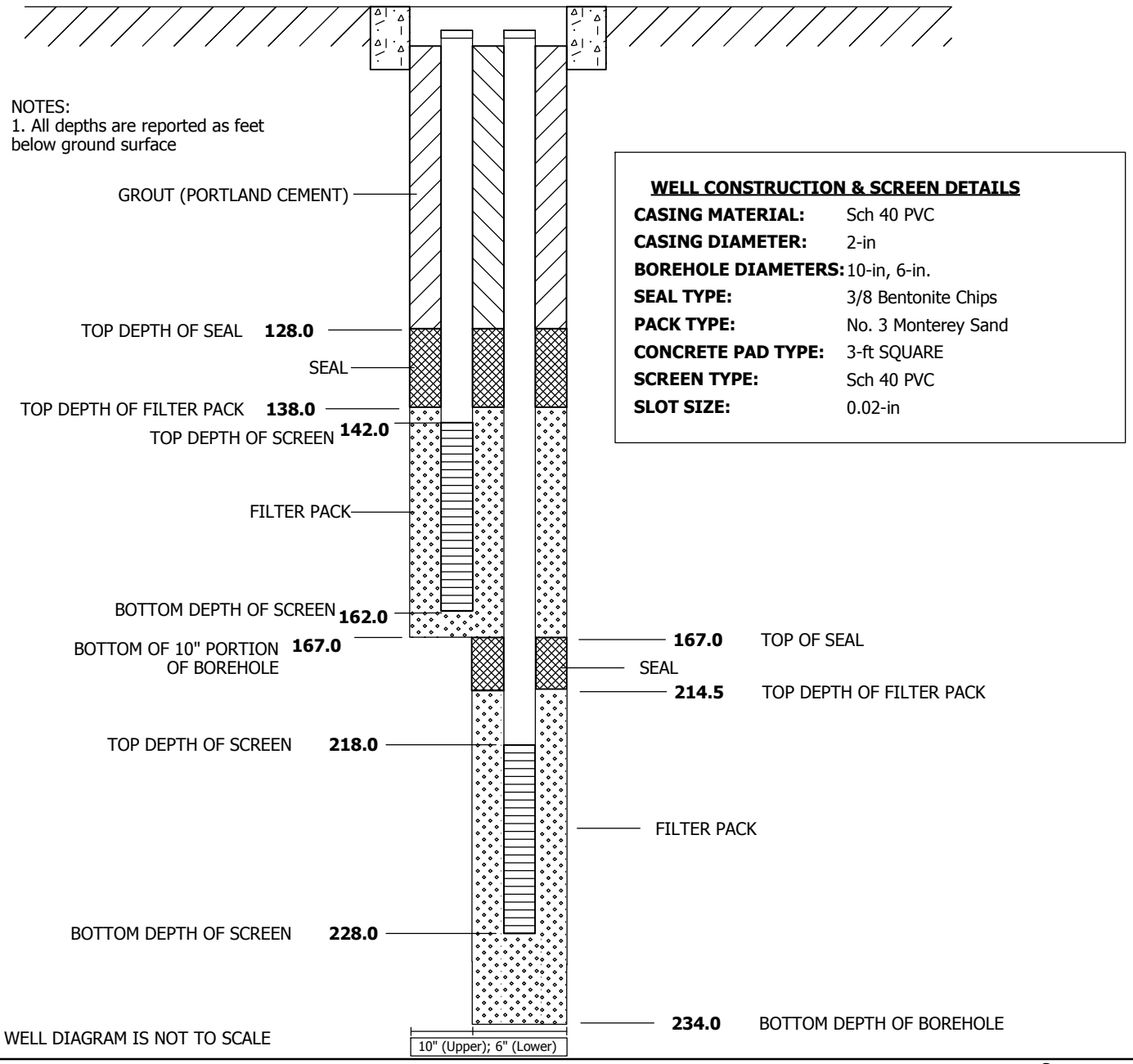
WELL COMPLETION DIAGRAM

PROJECT NO: 417981.ER.02.FW	**PROJECT:** ER-TCS Groundwater Investigation	**WELL NO:** ***MW-66-165*** ***MW-66-230***

LOCATION: Site 6

DRILLING CONTRACTOR: Boart Longyear (R. Sawrey)	**DRILLING START:** 4/12/2011
DRILLING METHOD: Rotosonic	**DRILLING END:** 4/20/2011
LOGGER: A. Brewster (Northstar)	**WELL COMPLETION DATE:** 4/20/2011
GROUND SURFACE ELEVATION (NAVD 88): 586.6 ft AMSL	**GENERAL REMARKS:** Centralizers at 15, 30, 45, 60, 75, 90, 105, 120, 135, 165, and 215 ft bgs.
NORTHING (CCS NAD 83 Z 5): 2100957.66 / **EASTING (CCS NAD 83 Z 5):** 7615153.76	

12-in DIAMETER WELL VAULT (FLUSH WITH GRADE)



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

CH2MHILL

PROJECT NUMBER:	BORING NUMBER:
417981.ER.02.FW	BH-66 SHEET 1 OF 15

SOIL BORING LOG

PROJECT : ER-TCS Investigation
LOCATION : Site 6 (TCS) (2100957.7 N, 7615153.8 E)
ELEVATION : 586.0 ft
DRILLING CONTRACTOR : Boart Longyear (R. Sawrey)
DRILLING EQUIPMENT AND METHOD :
ORIENTATION : Vertical
WATER LEVELS : Approx. 131 ft BGS
START : 4/12/2011
END : 9/11/2011
LOGGER : A. Brewster (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
	0.0 – 1.0	COMPLETE	10101	SP	**Poorly Graded Sand (SP)** 0.0-14.0' - yellowish brown, (10YR 5/4), dry, loose, 5% gravel, 90% sand, 5% fines, angular to subangular, poorly graded, predominantly quartz.		Soil sample collected between 0.0 and 1.0 ft bgs.
	2.0 – 3.0		10102				Soil sample collected between 2.0 and 3.0 ft bgs.
5	5.0 – 6.0		10103				Soil sample collected between 5.0 and 6.0 ft bgs.
10							
15	14.0 – 15.0		10104, 50003	SM	**Silty Sand (SM)** 14.0-17.0' - yellowish brown, (10YR 5/4), dry, loose, 10% gravel, 75% sand, 15% fines, angular to subangular, poorly graded, predominantly quartz.		Soil sample collected between 14.0 and 15.0 ft bgs.
				SP	**Poorly Graded Sand (SP)** 17.0-19.0' - yellowish brown, (10YR 5/4), dry, loose, 5% gravel, 90% sand, 5% fines, angular to subangular, poorly graded, predominantly quartz.		
20	19.0 – 20.0		10105	ML	**Silt (ML)** 19.0-32.0' - dark yellow brown, (10YR 4/4), dry, loose to partially consolidated, poorly graded		Soil sample collected between 19.0 and 20.0 ft bgs.

PROJECT NUMBER: 417981.ER.02.FW	BORING NUMBER: BH-66	SHEET 2 OF 15

SOIL BORING LOG

PROJECT : ER-TCS Investigation
LOCATION : Site 6 (TCS) (2100957.7 N, 7615153.8 E)
ELEVATION : 586.0 ft
DRILLING CONTRACTOR : Boart Longyear (R. Sawrey)
DRILLING EQUIPMENT AND METHOD :
ORIENTATION : Vertical
WATER LEVELS : Approx. 131 ft BGS
START : 4/12/2011
END : 9/11/2011
LOGGER : A. Brewster (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
25		COMPLETE		ML	**Silt (ML)** 19.0-32.0' - dark yellow brown, (10YR 4/4), dry, loose to partially consolidated, poorly graded		
30	29.0 30.0		10106				Soil sample collected between 29.0 and 30.0 ft bgs.
35				SM	**Silty Sand (SM)** 32.0-67.0' - yellowish brown, (10YR 5/4), dry, loose to partially consolidated, 10% gravel, 65% sand, 25% fines, angular to subangular, poorly graded, predominantly quartz.		
40	39.0 40.0		10107				Soil sample collected between 39.0 and 40.0 ft bgs.

PROJECT NUMBER:	BORING NUMBER:
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SOIL BORING LOG

PROJECT : ER-TCS Investigation
LOCATION : Site 6 (TCS) (2100957.7 N, 7615153.8 E)
ELEVATION : 586.0 ft
DRILLING CONTRACTOR : Boart Longyear (R. Sawrey)
DRILLING EQUIPMENT AND METHOD :
ORIENTATION : Vertical
WATER LEVELS : Approx. 131 ft BGS
START : 4/12/2011
END : 9/11/2011
LOGGER : A. Brewster (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			**Silty Sand (SM)** 32.0-67.0' - yellowish brown, (10YR 5/4), dry, loose to partially consolidated, 10% gravel, 65% sand, 25% fines, angular to subangular, poorly graded, predominantly quartz.		
45					46' - Change to 15% gravel, 60% sand, 25% fines.		
	49.0 50.0		10108	SM			Soil sample collected between 49.0 and 50.0 ft bgs.
50							
55							Stopped drilling at 1630, 4/12/2011 Resumed at 830, 4/13/2011
	59.0 60.0		10109				Soil sample collected between 59.0 and 60.0 ft bgs.
60							

PROJECT NUMBER:	BORING NUMBER:
417981.ER.02.FW	BH-66 SHEET 4 OF 15

SOIL BORING LOG

PROJECT : ER-TCS Investigation
LOCATION : Site 6 (TCS) (2100957.7 N, 7615153.8 E)
ELEVATION : 586.0 ft
DRILLING CONTRACTOR : Boart Longyear (R. Sawrey)
DRILLING EQUIPMENT AND METHOD :
ORIENTATION : Vertical
WATER LEVELS : Approx. 131 ft BGS
START : 4/12/2011
END : 9/11/2011
LOGGER : A. Brewster (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
65		COMPLETE		SM	**Silty Sand (SM)** 32.0-67.0' - yellowish brown, (10YR 5/4), dry, loose to partially consolidated, 10% gravel, 65% sand, 25% fines, angular to subangular, poorly graded, predominantly quartz.		
70	69.0 70.0		10110	SW	**Well Graded Sand (SW)** 67.0-83.0' - brown, (10YR 4/3), dry, loose, 5% gravel, 90% sand, 5% fines, angular to subangular, predominantly quartz.		Soil sample collected between 69.0 and 70.0 ft bgs.
75					77' - Change to 5% gravel, 85% sand, 10% fines.		
80	79.0 80.0		10111				Soil sample collected between 79.0 and 80.0 ft bgs.

PROJECT NUMBER:	BORING NUMBER:
417981.ER.02.FW	BH-66 SHEET 5 OF 15

SOIL BORING LOG

PROJECT : ER-TCS Investigation
LOCATION : Site 6 (TCS) (2100957.7 N, 7615153.8 E)
ELEVATION : 586.0 ft
DRILLING CONTRACTOR : Boart Longyear (R. Sawrey)
DRILLING EQUIPMENT AND METHOD :
ORIENTATION : Vertical
WATER LEVELS : Approx. 131 ft BGS
START : 4/12/2011
END : 9/11/2011
LOGGER : A. Brewster (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		SW	**Well Graded Sand (SW)** 67.0-83.0' - brown, (10YR 4/3), dry, loose, 5% gravel, 90% sand, 5% fines, angular to subangular, predominantly quartz.		
85				SM	**Silty Sand (SM)** 83.0-87.0' - yellowish brown, (10YR 5/4), dry, partially consolidated, 10% gravel, 70% sand, 20% fines, angular to subangular, poorly graded, predominantly quartz. 83.0-84.0' - Metadiorite boulder.		
	89.0 90.0		10112	SW	**Well Graded Sand With Gravel (SW)** 87.0-132.0' - yellowish brown, (10YR 5/4), dry to moist, loose, 20% gravel, 75% sand, 5% fines, angular to subangular, poorly graded, predominantly quartz and mixed gravel.		Soil sample collected between 89.0 and 90.0 ft bgs.
90							
95							
	99.0 100.0		10113				Soil sample collected between 99.0 and 100.0 ft bgs.
100							

PROJECT NUMBER: 417981.ER.02.FW	BORING NUMBER: BH-66	SHEET 6 OF 15

SOIL BORING LOG

PROJECT : ER-TCS Investigation
LOCATION : Site 6 (TCS) (2100957.7 N, 7615153.8 E)
ELEVATION : 586.0 ft
DRILLING CONTRACTOR : Boart Longyear (R. Sawrey)
DRILLING EQUIPMENT AND METHOD :
ORIENTATION : Vertical
WATER LEVELS : Approx. 131 ft BGS
START : 4/12/2011
END : 9/11/2011
LOGGER : A. Brewster (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
105		COMPLETE			104.0-105.0' - Metadiorite boulder.		
	109.0		10114				Soil sample collected between 109.0 and 110.0 ft bgs.
110	110.0			SW			
115							
				NR	**No Recovery (NR)** 117.0-119.0'		Rig down at 1200. Drilling resumes at 0845.
					Well Graded Sand With Gravel (SW) 87.0-132.0' - yellowish brown, (10YR 5/4), dry to moist, loose, 20% gravel, 75% sand, 5% fines, angular to subangular, poorly graded, predominantly quartz and mixed gravel.		
	119.0		10115, 50004				Soil sample collected between 119.0 and 120.0 ft bgs.
120	120.0						

PROJECT NUMBER:	BORING NUMBER:
417981.ER.02.FW	BH-66 SHEET 7 OF 15

SOIL BORING LOG

PROJECT : ER-TCS Investigation
LOCATION : Site 6 (TCS) (2100957.7 N, 7615153.8 E)
ELEVATION : 586.0 ft
DRILLING CONTRACTOR : Boart Longyear (R. Sawrey)
DRILLING EQUIPMENT AND METHOD :
ORIENTATION : Vertical
WATER LEVELS : Approx. 131 ft BGS
START : 4/12/2011
END : 9/11/2011
LOGGER : A. Brewster (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
125		COMPLETE		SW	**Well Graded Sand With Gravel (SW)** 87.0-132.0' - yellowish brown, (10YR 5/4), dry to moist, loose, 20% gravel, 75% sand, 5% fines, angular to subangular, poorly graded, predominantly quartz and mixed gravel.		
130	129.0 130.0		10116				Soil sample collected between 129.0 and 130.0 ft bgs.
135				SW	**Well Graded Sand With Gravel (SW)** 132.0-157.0' - brown, (10YR 5/3), saturated, loose to partially consolidated, 40% gravel, 40% sand, 20% fines, angular to subangular, poorly graded, Color change to brown (10YR 5/3), saturated, loose to partially consolidated, change to 40% gravel, 40% sand, 20% fines, mixed gravel.		
140							

PROJECT NUMBER: 417981.ER.02.FW	BORING NUMBER: BH-66	SHEET 8 OF 15

SOIL BORING LOG

PROJECT : ER-TCS Investigation
LOCATION : Site 6 (TCS) (2100957.7 N, 7615153.8 E)
ELEVATION : 586.0 ft
DRILLING CONTRACTOR : Boart Longyear (R. Sawrey)
DRILLING EQUIPMENT AND METHOD :
ORIENTATION : Vertical
WATER LEVELS : Approx. 131 ft BGS
START : 4/12/2011
END : 9/11/2011
LOGGER : A. Brewster (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
145		COMPLETE			**Well Graded Sand With Gravel (SW)** 132.0-157.0' - brown, (10YR 5/3), saturated, loose to partially consolidated, 40% gravel, 40% sand, 20% fines, angular to subangular, poorly graded, mixed gravel.		
	147.0		BH-66-20101	SW			Grab groundwater sample collected from borehole between 147.0 and 157.0 ft bgs.
150							
155							
	157.0						
160				SP	**Poorly Graded Sand (SP)** 157.0-162.5' - greyish brown, (10YR 5/2), saturated, loose, 5% gravel, 90% sand, 5% fines, subangular to subrounded, poorly graded and fining upwards, predominantly quartz sand.		

PROJECT NUMBER: 417981.ER.02.FW	BORING NUMBER: BH-66	SHEET 9 OF 15

SOIL BORING LOG

PROJECT : ER-TCS Investigation
LOCATION : Site 6 (TCS) (2100957.7 N, 7615153.8 E)
ELEVATION : 586.0 ft
DRILLING CONTRACTOR : Boart Longyear (R. Sawrey)
DRILLING EQUIPMENT AND METHOD :
ORIENTATION : Vertical
WATER LEVELS : Approx. 131 ft BGS
START : 4/12/2011
END : 9/11/2011
LOGGER : A. Brewster (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		SP	**Poorly Graded Sand (SP)** 157.0-162.5' - greyish brown, (10YR 5/2), saturated, loose, 5% gravel, 90% sand, 5% fines, subangular to subrounded, poorly graded and fining upwards, predominantly quartz sand.		
165				SW	**Well Graded Sand With Gravel (SW)** 162.5-233.0' - dark brown, (7.5YR 3/4), saturated, loose to partially consolidated, 40% gravel, 40% sand, 20% fines, angular to subangular, poorly graded, mixed gravel. 166.0-167.0' - Metadiorite boulder.		
170							
175							
	177.0				177' - Change to 40% gravel, 20% sand, 40% fines, dense.		Grab groundwater sample collected from borehole between 177.0 and 187.0 ft bgs.
180							

PROJECT NUMBER:	BORING NUMBER:
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SOIL BORING LOG

PROJECT : ER-TCS Investigation
LOCATION : Site 6 (TCS) (2100957.7 N, 7615153.8 E)
ELEVATION : 586.0 ft
DRILLING CONTRACTOR : Boart Longyear (R. Sawrey)
DRILLING EQUIPMENT AND METHOD :
ORIENTATION : Vertical
WATER LEVELS : Approx. 131 ft BGS
START : 4/12/2011
END : 9/11/2011
LOGGER : A. Brewster (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	BH-66-20102		**Well Graded Sand With Gravel (SW)** 162.5-233.0' - dark brown, (7.5YR 3/4), saturated, loose to partially consolidated, 40% gravel, 40% sand, 20% fines, angular to subangular, poorly graded, mixed gravel.		
185							
	187.0						Rig down at 1640. Drilling resumes at 1200.
190				SW			
195					197' - Increase in metadiorite content in gravel component.		
200							

PROJECT NUMBER:	BORING NUMBER:
417981.ER.02.FW	BH-66 SHEET 11 OF 15

SOIL BORING LOG

PROJECT : ER-TCS Investigation
LOCATION : Site 6 (TCS) (2100957.7 N, 7615153.8 E)
ELEVATION : 586.0 ft
DRILLING CONTRACTOR : Boart Longyear (R. Sawrey)
DRILLING EQUIPMENT AND METHOD :
ORIENTATION : Vertical
WATER LEVELS : Approx. 131 ft BGS
START : 4/12/2011
END : 9/11/2011
LOGGER : A. Brewster (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			**Well Graded Sand With Gravel (SW)** 162.5-233.0' - dark brown, (7.5YR 3/4), saturated, loose to partially consolidated, 40% gravel, 40% sand, 20% fines, angular to subangular, poorly graded, mixed gravel.		
205					204' - Change to 50% gravel and 50% fines, clast-supported.		
	207.0						Grab groundwater sample collected from borehole between 207.0 and 217.0 ft bgs.
210			BH-66-20103	SW			
					214' - Color change to reddish brown (5YR 4/4)		
215					215.0-216.0' - Metadiorite boulder.		
	217.0				217' - Color change to brown (7.5YR 4/4).		
220							

PROJECT NUMBER:	BORING NUMBER:
417981.ER.02.FW	BH-66 SHEET 12 OF 15

SOIL BORING LOG

PROJECT : ER-TCS Investigation
LOCATION : Site 6 (TCS) (2100957.7 N, 7615153.8 E)
ELEVATION : 586.0 ft
DRILLING CONTRACTOR : Boart Longyear (R. Sawrey)
DRILLING EQUIPMENT AND METHOD :
ORIENTATION : Vertical
WATER LEVELS : Approx. 131 ft BGS
START : 4/12/2011
END : 9/11/2011
LOGGER : A. Brewster (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			**Well Graded Sand With Gravel (SW)** 162.5-233.0' - dark brown, (7.5YR 3/4), saturated, loose to partially consolidated, 40% gravel, 40% sand, 20% fines, angular to subangular, poorly graded, mixed gravel.		
	224.0						Grab groundwater sample collected from borehole between 224.0 and 234.0 ft bgs.
225				SW			
							Rig down at 1630. Drilling resumes at 0800.
			BH-66-20104				
230							
					Conglomerate Bedrock (Tmc) 233.0-248.0' - massive.		
	234.0						
							Total depth reached at 0930.
235				Tmc			
240							

PROJECT NUMBER:	BORING NUMBER:
417981.ER.02.FW	BH-66 SHEET 13 OF 15

SOIL BORING LOG

PROJECT : ER-TCS Investigation
LOCATION : Site 6 (TCS) (2100957.7 N, 7615153.8 E)
ELEVATION : 586.0 ft
DRILLING CONTRACTOR : Boart Longyear (R. Sawrey)
DRILLING EQUIPMENT AND METHOD :
ORIENTATION : Vertical
WATER LEVELS : Approx. 131 ft BGS
START : 4/12/2011
END : 9/11/2011
LOGGER : A. Brewster (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
245	248.0	COMPLETE		Tmc	**Conglomerate Bedrock (Tmc)** 233.0-248.0' - massive.		
250					Begin rock coring from 248.0 ft bgs See the next page for the rock core log.		
255							
260							

PROJECT NUMBER: 417981.ER.02.FW	BORING NUMBER: BH-66	SHEET 14 OF 15

ROCK CORE LOG

PROJECT : PG&E Topock, ER-TCS Investigation
LOCATION : Site 6 (TCS) (2100957.7 N, 7615153.8 E)
ELEVATION : 586.6 ft
DRILLING CONTRACTOR : Boart Longyear (R. Sawrey)
CORING EQUIPMENT AND METHOD : HQ Wire-Line Rotary
ORIENTATION : Vertical
WATER LEVELS : Approx. 130 ft BGS
START : 4/12/2011
END : 9/11/2011
LOGGER : A. Brewster (Northstar)

DEPTH 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.)
	248.0		0	248' - Note: unless otherwise noted, all factures in core are mechanical breaks caused by the drilling process.		**Conglomerate** 248.0-271.0' - dark reddish brown, (10YR 3/4), no dominant mineralogy, highly cemented, moderate (), angular to subangular, massive (no bedding planes), matrix-supported.	R1=0.43 FPM
	R1 3 ft 100%	90	1	249.1' - Joint, 60 deg, planar, <1mm calcite infilling, iron staining, slickenslided, tight.			
250			0				
	251.0						
			0				R2=0.53 FPM
			0				
	R2 5 ft 100%	100	0				
			0				
255			0				
	256.0						
			0				R3=0.49 FPM
			0				
	R3 5 ft 100%	100	0				
			0				
260			0				
	261.0						
			0				R4=0.54 FPM
			0			Presence of foliation at approximately 30 degree dip.	
	R4 5 ft 100%	100	1	263.6' - Joint, 40 deg, smooth, undulating to planar, <1mm calcite infilling, iron staining, tight.			
265			0				
	266.0		0				
			0				R5=0.74 FPM
			0				

PROJECT NUMBER:	BORING NUMBER:
417981.ER.02.FW	BH-66 SHEET 15 OF 15

ROCK CORE LOG

PROJECT : PG&E Topock, ER-TCS Investigation
LOCATION : Site 6 (TCS) (2100957.7 N, 7615153.8 E)
ELEVATION : 586.6 ft
DRILLING CONTRACTOR : Boart Longyear (R. Sawrey)
CORING EQUIPMENT AND METHOD : HQ Wire-Line Rotary
ORIENTATION : Vertical
WATER LEVELS : Approx. 130 ft BGS
START : 4/12/2011
END : 9/11/2011
LOGGER : A. Brewster (Northstar)

DEPTH 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.)
	R5 5 ft 100%	100	0			**Conglomerate** 248.0-271.0' - dark reddish brown, (10YR 3/4), no dominant mineralogy, highly cemented, moderate (), angular to subangular, massive (no bedding planes), matrix-supported.	
270			0				
	271.0		0				
						End Drilling on 9/11/2011 Total Borehole Depth: 271.0 ft bgs	This borehole was converted into the following monitoring well(s): MW-66-165, MW-66-230, and MW-66BR-270
275							
280							
285							