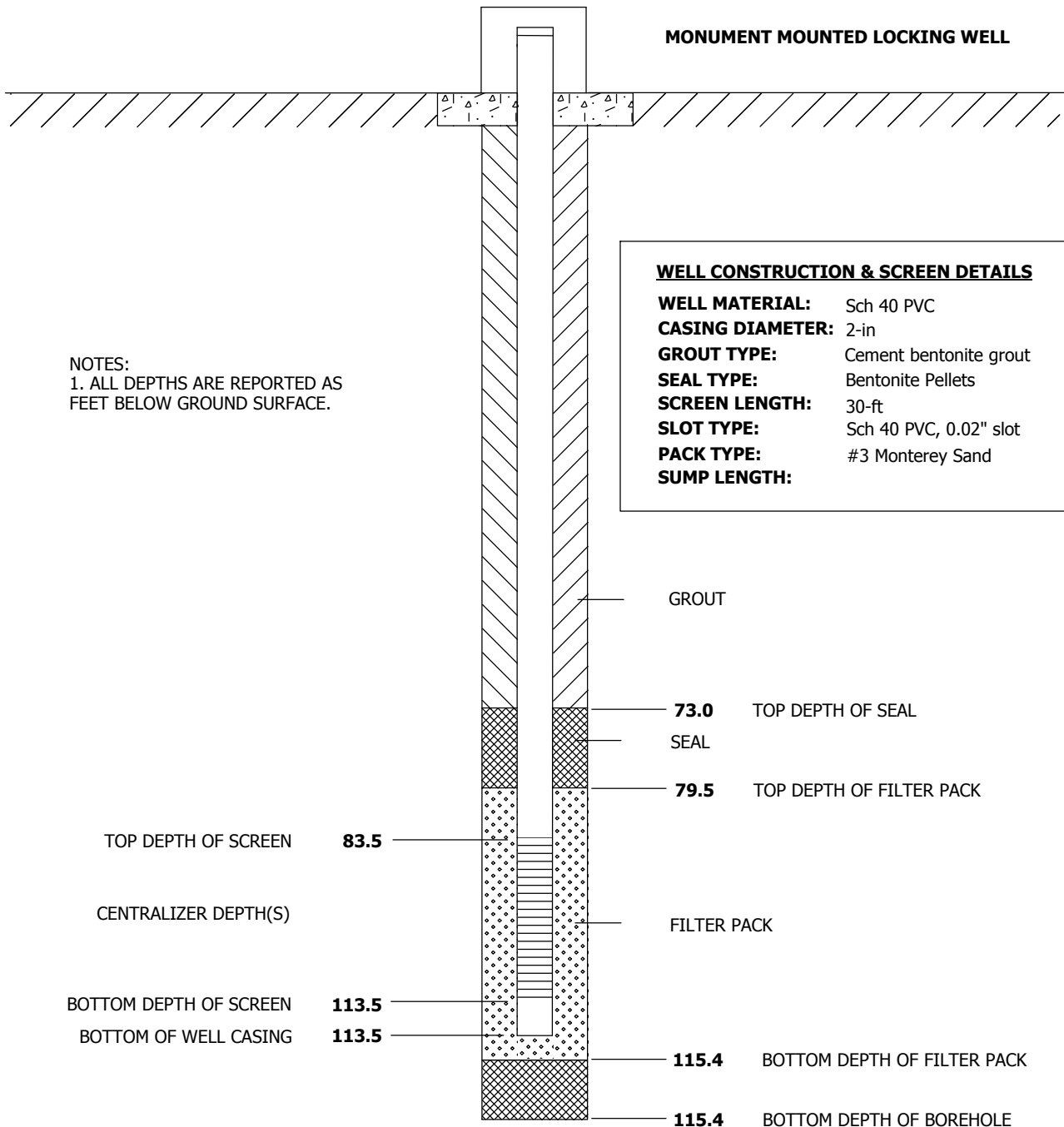


WELL COMPLETION DIAGRAM

PROJECT NO: 326128.01.07.AR	PROJECT: IM-3 Hydrogeologic Investigation, PG&E Topock	WELL NO: OW-1S
LOCATION: East Mesa, Parcel No. 650-151-06		
DRILLING CONTRACTOR: WDC Exploration & Wells, Montclair, CA		DRILLING START DATE: 11/16/2004
DRILLING METHOD: Rotosonic		DRILLING END DATE: 11/18/2004
LOGGER: M. Godwin		WELL COMPLETION DATE: 11/18/2004
TOP OF WELL CASING (NGVD 29): 550.15		NORTHING COORDINATE (CCS DAND 27, ZONE 5): 2103040.48
GROUND SURFACE ELEVATION (NGVD 29): 547.59		EASTING COORDINATE (CCS NAD 27 ZONE 5): 7613419.20



WELL DIAGRAM IS NOT TO SCALE

SOIL BORING LOG

PROJECT NAME: IM-3 Hydrogeologic Investigation, PG&E Topock		HOLE DEPTH (ft): 291.0	DRILLING CONTRACTOR: WDC Exploration & Wells, Montclair, CA	
SURFACE ELEVATION: 547.8 ft. MSL	NORTHING (CCS NAD 27 Z 5): 2,103,030.90	EASTING (CCS NAD 27 Z 5): 7,613,420.85	DATE STARTED: 09/09/2004	DATE COMPLETED: 09/22/2004
DRILLING METHOD: Rotosonic		WATER LEVEL (ft): ---	DRILLING EQUIPMENT: Sonic SS-15K	
LOCATION: East Mesa, Parcel No. 650-151-06			LOGGED BY: J. Weigel	

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		Box 1 Box 2	10	SM	GRAVEL WITH SAND AND SILT (SM) - lt brnsh gray (10YR 6/2), 50% f-c sand, 25% f-m gravel, 25% fines, subang to subrnd clasts. -layers of carbonate cement up to 3" thick, cemented layers are GM/SM. Cemented zones from 11' to 15' bgs - 3" metamorphic gneissic cobble - 10YR6/2 fines decreasing, cemented layers 1-2" thick - wet color 7.5YR5/3 - think cemented zones	11:40, dry-hot core barrel		
10		Box 3	5			12:00, 3" cobble at 11 ft bgs, metamorphic gneiss		
15		Box 4 Box 5	6			15:30, set casing stage bins		
20		Box 5 Box 6	5			GM/SM	WELL GRADED GRAVEL WITH SAND AND SILT (GM/SM) - <= 20% fines.	
25		Box 6 Box 7 Box 8	8			GM	WELL GRADED SANDY GRAVEL (GM) - lt brnsh gray to lt gray (10YR 6/2 to 7/2), 50% f-m gravel, 40% f-c sand, 10% fines, schist, gneiss, metamorphic clasts. - 50% f-c subrnd to subang gravel, 40% f-c subang sand, moist	hot core barrel
30								
35								



SOIL BORING LOG

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LOCATION: East Mesa, Parcel No. 650-151-06			LOGGED BY: J. Weigel	

DEPTH BGS (feet)	SAMPLE			USCS CODE	SOIL DESCRIPTION	COMMENTS
	INTERVAL	TYPE/NUMBER	RECOVERY (ft)			
40		Box 8	8	GM	WELL GRADED SANDY GRAVEL (GM) - lt brnsh gray to lt gray (10YR 6/2 to 7/2), 50% f-m gravel, 40% f-c sand, 10% fines, schist, gneiss, metamorphic clasts. - thin, weakly cemented zones fining upward	
45		Box 11	5	SM	SAND WITH GRAVEL AND SILT (SM) - lt gray (10YR 7/2), 50% f-c sand, 30% f-c gravel, 20% silt, subrnd to subang, little cementation, moisture increasing with depth. - white 10YR8/1, 50% f-c sand, 30% silt, 20% gravel, subang-subrnd	
50		Box 12 Box 13	5	SW	WELL GRADED SAND WITH GRAVEL (SW) - very pale brn (10YR 7/3), 75% f-c sand, 25% gravel, subang to subrnd, no cementation. - igneous/metamorphic rock up to cobble size	
55		Box 13 Box 14	4.5	ML/CL	SILT/CLAY WITH SAND (ML/CL) - pale brn (10YR 6/3), 60% silt, 37% f-c sand, < 3% gravel, wet, decreasing moisture with depth.	wet sample, decreasing moisture with increase in depth
60		Box 14 Box 15 Box 16	6	SW	SAND WITH GRAVEL AND FINES (SW) -lt gray (2.5Y 7/1), 60% f-c sand, 30% gravel, 10% silt, subrnd to subang, coarsening downwards, relatively dry. - gravel increasing to 40% subang-ang	sample relatively dry compared to upper sections, coarsening downward
65		Box 16 Box 17	6	SW/GM	SAND/GRAVEL WITH SILT (SW/GM) - lt gray (10YR 7/2), 55% f-c sand, 40% gravel, 5% silt, ang to subrnd. - some minor cementation, dissolves in water - metamorphic and gneissic clasts	
70					- lt gray 10YR7/2 50% f-m sand, 30% silt, 20% ang-subang gravel	

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DRILLING METHOD: Rotasonic		WATER LEVEL (ft): ---	DRILLING EQUIPMENT: Sonic SS-15K	
LOCATION: East Mesa, Parcel No. 650-151-06			LOGGED BY: J. Weigel	

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	INTERVAL	TYPE/NUMBER	RECOVERY (ft)			
75		Box 18	6	SW/GM	SAND/GRAVEL WITH SILT (SW/GM) - lt gray (10YR 7/2), 55% f-c sand, 40% gravel, 5% silt, ang to subrnd. -calcium carbonate cement caliche 3-5"	clay on sides of core from core barrel 5" silt zone
80		Box 19 Box 20	6	SM	SAND WITH SILT AND CLAY (SM) - 80% f-c sand, 20% silt/clay. - caliche 1-2"	
				ML/SM	SILT WITH SAND (ML/SM) - lt gray (10YR 7/2), 50% silt/clay, 50% fine sand.	
85		Box 21	4	SW	WELL GRADED SAND WITH SILT AND GRAVEL (SW) - 60% f-c sand, 30% gravel, 10% fines, ang to subang. - cemented, not CaCO3	
90		Box 22 Box 23	10	SM	SAND WITH SILT (SM) - very pale brn (10YR 7/3), 50% f-m sand, 45% silt, 5% gravel, ang to subang. - lt gray 10YR7/2, 65% well graded f-c sand, 20% silt, 15% subrnd-ang gravel, fairly moist but drying with depth, igneous and mm clasts - very pale brn 10YR7/3, 50% sand, 30% silt/clay, 20% gravel, fining upward, grain supported, quartzite and mm clasts	
95					- composition pale brn, 10YR6/3 - lt gray 10YR7/2	
100		Box 24 Box 25 Box 26	12		- 40% silt/clay, 30% f-c sand ang-subang, 10% gravel	groundwater grab sample collected from 100-116 ft bgs
				ML	SILT WITH SAND AND GRAVEL (ML) - lt brnsh gray (10YR 6/2), 50% silt, 40% f-c sand, 10% gravel, ang-subrnd, low plasticity.	
105				SW/SM	WELL GRADED SAND WITH SILT AND GRAVEL (SW/SM) - lt reddish	



SOIL BORING LOG

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DRILLING METHOD: Rotosonic		WATER LEVEL (ft): ---	DRILLING EQUIPMENT: Sonic SS-15K	
LOCATION: East Mesa, Parcel No. 650-151-06			LOGGED BY: J. Weigel	

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				SW/SM	brn (5YR 6/3), 75% f-c sand, 15% fines, 10% gravels, subrnd, grain supported, mm clasts. WELL GRADED SAND WITH SILT AND GRAVEL (SW/SM) - lt reddish brn (5YR 6/3), 75% f-c sand, 15% fines, 10% gravels, subrnd. WELL GRADED SAND WITH SILT AND GRAVEL (SM) - lt reddish gray (5YR 5/2), 70% f-c sand, 25% fines, 5% gravels, subang to subrnd, grain supported, natural soil moisture.	fell apart in core barrel	
115		Box 27 Box 28 Box 29	10	SM	- less cemented zone		
120				CL/ML	CLAY AND SILT WITH SAND AND GRAVEL (CL/ML) - olive gray (5Y 5/2), 65% med plasticity silt/clay, 30% f-c sand, 5% gravel, matrix supported.		
125		Box 30 Box 31	7	SM/SC	WELL GRADED SAND WITH GRAVEL AND SILT AND CLAY (SM/SC) - 55% f-c sand, 40% silt/clay, 5% gravel.		
130				ML/CL	SILT AND CLAY WITH GRAVEL AND SAND (ML/CL) - olive brn (2.5Y 4/3 to 4/4) to lt yellowish brn (2.5Y 6/4), 65% silt/clay, 25% f-c sand, 10% gravel, subang, low-med plasticity, matrix supported, wet. - lt olive 2.5Y5/3, 60% silt/clay, 35% f-c sand, 5% gravel, dry		hot core barrel
135		Box 32 Box 33 Box 34	10	SC	SAND WITH SILT, CLAY AND GRAVEL (SC) - pale brn (10YR 6/3) to lt olive gray (5Y 6/2), 60% f-m sand, 35% silt/clay, 5% gravel, ang to subang. - fining up sequence		
140				SM	SAND AND SILT WITH GRAVEL (SM) - dark grayish brn (2.5Y 4/2), 50% f-c sand, 40% silt/clay, 10% gravel, ang-subang, med plasticity. - 4" seam of low plasticity silt / clay		
140		Box 35 Box 36	6				

SOIL BORING LOG

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DRILLING METHOD: Rotosonic		WATER LEVEL (ft): ---		DRILLING EQUIPMENT: Sonic SS-15K	
LOCATION: East Mesa, Parcel No. 650-151-06			LOGGED BY: J. Weigel		

DEPTH BGS (feet)	SAMPLE			USCS CODE	SOIL DESCRIPTION	COMMENTS
	INTERVAL	TYPE/NUMBER	RECOVERY (ft)			
145				SM	<p>SAND AND SILT WITH GRAVEL (SM) - dark grayish brn (2.5Y 4/2), 50% f-c sand, 40% silt/clay, 10% gravel, ang-subang, med plasticity, grain edge contact, grain supported, dry.</p> <p>- sand with silt and gravel, lt yellowish brn 2.5YR6/3 and 10YR7/1, 60% f-c sand, 40% silt/clay, 5% gravel</p>	<p>DRILLING OBSERVATIONS AND OPERATIONS, DAILY START AND END TIMES, DRILL RATE, REFUSALS, SAMPLING AND TESTING NOTES.</p> <p>groundwater grab sample collected from 160-180 ft bgs</p> <p>casing at 160', borehole to 180'</p>
150		Box 36 Box 37 Box 38	10	ML/SM	<p>SAND AND SILT WITH GRAVEL (ML/SM) - lt gray (10YR 7/1) to lt gray (2.5Y 7/2) 40% f-c sand, 40% silt, 20% gravel.</p> <p>- 2.5Y7/2 lt gray, 55% silt, 35% f-c sand, 10% gravel</p>	
155				SM/ML	<p>SAND AND SILT WITH GRAVEL (SM/ML) - brn (10YR 5/3), 50% fines, 45% f-c sand, 5% gravel, not cemented, wet.</p> <p>- grayish brn 10YR5/2 45% f-c sand, 40% silt, 15% gravel, ang-subang, dry</p>	
160		Box 39 Box 40 Box 41	10		<p>SAND WITH GRAVEL AND SILT (SM) - brn (10YR 5/3), 55% f-c sand, 30% silt, 15% gravel.</p> <p>- silt content increasing with depth, gravel content decreasing</p> <p>- brn 10YR5/3, C208 50% silt, 48% f-c sand, 2% gravel</p>	
165				SM	<p>- brn 10YR5/3, 65% f-c sand, 20% silt, 15% gravel, ang-subang, moist</p> <p>- gray 2.5Y5/1, 60% silt, 30% sand, 10% gravel, ang-subang, med plasticity</p>	
170		Box 41 Box 42	8		<p>- wet</p> <p>- metamorphic clasts</p>	
175					<p>- lt olive brn 2.5Y5/3, 75% well grade f-c sand, 20% silt, 5% gravel, loose</p> <p>- lt yellowish brn 2.5YR6/3, 50% sand, 45% silt, 5% gravel, moist, tight</p>	

SOIL BORING LOG

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DRILLING METHOD: Rotosonic		WATER LEVEL (ft): ---	DRILLING EQUIPMENT: Sonic SS-15K	
LOCATION: East Mesa, Parcel No. 650-151-06			LOGGED BY: J. Weigel	

DEPTH BGS (feet)	SAMPLE			USCS CODE	SOIL DESCRIPTION	COMMENTS
	INTERVAL	TYPE/NUMBER	RECOVERY (ft)			
180		Box 43 Box 44	8	SM	<p>SAND WITH GRAVEL AND SILT (SM) - brn (10YR 5/3), 55% f-c sand, 30% silt, 15% gravel.</p> <ul style="list-style-type: none"> - compacted - lt olive brn 2.5Y5/3, 55% sand, 30% silt, 15% gravel, ang mm clasts, sample broken and dry 	<p>DRILLING OBSERVATIONS AND OPERATIONS, DAILY START AND END TIMES, DRILL RATE, REFUSALS, SAMPLING AND TESTING NOTES.</p>
185		Box 45 Box 46	6.5	SW/SM	<p>SAND WITH SILT AND GRAVEL (SW/SM) - yellowish brn (10YR 5/4), 70% subang to ang sand, 20% silt, 10% subrnd gravel up to 3".</p> <p>SILT AND SAND WITH GRAVEL (ML/SM) - yellowish brn (10YR 5/4), 50% silt/clay, 45% sand, 5% gravel, ang to subang.</p> <ul style="list-style-type: none"> - last sand and gravel, mm origin - lt yellowish brn 2.5Y6/3, 60% silt/clay, 30% f-c sand, 10% gravel, subang-subrnd, med plasticity, matrix supported 	
190				ML/SM	<ul style="list-style-type: none"> - dry and loose, oscillating silt and clay - moist and tight 	
195		Box 47 Box 48 Box 49	10		<ul style="list-style-type: none"> - moist mm clasts 	
200						
205				SM	<p>WELL GRADED SAND AND SILT WITH GRAVEL (SM) - pale brn (10YR 6/3), 50% sand, 40% fines, 10% coarse gravel up to 1.5", ang, stiff, grain edge supported, moist to wet.</p> <ul style="list-style-type: none"> - lt olive brn 2.5Y5/3, 50% sand ang, clast supported, 45% silt/clay, 5% gravel - 65% f-c sand, 20% silt, 15% gravel ang-subang, metamorphic clasts, loose, wet 	
210		Box 50 Box 51 Box 53	0	ML/CL	<p>SILT AND CLAY WITH SAND AND GRAVEL (ML/CL) - lt olive brn (2.5Y 5/3), 60% silt/clay, 35% f-c sand, 5% gravel, matrix supported, med plasticity, alternates between clast and matrix supported.</p>	

8:00, tripping in



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LOCATION: East Mesa, Parcel No. 650-151-06			LOGGED BY: J. Weigel	

DEPTH BGS (feet)	SAMPLE			USCS CODE	SOIL DESCRIPTION	COMMENTS
	INTERVAL	TYPE/NUMBER	RECOVERY (ft)			
215					NO RECOVERY	sample fell out of core barrel and was redrilled
220		Box 54	6		SAND AND SILTY CLAY WITH GRAVEL (SM/ML) - lt olive brn (2.5Y 5/3), 55% f-c sand, 40% silt/clay, 5% ang to subang gravel up to 1.75", moist, cohesive, soft, mm clasts, increasing sand and clay with depth. - gravel up to 3" - 3" sand zone, 65% sand, 30% silt, 5% gravel up to 3", stiff	drilling is hard
225				SM/ML	- lt yellowish brn 2.5Y6/3, 80% f-c sand subang-ang, 15% gravel subrnd-subang, 5% silt, soft, loose and moist - 80% silt/clay, 10% gravel to cobble, 10% f-m sand, m-h plasticity - 60% sand, 20% silt, 20% gravel, 3" sand / silt seam	groundwater grab sample collected from 220-236 ft bgs
230		Box 55 Box 56 Box 57	12		- lt yellowish brn 2.5Y6/3, 85% f-c sand, 10% silt, 5% gravel	sample went from hard to soft
235					- grayish brn 2.5Y5/2, 45% f-c sand, 40% silt/clay, 15% gravel, subrnd-ang, mm	
240		Box 53	0		NO RECOVERY	drilling is hard, broke casing at drill head at depth, casing at 180 ft bgs, had to shake core barrel to get out of hole, lost sample
245						



SOIL BORING LOG

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	INTERVAL	TYPE/NUMBER	RECOVERY (ft)			
250				SW/GP	NO RECOVERY SAND AND GRAVEL WITH FINES (SW/GP) - grayish brn (2.5Y 5/2), 55% m-c subang to subrnd sand, 40% f-m subang to rnd gravel, 5% silt. - gravely well graded sand with silt, lt olive brn 2.5Y5/3, 65% f-c sand, 20% f gravel ang-subang grain supported	246 ft bgs - formation tight, water flows out of casing while tripping in core barrel drilling is hard
255		Box 59 Box 60 Box 61	11	ML/CL	SILT AND CLAY WITH SAND (ML/CL) - lt olive brn (2.5Y 5/3), 70% m. plasticity fines, 35% f-c sand, 5% gravel, ang to subang. SAND WITH SILT AND CLAY (SM/ML) - lt olive brn (2.5Y 5/3), 50% fines, 48% f-c sand, 2% gravel, ang to subang, med plasticity, alternating zones of matrix and grain supported. - silty well graded sand with gravel, 55% f-c sand, 35% silt/clay, 10% f-m gravel, 2.5" max gravel size	
260				SM/ML		
265		no sample return	0			
270				GM	- sandy silty clay with gravel, grayish brn, 60% fines, 30% f-c sand, 10% ang-subang gravel GRAVEL WITH SILT (GM) - grayish brn (2.5Y 5/2), 90% f-c gravel, 10% fines, bimodal distribution.	drilling is hard, tried to wash down with casing from 246 to 266 ft bgs, cement casing broke on washdown, core barrel stuck -- had to vibrate to get it out, lost sample hard and tight
275		Box 62	3	ML/CL	SANDY SILTY CLAY WITH GRAVEL (ML/CL) - dark grayish brn (2.5Y 4/2), 60% silt, 35% f-c sand, 5% gravel, subrnd to subang, matrix supported, metamorphic, stiff, moist.	
		Box 63	5	CL	SILT AND CLAY WITH SAND (CL) - lt olive brn (2.5Y 5/3), 80% silt/clay, 15% sand, 5% gravel.	
				SW	WELL GRADED SAND WITH GRAVEL (SW) - grayish brn (2.5Y 5/2), 75% f-c sand, 20% gravel, 5% fines, bimodal distribution.	
280				SM/ML	SILTY SAND WITH GRAVEL (SM/ML) - lt olive brn, 55% f-c sand, 40% fines, 5% f-gravel, edge supported, increasing silt with depth.	



SOIL BORING LOG

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	INTERVAL	TYPE/NUMBER	RECOVERY (ft)			
285		Box 65	6	SM/ML	<p>SILTY SAND WITH GRAVEL (SM/ML) - lt olive brn, 55% f-c sand, 40% fines, 5% f-gravel, edge supported. - calcium carbonate cement</p> <p>- gravely silt/clayey sand, 40% f-c sand, 35% silt/clay, 25% f-gravel, subang-subrnd, grain supported, l-m dense, wet</p>	<p>ran casing after core barrel became stuck, casing broke, lost sample</p>
290		no sample return	0	NO RECOVERY		
					<p>Boring Terminated at 291 ft</p> <p>ABBREVIATIONS 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>	