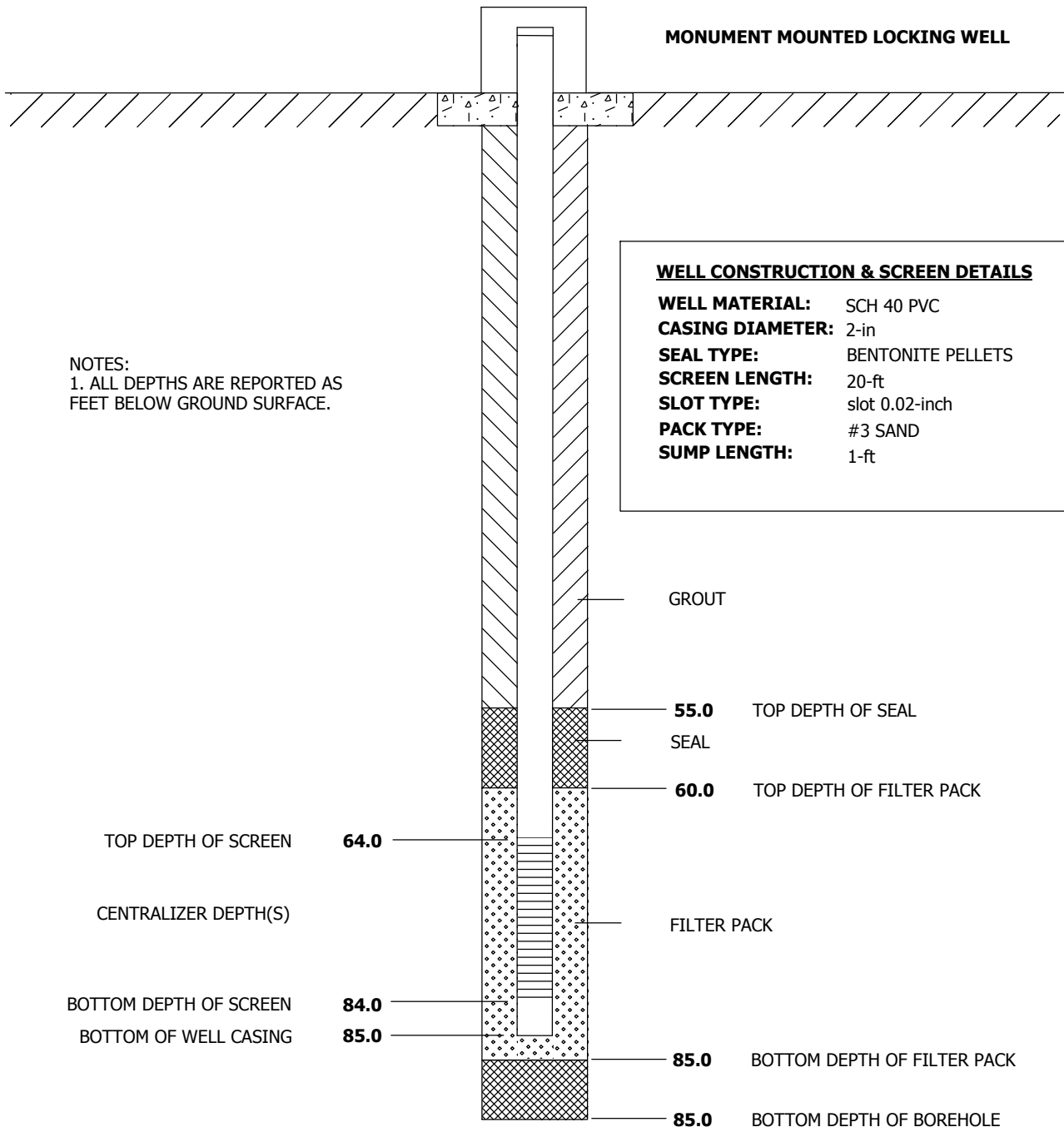


WELL COMPLETION DIAGRAM

PROJECT NO: 315024.IM.02	PROJECT: PG&E Topock IM Investigation (Phase 5 2004)	WELL NO: MW-37S
LOCATION: North Bat Cave Wash Topock, CA. - From extraction well bench head 500' to north, exit east to dirt road, 700' up steep slope to southeast, at crest of hill turn northeast and head 1000' down into wash.		
DRILLING CONTRACTOR: WDC Exploration and Wells, Montclair, CA	DRILLING START DATE: 04/13/2004	
DRILLING METHOD: Rotosonic	DRILLING END DATE: 04/21/2004	
LOGGER: S. Cooper	WELL COMPLETION DATE: 04/23/2004	
TOP OF WELL CASING (NGVD 29): 485.97	NORTHING COORDINATE (CCS DAND 27, ZONE 5): 2102869.45	
GROUND SURFACE ELEVATION (NGVD 29): 483.50	EASTING COORDINATE (CCS NAD 27 ZONE 5): 7614827.87	



WELL DIAGRAM IS NOT TO SCALE

SOIL BORING LOG

PROJECT NAME: PG&E Topock IM Investigation (Phase 1 2004)		HOLE DEPTH (ft): 228.0	DRILLING CONTRACTOR: WDC Exploration and Wells, Montclair, CA	
SURFACE ELEVATION: 483.7 ft. MSL	NORTHING (CCS NAD 27 Z 5): 2,102,882.18	EASTING (CCS NAD 27 Z 5): 7,614,825.33	DATE AND TIME STARTED: 04/13/2004 2:00:00 PM	DATE AND TIME COMPLETED: 04/21/2004
DRILLING METHOD: Rotasonic		WATER LEVEL (ft): ---	DRILLING EQUIPMENT: Standard Access Rig with continuous 4 core, 6 casing	
LOCATION: North Bat Cave Wash Topock, CA			LOGGED BY: S. Cooper	

DEPTH BGS (feet)	SAMPLE			USCS CODE	SOIL DESCRIPTION SOIL NAME, USCS SYMBOL, COLOR, PERCENT COMPOSITION, GRADING, GRAIN SHAPE, MINERALOGY, DENSITY/CONSISTENCY, STRUCTURE, MOISTURE.	COMMENTS DRILLING OBSERVATIONS AND OPERATIONS, DAILY START AND END TIMES, DRILL RATE, REFUSALS, SAMPLING AND TESTING NOTES.
	INTERVAL	TYPE/NUMBER	RECOVERY (ft)			
5				NR	NO RECOVERY	0-8' lost in setting conductor pipe
10		CC56	5	GW/GC	WELL GRADED GRAVEL WITH CLAY AND SAND (GW/GC) - dk gray 2.5YR4/1, 50% well graded ang to subang gravel, 40% well graded sand, 10% fines, high dry strength, no plasticity, wet.	15:00 drillers lost 8'-13' dropped drilling is soft
15						Cr 6+
20				SC	CLAYEY SAND WITH GRAVEL (SC) - 2.5YR5/2, 50% well graded subang sand, 30% well graded subang gravel, 20% fines, no plasticity, dry, grayish brn.	
25				GW	WELL GRADED GRAVEL WITH SAND (GW) - gray 2.5YR5/1, 70% gravel up to 3, 25% m-c sand, 5% f clay, gravel subrnd to subang, sand ang to subang, qtz, gneiss, dry.	
25					CLAYEY SAND WITH GRAVEL (SC) - dk gray 2.5YR4/1, 50% well graded subang sand, 30% well graded subang f-c gravel, 20% f clay, high dry strength, moist. - becomes more sandy	
30		CC57	20	SC		
35					- dark grayish brn 10YR4/2, 40% well graded subang sand, 40% clay fines, 20% well graded subround gravel, high dry strength, medium plasticity	

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DRILLING METHOD: Rotosonic		WATER LEVEL (ft): ---	DRILLING EQUIPMENT: Standard Access Rig with continuous 4 core, 6 casing	
LOCATION: North Bat Cave Wash Topock, CA			LOGGED BY: S. Cooper	

DEPTH BGS (feet)	SAMPLE			USCS CODE	SOIL DESCRIPTION SOIL NAME, USCS SYMBOL, COLOR, PERCENT COMPOSITION, GRADING, GRAIN SHAPE, MINERALOGY, DENSITY/CONSISTENCY, STRUCTURE, MOISTURE.	COMMENTS DRILLING OBSERVATIONS AND OPERATIONS, DAILY START AND END TIMES, DRILL RATE, REFUSALS, SAMPLING AND TESTING NOTES.
	INTERVAL	TYPE/NUMBER	RECOVERY (ft)			
40					CLAYEY SAND WITH GRAVEL (SC) - dk gray 2.5YR4/1, 50% well graded subang sand, 30% well graded subang f-c gravel, 20% f clay, high dry strength, moist.	
45		CC58	10			
50				SC	- 40% well graded subround to rnd sand, 30% clay fines, low plasticity	8:14, Cr6+
55		CC59	10		- dark grayish brn 10YR4/2, 40% clay fines, 30% well graded subround to subang sand, 30% well graded subang gravel, medium plasticity	8:16, Cr6+
60					- drier	8:45 drilling is hard, Cr6+ at 9:30
65		CC60	10		- brn 7.5YR4/3, 45% well graded subang to subround c-m sand, 40% well graded ang gravel, 15% fines, grades consolidated to unconsolidated at depth.	
				GW/GC	WELL GRADED GRAVEL WITH CLAY AND SAND (GW/GC) - dk brn 10YR3/3, 60% well graded ang to subang gravel, 30% ang to subang sand, 10% fines, gneiss, qtz, no plasticity, moist.	9:35, Cr6+
70				SC	CLAYEY SAND WITH GRAVEL (SC) - high dry strength, moist.	

SOIL BORING LOG

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DRILLING METHOD: Rotasonic		WATER LEVEL (ft): ---	DRILLING EQUIPMENT: Standard Access Rig with continuous 4 core, 6 casing	
LOCATION: North Bat Cave Wash Topock, CA			LOGGED BY: S. Cooper	

DEPTH BGS (feet)	SAMPLE			USCS CODE	SOIL DESCRIPTION SOIL NAME, USCS SYMBOL, COLOR, PERCENT COMPOSITION, GRADING, GRAIN SHAPE, MINERALOGY, DENSITY/CONSISTENCY, STRUCTURE, MOISTURE.	COMMENTS DRILLING OBSERVATIONS AND OPERATIONS, DAILY START AND END TIMES, DRILL RATE, REFUSALS, SAMPLING AND TESTING NOTES.
	INTERVAL	TYPE/NUMBER	RECOVERY (ft)			
75		CC61	10	SC	<p>CLAYEY SAND WITH GRAVEL (SC) - high dry strength, moist.</p> <p>- slightly more clay, less gravel, still very sandy</p> <p>CLAYEY GRAVEL WITH SAND (GC) - lt yellowish brn 2.5YR6/3, 50% well graded subang gravel up to 3, 20% well graded subang c-m sand, 20% clay fines, qtz, gneiss, unconsolidated, medium plasticity, dry.</p>	10:30, Cr6+
80		CC62	15	CL	<p>SANDY LEAN CLAY WITH GRAVEL (CL) - olive brn 2.5YR4/3, 55% clay fines, 30% well graded subrnd sand, 15% well graded subrnd f-m gravel, high dry strength, high plasticity, moist.</p>	14:05, Cr6+
85				GC	<p>CLAYEY GRAVEL WITH SAND (GC) - olive brn 2.5YR4/3, 50% well graded mm subang to subrnd gravel, 30% well graded subang to subrnd sand, 20% clay fines, unconsolidated, low dry strength, low plasticity, dry to moist.</p>	14:10, Cr6+
90				SC	<p>CLAYEY SAND WITH GRAVEL (SC) - brn 10YR4/3, 40% well graded subang to subrnd f-m sand, 35% clay fines, 25% well graded subang to subrnd gravel, medium dry strength, moist.</p>	
95		CC63	15	CL	<p>SANDY LEAN CLAY (CL) - grayish brn 2.5YR5/2, 70% clay fines, 20% m-c sand, 10% well graded subang gravel up to 1, low dry strength, medium plasticity, wet.</p>	16:35, Cr6+
100						
105						

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LOCATION: North Bat Cave Wash Topock, CA			LOGGED BY: S. Cooper	

DEPTH BGS (feet)	SAMPLE			USCS CODE	SOIL DESCRIPTION SOIL NAME, USCS SYMBOL, COLOR, PERCENT COMPOSITION, GRADING, GRAIN SHAPE, MINERALOGY, DENSITY/CONSISTENCY, STRUCTURE, MOISTURE.	COMMENTS DRILLING OBSERVATIONS AND OPERATIONS, DAILY START AND END TIMES, DRILL RATE, REFUSALS, SAMPLING AND TESTING NOTES.
	INTERVAL	TYPE/NUMBER	RECOVERY (ft)			
110				SC	<p>CLAYEY SAND WITH GRAVEL (SC) - brn 7.5YR4/2 with some reddish mottles and clasts, 40% well graded subang m-c sand, 40% f gravel, 20% clayey fines, qtz, gneiss, green minerals, thin layers of clay.</p> <p>- dark grayish brn 10YR4/2, metamorphic, gneiss, unconsolidated</p>	hard drilling, 16:40 CR6+
115		CC64	10			8:45 CR6+
120						8:50 CR6+
125						11:45 CR6+
130		CC65	20			11:45 CR6+
135						11:50 CR6+
140				SW/SC	<p>- brn 10YR4/3, 60% well graded subang sand, 20% well graded ang to subang gravel up to 3, 20% clay fines, qtz, green mm minerals, medium plasticity, wet</p> <p>- brn 10YR4/3, 60% subang sand, 25% well graded subang gravel up to 2, 15% clay fines, low plasticity, moist</p> <p>WELL GRADED SAND WITH CLAY AND GRAVEL (SW/SC) - brn 10YR4/3, 50% well graded ang to subang sand, 40% well graded subang gravel, 10% clay fines, low plasticity, wet.</p>	some heaving gravels

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	INTERVAL	TYPE/NUMBER	RECOVERY (ft)			
145		CC66	20	SW/SC	WELL GRADED SAND WITH CLAY AND GRAVEL (SW/SC) - brn 10YR4/3, 50% well graded ang to subang sand, 40% well graded subang gravel, 10% clay fines, low plasticity, wet.	14:45 CR6+
150				CL	SANDY LEAN CLAY (CL) - brn 10YR5/3, 50% clay fines, 40% well graded subang sand, 10% well graded subang gravel, medium plasticity, wet.	14:50 CR6+
155				SC	CLAYEY SAND WITH GRAVEL (SC) - dk grayish brn 10YR4/2, 60% well graded subang sand, 30% clay fines, 10% well graded subang gravel, medium plasticity, wet.	wet, Drilling becomes harder, reworked red fanglomerate
160				GC	CLAYEY GRAVEL WITH SAND (GC) - dk grayish brn 10YR4/2, reddish staining, 40% well graded ang to subang sand, 20% clay fines, unconsolidated, low plasticity, moist.	fairly hard drilling
165		CC67	20	CL	SANDY LEAN CLAY WITH GRAVEL (CL) - dk grayish brn 10YR4/2, 50% clay fines, 30% well graded subang gravel, 20% well graded subang sand, green mineralogy, medium plasticity, moist.	16:35 CR6+
170				SC	CLAYEY SAND WITH GRAVEL (SC) - dk grayish brn 10YR4/2, 50% well graded subang sand, 25% well graded ang to subang gravel, 25% clay fines, medium plasticity, wet.	16:40 Cr6+
175					- increasing fines	

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	INTERVAL	TYPE/NUMBER	RECOVERY (ft)			
				GC	CLAYEY GRAVEL WITH SAND (GC) - dk grayish brn 10YR4/2, 50% well graded subang gravel, 30% well graded subang sand, 20% clay fines, medium plasticity, moist to dry.	16:45 Cr6+
180				SC	CLAYEY SAND WITH GRAVEL (SC) - brn 7.5YR4/3, 40% well graded subang sand, 30% well graded subang gravel, 30% clay fines, sand qtz, gneiss, amphiboles, gravel gneiss, medium plasticity, matrix supported, moist, reddish stains. - gravels up to 3	
185						
190		CC68	20		- wetter, more sand and gravel	
195					- moist, reddish brn	
200				- brn 7.5YR4/4, 60% well graded subang to ang f-c sand, 25% well graded subang to ang gravel, 15% clay fines, low plasticity, high dry strength, matrix supported, moist		
				BEDROCK (BR) - Rock material, miocene conglomerate	13:00 Cr6+, fractures obliquely	
205				- increasing gravel up to 3 with depth		
					13:05 Cr6+	
210		CC69	20	- decreasing gravel		

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	INTERVAL	TYPE/NUMBER	RECOVERY (ft)			
215				BR	<p>BEDROCK (BR) - Rock material, miocene conglomerate</p> <p>- reddish brn, 30% gravel, consolidated, high dry strength, moist</p>	13:10 Cr6+, still fractures obliquely
220		CC70	10		<p>- brn 7.5YR4/3, gravelly sand and clay, gravels up to 2, low plasticity, moist.</p> <p>- brick red color</p>	13:15 Cr6+
225					<p>- more consolidated</p>	digital photo of oblique fracture in red fanglomerate, photo #4
Boring Terminated at 228 ft						
<p>ABBREVIATIONS</p> <p>cc = continuous core run brn = brown lt = light dk = dark vf = very fine-grained f = fine-grained m = medium-grained c = coarse-grained vc = very coarse-grained ang = angular subang = subangular subrnd = subrounded rnd = rounded br = bedrock formation ss = sandstone conglom = conglomerate comptd = compacted qtz = quartz</p>						