





Final Site-Wide Soil Remedial Investigation Kaiser Trentwood Facility Spokane Valley, Washington

Volume II Appendices

Prepared for Kaiser Aluminum Washington, LLC

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APPENDIX A EXPLORATION LOGS

Sample Number	Depth in Feet	Description
TY-SS-01	0.4 to 0.8	(Soft), moist, brown, clayey SILT to silty CLAY (Import FILL)
		under 0.4 foot of (1-inch minus, washed) GRAVEL.
TY-SS-02	0.3 to 0.8	(Soft), moist, brown, clayey SILT to silty CLAY (Import FILL)
		under removed 0.3 foot of (1-inch minus, washed) GRAVEL.
TY-SS-03	0.4 to 0.9	(Soft), moist, brown, silty CLAY to clayey SILT (Import FILL) over
		0.1 foot of (Medium Dense), moist, dark brown, silty, sandy
		GRAVEL under 0.4 foot of (1-inch minus, washed) GRAVEL.
TY-SS-04	0.4 to 0.9	(Soft), moist, brown, silty CLAY to clayey SILT (Import FILL)
		under 0.4 foot of (1-inch minus, washed) GRAVEL.
TY-SS-05	0.4 to 0.9	(Soft), moist, brown, silty CLAY to clayey SILT (Import FILL) over
		0.4 foot of (1-inch minus, washed) GRAVEL.
TY-SS-06	0.4 to 1.0	(Soft), moist, brown, silty CLAY to clayey SILT (Import FILL) over
		0.4 foot of (1-inch minus, washed) GRAVEL.
TY-SS-07	0.4 to 0.8	(Soft), moist, brown, clayey SILT to silty CLAY (Import FILL) over
		0.4 foot (1-inch minus, washed) GRAVEL.
TY-SS-08	0.4 to 1.0	(Soft), moist, brown, clayey SILT to silty CLAY (Import FILL) over
		0.4 foot of (1-inch minus, washed) GRAVEL with scattered 2- to
		4-inch gravel.
TY-SS-09	0.5 to 1.0	(Soft), moist, brown, silty CLAY to clayey SILT (Import FILL) over
		0.5 foot of (1-inch minus, washed) GRAVEL.

Table A-1 - Surface Soil Sample Data – Transformer Yard

Note: Each surface soil sample exploration terminated at the upper surface of (medium dense), moist, dark brown, silty, sandy GRAVEL. Soil sample TY-SS-03 contained 0.1 foot of the silty, sandy GRAVEL in the composite sample. Remaining soil samples did not include the silty, sandy GRAVEL in the composite sample.

Table A-2 - Surface Soil Sample Data - West Drainage Ravine

Sample Number	Depth in Feet	PID	Description
WDR-SS-1	0 to 1	0.5	Three- to four-inch-diameter dead tree limbs over one inch of
			compact Forest Duff over damp, brown, slightly silty, sandy
			GRAVEL with cobbles and scattered organic material and woody
			debris.
WDR-SS-2	0 to 1	5.6	Two inches of compact Forest Duff over dry to damp, brown,
			slightly silty, sandy GRAVEL with cobbles and scattered organic
			material.
WDR-SS-3	0 to 1	0.4	One inch of compact Forest Duff over dry, brown, slightly silty
			sandy GRAVEL with cobbles and organic material.
WDR-SS-4	0 to 1	0.2	One inch of compact Forest Duff over dry to damp, brown,
			slightly silty, sandy GRAVEL with cobbles and scattered organic
			material and woody debris.
WDR-SS-5	0 to 1	0.4	Three-fourths inch of compact Forest Duff over damp, dark
			brown, slightly silty, sandy GRAVEL with cobbles and scattered
			organic material and woody debris.
WDR-SS-6	0 to 1	0.2	One inch of compact Forest Duff over dry, light brown, slightly
			sandy GRAVEL with trace of silt and scattered organic material
			and woody debris.
WDR-SS-7	0 to 1	0.4	One and a half inches of compact Forest Duff over dry, brown,
			slightly silty, sandy GRAVEL with cobbles and scattered organic
			material and woody debris.
WDR-SS-8	0 to 1	0.2	One-half inch of compact Forest Duff over dry, light brown, silty,
			sandy GRAVEL with cobbles and minor organic material
			(rootlets).
WDR-SS-9	0 to 1	0.6	One inch of compact Forest Duff over damp, dark brown, silty,
			sandy GRAVEL with cobbles and abundant organic material
			(rootlets).
WDR-SS-10	0 to 1	0.3	One inch of compact Forest Duff over dry to damp, dark brown,
			slightly silty, sandy GRAVEL with cobbles and abundant organic
			material (rootlets). Organic-rich to 5-inch depth.
WDR-SS-11	0 to 1	0.4	One inch Moss over one-half inch of compact Forest Duff over
			dry to damp, dark brown, silty, sandy GRAVEL with cobbles and
			abundant organic material (rootlets). Organic-rich to 6-inch
			depth.
WDR-SS-12	0 to 1	0.5	One inch of Moss over one inch of compact Forest Duff over dry,
			brown, slightly silty, sandy GRAVEL with cobbles and abundant
			organic material (rootlets). Organic-rich to 8-inch depth.

Table A-2 - Surface Soil Sample Data - West Drainage Ravine

Sample Number	Depth in Feet	PID	Description
WDR-SS-13	0 to 1	0.2	Two inches of Moss over compact Forest Duff over damp, brown,
			slightly silty, sandy, very cobbly GRAVEL with abundant organic
			material. Organic-rich to 8-inch depth.
WDR-SS-14	0 to 1	0.1	One and one-half inches of Moss and Forest Duff over damp,
			brown, slightly silty, sandy, very cobbly GRAVEL with abundant
			wood fragments, stems, roots, and organic material. Organic-
			rich to 8-inch depth.
WDR-SS-15	0 to 1	0.3	One inch of Moss over damp, brown, slightly silty, slightly sandy
			GRAVEL with moderate organic material. Organic-rich to 8-inch
			depth.
WDR-SS-16	0 to 1	0.3	Trash (plywood and miscellaneous debris) over minimal Forest
			Duff over damp, brown, slightly silty to silty, sandy GRAVEL with
			scattered organic material. Organic-rich to 8-inch depth.
WDR-SS-17	0 to 1	0.8	One inch of Moss over damp, brown, slightly silty, sandy
			GRAVEL with trace of organic material.
WDR-SS-18	0 to 1	0.5	One-half inch of Moss over dry to damp, gray-brown, slightly
			sandy GRAVEL with trace of organic material.

Sample Number	Depth in Feet	PID	Description
SDR-SS-1	0 to 1	4.7	Dry to damp, brown, slightly silty, sandy GRAVEL with cobbles
			and abundant organic material.
SDR-SS-2	0 to 1	6.7	Dry, brown, slightly silty, slightly sandy to sandy GRAVEL with
			cobbles and abundant rootlets and scattered wood fragments.
SDR-SS-3	0 to 1	9.7	Dry to damp, brown, sandy to very sandy GRAVEL with cobbles
			and abundant rootlets and organic material and trace of wood
			fragments.
SDR-SS-4	0 to 1	2.3	Dry to damp, brown, slightly silty, sandy to very sandy GRAVEL
			with cobbles and abundant rootlets and organic material.
SDR-SS-5	0 to 1	2.4	One inch of moist, dark brown, fibrous organic material (wood,
			leaves, and roots) over 2 inches of moist, light brown, medium to
			coarse sandy GRAVEL with scattered organic material over
			moist, dark brown, coarse sandy GRAVEL.
SDR-SS-6	0 to 1	3.6	Six inches of moist to wet, dark brown, woody organic material
			with gravel and scattered sand over moist, brown, slightly sandy
			to sandy GRAVEL.
SDR-SS-7	0 to 1	2.0	Three inches of moist, brown, slightly sandy GRAVEL with
			abundant organic material (pine needles and roots) over moist,
			gray-brown, sandy GRAVEL.
SDR-SS-8	0 to 1	3.1	Six inches of moist, brown, fibrous, woody organic material over
			moist, brown, sandy GRAVEL.
SDR-SS-9	0 to 1	2.4	One inch of (loose), moist FOREST DUFF and organic material
			(sticks and pine needles) over moist, medium to coarse very
			sandy GRAVEL.

Table A-3 - Surface Soil Sample Data - South Drainage Ravine

Key to Exploration Logs

Sample Description

(HC Standards\SRF\ A-1.dwg)

12/05

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Native Material

Groundwater Seepage (Test Pits)

Classification of soils in this report is based on visual field and laboratory observations which include density/consistency, moisture condition, grain size, and plasticity estimates and should not be construed to imply field nor laboratory testing unless presented herein. Visual-manual classification methods of ASTM D 2488 were used as an identification guide.

Soil descriptions consist of the following:

Density/consistency, moisture, color, minor constituents, MAJOR CONSTITUENT, additional remarks.

	sed on visual observat	ion and is presented	parentnetically of	on the test pit logs	5.
SAND or GRAVEL Density	Standard Penetration Resistance (N) in Blows/Foot	SILT or CLAY Consistency	Per Res	ndard netration sistance(N) Blows/Foot	Approximate Shear Strength in TSF
Very loose	0 - 4	Very soft	C	0 - 2	<0.125
Loose	4 - 10	Soft	2	2 - 4	0.125 - 0.25
Medium dense	10 - 30	Medium stiff		4 - 8	0.25 - 0.5
Dense	30 - 50	Stiff	8	8 - 15	0.5 - 1.0
Very dense	>50	Very stiff	15	5 - 30	1.0 - 2.0
		Hard		>30	>2.0
Moisture			Minor Cons	tituents	Estimated Percentage
Dry Little perce	eptible moisture		Not identified	in description	0 - 5
Damp Some per	eptible moisture, proba	ably below optimum	Slightly (claye	ey, silty, etc.)	5 - 12
Moist Probably r	ear optimum moisture	content	Clayey, silty, s	sandy, gravelly	12 - 30
Wet Much perc	eptible moisture, proba	bly above optimum	Very (clayey,	silty, etc.)	30 - 50
Legends		,			
	hand a la			ymbols	
Sampling Test S	ymbols		GS	Grain Size Cla	ssification
Boring Samples	Test	Pit Samples	CN	Consolidation	
Split Spoc		Grab (Jar)	UU UU	Unconsolidated	d Undrained Triaxial
<u> </u>			CU	Consolidated L	Indrained Triaxial
Shelby Tu	be 🗌	Bag	CD	Consolidated E	Drained Triaxial
Cuttings	\Box	Shelby Tube	QU	Unconfined Co	mpression
Core Run			DS	Direct Shear	
	e Recovery		к	Pe r meability	
•	ned, Not Driven		PP	Pocket Penetro Approximate	ometer Compressive Strength in TSF
			ΤV	Torvane Approximate	Shear Strength in TSF
Groundwater Ol	oservation Wells		CBR	California Bear	•
	 Monument 		MD	Moisture Dens	ity Relationship
	- Surface Seal		AL	Atterberg Limit	
	 Gravel Backfill Riser Pipe Bentonite Groundwater Level 				Water Content in Percent Liquid Limit Natural Plastic Limit
	at Time of Drilling	(ATD)	PID		Detector Reading
	 Well Screen 		CA	Chemical Analy	vsis
Sand Pack			DT	In Situ Density	Test



Key to Exploration Logs

Sample Description

Classification of soils in this report is based on visual field and laboratory observations which include density/consistency, moisture condition, grain size, and plasticity estimates and should not be construed to imply field nor laboratory testing unless presented herein. Visual-manual classification methods of ASTM D 2488 were used as an identification guide.

Soil descriptions consist of the following:

Density/consistency, moisture, color, minor constituents, MAJOR CONSTITUENT, additional remarks.

Density/Consiste	ency			
Soil density/consistency in t	porings is related primarily to the	ne Standard Penetration Resistan	ce.	
Soil density/consistency in t		visual observation and is present		
SAND or GRAVEL	Standard Penetration	SILT or CLAY	Standard Penetration	Approximate Shear
Density	Resistance (N) in Blows/Foot	Consistency	Resistance (N) in Blows/Foot	Strength in TSF
Very loose	0 - 4	Very soft	0 - 2	<0.125
Loose	4 - 10	Soft	2 - 4	0.125 - 0.25
Medium dense	10 - 30	Medium stiff	4 - 8	0.25 - 0.5
Dense	30 - 50	Stiff	8 - 15	0.5 - 1.0
Very dense	>50	Very stiff	15 - 30	1.0 - 2.0
		Hard	>30	>2.0

Moisture

Little perceptible moisture
Some perceptible moisture, probably below optimum
Probably near optimum moisture content
Much perceptible moisture, probably above optimum

Legends

Sam	pling Test Symbol	s	
BORI	NG SAMPLES	TEST	PIT SAMPLES
\boxtimes	Split Spoon	\boxtimes	Grab (Jar)
	Shelby Tube	\square	Bag
	Cuttings	\square	Shelby Tube
	Core Run		
*	No Sample Recovery		
Р	Tube Pushed, Not Drive	en	
Exem	leretion and Comm	lation	Detaile
схр	loration and Comp	netion	Detalis
	Surface Seal		
⊻	Groundwater Lev (ATD) At Time o		I

Observation Well Tip or Slotted Section

Groundwater Seepage (Test Pits)

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Minor Constituents

Not identified in description	0 - 5
Slightly (clayey, silty, etc.)	5 - 12
Clayey, silty, sandy, gravelly	12 - 30
Very (clayey, silty, etc.)	30 - 50

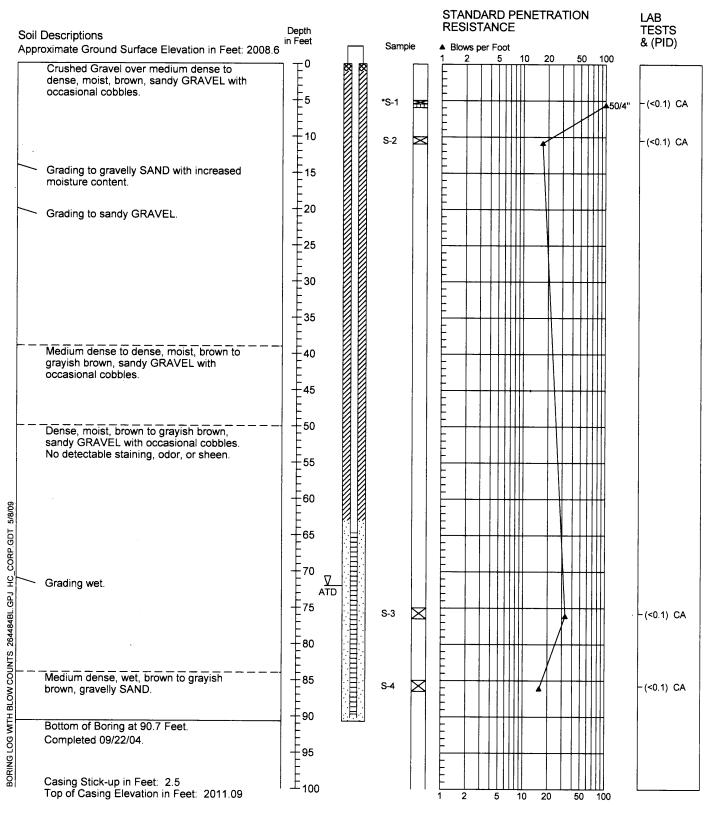
Estimated Percentage

Test Symbols

	•
NS	No Sheen
SS	Slight Sheen
MS	Moderate Sheen
HS	Heavy Sheen
TCD	Triaxial Consolidated Drained
QU	Unconfined Compression
DS	Direct Shear
к	Permeability
PP	Pocket Penetrometer Approximate Compressive Strength in TSF
τv	Torvane Approximate Shear Strength in TSF
CBR	California Bearing Ratio
MD	Moisture Density Relationship
AL	Atterberg Limits
	Water Content in Percent
	Liquid Limit Natural Plastic Limit
PID	Photoionization Detector Reading
CA	Chemical Analysis
DT	In Situ Density Test



Boring Log & Construction Data for Monitoring Well CM-MW-1S





- 2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
- Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

2644-84 Figure A-2

^{1.} Refer to Figure A-1 for explanation of descriptions and symbols.

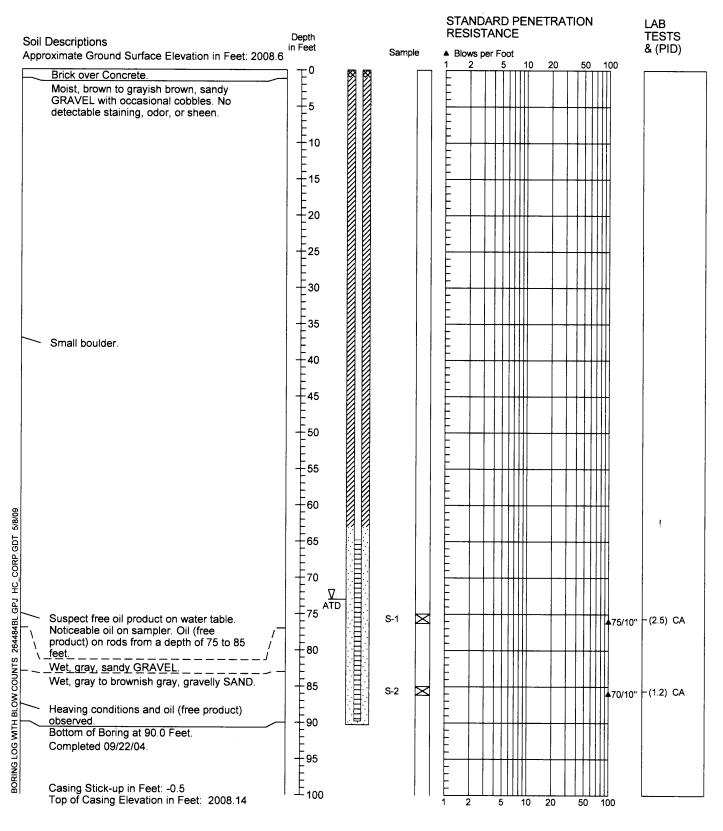
Boring Log & Construction Data for Monitoring Well CM-MW-2S

coil Deseriations	Depth		STANDARD PENETRATION RESISTANCE	LAB TESTS
oil Descriptions pproximate Ground Surface Elevation in Feet: 20	in Feet	Sample	▲ Blows per Foot	& (PID)
Brick over Concrete.	0			
Brown, sandy GRAVEL. No detectable	$+25+30+40+45+55+60$			
staining, odor, or sheen.	[5			
			<u>F</u>	
	[10			
	15			
	-20		$E \rightarrow + + + + + + + + + + + + + + + + + + $	
				·
Moist, brown, gravelly SAND.			E++++++++++++++++++++++++++++++++++	
			F	
Moist, brown and grayish brown, sandy			F	
GRAVEL.	-35			
			F	
	<u>+</u> 40			
	45			
			E	
	-50			
			E	
 Zones of gravelly SAND. 	- 55			
			E	
	-60			
			E	
			E	
	+ 70 目			
 Oil-like odor detected. 		III	E	- (1.6)
Dense to very dense, wet, brownish gray,	+75 目:	S-1 🗙		-(2.1) CA
sandy GRAVEL with visible product and odor.				
	+ 80 目			
			E	
		S-2 🗙		- (0.75) CA
			E	
Bottom of Boring at 90.9 Feet.	90 [注月:]			
Completed 09/23/04.	E		E	
	95			
Casing Stick-up in Feet: -0.5	I E		$E \mid $	
Top of Casing Elevation in Feet: 2008.24	「上 ₁₀₀	1.1	1 2 5 10 20 50 100	L



- 1. Refer to Figure A-1 for explanation of descriptions and symbols.
- 2. Soil descriptions and stratum lines are interpretive and actual changes
- Boold and a statistic marked and actual changes may be gradual.
 Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

Boring Log & Construction Data for Monitoring Well CM-MW-3S





1. Refer to Figure A-1 for explanation of descriptions and symbols.

 Soil descriptions and stratum lines are interpretive and actual changes may be gradual.

Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time. 2644-84 Figure A-4

Boring Log & Construction Data for Monitoring Well CM-MW-4S

	Depth		STANDARD PENETRATION RESISTANCE	LAB TESTS
Soil Descriptions	in Feet	Sample	Blows per Foot	& (PID)
Approximate Ground Surface Elevation in Feet: 200	0		1 2 5 10 20 50 100	
3-inch Wood Block Floor over 13 inches of Concrete.				
Moist, brown, slightly sandy to sandy				
GRAVEL. No detectable staining, odor, or sheen.				
Sheen.	<u>–</u> 10			
	<u>+</u> 15		F	
	F ₂₀			
	- - 25		$F \downarrow \downarrow$	
			E	
Moist, gray to brown, sandy to very sandy				
GRAVEL. No detectable staining, odor, or			E	
sheen.	-35		E	
	40			
			\mathbf{E}	
	45			
Dry to damp, brown GRAVEL with trace of sand and scattered cobbles.				
Sand and Scattered Cobbles.	-55		F	
Grading slightly sandy.			$F \rightarrow F \rightarrow$	
6018/4			E	
_	<u>–</u> 65 <u>–</u> 65			
			F = [+ [+ [+ [+ [+ [+ [+ [+ [+ [
			E	
		S-1 🛛		-(<0.1) CA
님 Very dense, wet, brown, sandy GRAVEL with cobbles. No detectable staining, odor, or sheen.			E / /	
		S-2 🛛	F	-(<0.1) CA
	<u></u> <u>−</u> 90		$F \rightarrow f \rightarrow $	
Bottom of Boring at 91.0 Feet. Completed 09/27/04.			E	
Completed 09/27/04.	- 95		╞╌╼┶╼┥┶┼┼┼╢╢	
	I E		E	
Casing Stick-up in Feet: -0.75 Top of Casing Elevation in Feet: 2007.96	丨上 ₁₀₀		<u>- </u>	

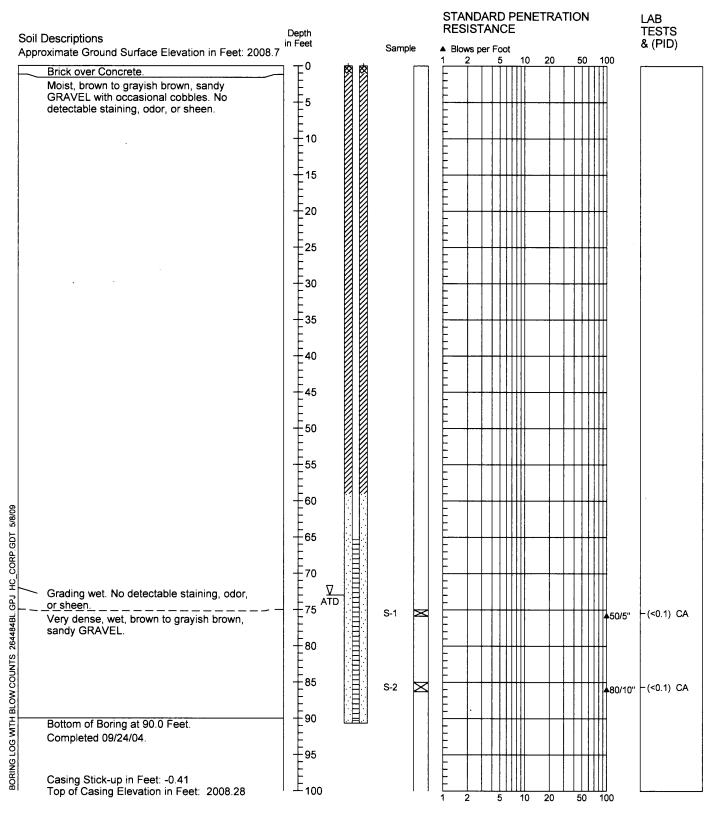


1. Refer to Figure A-1 for explanation of descriptions and symbols.

2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.

3. Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

Boring Log & Construction Data for Monitoring Well CM-MW-5S

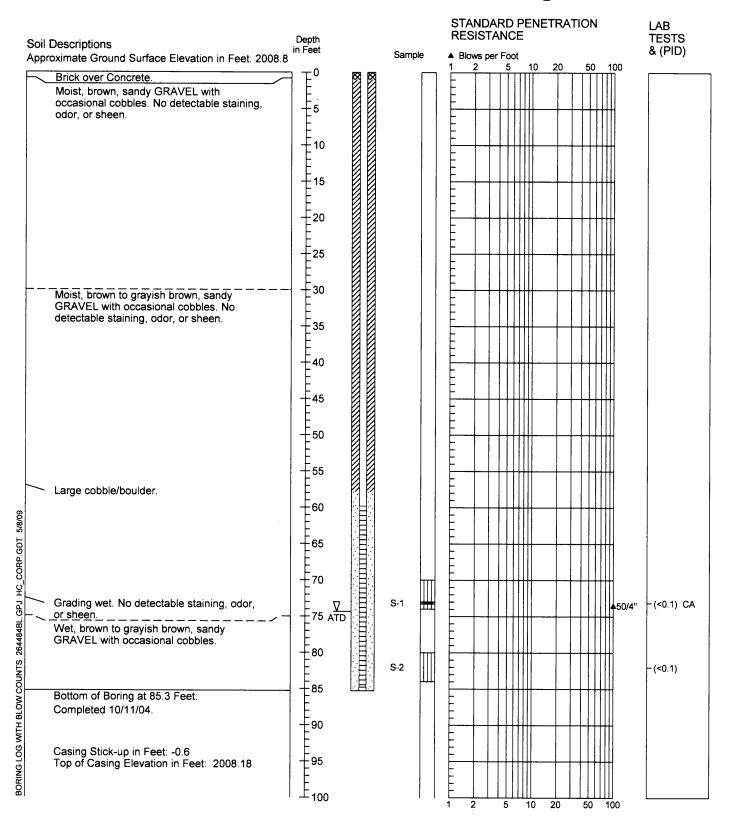




1. Refer to Figure A-1 for explanation of descriptions and symbols.

- Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
- Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

Boring Log & Construction Data for Monitoring Well CM-MW-6S





1. Refer to Figure A-1 for explanation of descriptions and symbols.

Soil descriptions and stratum lines are interpretive and actual changes may be gradual.

3. Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

Boring Log & Construction Data for Monitoring Well CM-MW-7S

	Depth		STANDARD PENETRATION RESISTANCE	LAB TESTS
Soil Descriptions	in Feet	Sample	 Blows per Foot 	& (PID)
Approximate Ground Surface Elevation in Feet: 2008.7	0 xa xa		1 2 5 10 20 50 100	
Concrete. Moist, brown to grayish brown, sandy				
GRAVEL. No detectable staining, odor, or sheen.	-0 8 8 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1			
	÷10			
(Very loose).	10			
Detectable odor to water table.	20	S-1		- (<0.1) CA
	-25			
	+30 E			
	-35			
Moist, brown to grayish brown, sandy	40			
GRAVEL with occasional cobbles.	45			
	+30 +35 +40 +45 +50	*S-2 🎹	E 50/4"	-(<0.1) CA
	55			
	E			
	-65 -70 -70 -75 ATD			
2	- 70 F ∇ E	S-3		-(<0.1) CA
Grading wet with detectable odor.				
GRAVEL.	- 80			
		S-4		- (<0.1)
Bottom of Boring at 85.5 Feet. Completed 10/12/04. Casing Stick-up in Feet: -0.7 Top of Casing Elevation in Feet: 2007.97	+85 LE			
Casing Stick-up in Feet: -0.7 Top of Casing Elevation in Feet: 2007.97	- 			
	L 100			
	100		1 2 5 10 20 50 100	



1. Refer to Figure A-1 for explanation of descriptions and symbols.

- 2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
- 3. Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

Boring Log & Construction Data for Monitoring Well CM-MW-8S

	Depth		STANDARD PENETRATION RESISTANCE	LAB TESTS
Soil Descriptions Approximate Ground Surface Elevation in Feet: 2011.2	in Feet	Sample	Blows per Foot	& (PID)
Imported Gravel Fill surface over Brick over PVC Conduit.				
Moist, brown to grayish brown, sandy GRAVEL with occasional cobbles. No detectable staining, odor, or sheen.	+0 +5 +10 +15 +20 +25 +30 +35 +40 +45 +55			
Moist, brown, sandy GRAVEL with	- 20	S-1	E	(<0.1) CA
occasional cobbles.	-25			
Moist, brown to grayish brown, sandy	30			
GRAVEL with occasional cobbles. No detectable staining, odor, or sheen.	-35			
	40			
	45			
	50	*S-2	E ▲50/4'	- (<0.1) CA
	55			
Brown, sandy GRAVEL. No detectable	-60 -65 -70	S-3		- (<0.1)
	- 75 - 80 - 55	S-4		
Brown, sandy GRAVEL. No detectable staining, odor, or sheen. Bottom of Boring at 85.0 Feet. Completed 10/13/04. Casing Stick-up in Feet: -0.6 Top of Casing Elevation in Feet: 2010.56	日 日 日 日 日 日 日 日 日 日 日 日 日 日 日 日 日 日 日			- (<0.1)
Casing Stick-up in Feet: -0.6 Top of Casing Elevation in Feet: 2010.56				
	上 ₁₀₀		1 2 5 10 20 50 100	



- Refer to Figure A-1 for explanation of descriptions and symbols.
 Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
- 3. Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

Boring Log/Construction Data for Monitoring Well FO-MW-1S

Soil Descriptions	Depth		STANDARD PENETRATION RESISTANCE	LAB TESTS
Approximate Ground Surface Elevation in Feet: 2007.9	in Feet	Sample	▲ Blows per Foot	& (PID)
Dry to moist, dark brown FILL soil.	+0 +5 +10			
Moist, brown to grayish brown, sandy GRAVEL with open work zones and scattered cobbles.	-10 -15	S-1		-(4.1) CA
Rapid penetration.	-20	S-2	50/5 ¹	- (13.4) CA
Circulation loss indicates open work Gravel with scattered cobbles.	$\begin{array}{c} 0 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\$	*S-3	▲50/6	- (2.8) CA
	40	S-4	- - - - - - - - - - - - - - - - - - -	' – (6.8) CA
Moist, brown, sandy GRAVEL.	- 	*S-5	▲50/3	' - (1.2) CA
Increased cuttings return.	- 60 - 65	S-6	▲50/3	- (1.0) CA
Increasing moisture with depth.	-70	*S-7	– – – – – – – – – – – – – – – – – – – –	- (4.5) CA
Wet, gray to dark gray, slightly sandy to sandy GRAVEL. Very strong petroleum-like odor.	- 75 ATD	S-8		- (5.6) CA
Visible product sheen with odor. Bottom of Boring at 90.9 Feet. Completed 02/22/06. Casing Stick-up in Feet: 2.9	- 75 ATD - 80 - 85 - 90	s-9 🗮	50/5	' - (3.7) CA
Completed 02/22/06. Casing Stick-up in Feet: 2.9 Top of Casing Elevation in Feet: 2009.39	- 95 - 100			



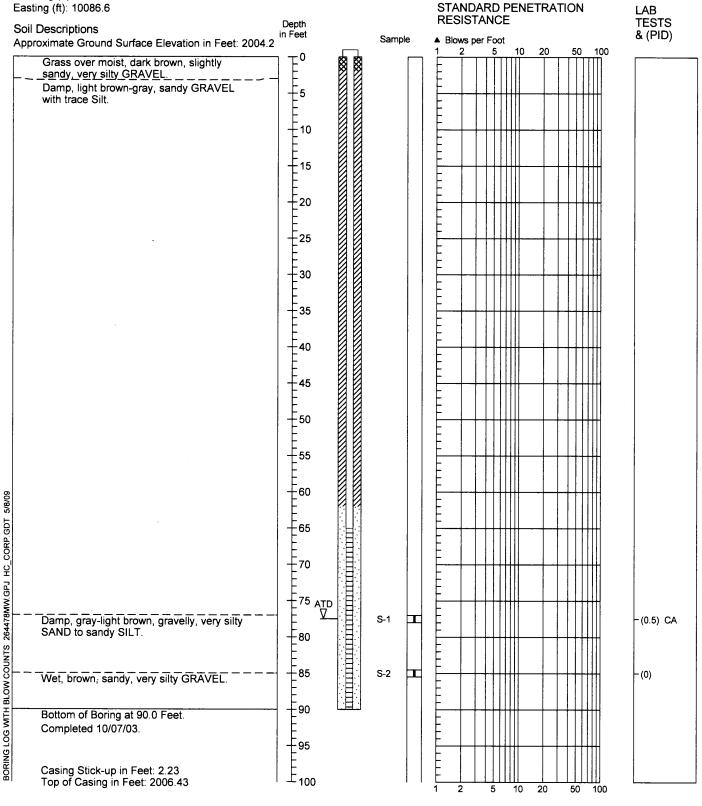
Refer to Figure A-1 for explanation of descriptions and symbols.
 Soil descriptions and stratum lines are interpretive and actual changes

may be gradual.

^{3.} Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

Monitoring Well Log HL-MW-12S

Northing (ft): 11199.4 Easting (ft): 10086.6





1. Refer to Figure A-1 for explanation of descriptions and symbols.

2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.

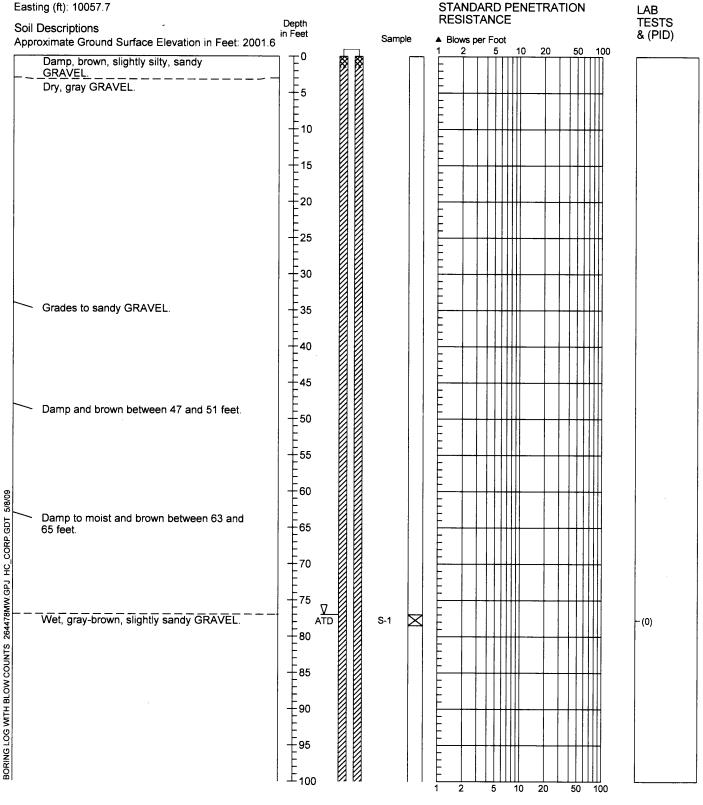
3. Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time

Figure A-11

^{10/03}

Monitoring Well Log HL-MW-13DD

Northing (ft): 11082.8 Easting (ft): 10057.7





 <sup>2644-78
 9/03</sup> Figure A-12
 1/2

1. Refer to Figure A-1 for explanation of descriptions and symbols.

- 2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
- 3. Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

Monitoring Well Log HL-MW-13DD

Northing (ft): 11082.8 Easting (ft): 10057.7

Easting (ft): 10057.7 Soil Descriptions	Depth		STANDARD PENETRATION RESISTANCE	LAB TESTS
Approximate Ground Surface Elevation in Feet: 200	in Feet 1.6	Sample	▲ Blows per Foot	& (PID)
Wet, gray-brown, slightly sandy GRAVEL. Grades to brown, non-silty to slightly silty, sandy GRAVEL and gravelly SAND. Bottom of Boring at 150.5 Feet. Completed 09/28/03. Casing Stick-up in Feet: 2.51 Top of Casing in Feet: 2004.11	$ \begin{array}{c} 100 \\ 1105 \\ 110 \\ 1115 \\ 1120 \\ 1125 \\ 1130 \\ 1135 \\ 1140 \\ 145 \\ 1150 \\ 1155 \\ 1160 \\ 1155 \\ 1160 \\ 1155 \\ 1160 \\ 1155 \\ 1160 \\ 1155 \\ 1160 \\ 1155 \\ 1160 \\ 1155 \\ 1160 \\ 1155 \\ 1190 \\ 1195 \\ 200 \\ 200 \\ $	5-2		-(0)



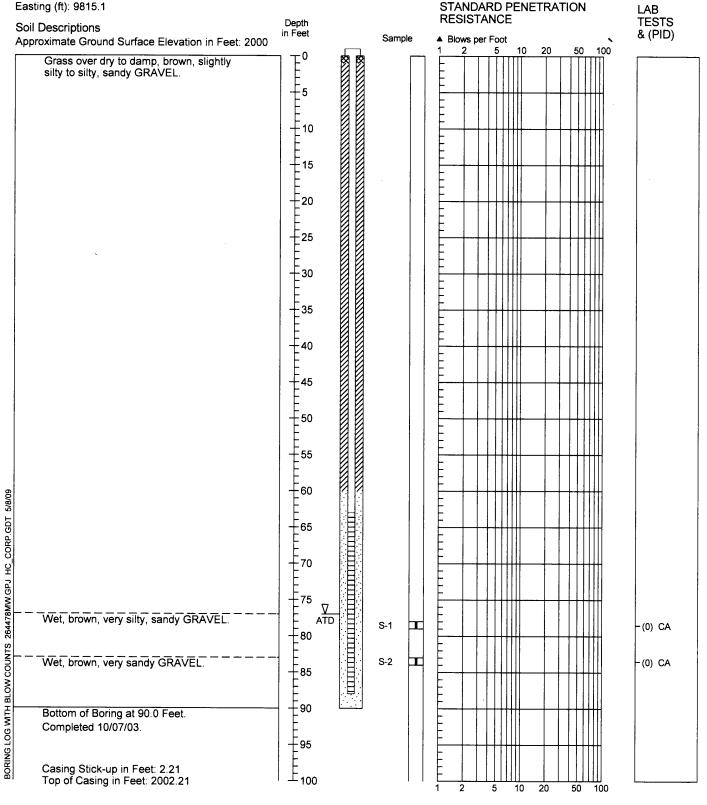
2/2

Figure A-12

- Refer to Figure A-1 for explanation of descriptions and symbols.
 Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
- Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

Monitoring Well Log HL-MW-14S

Northing (ft): 10868.4 Easting (ft): 9815.1





1. Refer to Figure A-1 for explanation of descriptions and symbols.

 Soil descriptions and stratum lines are interpretive and actual changes may be gradual.

 Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time. 2644-78 Figure A-13

Monitoring Well Log HL-MW-15DD

Northing (ft): 10990 Easting (ft): 10307.5

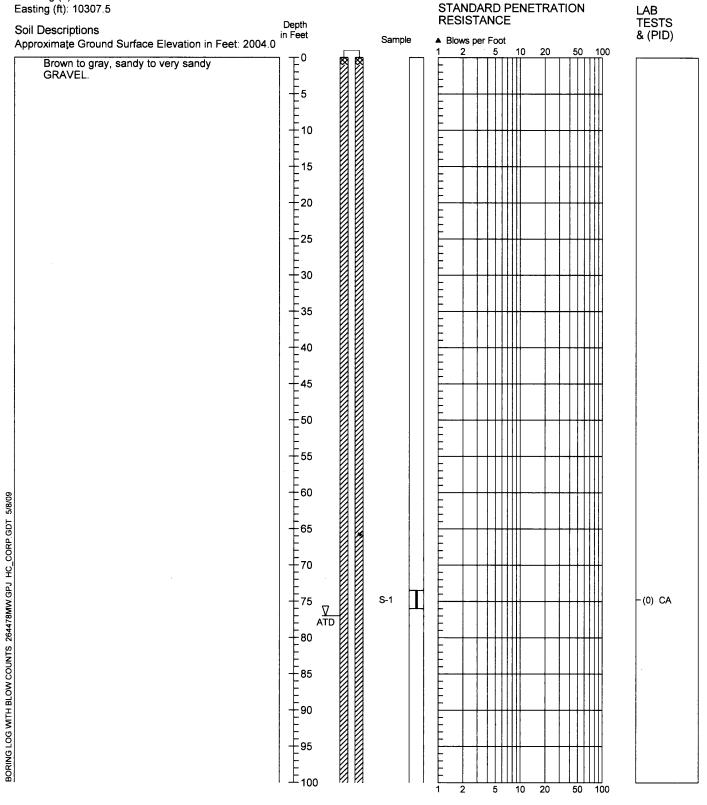




Figure A-14

1. Refer to Figure A-1 for explanation of descriptions and symbols.

- 2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
- 3. Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

1/2

Monitoring Well Log HL-MW-15DD

Northing (ft): 10990 Easting (ft): 10307.5

Northing (ft): 10990 Easting (ft): 10307.5 Soil Descriptions	Depth in Feet	Querrala	STANDARD PENETRATION RESISTANCE	LAB TESTS & (PID)
Approximate Ground Surface Elevation in Feet: 2004.0 Brown to gray, sandy to very sandy GRAVEL.	-100 -105 -110 -1110 -1110 -1120 -125 -130 -135	Sample	Blows per Foot 2 5 10 20 50 100	
Wet, brown to gray, very silty, non-sandy to sandy GRAVEL.	+125 +130 +135			
Wet, brownish gray SAND with scattered Gravel.	- 140 - 145 - 150	S-2 I		- (0)
Bottom of Boring at 151.0 Feet. Completed 10/03/03.	- 155			
Casing Stick-up in Feet: 2.1 Top of Casing in Feet: 2006.10	- 160 - 165 - 170 - 175 - 180 - 185 - 190 - 195 - 200			



.

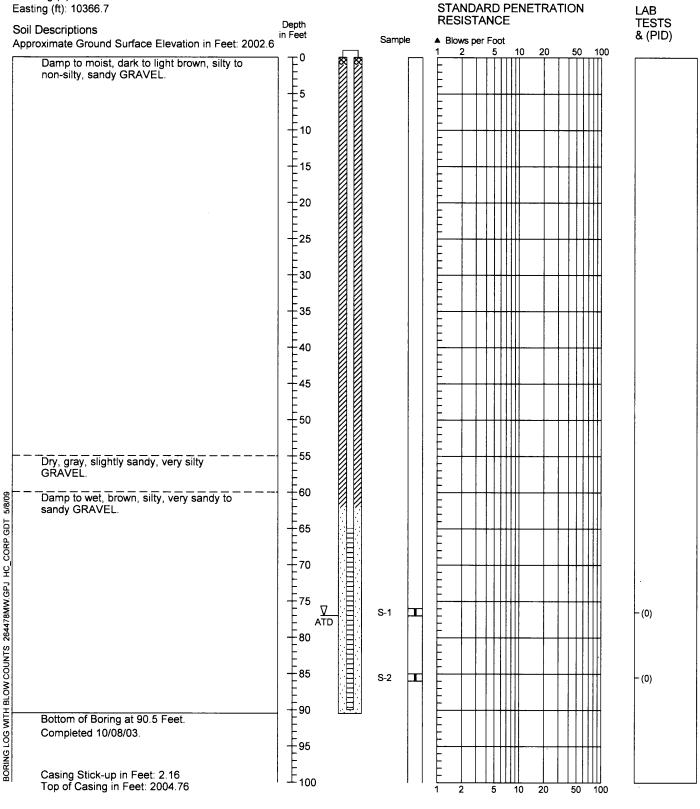
Refer to Figure A-1 for explanation of descriptions and symbols.
 Soil descriptions and stratum lines are interpretive and actual changes

- Boo descriptions and addition integration and prevention actual change may be gradual.
 Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

CORP.GDT 5/8/09 264478MW.GPJ HC BORING LOG WITH BLOW COUNTS

Monitoring Well Log HL-MW-16S

Northing (ft): 10800.7 Easting (ft): 10366.7





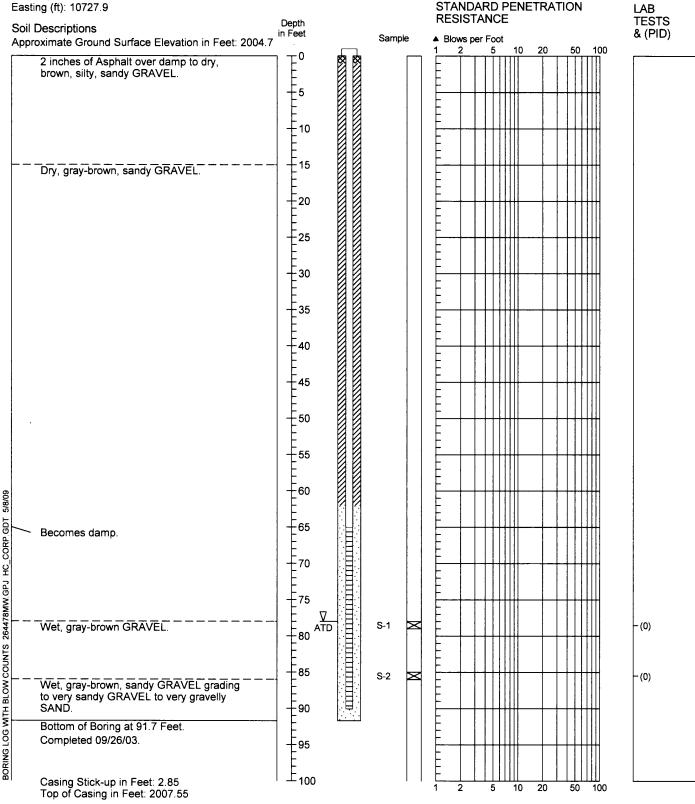
1. Refer to Figure A-1 for explanation of descriptions and symbols.

- 2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
- 3. Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

Figure A-15

Monitoring Well Log HL-MW-17S

Northing (ft): 11084.4 Easting (ft): 10727.9



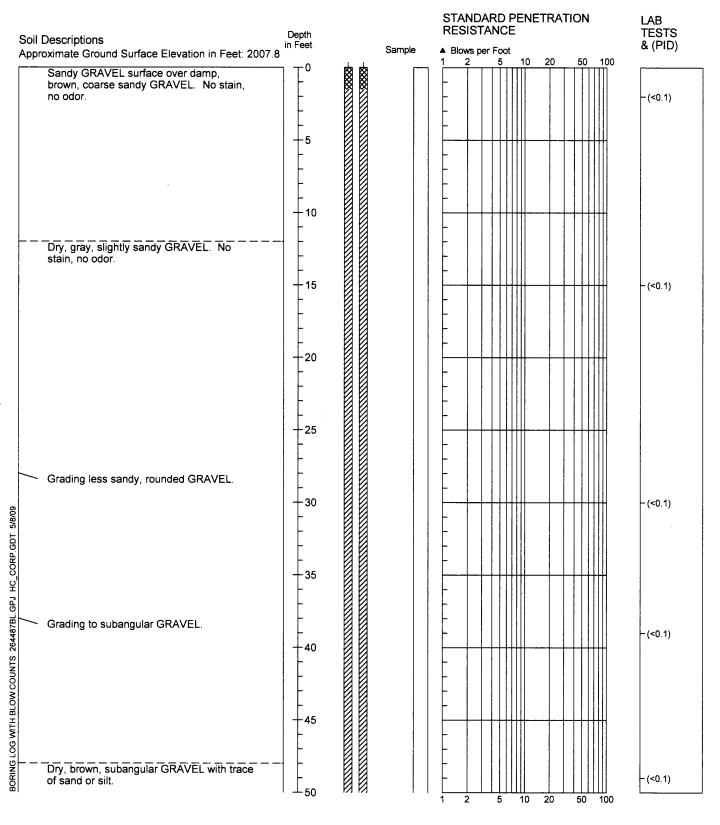


1. Refer to Figure A-1 for explanation of descriptions and symbols.

- 2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
- Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

2644-78 Figure A-16

Boring Log/Construction Data for Monitoring Well HL-MW-18S

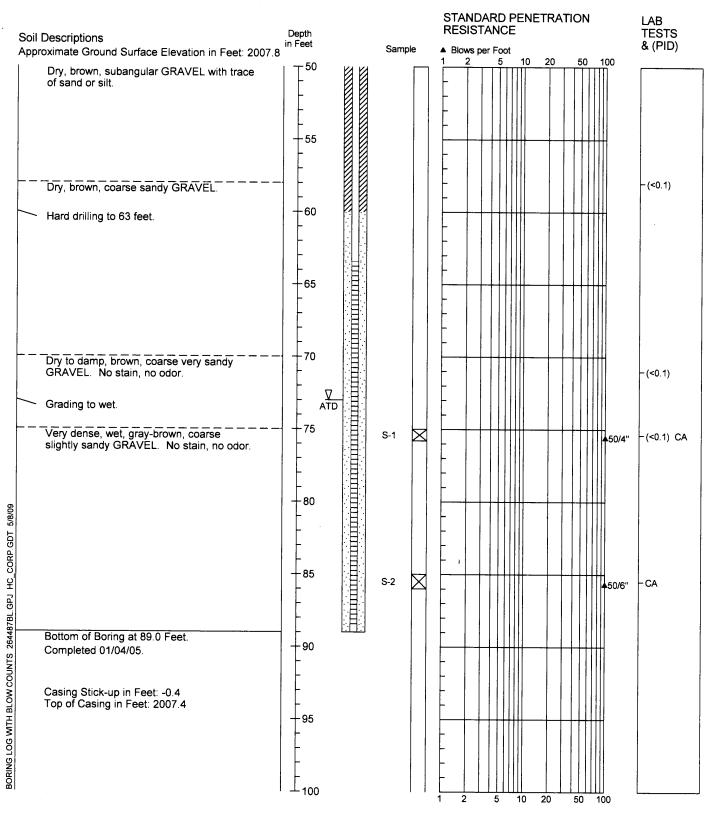




1. Refer to Figure A-1 for explanation of descriptions and symbols.

- Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
- Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

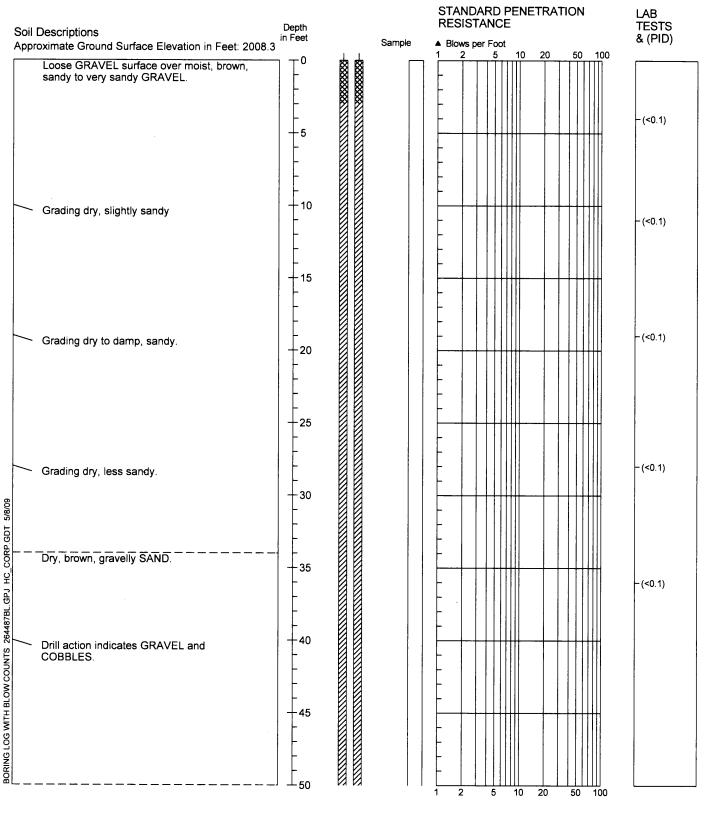
Boring Log/Construction Data for Monitoring Well HL-MW-18S





- 1. Refer to Figure A-1 for explanation of descriptions and symbols.
- Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
- Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

Boring Log/Construction Data for Monitoring Well HL-MW-19S

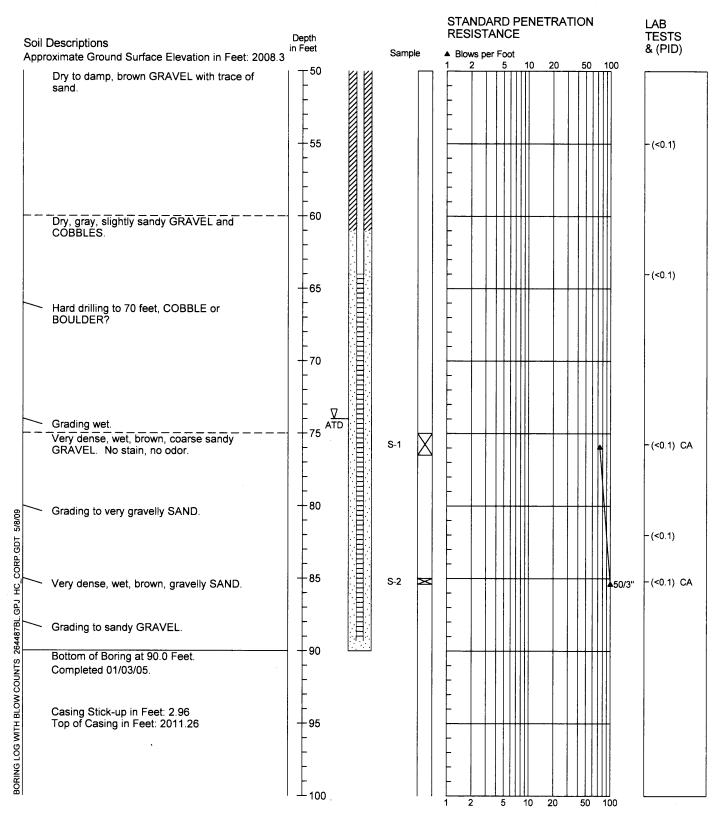




1. Refer to Figure A-1 for explanation of descriptions and symbols.

- 2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
- Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

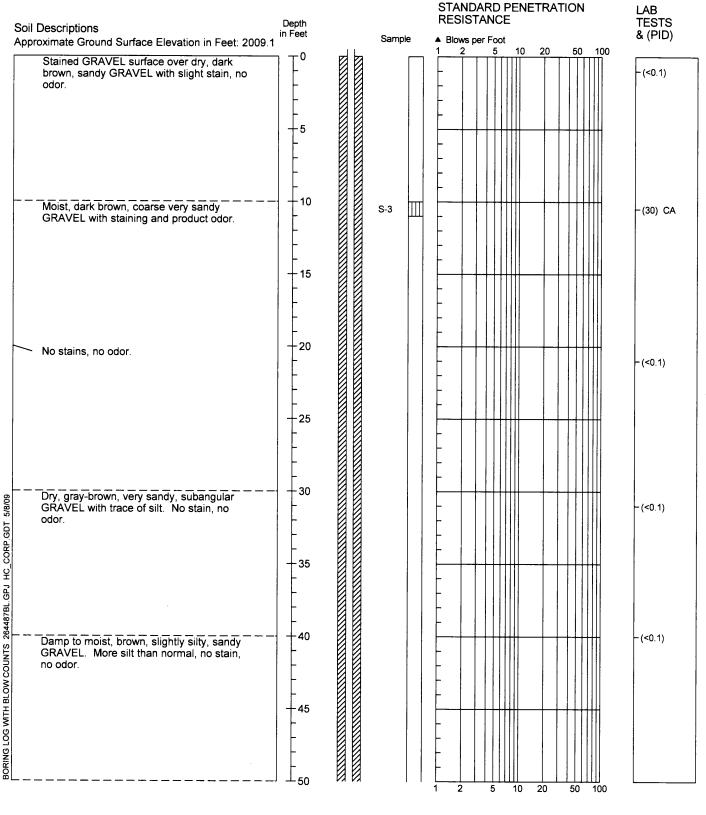
Boring Log/Construction Data for Monitoring Well HL-MW-19S





- 1. Refer to Figure A-1 for explanation of descriptions and symbols.
- Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
- Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

Boring Log/Construction Data for Monitoring Well HL-MW-20S



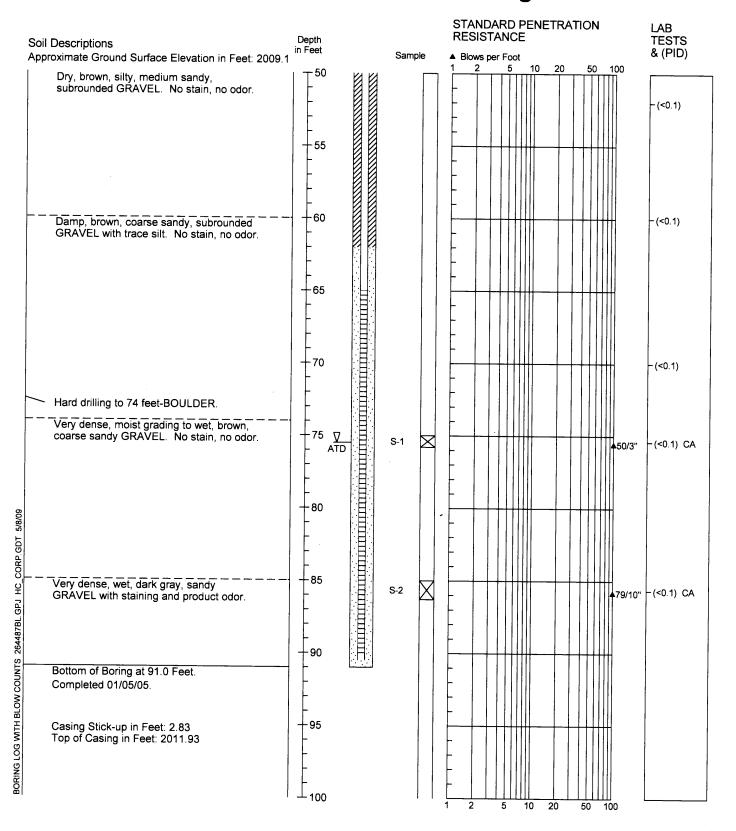


1. Refer to Figure A-1 for explanation of descriptions and symbols.

Soil descriptions and stratum lines are interpretive and actual changes may be gradual.

 Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

Boring Log/Construction Data for Monitoring Well HL-MW-20S





2644-87

Refer to Figure A-1 for explanation of descriptions and symbols.
 Soil descriptions and stratum lines are interpretive and actual changes

may be gradual.3. Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

 2644-87
 1/05

 Figure A-19
 2/2

Boring Log/Construction Data for Monitoring Well HL-MW-21S

	Depth		STANDARD PENETRATION RESISTANCE	LAB TESTS
oil Descriptions pproximate Ground Surface Elevation in Feet: 2007.	in Feet 7	Sample	▲ Blows per Foot	& (PID)
(Loose), moist, brownish gray, slightly sandy GRAVEL/COBBLE.		S-1		- (<0.1) CA
(Loose), moist, brownish gray, slightly sandy GRAVEL with scattered Cobbles.		S-2		-(0.4) CA
(Medium dense), moist, brownish gray, sandy GRAVEL.	-1 - 10 -1 - 10 -1 - 10 -1 - 15 -1 - 20 -1 - 25 -1 - 25 -1 - 25 -1 - 25 -1 - 30 -1 - 35 -1 - 35	*5-3	- - - - - - -	" -(0.1) CA
Grading to brown.				



Refer to Figure A-1 for explanation of descriptions and symbols.
 Soil descriptions and stratum lines are interpretive and actual changes

Bool descriptions and addition mines are interpretive and actual change may be gradual.
 Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

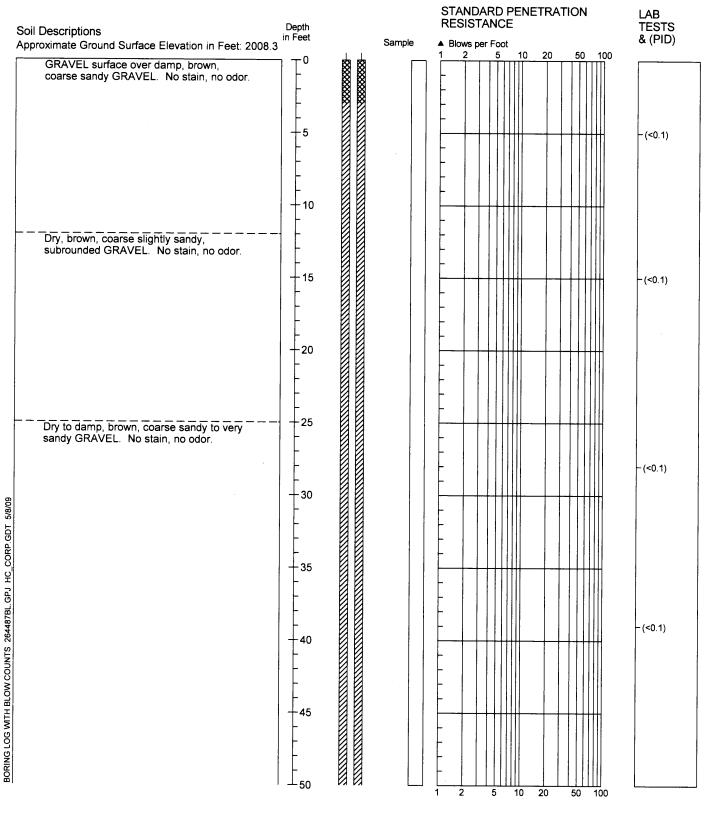
Boring Log/Construction Data for Monitoring Well HL-MW-21S

Soil Descriptions	Depth		STANDARD PENETRATION RESISTANCE	LAB TESTS
Approximate Ground Surface Elevation in Feet: 2007.7	in Feet	Sample	▲ Blows per Foot	& (PID)
(Medium dense), moist, brown, sandy GRAVEL with possible scattered Cobbles.		*5-4	1 2 5 10 20 50 100 	
COBBLE/BOULDER.	55 			
Cuttings indicate increased moisture content.				
(Very dense), wet, gray, sandy GRAVEL.		s-5 🗙	 	(<0.1) CA
(Very dense), wet, brownish gray, sandy GRAVEL.	+75 - - - - - - - - - - - - - - - - - - -	*\$6	- - - -	(<0.1) CA
Bottom of Boring at 81.0 Feet. Completed 01/28/05.				
Casing Stick-up in Feet: 3.49 Top of Casing in Feet: 2011.19	- 85 90 90 			



- Refer to Figure A-1 for explanation of descriptions and symbols.
 Soil descriptions and stratum lines are interpretive and actual changes
- Boond designed and a strattern mines are interpretive and actual change may be gradual.
 Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

Boring Log/Construction Data for Monitoring Well HL-MW-22S



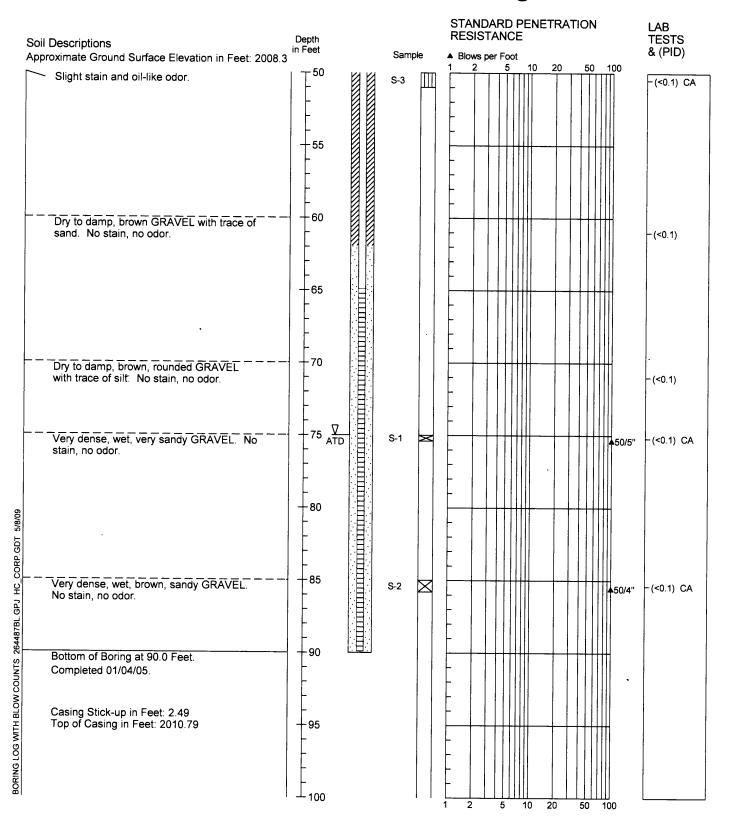


1/2

Figure A-21

- Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
- 3. Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

Boring Log/Construction Data for Monitoring Well HL-MW-22S





2644-87 Figure A-21

- 2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
- Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

1/05 2/2

^{1.} Refer to Figure A-1 for explanation of descriptions and symbols.

Boring Log/Construction Data for Monitoring Well HL-MW-23S

	Depth		STANDARD PENETRATION RESISTANCE	LAB TESTS
oil Descriptions	in Feet	Sample	 Blows per Foot 	& (PID)
oproximate Ground Surface Elevation in Feet: 2004		Campio	1 2 5 10 20 50 100	
Moist, dark brown, slightly silty, sandy GRAVEL (Recent FILL).				
	+5			
	10	S-1 🗙		-(0.4) CA
Moist, brownish gray to grayish brown,				
sandy GRAVEL with scattered open work Gravel zones.	20	S-2	= 5 0/4"	-(0.4) CA
 Circulation loss, open work zones. 	-25			
· · ·		S-3		- (0.6) CA
	-100 + 150 + 100			
	40	S-4		- (0.9) CA
	-45	34		- (0.9) CA
Moist, grayish brown to brownish gray, sandy GRAVEL.	- + 50	*S-5 😾	_	-(0.4) CA
 Increased cuttings return. 	+55			
	60	S-6 🔀	<u>−</u> − −	- (0.8) CA
	-65			
		S-7 🔀	- 	-(0.3) CA
 Grading wet. 		•		
 Heaving conditions. 	80	S-8		-(0.2) CA
 Heaving conditions, no drive sample 		s-9		-CA
attempt. Bottom of Boring at 94.0 Feet.	<u>+</u> 95			
Completed 02/13/06.				

Top of Casing Elevation in Feet: 2006.82

1. Refer to Figure A-1 for explanation of descriptions and symbols.

Soil descriptions and stratum lines are interpretive and actual changes may be gradual.

3. Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.



Boring Log/Construction Data for Monitoring Well HL-MW-24DD

	Deeth		STANDARD PENETRATION RESISTANCE	LAB TESTS
Soil Descriptions	Depth in Feet	Sample	▲ Blows per Foot	& (PID)
Approximate Ground Surface Elevation in Feet: 2003.3		Sample	1 2 5 10 20 50 100	
SOD over dark brown, slightly silty, sandy GRAVEL over moist, grayish brown, slightly silty, sandy GRAVEL with slightly sandy, open work Gravel zones. Circulation loss, open work zones.				
		S-1 🛣	− − − − − − − − − −	-(0.7) CA
	-20	S-2	52/2"	-(0.7) CA
	+25 +30	s-3		-(<0.1) CA
Moist, brownish gray, sandy GRAVEL.		S-4	50/4"	-(0.7) CA
	+45 +50	*S-5	− − − − −	-(0.2) CA
60/LLG	+ 5 + 10 + 15 + 20 + 25 + 30 + 40 + 45 + 50 + 55 + 60 + 65	*S-6 III	50/0"	-(0.4) CA
Grading wet. Wet, gray to grayish brown, slightly sandy to sandy GRAVEL.	- 70 <u>↓</u> ATD	s-7		-(1.3) CA
UN IS 204489-1-0	+80	*S-8	50/2"	-(1.3) CA
Heaving conditions with increased Sand content. Wet, grayish brown, well-graded, very sandy GRAVEL.	+80 +85 +90 +95	s-9		- (0.7) CA
	+95 			



Refer to Figure A-1 for explanation of descriptions and symbols.
 Soil descriptions and stratum lines are interpretive and actual changes

Solidescriptions and stratum mes are interpretive and actual ordinger may be gradual.
 Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

Boring Log/Construction Data for Monitoring Well HL-MW-24DD

Approximate Ground Surface Elevation in Feet 2003.3 Sample Bowe per Fot Current Surface Wet, grayeh brown, weil-graded, very sandy GRAVEL 100 105 12 10 12 10 100	Soil Descriptions	Depth		STANDARD PENETRAT	FION	LAB TESTS
Wet: gravish brown, well-graded, very sandy GRAVEL. 100 2 5 0 20 50 00 Wet: gravish brown to brownish gray, well-graded, very sandy GRAVEL. 110 510 2 5 0 20 50 00 20 50 00 20 50 00 20 50 00 20 50 00 20 50 00 20 50 00 20 50 00 20 50 00 20 50 00 20 50 00 20 50 00 20 50 00 20 50 00 20 50 20 50 20 50 20 50 20		in Feet	Sample			& (PID)
Heaving conditions.		100			50 100	[]
Heaving conditions.	sandy GRAVEL.			E		
Heaving conditions.		+105				
Heaving conditions.				F		
Heaving conditions.		E110	S 10			
Heaving conditions.	Wet, gravish brown to brownish gray,		5-10 A		↓ 50/3"	(2.7)
Heaving conditions.	wen gladed, very sandy ero (vee.					
Heaving conditions.						
Heaving conditions.						
Heaving conditions.	Increased Sand content with depth.					
Heaving conditions.	Heaving conditions.					
Heaving conditions.		+125			-+++++++	
Heaving conditions.						
Heaving conditions.			S-11 🖂		74/8"	- (3.0)
Heaving conditions.				F		
Heaving conditions.		-135				
Heaving conditions.				E		
Heaving conditions.		140				
Bottom of Boring at 150.0 Feet. Completed 02/09/06. 150 150 Casing Stick-up in Feet: 2.81 Top of Casing Elevation in Feet: 2006.11 160 165 180 175 180 186 190 185 190 186 190 195 195	Wet, grayish brown, very sandy GRAVEL.			E		
Bottom of Boring at 150.0 Feet. Completed 02/09/06. 150 150 Casing Stick-up in Feet: 2.81 Top of Casing Elevation in Feet: 2006.11 160 165 180 175 180 186 190 195 190		- 145 E				
Bottom of Boring at 150.0 Feet. Completed 02/09/06. 150 150 Casing Stick-up in Feet: 2.81 Top of Casing Elevation in Feet: 2006.11 160 165 180 175 180 186 190 185 190 186 190 195 195						
Bottom of Borling at 150.0 Feet. 155 Casing Stick-up in Feet: 2.81 160 Top of Casing Elevation in Feet: 2006.11 165 170 175 180 185 180 185 190 195 190 195	to very gravelly SAND.		S-12			- GS
Casing Stick-up in Feet: 2.81 Top of Casing Elevation in Feet: 2006.11						
Casing Stick-up in Feet: 2.81 Top of Casing Elevation in Feet: 2006.11	Completed 02/09/06.	155				
Top of Casing Elevation in Feet: 2006.11 160 165 170 170 175 180 185 190 195 195 190						
	Casing Stick-up in Feet: 2.81	E F A B B				
	Top of Casing Elevation in Feet: 2006.11	160 E				
	6					
		+ ¹⁶⁵				
				EIIIII		
		+170				
		- 185				
		E		E		
		190				
		E		E		
		+ 195				
		L E200		E		
		200		1 2 5 10 20	50 100	

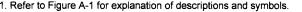


Refer to Figure A-1 for explanation of descriptions and symbols.
 Soil descriptions and stratum lines are interpretive and actual changes

- may be gradual. 3. Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

Boring Log/Construction Data for Monitoring Well HL-MW-25S

-il Deservictions	Depth		STANDARD PENETRATION RESISTANCE	LAB TESTS
bil Descriptions oproximate Ground Surface Elevation in Feet: 2004.7	in Feet	Sample	▲ Blows per Foot	& (PID)
4 inches of Asphalt over brown, sandy GRAVEL.	Ē			
Moist, brown to brownish gray, slightly silty, sandy GRAVEL with scattered open work Gravel zones.	-5 +5 +10 +15 +25 +30 +35 +40 +45 +55 +55 +60	S-1	E E E E E E E E € E E € € € € € € €	- (0.2) CA
	-20	•S-2	E	- CA
	-25	S-3	▲ 50/3"	-(<0.1) C/
Circulation loss, open work zone.	- 35 - 40	*S-4		- (0.5) CA
	+45	S-5	E E E E E E E E € E E E € E € E E E E E	-(0.4) CA
Moist, brownish gray to grayish brown, sandy GRAVEL.		*S-6	E E E E	- (0.4) CA
 > Grading wet. ─ Wet, grayish brown, sandy GRAVEL. 	-65 -70 ATD -11	*S-7		- (0.1) CA
	- 75 80 85 85 85	S-8		-(<0.1) C/
 Decreasing sand content. 	+85 90	S-9		- (0.8) CA
Bottom of Boring at 91.5 Feet. Completed 02/15/06.				
Casing Stick-up in Feet: -0.43 Top of Casing Elevation in Feet: 2004.27	L 上 ₁₀₀		L	L



 Refer to Figure A-1 for explanation of descriptions and symbols.
 Soil descriptions and stratum lines are interpretive and actual changes may be gradual.

3. Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

HARTCROWSER 2644-99 2/06 Figure A-24

Boring Log/Construction Data for Monitoring Well HL-MW-26S

	Depth		STANDARD PENETRATION RESISTANCE	LAB TESTS
Soil Descriptions Approximate Ground Surface Elevation in Feet: 2008.	in Feet	Sample	▲ Blows per Foot	& (PID)
			1 2 5 10 20 50 100	·
Moist, dark brown (to 5 feet) over brown (to 10 feet) over brownish gray, sandy	- $ -$		F	
GRAVEL.	F 5			
	IE II			
		htt		
	+10	S-1 🔀		- (0.1) CA
 Rapid penetration. 	-15			
	E Fao E		$ \begin{bmatrix} F & F \\ F & F \end{bmatrix} = \begin{bmatrix} F$	
		S-2 🐱	__ 50/6"	-(1.4) CA
	25			
Moist, brown, sandy to slightly sandy GRAVEL with open work zones.				
Circulation loss indicates open work	-30	*S-3 🔫		-CA
Gravel			_▲ 50/6"	
	Far BB			
	+35			
		htt		
	-40	S-4	E	-(1.3) CA
		H		
	45			
	F 88			
	+50	S-5 📈		-(2.6) CA
	IF ØØ		F	
Moist, brownish gray to grayish brown,	55			
sandy GRAVEL.				
Increased cuttings return.		*S-6 💻		- (1.3) CA
> !=====:=:=:::::::::::::::::::::::::::				
 Increasing moisture with depth. 	+ 65 ⊟			
		htte	F	
	70 <u>[]</u> []	S-7 😾	E	-(3.2) CA
	-65 -70 -70			
Wet, brownish gray, slightly sandy to sandy				
GRAVEL.				
		httl		
	+80 目	S-8 🔀		-(2.4) CA
			F	
			<u> </u>	
	二 90	S-9		-(2.8) CA
Bottom of Boring at 91.0 Feet.			F	
Completed 02/16/06.	Far		F	
	+95			
	F		F	
Casing Stick-up in Feet: -0.66	「上100			L
Casing Stick-up in Feet: -0.66 Top of Casing Elevation in Feet: 2007.64	<u>+</u> 100			



Refer to Figure A-1 for explanation of descriptions and symbols.
 Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
 Group descriptions in the strategies of the strategies

3. Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

Boring Log/Construction Data for Monitoring Well HL-MW-27D

Deil Deserintions	Depth		STANDARD PENETRATION RESISTANCE	LAB TESTS
Soil Descriptions Approximate Ground Surface Elevation in Feet: 2008.6	in Feet	Sample	▲ Blows per Foot	& (PID)
Moist, dark brown (to 10 feet) over brownish gray, sandy to slightly sandy GRAVEL.				
Rapid penetration.	-10 -15	S-1	 	- (0.9) CA
	-20	S-2	► 	-(0.9) CA
Moist, brownish gray, slightly sandy GRAVEL with open work zones. Circulation loss indicates open work	-25	S-3	 	-(3.8) CA
Gravel.	+ 35 + 40	S-4		-(1.0) CA
	-10 +5 +10 +15 +20 +25 +30 +40 +45 +45 +55 +60 +65 +70	S-5		-(0.8) CA
Moist, grayish brown, very sandy GRAVEL.	-60	*S-6	50/3"	-(1.0) CA
	-65 -70	*S-7	- 	~(0.9) CA
Increasing moisture and cobbles	-75 <u>∇</u> ATD -80	*S-8	50/0"	-(0.3) CA
	-75 ATD -80 -85 -90 -95 -95	S-9		- (0.4) CA
	+95 			



Refer to Figure A-1 for explanation of descriptions and symbols.
 Soil descriptions and stratum lines are interpretive and actual changes

- Soli descriptions and stratum lines are interpretive and actual chan may be gradual.
- 3. Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

Boring Log/Construction Data for Monitoring Well HL-MW-27D

STANDARD PENETRATION RESISTANCE	LAB TESTS
e ▲ Blows per Foot 1 2 5 10 20 50 10	& (PID)
	70/8" - (5.2)
	5 50/5" - (3.2)



- Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
- Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

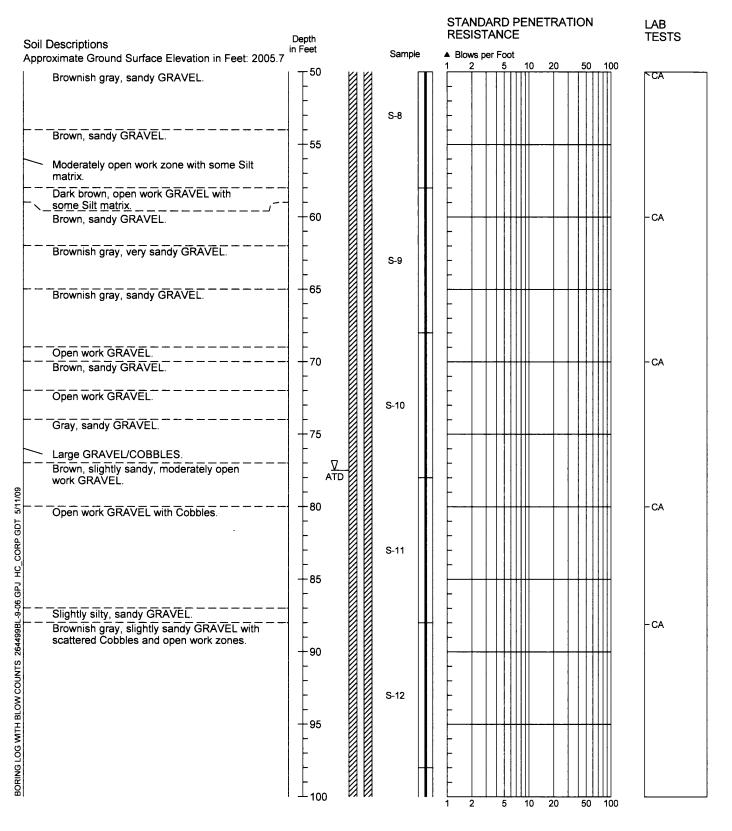
Boring Log/Construction Data for Monitoring Well HL-MW-28DD

	Depth		STANDARD PENETRATION RESISTANCE	LAB TESTS
Soil Descriptions Approximate Ground Surface Elevation in Feet: 2005.7	in Feet	Sample	Blows per Foot	
Brown to dark brown, sandy GRAVEL,		Π		
Brownish gray, sandy GRAVEL.		S-1		-CA
Brownish gray, sandy GRAVEL.		S-2		-CA
Large GRAVEL based on drill action.	5	3-2		-CA
Brown to dark brown, sandy GRAVEL. Brownish gray, slightly sandy GRAVEL with		S-3		
scattered slightly to moderately open work zones.				
				- CA
			-	
		S-4		
	-15			
			-	
	-20			-CA
Open work with Silt matrix.		S-5		
		5-5	$\begin{bmatrix} 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 $	
	-10 -1		}	
Sandy GRAVEL.				
Open work GRAVEL.				-CA
			<u>⊢</u>	
		S-6		
은 Large COBBLES based on drill action. 앞				
Sandy GRAVEL.	- +35			
ଞ୍ଚା ବ୍Brownish gray, sandy GRAVEL with				
scattered Cobbles.				
284	+40			-CA
8		S-7		
	45			
E □ g Slightly sandy GRAVEL				
Brownish gray, sandy GRAVEL with scattered Cobbles.	40 40 			
ž Brownish gray, sandy GRAVEL				
	I⊥ ₅₀ ⊠⊠	1 🛛		L

- 2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
- Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.
 Note: Boring by Sonic Rig.



Boring Log/Construction Data for Monitoring Well HL-MW-28DD





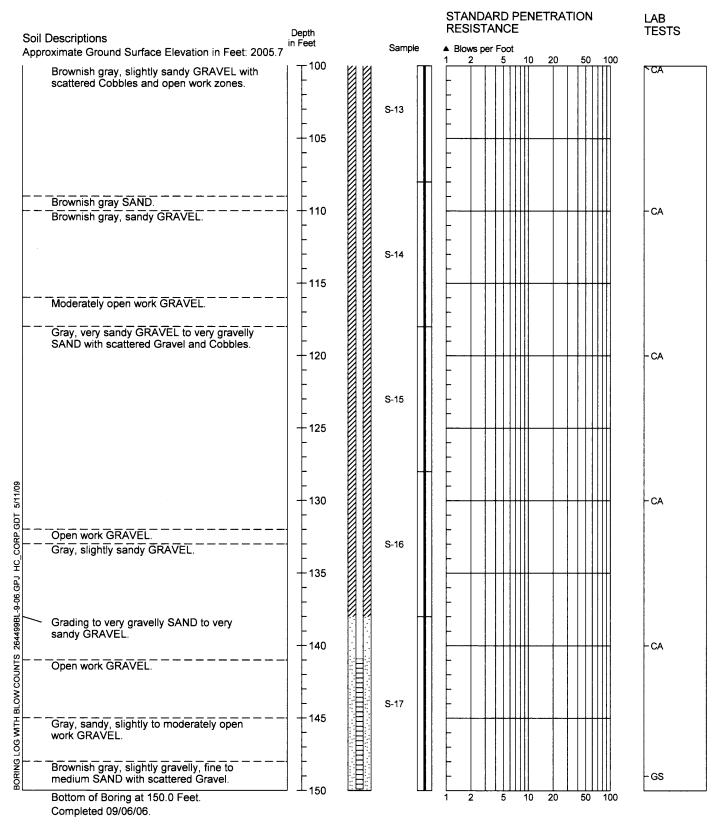
1. Refer to Figure A-1 for explanation of descriptions and symbols.

Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

4. Note: Boring by Sonic Rig.

Soil descriptions and stratum lines are interpretive and actual changes may be gradual.

Boring Log/Construction Data for Monitoring Well HL-MW-28DD



Casing Stick-up in Feet: 2.5

Top of Casing Elevation in Feet: 2008.22

1. Refer to Figure A-1 for explanation of descriptions and symbols.

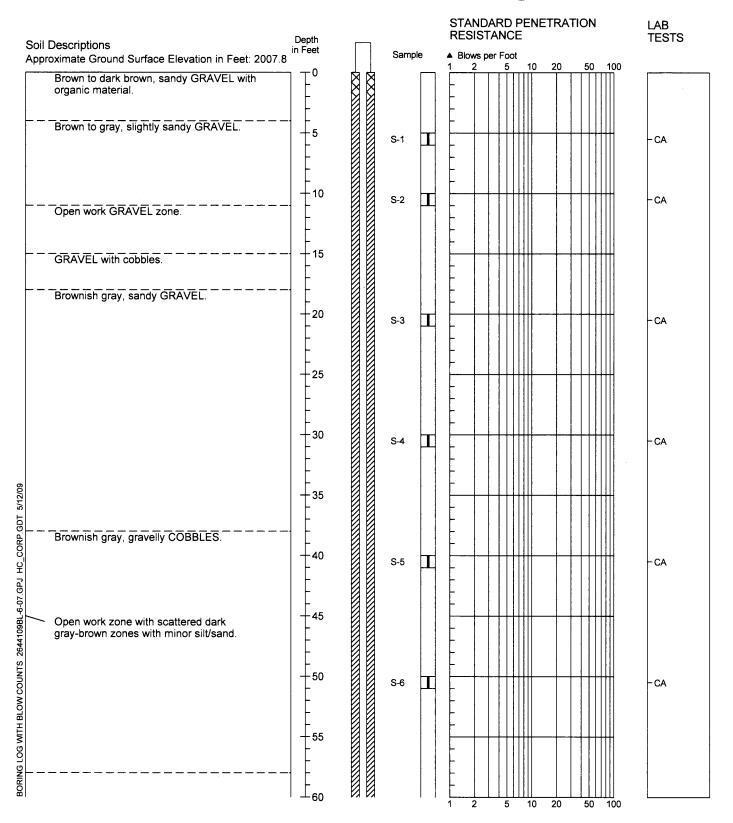
Soil descriptions and stratum lines are interpretive and actual changes may be gradual.

3. Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

4. Note: Boring by Sonic Rig.



Boring Log/Construction Data for Monitoring Well HL-MW-29S



1. Refer to Figure A-1 for explanation of descriptions and symbols.

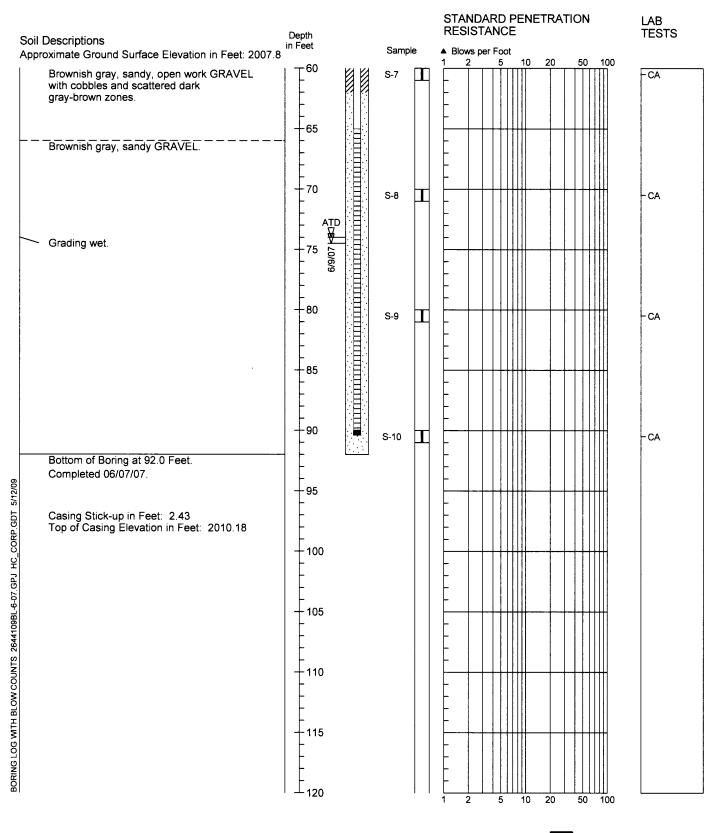
Soil descriptions and stratum lines are interpretive and actual changes may be gradual.

3. Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

 Note: Boring continuously cored by Sonic Rig with composite samples collected as indicated.



Boring Log/Construction Data for Monitoring Well HL-MW-29S





- Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
- Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.
- 4. Note: Boring continuously cored by Sonic Rig with composite samples collected as indicated.

Boring Log/Construction Data for Monitoring Well HL-MW-30S

oil Descriptions	Depth		STANDARD PENETRATION RESISTANCE	LAB TESTS
oil Descriptions pproximate Ground Surface Elevation in Feet: 2002.7	in Feet	Sample	▲ Blows per Foot	
Brown and gray, sandy GRAVEL with scattered concrete fragments and wire. (FILL)			1 2 5 10 20 50 100	
Dark gray, reworked organic material (Topsoil).		S-1 I		- CA
Brownish gray, sandy GRAVEL.	+ 10 - - -	S-2 I		- CA
	- +15 -	S-3 I		- CA
Grades to slightly sandy, open work GRAVEL with cobbles and some silt infilling.	-20	s-4 I		-CA
	-25	S-5 I		- CA
 Grades to brownish gray, gravelly COBBLES. 	+30			
Brownish gray, slightly sandy, open work GRAVEL with scattered cobbles and some silt infilling.	-5 -5 -100 -100			
	-40	s-6 I		-CA
Large cobble	-45			
Brownish gray, sandy GRAVEL with scattered dark brown zones.	+45 	s-7 T		-CA
Gray, slightly silty, sandy GRAVEL.	-55			

- 2. Soil descriptions and stratum lines are interpretive and actual changes
- as a second as a second and a stratter mines are time preview and actual change may be gradual.
 Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.
- 4. Note: Boring continuously cored by Sonic Rig with composite samples collected as indicated.



Boring Log/Construction Data for Monitoring Well HL-MW-30S

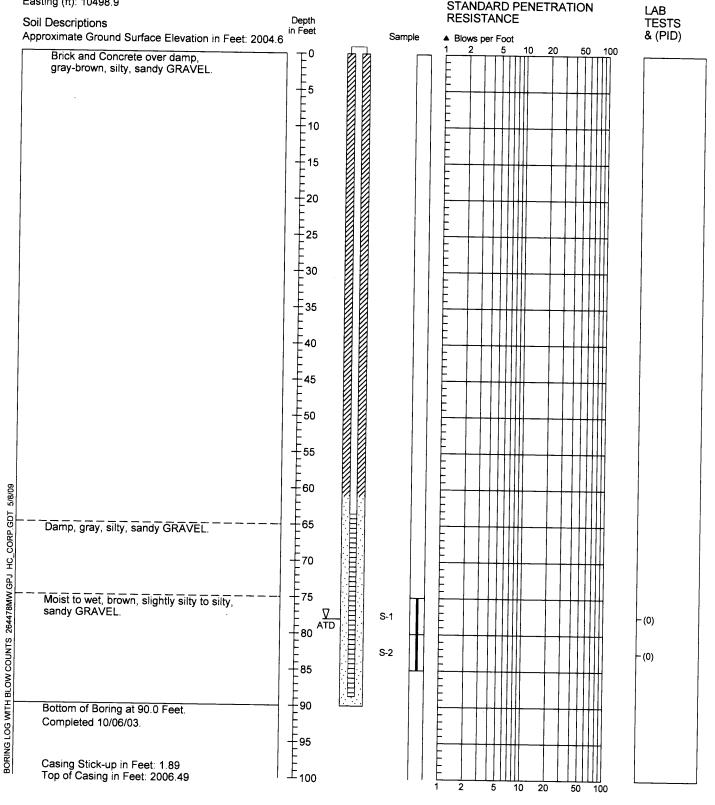
	Depth		STANDARD PENETRATION RESISTANCE	LAB TESTS
Soil Descriptions Approximate Ground Surface Elevation in Feet: 2002.7	in Feet	Sample	▲ Blows per Foot	
Gray, slightly silty, sandy GRAVEL.		S-8 II	1 2 5 10 20 50 100 	- CA
Brownish gray to gray, sandy GRAVEL with scattered cobbles and open work zones. Boulder from 67 to 70 feet Grading wet		5-9 T		-CA
		S-10 T		- CA
Open work zone with no sand matrix.				
Bottom of Boring at 90.0 Feet. Completed 06/08/07.				
Casing Stick-up in Feet: 2.3 Top of Casing Elevation in Feet: 2005	- 95 - 100 - 105 - 110 - 1110 - 1115 - 120			



- 2. Soil descriptions and stratum lines are interpretive and actual changes
- Son descriptions and strattern miles are interpretive and actual change may be gradual.
 Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.
- 4. Note: Boring continuously cored by Sonic Rig with composite samples collected as indicated.

Monitoring Well Log RM-MW-1S

Northing (ft): 11216 Easting (ft): 10498.9



HARTCROWSER 2644-78 10/03 Figure A-30

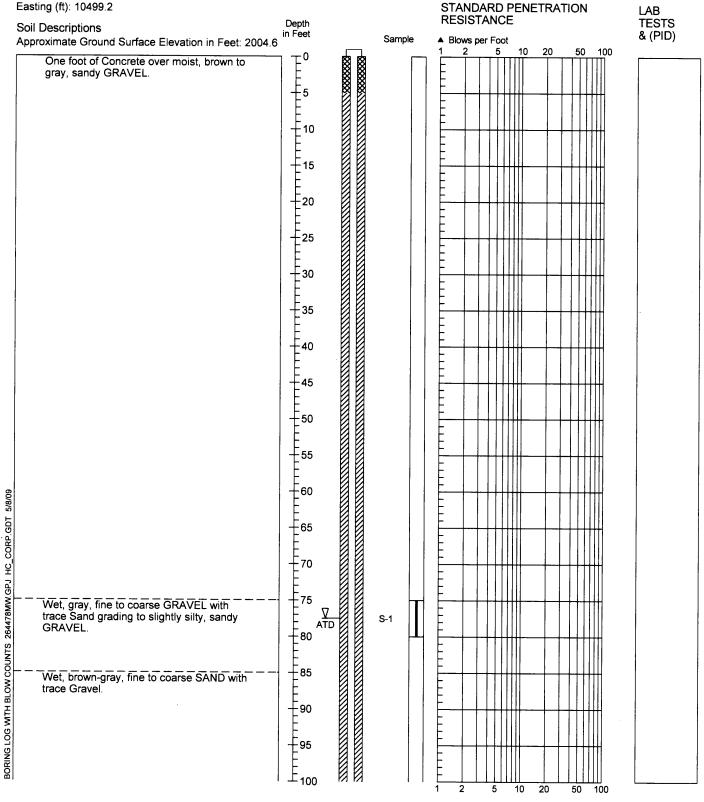
1. Refer to Figure A-1 for explanation of descriptions and symbols.

Soil descriptions and stratum lines are interpretive and actual changes may be gradual.

 Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

Monitoring Well Log RM-MW-2D

Northing (ft): 11228.8 Easting (ft): 10499.2





- 1. Refer to Figure A-1 for explanation of descriptions and symbols.
- 2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
- Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

Monitoring Well Log RM-MW-2D

Northing (ft): 11228.8 Easting (ft): 10499.2

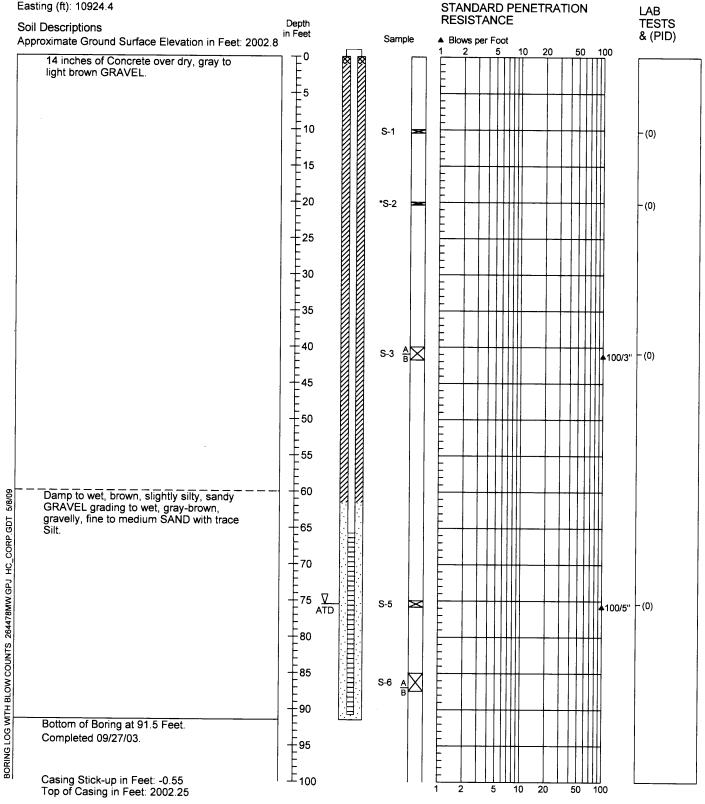
oll Descriptions	Depth	Sample	RESISTANCE	TESTS
proximate Ground Surface Elevation in Feet: 2004.6	in Feet		A Blows per Foot	& (PID)
Wet, brown-gray, fine to coarse SAND with trace Gravel. Wet, brown-gray, fine to coarse SAND with silty SAND lenses. Bottom of Boring at 155.0 Feet. Completed 10/04/03. Casing Stick-up in Feet: 1.91 Top of Casing in Feet: 2006.51	-100 -105 -110 -115 -120 -125 -130 -135 -140 -145 -155 -160 -165 -170 -175 -180 -195 -200	S-2		- (0)



- Refer to Figure A-1 for explanation of descriptions and symbols.
 Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
- Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

Monitoring Well Log RM-MW-3S

Northing (ft): 11301.7 Easting (ft): 10924.4





1. Refer to Figure A-1 for explanation of descriptions and symbols.

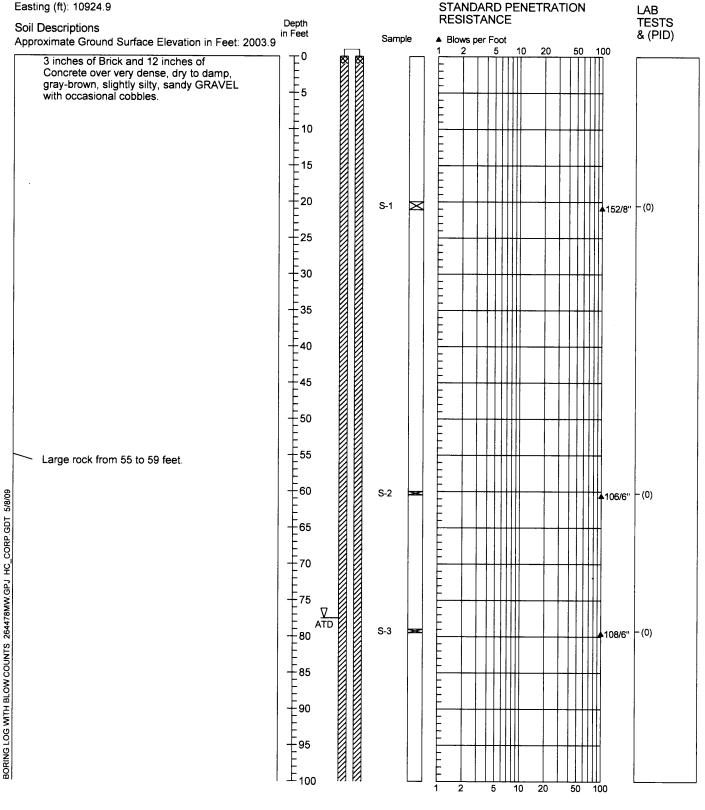
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.

3. Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

Figure A-32

Monitoring Well Log RM-MW-4D

Northing (ft): 11290.6 Easting (ft): 10924.9





^{2644-78 10/03} Figure A-33 1/2

- 2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
- 3. Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

Monitoring Well Log RM-MW-4D

Northing (ft): 11290.6 Easting (ft): 10924.9

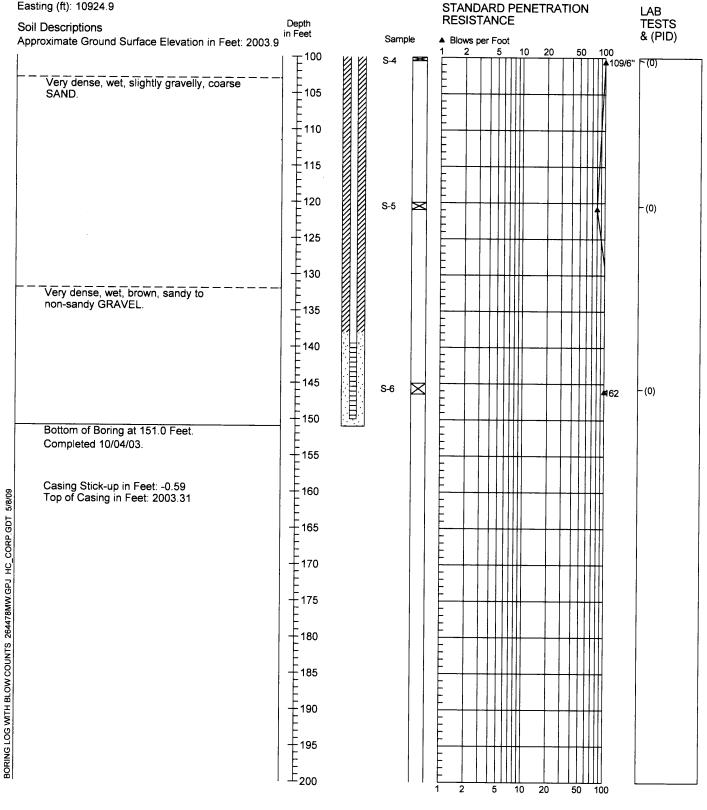
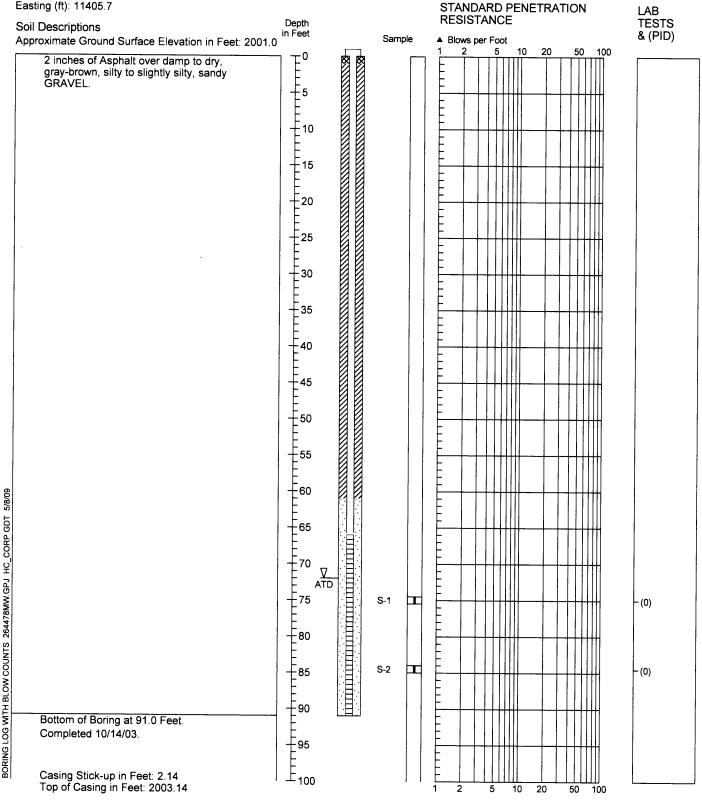


Figure A-33

- Refer to Figure A-1 for explanation of descriptions and symbols.
 Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
- 3. Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

Monitoring Well Log RM-MW-5S

Northing (ft): 11414.8 Easting (ft): 11405.7





1. Refer to Figure A-1 for explanation of descriptions and symbols.

2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.

 Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time. 2644-78 Figure A-34

Boring Log/Construction Data for Monitoring Well RM-MW-8S

-:- -		Depth			STANDARD PENETRATION RESISTANCE	LAB TESTS
	Descriptions iximate Ground Surface Elevation in Feet: 2005.4	in Feet	Sample	9	▲ Blows per Foot	& (PID)
	Concrete Floor Slab over medium dense to	<u>א הא</u> 0 רו				·
	very dense, moist, brown to brownish gray,	$ \begin{array}{c} -0 \\ -5 \\ -10 \\ $			$ \begin{bmatrix} -1 \\ -1 \\ -1 \\ -1 \\ -1 \\ -1 \\ -1 \\ -1$	
	slightly sandy to sandy GRAVEL.	F_			$F \mid I \mid $	
		+5	S-1	\boxtimes		- CA
		 10	6.0			(10.4) 0
			S-2	A.	F	-(<0.1) C/
-	Slight moisture increase.	-15	S-3	\mathbf{X}	-	(<0.1) C
	ů –					
		÷20	*S-4			- (0.1) CA
			3-4		50/5	
		+25	S-5			- (0.1) CA
					E	(0) 0
			* C C		-	(10.0) 0
			*S-6	ΠI	E 50/4	" - (<0.1) C
		-35	S-7	\mathbf{X}		- (<0.1) C
					$F = \{ \ \ \ \ \ \ \ \ \ \$	
-	Grading gray to brownish gray.	+40	S-8			" - (<0.1) C
		IF 88			$F = \{ I \in I \mid I \in I \mid I \in I \in I \}$	
		-45				
_	Grading dry, open works GRAVEL with	+50	S-9			" - (<0.1) C
	dusty air discharge. Possible cobbles.					
		-55				
-	Increasing moisture content.	+60	* S-10	Ξī.		" - (<0.1) C
	-					
		- 65 日				
	Very dense, wet, gray, sandy GRAVEL.	65 70 -				•
	,,, g,		*S-11			(-0.1) 0
			3-11	M	<u></u> 50/5	" - (<0.1) C,
				1		
		+75 -80 -85	0.45			/
			S-12	\mathbf{X}		"
	Bottom of Boring at 90.0 Feet.					
	Completed 03/01/05.	ΙE			E	
		E				
	Casing Stick-up in Feet: -0.4	I E			E	
		上100		i I		1

 Refer to Figure A-1 for explanation of descriptions and symbols.
 Soil descriptions and stratum lines are interpretive and actual changes may be gradual.

3. Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.



Boring Log/Construction Data for Monitoring Well RM-MW-9S

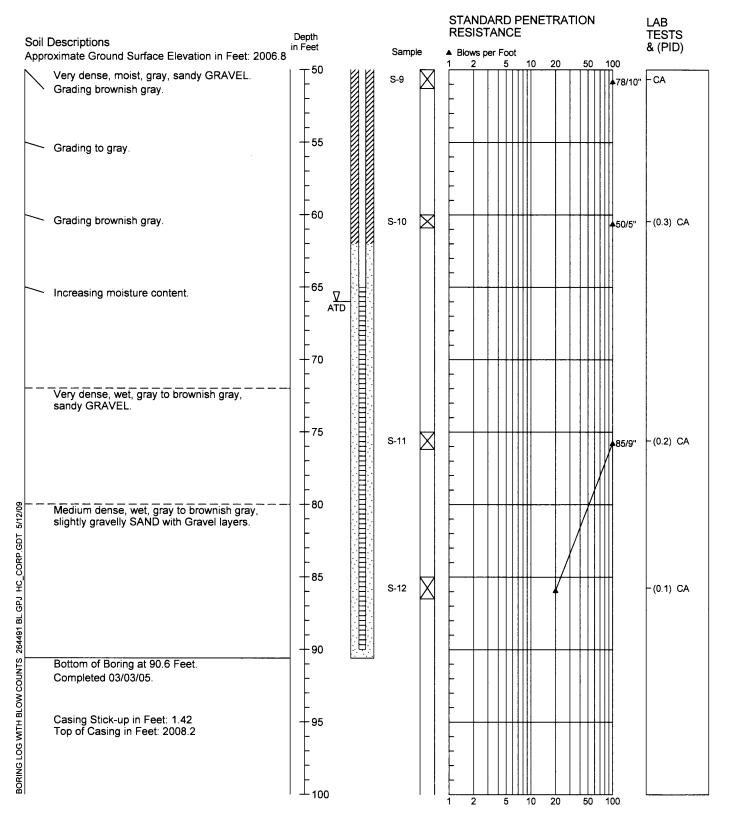
Sample •S-1 S-2 S-3	Blows per Foot 1 2 5 10 20 50 100 -	& (PID) - (1.0) CA - (0.5) CA
S-2		
		-(0.5) CA
s-3		
		-(0.3) CA
S-4		-(0.4) CA
S-5 🗙	- - - -	-(0.7) CA
S-6 🗙		- (0.5) CA
S-7 🗙	- - - -	-(0.2) CA
*S-8		- (0.2) CA



1. Refer to Figure A-1 for explanation of descriptions and symbols.

Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
 Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

Boring Log/Construction Data for Monitoring Well RM-MW-9S



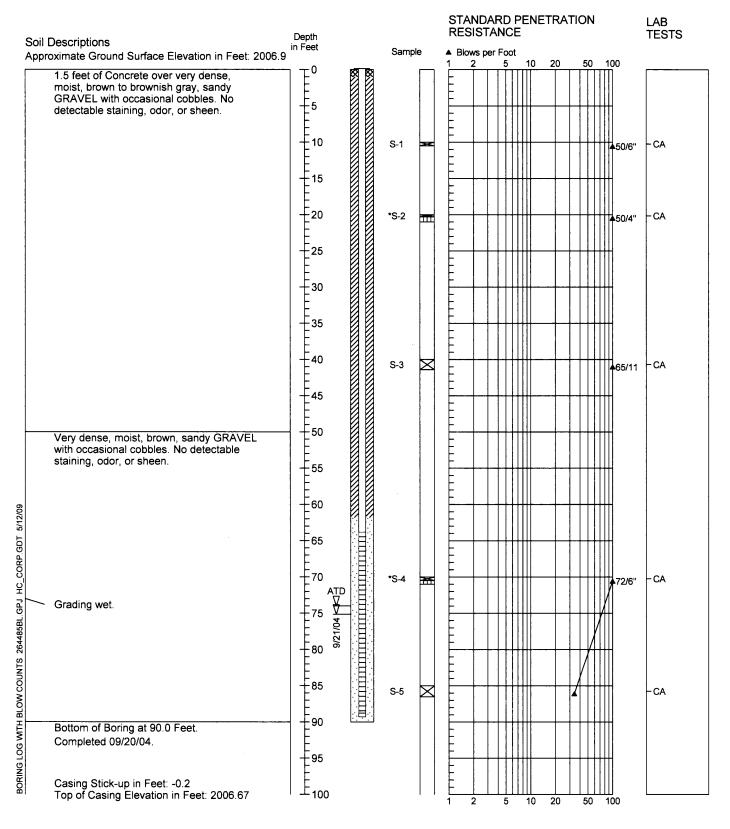


1. Refer to Figure A-1 for explanation of descriptions and symbols.

Soil descriptions and stratum lines are interpretive and actual changes may be gradual.

3. Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

Boring Log /Construction Data for Monitoring Well RM-MW-10S





1. Refer to Figure A-1 for explanation of descriptions and symbols.

Soil descriptions and stratum lines are interpretive and actual changes may be gradual.

3. Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

Boring Log/Construction Data Monitoring Well RMSW-MW-11S

	Depth		STANDARD PENETRATION RESISTANCE	LAB TESTS
Soil Descriptions Approximate Ground Surface Elevation in Feet: 2005.6	in Feet	Sample	▲ Blows per Foot	& (PID)
Concrete Floor Slab.				[]
Very dense, moist, brown, sandy GRAVEL.	+5 +10 +15 +20 +25 +30 +35 +40 +45 +55 +55 +60	S-1	F 	
Very dense, moist, brown, slightly sandy GRAVEL with possible cobbles (based on drill action). (Open Work Gravel)		*S-2 ===		- (<0.1)
	-25	S-3		- (<0.1)
	-30	S-4	 	- (<0.1)
	-35	S-5 🛥	50/5'	- (<0.1)
	40	S-6 🛛		- (<0.1)
	-45	S-7 🗙	- 	- (<0.1)
	+50 +55	S-8 ===	▲75/5"	- (<0.1)
CORP.GDT 5/12/09		S-9 🔀		- (<0.1)
오 Grading wet and sandy. 같 Very dense, wet, brown, sandy GRAVEL.	70 <u>V</u> ATD 75	S-10 🔀	►	· (<0.1)
Grading with silty zones and rapid advance of auger.	75 80 85 90	S-11 🛣	► ► ►	· (<0.1)
Bottom of Boring at 91.0 Feet. Completed 04/23/05.	90	S-12	50/4 ⁴	(<0.1)
Casing Stick-up in Feet: -1.25 Top of Casing Elevation in Feet: 2004.39				

- 1. Refer to Figure A-1 for explanation of descriptions and symbols.
- 2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
- 3. Groundwater level, if indicated, is at time of drilling (ATD) or for date

specified. Level may vary with time. 4. Boring drilled on 73° slant relative to horizontal. Depths indicated are dimensions along slope, not vertical depths. Prepacked well screen installed and casing withdrawn allowing native material to collapse around screen below depth of 65 feet.



Figure A-38

Boring Log/Construction Data for Monitoring Well RM-MW-12S

	Depth		STANDARD PENETRATION RESISTANCE	LAB TESTS
oil Descriptions oproximate Ground Surface Elevation in Feet: 2006	in Feet	Sample	▲ Blows per Foot	& (PID)
Concrete Floor Slab. Very dense, moist, brown, sandy GRAVEL.		S-1 🗙	E 65/5"	- (<0.1)
	$ \begin{array}{c} - & -5 \\ - & -5 \\ - & -25 \\ - & -25 \\ - & -25 \\ - & -30 \\ - & -40 \\ - & -45 \\ - & -50 \\ - & -55 \\ \end{array} $	*S-2 📻	E 75/5"	- (<0.1)
	15	S-3 🎹	–	- (<0.1)
Very dense, moist, brown, gravelly SAND.		S-4 📅	E	- (<0.1)
Very dense, moist, brown, slightly sandy GRAVEL. (Open Work Gravel)		S-5	E	- (<0.1)
	-30	S-6 ===	-- 50/4"	
	-35	S-7 🗙	E E€50/3"	- (<0.1)
	40	-	<u>−</u>	
Very dense, moist, gravelly SAND.	45	S-8 III		- (<0.1)
Very dense, moist, brown, slightly sandy	- 50	S-9 🛥	E 50/5"	- (0.2)
GRAVEL with cobble zones.	-55			
 Cobbles based on drill action. 		S-10 🚠	50/3"	- (<0.1)
 Grading wet with scattered cobbles. 				
 Heave in auger 				
Very dense, wet, brown, sandy GRAVEL.		S-11		- (<0.1)
Very dense, wet, brownish gray, sandy GRAVEL.				
Bottom of Boring at 85.9 Feet. Completed 04/26/05.		S-12 🗙	_↓ ↓↓↓↓↓↓↓↓↓↓↓↓↓↓↓↓↓↓↓↓↓↓↓↓	
Casing Stick-up in Feet: -0.7 Top of Casing Elevation in Feet: 2005.93	95			

1. Refer to Figure A-1 for explanation of descriptions and symbols.

2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.

3. Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.



Boring Log/Construction Data for Monitoring Well RM-MW-13S

Soil Descriptions	Depth		STANDARD PENETRATION RESISTANCE	LAB TESTS
Approximate Ground Surface Elevation in Feet: 2008.6	in Feet	Sample	▲ Blows per Foot	& (PID)
Concrete Floor Slab.			1 2 5 10 20 50 100 -	
Very dense, moist, brown, sandy GRAVEL.		S-1 👷	E 	- (<0.1)
	10	S-2	E E E	- (<0.1)
Very dense, moist, brown, slightly sandy GRAVEL with open work zones.	-15	S-3	_▲ 50/4"	- (<0.1)
	-20	S-4	E	- (<0.1)
	-25	*S-5 =	<u>−</u> − −	- (<0.1)
	-30	*S-6 🎹	<u>−</u> <u>−</u> <u>−</u> <u>−</u> <u>−</u> <u>−</u> <u>−</u> <u>−</u> <u>−</u> <u>−</u>	- (<0.1)
	-35	*S-7		- (<0.1)
	+40 +45	*S-8	- 	- (<0.1)
	+5 +10 +15 +20 +25 +30 +35 +40 +45 +50 +55 +55 +60	*S-9	E 	- (<0.1)
Scattered cobbles and cobble zones.	-55			
		*S-10 ====	→ 50/3"	- (<0.1)
Grading wet with increasing fines.				
Very dense, wet, brown, sandy GRAVEL.		S-11 🗙		- (<0.1)
	-75 - 80	S-12 🃅		- (<0.1)
Bottom of Boring at 90.9 Feet. Completed 04/28/05.	90 [] 95			
Very dense, wet, brown, sandy GRAVEL. Bottom of Boring at 90.9 Feet. Completed 04/28/05. Casing Stick-up in Feet: -0.5 Top of Casing Elevation in Feet: 2008.07				

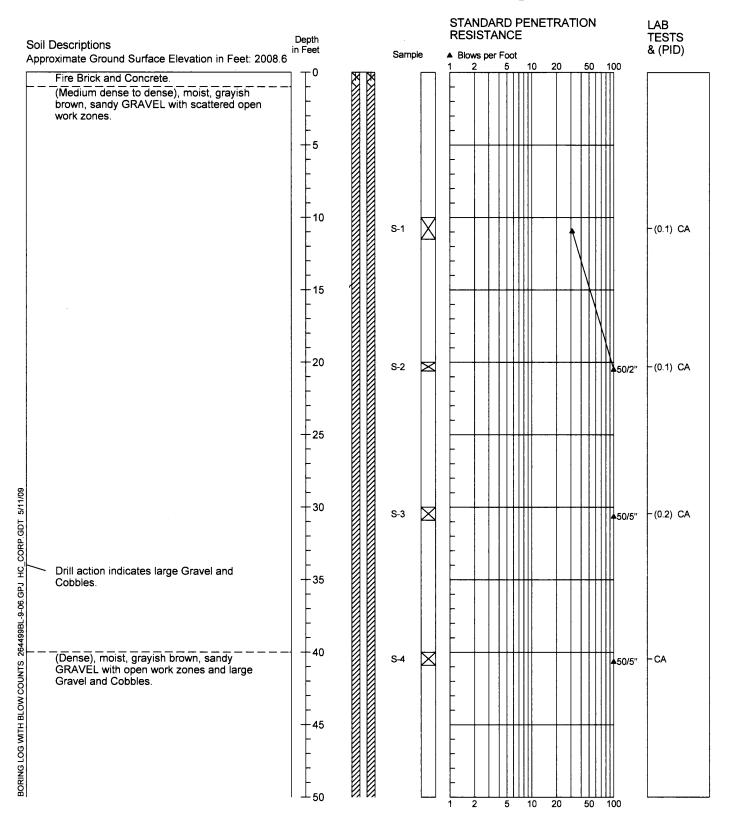


Refer to Figure A-1 for explanation of descriptions and symbols.
 Soil descriptions and stratum lines are interpretive and actual changes

may be gradual.

3. Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

Boring Log/Construction Data for Monitoring Well RM-MW-14S



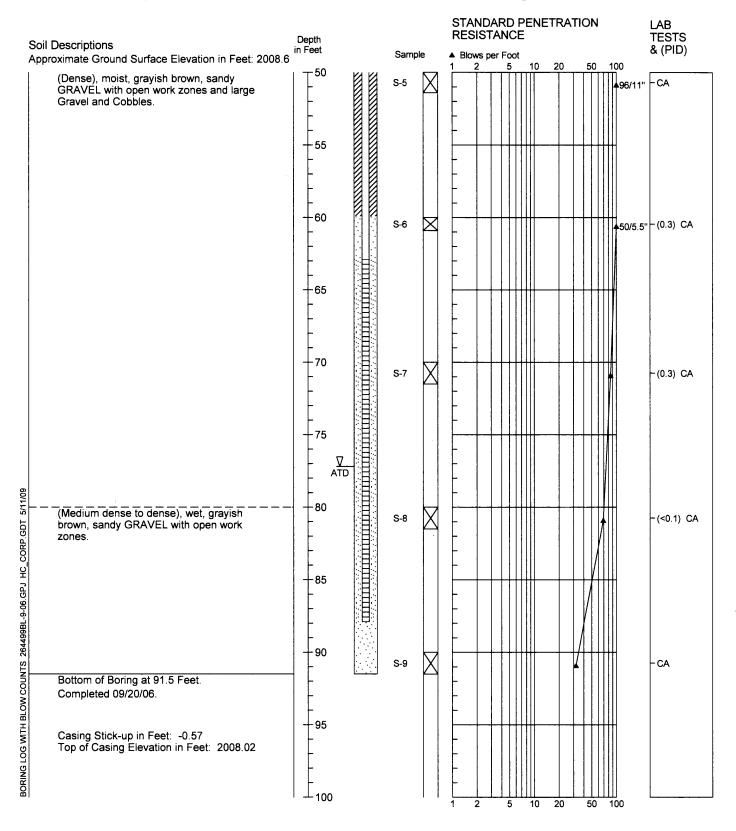


1. Refer to Figure A-1 for explanation of descriptions and symbols.

Soil descriptions and stratum lines are interpretive and actual changes may be gradual.

 Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

Boring Log/Construction Data for Monitoring Well RM-MW-14S



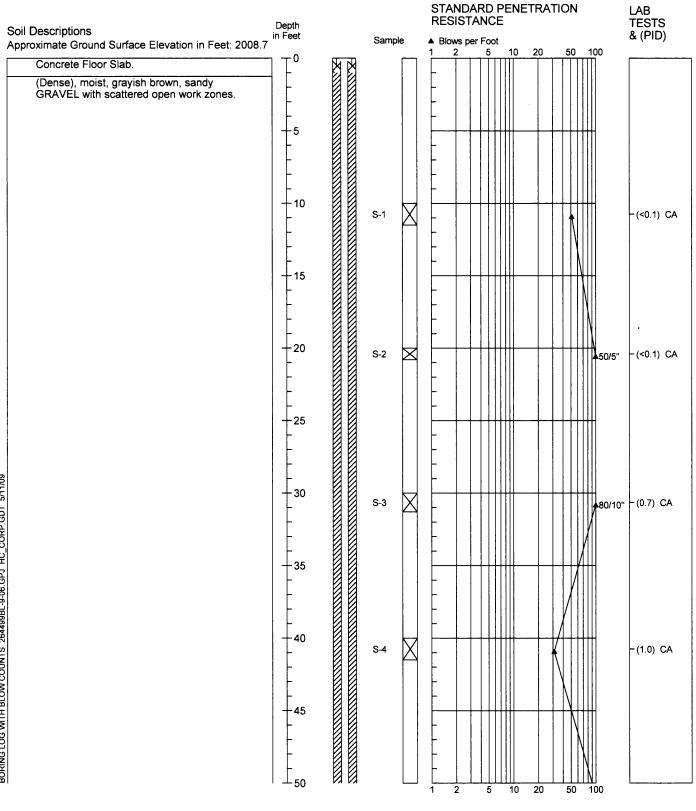


1. Refer to Figure A-1 for explanation of descriptions and symbols.

Soil descriptions and stratum lines are interpretive and actual changes may be gradual.

 Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

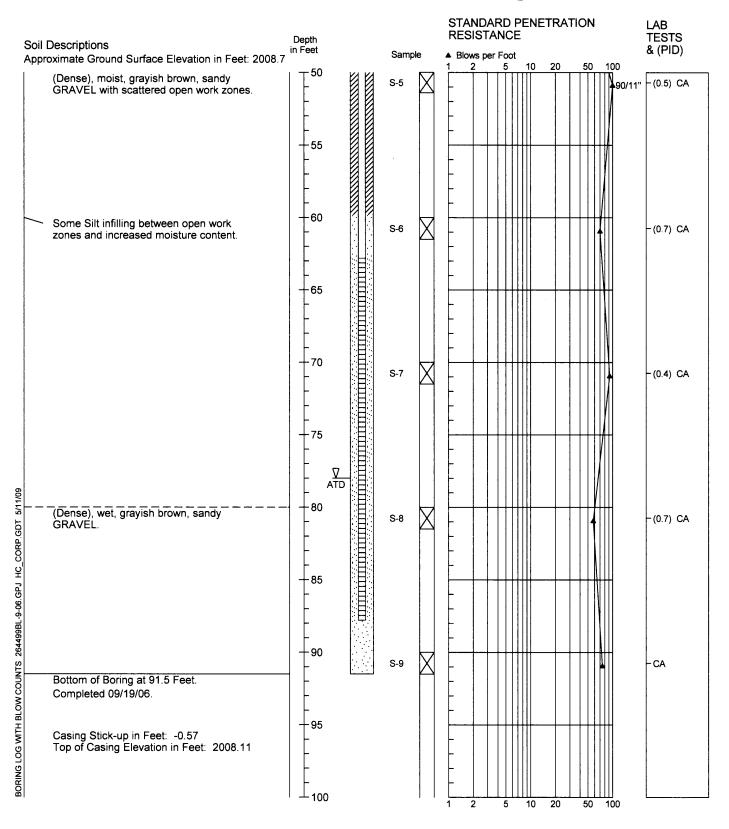
Boring Log/Construction Data for Monitoring Well RM-MW-15S





- 2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
- 3. Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

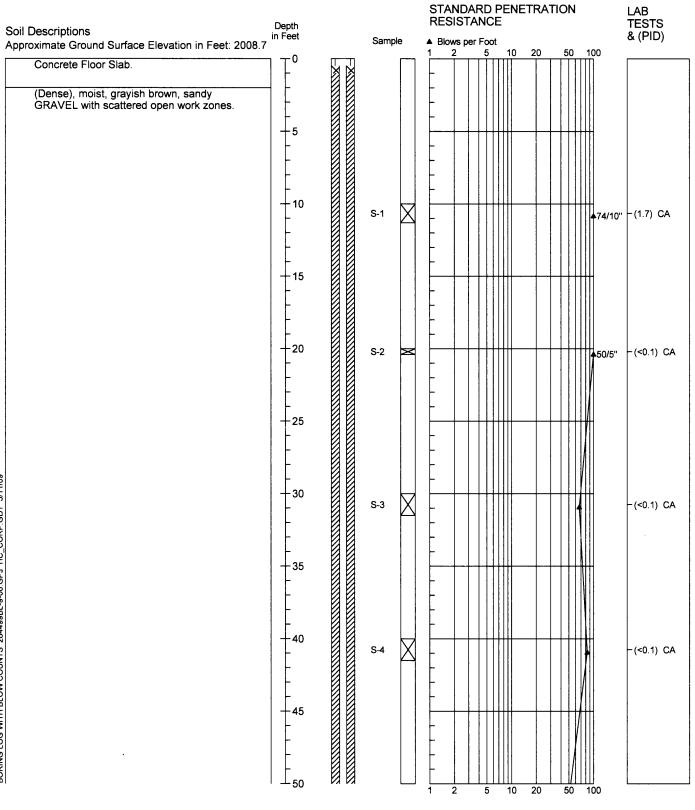
Boring Log/Construction Data for Monitoring Well RM-MW-15S





- Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
- Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

Boring Log/Construction Data for Monitoring Well RM-MW-16S



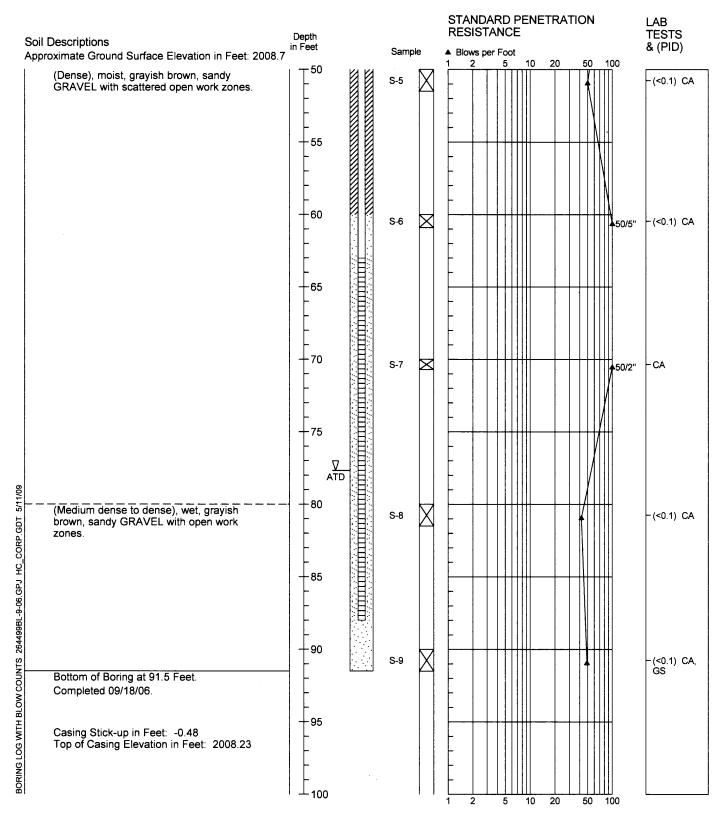


Refer to Figure A-1 for explanation of descriptions and symbols.
 Soil descriptions and stratum lines are interpretive and actual changes

- may be gradual.
- 3. Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

5/11/09 BORING LOG WITH BLOW COUNTS 264499BL-9-06.GPJ HC_CORP.GDT

Boring Log/Construction Data for Monitoring Well RM-MW-16S





1. Refer to Figure A-1 for explanation of descriptions and symbols.

- Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
- 3. Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

Boring Log/Construction Data for Monitoring Well RM-MW-17S

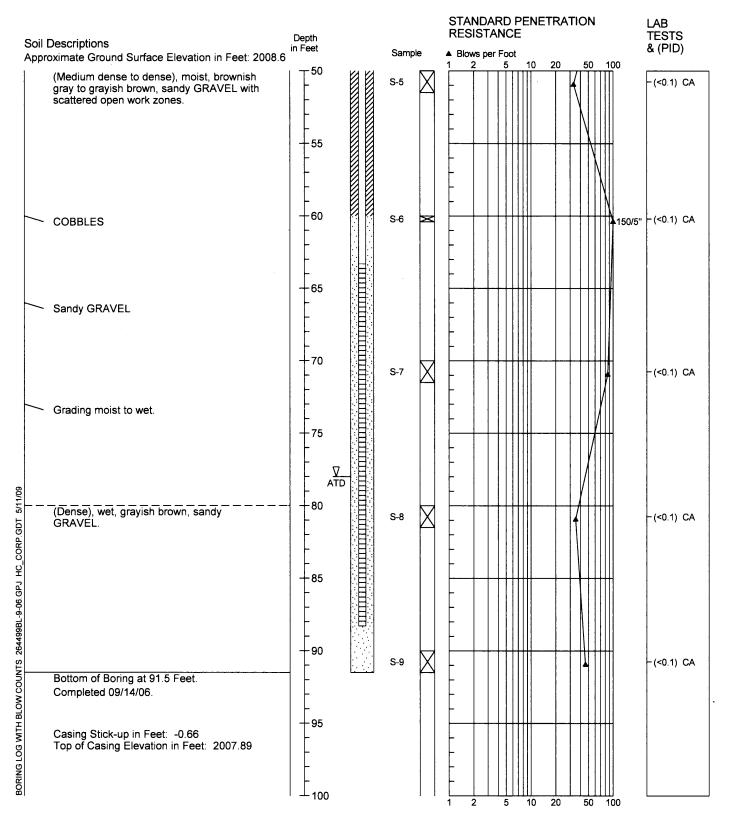
Soil Descriptions	Depth		STANDARD PENETRATION RESISTANCE	LAB TESTS
Approximate Ground Surface Elevation in Feet: 2008.		Sample	▲ Blows per Foot 1 2 5 10 20 50 100	& (PID)
Concrete Floor Slab with 0.2 foot of Fire Brick. (Medium dense to dense), moist, brownish gray to grayish brown, sandy GRAVEL with scattered open work zones.				
	-5 -5 -10 -10 -110 -115 -115 -125 -25 -12	S-1		- (<0.1) CA
	- 20 - 20 	S-2		- (<0.1) CA
60/LL/6 105/4	+25 - - - - - - - - - - - - - - - - - - -	S-3	- - - - - - - - - - - - - - - - - - -	1" - (<0.1) CA
148981-4-05 GT- 170- CC- C- C	- 35			
BORING LOG WITH BLOW COUNTS 28449981-9-06.6PJ HC CORP GDI	5 5 5 	S-4 🗙		- (<0.1) CA



Refer to Figure A-1 for explanation of descriptions and symbols.
 Soil descriptions and stratum lines are interpretive and actual changes

- may be gradual.
- 3. Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

Boring Log/Construction Data for Monitoring Well RM-MW-17S





1. Refer to Figure A-1 for explanation of descriptions and symbols.

- Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
- 3. Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

Boring Log/Construction Data for Monitoring Well TS-MW-1S

Soil Descriptions Approximate Ground Surface Elevation in Feet: 2008.5		Sample	STANDARD PENETRATION RESISTANCE ▲ Blows per Foot 1 2 5 10 20 50 100	LAB TESTS & (PID)
Loose, crushed, minus 3/4-inch, import GRAVEL.		S-1		- (<0.1)
Medium dense, moist, dark gray, silty, sandy GRAVEL with TPH-like odor.		S-2 X	5 0/5"	- (1.6) - (6.0)
Medium dense, moist, grayish brown, sandy_GRAVEL Very dense, moist, grayish brown, sandy	20	S-4	50/5"	- (46.2)
GRAVEL with open work zones.	-25	S-5		- (62.6)
		*S-6		- (42.3) - (19.5)
Very dense, moist, gray-brown to brownish gray, slightly sandy GRAVEL with	40	S-8	 	
scattered cobbles and cobble zones.	-5 -10 -10 -110 -120 -25 -30 -35 -40 -45 -55 -60	S-9 ====	50/3" 	
Grading wet	-65 -70 -70			
Very dense, wet, gray, slightly sandy to	- 75 - 75 - 80 - 80 - 85	S-11 📻	= = = =	- (<0.1)
Bottom of Boring at 85.8 Feet. Completed 05/19/05. Casing Stick-up in Feet: 1.8 Top of Casing Elevation in Feet: 2010.25	85 ·····	S-12 💌	= = =	- (3.5)
Casing Stick-up in Feet: 1.8 Top of Casing Elevation in Feet: 2010.25	95 			

1. Refer to Figure B-1 for explanation of descriptions and symbols.

- 2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
- 3. Groundwater level, if indicated, is at time of drilling (ATD) or for date
- Stouridwater rever, in indicated, is at time of drining (ATD) of of date specified. Level may vary with time.
 Boring drilled to depth of 17 feet and abandoned with second boring drilled 4.5 feet to the south. Second boring drilled unsampled to depth of 15 feet with no recovery at that depth. Samples S-4 on are from second boring.



Figure A-45

Boring Log/Construction Data for Monitoring Well TS-MW-2S

-il Deservisione	Depth		STANDARD PENETRATION RESISTANCE	LAB TESTS
bil Descriptions oproximate Ground Surface Elevation in Feet: 2008.6	in Feet	Sample	Blows per Foot	& (PID)
3 inches of Asphalt over 12 inches of				
Very dense, moist, brown, slightly silty, sandy GRAVEL.	<u>-</u> 5	*S-1		- (<0.1)
	10	S-2	- - - - - - - - - -	- (80)
Very dense, moist, brown, sandy GRAVEL.	15	*S-3	E	- (750)
	20	*S-4	E	- (150)
	-25	*S-5	<u>−</u>	- (500)
Very dense, moist, brown GRAVEL. (Open Work Gravel)	-30	S-6	E	- (300)
	+5 +10 +15 +20 +25 +30 +35 +40 +45 +55 +55	S-7		- (1200)
	40	S-8		- (300)
	45			
Very dense, moist, grayish brown, sandy GRAVEL.	-50	*S-9 ===		- (-0.1)
		3-3	 	- (<0.1)
 Possible scattered large cobbles based on 		*S-10		- (1.0)
drill action.				
C Grading wet	-65 -70			
Very dense, wet, grayish brown, slightly sandy to sandy GRAVEL.		S-11	E	- (600)
	75 80 85			
Bottom of Boring at 85.8 Feet.		S-12	E ≜ 50/4"	- (300)
Completed 05/20/05.				
Casing Stick-up in Feet: -0.38 Top of Casing Elevation in Feet: 2008.22	-95			
· · · ·				

1. Refer to Figure B-1 for explanation of descriptions and symbols.

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- 2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
- 3. Groundwater level, if indicated, is at time of drilling (ATD) or for date Specified. Level may vary with time.
 PID readings not consistent with field observations and laboratory data.



Boring Log CM-TL-SB-1

Call Descriptions	Depth	Consta	Standard Penetration Resistance	Field Tests and (PID)
Soil Descriptions	in Feet	Sample	▲ Biows per Foot	
SOD with scattered roots in upper foot over moist, brown, slightly sandy to sandy GRAVEL.			1 2 5 10 20 50 100 	
(Medium dense), moist, brown, sandy GRAVEL.	- +5	s-1		- CA (1.0)
	+ 10 	s-2		- CA
Bottom of Boring at 15.7 Feet. Completed 1/03/07.	15	S-3 🗙	- - - -	3" - CA
Note: Boring by Hollow-stem Auger Rig.				
	-25			
	- 30			
	40			
	- 45 45 			
	- 50			
2	丨上 ₆₀		1 2 5 10 20 50 100	L



1. Refer to Figure A-1 for explanation of descriptions and symbols.

- Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
 Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

264499BI -1-07 GPJ HC CORP GDT 5/8/09 MONITORING WELL WITH BLOW COUNTS

Boring Log FCT-SB-1

Location: See Figure 6-3. Approximate Ground Surface Elevation: Feet Horizontal Datum: Vertical Datum:

Drill Equipment: Sonic (Schramm T-300M) Hammer Type: 4" I.D. Sample Barrel Hole Diameter: 4 inches Logged By: B. McDonald Reviewed By: A. Conrad

JSCS Graphic Class Log	Soil Descriptions	Depth in Feet	Sa	ample	PENE	per Foc	t	SISTA		LAB TESTS & (PID)
No c	ose), moist, dark gray, sandy GRAVEL. odor. (FILL)	0					0 3		0 50	J+
gray	se), moist, grayish brown grading dark to gray, slightly silty, sandy GRAVEL. odor. (FILL)							• • • •	• • •	
<u>No.c</u> <u>No.c</u> (Loc	ose), moist, dark gray, sandy GRAVEL. odor. (FILL) ose), moist, dark gray to gray, sandy		FCT-SB-1-S1	x						− (<0.1) C/
GRA (FIL	AVÉL with scattered cobbles. No odor. L)	-							•	-
		10						· · ·	• • • •	
		-					•			
		- 15	FCT-SB-1-S2	xx				· · ·		- (<0.1) CA
(Mea gray	dium dense), moist, brownish gray to , sandy GRAVEL.					•	•		· · ·	
		- 20					•	- - - - -	: : :	
							•		• • • •	
	ding very sandy.	25			- :		•			
	asional cobbles.	-				• • • •	· · · · · · · · · · · · · · · · · · ·		· · · ·	
			FCT-SB-1-S3	XX		· · ·	· · · ·			- (<0.1) CA
Star	om of Boring at 30.0 Feet. ted 03/19/08. npleted 03/19/08.	-				• • • •			• • • •	
Note colo	e: Potentially impacted soils (based on r) from 0 to 2, 4.5 to 5.5, and 8 to 17 fee	t				· · · · · · · · · · · · · · · · · · ·		• • • • •	· · ·	
		L_35		1 1	0 2	20 4 r Conten		0 8	0 10	L 0+



Refer to Figure A-1 for explanation of descriptions and symbols.
 Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
 USCS designations are based on visual manual classification (ASTM D 2488) unless otherwise supported by laboratory testing (ASTM D 2487).
 Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

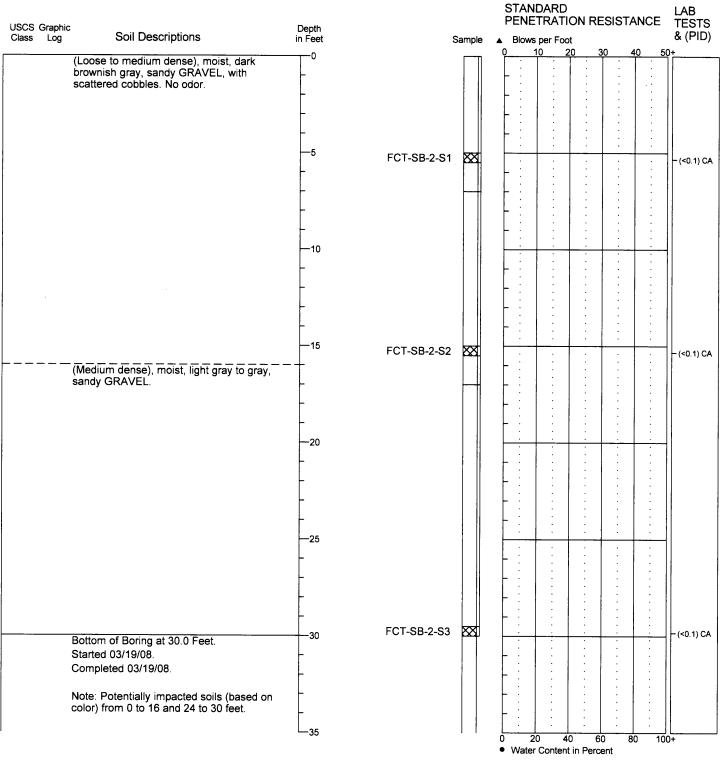
with time.

NEW BORING LOG 2644112-BL.GPJ HC_CORP.GDT 5/8/09

Boring Log FCT-SB-2

Location: See Figure 6-3. Approximate Ground Surface Elevation: Feet Horizontal Datum: Vertical Datum:

Drill Equipment: Sonic (Schramm T-300M) Hammer Type: 4" I.D. Sample Barrel Hole Diameter: 4 inches Logged By: B. McDonald Reviewed By: A. Conrad





1. Refer to Figure A-1 for explanation of descriptions and symbols.

2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual. 3. USCS designations are based on visual manual classification (ASTM D 2488) unless otherwise

Supported by laboratory testing (ASTM D 2487).
 Grundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary

with time.

NEW BORING LOG 2644112-BL.GPJ HC_CORP.GDT 5/8/09

Boring Log FCT-SB-3

Location: See Figure 6-3. Approximate Ground Surface Elevation: Feet Horizontal Datum: Vertical Datum:

Drill Equipment: Sonic (Schramm T-300M) Hammer Type: 4" I.D. Sample Barrel Hole Diameter: 4 inches Logged By: B. McDonald Reviewed By: A. Conrad

ISCS Graphic	Depth					STANCE	
Class Log Soil Descriptions	in Feet	S	Sample	per Foot			& (PID
(Loose to medium dense), moist, brown to gray, sandy GRAVEL, with a zone of dark gray, sandy GRAVEL with a TPH-like odor from 0.5 to 1.5 feet.		FCT-SB-3-S1A	×) 30		50+ - (<0.1) C
(Loose to medium dense), moist, dark gray, silty, sandy GRAVEL.		FCT-SB-3-S1	x			· · ·	_ (<0.1) (
Grading less silty.	-				· · · · · · · · · · · · · · · · · · ·		
(Loose to medium dense), moist, brown, sandy, open work GRAVEL.				•			
		FCT-SB-3-S2	XX		- - - - - - -		- (<0.1) (
		,			- - - - -		
(Medium dense), moist, grayish brown,							
sandy, open work GRAVEL with cobbles.	25						
	-					· · · · · · · · · · · · · · · · · · ·	
		FCT-SB-3-S3	XX			· · ·	(<0.1) C
Bottom of Boring at 30.0 Feet. Started 03/19/08. Completed 03/19/08.						· · · · · · · · · · · · · · · · · · ·	
Note: Potentially impacted soils (based on color) from 0 to 1.5 and 4.5 to 12.5 feet.	-					· · · · · · · · · · · · · · · · · · ·	
Note: Potentially impacted soils (based on color) from 0 to 1.5 and 4.5 to 12.5 feet.	- 35			20 40 r Content) 60 in Percent		00+

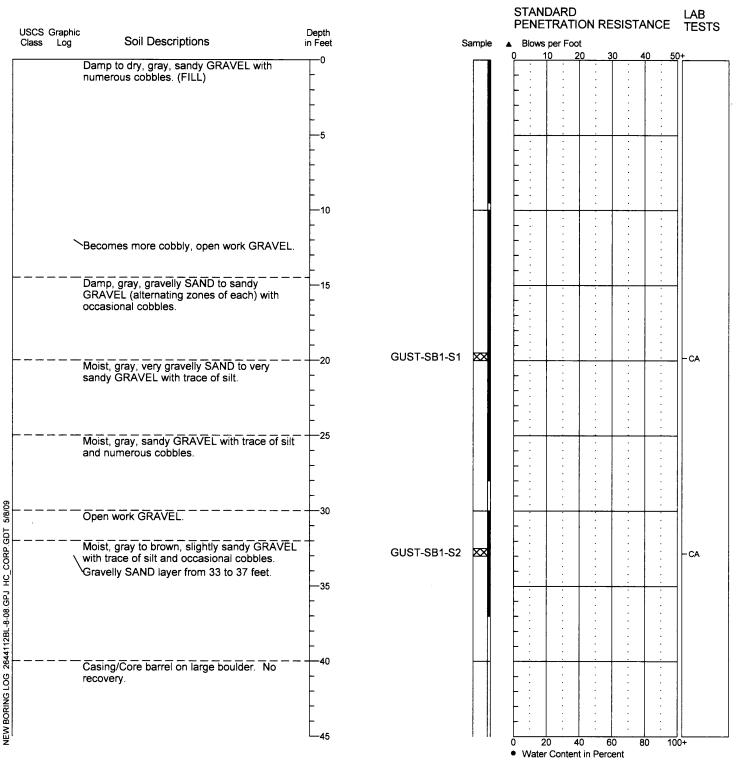
Refer to Figure A-1 for explanation of descriptions and symbols.
 Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
 USCS designations are based on visual manual classification (ASTM D 2488) unless otherwise supported by laboratory testing (ASTM D 2487).
 Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

with time.



Location: See Figure 5-4. Approximate Ground Surface Elevation: Feet Horizontal Datum: Vertical Datum:

Drill Equipment: Sonic - 4" I.D. Core Barrel Hammer Type: 10' Core Retrieval Hole Diameter: 4.5 inches Logged By: P. Cordell/J. Ebnet Reviewed By: M. Hardiman





1. Refer to Figure A-1 for explanation of descriptions and symbols.

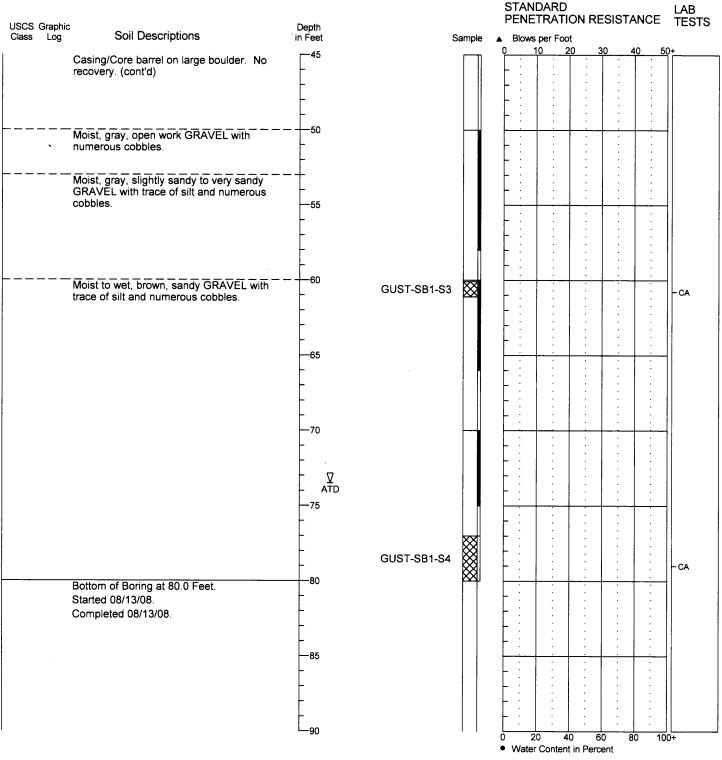
3. USCS designations are based on visual manual classification (ASTM D 2488) unless otherwise supported by laboratory testing (ASTM D 2487).
 Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary

with time.

^{2.} Soil descriptions and stratum lines are interpretive and actual changes may be gradual.

Location: See Figure 5-4. Approximate Ground Surface Elevation: Feet Horizontal Datum: Vertical Datum:

Drill Equipment: Sonic - 4" I.D. Core Barrel Hammer Type: 10' Core Retrieval Hole Diameter: 4.5 inches Logged By: P. Cordell/J. Ebnet Reviewed By: M. Hardiman





Refer to Figure A-1 for explanation of descriptions and symbols.
 Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
 USCS designations are based on visual manual classification (ASTM D 2488) unless otherwise supported by laboratory testing (ASTM D 2487).

4. Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

Location: See Figure 5-4. Approximate Ground Surface Elevation: Feet Horizontal Datum: Vertical Datum:

Drill Equipment: Sonic - 4" I.D. Core Barrel Hammer Type: 10' Core Retrieval Hole Diameter: 4.5 inches Logged By: B. McDonald/A. Inglish Reviewed By: M. Hardiman

CS Graphic ass Log Soil Descriptions	Depth in Feet	Samp	ole 🔺	Blows	TRATI				
		Cump	0		0 2		so 4	40 50	0+
2 inches of Asphalt over 6 inches of crushed	T_0				:		[1	1
Gravel over (medium dense), moist,	F		-						
brownish gray, slightly silty, sandy GRAVEL.			-	÷		:	:		
(FILL)	+			•	•	•	· ·	· ·	
				:					
	-			:	:	•			
	-5			•		•		1	11
	-			:	:	:	:		
	+	H	-	·	·	•	•	·	
	+		-						
(Medium dense), moist, gray, sandy GRAVEL.				:	•	:	:	1 :	
GRAVEL.	-10			•	•	•		·	
									1
	F			÷	:	•		1 :	
	-		-	•		•			
	┝			:		:		:	
	F			:	•	· ·	1 :	1 :	
	-15		1 L						
	15			:		:	:	1 :]
	Γ			•		•			
Scattered Cobbles.	F	 •−	┪┝						
Very poor recovery, cobble in shoe.	-		-	:	:		:		
very poor recovery, cobble in shoe.	-			•		•		•	
	-20								
Grading to open work, coarse GRAVEL.	20			:	•	•			
	Γ		II F	•		•	•	•	
	-		-	:	:	•			
	-		-				· ·		11
							ļ		41
(Medium dense), moist, gray, slightly silty, sandy GRAVEL and sandy GRAVEL with				:	•	•			
scattered cobbles and some open work				·	•	•	•	· ·	
zones.	Γ					•			
201100.	-			•	•	•	:		
	-			•		•	· ·	•	
	-30		< ⊢		•	· 	: 	·	
	L GO	ST-SB2-S1 🕅	A L	•	:	:			-CA
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						•			
	Ē.			•	:	•			
	F			·		·		· ·	
	-35		-	÷	•	· ·		<u> </u>	1
	F			:	:	•		1	
	4		-↓ -	•	•	•		·	
(Medium dense), moist, gray, open work GRAVEL with scattered cobbles.	F	l						:	
GRAVEL with scattered coddles.	L		1	:		:		1 :	
				•	•	•		· ·	
	-40			•	•	_ <u>;</u>		1 :	11
	+		-	:	:	:	:	1 :	
·	┝		-			•			[
	F			÷.,	:	:		:	
				·	÷	÷	•	· ·	
						:			
	L—45	I	" 0	2	0 4	~ ~	io 8	30 10)0+

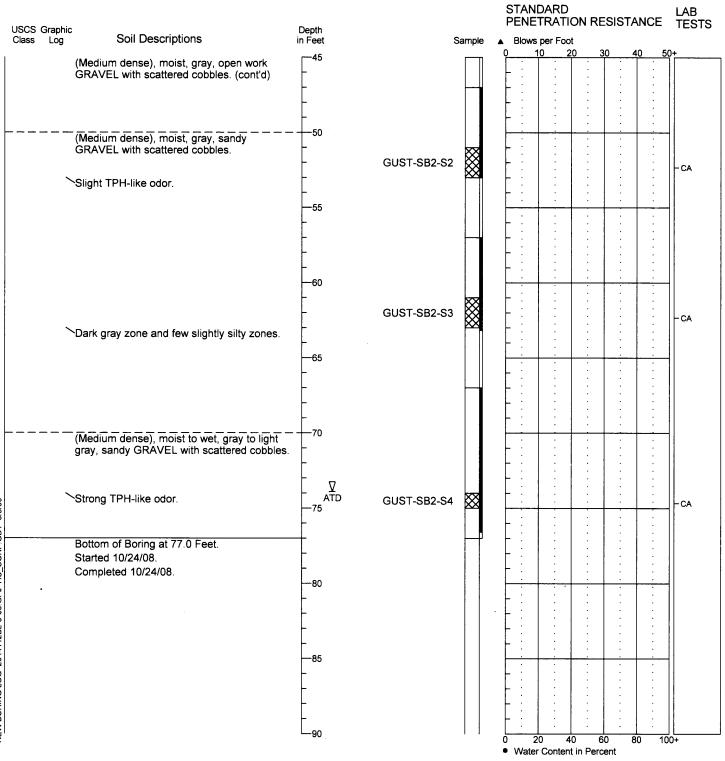


Refer to Figure A-1 for explanation of descriptions and symbols.
 Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
 USCS designations are based on visual manual classification (ASTM D 2488) unless otherwise supported by laboratory testing (ASTM D 2487).
 Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

with time.

Location: See Figure 5-4. Approximate Ground Surface Elevation: Feet Horizontal Datum: Vertical Datum:

Drill Equipment: Sonic - 4" I.D. Core Barrel Hammer Type: 10' Core Retrieval Hole Diameter: 4.5 inches Logged By: B. McDonald/A. Inglish Reviewed By: M. Hardiman





Refer to Figure A-1 for explanation of descriptions and symbols.
 Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
 USCS designations are based on visual manual classification (ASTM D 2488) unless otherwise supported by laboratory testing (ASTM D 2487).
 Computer life interpret is time of division (ATD) as for data casaified. Logal parameters

4. Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

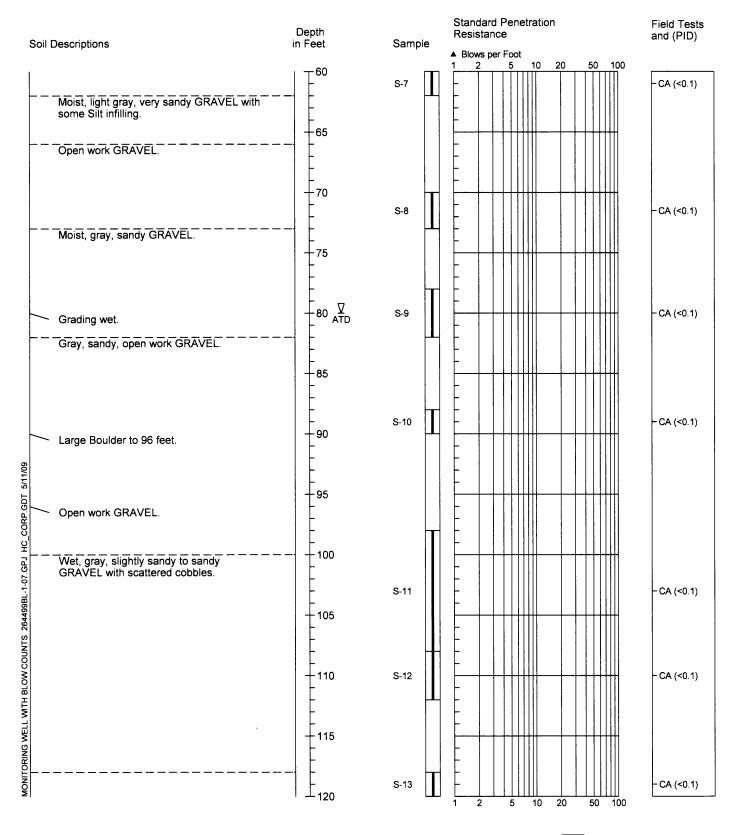
5/8/09 VEW BORING LOG 2644112BL-8-08.GPJ HC CORP.GDT

Soil Descriptions	Depth in Feet	Sample	Standard Penetration Resistance	Field Tests and (PID)
		e a mpie	▲ Blows per Foot	
Dry Well				
Water in bottom of dry well on top of concrete bottom.	-5			
Wet, light gray, silty, sandy GRAVEL with firebrick fragments.		S-1		- CA (<0.1)
Wet, dark gray, silty, sandy GRAVEL.		S-2		- CA (<0.1)
Moist, brown to light brown, sandy GRAVEL with scattered cobble.				
	+ 15			
Silt infilling between open work GRAVEL with cobbles.		S-3		- CA (<0.1)
	-25			
Large GRAVEL with occasional cobble Moist, gray, very sandy GRAVEL.				
	+30	S-4		- CA (<0.1)
	-35			
	+40 	S-5		- CA (<0.1)
Moist, gray, sandy GRAVEL with cobbles and some Silt infilling.	- 45			
Moist, dark brown, sandy GRAVEL.		S-6		- CA (<0.1)
	55			
Moist, light gray, sandy GRAVEL with cobbles.				



Refer to Figure A-1 for explanation of descriptions and symbols.
 Soil descriptions and stratum lines are interpretive and actual changes

action descriptions and strattern miss are interpretive and actual change may be gradual.
 Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.



HARTCROWSER

1/07

2/3

2644-99

Figure A-53

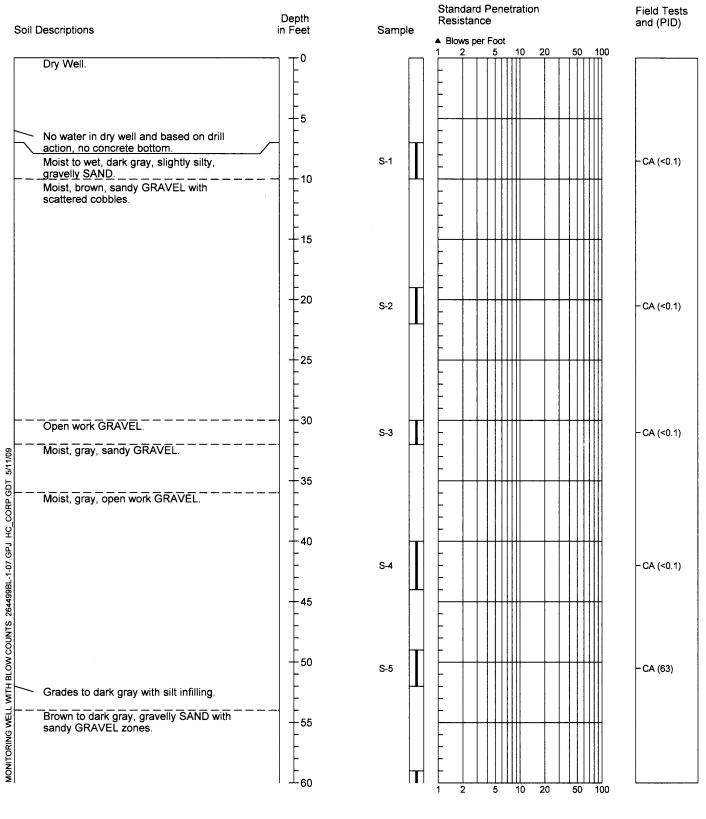
Refer to Figure A-1 for explanation of descriptions and symbols.
 Soil descriptions and stratum lines are interpretive and actual changes

- may be gradual
- 3. Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

bil Descriptions	Depth in Feet	Sample	Standard Penetration Resistance	Field Test and (PID)
		Gumple	▲ Blows per Foot	
Wet, gray, very gravelly SAND to very sandy GRAVEL.				
Moist, gray, silty, fine SAND to fine sandy SILT.		S-14		- CA (<0.1)
Wet, gray, slightly sandy to sandy GRAVEL with cobbles.				
	 135			
	- - 140			
		S-15		– CA (<0.1
	145 			
	- 	S-16		- CA (<0.1
Silty, fine SAND.				
Bottom of Boring at 155.0 Feet. Completed 1/03/07.				
Note: Boring continuously cored by Sonic Rig with composite samples collected as				
indicated.				
	+ 165 - -			
	- 170			
	+ 175			
	 180		- -	



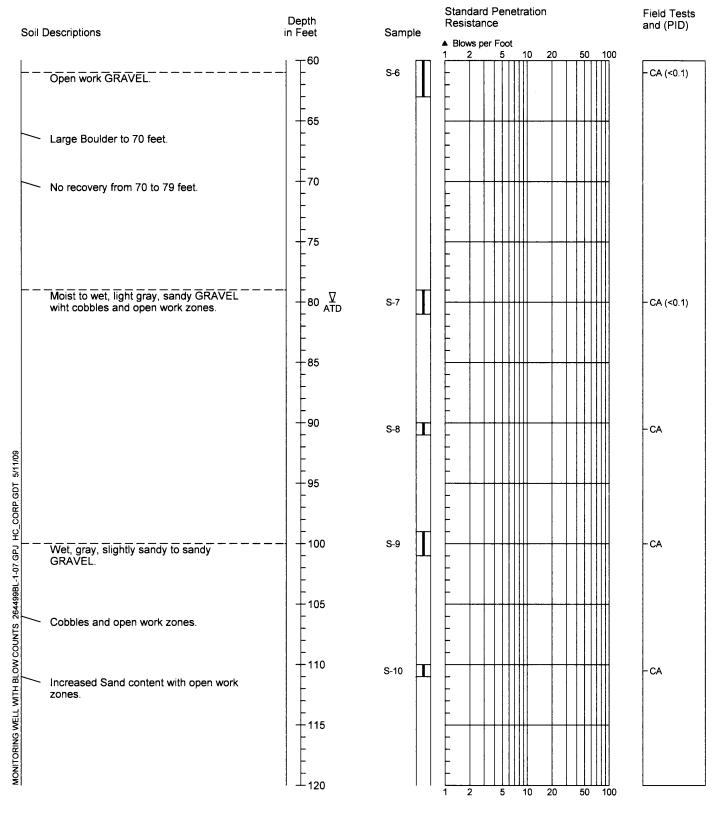
- Refer to Figure A-1 for explanation of descriptions and symbols.
 Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
 Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.





1. Refer to Figure A-1 for explanation of descriptions and symbols.

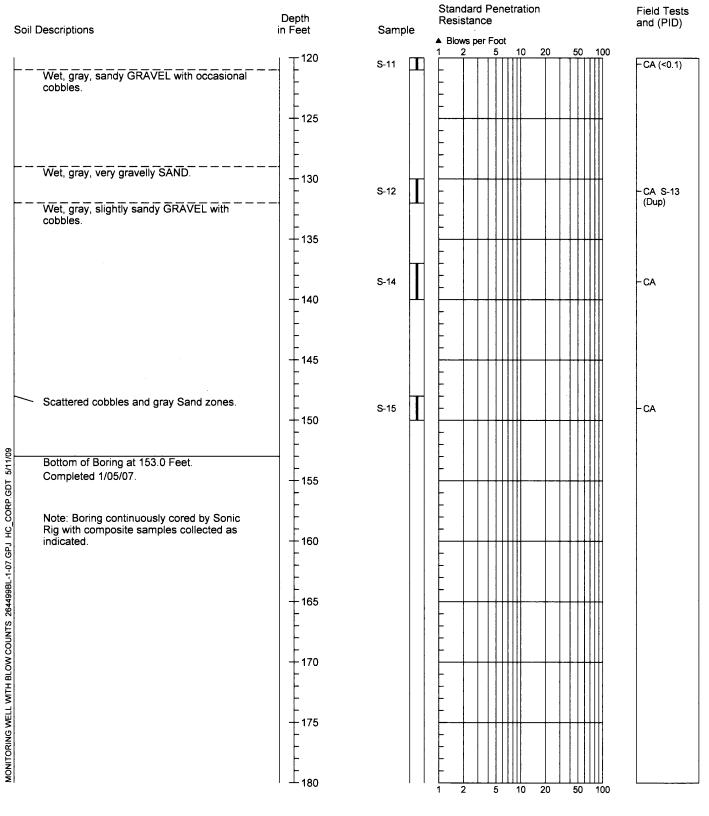
- 2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
- 3. Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.





Refer to Figure A-1 for explanation of descriptions and symbols.
 Soil descriptions and stratum lines are interpretive and actual changes

- may be gradual.
- 3. Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.





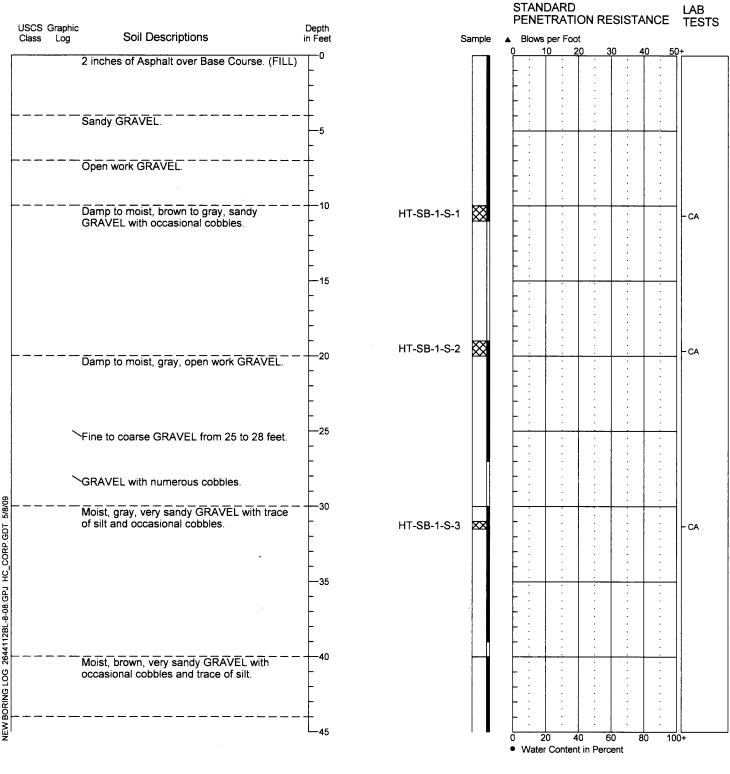
1. Refer to Figure A-1 for explanation of descriptions and symbols.

- Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
- 3. Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

Boring Log HT-SB-1

Location: See Figure 6-4. Approximate Ground Surface Elevation: Feet Horizontal Datum: Vertical Datum:

Drill Equipment: Sonic - 4" I.D. Core Barrel Hammer Type: 10' Core Retrieval, Roto-Vibration Hole Diameter: 4.5 inches Logged By: P. Cordell/J. Ebnet Reviewed By: M. Hardiman





Refer to Figure A-1 for explanation of descriptions and symbols.
 Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
 USCS designations are based on visual manual classification (ASTM D 2488) unless otherwise

supported by laboratory testing (ASTM D 2487).

4. Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

Boring Log HT-SB-1

Location: See Figure 6-4. Approximate Ground Surface Elevation: Feet Horizontal Datum: Vertical Datum:

Drill Equipment: Sonic - 4" I.D. Core Barrel Hammer Type: 10' Core Retrieval, Roto-Vibration Hole Diameter: 4.5 inches Logged By: P. Cordell/J. Ebnet Reviewed By: M. Hardiman

	Cranhia	•	Death		STA PEN		ON RES	ISTANCE	LAB TESTS
Class	Graphic Log	Soil Descriptions	Depth in Feet	Sample	▲ Blo	ws per Foot	t		
1		Maint hanve tean to alightly ailty and	45		Q	10 2		40 5	iQ+
	(Moist, brown, trace to slightly silty, sandy GRAVEL with occasional cobbles. (cont'd)	-		- :				
			-		- :		:	: :	
	\searrow	ncreasing moisture.	F	HT-SB-1-S-5 🔀	- :		•	· · ·	-CA
			-50		F :				
							:	: :]
			_		Ļ	•	:	: :	
			-		Ļ:		:		
			+		- ·				
			-55		<u> </u>				-11
			F		F :	÷	·	: :	
							÷	: :	
	١	Wet, gray, sandy GRAVEL with trace of silt and occasional cobbles.	-						
		Wet, gray, sandy GRAVEL with occasional	60	HT-SB-1-S-6	· ·			÷ ÷	
	Ċ	cobbles.	-		- :		:	1 1	
	~	Strong petroleum-like odor from 60 to 65			- :		:	: :	
		eet.			F :				
			65				:	· · ·	
	۲ د	Color changes from gray to brown. Become: slightly more silty with weaker odor.	s	HT-SB-1-S-7 🔀	_ :		·	· · ·	-CA
	•	signly more sity with weaker oddr.	-		- ·		:	· · ·	
			-						
			F		- :	•	:	: :	
		Bottom of Boring at 70.0 Feet.	70	<u>}</u> +∕					4
		Started 08/12/08.	_						
	(Completed 08/12/08.	-		L :			: :	
			-		- ·	•		: :	
			75						-
			-						
					[]		•	: :	
			_				•		
			-80						41
			-		- :		:	: :	
			-		- :		:	1 1	
			F		-				
			-85						
					L :		: [: :	
			F		L :		÷		
			F		F :				
			F		- :		:	· · ·	
			<u> 90</u>	1 1	0	20 40			ے لیے۔۔۔۔۔ا 00+
					• Wa	ter Content	in Percen	t	



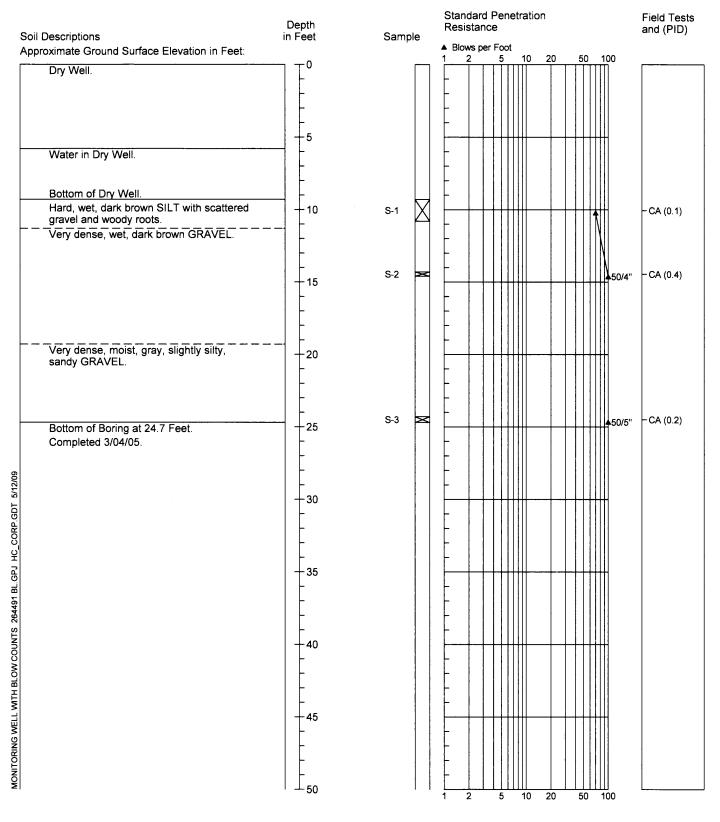
NEW BORING LOG 2644112BL-8-08.GPJ HC_CORP.GDT 5/8/09

,

Refer to Figure A-1 for explanation of descriptions and symbols.
 Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
 USCS designations are based on visual manual classification (ASTM D 2488) unless otherwise supported by laboratory testing (ASTM D 2487).
 Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

with time.

Boring Log INDBG-SB-1





- Refer to Figure A-1 for explanation of descriptions and symbols.
 Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
- 3. Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

Boring Log OH-SB-1

Location: See Figure 5-5. Approximate Ground Surface Elevation: Feet Horizontal Datum: Vertical Datum:

Drill Equipment: Sonic - 4" I.D. Core Barrel Hammer Type: 10' Core Retrieval, Roto-Vibration Hole Diameter: 4.5 inches Logged By: P. Cordell/J. Ebnet Reviewed By: M. Hardiman

SCS Graphic	Depth		STANDARD PENETRATION RESISTANCE					
lass Log Soil Descriptions	in Feet	Sample	▲ Blows pe					
1 inch of Asphalt over damp, gray to brown,	0		0 10	. 20	30	40		
sandy GRAVEL with trace of silt and	-		- :	:				
occasional cobbles. (FILL)	-			.		. .		
	L			:		: :		
				:	: :	: :		
	-5			:	: ;	: :		
	— ³		•	•	•			
	Γ					: :		
	Γ			:	: :	: :		
	F			:	: 1	: :		
	-	ОН-SB-1-S-1 🔀		:	: 1	: :		
Damp to moist, gray to brown, sandy	- +-10							
GRAVEL with trace of silt.	-			:				
	F		- :	:	: :	: :		
	-		- : I	:		: :		
	F		- :	:		: :		
	-15				· ·			
Open work GRAVEL.	_							
	L			:				
			Γ: Ι	:	: :	: :		
	[:	: :			
	20							
Moist, brown, very gravelly SAND to very	-+	ОН-SB-1-S-2 🔀	F :		: :		-CA	
sandy GRAVEL with trace of silt and	F		F :	:	: :	: :		
occasional cobbles.	-		F : 1	:	: :			
	-		- :	:	: :			
	25	۲.		. -	<u> </u>			
	-		- ·					
	F		·					
Open work GRAVEL	-+	OH-SB-1-S-3 🗙	- 1				-CA	
Open work ONAVEE.	-		- :	:	: :			
	-30			· .	· · ·			
	-		L :	•	: :			
			L :	:	: :			
Moist, brown to gray, sandy GRAVEL with trace of silt and occasional cobbles.	_							
trace of sitt and occasional cobbles.								
	-35							
	_ 33			:	: .			
		OH-SB-1-S-4 🔀			: :		-CA	
	Γ			:				
	Γ			:				
	Ť		► :		: :			
Moist, gray, very gravelly SAND with trace of	F			÷	· ·			
Moist, gray, very gravelly SAND with trace of silt, very sandy GRAVEL zones, and occasional cobbles.	F		► :	:	: :	:		
occasional cobbles.	F		⊢ :	:	: :			
	F		- :	:				
	-		·	•	. .			
	L_45		0 20	·	60		100+	



Refer to Figure A-1 for explanation of descriptions and symbols.
 Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
 USCS designations are based on visual manual classification (ASTM D 2488) unless otherwise supported by laboratory testing (ASTM D 2487).
 Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with the second stratum lines are the second strategies.

with time.

Boring Log OH-SB-1

Location: See Figure 5-5. Approximate Ground Surface Elevation: Feet Horizontal Datum: Vertical Datum:

Drill Equipment: Sonic - 4" I.D. Core Barrel Hammer Type: 10' Core Retrieval, Roto-Vibration Hole Diameter: 4.5 inches Logged By: P. Cordell/J. Ebnet Reviewed By: M. Hardiman

CS Graphic	Soil Descriptions	Depth	_					ESIST	TANCE	LAB TEST
ss Log	Soli Descriptions	in Feet	Samp	le ▲	Biows			~~		
	Moist, gray, very gravelly SAND with trace of	45		ה ב	10	<u>,</u>	20	30	40 :	50+
	Moist, gray, very gravelly SAND with trace of silt, very sandy GRAVEL zones, and	-			•	·	· ·	· ·	· ·	1
	occasional cobbles. (cont'd)									
	(OH-SB-1-S-5 🕅	8	·	•	•	· ·		-CA
				1 1	:					
		F			·		•	· ·	· ·	11
		50		l L			i.			
	Core barrel advanced but not pulled out.				·	•	•	· ·		
	Probably pushed cobble down during run.	Γ				:				
					·	•	· ·	· ·	•	
		+			:					
		L				·	· ·		· ·	
					:					
		-55								-11
		-		11 F						
		-			:	:	1		•	
		L				•				
		Γ			:	:	:		1 :	
		F								
,	Wet, brown, slightly sandy open work	60		┪┝─	· +		<u> </u>	· :	:	41
	GRAVEL with trace of silt and numerous	L			•	•	· ·		· ·	
	cobbles and boulders.	L			:	:				
		Γ	ОН-SB-1-S-6 💥	4 F	: 1	·	· ·	·	· ·	-CA
		-		-	:	:	:		1	
		-		-	•	•	·	· ·	· ·	
		65								
					:	:		· ·	1 ·	71
		F					:	1 :		
		F		1 -	•	•	•		·	
		-			.					
		L	OH-SB-1-S-7 🔀		:	•	:		1	-CA
				ΠΓ						
		-70		1	. †		<u> </u>	1 :	- :	
,	Net grav sandy GRAVEL with trace of silt	-+-			· [·		
\ .	Wet, gray, sandy GRAVEL with trace of silt and occasional cobbles.	L			:					
\sim	Strong petroleum-like odor.	L			. •		•			
•	Strong petroleum-like odor.							:		
					•	•	•	· ·	· ·	
		-75 ∑ ATD			·	· · ·	<u>↓ .</u>	\downarrow		41
					:	:			· ·	
		L								
					:	:		1 :		
		F	ОН-SB-1-S-8 🔀		•	•			1	
		F		┦ ┝	:	:			1	-CA
				μL	•		· ·	· ·		11
	Bottom of Boring at 80.0 Feet.	L			:	:				
	Started 08/12/08.	Γ			·	·	·	· ·	· ·	
(Completed 08/13/08.	F		-	:	:				
		<u>-</u>		-	:	·	· ·	· ·	· ·	
		F			:	:				
		95			:	:	1		·	
		85			·	- :	i	 .	÷ –	11
		F		-	:	:			1	
		+				•				11
		F			:	:	:	:		11
				[.	•				
		F			:	•				
		<u>∟₉₀</u>								



Refer to Figure A-1 for explanation of descriptions and symbols.
 Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
 USCS designations are based on visual manual classification (ASTM D 2488) unless otherwise supported by laboratory testing (ASTM D 2487).
 Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

with time.

Boring Log RM-F4-SB-1

	Depth		Standard Penetration Resistance	Field Tests
Soil Descriptions Approximate Ground Surface Elevation in Feet:	in Feet	Sample	 Blows per Foot 	
			1 2 5 10 20 50 100	r
27.5-inch Concrete Slab over 1/8-inch Steel Plate over 16-inch-diameter Duct Line over 1/8-inch Steel Plate over 12 inches of Concrete. Medium dense to dense, moist, brown,		*S-1		-CA
sandy GRAVEL. No detectable staining, odor, or sheen.		S-2		- CA
		S-3 🛛		- CA
	20	S-4 🛛		- CA
Grading very dense, slightly sandy to sandy.	- 25	S-5 🛛		-CA
		S-6 🔀		" - CA
	- 35	S-7 🗙	▲50/2	"
Occasional cobbles.	+ 40 - - 45	*S-8 🏦		" - CA
Increasing cobbles.		*S-9 ===		n
Very dense, moist, brown, sandy GRAVE No detectable staining, odor, or sheen.	L			
Increasing moisture content with occasional cobbles.	+60 -65 -70	S-10 🗙		" – CA
Grading wet.	-75 %	S-11 🗙		- CA
		S-12 🔀		" - CA
Bottom of Boring at 85.7 Feet. Completed 9/16/04.	- 90 - 95			
			1 2 5 10 20 50 100	



Refer to Figure A-1 for explanation of descriptions and symbols.
 Soil descriptions and stratum lines are interpretive and actual changes

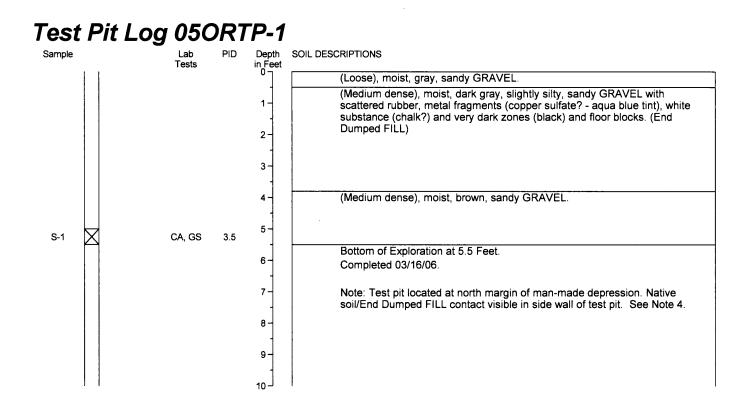
- may be gradual. 3. Groundwater level, if indicated, is at time of drilling (ATD) or for date
- specified. Level may vary with time.

Boring Log SDR-SB-1

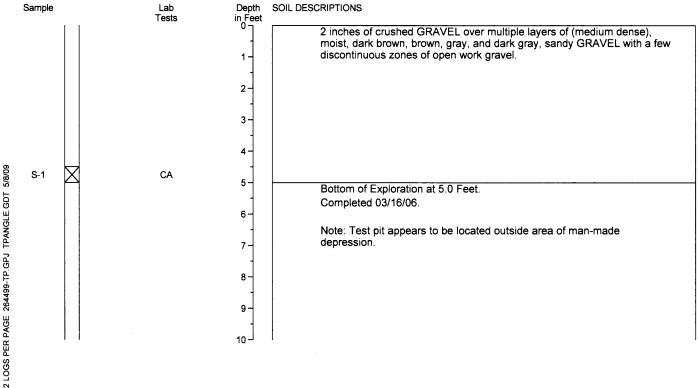
il Descriptions	Depth in Feet	Sample	Standard Penetration Resistance	Field Tests and (PID)
proximate Ground Surface Elevation in Feet:			▲ Blows per Foot 1 2 5 10 20 50 100	
(Loose), moist, brown to dark brown, sandy GRAVEL. (FILL)] – 0 – 5			,
 Rapid penetration. Total circulation loss between 10 and 15 				
feet. (Large void?)	_ 15	*S-1	E → 50/3"	- CA (2.5)
	20 E	S-2		- CA (9.2)
Moist, brown, sandy GRAVEL.	25	S-3		- CA, GS (7.3)
		S-4 🐱	E 50/6"	- CA (5.7)
	35	*S-5	E	- CA (4.1)
∽ Granitic Boulder.	40	*s-6	E 50/3"	- CA (8.7)
 Scattered cobbles. 	45	S-7	<u>-</u>	- CA (3.3)
	-50	S-8	-	- CA (6.8)
	- 	S-9	E	- CA (3.1)
		S-10	- ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓	- CA (8.4)
Bottom of Boring at 60.8 Feet. Completed 2/23/06.				
	 70			
	- 75 80			
	- 90 - 90 - 95			
	+95 - - 100			
	「 「 100			L



- Refer to Figure A-1 for explanation of descriptions and symbols.
 Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
 Groundwater level, if indicated, is at time of drilling (ATD) or for date approximation of the provide manufacture in the provide strategy of the strategy of
- specified. Level may vary with time.



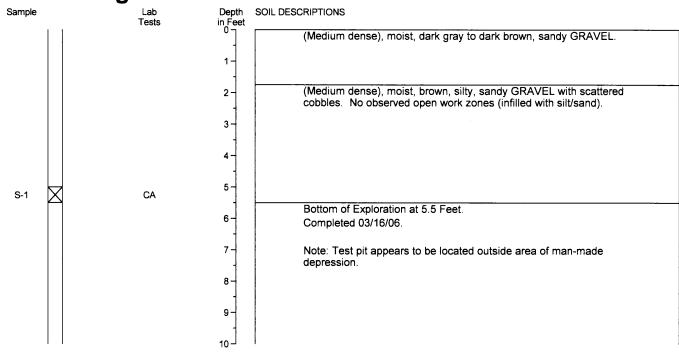
Test Pit Log 05ORTP-2



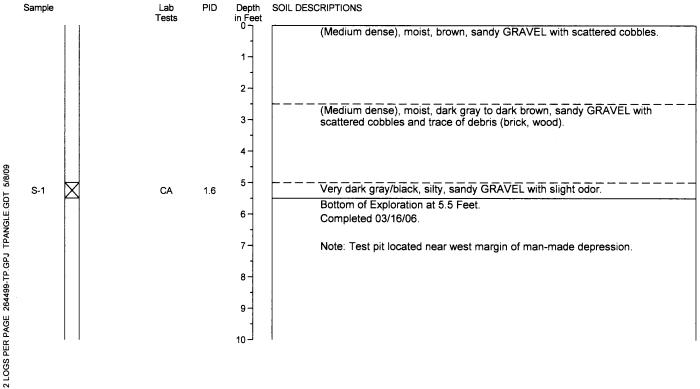
- 1. Refer to Figure A-1 for explanation of descriptions and symbols.
- 2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
- 3. Groundwater conditions, if indicated, are at time of excavation. Conditions may vary with time.
- 05ORTP-1 cont'd Contact dips from north edge of test pit to a depth of approximately 4 feet at the south edge of test pit. Sample collected of native material below this contact.



Test Pit Log 05ORTP-3



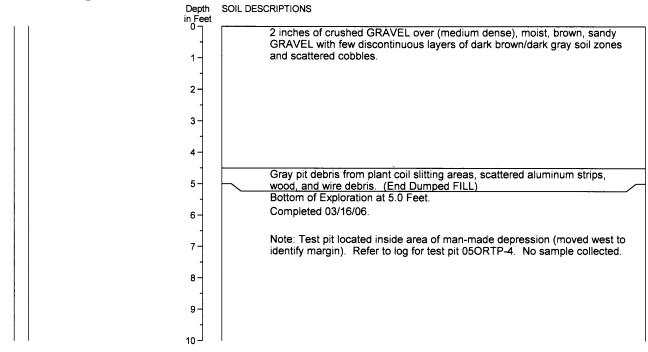
Test Pit Log 05ORTP-4



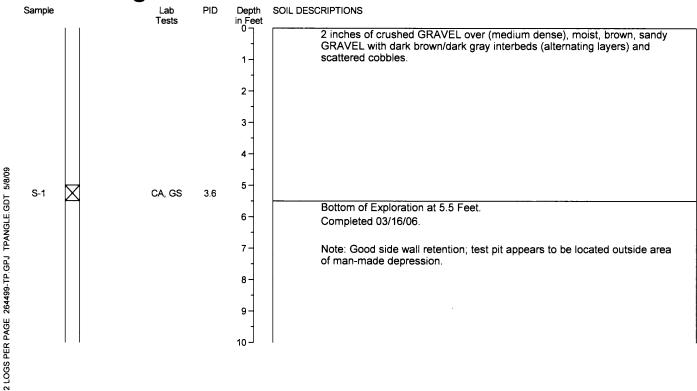


- 1. Refer to Figure A-1 for explanation of descriptions and symbols.
- Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
- Groundwater conditions, if indicated, are at time of excavation. Conditions may vary with time.

Test Pit Log 05ORTP-4A



Test Pit Log 05ORTP-5

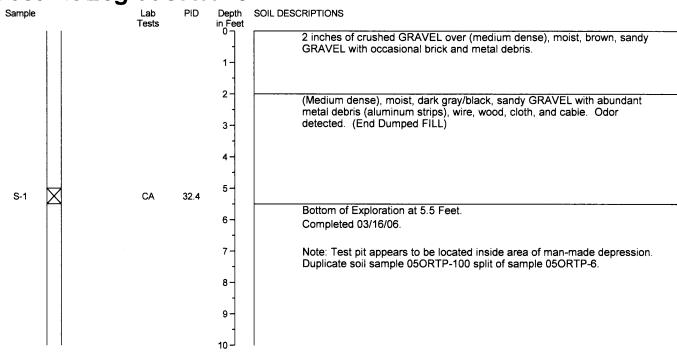




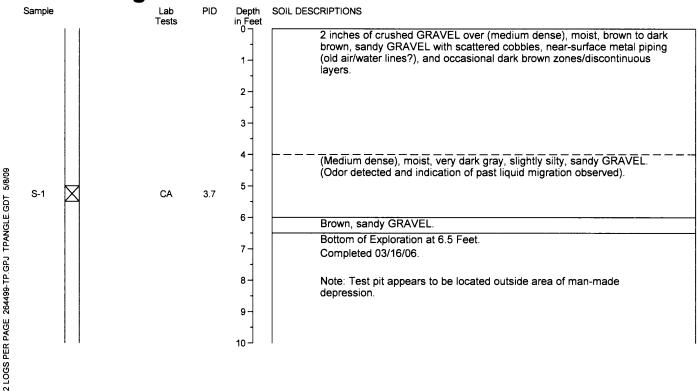
1. Refer to Figure A-1 for explanation of descriptions and symbols.

- Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
- Groundwater conditions, if indicated, are at time of excavation. Conditions may vary with time.

Test Pit Log 05ORTP-6



Test Pit Log 05ORTP-7





- 1. Refer to Figure A-1 for explanation of descriptions and symbols.
- Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
- 3. Groundwater conditions, if indicated, are at time of excavation. Conditions may vary with time.

Location: See Figure 2. Approximate Ground Surface Elevation: Feet Logged By: B. McDonald Reviewed By: G. Both Horizontal Datum: Vertical Datum:

USCS Graphic Class Log	Soil Descriptions	Depth in Feet	Sample	Water Content in Percent	PID	LAB TESTS
	Impacted surficial soil below former perimeter footing.	0				
	(Medium dense), moist, brownish gray to grayish brown, sandy GRAVEL with scattered cobbles to 12-inch-diameter.		rp-1-S1 🔀			-CA
	(Medium dense), moist, grayish brown, sandy GRAVEL with scattered cobbles.	- 5 -	rp-1-S2 🔀			- CA
-	Scattered zones of open work GRAVEL.	-				
<u> </u>		ТР-1	-Bottom			-CA
	Bottom of Test Pit at 9.5 Feet. Started 07/02/08. Completed 07/02/08.	—10 -				
	Note: Very poor side wall retention of fill slope with strong TPH-like odor adjacent to former perimeter footing.	- - - 				

Test Pit Log FCT-TP- 2

Location: See Figure 2. Approximate Ground Surface Elevation: Feet Logged By: B. McDonald Reviewed By: G. Both Horizontal Datum: Vertical Datum:

Soil Descriptions	Depth in Feet	Sample	Water Content in Percent	PID	LAB TESTS
mpacted soil to 1.5-foot depth at former perimeter footing.	0				
(Medium dense), moist, grayish brown, slightly sandy GRAVEL with cobbles up to 12-inch diameter.	 - тр- -	2-S1 🔀			- CA
Medium dense), moist, brownish gray, open work	5 TP-	2-S2 🔀			-CA
SRAVEL.	- - - ТР-2-Во	ottom XX			- CA
Bottom of Test Pit at 9.5 Feet. Started 07/02/08. Completed 07/02/08.	10 				
Note: Open work gravel zones dipping ~15° to the west.	-				
	Medium dense), moist, grayish brown, slightly sandy GRAVEL with cobbles up to 12-inch diameter. Medium dense), moist, brownish gray, open work GRAVEL. Bottom of Test Pit at 9.5 Feet. Started 07/02/08. Completed 07/02/08.	Soil Descriptions in Feet Impacted soil to 1.5-foot depth at former perimeter footing. 0 Medium dense), moist, grayish brown, slightly sandy	Soil Descriptions in Feet Sample Impacted soil to 1.5-foot depth at former perimeter footing. 0 0 0 Medium dense), moist, grayish brown, slightly sandy 0 0 0 0 SRAVEL with cobbles up to 12-inch diameter. 0	Soil Descriptions in Feet Sample in Percent Impacted soil to 1.5-foot depth at former perimeter footing. 0 0 0 Medium dense), moist, grayish brown, slightly sandy TP-2-S1 Impacted soil to 12-inch diameter. TP-2-S1 Medium dense), moist, brownish gray, open work TP-2-S2 Impacted soil to 12-inch diameter. TP-2-S2 Medium dense), moist, brownish gray, open work TP-2-S2 Impacted soil to 12-inch diameter. TP-2-S2 Medium dense), moist, brownish gray, open work TP-2-S2 Impacted soil to 12-inch diameter. TP-2-S2 Medium dense), moist, brownish gray, open work TP-2-S2 Impacted soil to 12-inch diameter. TP-2-S2 Soltom of Test Pit at 9.5 Feet. TP-2-Bottom Impacted soil to 12-inch diameter. TP-2-Bottom Soltom of Test Pit at 9.5 Feet. TP-2-Bottom Impacted soil to 12-inch diameter. TP-2-Bottom Soltom of Test Pit at 9.5 Feet. TP-2-Bottom TP-2-Bottom TP-2-Bottom Soltom of Test Pit at 9.5 Feet. TP-2-Bottom TP-2-Bottom TP-2-Bottom Soltom of Test Pit at 9.5 Feet. TP-2-Bottom TP-2-Bottom TP-2-Bottom Soltom of Test Pit at 9.5 Feet. TP-2-Bottom T	Soil Descriptions in Feet Sample in Percent PID mpacted soil to 1.5-foot depth at former perimeter footing. 0

1. Refer to Figure C-1 for explanation of descriptions and symbols.

- Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
 USCS designations are based on visual manual classification (ASTM D 2488) unless otherwise
- supported by laboratory testing (ASTM D 2487).
 Groundwater conditions, if indicated, are at time of excavation. Conditions may vary with time.
- 5. Depth measured from base of former perimeter tank footing.

2644-112 7/08 Figure A-64

HARTCROWSER

Location: See Figure 2.

Approximate Ground Surface Elevation: Feet Logged By: B. McDonald Reviewed By: G. Both

Horizontal Datum: Vertical Datum:

Horizontal Datum:

Vertical Datum:

USCS Graphi Class Log	c Soil Descriptions	Depth in Feet	Sample	Water Content in Percent	PID	LAB TESTS
	No detectable impacted soils below former perimeter footing.	0				
	(Medium dense), moist, grayish brown, sandy GRAVEL with scattered cobbles up to 12-inch diameter.	 TP-3-S1	፟			-CA
		—5				
	(Medium dense), moist, grayish brown, slightly sandy, open work GRAVEL.		XX			-CA
	Bottom of Test Pit at 9.5 Feet. Started 07/02/08. Completed 07/02/08.	_ TP-3-Bottom 	XX			- CA
	Note: Open work gravel zones dipping ~20° to the west.	- - 				

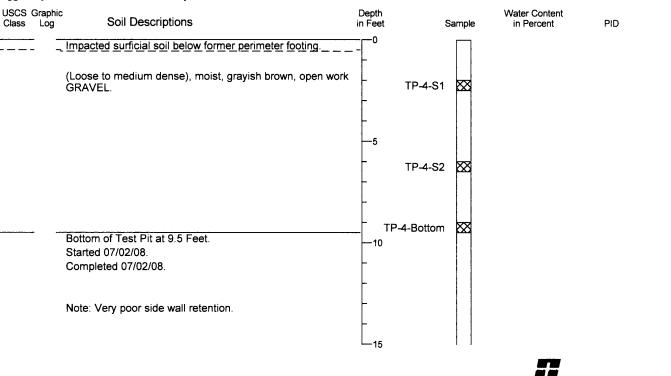
Test Pit Log FCT-TP- 4

Location: See Figure 2.

2644112-TP.GPJ HC_CORP.GDT 5/8/09

NEW TEST PIT LOG

Approximate Ground Surface Elevation: Feet Logged By: B. McDonald Reviewed By: G. Both



1. Refer to Figure C-1 for explanation of descriptions and symbols.

 Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
 USCS designations are based on visual manual classification (ASTM D 2488) unless otherwise supported by laboratory testing (ASTM D 2487).

4. Groundwater conditions, if indicated, are at time of excavation. Conditions may vary with time. 5. Depth measured from base of former perimeter tank footing.



LAB

TESTS

CA

CA

CA

Location: See Figure 2. Approximate Ground Surface Elevation: Feet

Logged By: B. McDonald Reviewed By: G. Both

Horizontal Datum: Vertical Datum:

USCS Graphic Class Log Soil Descriptions	Depth in Feet	Sample	Water Content in Percent	PID	LAB TESTS
(Loose), moist, grayish brown, open work GRAVEL.	0				
	- т	P-5-S1 🔀			-CA
	5				
Scattered cobbles.	- т	P-5-S2 🔀			-CA
Bottom of Test Pit at 9.0 Feet	- TP-5-	Bottom 🔀			-CA
Started 07/02/08. Completed 07/02/08.	10				
Note: Impacted surficial soil on west side of excavation	-				
between depths of 2.0 to 2.5 feet.	-				
	L_15				

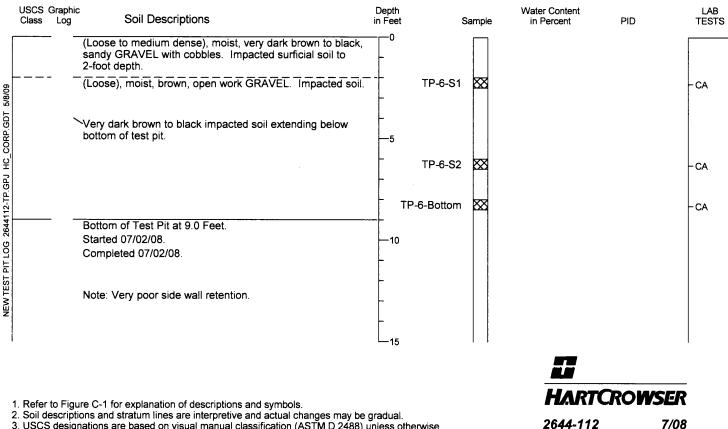
Test Pit Log FCT-TP- 6

Location: See Figure 2.

Approximate Ground Surface Elevation: Feet Logged By: B. McDonald Reviewed By: G. Both

Horizontal Datum: Vertical Datum:

Figure A-66

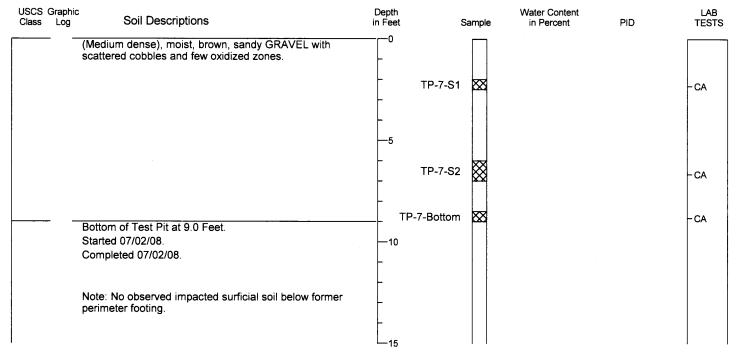


3. USCS designations are based on visual manual classification (ASTM D 2488) unless otherwise supported by laboratory testing (ASTM D 2487).
 Groundwater conditions, if indicated, are at time of excavation. Conditions may vary with time.

5. Depth measured from base of former perimeter tank footing.

Location: See Figure 2.

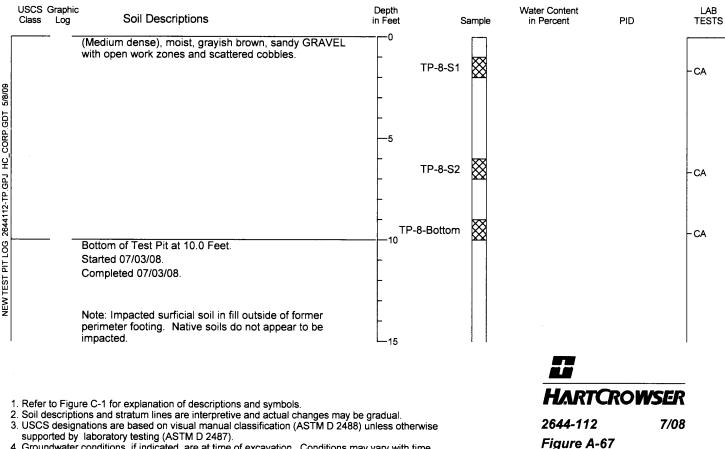
Approximate Ground Surface Elevation: Feet Logged By: B. McDonald Reviewed By: G. Both Horizontal Datum: Vertical Datum:



Test Pit Log FCT-TP- 8

Location: See Figure 2. Approximate Ground Surface Elevation: Feet Logged By: B. McDonald Reviewed By: G. Both





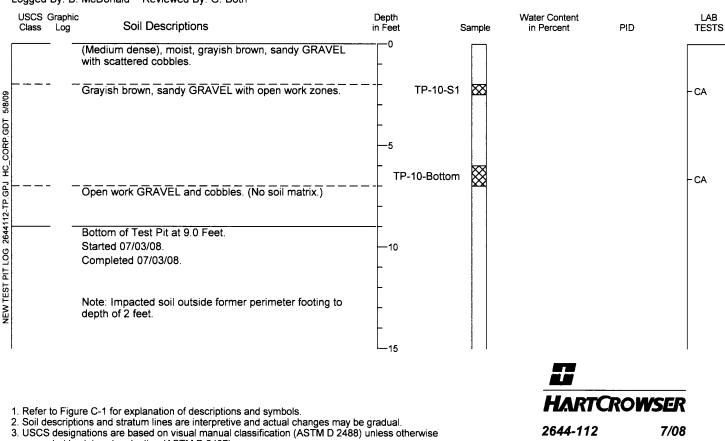
Groundwater conditions, if indicated, are at time of excavation. Conditions may vary with time. 4 5. Depth measured from base of former perimeter tank footing.

Location: See Figure 2. Approximate Ground Surface Elevation: Feet Logged By: B. McDonald Reviewed By: G. Both Horizontal Datum: Vertical Datum:

USCS Graphi Class Log	c Soil Descriptions	Depth in Feet	Sample	Water Content in Percent	PID	LAB TESTS
	(Loose to medium dense), moist, dark gray, open work GRAVEL.	0				
		TP.	.9-S1			- CA
	(Medium dense), moist, grayish brown, sandy GRAVEL with open work/cobble zones to ~8 feet (dipping ~15° west).					
		- тр.	-9-S2 🔀			-CA
		- ТР-9-Во	ottom 🔀			- CA
	Bottom of Test Pit at 9.0 Feet. Started 07/03/08. Completed 07/03/08.	—– —–10 –				
	Note: Impacted soil on western edge of former perimeter footing to depth of 4 feet.	- - 				

Test Pit Log FCT-TP-10

Location: See Figure 2. Approximate Ground Surface Elevation: Feet Logged By: B. McDonald Reviewed By: G. Both Horizontal Datum: Vertical Datum:



- supported by laboratory testing (ASTM D 2487).
- 4. Groundwater conditions, if indicated, are at time of excavation. Conditions may vary with time. 5. Depth measured from base of former perimeter tank footing.
- Figure A-68

7/08

2644-112

Location: See Figure 2.

Approximate Ground Surface Elevation: Feet Logged By: B. McDonald Reviewed By: G. Both Horizontal Datum: Vertical Datum:

USCS Graphic Class Log	Soil Descriptions	Depth in Feet	Sample	Water Content in Percent	PID	LAB TESTS
	(Medium dense), moist, grayish brown, sandy GRAVEL with scattered cobbles.	0 				
		_ TP-11-Botto	m 🕅			- CA
	Bottom of Test Pit at 3.0 Feet. Started 07/03/08.	-				
1	Completed 07/03/08.	5				
	Note: Excavator not able to excavate deeper when extending over reinforced slab.	-				
		-				
		-10				
		F				
		-				
		-				
		F				
		15				

Test Pit Log FCT-TP-12

Location: See Figure 2. Approximate Ground Surface Elevation: Feet

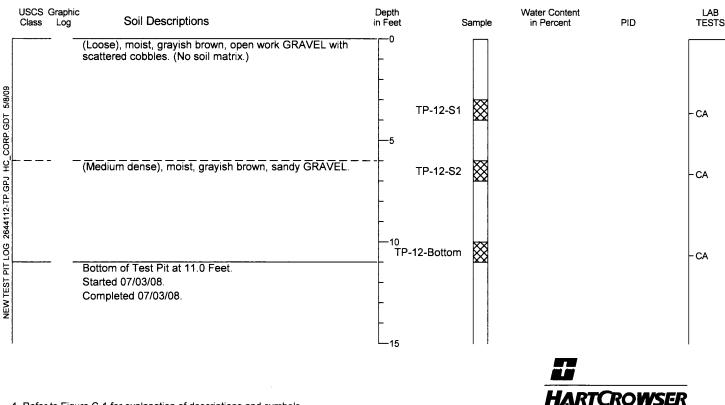


2644-112

Figure A-69

7/08

Logged By: B. McDonald Reviewed By: G. Both USCS Graphic



1. Refer to Figure C-1 for explanation of descriptions and symbols.

- Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
 USCS designations are based on visual manual classification (ASTM D 2488) unless otherwise

supported by laboratory testing (ASTM D 2487). 4. Groundwater conditions, if indicated, are at time of excavation. Conditions may vary with time.

5. Depth measured from base of former perimeter tank footing.

Test Pit Log FCT-TP-13

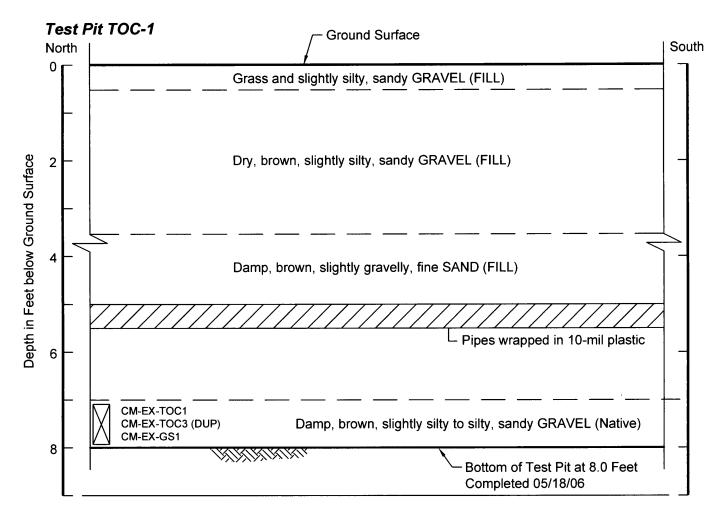
Location: See Figure 2. Approximate Ground Surface Elevation: Feet Logged By: B. McDonald Reviewed By: G. Both

Horizontal Datum: Vertical Datum:

USCS Graphic Class Log	Soil Descriptions	Depth in Feet	Sample	Water Content in Percent	PID	LAB TESTS
	(Loose), moist, grayish brown, open work GRAVEL. (No soil matrix.)	0				
		- TF	P-13-S1			-CA
		-5				
	(Loose), moist, grayish brown, open work GRAVEL with scattered cobbles.	ат]	P-13-S2			- CA
	Bottom of Test Pit at 11.0 Feet. Started 07/03/08.	 TP-13-	Bottom			-CA
	Completed 07/03/08.	F				
	Note: Poor side wall retention to depth of 6 feet.	15				

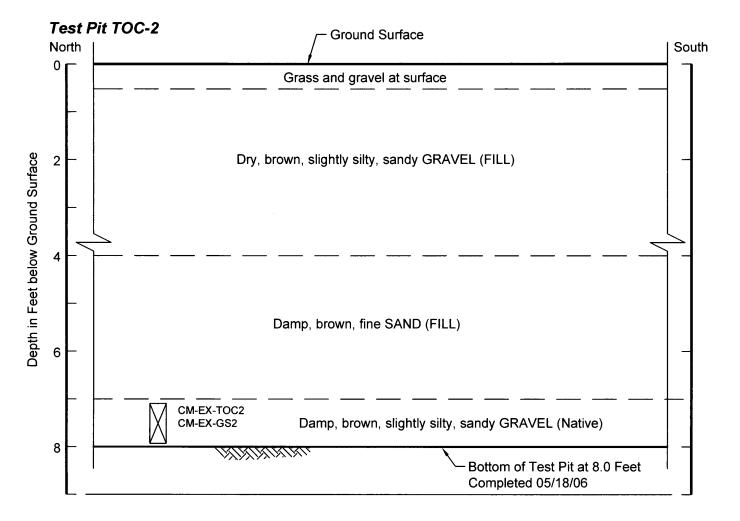


- Refer to Figure C-1 for explanation of descriptions and symbols.
 Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
 USCS designations are based on visual manual classification (ASTM D 2488) unless otherwise supported by laboratory testing (ASTM D 2487).
 Groundwater conditions, if indicated, are at time of excavation. Conditions may vary with time.
 Depth measured from base of former perimeter tank footing.



Notes:

1. Collected two 5-gallon buckets of soil (CM-EX-GS1) at depth of 7 to 8 feet for grain size analysis.

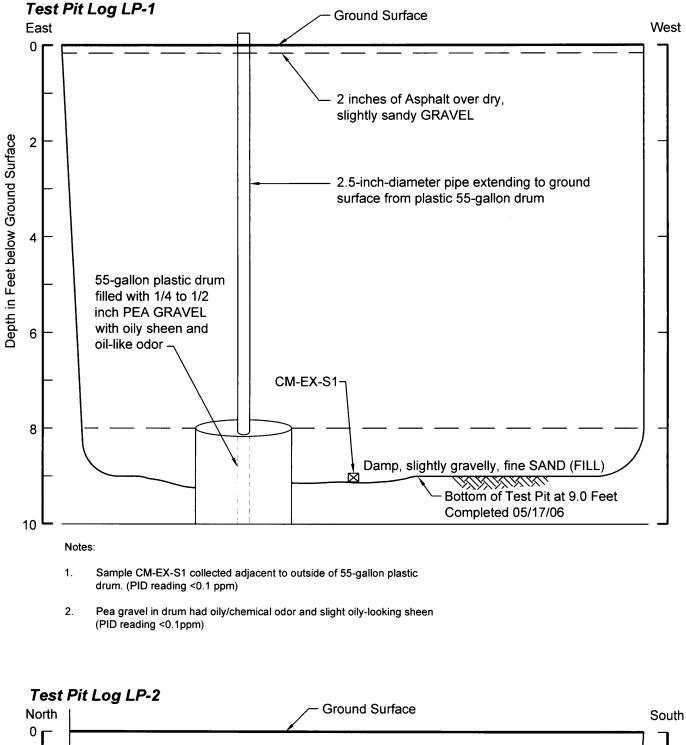


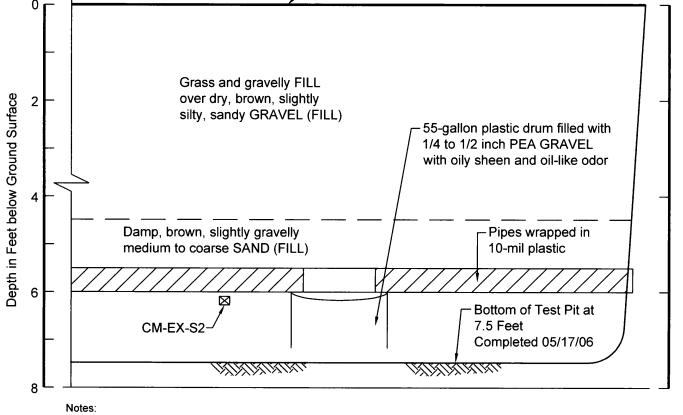
Notes:

1. Collected two 5-gallon buckets of soil (CM-EX-GS2) at depth of 7 to 8 feet for grain size analysis.





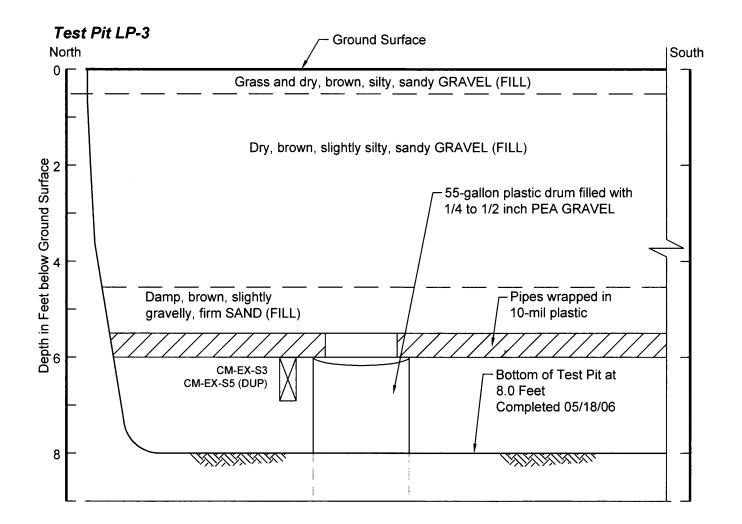




- 1. Sample CM-EX-S2 collected adjacent to outside of 55-gallon plastic drum. (PID reading <0.1 ppm)
- 2. Pea gravel in drum had oily/chemical odor and slight oily-looking sheen (PID reading <0.1ppm)







Notes:

Sample CM-EX-S3 and CM-EX-S5 (DUP) collected adjacent to outside 1. of 55-gallon plastic drum. (PID reading <0.1 ppm)

2 4 0

Scale in Feet



APPENDIX B INPUT PARAMETERS AND DERIVATION OF SATURATED AND UNSATURATED SOIL SCREENING LEVELS

Table B-1 - Unsaturated 3-Phase Soil Screening Levels and Calculation Parameters for MTCA eqn 747-1

	3-Phase Soil	Chosen												
Chemical Constituent	Screening Level	GW Level	Method B GW	MCL	Bulk Density	Soil Water	Soil Air	Dilution	H'	K _{oc}	K _d	foc	Data Source	Checked (f)
	in mg/kg (a)	in µg/L (b)	in µg/L	in µg/L	in g/cc	in cc/cc	in cc/cc	Factor	in cc/cc	in ml/g	in cc/g	in %	Η'	K _d & K _{oc}
Antimony	5.42	6	6.4	6	1.5	0.3	0.13	20	0	45	45	100.00%	CLARC online	CLARC online
Arsenic	0.0341	0.0583	0.0583	10	1.5	0.3	0.13	20	0	29	29	100.00%	CLARC online	CLARC online
Barium	1650	2000	3200	2000	1.5	0.3	0.13	20	0	41	41	100.00%	CLARC online	CLARC online
Beryllium	63.2	4	32	4	1.5	0.3	0.13	20	0	790	790	100.00%	CLARC online	CLARC online
Cadmium	0.69	5	8	5	1.5	0.3	0.13	20	0	6.7	6.7	100.00%	CLARC online	CLARC online
Chromium (c)	2000	100	24000	100	1.5	0.3	0.13	20	0	1000	1000	100.00%	CLARC online	CLARC online
Copper	263	592	592	1300	1.5	0.3	0.13	20	0	22	22	100.00%	CLARC online	CLARC online
Hexavalent Chromium	18.4	48	48	100	1.5	0.3	0.13	20	0	19	19	100.00%	CLARC online	CLARC online
Lead	NC	15		15	1.5	0.3	0.13	20	0	10000	10000	100.00%	EPA 9 PRGs	EPA 9 PRGs
Manganese	52.2	50	2240	50	1.5	0.3	0.13	20	0	52	52	100.00%	CLARC online	EPA 3
Mercury	2.09	2	4.8	2	1.5	0.3	0.13	20	0.47	52	52	100.00%	CLARC online	CLARC online
Nickel	130	100	320	100	1.5	0.3	0.13	20	0	65	65	100.00%	CLARC online	CLARC online
Selenium	5.2	50	80	50	1.5	0.3	0.13	20	0	5	5	100.00%	CLARC online	CLARC online
Silver	13.6	80	80	100	1.5	0.3	0.13	20	0	8.3	8.3	100.00%	CLARC online	CLARC online
Thallium	1.595	1.12	1.12	2	1.5	0.3	0.13	20	0	71	71	100.00%	CLARC online	CLARC online
Zinc	5970	4800	4800	5000	1.5	0.3	0.13	20	0	62	62	100.00%	CLARC online	CLARC online
Total PCBs	0.271	0.0438	0.0438	0.5	1.5	0.3	0.13	20		310000	310	0.10%	CLARC online	CLARC online
1-Methylnaphthalene (d)	2.19	32	32		1.5	0.3	0.13	20	0.021	3220	3.22	0.10%	EPA 9 PRGs	Montgomery
2-Methylnaphthalene	2.19	32	32		1.5	0.3	0.13	20	0.021	3220	3.22	0.10%	EPA 9 PRGs	Montgomery
Acenaphthene	97.9	960	960		1.5	0.3	0.13	20	0.0064	4900	4.9	0.10%	CLARC online	CLARC online
Anthracene	2230	4800	4800		1.5	0.3	0.13	20	0.0027	23000	23	0.10%	CLARC online	CLARC online
Benzo(a)pyrene	0.233	0.012	0.012	0.2	1.5	0.3	0.13	20	0.000046	970000	970	0.10%	CLARC online	CLARC online
Bis(2-Ethylhexyl)Phthalate	13.2	6	6.25	6	1.5	0.3	0.13	20	0.0000042	110000	110	0.10%	CLARC online	CLARC online
Dibenzofuran	5.09	32	32		1.5	0.3	0.13	20	0.000533	7760	7.76	0.10%	EPA 9 PRGs 2002	EPA 9 PRGs 2002
Di-n-butylphthalate	57.6	1600	1600		1.5	0.3	0.13	20	0.00000039	1600	1.6	0.10%	CLARC online	CLARC online
Di-n-octylphthalate	531000	320	320		1.5	0.3	0.13	20	0.0027	83000000	83000	0.10%	CLARC online	CLARC online
Fluoranthene	630	640	640		1.5	0.3	0.13	20	0.00066	49000	49	0.10%	CLARC online	CLARC online
Fluorene	101	640	640		1.5	0.3	0.13	20	0.0026	7700	7.7	0.10%	CLARC online	CLARC online
Naphthalene	4.49	160	160		1.5	0.3	0.13	20	0.02	1200	1.2	0.10%	CLARC online	CLARC online
N-Nitrosodiphenylamine	0.536	17.9	17.9		1.5	0.3	0.13	20	0.00021	1300	1.3	0.10%	CLARC online	CLARC online
Phenol	22	4800	4800		1.5	0.3	0.13	20	0.000016	29	0.029	0.10%	CLARC online	CLARC online
Pyrene	655	480	480		1.5	0.3	0.13	20	0.00045	68000	68	0.10%	CLARC online	CLARC online
1,1,1-Trichloroethane	1.61	200	7200	200	1.5	0.3	0.13	20	0.71	140	0.14	0.10%	CLARC online	CLARC online
1,1-Dichloroethane	8.73	1600	1600		1.5	0.3	0.13	20	0.23	53	0.053	0.10%	CLARC online	CLARC online
1,2,4-Trimethylbenzene	31.4	400	400		1.5	0.3	0.13	20	0.23	3700	3.7	0.10%	EPA 9 PRGs	EPA 9 PRGs
1,3,5-Trimethylbenzene	8.38	400	400		1.5	0.3	0.13	20	0.32	820	0.82	0.10%	EPA 9 PRGs	EPA 9 PRGs
2-Butanone (MEK)	19.7	4800	4800		1.5	0.3	0.13	20	0.0023	4.5	0.0045	0.10%	EPA 9 PRGs	EPA 9 PRGs
2-Chlorotoluene	2.39	320	320		1.5	0.3	0.13	20	0.15	160	0.16	0.10%	EPA 9 PRGs	EPA 9 PRGs
4-Chlorotoluene	4.18	560	560		1.5	0.3	0.13	20	0.15	160	0.16	0.10%	EPA 9 PRGs	EPA 9 PRGs
Acetone	3.21	800	800		1.5	0.3	0.13	20	0.0016	0.58	0.00058	0.10%	CLARC online	CLARC online
Benzene	0.00449	0.796	0.796	5	1.5	0.3	0.13	20	0.23	62	0.062	0.10%	CLARC online	CLARC online
Bromomethane	0.0519	11.2	11.2		1.5	0.3	0.13	20	0.26	9	0.009	0.10%	CLARC online	CLARC online
Carbon Disulfide	5.6	800	800		1.5	0.3	0.13	20	1.2	46	0.046	0.10%	CLARC online	CLARC online
Chloroform	0.0382	7.17	7.17	80	1.5	0.3	0.13	20	0.15	53	0.053	0.10%	CLARC online	CLARC online
Chloromethane	0.0215	3.37	3.37		1.5	0.3	0.13	20	0.98	35	0.035	0.10%	EPA 9 PRGs	EPA 9 PRGs
Dichlorodifluoromethane	47.1	1600	1600		1.5	0.3	0.13	20	14	58	0.058	0.10%	EPA 9 PRGs	EPA 9 PRGs
Ethylbenzene	5.99	700	800	700	1.5	0.3	0.13	20	0.32	200	0.2	0.10%	CLARC online	CLARC online
Isopropylbenzene	7.37	800	800		1.5	0.3	0.13	20	0.472	220	0.22	0.10%	EPA 9 PRGs	EPA 9 PRGs
m,p-Xylenes (e)	8.52	1000	16000	1000	1.5	0.3	0.13	20	0.3	200	0.2	0.10%	CLARC online	CLARC online

Table B-1 - Unsaturated 3-Phase Soil Screening Levels and Calculation Parameters for MTCA eqn 747-1

	3-Phase Soil	Chosen												
Chemical Constituent	Screening Level	GW Level	Method B GW	MCL	Bulk Density	Soil Water	Soil Air	Dilution	H'	K _{oc}	K _d	foc	Data Source	Checked (f)
	in mg/kg (a)	in µg/L (b)	in µg/L	in µg/L	in g/cc	in cc/cc	in cc/cc	Factor	in cc/cc	in ml/g	in cc/g	in %	H'	K _d & K _{oc}
Methylene Chloride	0.0218	5	5.83	5	1.5	0.3	0.13	20	0.09	10	0.01	0.10%	CLARC online	CLARC online
Naphthalene	4.49	160	160		1.5	0.3	0.13	20	0.02	1200	1.2	0.10%	CLARC online	CLARC online
N-Butylbenzene	19.5	320	320		1.5	0.3	0.13	20	0.54	2800	2.8	0.10%	EPA 9 PRGs	EPA 9 PRGs
N-Propylbenzene	19.5	320	320		1.5	0.3	0.13	20	0.54	2800	2.8	0.10%	EPA 9 PRGs 2002	EPA 9 PRGs 2002
o-Xylene	0.916	100	16000	100	1.5	0.3	0.13	20	0.21	240	0.24	0.10%	CLARC online	CLARC online
Sec-Butylbenzene	15.8	320	320		1.5	0.3	0.13	20	0.77	2200	2.2	0.10%	EPA 9 PRGs	EPA 9 PRGs
Styrene	0.0327	1.46	1.46	100	1.5	0.3	0.13	20	0.11	910	0.91	0.10%	CLARC online	CLARC online
Tert-Butylbenzene	15.6	320	320		1.5	0.3	0.13	20	0.52	2200	2.2	0.10%	EPA 9 PRGs	EPA 9 PRGs
Tetrachloroethene	0.000867	0.081	0.081	5	1.5	0.3	0.13	20	0.75	270	0.27	0.10%	CLARC online	CLARC online
Toluene	4.65	640	640	1000	1.5	0.3	0.13	20	0.27	140	0.14	0.10%	CLARC online	CLARC online
Total Xylenes	14.5	1600	1600	10000	1.5	0.3	0.13	20	0.28	230	0.23	0.10%	CLARC online	CLARC online
Trichloroethene	0.00325	0.492	0.492	5	1.5	0.3	0.13	20	0.422	94	0.094	0.10%	CLARC online	CLARC online

Notes:

(a) Based on a Fixed Parameter 3-Phase Partitioning Model for deriving soil concentrations for groundwater protection as specified in WAC 173-340-747, unless otherwise specified.

(b) Chosen groundwater level based on lowest value between Method B groundwater level and Maximum Contaminant Level (MCL).

(c) Screening level for chromium based on chromium (III).

(d) Screening level for 1-Methylnaphthalene based on 2-Methylnaphthalene

(e) Screening level for m,p-xylenes based on m-xylenes.

(f) Data Sources Checked:

Montgomery: Montgomery, John H., 1996. Groundwater Chemicals Desk Reference, 2nd Ed. Boca Raton: CRC Press (Lewis Publishers).

EPA 9 PRGs 2002: EPA Region 9 program table, 2002.

EPA 3: Value obtained from EPA Region 3 Screening Level website in 2006. Link no longer exists.

CLARC online: https://fortress.wa.gov/ecy/clarc/CLARCHome.aspx

EPA 9 PRGs: http://www.epa.gov/region09/superfund/prg/

Blank indicates no MCL or Method B Groundwater Cleanup Level established.

NC indicates 3-Phase Soil Screening Level not calculated. MTCA Method A Soil Cleanup Level used as screening level (see Table 1-1).

Table B-2 - Saturated 3-Phase Soil Screening Levels and Calculation Parameters for MTCA eqn 747-1

Chemical Constituent	3-Phase Soil Screening Level	Chosen GW Level	Method B GW	MCL	Bulk Density	Soil Water	Soil Air	Dilution	H'	K _{oc}	K _d	foc	Data Source (Checked (e)
	in mg/kg (a)	in µg/L (b)	in µg/L	in µg/L	in g/cc	in cc/cc	in cc/cc	Factor	in cc/cc	in ml/g	in cc/g	in %	Η'	K _d & K _{oc}
Antimony	0.272	6	6.4	6	1.5	0.4	0	1	0	45	45	100.00%	CLARC online	CLARC online
Arsenic	0.00171	0.0583	0.0583	10	1.5	0.4	0	1	0	29	29	100.00%	CLARC online	CLARC online
Barium	82.6	2000	3200	2000	1.5	0.4	0	1	0	41	41	100.00%	CLARC online	CLARC online
Cadmium	0.0349	5	8	5	1.5	0.4	0	1	0	6.7	6.7	100.00%	CLARC online	CLARC online
Chromium (c)	100	100	24000	100	1.5	0.4	0	1	0	1000	1000	100.00%	CLARC online	CLARC online
Hexavalent Chromium	0.926	48	48	100	1.5	0.4	0	1	0	19	19	100.00%	CLARC online	CLARC online
Lead	NC	15		15	1.5	0.4	0	1	0	10000	10000	100.00%	EPA 9 PRGs	EPA 9 PRGs
Manganese	2.61	50	2240	50	1.5	0.4	0	1	0	52	52	100.00%	CLARC online	EPA 3
Mercury	0.105	2	4.8	2	1.5	0.4	0	1	0.47	52	52	100.00%	CLARC online	CLARC online
Selenium	0.264	50	80	50	1.5	0.4	0	1	0	5	5	100.00%	CLARC online	CLARC online
Silver	0.687	80	80	100	1.5	0.4	0	1	0	8.3	8.3	100.00%	CLARC online	CLARC online
Total PCBs	0.0136	0.0438	0.0438	0.5	1.5	0.4	0	1		310000	310	0.10%	CLARC online	CLARC online
2-Methylnaphthalene	0.112	32	32	0.0	1.5	0.4	0	1	0.021	3220	3.22	0.10%	EPA 9 PRGs	Montgomery
Acenaphthene	4.98	960	960		1.5	0.4	0	1	0.0064	4900	4.9	0.10%	CLARC online	CLARC online
Anthracene	112	4800	4800		1.5	0.4	0	1	0.0027	23000	23	0.10%	CLARC online	CLARC online
Benzo(a)pyrene	0.0116	0.012	0.012	0.2	1.5	0.4	0	1	0.000046	970000	970	0.10%	CLARC online	CLARC online
Bis(2-Ethylhexyl)Phthalate	0.662	6	6.25	6	1.5	0.4	0	1	0.0000042	110000	110	0.10%	CLARC online	CLARC online
Dibenzofuran	0.257	32	32		1.5	0.4	0	1	0.000533	7760	7.76	0.10%	EPA 9 PRGs 2002	EPA 9 PRGs 2002
Di-n-butylphthalate	3.02	1600	1600		1.5	0.4	0	1	0.00000039	1600	1.6	0.10%	CLARC online	CLARC online
Di-n-octylphthalate	26600	320	320		1.5	0.4	0	1	0.0027	83000000	83000	0.10%	CLARC online	CLARC online
Fluoranthene	31.5	640	640		1.5	0.4	0	1	0.00066	49000	49	0.10%	CLARC online	CLARC online
Fluorene	5.11	640	640		1.5	0.4	0	1	0.0026	7700	7.7	0.10%	CLARC online	CLARC online
Naphthalene	0.238	160	160		1.5	0.4	0	1	0.02	1200	1.2	0.10%	CLARC online	CLARC online
N-Nitrosodiphenylamine	0.0283	17.9	17.9		1.5	0.4	0	1	0.00021	1200	1.2	0.10%	CLARC online	CLARC online
Phenol	1.52	4800	4800		1.5	0.4	0	1	0.000016	29	0.029	0.10%	CLARC online	CLARC online
Pyrene	32.8	480	480		1.5	0.4	0	1	0.00045	68000	68	0.10%	CLARC online	CLARC online
1,1,1-Trichloroethane	0.0853	200	7200	200	1.5	0.4	0	1	0.71	140	0.14	0.10%	CLARC online	CLARC online
1,1-Dichloroethane	0.543	1600	1600	200	1.5	0.4	0	1	0.23	53	0.053	0.10%	CLARC online	CLARC online
1,2,4-Trimethylbenzene	1.6	400	400		1.5	0.4	0	1	0.23	3700	3.7	0.10%	EPA 9 PRGs	EPA 9 PRGs
1,3,5-Trimethylbenzene	0.443	400	400		1.5	0.4	0	1	0.32	820	0.82	0.10%	EPA 9 PRGs	EPA 9 PRGs
2-Butanone (MEK)	1.4	4800	4800		1.5	0.4	0	1	0.0023	4.5	0.0045	0.10%	EPA 9 PRGs	EPA 9 PRGs
2-Chlorotoluene	0.143	320	320		1.5	0.4	0	1	0.15	160	0.16	0.10%	EPA 9 PRGs	EPA 9 PRGs
4-Chlorotoluene	0.25	560	560		1.5	0.4	0	1	0.15	160	0.16	0.10%	EPA 9 PRGs	EPA 9 PRGs
Acetone	0.23	800	800		1.5	0.4	0	1	0.0016	0.58	0.00058	0.10%	CLARC online	CLARC online
Benzene	0.000277	0.796	0.796	5	1.5	0.4	0	1	0.0010	62	0.062	0.10%	CLARC online	CLARC online
Bromomethane	0.00331	11.2	11.2		1.5	0.4	0	1	0.26	9	0.009	0.10%	CLARC online	CLARC online
Carbon Disulfide	0.266	800	800		1.5	0.4	0	1	1.2	46	0.046	0.10%	CLARC online	CLARC online
Chloroform	0.00244	7.17	7.17	80	1.5	0.4	0	1	0.15	53	0.053	0.10%	CLARC online	CLARC online
Chloromethane	0.00108	3.37	3.37		1.5	0.4	0	1	0.98		0.035	0.10%	EPA 9 PRGs	EPA 9 PRGs
Dichlorodifluoromethane	0.551	1600	1600		1.5	0.4	0	1	14	58	0.058	0.10%	EPA 9 PRGs	EPA 9 PRGs
Ethylbenzene	0.341	700	800	700	1.5	0.4	0	1	0.32	200	0.2	0.10%	CLARC online	CLARC online
Isopropylbenzene	0.405	800	800	100	1.5	0.4	0	1	0.32		0.22	0.10%	EPA 9 PRGs	EPA 9 PRGs
m,p-Xylenes (d)	0.487	1000	16000	1000	1.5	0.4	0	1	0.472	200	0.22	0.10%	CLARC online	CLARC online
Methylene Chloride	0.00148	5	5.83	5	1.5	0.4	0	1	0.09	10	0.2	0.10%	CLARC online	CLARC online
Naphthalene	0.238	160	160	5	1.5	0.4	0	1	0.09	1200	1.2	0.10%	CLARC online	CLARC online
N-Butylbenzene	0.988	320	320		1.5	0.4	0	1	0.54	2800	2.8	0.10%	EPA 9 PRGs	EPA 9 PRGs
N-Propylbenzene	0.988	320	320		1.5	0.4	0	1	0.54		2.8	0.10%	EPA 9 PRGs 2002	EPA 9 PRGs 2002
o-Xylene	0.0527	100	16000	100	1.5	0.4	0	1	0.34	2800	0.24	0.10%	CLARC online	CLARC online
Sec-Butylbenzene	0.796	320	320	100	1.5	0.4	0	1	0.21	240	2.2	0.10%	EPA 9 PRGs	EPA 9 PRGs

Table B-2 - Saturated 3-Phase Soil Screening Levels and Calculation Parameters for MTCA eqn 747-1

	3-Phase Soil	Chosen												
Chemical Constituent	Screening Level	GW Level	Method B GW	MCL	Bulk Density	Soil Water	Soil Air	Dilution	Η'	K _{oc}	K _d	foc	Data Source C	Checked (e)
	in mg/kg (a)	in µg/L (b)	in µg/L	in µg/L	in g/cc	in cc/cc	in cc/cc	Factor	in cc/cc	in ml/g	in cc/g	in %	H'	K _d & K _{oc}
Styrene	0.00175	1.46	1.46	100	1.5	0.4	0	1	0.11	910	0.91	0.10%	CLARC online	CLARC online
Tert-Butylbenzene	0.796	320	320		1.5	0.4	0	1	0.52	2200	2.2	0.10%	EPA 9 PRGs	EPA 9 PRGs
Tetrachloroethene	0.0000451	0.081	0.081	5	1.5	0.4	0	1	0.75	270	0.27	0.10%	CLARC online	CLARC online
Toluene	0.273	640	640	1000	1.5	0.4	0	1	0.27	140	0.14	0.10%	CLARC online	CLARC online
Total Xylenes	0.827	1600	1600	10000	1.5	0.4	0	1	0.28	230	0.23	0.10%	CLARC online	CLARC online
Trichloroethene	0.000187	0.492	0.492	5	1.5	0.4	0	1	0.422	94	0.094	0.10%	CLARC online	CLARC online

Notes:

(a) Based on a Fixed Parameter 3-Phase Partitioning Model for deriving soil concentrations for groundwater protection as specified in WAC 173-340-747, unless otherwise specified.

(b) Chosen groundwater level based on lowest value between Method B groundwater level and Maximum Contaminant Level (MCL).

(c) Screening level for chromium based on chromium (III).

(d) Screening level for m,p-xylenes based on m-xylenes.

(e) Data Sources Checked:

Montgomery: Montgomery, John H., 1996. Groundwater Chemicals Desk Reference, 2nd Ed. Boca Raton: CRC Press (Lewis Publishers).

EPA 9 PRGs 2002: EPA Region 9 program table, 2002.

EPA 3: Value obtained from EPA Region 3 Screening Level website in 2006. Link no longer exists.

CLARC online: https://fortress.wa.gov/ecy/clarc/CLARCHome.aspx

EPA 9 PRGs: http://www.epa.gov/region09/superfund/prg/

Blank indicates no MCL or Method B Groundwater Cleanup Level established.

NC indicates 3-Phase Soil Screening Level not calculated. MTCA Method A Soil Cleanup Level used as screening level (see Table 1-2).

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APPENDIX C CHEMICAL DATA QUALITY REVIEW SUMMARY

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APPENDIX C CHEMICAL DATA QUALITY REVIEW SUMMARY

C.1 Summary of Data Validation Effort

The quality assurance (QA) review of 688 soil samples and 3 soil gas samples collected from the Kaiser Trentwood facility from March 2005 to October 2008 has been completed for the RI/FS report. Soil samples collected prior to March 2005 and groundwater samples included presented in this report have been previously reviewed.

Samples were submitted to Columbia Analytical Services, Inc. (CAS) of Kelso, WA and Advanced Analytical Laboratories, Inc. (AAL) of Redmond, WA. The laboratory submitted data packages were reviewed by Hart Crowser. The quality assurance evaluation performed and the resulting data qualification recommendations have been summarized by laboratory sample delivery groups (SDGs) for the submitted packages.

The summaries of the laboratory analyses have been evaluated in accordance with the Quality Assurance Project Plan (QAPP) in the Phase I Remedial Investigation Work Plan (Hart Crowser 2005), specific method requirements, laboratory control limits, and EPA Data Validation Functional Guidelines (EPA 1994a and 1994b). Applicable methods include the Washington State Department of Ecology (Ecology) Method for TPH, EPA SW-846 Methods, EPA Methods for Chemical Analysis of Water and Wastes, Standard Methods (18th Edition) and laboratory Standard Operating Procedures (SOPs). Recommended data qualifiers are based on the EPA Data Validation Functional Guidelines; definitions of qualifiers are provided at the end of this appendix.

The analytical methods and reporting limit goals are outlined in the referenced QAPPs. Data for chemical analyses and data qualifiers are presented throughout sections in text. Laboratory certificates are presented by SDG on attached disk.

All data were validated to a standard data validation effort in accordance with the QAPPs. Raw data were reviewed where deemed appropriate by the reviewer.

C.2 Quality Assurance Objectives

The overall data quality objectives (DQOs), as set forth in the QAPP, are met, and the data for this project are acceptable for use as qualified. The completeness for the associated data is 100 percent. Detailed discussions of the data quality indicators used to quantitate the DQOs are presented below.

C.2.1 Precision

Precision measures the reproducibility of measurements under a given set of conditions. Specifically, it is a quantitative measure of the variability of a group of measurements compared to their average values. Precision is generally evaluated using both matrix spike/matrix spike duplicate (MS/MSD) (or lab duplicate) results and field duplicate results. MS/MSD and lab duplicate results provide information on laboratory precision (only), while field duplicates provide information on field and lab precision combined.

Analytical precision is quantitatively expressed as the relative percent difference (RPD) between the MS/MSD or duplicates. Analytical precision measurements were carried out on project-specific samples whenever possible at a minimum frequency of one per sample delivery group (SDG). Data qualifiers were assigned based on high RPDs of MS/MSD or laboratory duplicates.

The project-specific precision acceptance criteria for field duplicates was 50 percent RPD. Due to the heterogeneous nature of soil samples field duplicates often exceeded the acceptance criteria but no data were qualified based on field duplicate recovery alone. The field duplicate precision was not calculated if sample results were not detected above the reporting limits.

C.2.2 Accuracy

Accuracy measures the closeness of the measured value to the true value. The accuracy of chemical test results was assessed by "spiking" samples with known standards (surrogates, laboratory control samples, blank spikes, and/or matrix spike) and measuring the percent recovery.

Accuracy measurements for all fractions were carried out at a minimum frequency of one per SDG. Recoveries of surrogates, MS/MSDs, blank spikes, and LCSs were generally acceptable for all analyses. Data qualifiers were required for some samples based on surrogate or MS recoveries being out of control limits. These data qualifications are described in greater detail within each data validation section below and are generally the result of matrix interferences in the samples.

C.2.3 Completeness

Completeness is defined as the percentage of measurements made which are judged to be valid measurements. The completeness of the data is the number of acceptable data points over the total number of data points times 100. A target completeness goal for this work was 95 percent. No results were rejected based on data QA/QC review; therefore, the completeness of the data for this project was 100 percent.

C.2.4 Comparability

Comparability is a qualitative parameter expressing the confidence with which one data set can be compared with another. Because of the use of standard techniques for both sample collection and laboratory analysis, the data collected from same sampling locations and depths should be comparable to both internal and other data generated.

C.3 Minor Problems Encountered

This section describes the common quality assurance issues that were found across all sections and analytes. Sections C.4 through C.10 detail specific qualification summaries for the data presented in each section of this report.

C.3.1 Detection Limit Goal Exceedances

Several samples results exceeded the reporting limit (RL) goal outlined in the QAPP. These exceedances were largely the result of dilution effects or matrix interferences and do not effect the quality of the results. Diesel/Fuel oil often had a reporting limit of 50 mg/kg which exceeded the reporting limit goal of 20 mg/kg specified in the QAPP.

The laboratory qualifiers applied to diluted samples "D" were removed from results where applicable. Laboratory "Ui" qualifiers applied to elevated RL due to matrix interference were updated to "U" qualifiers.

C.3.2 Detections between MRL and MDL

Results that fell between the MDL and RL were qualified by the laboratory with a "J" (estimated value). The J qualifier was replaced by Hart Crowser with a "T" (estimated value between MDL and RL) after August 2007 to comply with Ecology's new EIM database. Metal detections between the MDL and RL were qualified by the laboratory with a "B". The "B" qualifier was changed to a "J" prior to August 2007 and to a "T" after August 2007.

C.3.3 Method Blank Detection

Method blank contamination was present for some samples, resulting in the qualification of some results. Associated sample results less than five times the

blank contamination were qualified as not detected (U) samples below the MRL were generally raised to the MRL and qualified as not detected (U).

C.4 Section 2.0 Oil Reclamation Building Area

Fourty-seven soil samples and two soil gas samples collected from March 2005 to October 2008 are included in Section 2.0 Oil Reclamation Building Area. Data with associated qualifiers are presented in Tables 2-3, 2-5, 2-6, 2-12, 2-13, 2-14, 2-17, 2-18, 2-20, and 2-22 of Section 2.0.

C.4.1 PCBs

Continuing calibration verification (CCV) exceedances led to qualification of detections in samples 05ORTP-1, 05ORTP-6 and 05ORTP-100 as estimated (J).

C.4.2 TPH

Detections of Stoddard/mineral spirits in several of the soil samples analyzed were reported as detected, but could not be quantified using NWTPH-HCID. The laboratory reported these data with a "D."

C.4.3 Volatiles

Internal Standard failures in 05ORTP-6 and 05ORTP-100 lead to qualifications of detections as estimated (J).

Initial calibration (ICAL) exceedances led to qualification of detections of acetone and bromoform in associated samples as estimated (J). Continuing calibration verification (CCV) exceedances led to qualification of detections in several samples as estimated (J).

C.4.4 PAHs

Sample FO-MW-1S S-10 was analyzed outside of holding time, data were reported as estimated (J).

C.5 Section 3.0 Rail Car Unloading Area

Twenty-one soil samples collected from March 2005 to October 2008 are included in Section 3.0 Rail Car Unloading Area. Data with associated qualifiers are presented in Tables 3-3 and 3-4 of Section 3.0.

Samples RCU-TP-1-B-1, RCU-TP-3-B-1, RCU-TP-4-B-1, and RCU-TP-FL-B-1 were reanalyzed using a different method to achieve lower detection limits.

C.5.1 TPH

Results for sample FO-SP are qualified as "C" because the chromatographic pattern did not match the calibration standard.

C.5.2 Volatiles

Sample results for FO-SP were qualified as estimate (J) due to elevated receiving temperatures. Results qualified with a "T" for estimate between MDL and RL were qualified as "JT".

C.5.3 PAHs

Samples RCU-TP-1-B-1-RE, RCU-TP-3-B-1-RE, RCU-TP-4-B-1-RE, and RCU-TP-FL-B-1-RE were analyzed outside of holding times, data were reported as estimated (J). These samples were a reanalysis at lower detection limits of samples run within holding time.

C.5.4 Total Solids

Samples RCU-TP-1-B-1-RE, RCU-TP-3-B-1-RE, RCU-TP-4-B-1-RE, RCU-TP-FL-B-1-RE, and RCU-SP were analyzed outside of holding times, data were reported as estimated (J).

C.6 Section 4.0 Cold Mill Area

Twenty-one soil samples collected from March 2005 to October 2008 are included in Section 4.0 Cold Mill Area. Data with associated qualifiers are presented in Tables 4-1, 4-2, 4-3, and 4-6 of Section 4.0.

C.6.1 TPH

Detections of Kensol in sample CM-EX-S1 was reported as detected, but could not be quantified using NWTPH-HCID. The laboratory reported these data with a "D."

Samples TY-SS-01 and TY-SS-05 were reanalyzed for NWTPH-HCID using a silica gel cleanup remove biogenic interferences. The reanalysis was performed outside of the required hold time and was qualified as estimated (J).

C.6.2 Metals

Cadmium detections in samples CM-EX-1, CM-EX-2, CM-EX3 and CM-EX-4 were qualified as estimated due to a low Contract Required Detection Limit (CRDL) standard recovery.

C.7 Section 5.0 Oil House Area

Nineteen soil samples collected from March 2005 to October 2008 are included in Section 5.0 Oil House Area. Data with associated qualifiers are presented in Tables 5-7 and 5-10 of Section 5.0.

C.7.1 Volatiles

Laboratory Control Sample (LCS) and Laboratory Control Sample Duplicate (LCSD) associated with sample OH-SB-1-S6 exceeded control limits for several compounds. The sample was non detect for compounds except for 1,2,4-Trimethylbenzene, which was qualified as estimated (J).

Acetone was qualified as estimated (J) in samples OH-SB-1-S2 and OH-SB-1-S-40 because it was below the acceptance criteria for the continuing calibration verification standard.

The Trip Blank had detections for benzene and toluene between the MDL and MRL. Results in associated samples with benzene and toluene detections between the MDL and RL were elevated to the reporting limit and qualified as non detect (U).

C.8 Section 6.0 Wastewater Treatment Area

Seventy-eight soil samples collected from March 2005 to October 2008 are included in Section 6.0 Wastewater Treatment Area. Seventy samples were originally presented in the Tank Closure Report, South Field Constructed Tank (Hart Crowser 2008b) and include a QA review. Data with associated qualifiers of the eight remaining samples are presented in Table 6-9.

C.8.1 Metals

Matrix spike and matrix spike duplicate samples had a low recovery for antimony. Antimony results qualified as estimated (J).

C.8.2 Volatiles

Initial calibration exceedances caused detections of 4-Isopropyltoluene and n-Butylbenzene to be qualified as estimated (J) in sample HT-SB-1-S-6.

Acetone was qualified as estimated (J) in samples HT-SB-1-S-2, HT-SB-1-S-4, and HT-SB-1-S-20) because it was below the acceptance criteria for the continuing calibration verification standard.

The Trip Blank had detections for benzene and toluene between the MDL and MRL. Results in associated samples with benzene and toluene detections between the MDL and RL were elevated to the reporting limit and qualified as non detect (U).

C.9 Section 7.0 Truck Shop Area

Twenty-seven soil samples and one soil gas samples collected from March 2005 to October 2008 are included in Section 7.0 Truck Shop Area. Data with associated qualifiers are presented in Tables 7-3 and 7-5 of Section 7.0.

C.9.1 TPH

Detections of Stoddard/mineral spirits in several of the soil samples analyzed were reported as detected, but could not be quantified using NWTPH-HCID. The laboratory reported these data with a "D."

C.9.2 Semi-Volatiles

Samples TSMW-1S/S-3, TSMW-1S/S-7, and TSMW-1S/S-10 exceeded holding times by 2 days. Results for these samples were qualified as estimated (J).

C.10 Section 8.0 Former Discharge Ravines

Two hundred and sixteen samples collected from March 2005 to October 2008 are included in Section 8.0 Former Discharge Ravines. One hundred and twenty-four samples were originally presented in the West Discharge Ravine Interim Action Completion Report (Hart Crowser 2008a) which includes a QA review. Data with associated qualifiers for the ninety-two remaining samples are presented in Tables 8-1, 8-4, 8-5, and 8-6.

Samples WDR-PIA-01 through WDR-PIA-18 were incorrectly labeled by laboratory as WDR-P1A-01 through WDR-P1A-18.

C.10.1 PCBs

Continuing calibration verification (CCV) drifts of three aroclors lead to the qualification of detections in samples WDR-SS-1 through WDR-SS-18 and WDR-SS-100 as estimated (J).

Column confirmation criteria (greater than 40% difference) was exceeded for Aroclor 1248 in samples WDR-PIA-01, WDR-PIA-06, and WDR-PIA-07; Aroclor 1242 in sample WDR-PIA-12; and Aroclor 1254 in samples WDR-PIA-18 and SDR-SS1-PH2-1-S1. The higher of the two values for each sample was reported because no evidence of matrix interference was observed. Results were qualified as estimated (JP).

C.11 Section 9.0 Remelt/Hotline Area

Two hundred and sixty samples collected from March 2005 to October 2008 are included in Section 9.0 Remelt/Hotline Area. The data with associated qualifiers are presented in Tables 9-1, 9-2, 9-3, 9-4, 9-5 and 9-6.

C.11.1 PCBs

Samples HL-MW-27D S-1 and HL-MW-27D S-9 were reanalyzed outside of holding times specified in the QAPP. Results were qualified as estimated (J).

Column confirmation criteria (greater than 40% difference) were exceeded for all aroclors in samples RM-MW-15S S-3, RM-MW-15S S-4, RM-MW-15S S-5, and RM-MW-15S S-10 and for Aroclor 1254 in sample HL-MW-30s 7 1/2. Detections were reported from the column with the higher value and qualified as estimated (JP).

C.11.2 TPH

Detections of Heavy oil in sample RM-OE-3 was reported as detected, but could not be quantified using NWTPH-HCID. The laboratory reported these data with a "D."

C.11.3 Metals

Low matrix spike recovery led to the qualification of manganese detections as estimated (J) in samples HL-MW-26S-S1, HL-MW-26S-S4, HL-MW-26S-S7, HL-MW-27D-S1, HL-MW-27D-S4, and HL-MW-27D-S7.

Matrix spike recovery and relative percent difference exceedances in the laboratory duplicate resulted in the qualification of arsenic, barium, and manganese in samples HL-MW-24DD-S1, HL-MW-24DD-S4 and HL-MW-24DD-S7.

The arsenic results in sample HL-MW-30s 10' were qualified as estimated (J) due to relative percent differences in the laboratory duplicate for arsenic.

C.11.4 Volatiles

Elevated surrogate recoveries led to the qualification of detections as estimated in samples HL-MW-26S-S4, HL-MW-26S-S7, and HL-MW-27D-S1.

C.11.5 Total Organic Carbon

Samples HL-MW-27D S-1 and HL-MW-27D S-9 were reanalyzed outside of holding times specified in the QAPP. Results were qualified as estimated (J).

C.11.6 Total Solids

Samples HL-MW-26S-S1, HL-MW-26S-S4, and HL-MW-26S-S7 were analyzied out of holding times specified in the QAPP. Samples HL-MW-27D S-1 and HL-MW-27D S-9 were reanalyzed outside of holding times. Results were qualified as estimated (J).

C.12 References for Appendix C

EPA 1986. Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response, Washington D.C.

EPA 1994a. Contract Laboratory Program National Functional Guidelines for Organic Data Review. U.S. Environmental Protection Agency, Washington D.C.

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Hart Crowser 2008b. Tank Closure Report, South Field Constructed Tank. Kaiser Trentwood Facility, Spokane, Washington. Prepared for Kaiser Aluminum and Chemical Corporation. J-2644-99. November 12, 2008.

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DATA QUALIFIER DEFINITIONS

The following data qualifiers have been used in the text and the following tables based on a quality assurance review of the laboratory procedures and results:

- U Indicates the compound or analyte was analyzed for and not detected.
 The value reported is the sample quantitation limit corrected for sample dilution and moisture content by the laboratory.
- UJ Indicates the compound or analyte was analyzed for and not detected. Due to quality control deficiencies identified during data validation the value reported may not accurately reflect the sample quantitation limit.
- J Indicates the compound or analyte was analyzed for and detected. The associated value is estimated but the data are usable for decision-making processes. "J " also indicated estimated values that fell between the Method Detection Limit (MDL) and the Reporting Limit (RL) prior to August 2007.
- T Estimated values that fell between the MDL and RL. Applied to data from August 2007.
- P PCB confirmation criteria exceeded. The relative percent difference is greater than 40% between the two analytical results.
- D Indicates the compound or analyte was analyzed for and was detected at or above the sample quantitation limit.
- C See comment. Qualifier used for results requiring additional explanation.

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