry, loose, 40% gravel, 20% sand, 40% fines, angular gravel, poorly graded, no dominant mineralogy, matrix-supported, max clast size = 100 mm 25 30 GM 35 40



BORING NUMBER:

MW-57

SHEET 3 OF 11

# **SOIL BORING LOG**

PROJECT : PG&E Topock - ERGI LOCATION : Site B (2100899.6 N, 7616389.4 E)

ELEVATION: 509.0 ft DRILLING CONTRACTOR: Boart Longyear (D. Roberts)

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

ORIENTATION: Vertical

MATER_LEVELS - Agoros, 2g & BGS  PEPPH BELOW EXENTING GRADE (III)  RECOVERY (III)  LOSS   SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DESISTY OR COMMETTS  SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DESISTY OR COMMETS  SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DESISTY OR COMMETS  BETT OF CASING, PRILLING RAVE DRILLING RUDID LOSS, TESTS, AND COMPANY OR COMMETS OF COMETS OF COMMETS OF COMMETS OF COMMETS OF COMMETS OF COMMETS OF COM	DITIELING EQUII MENT AND	NIETHOD . Hack-IIIO	unted Rig, Rotosonic drill head and tools		ORIENTATION : Vertical
NTTERVAL (10)  RECOVERY (n) LAB USGS CHIEROCOY LAB	WATER LEVELS : Approx. 52	2 ft BGS		END: 1/20/2009	
Sity Gravel (GM) 3.0 – 46.0 - dark thrown, (7.5YR 3/3), dry, losse, 40% gravel, 20% sand, 40% fines, angular gravel, poorly gradet, no dominant mineralogy, matrix-supported, max clast size = 100 mm  GM  Conglomerate (Tmc) 46.0 – 45.5 - bestrook is consolidated. Drilling method pulverizes most of the orae. Intact portions of one are yellowsh red (5YR 4/6), dry, matrix-supported conglomerate with no dominant clast mineralogy  Timc	DEPTH BELOW EXISTING GRAI	DE (ft)	SOIL DESCRIPTION		COMMENTS
Sity Gravel (GM) 3.0 – 46.0 - dark thrown, (7.5YR 3/3), dry, losse, 40% gravel, 20% sand, 40% fines, angular gravel, poorly gradet, no dominant mineralogy, matrix-supported, max clast size = 100 mm  GM  Conglomerate (Tmc) 46.0 – 45.5 - bestrook is consolidated. Drilling method pulverizes most of the orae. Intact portions of one are yellowsh red (5YR 4/6), dry, matrix-supported conglomerate with no dominant clast mineralogy  Timc	I I ——	USCS CODE/	SOIL NAME, USCS GROUP SYMBOL, COLOR,		DEPTH OF CASING, DRILLING RATE,
Sity Gravel (GM) 3.0 – 46.0 - dark thrown, (7.5YR 3/3), dry, losse, 40% gravel, 20% sand, 40% fines, angular gravel, poorly gradet, no dominant mineralogy, matrix-supported, max clast size = 100 mm  GM  Conglomerate (Tmc) 46.0 – 45.5 - bestrook is consolidated. Drilling method pulverizes most of the orae. Intact portions of one are yellowsh red (5YR 4/6), dry, matrix-supported conglomerate with no dominant clast mineralogy  Timc		LITHOLOGY	MOISTURE CONTENT, RELATIVE DENSI CONSISTENCY. SOIL STRUCTURE. MINER	TY OR	DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
3.0.4-6.0 - John Korvan, (7.7-YR 37), dry, lose, 40% gravel, 20% sand, 40% fines, anglar gravel, poorly graded, no dominant mineralogy, matrix supported, max clast slize = 100 mm  Conglomerate (7 me) 4.00 14.5 5 - bedrook is consolidated. Drilling method pulverizes most of the core. Intact portions of core are yellowlash red (7x4-8), dry, matrix supported conglomerate with no dominant clast mineralogy  Tmc	LA SA	AMPLE		SYL	
46.0-145.5' - bedrock is consolidated. Drilling method pulverizes most of the core. Intact portions of core are yellowish red (5/YR 4/6), dry, matrix-supported conglomerate with no dominant clast mineralogy  Tmc  Tmc		GM	3.0-46.0' - dark brown, (7.5YR 3/3), dry, loose gravel, 20% sand, 40% fines, angular gravel, graded, no dominant mineralogy, matrix-supp	e, 40% - poorly orted, max	_
	55	Tmc	46.0-145.5' - bedrock is consolidated. Drilling pulverizes most of the core. Intact portions of yellowish red (5YR 4/6), dry, matrix-supported	core are	



BORING NUMBER: MW-57

SHEET 4 OF 11

# **SOIL BORING LOG**

PROJECT : PG&E Topock - ERGI LOCATION : Site B (2100899.6 N, 7616389.4 E)

ELEVATION: 509.0 ft DRILLING CONTRACTOR: Boart Longyear (D. Roberts)

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

ORIENTATION: Vertical

WATER LEVELS - Approx 26 1 Res START - 1/14/2000 PND - 1/20/2000 LOGGER - A Brevester (Northstart) OPPH BELOW - SENTIOR GRAPE IN COORD START - 1/14/2000 PND - 1/20/2000 LOGGER - A Brevester (Northstart) OPPH BELOW - SENTIOR GRAPE IN COORD START - 1/14/2000 PND - 1/20/2000 LOGGER - A Brevester (Northstart) OPPH BELOW - SENTIOR GRAPE IN COORD START - 1/14/2000 PND - 1/20/2000 LOGGER - A Brevester (Northstart) OPPH BELOW - 1/20/2000 LOGGER - 1/20/20	\A/ATEE			50 ft DO	.0	OTABT - 4/44/0000	END 4/0	0,000	A December (Alestholog)						
SOL NAME USCS GROUP SYMBOL. COLOR MOISTORY ON CONSISTENCY. SOL STRUCTURE MINERAL DOT ON INSTRUMENTATION  SOL NAME USCS GROUP SYMBOL. COLOR MOISTORY OR CONSISTENCY. SOL STRUCTURE MINERAL DOT ON INSTRUMENTATION  Congloraries (Time)  Gold Silver and of the core interpretation of core are yellowish red (YRA 46), dry, matrix upported conglowerse with no dominant clast mineralogy  Time  Time  Time  Begin rock coring from 70.0 it bgs See the next page for the rock core log.					-S	START : 1/14/2009	END : 1/2								
Conjournerate (Time)  46 - 14.5 7 - bedrook is consolidated. Drilling method pulverizes most of the core. Inlact portions of core are yellowish red (Tyrk 46), dry, method core) are yellowish red (Tyrk 46), dry, method or yellowish red (Tyrk 46),	DEPIRE			ADE (II)		GOIL DESCRIPTION		90	COIVIIVILIVIO						
Conjournerate (Time)  46 - 14.5 7 - bedrook is consolidated. Drilling method pulverizes most of the core. Inlact portions of core are yellowish red (Tyrk 46), dry, method core) are yellowish red (Tyrk 46), dry, method or yellowish red (Tyrk 46),	1	INTERV									USCS	SOIL NAME LISCS CROLID SYMPOL CO	N OP	CL	DEPTH OF CASING IDDILLING DATE
Conglomerate (Tmc)  463 - 145.5 * bedrook is consolidated. Drilling method pulverizes most of the core. Intact portions of core are yellowash red (S74 46), dry, method yellowash red (S74 46), dry, method core) are yellowash red (S74 46), dry, method yellowash red (S74 46), dry, met			RECOVER	RY (in)	CODE/ LITHOLOGY	MOISTURE CONTENT, RELATIVE DENSI	TY OR	ΙÖ	DRILLING FLUID LOSS, TESTS, AND						
Conglomerate (Tmc)  463 - 145.5 * bedrook is consolidated. Drilling method pulverizes most of the core. Intact portions of core are yellowash red (S74 46), dry, method yellowash red (S74 46), dry, method core) are yellowash red (S74 46), dry, method yellowash red (S74 46), dry, met			[ [	.AB	202001	CONSISTENCY, SOIL STRUCTURE, MINEF	RALOGY	¥₩	INSTRUMENTATION						
46.0-14.5.5 - bedrock is consolidated. Drilling method pulser the core in land protinces of one at each pulse with no dominant clast mineral cyr.  Timc  Timc  Timc  Begin rock coring from 70.0 ft bgs See the next page for the rock core log.  Begin rock core log.				SAMPLE		(T)		_							
	70	70.0			Tmc	46.0-145.5' - bedrock is consolidated. Drilling pulverizes most of the core. Intact portions of cyellowish red (5YR 4/6), dry, matrix-supported conglomerate with no dominant clast mineralo	ore are		Boring by Rotosonic completed 1/14/09. Install permanent 5-in diameter PVC conductor casing (portland cement grout). Begin rotary						



BORING NUMBER:

MW-57

SHEET 5 OF 11

# **ROCK CORE LOG**

PROJECT : PG&E Topock - ERGI LOCATION : Site B (2100899.6 N, 7616389.4 E)

ELEVATION: 509.0 ft DRILLING CONTRACTOR: Boart Longyear (D. Roberts)

WATER	LEVELS : Ap	oprox.	52 ft I	BGS START : 1/14/2009		END: 1/20/2009 LOGGER:	A. Brewster (Northstar)
	6)			DISCONTINUITIES	ပ္ခ	LITHOLOGY	COMMENTS
DEPTH AND ELEVATION BELOW SURFACE (#)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	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.
- - - - - - - 75	70.0 R1 5.3 ft 0%	0	NR			No Recovery 70-75.3'	- - - - - - - - - - - - -
-	70.0		0		0.0	Conglomerate (Tmc)	- 1(1 - 25.0 111111
-			0		0.00	75.3-145.5' - light brown, (5YR 5/6), no dominant clast mineralogy, fine to coarse grained, medium strong (R3), unweathered, matrix-supported,	-
-			0		0.0	massive	_
-			0			-	_
-	R2				000	-	-
80	9.5 ft 103%	100	0	-		- -	_
-			0		0.0	- -	-
-			0		000	- -	-
-			0		0000	-	-
-			0		000	-	-
85	84.8		0		000	-	Added Approx. 50 gallons of water
-			0	_	000	-	-
-			0			- -	]
-			0		0.00	- -	]
-			0		000	-	
-	R3 10 ft 100%		0		000	- -	
90	100%	100			,o • .		-



BORING NUMBER:

MW-57

SHEET 6 OF 11

# **ROCK CORE LOG**

PROJECT : PG&E Topock - ERGI LOCATION : Site B (2100899.6 N, 7616389.4 E)

ELEVATION: 509.0 ft DRILLING CONTRACTOR: Boart Longyear (D. Roberts)

WATER	R LEVELS : Ap	oprox.	52 ft I	BGS START : 1/14/2009		END: 1/20/2009 LOGGER:	A. Brewster (Northstar)
	(9)			DISCONTINUITIES		LITHOLOGY	COMMENTS
DEPTH AND ELEVATION BELOW SURFACE (#)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	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.
95	94.8		0 0 0 0 0 0	98.5, 99.0' - Joint, 35 deg, rough, undulating, reddish staining, tight		Conglomerate (Tmc) 75.3-145.5' - light brown, (5YR 5/6), no dominant clast mineralogy, fine to coarse grained, medium strong (R3), unweathered, matrix-supported, massive	Added approx. 25 gallons of water. R3 = 10.0 min
100	10 ft 100%	70	0 0 >10 >10 0 0 0	103.0-105.0' - Multiple breaks, difficult to ascertain if jointed or caused by drilling.			R4 = 10.5 min
110	100 /0	97			,o		



BORING NUMBER:

MW-57

SHEET 7 OF 11

# **ROCK CORE LOG**

PROJECT : PG&E Topock - ERGI LOCATION : Site B (2100899.6 N, 7616389.4 E)

ELEVATION: 509.0 ft DRILLING CONTRACTOR: Boart Longyear (D. Roberts)

WATER	LEVELS : A	oprox.	52 ft I	BGS START : 1/14/2009		END: 1/20/2009 LOGGER:	A. Brewster (Northstar)
	(9)			DISCONTINUITIES	g	LITHOLOGY	COMMENTS
DEPTH AND ELEVATION BELOW SURFACE (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	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.
	114.8	~	0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	113.1' - Joint, 35 deg, rough, undulating, reddish staining, tight		Conglomerate (Tmc)  75.3-145.5' - light brown, (5YR 5/6), no dominant clast mineralogy, fine to coarse grained, medium strong (R3), unweathered, matrix-supported, massive	- Added approx. 25 gallons of water. R5 = 12.5 min
120	R6 10 ft 100%	100	1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	119.3' - Joint, 35 deg, rough, planar, reddish staining, tight			R6 = 14.0 min
130	R7 9.9 ft 100%	100	0 0			- - - -	- - -



BORING NUMBER:

MW-57

SHEET 8 OF 11

# **ROCK CORE LOG**

PROJECT : PG&E Topock - ERGI LOCATION : Site B (2100899.6 N, 7616389.4 E)

ELEVATION: 509.0 ft DRILLING CONTRACTOR: Boart Longyear (D. Roberts)

WATER	LEVELS : Ap	prox.	52 ft I	BGS START : 1/14/2009		END: 1/20/2009 LOGGER: A. Brewster (Northstar)		
	(9)			DISCONTINUITIES	g	LITHOLOGY	COMMENTS	
DEPTH AND ELEVATION BELOW SURFACE (#)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	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.	
-			0		0.0000000000000000000000000000000000000	Conglomerate (Tmc) 75.3-145.5' - light brown, (5YR 5/6), no dominant clast mineralogy, fine to coarse grained, medium strong (R3), unweathered, matrix-supported, massive	- - -	
- - -	134.7		1 0	133' - Joint, 35 deg, rough, planar, < 1 mm calcite infilling, reddish staining, tight (likely caused by drilling)	0.000.000000000000000000000000000000000	· · · · · · ·	- - - R7 = 15.0 min	
135 - - -	10 1		1 0	135' - Joint, 60 deg, rough, undulating, < 2 mm calcite infilling, reddish staining, tight	V		 _ _ _	
- - - -	R8		1 0	137.1' - Joint, 35 deg, rough, undulating, reddish staining, minor yellow staining, tight		·	- - - - -	
140 <u> </u>	10.1 ft 100%	100	0 0 1	– 141' - Joint, 80 deg, rough, undulating, reddish staining, tight (likely caused by drilling)		- - - - -	-  - - -	
- - - - 145	144.8		0 0 1	144' - Joint, 45 deg, rough, stepped, reddish staining, tightness uncertain		· · · · · ·	- - - R8 = 14.5 min	
-   -   -   -			0 0	146.8-152.6' - Multiple fractures caused by drilling. Preferential clevage 25 to 35 deg, undulating, slickensided, no infill, reddish	Q Q	145.5-153.1' - moderate reddish orange, (10R 6/6), no dominant clast mineralogy, fine to coarse grained, medium strong (R3), completely weathered, matrix-supported, foliated	Conglomerate from 144.5 153.1 is altered. The matrix of the rock rapidly dissolves on contact with water as evident from the outer portion of the recovered core exposed to drilling	
150	R9 10.1 ft 99%	98	0	staining	0.000.000.000.000.000.0000.0000.0000.0000	: - -	fluids and fragments of core intentionally submersed in water.	



BORING NUMBER:

MW-57

SHEET 9 OF 11

### **ROCK CORE LOG**

PROJECT : PG&E Topock - ERGI LOCATION : Site B (2100899.6 N, 7616389.4 E)

ELEVATION: 509.0 ft DRILLING CONTRACTOR: Boart Longyear (D. Roberts)

WATER	R LEVELS : Ap	prox.	52 ft E	BGS START : 1/14/2009		END : 1/20/2009 LOGGER : A	A. Brewster (Northstar)
	(%			DISCONTINUITIES	LOG	LITHOLOGY	COMMENTS
DEPTH AND ELEVATION BELOW SURFACE (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LC	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.
155	154.9 R10 4.8 ft 100%	58	0 0 0 0 >10 0	153.5, 154.5' - Mechanical break, 35 deg, undulating to planar, brownish with black staining, no infill, slickensided, tight 154.6-155.6' - Fracture zone, healed fractures with random orientation		Conglomerate (Tmc)  145.5-153.1' - moderate reddish orange, (10R 6/6), no dominant clast mineralogy, fine to coarse grained, medium strong (R3), completely weathered, matrix-supported, foliated  Metaconglomerate (Tmc)  153.1-154.6' - dark yellowish orange, (10YR 6/6), strong (R4), unweathered, massive, moderate HCI reaction, conglomerate matrix has been largely replaced with minerals that have a moderate reaction with HCI, however relict conglomerate structure is apparent.  Altered Metadiorite (pTbr)  154.6-155.6' - moderate yellowish brown, (10YR 5/4), largely felsic mineralogy, medium grained, strong (R4), unweathered, no HCL reaction, portions of this interval exhibit mylonitic texture	R9 = 17.5 min  General Note: The
- 160_ - - - - -	159.7 R11 4.7 ft 100%	51	0 0 >10 >10	planes, rough, undulating, < 1 mm calcite infilling covering 50% of one plane, yellowish staining, tightness uncertain  -  160.9-164.2' - Fracture zone, reddish staining, yellow staining from 162.3-164.2'	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	Metadiorite (pTbr)  155.6-191.9' - dusky yellowish green, (10GY 3/2), intermediate (dioritic) mineralogy, fine to medium grained, strong (R4), unweathered, massive to foliated	metadiorite bedrock exhibits many small healed fractures (1-3 mm) of somewhat random orientation. These healed fractures create weaknesses in the rock. It can be difficult to determine if the metadiorite is jointed in-situ, or if the discontinuities are caused by the drilling method. Intervals with fracture per foot counts >10 are likely caused by drilling. R10 = 23.0 min
165_ - -	164.4 R12 4.6 ft		0 0	166 1' - Mechanical break near 90 deg calcite	***********	- - - -	R11 = 13.3 min
-	4.6 π 100%	53	0 0	166.1' - Mechanical break, near 90 deg, calcite infilling, calcite healed fracture, most likely induced by drilling  167.7-170.0' - Mechanical break (6), 35 deg and 45 deg, calcite infilling, along calcite healed fractures, likely induced by drilling	\$	- 166.8-167.0' - slightly weathered - - -	R12 = 19.3 min
170					100		



BORING NUMBER:

MW-57

SHEET 10 OF 11

# **ROCK CORE LOG**

PROJECT : PG&E Topock - ERGI LOCATION : Site B (2100899.6 N, 7616389.4 E)

ELEVATION: 509.0 ft DRILLING CONTRACTOR: Boart Longyear (D. Roberts)

WATER	LEVELS : Ar	oprox.				END: 1/20/2009 LOGGER:	ER : A. Brewster (Northstar)			
	(%			DISCONTINUITIES	၅	LITHOLOGY	COMMENTS			
ON (#)	AND 3 3 3 3 3	_	SES T	DESCRIPTION		ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,			
DEPTH AND ELEVATION BELOW SURFACE (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	RQD(%)	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	MINERALOGY, TEXTURE, HARDNESS, WEATHERING, AND ROCK MASS CHARACTERISTICS	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.			
_	R13 4.8 ft		0		***	Metadiorite (pTbr)  155.6-191.9' - dusky yellowish green, (10GY 3/2), intermediate (dioritic)	Last 1.5' = 2-3x faster drill rate			
_	100%	69	0		$\overset{\sim}{\overset{\sim}{\overset{\sim}{\overset{\sim}{\overset{\sim}{\overset{\sim}{\overset{\sim}{\overset{\sim}$	mineralogy, fine to medium grained, strong (R4), unweathered, massive to foliated	-			
_			>10	172.2-173.8' - Fracture zone, reddish staining		-				
_	R14 173.8 0.5 ft	•	>10			- - -	R13 = 25.3 min			
	174.3	0			$\sim$	-	R14 = 7.5 min			
175			1	174.4' - Joint, 30 deg, smooth, undulating, < 1 mm calcite infilling, reddish staining, tight	$\mathbb{X}$	- 	_			
_	R15 3.4 ft 100%	71	0	175.2' - Mechanical break, 35 deg, < 2 mm calcite infilling, along calcite healed fracture	$\bigotimes$	- -	@ 175' bgs: drill rate increases -			
-			1	176.6' - Joint, 60 deg, rough, undulating, reddish staining, tight	$\frac{1}{2}$	- -	- R15 = 17.0 min			
-	177.7		1	177.3' - Joint, 30 deg, rough, undulating, < 1 mm calcite infilling, reddish staining, tight	$\bigotimes$	-	-			
-	R16		100 1 r	170.11 Joint 20 dog rough undulating < 1	$\bigotimes$	- -	-			
180	4.2 ft 100%	100		179.1' - Joint, 20 deg, rough, undulating, < 1 mm calcite infilling, reddish staining, tight  180' - Joint, 30 deg, rough, undulating, minor	$\bigotimes$	- 				
_								reddish staining, tight	$\frac{1}{2}$	-
_	181.9		1	181.2' - Joint, 25 deg, rough, undulating, < 1 mm calcite infilling, reddish and black staining, tight 182.1, 189.6' - Joint (2), 10 deg, smooth,	$\frac{8}{100}$	-	]			
-			1	undulating, < 1 mm clay infilling, reddish staining, tight, clay infilling is dark-reddish brown	****	-				
_			0			- - -				
185 <u> </u>			0	_	$\bigotimes$					
-	R17 10 ft		0	185.8 - 186.0' - Multiple breaks, likely induced by drilling		- -				
-	100%	92	0			- -				
-			1		$\bigotimes$	- -				
190			0			-				
190										



BORING NUMBER: MW-57

SHEET 11 OF 11

# **ROCK CORE LOG**

PROJECT : PG&E Topock - ERGI LOCATION : Site B (2100899.6 N, 7616389.4 E)

ELEVATION: 509.0 ft DRILLING CONTRACTOR: Boart Longyear (D. Roberts)

WATER	LEVELS : A	Approx. 52 ft BGS				END : 1/20/2009 LOGGER : A. Brewster (Northstar)		
	(9			DISCONTINUITIES	ပ္ခ	LITHOLOGY	COMMENTS	
QN (#)	ZAND SOD		ZES T	DESCRIPTION	C LC	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,	
DEPTH AND ELEVATION BELOW SURFACE (#)	CORE RUN, LENGTH, AND RECOVERY (%)	RQD(%)	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, HARDNESS, WEATHERING, AND ROCK MASS CHARACTERISTICS	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.	
-			0		<b>}</b> <b>}</b> <b>}</b>	Metadiorite (pTbr)  155.6-191.9' - dusky yellowish green, (10GY 3/2), intermediate (dioritic)	-	
-	191.9		0		***	mineralogy, fine to medium grained, strong (R4), unweathered, massive to foliated	R17 = 35.5 min	
-	-				-	End Drilling on 1/20/2009  Total Borehole Depth: 191.9 ft bgs	_	
-	-				-	-	_	
195_	-			-		- 	-	
-					1	-	-	
-						-		
-					-	-	_	
-	-				-	-		
200	-			_	-	<del>-</del>		
-	-				-	-	-	
-					-	-	]	
-						-	-	
205 <u> </u>	-			_	<u> </u>		_	
-	-				-	-	_	
-	-				1	-		
-	-				- - -	-	- - -	
-	-				1	-	-	
210					1		-	