Dredge Prism Characterization
Biogenesis Sediment-Based Manufacturing Facility
Kearny, New Jersey

Prepared for

Biogenesis Enterprises, Inc.

7240 Alban Station Boulevard
Suite B-208
Springfield, VA 22150

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VOLUME I

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DREDGE PRISM CHARACTERIZATION
BIOGENESIS SEDIMENT-BASED MANUFACTURING FACILITY
KEARNY, NEW JERSEY

INTRODUCTION

Dredging will be required to facilitate the offloading of raw sediment to the BioGenesis Sediment Decontamination Facility at Kearny Point. Under the current plan, approximately 60,000 cubic yards of sediment must be removed from the bottom of the Passaic River to allow scows to dock along the proposed pier and dolphins. To support an application to dredge, Hart Crowser completed characterization of the proposed dredge prism through sampling and analyses of material to be dredged. The work was conducted in accordance with the Sampling and Analysis Plan issued by the New Jersey Department of Environmental Protection (NJDEP) on September 19, 2001, and modified on June 26, 2002.

Samples of sediment were collected at 18 locations by vibracoring between July 17 and 24, 2002. Sets of three individual cores were combined into six composite samples, which were subjected to testing for geotechnical properties and chemical content. Aqua Survey, Inc. completed the sampling, compositing, and geotechnical analyses. Severn Trent Laboratories, Inc. completed the chemical analyses.

SITE DESCRIPTION

The Passaic River basin is heavily populated and supports a large number of industrial facilities. Industrial activity, which was formerly heavier than today, dates back to the colonial period. Discharge of wastes into the river and its tributaries has resulted in contamination of sediments. Several studies have been conducted by federal and state agencies to characterize sediment contamination associated with these practices. Polychlorinated biphenyls (PCB), polycyclic aromatic hydrocarbons, (PAH), dioxins, and metals, among others, have been identified in the sediments of the Passaic River.

The subject site is located near the mouth of the Passaic River where it joins the Hackensack River at the north end of Newark Bay (Figure 1). Investigations in this area by the National Oceanic and Atmospheric Administration (1995) identified slightly elevated concentrations of PAH, including benz(a)anthracene and benzo(a)pyrene, and PCB. This portion of the Passaic River has relatively

low currents and a tidal range of approximately 5 feet. River traffic is relatively light.

SAMPLING

Eighteen sediment cores were collected from the Passaic River at Kearny Point between July 17 and 24, 2002. The weather was generally warm (80 to 95 degrees Fahrenheit) and humid with light breezes and cloudy to clear skies. Waves did not affect the sampling as the site has limited fetch and navigation traffic is infrequent. Aqua Survey, Inc. collected the sediment cores with a Rossfelder Model P-3 Electric Vibracorer mounted on the Research Vessel Robert E. Hayes. This vibracorer recovers 4-inch-diameter cores.

Sampling locations were determined with a Trimble NT200D Differential Global Positioning System (DPGS). Readings from this unit indicated that all cores were obtained within 10 feet of the designated locations.

A new plastic liner was inserted in the coring device for each sample. The device was advanced into the sediment at each sampling location to a depth equal to the project depth of 25 feet plus 2 feet over-dredge. The target core depth for each location was calculated by sounding the water depth at the sampling point, adjusting to Mean Low Water, and then subtracting the corrected water depth from the project depth. Target core depths ranged from 9.5 to 19.5 feet of sediment.

All cores penetrated to the project depth of 27 feet (including over-dredge) from Mean Low Water. Core recoveries were good, ranging from 80 to 100 percent of the penetration core lengths. Second cores were collected at locations SC6 and SC18 to obtain adequate recovery lengths. In each case, the longer of the two cores was kept for sampling. The sample locations and the DGPS coordinates are shown on Figure 1.

After recovery, each core was measured and documented following the United Soil Classification System, which includes details on stratification, grain size, odor, and color. All cores were then photographed and emptied into new, clean buckets and stored in a cooling unit in the dark.

The upper layers of the 18 cores consisted of very soft to soft, moist, black, organic silt. In 12 of the cores, this material persisted to the bottom of exploration. In the others, deeper strata included clay, sandy clay, silty sand, and/or sand. Logs with descriptions of the cores are attached in Appendix A.

A field blank sample was prepared by pouring deionized water through a clean core liner and core catcher and collecting the water in a sample container. Sediment samples were sealed in clean plastic buckets, labeled, and transported to the Aqua Survey facility in Flemington, New Jersey. Samples were stored in the dark at 4 degrees Celsius.

The sediment samples were prepared for analyses at the Aqua Survey facility. Each of the 18 core samples was homogenized with a stainless steel mixer according to Appendix A of the NJDEP dredging manual (1997). Samples were mixed until uniform in color and texture. Composite samples were prepared by mixing equal portions from each of three homogenized core samples as follows:

Composite Sample	Core Samples
A	SC1, SC2, SC3
B	SC4, SC5, SC6
C	SC7, SC8, SC9
D	SC10, SC11, SC12
E	SC13, SC14, SC15
F	SC16, SC17, SC18

Aliquots of each of the core samples and the composite samples were sealed in appropriate containers and labeled pending analyses. Chain of custody documents and sample handling logs are attached in Appendix B.

GEOTECHNICAL ANALYSES

Aqua Survey analyzed sediment samples at its Flemington facility for grain size, total organic carbon (TOC), and moisture content. Particle size distribution and percent moisture were analyzed in accordance with the American Society for Testing and Materials (ASTM) Designation D 4822. TOC was determined using U.S. Environmental Protection Agency Method 9060. The analysis was conducted with a Dohrmann TOC Boat Sampler, Model 183 connected to a Dohrmann DC-80 TOC Analyzer.

Aliquots of the individual core samples were largely silt and clay, ranging from 48.8 to 64.3 percent silt and from 27.4 to 43.5 percent clay. Sand was reported in five of the core samples; the highest value was 23.8 percent in sample SC16. Moisture contents ranged from 46.1 to 58.9 percent. TOC concentrations ranged from 3.45 to 5.62 percent of dry weight. Results of the geotechnical testing are summarized in Table 1. Full results are attached in Appendix C.

CHEMICAL ANALYSES

The six composite samples prepared by Aqua Survey and the field blank were shipped to Severn Trent Laboratories, Inc. for bulk chemical analyses. The samples were analyzed for target analytes listed in Appendix B of the NJDEP dredging manual (1997). These included volatile organic compounds (USEPA Method 8260B), semivolatile organic compounds (USEPA Method 8270C), pesticides (USEPA Method 8081A), PCB (USEPA Method 8082), mercury (USEPA Method 7471A), other metals (USEPA Method 6010B), cyanide (USEPA Method 9012A), and polychlorinated dibenzo-p-dioxins and dibenzofurans (USEPA Method 1613B).

Seven volatile organic compounds were detected at low concentrations. These concentrations were well below the residential direct contact soil cleanup criteria published by NJDEP (Frasco 1999). Results for the compounds detected are presented in Table 2, along with NJDEP cleanup criteria.

Eighteen semivolatile organic compounds were detected. Most findings were below NJDEP residential cleanup criteria. Benzo(a)pyrene was quantified above its criterion (for this compound, the residential criteria and the nonresidential criteria are equal) in one sample and estimated slightly above the criterion in five other samples. Benzo(b)fluoranthene and benzo(k)fluoranthene were both estimated slightly above their residential criteria in five samples and above their nonresidential criteria in one sample. Bis(2-ethylhexyl)phthalate was detected above its residential criterion in four samples. Chrysene was detected above its residential criterion in one sample. Indeno(1,2,3-cd)pyrene was estimated slightly above its residential criterion in one sample. Results for the compounds detected are presented in Table 3, along with NJDEP cleanup criteria.

Eleven pesticides were detected at low concentrations. These concentrations were well below the residential soil cleanup criteria. Results for the compounds detected are presented in Table 4, along with NJDEP cleanup criteria.

Three PCB Aroclors were detected in the six composite samples at concentrations ranging from 0.11 to 2.4 milligrams per kilogram (mg/kg). None of the other four Aroclors analyzed were detected. To compare results to NJDEP cleanup criteria, total PCB values were calculated as the sums of the Aroclor concentrations detected. These values exceeded the residential cleanup criteria of 0.49 mg/kg in each case. In addition, the total for Composite A exceeded the nonresidential criteria of 2 mg/kg. Results for the Aroclors detected are presented in Table 5.

Composite samples were analyzed for 23 metals. The presence of the metals is consistent with the mineral nature of the sediments and, in part, represents naturally occurring material. Of the 15 metals that have NJDEP cleanup criteria, only arsenic, lead, and thallium displayed exceedances. Five samples have arsenic concentrations above the residential and non-residential criteria (both 20 mg/kg). One sample had lead above the residential criterion of 400 mg/kg. The six composite samples have thallium above the residential and nonresidential criteria (both 2 mg/kg). Metal results for are presented in Table 6, along with NJDEP cleanup criteria.

Cyanide was estimated in the six samples at concentrations ranging from 1.9 to 5.3 mg/kg. These estimates are well below the residential cleanup criterion of 1,100 mg/kg.

Sixteen dioxins and furans were detected at low concentrations ranging from less than 0.01 to 19 micrograms per kilogram (ug/kg). Analytical results are summarized on Table 7 along with the 2,3,7,8-tetrachlorodibenzo(p)dioxin toxicity equivalents for each sample. The toxicity equivalents were calculated using the toxicity equivalency factors presented in Appendix B of the NJDEP dredging manual (1997). NJDEP has not published soil cleanup criteria for any of these compounds.

Laboratory reports for the analytical fractions are attached in Appendix D. Complete laboratory documentation is provided in electronic format on a compact disc, also included in Appendix D.

QUALITY ASSURANCE

Severn Trent laboratories handled and analyzed the samples in three lots. One lot included Composite Samples A and B. The second lot included Composite Samples C, D, E, and F. The third lot included the field blank and the method blanks, which were aqueous samples.

Analyses of the method blank samples and a field blank sample indicated no volatile organics, pesticides, PCB, dioxins, or furans. The semivolatile compound bis (2-ethylhexyl) phthalate was detected at 29 micrograms per liter (ug/L) in the method blank and at 9.9 ug/L in the field blank. Severn Trent's case narrative notes that this is a common laboratory contaminant. This compound was detected in sediment samples at concentrations three orders of magnitude greater than in the blanks; therefore, this blank contamination does not have a significant effect on the results.

Low concentrations of some metals were also detected in the blanks. The method blank contained silver, aluminum, beryllium, and mercury. The field blank contained silver, aluminum, beryllium, potassium, manganese, lead, and thallium. These metals were detected in sediment samples at concentrations at least three orders of magnitude greater than in the blanks; therefore, this blank contamination does not have a significant effect on the results.

Both blanks had low concentrations of cyanide. This compound was detected in sediment samples at concentrations three orders of magnitude greater than in the blanks; therefore, this blank contamination does not have a significant effect on the results.

Matrix spikes and matrix spike duplicates were analyzed for each lot of samples. Surrogate spike recoveries were analyzed for the organic analyses. Duplicate results were reported for semivolatile organics for Samples E and F (see Table 3). Duplicate results showed good agreement.

CONCLUSIONS

The sediment within the proposed dredge prism is predominantly silt and clay with some sand. Semivolatile organic compounds were detected in the six composite samples at concentrations at least marginally above NJDEP direct contact soil cleanup criteria. Total PCB concentrations exceeded the residential cleanup criterion for the six composite samples. Arsenic was detected at concentrations above residential and nonresidential criteria in five of the six composite samples. Lead was detected in one composite at a concentration above the residential criteria. Thallium was detected at concentrations above residential and nonresidential criteria in the six composites. Dioxins and furans were detected in the six composite samples.

LIMITATIONS

Work for this project was performed, and this report prepared, in accordance with generally accepted professional practices for the nature and conditions of the work completed in the same or similar localities, at the time the work was performed. It is intended for the exclusive use of BioGenesis Enterprises, Inc. for specific application to the referenced property. This report is not meant to represent a legal opinion. No other warranty, express or implied, is made.

Any questions regarding our work, this report, the presentation of the information, or the interpretation of the data are welcome and should be referred to Hart Crowser.

REFERENCES

Frasco, Barry. 1999. "Revisions to the Soil Cleanup Criteria." *New Jersey Department of Environmental Protection Site Remediation News,* 11(1): 4-8.

National Oceanic and Atmospheric Administration (NOAA). 1995. *NOAA Technical Memorandum NOS ORCA88: Magnitude and Extent of Sediment Toxicity in the Hudson-Raritan Estuary.*

New Jersey Department of Environmental Protection (NJDEP). 1997. *Management and Regulation of Dredging Activities in New Jersey's Tidal Waters.*

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TABLES 1 – 7

Table 1 – Summary of Geotechnical Testing Results

Sample ID	Percent Gravel	Percent Clay	Percent Silt	Percent Sand	Percent Moisture	TOC as percent of dry weight
SC1	0.0	37.3	62.7	0	58.9	5.62
SC2	0.0	41.4	58.6	0	53.5	4.50
SC3	0.0	28.8	57.2	14.0	55.9	4.48
SC4 DUP					58.1	
SC4 TRI					53.7	
SC4	0.6	39.2	60.2	0	49.6	5.54
SC5	0.0	35.7	64.3	0	57.4	4.59
SC6	0.2	35.1	56.9	7.8	51.0	4.60
SC7	0.0	36.5	63.5	0	55.1	4.57
SC8	0.0	42.3	57.7	0	55.5	5.60
SC9	0.0	36.3	63.7	0	53.5	3.84
SC9 DUP					54.6	
SC9 TRI					53.6	
SC10	0.0	33.7	60.9	5.5	51.7	4.67
SC11	0.0	40.7	59.3	0	53.5	3.66
SC12	0.0	43.5	56.5	0	53.1	4.84
SC12 DUP	0.0	42.8	57.2	0		
SC12 TRI	0.0	42.0	58.0	0		
SC13	0.0	36.4	63.6	0	54.2	3.88
SC14	0.0	37.9	62.1	0	56.2	5.39
SC15	0.0	40.7	59.3	0	53.4	4.11
SC15 DUP	0.0	42.1	57.9	0		
SC15 TRI	0.1	40.5	59.4	0		
SC16	0.7	27.4	48.8	23.8	46.1	3.45
SC17	0.0	40.3	59.7	0	54.0	4.36
SC18	0.0	29.8	49.1	21.0	52.3	4.65
COMP A	0.0	33.5	59.6	6.9	56.7	5.05
COMP B	0.2	41.2	58.6	0	52.9	5.08
COMP B DUP	0.2	40.1	59.7	0		
COMP B TRI	0.0	40.2	59.8	0		
COMP C	0.0	38.4	61.6	0	54.9	4.56
COMP D	0.0	39.5	60.5	0	52.7	4.80
COMP E	0.0	39.3	60.7	0	54.5	4.69
COMP F	0.2	38.1	61.3	0.63	50.9	4.45

Notes: COMP: Composite Sample
DUP: Duplicate Analysis
TRI: Triplicate Analysis
TOC: Total Organic Carbon
Blank space indicates no analysis

Table 2 – Concentrations of Volatile Compounds Detected in Milligrams per Kilogram

Parameter	Composite Sample Identifier A	B	C	D	E	F	RC	NRC
Acetone	0.037 J	0.035 J	0.023 J	0.027 J	0.024 J	0.028 J	1000	1000
Benzene	0.015	0.0040 J	ND	ND	0.0036 J	ND	3	13
2-Butanone	0.02l J	0.014 J	0.0058 J	0.0087 J	0.0083 J	0.0098 J	1000	1000
Chlorobenzene	0.0039 J	ND	ND	ND	ND	ND	37	680
Ethylbenzene	0.018	0.027	ND	ND	ND	ND	1000	1000
Toluene	0.004	0.0034 J	ND	ND	ND	ND	1000	1000
Xylenes (total)	0.11	0.017 J	ND	ND	0.020 J	0.011 J	410	1000

Notes: J: Estimated result. Result is less than the reporting limit
ND: Not detected
RC: NJ Residential Direct Contact Soil Cleanup Criteria (Frasco 1999)
NRC: NJ Non-Residential Direct Contact Soil Cleanup Criteria (Frasco 1999)

Table 3 – Concentrations of Semivolatile Organic Compounds Detected in Milligrams per Kilogram

Parameter	Composite Sample Identifier								RC	NRC
	A	B	C	D	E	E Dup	F	F Dup		
Acenaphthene	0.86 J	3.1 J	0.83 J	0.74 J	ND	ND	ND	ND	3400	10000
Acenaphthylene	0.78 J	2.4 J	ND	ND	ND	ND	ND	ND	NA	NA
Anthracene	2.4 J	7.8	1.7 J	1.9 J	0.7 J	ND	1.3 J	1.3 J	10000	10000
Benzo(a)anthracene	2.7 J	8.7	2.4 J	2.5 J	1.2 J	ND	1.7 J	1.7 J	0.9	4
Benzo(a)pyrene	2.1 J	7.3	2.1 J	2.0 J	1.2 J	ND	1.5 J	1.5 J	0.66	0.66
Benzo(b)fluoranthene	1.7 J	4.2 J	1.7 J	1.9 J	1.1 J	ND	1.5 J	ND	0.9	4
Benzo(k)fluoranthene	1.8 J	5.8 J	2.2 J	2.1 J	1.2 J	ND	1.6 J	ND	0.9	4
Benzo(ghi)perylene	ND	1.4 J	ND	ND	ND	ND	ND	ND	NA	NA
Bis(2-ethyl hexyl) phthalate	59	23	54	37	88 E	81	71 E	68 E	49	210
Chrysene	3.1 J	9.6	2.5 J	2.8 J	1.3 J	ND	1.9 J	2.1 J	9	40
Di-n-octyl phthalate	3.6 J	0.62 J	2.0 J	ND	2.4 J	2.2 J	2.3 J	2.1 J	1100	10000
Fluoranthene	5.9 J	17	5.9 J	6.5 J	3.0 J	2.7 J	4.5 J	4.1 J	2300	10000
Fluorene	1.1 J	4.1 J	0.87 J	0.98 J	ND	ND	0.66 J	ND	2300	10000
Ideno (1,2,3-cd) pyrene	ND	1.5 J	0.65 J	0.58 J	ND	ND	ND	ND	0.9	4
2-Methylnaphthalene	1.3 J	3.8 J	ND	ND	ND	ND	ND	ND	NA	NA
Naphthalene	1.3 J	2.1 J	2.4 J	3.8 J	ND	ND	1.5 J	1.5 J	230	4200
Phenanthrene	5.1 J	19	3.8 J	4.0 J	1.4 J	ND	2.8 J	2.6 J	NA	NA
Pyrene	4.9 J	16	4.5 J	4.3 J	2.1 J	2.3 J	3.0 J	3.3 J	1700	10000

Notes: Dup: Duplicate analysis
J: Estimated result. Result is less than reporting limit
E: Estimated result. Result concentration exceeds the calibration range
NA: Not available
ND: Not detected
RC: NJ Residential Direct Contact Soil Cleanup Criteria (Frasco 1999)
NRC: NJ Non-Residential Direct Contact Soil Cleanup Criteria (Frasco 1999)
*: Duplicate analysis of Composite E and F
Highlighted results exceed cleanup criteria

Table 4 – Concentrations of Pesticides Detected in Milligrams per Kilogram

Parameter	Composite Sample Identifier						RC	NRC
	A	B	C	D	E	F		
beta-BHC	0.012 J P	0.0029 J P	ND	ND	0.004 J P	0.015 J P	NA	NA
Endosulfan I	ND	0.008 P	ND	ND	ND	ND	340	6200
Dieldrin	0.034 J P	0.0044 P	ND	ND	0.014 J	0.011 P	0.042	0.18
4,4'-DDE	0.10 P	0.040 P	0.093 P	0.083 P	0.067	0.048	2	9
Endrin	0.027 J P	0.0064 P	0.014 P	0.0069 J P	ND	ND	17	310
4,4'-DDD	0.12	0.018	0.018 P	0.019 P	0.026 P	0.023 P	3	12
4,4'-DDT	0.027 J P	0.015 P	0.042	0.027	0.025 P	0.012 P	2	9
Endrin ketone	0.014 J P	ND	ND	ND	0.031 J P	ND	NA	NA
Endrin aldehyde	ND	ND	ND	ND	0.020 P	0.046 J P	NA	NA
alpha-Chlordane	0.033 J P	0.0064 P	0.017	0.093 P	0.025	0.017 P	NA	NA
gamma-Chlordane	0.012 J P	ND	0.012 P	0.077 J P	0.013 J P	0.0097 P	NA	NA

Notes: J: Estimated result. Result is less than the reporting limit
NA: Not available
ND: Not detected
P: Difference between original and confirmation analyses is greater than 40 percent
RC: NJ Residential Direct Contact Soil Cleanup Criteria (Frasco 1999)
NRC: NJ Non-Residential Direct Contact Soil Cleanup Criteria (Frasco 1999)

Table 5 – Concentrations of Aroclors Detected and Total PCB in Milligrams per Kilogram

Parameter	Composite Sample Identifier							
	A	B	C	D	E	F	RC	NRC
Aroclor 1248	2.4	0.22	0.69	0.43	0.93	0.62		
Aroclor 1254	1.3	0.18	0.48	0.37	0.60	0.41		
Aroclor 1260	0.6	0.11	0.30	0.27	0.40	0.26		
Total	4.3	0.51	1.47	1.07	1.93	1.29	0.49	2

Notes: RC: NJ Residential Direct Contact Soil Cleanup Criteria (Frasco 1999)
NRC: NJ Non-Residential Direct Contact Soil Cleanup Criteria (Frasco 1999)
Highlighted results exceed cleanup criteria

Table 6 – Concentrations of Metals in Milligrams per Kilogram

Parameter	Composite Sample Identifier A	B	C	D	E	F	RC	NRC
Aluminum	11600 E	11700 E	12100	10800	11500	10700	NA	NA
Antimony	0.83 JN	1.2 JN	0.45 JN*	0.53 JN*	0.42 JN*	0.63JN*	14	340
Arsenic	48.3 E	82.5 E	32.2	36.4	17.9	23.9	20	20
Barium	218 NE	258 NE	235	277	163	207	700	47000
Beryllium	1.2	1.2	1.2	1.1	1.2	1.1	2	2
Cadmium	12.6 N*	4.8 N*	7.4	6.9	7.9	6.9	39	100
Calcium	5890 E	4090 E	6200	5380	6480	5500	NA	NA
Chromium	624	436	351	337	293	285	**	**
Cobalt	10.8 N	13.8 N	10.7 E	9.8 E	10.6 E	10.3 E	NA	NA
Copper	385	423	301	307	269	274	600	600
Iron	26300	57300	30000	28100	27400	26700	NA	NA
Lead	383	444	336	345	316	319	400	600
Mercury	12.6	7.4	8.5	7.4	7.7	7.2	14	270
Magnesium	6170 NE	6870 NE	6910	6180	6420	6020	NA	NA
Manganese	317	476	421	370	431	389	NA	NA
Nickel	69.3 NE	78.7 NE	45.8	40.9	46.3	46.3	250	2400
Potassium	1990	1920	2220	2030	1980	1860	NA	NA
Selenium	1.3	1.8	1.3	1.4	1.0	1.0	63	3100
Silver	7.0	4.0	5.9	4.9	6.4	5.0	110	4100
Sodium	6910	5200	6820	5780	6130	5550	NA	NA
Thallium	3.2	6.7	3.0	3.7	2.9	2.9	2	2
Vanadium	49.8	41.4	42.0 E	38.6 E	40.1 E	37.7 E	370	7100
Zinc	867	652	597 E	574 E	592 E	573 E	1500	1500

Notes: E: Serial dilution differences were outside of control limits
J: Result is less than the reporting limit
N: Matrix spike or matrix spike duplicates recovered outside of control limits
RC: NJ Residential Direct Contact Soil Cleanup Criteria (Frasco 1999)
NRC: NJ Non-Residential Direct Contact Soil Cleanup Criteria (Frasco 1999)
* Relative difference between matrix spike and matrix spike duplicate was outside of control limits
** Direct Contact Soil Cleanup Criteria for chromium range from 20 to 120,000 mg/kg depending on species (hexavalent or trivalent) and exposure pathway (Frasco 1999)
Highlighted results exceed cleanup criteria

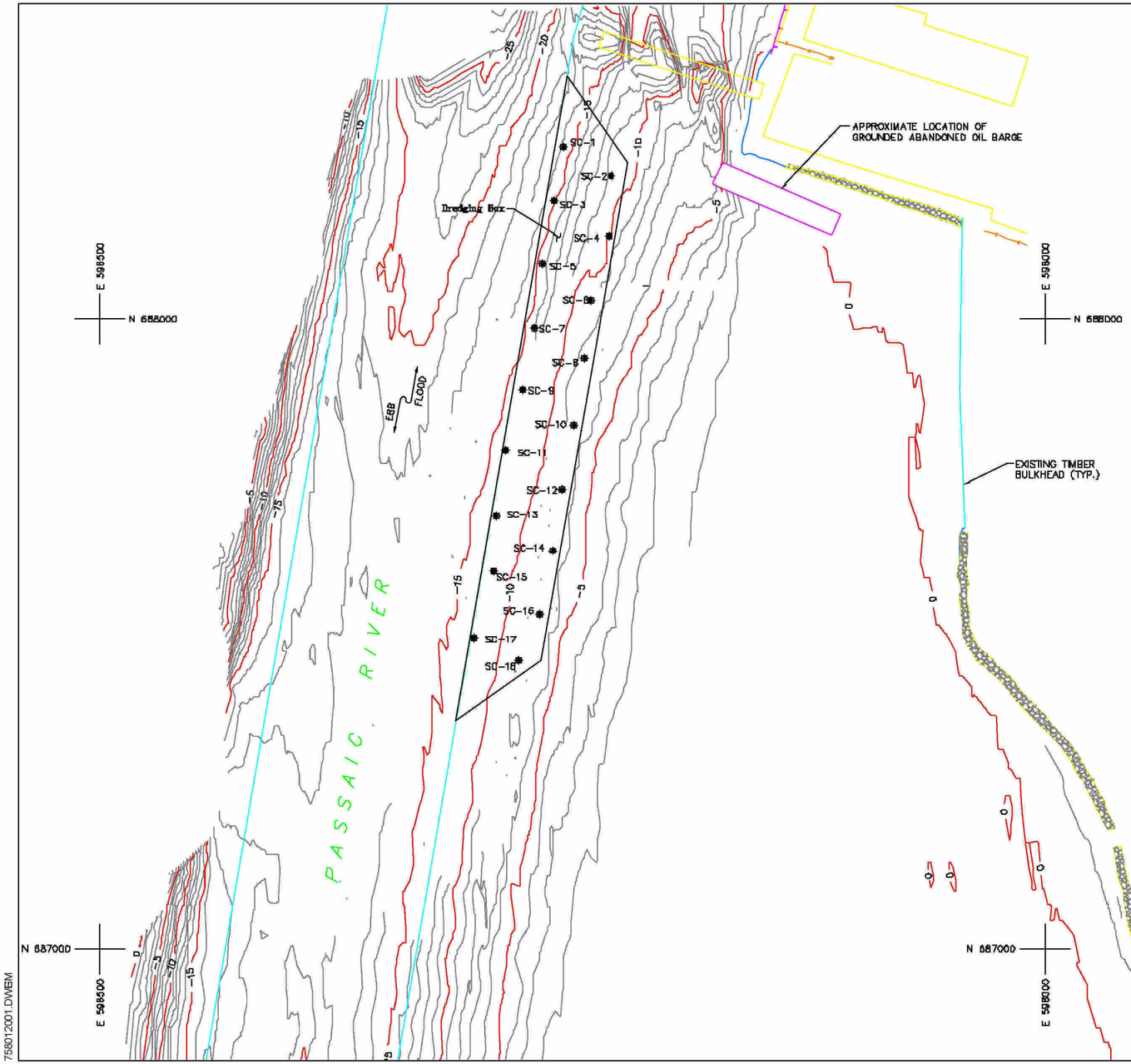
Table 7 – Concentrations of Dioxins and Furans Detected in Micrograms per Kilogram

Parameter	Composite Sample Identifier					
	A	B	C	D	E	F
2, 3, 7, 8-TCDD	2.1 E	0.42	1.10 E	0.54	1.0 E	0.65
1, 2, 3, 7, 8-PeCDD	0.027	ND	0.015	0.098	0.017	0.012
1, 2, 3, 4, 7, 8-HxCDD	0.014 J	ND	0.011 J	0.092	0.014	0.0073 J
1, 2, 3, 6, 7, 8-HxCDD	0.12	0.028	0.064	0.044	0.092	0.059
1, 2, 3, 7, 8, 9-HxCDD	0.070	0.011 J	0.027	0.019	0.033	0.032
1, 2, 3, 4, 6, 7, 8-HpCDD	1.7	0.33	0.91	0.60	1.2	0.80
OCDD	19 E	3.9	9.7 E	6.5	12. E	8.5 E
2, 3, 7, 8-TCDF	0.073 C	0.027 C	0.046 C	0.033 C	0.056 C	0.045 C
1, 2, 3, 7, 8-PeCDF	0.039	0.022	0.036	0.030	0.033	0.027
2, 3, 4, 7, 8-PeCDF	0.074	0.032	0.067	0.048	0.073	0.058
1, 2, 3, 4, 7, 8-HxCDF	0.32	0.15	0.30	0.24	0.25	0.23
1, 2, 3, 6, 7, 8-HxCDF	0.085	0.046	0.090	0.070	0.071	0.056
2, 3, 4, 6, 7, 8-HxCDF	0.046	0.021	0.036	0.027	0.031	0.026
1, 2, 3, 4, 6, 7, 8-HpCDF	1.5	0.72	1.7	1.4	1.4	1.0
1, 2, 3, 4, 7, 8, 9-HpCDF	0.052	0.024	0.054	0.048	0.049	0.042
OCDF	3.0	1.2	2.8	2.0	2.4	1.8
TE	2.28	0.48	1.24	0.64	1.14	0.76

Notes: J: Estimated result. Result is less than the reporting limit
E: Estimated result. Result concentration exceeds the calibration range
C: Confirmation analysis
TE: 2,3,7,8-TCDD Toxicity Equivalent calculated per Appendix B of NJDEP dredging manual (1997)

FIGURE

DREDGE PRISM CHARACTERIZATION
BORING PLAN



NOTES

1. SOUNDINGS WERE COLLECTED ON JULY 24, 2001 AND CAN ONLY REFLECT CONDITIONS AS THEY EXISTED AT THAT TIME.
2. CONTOURS SHOWN HEREON ARE NEGATIVE UNLESS NOTED WITH A (+). CONTOURS REFERENCE MEAN LOW WATER DATUM.
3. HORIZONTAL DATUM IS NAD 83 S.P.C.S. FOR THE STATE OF NEW JERSEY.

SEDIMENT CORE LOCATIONS

SAMPLE No.	N (FT)	E (FT)
SC-1	[illegible]	[illegible]
SC-2	[illegible]	[illegible]
SC-3	[illegible]	[illegible]
SC-4	[illegible]	[illegible]
SC-5	[illegible]	[illegible]
SC-6	[illegible]	[illegible]
SC-7	[illegible]	[illegible]
SC-8	[illegible]	[illegible]
SC-9	[illegible]	[illegible]
SC-10	[illegible]	[illegible]
SC-11	[illegible]	[illegible]
SC-12	[illegible]	[illegible]
SC-13	[illegible]	[illegible]
SC-14	[illegible]	[illegible]
SC-15	[illegible]	[illegible]
SC-16	[illegible]	[illegible]
SC-17	[illegible]	[illegible]
SC-18	[illegible]	[illegible]

* LOCATIONS ARE ACTUAL BASED ON DGPS READINGS TAKEN DURING DURING ACTIVITIES.

COMPOSITE SAMPLES

COMPOSITE No.	SAMPLE No.	SAMPLE No.	SAMPLE No.
A	SC-1	SC-2	SC-3
B	SC-4	SC-5	SC-6
C	SC-7	SC-8	SC-9
D	SC-10	SC-11	SC-12
E	SC-13	SC-14	SC-15
F	SC-16	SC-17	SC-18

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Note:

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Figure 1

APPENDIX A

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/Consistency

Soil density/consistency in borings is related primarily to the Standard Penetration Resistance.
Soil density/consistency in test pits is estimated based on visual observation and is presented parenthetically on the test pit logs.

SAND or GRAVEL Density	Standard Penetration Resistance (N) in Blows/Foot	SILT or CLAY Consistency	Standard Penetration Resistance (N) in Blows/Foot	Approximate Shear 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

Dry	Little perceptible moisture
Damp	Some perceptible moisture, probably below optimum
Moist	Probably near optimum moisture content
Wet	Much perceptible moisture, probably above optimum

Minor Constituents

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

Legends

Sampling Test Symbols

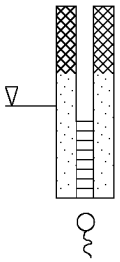
BORING SAMPLES

- Split Spoon
- Shelby Tube
- Cuttings
- Core Run
- * No Sample Recovery
- P Tube Pushed, Not Driven

TEST PIT SAMPLES

- Grab (Jar)
- Bag
- Shelby Tube

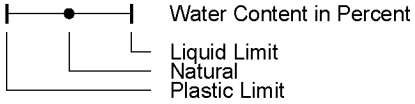
Groundwater Observations



- Surface Seal
- Groundwater Level on Date (ATD) At Time of Drilling
- Observation Well Tip or Slotted Section
- Groundwater Seepage (Test Pits)

Test Symbols

GS	Grain Size Classification
SPG	Specific Gravity
DD	Dry Density
CN	Consolidation
TCD	Triaxial Consolidated Drained
QU	Unconfined Compression
DS	Direct Shear
K	Permeability
PP	Pocket Penetrometer Approximate Compressive Strength in TSF
TV	Torvane Approximate Shear Strength in TSF
CBR	California Bearing Ratio
MD	Moisture Density Relationship
AL	Atterberg Limits
PID	Photoionization Detector Reading
CA	Chemical Analysis
DT	*In Situ* Density Test



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KEY SHEET 7580-12.GPJ

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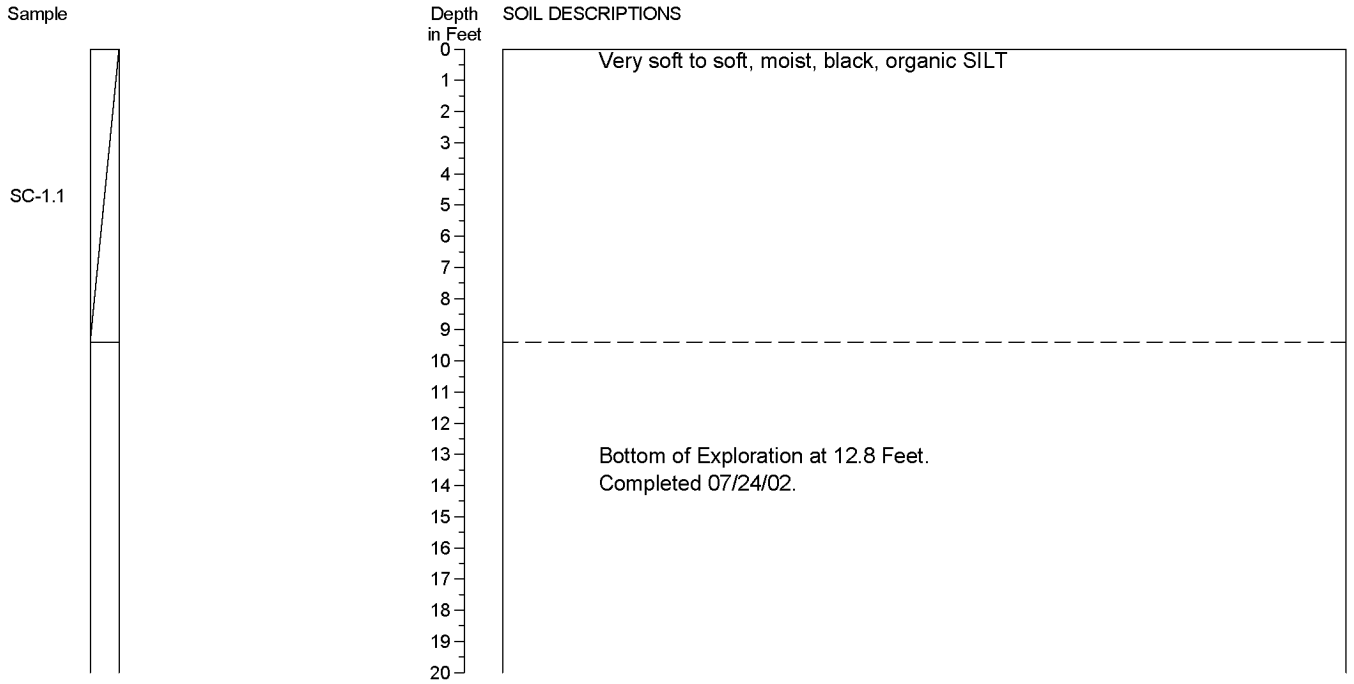

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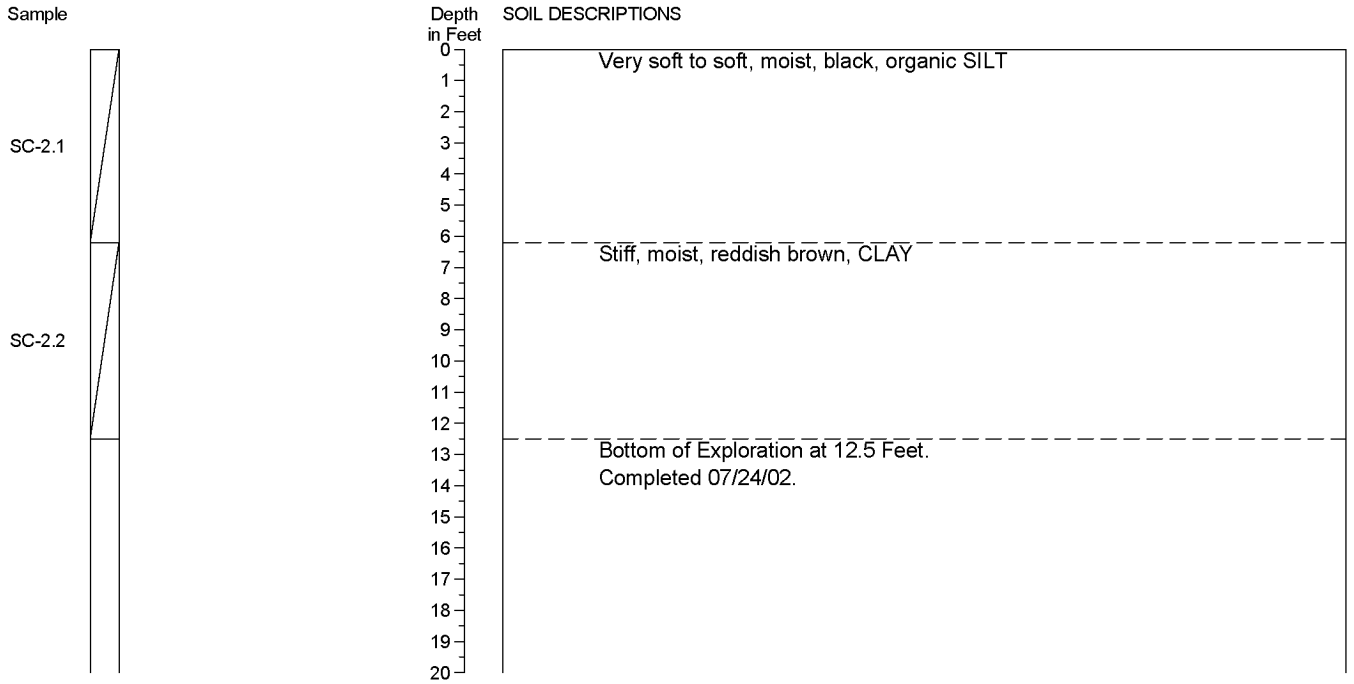

2 LOGS PER PAGE 7580-12.GPJ

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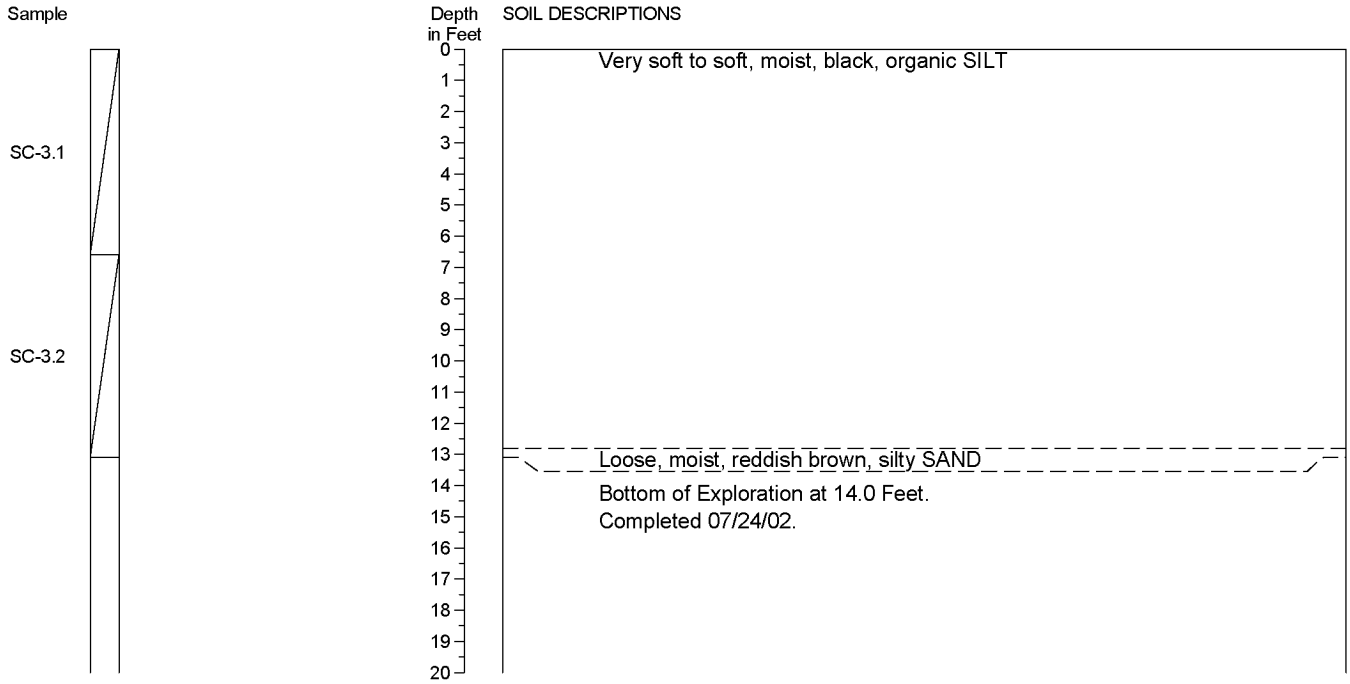
1. Refer to KEY for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.

Boring Log SC-03



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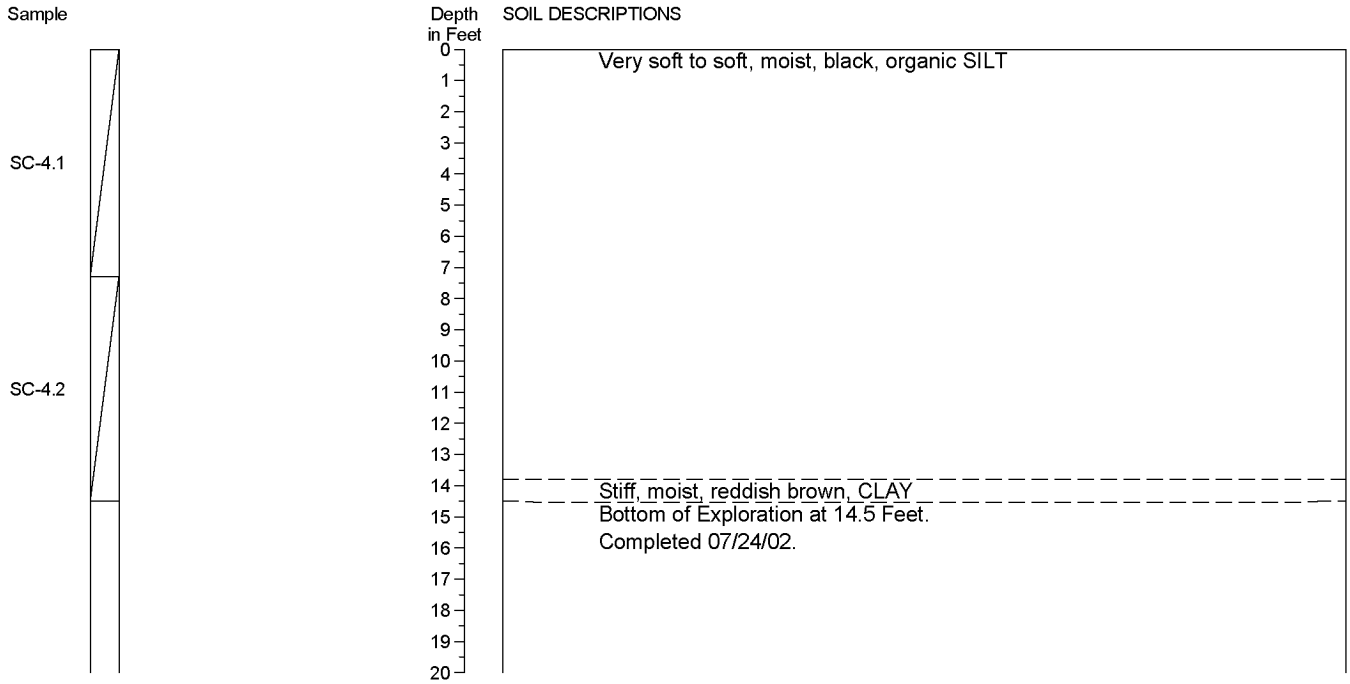

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7580-12 03/03

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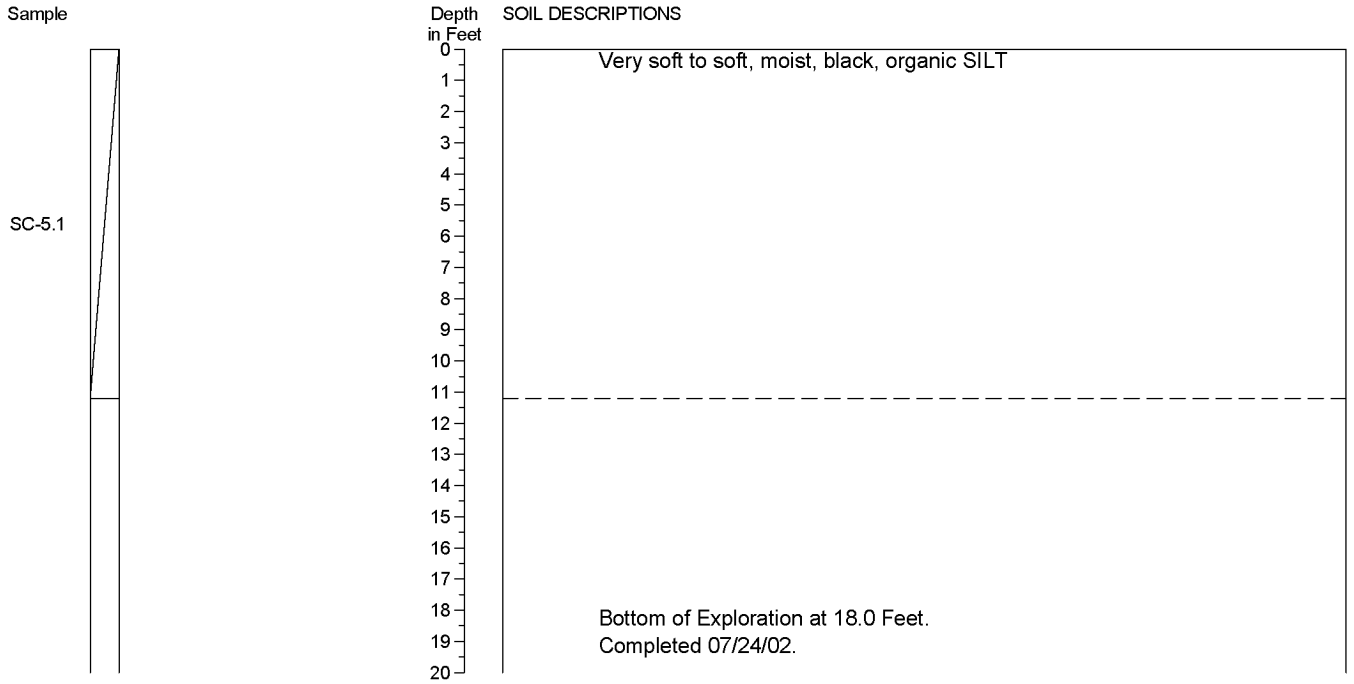

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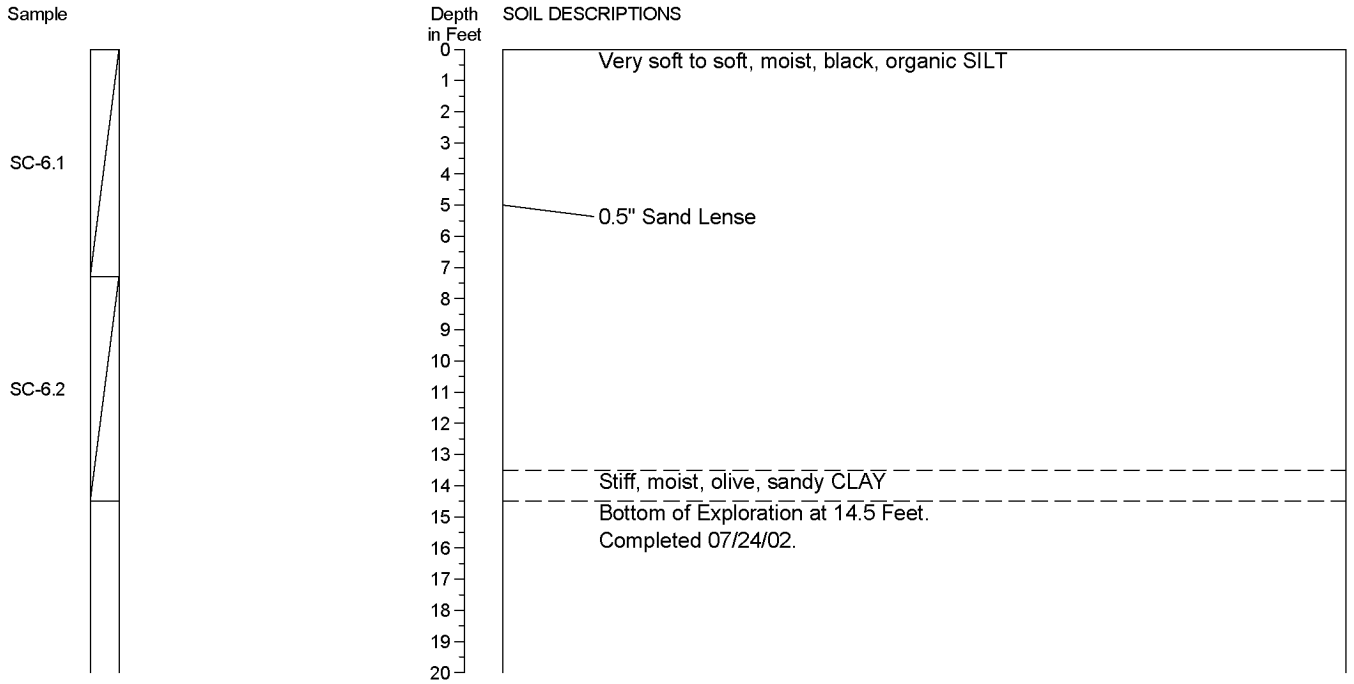

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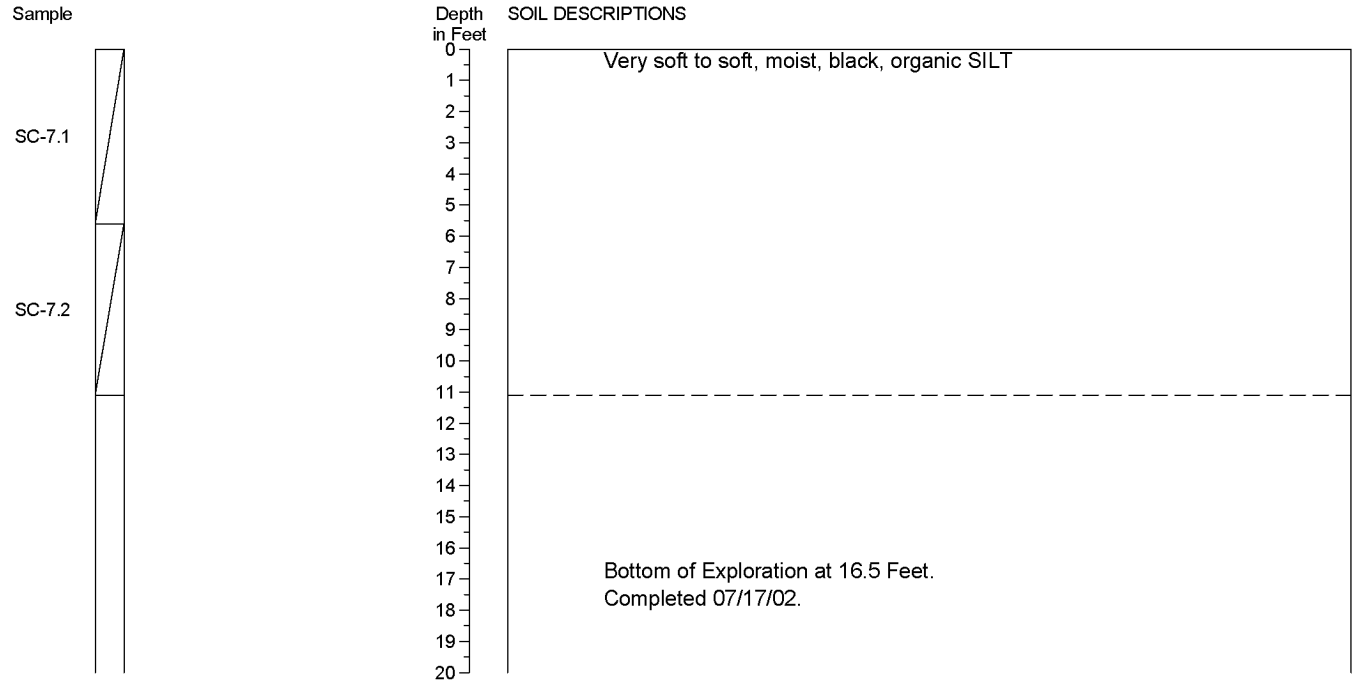
Boring Log SC-07



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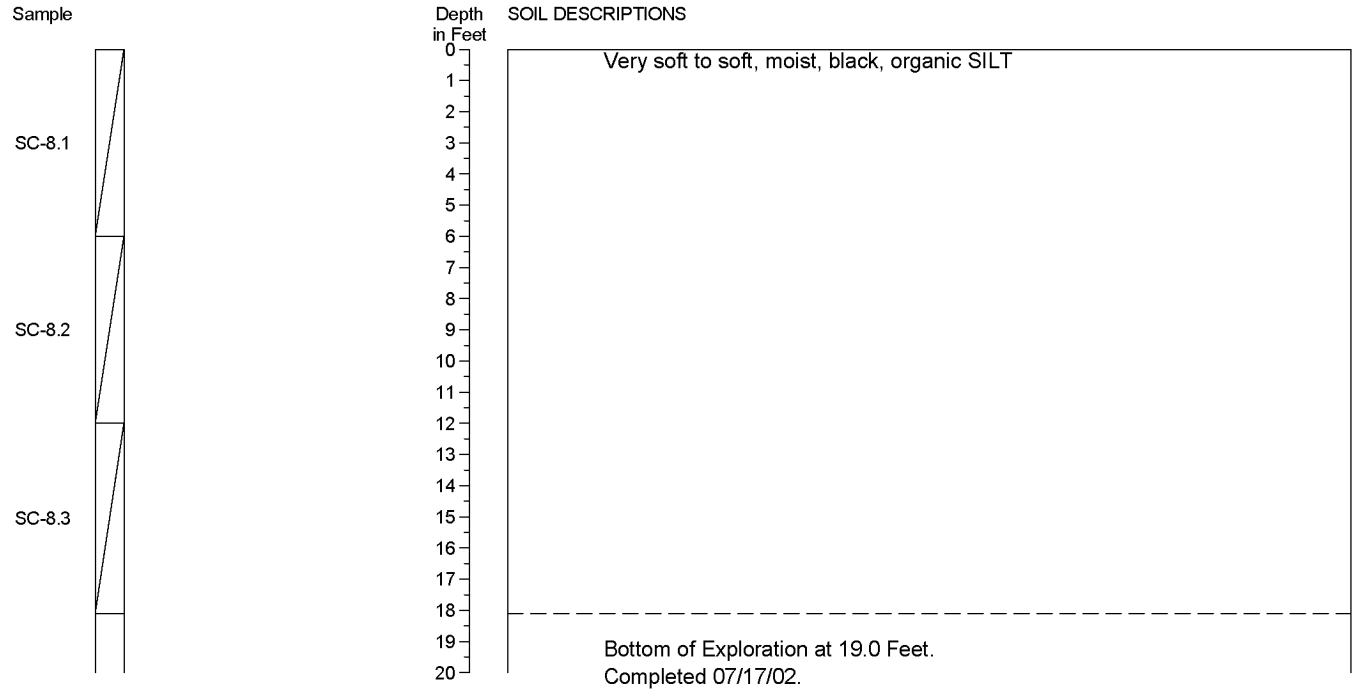

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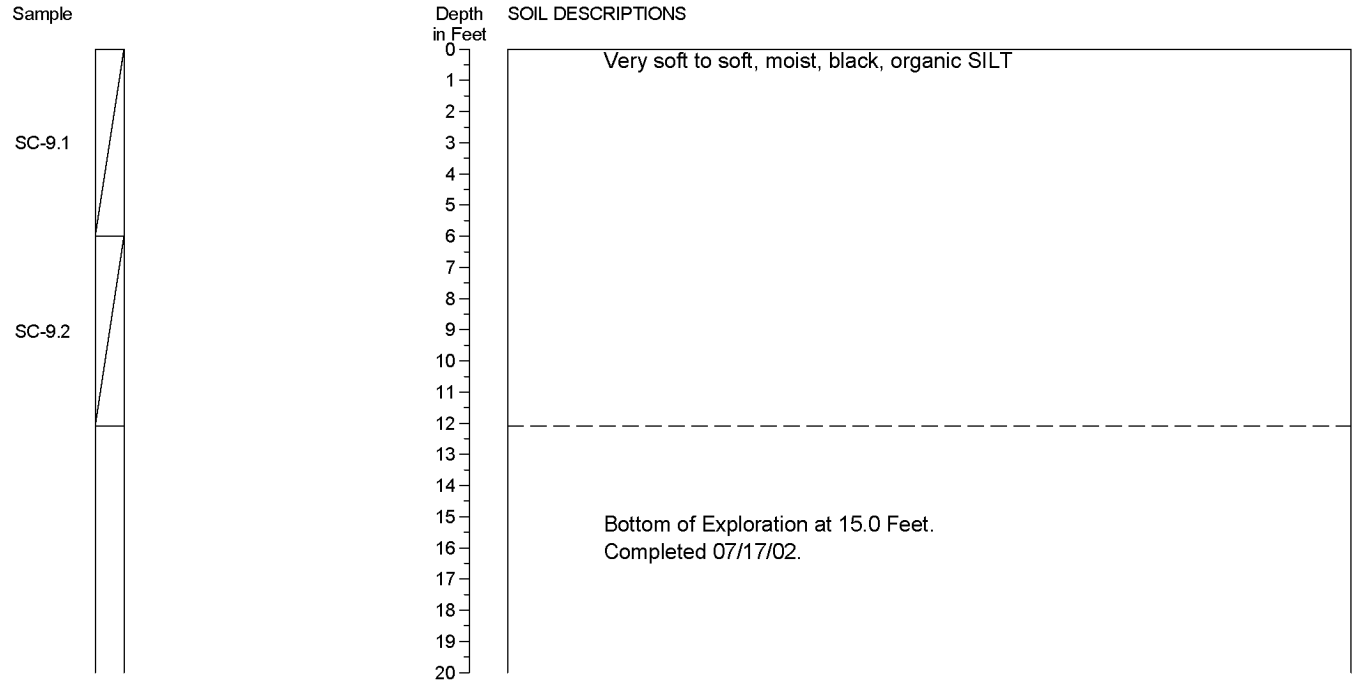
Boring Log SC-09



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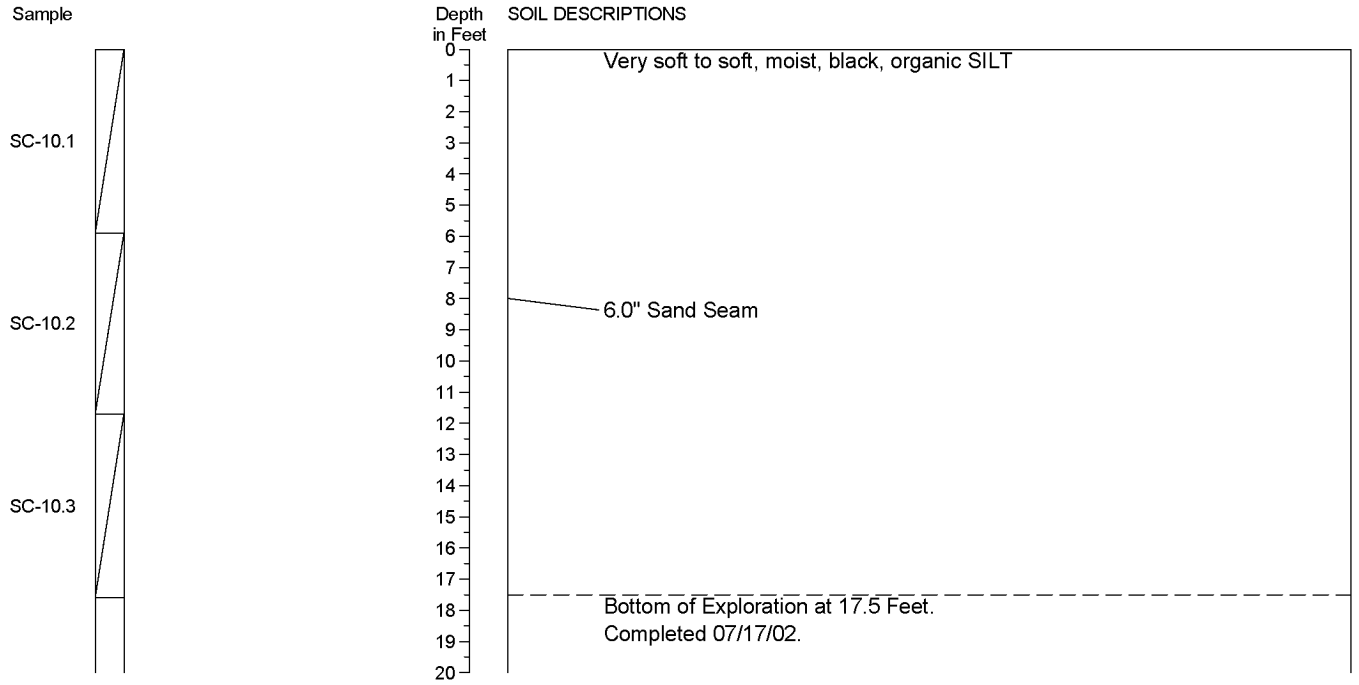

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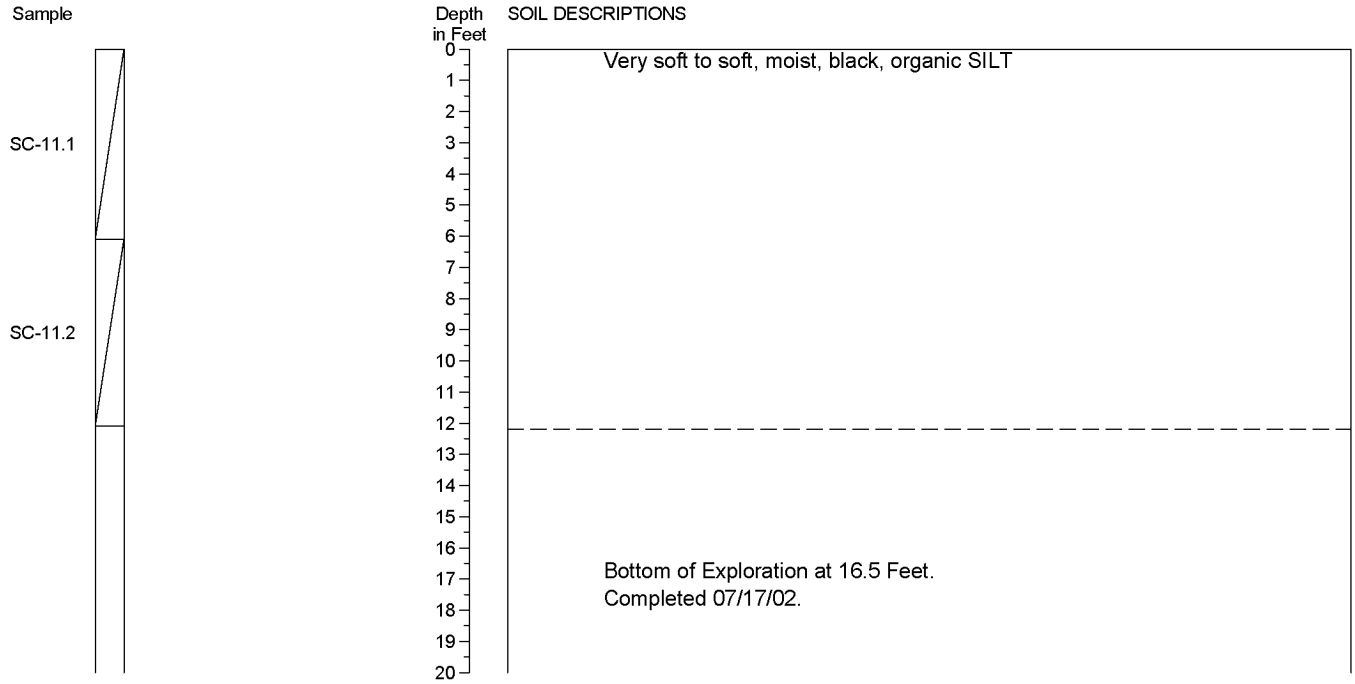
Boring Log SC-11



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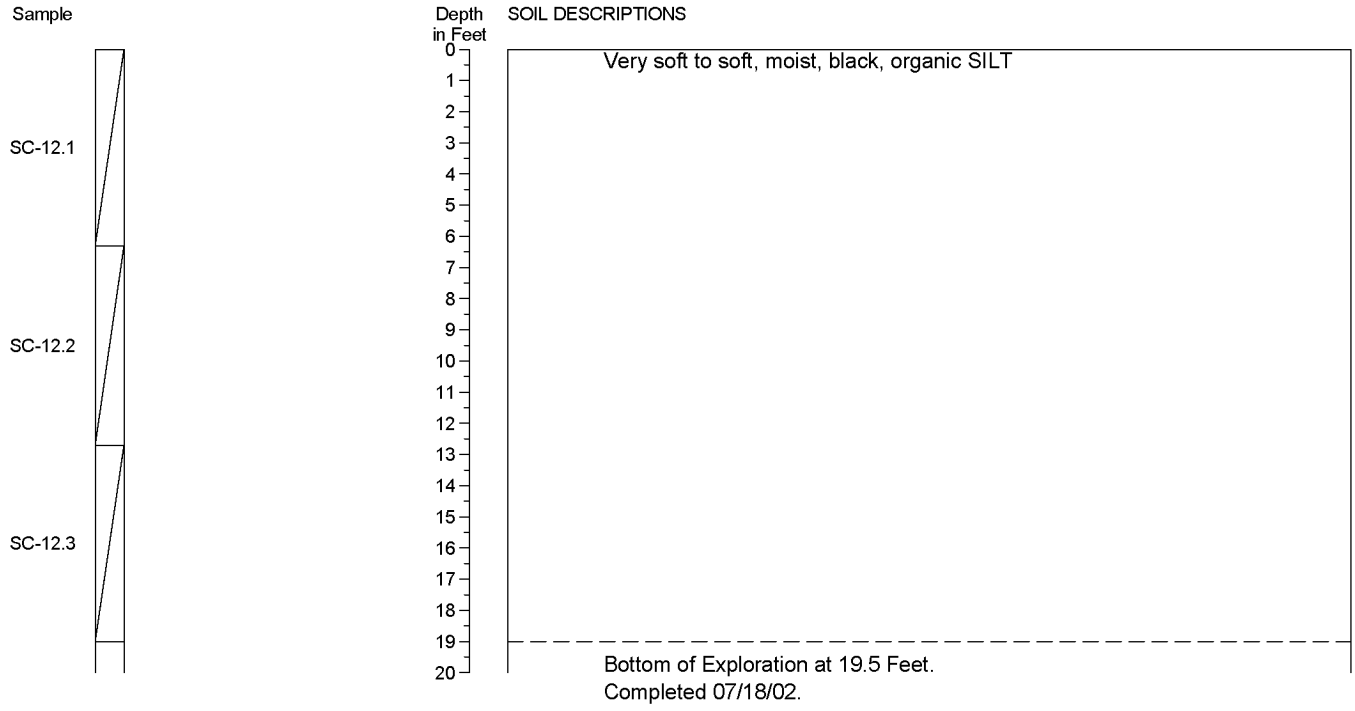

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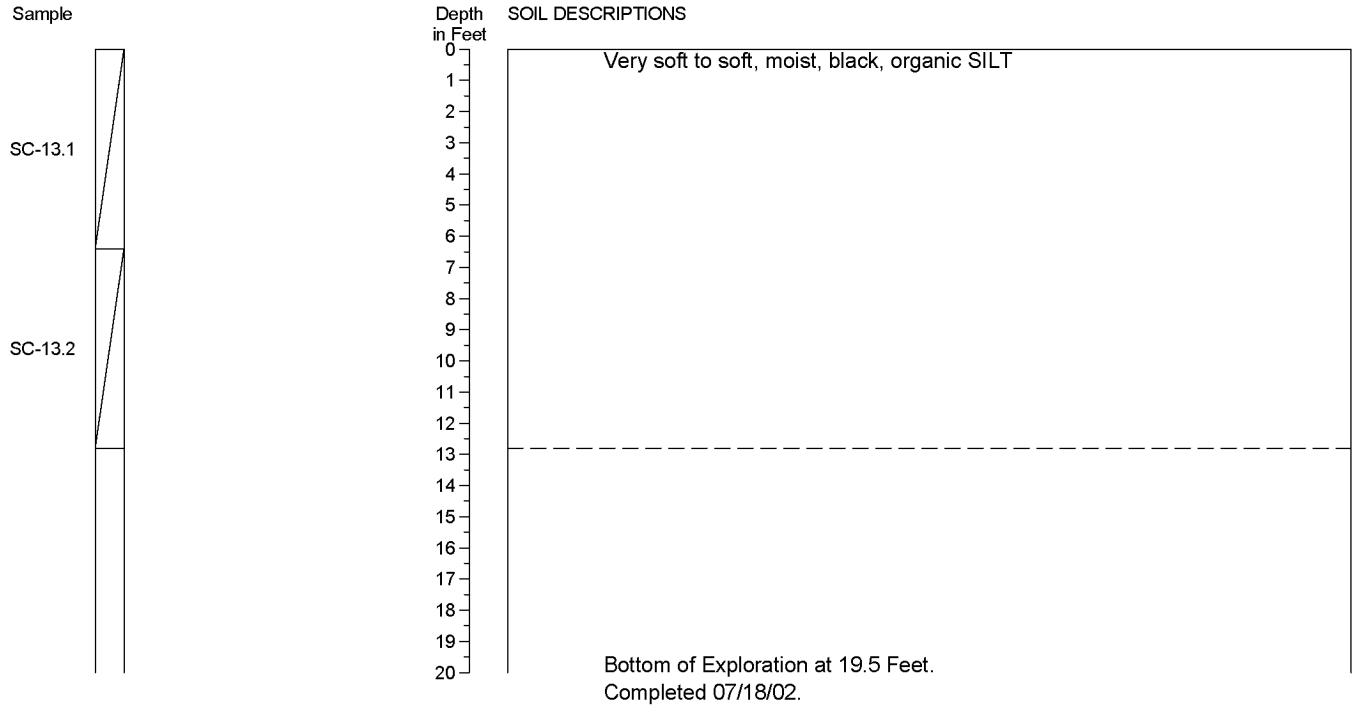

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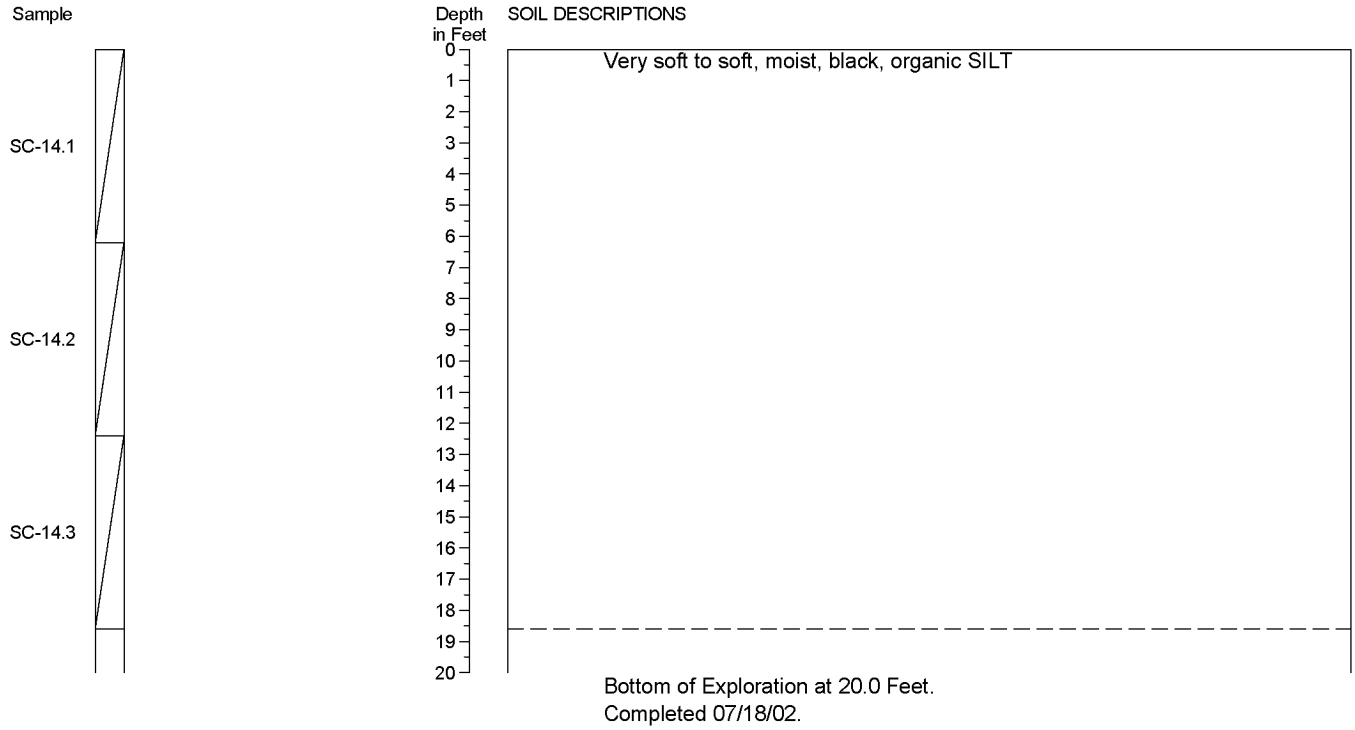

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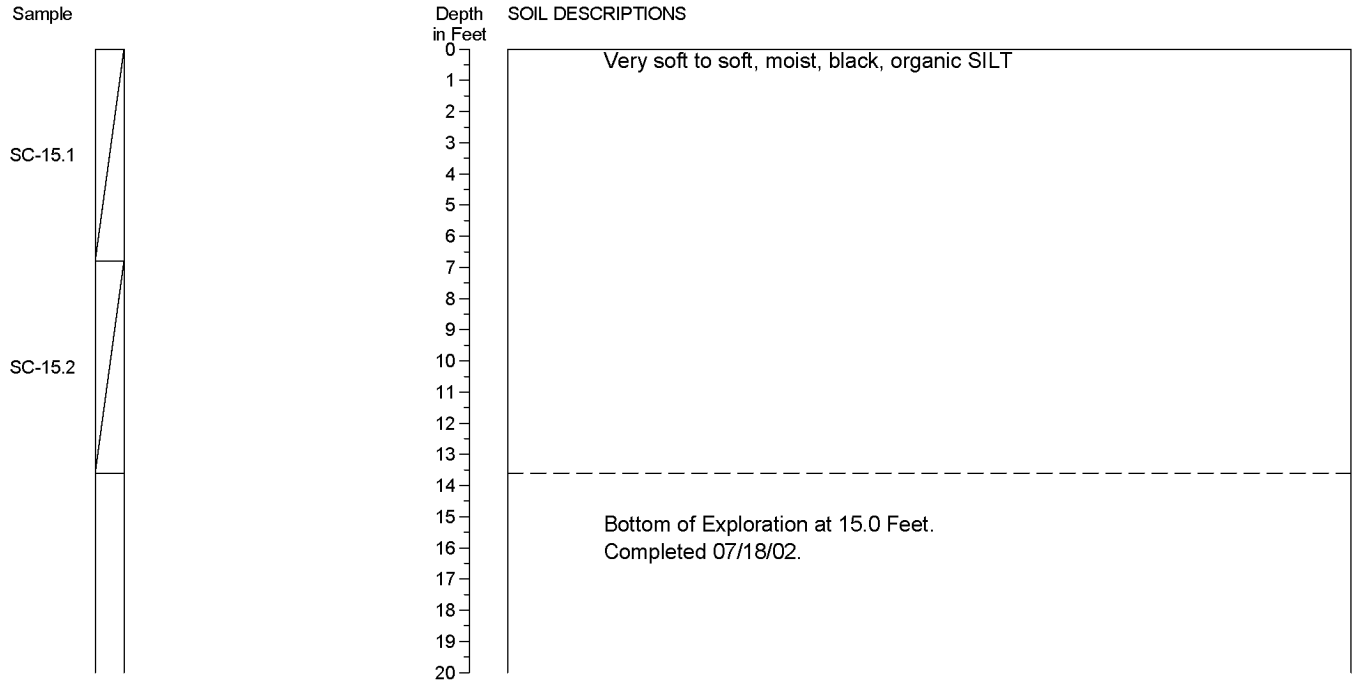
Boring Log SC-15



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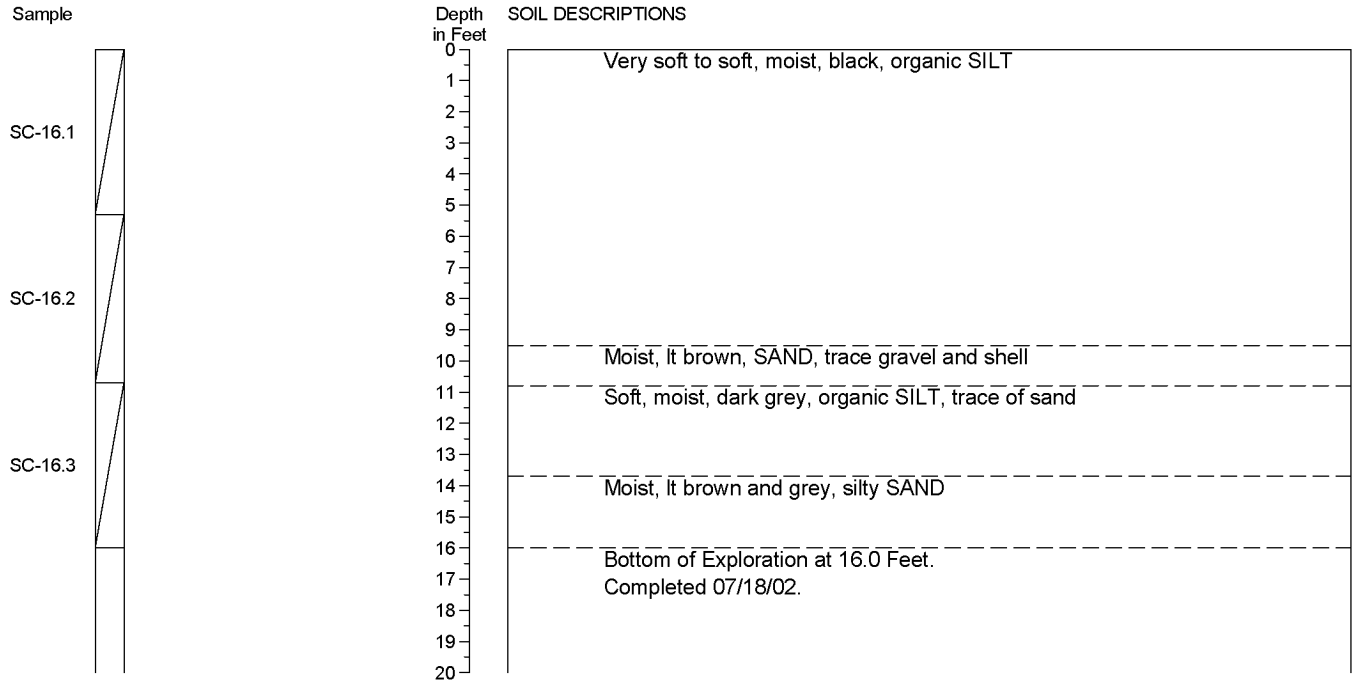

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HARTCROWSER

7580-12 03/03

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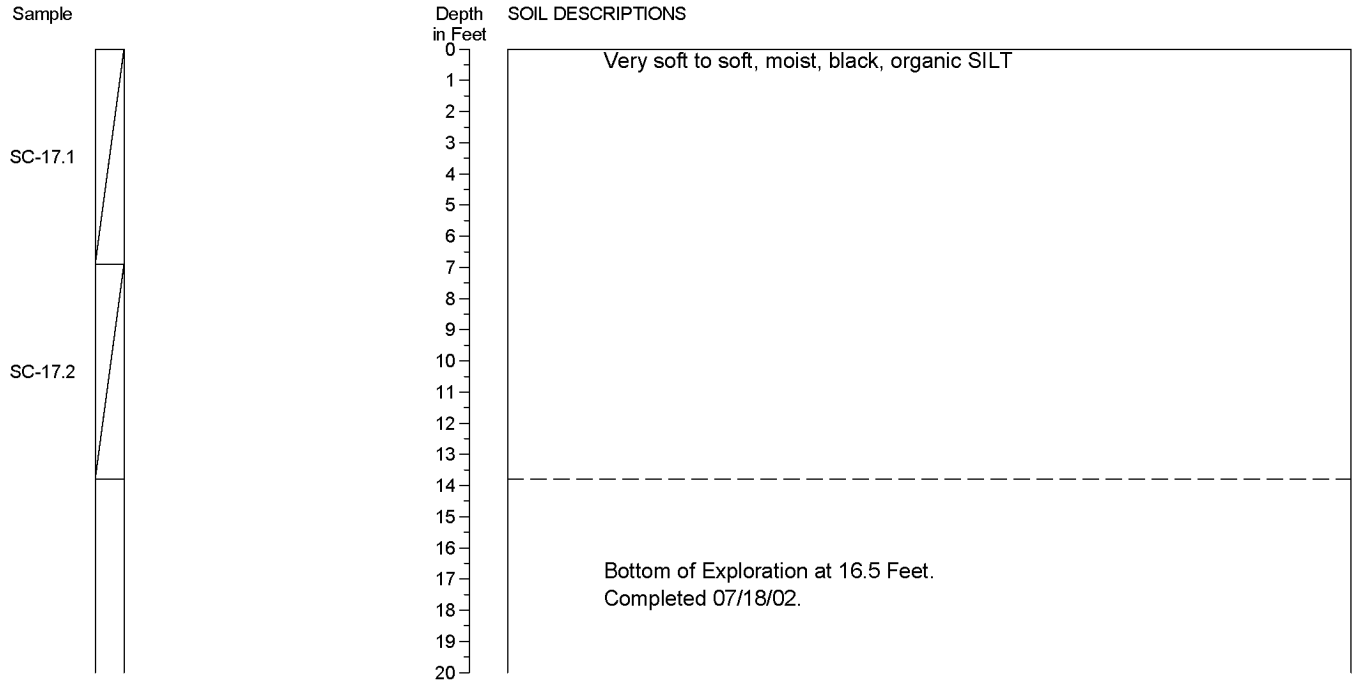

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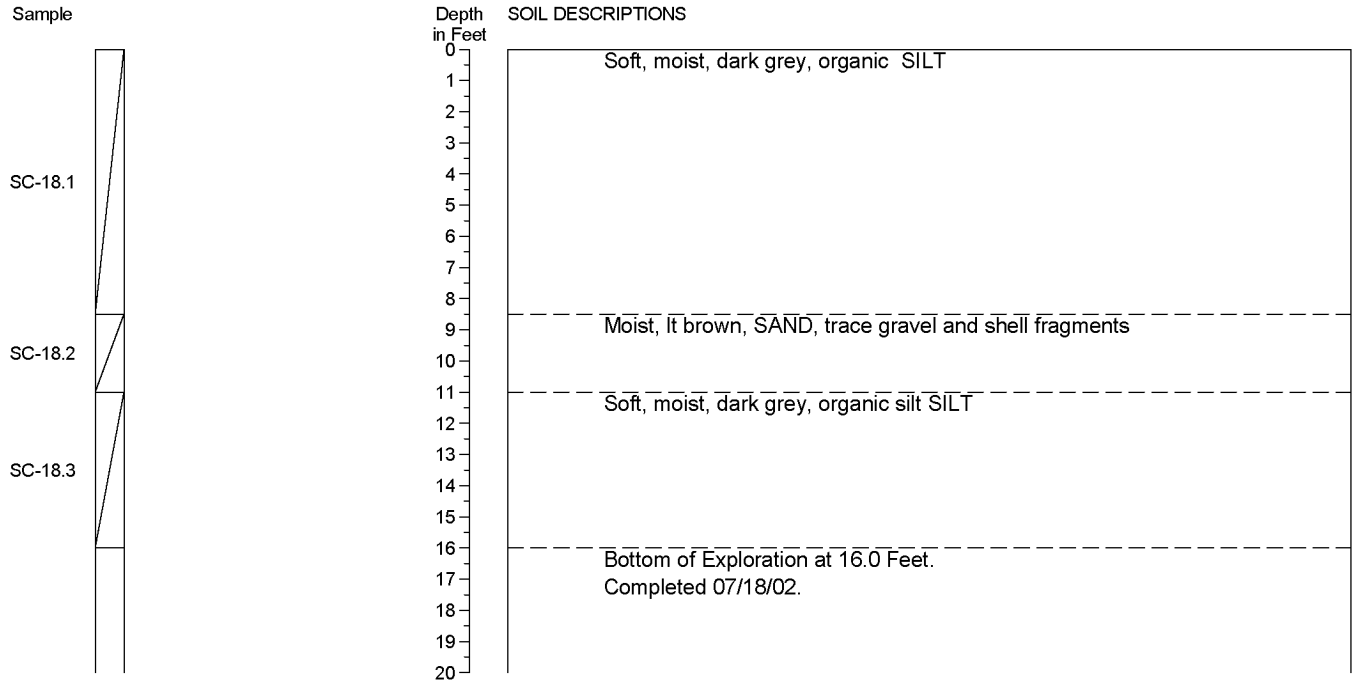

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