



BORING NUMBER: BH-68

SHEET 1 OF 15

SOIL BORING LOG

PROJECT : PG&E Topock, ER-TCS Investigation

ELEVATION: 621.6 ft

LOCATION : Site 3 (2100773.6 N, 7615453.4 E)

DRILLING CONTRACTOR : Boart Longyear (R. Sawrey)

DRILLING EQUIPMENT AND METHOD : RS-350, Rotosonic drill head and tools

							2044	
			. 164 ft BO	50	START : 5/13/2011 EN SOIL DESCRIPTION	ID : 5/16/2	2011	
DEPTHE	BELOW EX		RADE (II)		JUIL DEJURIPTIUN		g	COMMENTS
	INTERV			USCS	SOIL NAME, USCS GROUP SYMBOL, COLOR,		СГ	DEPTH OF CASING, DRILLING RATE,
1		RECOV	ERY (in)	CODE/ LITHOLOGY	MOISTURE CONTENT. RELATIVE DENSITY OR		30L	DRILLING FLUID LOSS, TESTS, AND
1			LAB SAMPLE		CONSISTENCY, SOIL STRUCTURE, MINERALOG	Y	SYMBOLIC LOG	INSTRUMENTATION
—	0.0		SAMPLE		Poorly Graded Sand (SP)		ω 	Soil sample collected between 0.0 and 1.0 ft
-	-	L H	10301		0.0-17.0' - dark yellowish brown, (10YR 4/4), dry, loose, 5% gravel, 90% sand, 5% fines, angular to	4		bgs
-	1.0	LE PLE			loose, 5% gravel, 90% sand, 5% fines, angular to			-
		COMPLETE-			subangular, poorly graded, predominantly quartz.	L.		_
	2.0		10000			7:		
-	3.0		10302			- 1		-
-						-		Soil sample collected between 3.0 and 4.0 ft
	1					-		bgs. –
	1					-1	•	-
-	-						· .	-
5	5.0							Soil sample collected between 5.0 and 6.0 ft
	5.0		10303,			_		bgs
-	6.0		50009			-i		-
								-
							•	
-	1					_		-
-	1					-		-
	1			SP				-
-	9.0					-		Soil sample collected between 9.0 and 10.0
-	-		10304			j-		ft bgs.
10	10.0							-
-	4					;	• •	-
								_
						Ţ		
-	1					-		-
-	1					-1		1
	1					- f		-
- 1	1					-		-
	14.0				14' - Color change to yellowish brown, (10YR 5/4)	ł		Soil sample collected between 14.0 and 15.0
-	-		10305			-		ft bgs.
15	15.0							
- 1	4					ļ		-
_	1							
						ŀ		
1						1		1
1 -	1				Silty Sand (SM)	. 1		1
1 -	1				17.0-35.0' - brown, (10YR 5/3), dry, loose to partia consolidated, 10% gravel, 60% sand, 30% fines,	lly –		1
	1				subangular to subrounded, poorly graded,	-1;		-
- 1	1			SM	predominantly quartz.			-
- 1	19.0					ŀ		Soil sample collected between 19.0 and 20.0
- 1	-		10306			ł		ft bgs
20	20.0							
1								
L								



BORING NUMBER: BH-68

SHEET 2 OF 15

SOIL BORING LOG

PROJECT : PG&E Topock, ER-TCS Investigation

LOCATION : Site 3 (2100773.6 N, 7615453.4 E)

ELEVATION: 621.6 ft

DRILLING CONTRACTOR : Boart Longyear (R. Sawrey)

DRILLING EQUIPMENT AND METHOD : RS-350, Rotosonic drill head and tools

WATER LEVELS - Acrows: 661 RES START: 51/32011 END: 51/62011 LOCE DEPTH RECOVERSING CARD, 00 INTERNAL,									ORIENTATION : Vertical
Interval (f) USG Introducery Data Solit. NAME, LISCS GROUP SYMBOX, COLOR, MOSTURE CONTENT, RELATIVE ENSITY OR CONSISTENCT, SOLIT RELATIVE ENSITY OR CONSISTENCT, SOLITON, RELATIVE ENSITY OR CONSISTENCT, SOLITON, RELATIVE ENSITY OR Solit. NAME, LISCS GROUP SYMBOX, COLOR, MOSTURE CONTENT, RELATIVE ENSITY OR DELING FLUID LOSS, TESTS, AND INSTRUMENTATION Image: Solit Name, LisCS GROUP SYMBOX, COLOR, MOSTURE CONTENT, RELATIVE ENSITY OR Solit Stand (SM) TO CONSISTENCT, SOLITON, RELATIVE BUILING FLUID LOSS, TESTS, AND Instrumentation Protocolladed, 10% grave, 60% send, 30% fines, solit Stand (SM) TO CONSISTENCT, SOLITON, RELATIVE Protocolladed, 10% grave, 60% send, 30% fines, solit Stand (SM) TO CONSISTENCT, SOLITON, RELATIVE Protocolladed, 10% grave, 60% send, 30% fines, solit Stand (SM) TO CONSISTENCT, SOLITON, RELATIVE Solit Sample collected between 29.0 and 30.0 Th bgs. 30 10807 30 10807 30 10807 30 10807 30 10807 30 10807 30 10807 30 10807 30 10807 30 10807 30 10807 30 10807 30 10807 30 10807 30 10807 30 10807 30 10807 3					GS		: 5/16/2	2011	
25 Soil sample collected between 29.0 and 30.0 30 30.0 35 Well Graded Sand With Gravel (SW) 35.062.0* brown, (10/R 55), dry, loose to partially consolidated, 0.9% gravel, 5% gravel, 75%	Іг			RADE (ft)		SOIL DESCRIPTION		ŋ	COMMENTS
25 Soil sample collected between 29.0 and 30.0 30 30.0 35 Well Graded Sand With Gravel (SW) 35.0 62.0* - brown, (10/R 55.), dry, loose to partially consolidated, 25% gravel, 75% sand, subrounded to subangular to subrounded, point graded, 36 10307 30 30.0 30 30.0 30 30.0 30 10307 30 Soil sample collected between 29.0 and 30.0 10307 Soil sample collected between 29.0 and 30.0		INTERVA	AL (ft)		USCS			C LC	
25 Soil sample collected between 29.0 and 30.0 30 30.0 35 Well Graded Sand With Gravel (SW) 35.0 62.0* - brown, (10/R 55.), dry, loose to partially consolidated, 25% gravel, 75% sand, subrounded to subangular to subrounded, point graded, 36 10307 30 30.0 30 30.0 30 30.0 30 10307 30 Soil sample collected between 29.0 and 30.0 10307 Soil sample collected between 29.0 and 30.0			RECOVE	ERY (in)	CODE/	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT RELATIVE DENSITY OR		OLK	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS TESTS AND
25 Soil sample collected between 29.0 and 30.0 30 30.0 35 Well Graded Sand With Gravel (SW) 35.0.62.0* brown, (10/R 53), dry, loose to partially consolidated, 25% gravel, 75% sand, subrounded to subangular to subrounded, poorting and drawel (SW) 30 30.0 30 Soil sample collected between 29.0 and 30.0 10307 Soil sample collected between 29.0 and 30.0 30 Soil sample collected between 29.0 and 30.0 10307 Soil sample collected between 29.0 and 30.0 30 Soil sample collected between 29.0 and 30.0 10307 Soil sample collected between 29.0 and 30.0 10308 Soil sample collected between 29.0 and 30.0				LAB	LITHOLOGY	CONSISTENCY, SOIL STRUCTURE, MINERALOGY		ŴВ	INSTRUMENTATION
25 29.0 10307 30 30.0 10307 35 Well Graded Sand With Gravel (SW) 30.0 ± 000000000000000000000000000000000				SAMPLE				ŝ	
- -	30		COMPLETE		SM	Well Graded Sand With Gravel (SW) 35.0-62.0' - brown, (10YR 5/3), dry, loose to partially consolidated, 10% gravel, 60% sand, 30% fines, subangular to subrounded, poorly graded, predominantly quartz.			Soil sample collected between 29.0 and 30.0 ft bgs.
	- - - - - - - - - - - - - - - - - - -			10308	SW				



BORING NUMBER: BH-68

SHEET 3 OF 15

SOIL BORING LOG

PROJECT : PG&E Topock, ER-TCS Investigation

LOCATION : Site 3 (2100773.6 N, 7615453.4 E)

ELEVATION: 621.6 ft

DRILLING CONTRACTOR : Boart Longyear (R. Sawrey)

DRILLING EQUIPMENT AND METHOD : RS-350, Rotosonic drill head and tools

WATER L	EVELS		164 ft BG	29	START : 5/13/2011	END : 5/16/20	11 LOGGER : R. Tweidt (Northstar)
DEPTH BE					SOIL DESCRIPTION		COMMENTS
	INTERVA					90	
				USCS	SOIL NAME, USCS GROUP SYMBOL, CC	DLOR,	DEPTH OF CASING, DRILLING RATE,
		RECOVE		CODE/ LITHOLOGY	MOISTURE CONTENT, RELATIVE DENSI CONSISTENCY, SOIL STRUCTURE, MINER	TY OR 🛛 🧕	DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
			LAB SAMPLE		CONSISTENCT, SUL STRUCTURE, MINER		INSTRUMENTATION
	49.0 50.0 59.0 60.0	-COMPLETE	LAB SAMPLE	SW	 Well Graded Sand With Gravel (SW) 35.0-62.0' - brown, (10YR 5/3), dry, loose to consolidated, 25% gravel, 75% sand, subrou subangular, predominantly quartz. 48.0-50.0' - Rock flour 	•.•	
							1



BORING NUMBER: BH-68

SHEET 4 OF 15

SOIL BORING LOG

PROJECT : PG&E Topock, ER-TCS Investigation

LOCATION : Site 3 (2100773.6 N, 7615453.4 E)

ELEVATION: 621.6 ft

DRILLING CONTRACTOR : Boart Longyear (R. Sawrey)

DRILLING EQUIPMENT AND METHOD : RS-350, Rotosonic drill head and tools

					tosonic drill nead and tools		V2011 LOGGER R Tweidt (Northstar)		
			. 164 ft BC	GS	START : 5/13/2011 END : 5/1	6/201			
DEPTH E	BELOW EX		RADE (ft)		SOIL DESCRIPTION	ų	COMMENTS		
	INTERVA	AL (ft)		USCS		C C			
		RECOV	ERY (in)	CODE/	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR	DLIC	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS TESTS AND		
1				LITHOLOGY	CONSISTENCY, SOIL STRUCTURE, MINERALOGY	MBC	INSTRUMENTATION		
			SAMPLE			sγ			
	69.0 70.0		ERY (in) LAB SAMPLE 10311 10312	GW	MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY Well Graded Sand With Gravel (SW) 35.0-62.0' - brown, (10YR 5/3), dry, loose to partially consolidated, 25% gravel, 75% sand, subrounded to subangular, predominantly quartz. Well Graded Gravel (GW) 62.0-243.0' - greyish brown, (10YR 5/2), dry, loose to partially consolidated, 40% gravel, 40% sand, 20% fines, angular to subangular, no dominant mineralogy. 69' - color change to light yellow brown, (2.5Y 6/3) 70.0-71.0' - Rock flour		DRILLING FLUID LOSS, TESTS, AND		
80	80.0					•••	-		
<u> </u>									



BORING NUMBER: BH-68

SHEET 5 OF 15

SOIL BORING LOG

PROJECT : PG&E Topock, ER-TCS Investigation

LOCATION : Site 3 (2100773.6 N, 7615453.4 E)

ELEVATION: 621.6 ft

DRILLING CONTRACTOR : Boart Longyear (R. Sawrey)

DRILLING EQUIPMENT AND METHOD : RS-350, Rotosonic drill head and tools

		· Approv	164 # DC		STADT - 5/12/2011	END : 5/16/2011	LOCCER : R. Twoidt (Northstor)
	BELOW EX		. 164 ft BO		START : 5/13/2011 SOIL DESCRIPTION		LOGGER : R. Tweidt (Northstar) COMMENTS
						ي	
	INTERV			USCS	SOIL NAME, USCS GROUP SYMBOL, CO		DEPTH OF CASING, DRILLING RATE,
		RECOVE	ERY (in)	CODE/ LITHOLOGY	MOISTURE CONTENT, RELATIVE DENSIT		DRILLING FLUID LOSS, TESTS, AND
			LAB		CONSISTENCY, SOIL STRUCTURE, MINER	ALOGY	INSTRUMENTATION
90_ 	89.0 90.0		ERY (in) LAB SAMPLE 10313 10314, 50010	USCS CODE/ LITHOLOGY GW	MOISTURE, CONTENT, RELATIVE DENSIT CONSISTENCY, SOIL STRUCTURE, MINER Well Graded Gravel (GW) 62.0-243.0' - light yellow brown, (2.5Y 6/3), d to partially consolidated, 40% gravel, 40% sa fines, angular to subangular, no dominant mi 84' - Change to unconsolidated	Iry, loose -	Soil sample collected between 89.0 and 90.0 Soil sample collected between 89.0 and 90.0 ft bgs.
1							
L	L	I					



BORING NUMBER: BH-68

SHEET 6 OF 15

SOIL BORING LOG

PROJECT : PG&E Topock, ER-TCS Investigation

LOCATION : Site 3 (2100773.6 N, 7615453.4 E)

ELEVATION: 621.6 ft

DRILLING CONTRACTOR : Boart Longyear (R. Sawrey)

DRILLING EQUIPMENT AND METHOD : RS-350, Rotosonic drill head and tools

WATER	I EVELS		. 164 ft BG	SS	START : 5/13/2011 END : 5	5/16/201 ⁻	1 LOGGER : R. Tweidt (Northstar)
	ELOW EX				SOIL DESCRIPTION		COMMENTS
	INTERVA					00.	
1				USCS	SOIL NAME, USCS GROUP SYMBOL, COLOR,	10	DEPTH OF CASING, DRILLING RATE,
1		RECOVE		CODE/ LITHOLOGY	MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
1			LAB SAMPLE		CONSIGTENCE, SOIL STRUCTURE, MINERALUGT	SYN	
	109.0 110.0 119.0 120.0	-COMPLETE	LAB SAMPLE	GW	Weil Graded Gravel (GW) 62.0-243.0' - light yellow brown, (2.5Y 6/3), dry, loose to partially consolidated, 40% gravel, 40% sand, 20% fines, angular to subangular, no dominant mineralogy. 102' - Change to partially consolidated 105' - Color change to light yellow brown (2.5Y 6/3) 109.0-110.0' - Rock flour 111.5-112.0' - Rock flour 115.0-115.5' - Rock flour		Soil sample collected between 109.0 and
120	120.0						
L							



BORING NUMBER: BH-68

SHEET 7 OF 15

SOIL BORING LOG

PROJECT : PG&E Topock, ER-TCS Investigation

LOCATION : Site 3 (2100773.6 N, 7615453.4 E)

ELEVATION: 621.6 ft

DRILLING CONTRACTOR : Boart Longyear (R. Sawrey)

DRILLING EQUIPMENT AND METHOD : RS-350, Rotosonic drill head and tools

WATER LEVES - Apport, 644 Bos STATE (312011 LOOSE (110011 LOOSE (110011 INTERVAL 00 INTERVAL 00 INTERVAL 00 SOLI DESCRIPTION IOOSE (110011 LOOSE (110011 LOOSE (110011 LOOSE (110011 IOOSE (1100111 IOOSE (
INTERVAL (n) USGE MODIFIER SOIL NAME: USCS GROUP SYMBOL: COLOR. MOST UPE CONTENT, TREI, TWE DENSITY OR MOST UPE CONTENT. MOST UPE CONTENT OF TWE DENSITY OR MOST UPE CONTENT OF TWE DENSITY OR MOST UPE CONTENT. MOST UPE CONTENT MOST UPE CONTENT OF TWE DENSITY OR MOST UPE CONTENT MOST UPE CONTENT OF TWE DENSITY OR MOST UPE CONTENT. MOST UPE CONTENT MOST UPE CONTE	r				38		16/2011	
125 120.0 10317 GW Soil sample collected between 120.0 and 130.0 h bgs. 136 138.0 10318 GW Soil sample collected between 130.0 and 140.0 h bgs.	DEPTH E			RADE (ft)		SOIL DESCRIPTION	ğ	COMMENTS
125 120.0 10317 GW Soil sample collected between 120.0 and 130.0 h bgs. 136 138.0 10318 GW Soil sample collected between 130.0 and 140.0 h bgs.		INTERVA	AL (ft)		USCS		CLC	
125 120.0 10317 GW Soil sample collected between 120.0 and 130.0 ft bgs. 136 138.0 10318 GW Soil sample collected between 130.0 and 140.0 ft bgs.			RECOVE	ERY (in)	CODE/	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT RELATIVE DENSITY OR	OLIC	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS TESTS AND
125 120.0 10317 GW Soil sample collected between 120.0 and 130.0 ft bgs. 136 138.0 10318 GW Soil sample collected between 130.0 and 140.0 ft bgs.				LAB	LITHULUGY	CONSISTENCY, SOIL STRUCTURE, MINERALOGY	ÅΒ	INSTRUMENTATION
125 10317 GW Soil sample collected between 129.0 and 130.0 ft bgs. 136 138.0 10318 Soil sample collected between 139.0 and 140.0 ft bgs.				SAMPLE				
	- - - - - - - - - - - - - - - - - - -	130.0	COMPLETE	10317	GW	62.0-243.0' - light yellow brown, (2.5Y 6/3), dry, 40% gravel, 40% sand, 20% fines, angular to subangular, no dominant mineralogy, partially consolidated from		130.0 ft bgs.
	1							



BORING NUMBER: BH-68

SHEET 8 OF 15

SOIL BORING LOG

PROJECT : PG&E Topock, ER-TCS Investigation

LOCATION : Site 3 (2100773.6 N, 7615453.4 E)

ELEVATION: 621.6 ft

DRILLING CONTRACTOR : Boart Longyear (R. Sawrey)

DRILLING EQUIPMENT AND METHOD : RS-350, Rotosonic drill head and tools

							ORIENTATION : Vertical
			. 164 ft BC	SS		: 5/16/20	
DEPTH E	BELOW EX	ISTING G	RADE (ft)		SOIL DESCRIPTION	J	COMMENTS
1	INTERV	AL (ft)				LO L	
1		RECOVE	ERY (in)	USCS CODE/ LITHOLOGY	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR	J.LIC	DEPTH OF CASING, DRILLING RATE,
1				LITHOLOGY	CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
			lab Sample				
	149.0 150.0	COMPLETE	10319	GW	Weil Graded Gravel (GW) 62.0-243.0' - light yellow brown, (2.5Y 6/3), dry, 40% gravel, 40% sand, 20% fines, angular to subangular, no dominant mineralogy, partially consolidated from 102.0 ft		
1							
<u> </u>							•



BORING NUMBER: BH-68

SHEET 9 OF 15

SOIL BORING LOG

PROJECT : PG&E Topock, ER-TCS Investigation

LOCATION : Site 3 (2100773.6 N, 7615453.4 E)

ELEVATION: 621.6 ft

DRILLING CONTRACTOR : Boart Longyear (R. Sawrey)

DRILLING EQUIPMENT AND METHOD : RS-350, Rotosonic drill head and tools

WATER	I EVELS	· Approx	. 164 ft BG		START : 5/13/2011	END : 5/16/2011	LOGGER : R. Tweidt (Northstar)
	BELOW EX				SOIL DESCRIPTION		COMMENTS
1	INTERVA		1.7			ő	
1			DV (in)	USCS	SOIL NAME, USCS GROUP SYMBOL, CO	DLOR, 긱	DEPTH OF CASING, DRILLING RATE,
1				CODE/ LITHOLOGY	MOISTURE CONTENT, RELATIVE DENSI CONSISTENCY, SOIL STRUCTURE, MINER	TY OR Q	DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
			LAB SAMPLE		CONSISTENCE, SOIL STRUCTURE, MINER		
- - - - - - - - - - - - - - - - - - -		COMPLETE	SAMPLE		Well Graded Gravel (GW) 62.0-243.0' - greyish brown, (10YR 5/2), dry partially consolidated, 40% gravel, 40% san fines, angular to subangular, no dominant n 163' - Increase in metadiorite fraction of gra increase in average gravel size to coarse; o subangular. 164' - Saturated	/, loose to	- - - 163 ft bgs: Drill rate (~10 FPM to ~0.1 FPM) - - - - - - - - - - - - - - - - - - -
- 170 - - - -				GW	170.0-172.0' - Decrease in average gravel s increase in average sand size (coarse). 173.0-177.0' - Change to highly angular	size (fine),	170 ft bgs: Drill rate ~10 FPM
- - 175_ - -					175' - light yellow brown, (2.5Y 6/3)		- - - - - -
- - - - 180	177.0				177' - Color change to strong brown (7.5YR	4/6)	



BORING NUMBER: BH-68

SHEET 10 OF 15

SOIL BORING LOG

PROJECT : PG&E Topock, ER-TCS Investigation

LOCATION : Site 3 (2100773.6 N, 7615453.4 E)

ELEVATION: 621.6 ft

DRILLING CONTRACTOR : Boart Longyear (R. Sawrey)

DRILLING EQUIPMENT AND METHOD : RS-350, Rotosonic drill head and tools

WATER LEVELS: Address: 164 fbCS STATE : 5122011 END: 5182011 Code (Norther) INTERVAL (0) ISC SOIL NAME; USCS GROUP SYMBOL, COLOR, MOST DUC EX CONTY (F), INTERVAL (0) SOIL NAME; USCS GROUP SYMBOL, COLOR, MOST DUC EX CONTY (F), THE LATIVE DENSITY OR, MOST DUC EX CONTY (F), THE LATIVE DENSITY (F), THE LATIVE DENS						tosonic drill head and tools		ORIENTATION : Vertical
Improvement Impr					SS		2011	LOGGER : R. Tweidt (Northstar)
185 -	DEPTH BEL	OW EX	STING G	RADE (ft)		SOIL DESCRIPTION	υ	COMMENTS
185	IN	NTERVA	L (ft)		11000		2	
185		[RY (in)	CODE/	SOIL NAME, USCS GROUP SYMBOL, COLOR,	JLIC	DEPTH OF CASING, DRILLING RATE,
185					LITHOLOGY	CONSISTENCY, SOIL STRUCTURE. MINERALOGY	MBC	UKILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
185 -				SAMPLE		,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	SΥ	
		187.0	COMPLETE		GW	62.0-243.0* - light yellow brown, (2.5Y 6/3), 40% gravel, 40% sand, 20% fines, higly angular from 173.0 ft bgs, predominantly metadiorite gravel from 163.0 ft bgs, partially consolidated from 102.0 ft bgs, matrix-supported, saturated from 164.0 ft bgs.		Grab groundwater sample collected from borehole between 187.0 and 197.0 ft bgs.



BORING NUMBER: BH-68

SHEET 11 OF 15

SOIL BORING LOG

PROJECT : PG&E Topock, ER-TCS Investigation

LOCATION : Site 3 (2100773.6 N, 7615453.4 E)

ELEVATION: 621.6 ft

DRILLING CONTRACTOR : Boart Longyear (R. Sawrey)

DRILLING EQUIPMENT AND METHOD : RS-350, Rotosonic drill head and tools

	LEVELS BELOW EX		. 164 ft BC	30	START : 5/13/2011 E SOIL DESCRIPTION	ND : 5/16/201	1 LOGGER : R. Tweidt (Northstar) COMMENTS
			RADE (TT)		SUL DESCRIFTION	р С	
	INTERV			USCS	SOIL NAME, USCS GROUP SYMBOL, COLOR	SVLD SULL SULL SULL SULL SULL SULL SULL SU	DEPTH OF CASING, DRILLING RATE,
		RECOVE		USCS CODE/ LITHOLOGY	MOISTURE CONTENT, RELATIVE DENSITY OF	R IO	DRILLING FLUID LOSS, TESTS, AND
			LAB SAMPLE		CONSISTENCY, SOIL STRUCTURE, MINERALO	GY X	INSTRUMENTATION
	207.0	COMPLETE	BH-68-20302 BH-68-20302	GW	 Well Graded Gravel (GW) 62.0-243.0" - light yellow brown, (2.5Y 6/3), 40% gravel, 40% sand, 20% fines, higly angular from 16 tbgs, predominantly metadiorite gravel from 163 bgs, partially consolidated from 102.0 ft bgs, matrix-supported, saturated from 164.0 ft bgs. 205.0-207.0' - Coarse-grained sand 205.0-207.0' - Coarse-grained sand 212' - Color change to pale olive (5Y 6/3) 	173.0	Grab groundwater sample collected from borehole between 207.0 and 217.0 ft bgs.
-							Resume 05/15/2011 at 1130
220							
1							



BORING NUMBER: BH-68

SHEET 12 OF 15

SOIL BORING LOG

PROJECT : PG&E Topock, ER-TCS Investigation

LOCATION : Site 3 (2100773.6 N, 7615453.4 E)

ELEVATION: 621.6 ft

DRILLING CONTRACTOR : Boart Longyear (R. Sawrey)

DRILLING EQUIPMENT AND METHOD : RS-350, Rotosonic drill head and tools

							2011	
	BELOW EX		. 164 ft BC	50	START : 5/13/2011 E SOIL DESCRIPTION	END : 5/16/		LOGGER : R. Tweidt (Northstar) COMMENTS
							Ю	
	INTERVA	· · ·		USCS	SOIL NAME, USCS GROUP SYMBOL, COLOR	2	SYMBOLIC LOG	DEPTH OF CASING, DRILLING RATE,
		RECOVI	ERY (in)	CODE/ LITHOLOGY	MOISTURE CONTENT, RELATIVE DENSITY O)R	BOL	DRILLING FLUID LOSS, TESTS, AND
			LAB SAMPLE		CONSISTENCY, SOIL STRUCTURE, MINERALO	JGY	МХS	INSTRUMENTATION
-	_	COMPLETE-			Well Graded Gravel (GW) 62.0-243.0' - olive grey, (5Y 5/2), 40% gravel, 40 sand, 20% fines, higly angular from 173.0 ft bgs,)% -	•••	-
-	-	COMF		GW	predominantly metadiorite gravel from 163.0 ft by partially consolidated from 102.0 ft bgs, matrix-supported, saturated from 164.0 ft bgs.	gs, – – –		-
- - 225_ - -	-					- - - -		- - - -
-	1			CL	Clay With Silt (CL)			-
-	-				226.5-227.0' - olive grey, (5Y 5/2), saturated, 100 fines, low dilatancy, soft, matrix-supported Well Graded Gravel (GW) 227.0-243.0' - pale olive, (5Y 6/3), saturated, 409 gravel, 40% sand, 20% fines, angular to subangu predominantly metadiorite gravel, dense. 229.0-230.0' - Rock flour	/ _ % _		- - -
230				GW	233.0-234.0' - Change to 40% gravel, 50% sand, fines, color change to light olive brown (2.5Y 5/3)	- - - - - - - - - - - - - - - - - - -		
235	235.0				238.5-239.0' - Color change to black 239' - Color change to brown (10YR 5/3)			Grab groundwater sample collected from borehole between 235.0 and 245.0 ft bgs.
240	1					-		-
-			-					



BORING NUMBER: BH-68

SHEET 13 OF 15

SOIL BORING LOG

PROJECT : PG&E Topock, ER-TCS Investigation

LOCATION : Site 3 (2100773.6 N, 7615453.4 E)

ELEVATION: 621.6 ft

DRILLING CONTRACTOR : Boart Longyear (R. Sawrey)

DRILLING EQUIPMENT AND METHOD : RS-350, Rotosonic drill head and tools

LEVELS	: Approx	. 164 ft BC	SS	START : 5/13/2011	LOGGER : R. Tweidt (Northstar)	
BELOW EX	ISTING O	GRADE (ft)		SOIL DESCRIPTION	<u>ں</u>	COMMENTS
INTERVA	RECOVERY (in)		USCS CODE/ LITHOLOGY	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY		DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
-	COMPLETE	-68-20303	GW	gravel, 40% sand, 20% fines, angular to suba	angular, 🏼 🍽 🖣	- - -
245.0		BH		Conglomerate (Tmc) 243.0-257.0' - massive, red (2.5YR 4/8)	0.00 - 0	- - - - Stop 05/15/2011 at 1630 at 245 ft bgs.
-						- - - - -
-			Tmc			- Stop 05/16/2011 at 1100. Drilling complete. - -
-					0.00 0.00	- - -
257.0				Begin rock coring from 257.0 ft bgs See the next page for the rock core log.	- 0.0 - 0.0 - 0.0 - 0.0 - 0.0 - 0 - 0 - 0 - 0 - 0 - 0 - 0 - 0 - 0 -	Initiate rock core drilling at 1115 on 8/10/2011
- - -						- - - -
	ELOW EX	245.0	ELOW EXISTING GRADE (ft) INTERVAL (ft) RECOVERY (in) LAB SAMPLE SOCON SOCO	INTERVAL (ft) RECOVERY (in) LAB SAMPLE GW GW 245.0 I I I I I I I I I I I I I I I I I I I	BELOW EXISTING GRADE (ft) SOIL DESCRIPTION INTERVAL (ft) USCS CODE/ UTHOLOGY SOIL NAME, USCS GROUP SYMBOL COL MOISTURE CONTENT, RELATIVE DENSIT CONSISTENCY, SOIL STRUCTURE, MINER/ 227.0-243.0' - Drown, (10YR 5/3), saturated, , grazel, 40% sand, 20% fines, angular to subpoorly graded, predominantly metadionite gra dense, matrix-supported, 245.0 GW Conglomerate (Tmc) 243.0-257.0' - massive, red (2.5YR 4/8) 245.0 Tmc Tmc 257.0 Begin rock coring from 257.0 ft bps	BELOW EXISTING GRADE (ft) INTERVAL (ft) USCS USCOP INTERVAL (ft) SOIL DESCRIPTION OTHER SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY 1 LB SAMPLE GW Well Graded Gravel (GW) (227.0-243.0° - brown, (10/YR 5/3), saturated, 40%, gravel, 40%, sand, 20%, fines, angular to subangular, poorly graded, network, soup structure, mineral, description dense, matrix-supported, Image: Conglomerate (Timc) 243.0-257.0° - massive, red (2.5YR 4/8) 245.0 Image: Conglomerate (Timc) 243.0-257.0° - massive, red (2.5YR 4/8) Image: Conglomerate (Timc) 243.0-257.0° - massive, red (2.5YR 4/8) 245.0 Image: Conglomerate (Timc) 243.0-257.0° - massive, red (2.5YR 4/8) Image: Conglomerate (Timc) 243.0-257.0° - massive, red (2.5YR 4/8) 245.0 Image: Conglomerate (Timc) 243.0-257.0° - massive, red (2.5YR 4/8) Image: Conglomerate (Timc) 243.0-257.0° - massive, red (2.5YR 4/8)



BORING NUMBER: BH-68

SHEET 14 OF 15

ROCK CORE LOG

PROJECT : PG&E Topock, ER-TCS Investigation

LOCATION : Site 3 (2100773.6 N, 7615453.4 E)

ELEVATION: 621.6 ft

DRILLING CONTRACTOR : Boart Longyear (R. Sawrey)

CORING EQUIPMENT AND METHOD : RS-350, Wire-Line Rotary

WATER	WATER LEVELS : Approx. 164 ft BGS START : 5/13/2011 END : 5/16/2011 LOGGER : R. Tweidt (Northstar)								
					(")	LITHOLOGY	COMMENTS		
DEPTH BELOW SURFACE (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	Q D (%)	FRACTURES PER FOOT	DESCRIPTION	SOL:	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, HARDNESS, WEATHERING,			
				DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	OLIC		SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND		
EPT URF					SYMBOLIC	AND ROCK MASS CHARACTERISTICS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.		
οω		Ľ	шд		S		Run 1 (257 ft - 260 ft), Drill		
-	257.0		NR	-	Q	Miocene Conglomerate (Tmc) – 257.0-257.8' - moderate brown, (5YR	rate = 0.55 ft/min -		
-			8 >10	258.0-258.5' - abundant joints, no dominant orientation, not healed, rough, dry 258.5-263.5' - fracture zone, no dominant orientation, presence of moderately to totally healed fractures, some 60 degree dip angles			-		
	R1 3 ft 70%	28				Metadiorite (pTbr) 257.8-280.5' - pale yellowish brown	-		
						 (10YR 8/6), non-foliated, uniform, 	-		
	-					 slightly to moderately decomposed, slightly disintegrated, slightly to 	-		
260	260.0			between 262 and 263 ft bgs.		moderately fractured	Run 2 (260 ft - 264.5 ft),		
			>10	-	Ě	_	Drill rate = 0.28 ft/min -		
				-		-	-		
			3	-		-	-		
	R2 4.5 ft	44		-		-	-		
	75%		>10 >10	- 263.0-264.5' - shear zone, dry, rough -		-	-		
						-	-		
					\sim	-	-		
	264.5			-			-		
265	204.0		>10	264.5-269.5' - undulating, few joints	Ě	-	Run 3 (264.5 ft - 269.5 ft),		
200			2	observed, narrow presence of totally healed — fractures, mineralization, dry			Drill rate = 0.41 ft/min —		
-					\sim	265.5' - Color change to dusky yellow	-		
-	R3 5 ft 80%					- green (5GY 5/2)	-		
-			1		Ě	-	-		
-		93				-	-		
			1			-			
			1						
_			1						
_	269.5					_	_		
270	R4 1 ft	0	>10 >10	269.5-273.5' - undulating, fracture zones, no dominant orientation, not healed, dry —		_	Run 4 (269.5 ft - 270.5 ft), Drill rate = 0.44 ft/min		
	270.5 50%					_			
	-					-	Run 5 (270.5 ft - 275.5 ft), Drill rate = 0.45 ft/min -		
		15	>10 >10			-	-		
						_	-		
				-		-	-		
	R5 5 ft			-	Ě	_	-		
	70%		3	-		-	4		
						-	4		
			5		E h	_	4		
275 		.5 >10		-	Ě	L	-		
	275.5					-	Run 6 (275.5 ft - 280.5 ft),		
				276.0-280.5' - undulating, fracture zone, no		-	Drill rate = 0.3 ft/min -		
			>10	dominant orientation, not healed, surface	ť	-	-		
				staining	<u>l'a`a</u>				



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SHEET 15 OF 15

ROCK CORE LOG

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DRILLING CONTRACTOR : Boart Longyear (R. Sawrey)

CORING EQUIPMENT AND METHOD : RS-350, Wire-Line Rotary

WATER	LEVELS : Ap	prox.	164 ft				R. Tweidt (Northstar)
3				DISCONTINUITIES	Ŋ	LITHOLOGY	COMMENTS
DEPTH 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.
-	R6 5 ft 70%	15	>10 >10	-	\$\$\$\$\$\$\$\$\$\$	Metadiorite (pTbr) 257.8-280.5' - pale yellowish brown (10YR 8/6), non-foliated, uniform, slightly to moderately decomposed, slightly disintegrated, slightly to moderately fractured	
- 280	280.5		>10	276.0-280.5' - undulating, fracture zone, no dominant orientation, not healed, surface staining		- End Drilling on 5/16/2011 - Total Borehole Depth: 280.5 ft bgs -	This borehole was converted into the following – monitoring well(s): MW-68-180, MW-68-240, and MW-68BR-280 –
- - - 285				-		- - - - -	
	-					-	
- 290 -	-			- - - - - -		- - 	
						-	
295_ - - -	-						