US Army Corps of Engineers
Buffalo District

FUSRAP

FINAL

ADDITIONAL SURFACE CHARACTERIZATION OF AREAS B AND C AT THE SEAWAY SITE

TONAWANDA, NEW YORK

JUNE 7, 1999

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Additional Surface Characterization of Areas B and C at the Seaway Site
Tonawanda, New York
June 7, 1999

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Additional Surface Characterization of Areas B and C at the Seaway Site Tonawanda, New York

June 7, 1999

1.0 INTRODUCTION

1.1 Purpose

SAIC Engineering, Inc. (SAIC) was retained by the United States Army Corps of Engineers (USACE) to obtain additional characterization of radiological contamination at Areas B and C of the Seaway Site in Tonawanda, New York. This report documents the activities, and presents the findings, conclusions and recommendations of an investigation conducted at Areas B and C of the Seaway Site in December 1998. The purpose of this investigation was to determine whether there is Manhattan Engineering District (MED) related radiological contamination within the upper 4 feet of the ground-surface in areas showing anomalous Gamma readings in Areas B and C of the Seaway Site. This investigation involved completion of 18 Geoprobe® soil borings, and collection of 72 samples.

1.2 Background

The Seaway Site is currently being remediated under the Formerly Utilized Sites Remedial Action Program (FUSRAP). FUSRAP was established to identify and clean up, or otherwise control, sites where residual contamination remains from activities conducted under contract to MED or the Atomic Energy Commission (AEC). The Seaway Site consists of four areas exhibiting elevated levels of radionuclide activity. These four areas are referred to as Areas A, B, C, and D, respectively.

The Tonawanda Site Proposed Plan (DOE, 1993a) and Feasibility Study (DOE, 1993b) were prepared to address remediation of radioactive contamination at the Seaway Site. At the time the drafts of these documents were prepared, sufficient characterization data had been collected to allow for acceptable estimates of contamination/remediation volumes for Area A, where the majority of the radiological contamination is present. However, for Area B and C only limited data consisting of grab samples taken from the waste piles of MED material shortly after they were placed in the landfill. These limited data were used in a proven, commercially available, state-of-the-art geospatial data analysis 3-D modeling software package called EarthVision™ to further refine the volume of contamination at Areas B and C (SAIC, 1999a).

Surface gamma activity in Areas A, B, and C was determined from two Gamma Walkover surveys performed in the Spring (USACE, 1998) and December of 1998. These surveys revealed minimal surface activity in most of Areas B and C (SAIC, 1999a). However, two isolated locations surveyed (referred to hereinafter as target anomalies) in Area C, and one location in Area B, exhibited elevated surface radiological activity (Figure 1). Modeling results did predict near surface contamination in one of the three target areas of elevated activity identified during the

gamma walkover survey (i.e. the northern-most anomaly/target area in Area C). USACE decided that additional characterization-sampling efforts were required at Areas B and C to determine whether MED-related residues were associated with the elevated readings found during the gamma walkover survey. This data, once collected would also provide the additional benefit of an increase in the data set used to estimate volumes of contaminated material existing at Seaway. The findings of the characterization effort are presented in Section 3.0.

2.0 ADDITIONAL SURFACE CHARACTERIZATION

Surface sampling was performed to further characterize radiological contamination at Areas B and C of the Seaway Site on December 16 to 18, 1998. All field activities took place in the southeastern portion of the property not currently covered by the landfill cap. Standard Operating Procedures (SOPs) and Quality Assurance/Quality Control (QA/QC and QA/QC Addendum) protocols implemented during the characterization were specified in the Sampling and Analysis Plan (SAP and SAP Addendum) (SAIC, 1999b), and Quality Assurance Project Plan (QAPP and QAPP Addendum) (SAIC, 1999c), respectively. This investigation involved completion of 18 Geoprobe® soil borings, collection of 71 soil samples, and collection of one rock sample. Forty-four (44) samples were submitted to Thermo Nutech in Oak Ridge, TN to be analyzed for U-234, U-235, U-238, Th-230, Th-232, Ra-226, Pr-231, and Ac-227.

2.1 Field Screening of Sampling Locations for Gamma Activity

Gamma activity screening was performed in the field using a hand-held 2” X 2” Sodium Iodide (NaI) detector. Gamma activity was recorded in microroentgen per hour (uR/h). Prior to sample collection, the ground-surface of the sampling area (20-foot radius) was scanned by the Radiation Project Manager. This pre-sampling scan (later referred to as “sampling area scan”) was used to obtain the range of Gamma activity in the area of each sampling point (or anomaly), and to identify the precise location of the target anomalies. The pre-sampling scan was also used to establish background gamma activity. Gamma activity readings listed in this report are inclusive of site background radiological activity.

2.2 Soil Sampling

Biased soil sampling was conducted at the three points of elevated gamma activity identified during the gamma walkover. At each target anomaly, sampling was conducted directly at the anomaly, and at three points situated in a triangular pattern around each anomaly (referred to as satellite sampling locations). Sampling locations are shown in Figure 2.

Sampling at each target anomaly location consisted of one hand-augered sample to a depth of 6 inches, and one 4-foot Geoprobe® core. Satellite sampling locations were situated 20 feet from the target anomaly. One satellite sampling location was positioned upgradient of the target anomaly, and two were located downgradient of the target anomaly. A total of 12 biased Geoprobe® borings, and 3 hand-augered holes, were performed.

Random soil sampling was performed to provide general coverage of the uncapped portions of Areas B and C. Random sampling locations were selected in coordination with USACE, based on site accessibility and general coverage of Areas B and C. A total of 6 random Geoprobe® borings were performed. Random sampling locations are shown in Figure 2.

Geoprobe® soil samples were collected utilizing 4-foot probe-drive sampling device. The probe-drive sampler was advanced to the desired depth by the weight of the Geoprobe® rig, or a reciprocating hammer. At each sampling location a 4-foot soil-core was collected from 0 to 4 feet below ground surface (ft bgs). Each 4-foot core was sub-sampled using a 1-foot sampling interval. Upon removal of the probe-drive sampler from the boring, the sample core was scanned for Gamma activity using the NaI detector. If the Gamma activity encountered in the upper 4 feet exceeded the sampling area background level by a factor of 2 or more, an additional core was to be collected from 4 to 8 ft bgs. Sampling area background level was considered to be the 7-9 uR/H range of gamma activity recorded during the sampling area scan. Sampling was discontinued if refuse, or refusal, was encountered in the boring.

All Geoprobe® samples were collected inside a one-inch diameter plastic tube. The sample material was accessed by splitting the plastic sampling tube with a knife, and collected using disposable plastic scoops. Hand-augered samples were collected with a hand-held stainless steel shovel. Soil collected from the ground surface to a depth of 6 inches was placed in a stainless steel bowl and thoroughly mixed. Sample collection locations were marked with a 4-foot stake labeled with the sample station identification number. Sample collection locations were surveyed by USACE using Geographic Positioning System (GPS) system on 12/18/98.

All samples were containerized in 500-mL wide-mouth plastic jars, wiped with a clean cloth, and placed in a cooler. The coolers were subsequently transported to the USACE office-trailer at Ashland 2, where Gamma activity was measured for each individual sample. Gamma activity was measured using a NaI detector. The detector probe was placed against the side of the sample container and readings were recorded after Gamma activity stabilized.

2.3 QA/QC Sampling and Data Validation

Duplicate QC samples and QA split samples were collected in the field as specified in the project SAP (SAIC, 1999b). A total of 4 duplicate QC soil samples were collected and submitted for radiological analysis at Thermo Nutech. Two QA split samples were collected by SAIC, and delivered to USACE.

Analytical QA/QC procedures for the investigation are specified in the laboratory's written QA program and individual method descriptions. To ensure the reliability and validity of work conducted at the laboratory, Thermo Nutech QC checks included method blanks, laboratory control samples, matrix spike analyses, and duplicate analyses.

Laboratory analytical data was validated by SAIC to asses the reliability of the data for the intended use, and to document data quality. Data validation entailed technical review of analytical

QC results and laboratory documentation. A qualifier was applied to data that did not meet the validation criteria.

2.4 Investigation Derived Waste

Investigation Derived Waste (IDW) included: soil and sediment waste generated by sampling activities; used personal protective equipment (PPE); used sampling equipment; and, water used to decontaminate Geoprobe® sampling equipment. Soil and sediment waste was disposed of at the boring locations within the uncapped areas of Seaway Areas B and C. Used sampling equipment and PPE was collected in a plastic-lined 55-gallon drum, and transported to the Ashland 2 facility where it was managed by USACE. Liquid IDW was collected in a 5-gallon plastic drum, transferred to the Ashland 2 decontamination pad, and managed as directed by USACE.

3.0 FINDINGS

3.1 Field Investigation Results

Geoprobe® boring, and hand-auger sampling point locations are shown in Figure 2. Subsurface material encountered during the investigation included clay, silt, and gravel used as landfill daily cover, and refuse. Refuse was composed primarily of wood, brick, newspaper, fabric, plastics, and glass. Boring logs are included in Appendix A. Results of sample core Gamma activity screening, as well as individual sample Gamma activity, are summarized in Table 1. A discussion of key findings at each Seaway Site Area is presented below.

3.1.1 Area B

The target anomaly in Area B was located by a maximum ground-surface Gamma scan reading of 72 uR/h. Field Gamma ground-surface scans at the satellite sampling locations associated with the Area B anomaly did not indicate elevated radiological activity. No elevated Gamma activity was observed during ground-surface scans at the random sampling locations within Area B.

Four borings were performed at the target anomaly, as specified in Section 2.2. These borings are identified as SWb-SLC-SS-0001, SWb-SLC-SS-0002, SWb-SLC-SS-0003, SWb-SLC-SS-0004, and SWb-SLC-SS-0005 in Table 1a. Two random Geoprobe® borings were performed in Area B, and are identified as SWb-SLC-SS-2003 and SWb-SLC-SS-2004 in Table 1a. During hand-augering at location SWb-SLC-SS-0001, a rock was encountered at approximately 4 to 6 inches below ground surface. The rock was not fully excavated, but was estimated to be approximately 0.5 to 1 foot in length along its longest axis.

Geoprobe® core soil-samples in Area B were collected to a depth of 4 ft bgs, except at location SWb-SLC-SS-0003. Samples at this location were collected to a depth of 8 ft bgs, in order to determine whether MED-related contamination was present at a depth below the rock found in SWb-SLC-SS-0001. Refuse was encountered at a depth of 4 feet, or less, at the two random

sampling locations. None of the soil cores collected in Area B exhibited elevated Gamma scan readings.

A soil sample was collected from the material above the rock found in SWb-SLC-SS-0001, and a rock sample (SWb-SLC-RR-0001-00-0) was collected after hammering the rock until sufficient sample volume was obtained. A Gamma scan conducted inside the hand-auger hole yielded a reading of 500 uR/h. A Gamma scan of the rock sample yielded 55 uR/h.

3.1.2 Area C

The target anomalies in Area C were located by ground-surface Gamma scans. Scans of the target anomalies yielded maximum readings of 22 uR/h and 17 uR/h, respectively. No elevated radiological activity was observed during ground-surface Gamma scans at the satellite sampling locations of either Area C target anomalies, or at the random sampling locations within Area C.

Four borings were performed at each of the target anomalies in Area C, as specified in Section 2.2. For the target anomaly where a surface reading of 22 uR/h was observed, the borings are identified as SWc-SLC-SS-0001, SWc-SLC-SS-0002, SWc-SLC-SS-0003, SWc-SLC-SS-0004, and SWc-SLC-SS-0005 in Table 1b. For the target anomaly where a surface reading of 17 uR/h was observed, the borings are identified as SWc-SLC-SS-1001, SWc-SLC-SS-1002, SWc-SLC-SS-1003, SWc-SLC-SS-1004, and SWc-SLC-SS-1005 in Table 1b. Four random Geoprobe® borings were performed in Area C, and are identified as SWc-SLC-SS-2001, SWc-SLC-SS-2002, SWc-SLC-SS-2005, and SWc-SLC-SS-2006 in Table 1b.

Geoprobe® core soil-samples in Area C were collected to a maximum depth of 4-ft bgs. Refusal was encountered at a depth less than 4 feet in two of the borings, and refuse was encountered at a depth of 4 feet, or less, in 5 of the borings. None of the soil cores collected in Area C exhibited elevated Gamma scan readings.

3.2 Evaluation of Laboratory Results

Laboratory results for radiological analyses performed on samples collected from the Seaway Site Areas B and C are summarized in Table 2, and are briefly discussed in the following subsections. Samples submitted for laboratory analysis were selected to establish the concentrations of radioisotopes at the upper and lower limits of the collected samples. Results of Th-230 analyses were compared to the USACE established site-specific Cleanup Guideline of 40 pCi/g. An exceedance of the cleanup guideline concentration was considered indicative of the presence of radiological contamination. A copy of the laboratory analytical reports generated by Thermo Nutech, and sample validation records generated by SAIC, are held in the administrative record file (reference to be included in final document).

3.2.1 Field Samples

No Cleanup Guideline exceedances were detected in Area B soil samples. The Th-230 concentration for Area B soil samples ranged from 0.78 to 3.09 pCi/g. The rock sample collected at station SWb-SLC-0001 exhibited elevated levels of Th-230 (196.20 pCi/g), Ra-226 (75.79 pCi/g), U-234 (259.80 pCi/g), U-238 (259.10 pCi/g), and Th-232 (145.10 pCi/g).

Cleanup Guideline exceedances were detected in three samples collected from Area C.[1] The Th-230 guideline was exceeded at sample station SWc-SLC-SS-1002 (411.60 pCi/g at 2-3 ft bgs), SWc-SLC-SS-1003 (236.20 pCi/g at 3-4 ft bgs), and SWc-SLC-SS-1005 (181.90 pCi/g at 3-4 ft bgs). Th-230 concentrations at all other sampling locations ranged from 1.06 to 11.98 pCi/g. The next highest Th-230 concentration was 32.57 pCi/g.

3.2.2 QA/QC Samples and Data Validation

Laboratory reports indicate that all results were within acceptable limits for the respective analytical techniques, and that no significant problems were encountered during the analysis process. Field duplicate sample results were representative of concentrations detected in the original samples. SAIC data validation indicates that over 99% of the laboratory data are of an acceptable quality. The only unacceptable datum was the Ac-227 result for sample SWc-SLC-SS-2006-12-0, which exhibited a counting error greater than 100% of the reported concentration and was rejected.

4.0 KEY FINDINGS AND CONCLUSIONS

4.1 Key Findings

Based on the additional surface characterization activities conducted in December 1998 at the Seaway Site Areas B and C, SAIC identifies the following key findings:

1. No radiological contamination was found at random sampling locations in Area B or Area C.

2. Sample results for Area B indicate that the elevated readings detected in the gamma walkover survey were attributed to a rock buried approximately 4 to 6 inches beneath ground surface. The rock was estimated to be approximately 0.5 to 1 foot in length along its longest axis. A sample from this rock exhibited a gamma reading of 55 uR/h, and laboratory results indicated elevated levels of Ra, U, and Th.

3. Sample results for Area C indicate the presence of radiological contamination at one of the target anomalies identified in the Gamma walkover survey. Analytical data from sampling stations SWc-SLC-SS-1002, SWc-SLC-SS-1003, and SWc-SLC-SS-1005 indicate that

[1] Location of elevated radioactivity was identified in the model as a predicted area of near surface contamination.

the interval from 2 to 4 feet below ground surface in this area contains elevated concentrations of Ra, Th, U, Ac, and Pr.

4. Refusal and/or refuse were encountered at depths of 4 feet, or less, in 7 of the 12 Geoprobe® sampling locations within Area C.

5. No elevated Gamma activity was detected in soil samples screened during field activities, while laboratory results indicated elevated radionuclide concentrations in several of the samples. This apparent disparity between laboratory and field data is attributed to limitations of the field instrument, which cannot detect relatively low levels of radionuclides in small volumes of material such as soil core samples.

4.2 Conclusions

Based on findings of the additional surface characterization activities conducted at the Seaway Site Areas B and C, SAIC makes the following conclusions:

1. It appears that radiological contamination (as defined by Th-230 > 40 pCi/g) is not present in the upper 4 feet of Area B. At Area C, one of the locations identified as a target anomaly in the gamma walkover surveys contains radiological contamination at a depth of 2 to 4 feet below the ground surface. The location of confirmed contamination was an area of near surface contamination predicted by the 1998 modeling effort.

2. Refusal was encountered in 2 of the borings and refuse was encountered in 5 of the borings at depths of 4 feet or less in Area C, suggesting that any MED-related material that would be accessible is likely to be located within the upper 4-feet of the ground surface.

3. The rock discovered at sampling location SWb-SLC-SS-0001 appears to be naturally occurring material, and is not MED-related residue, as evidenced by the relatively high concentration of uranium compared to thorium and radium (which indicates that it is unprocessed material, i.e., naturally occurring).

5.0 REFERENCES

U.S. Department of Energy (DOE), 1993a. *Proposed Plan for the Tonawanda Site, DOE/OR/21950-233*. November.

U.S. Department of Energy (DOE), 1993b. *Feasibility Study for the Tonawanda Site, CNN 1101104*. November.

SAIC, 1999a. *Technical Memorandum, Synopsis of Volume Calculations for Seaway Site Areas A, B, and C, Tonawanda, NY,* Science Applications International Corporation, June 7.

SAIC,1999b. *Sampling and Analysis Plan for Additional Surface Characterization at the Seaway Site Areas B and C, Tonawanda NY,* Science Applications International Corporation, March.

SAIC,1999c. *Quality Assurance Project Plan for Additional Surface Characterization at the Seaway Site Areas B and C, Tonawanda NY,* Science Applications International Corporation, April.

U.S. Army Corps of Engineers (USACE) 1998. *Gamma Walkover survey of the Seaway Landfill, Tonawanda, New York*, November.

TABLES

Table 1a. Summary of Field Gamma Activity Scan, Area B

AREA B		SWb-SLC-SS							SWb-SLC-RR
	Sampling Station	**0001**	**0002**	**0003^**	**0004**	**0005**	**2003**	**2004**	**0001**
	Sample Location	**Surface Sample**	**Center**	**Up-slope**	**Down-slope**	**Down-slope**	**Random**	**Random**	**Rock Sample**
Sample ID	**Interval (ft bgs)**	**(uR/h)**	**(uR/h)**	**(uR/h)**	**(uR/h)**	**(uR/h)**	**(uR/h)**	**(uR/h)**	**(uR/h)**
00-0	0-0.5	3*	NA	NA	NA	NA			55*
01-0	0-1	end sampling	3	3	4	3*	3	4*	end sampling
12-0	1-2		5*	5*	4*	3	4*	3**	
23-0	2-3		3	3	3	4	3	refuse @ 2.5	
34-0	3-4		4*	3	4*	4*	3*		
45-0	4-5		end sampling	5*	end sampling	end sampling	refuse @ 4.0		
56-0	5-6			4*					
67-0	6-7			3					
78-0	7-8			3*					
Field Screening Data:									
Ground Surface Scan		72	NA	NA	NA	NA	NA	NA	NA
Scan of Hand-augered Cavity		500	NA	NA	NA	NA	NA	NA	NA
Geoprobe Core Scan		NA	7-9	6-12	9-11	8-9	5-9	8-14	NA
Sampling Area Scan		NA	7-9	7-11	8-10	6-9	11-15	10-14	NA

KEY:
NA - Not Applicable
NR - No Recovery
^ - Core advanced to 8 ft per F. Stevenson direction
* - Sample submitted for laboratory analysis
** - Sample and duplicate sample submitted for laboratory analysis

Table 1b. Summary of Field Gamma Activity Scan, Area C

AREA C		SWc-SLC-SS						
	Sampling Station	0001	0002	0003	0004	0005	2001	2002
	Sample Location	Surface Sample	Center	Up-slope	Down-slope	Down-slope	Random	Random
Sample ID	Interval (ft bgs)	(uR/h)	(uR/h)	(uR/h)	(uR/h)	(uR/h)	(uR/h)	(uR/h)
00-0	0-0.5	5**	NA	NA	NA	NA	NS	NA
01-0	0-1	end sampling	7*	3**	3	4*	refuse @ 0.6	3*
12-0	1-2		3*	3	4*	3		refuse @ 1.1
23-0	2-3		refusal @ 2.25	3	3	3		
34-0	3-4			3*	3**	3*		
45-0	4-5			refuse @ 3.0	end sampling	refuse @ 4.0		
56-0	5-6							
67-0	6-7							
78-0	7-8							
Field Screening Data								
Ground Surface Scan		22	NA	NA	NA	NA	NA	NA
Scan of Hand-augered Cavity		40	NA	NA	NA	NA	NA	NA
Geoprobe Core Scan		NA	11-17	6-9	7-9	6-8	4-5	7-11
Sampling Area Scan		NA	17-22	11-15	10-13	7-10	6-11	7-15

KEY:
NA - Not Applicable
NR - No Recovery
NS - Not Sampled
* - Sample submitted for laboratory analysis
** - Sample and duplicate sample submitted for laboratory analysis

Table 1b. Summary of Field Gamma Activity Scan, Area C

AREA C		SWc-SLC-SS						
	Sampling Station	1001	1002	1003	1004	1005	2005	2006
	Sample Location	Surface Sample	Center	Up-slope	Down-slope	Down-slope	Random	Random
Sample ID	Interval (ft bgs)	(uR/h)	(uR/h)	(uR/h)	(uR/h)	(uR/h)	(uR/h)	(uR/h)
00-0	0-0.5	5*	NA	NA	NA	NA	NA	NA
01-0	0-1	end sampling	4*	3*	3	3*	3*	4*
12-0	1-2		4	3	4*	3	3*	3*
23-0	2-3		5*	3	3	5	NR	refuse @ 1.3
34-0	3-4		3*	4*	3*	5*	NR	
45-0	4-5		refusal @ 3.7	end sampling	end sampling	end sampling	end sampling	
56-0	5-6							
67-0	6-7							
78-0	7-8							
Field Screening Data								
Ground Surface Scan		17	NA	NA	NA	NA	NA	NA
Scan of Hand-augered Cavity		12	NA	NA	NA	NA	NA	NA
Geoprobe Core Scan		NA	7-12	8-10	9-11	9-11	7-9	7-9
Sampling Area Scan		NA	7-12	8-10	7-11	7-10	6-9	7-11

KEY:
NA - Not Applicable
NR - No Recovery
NS - Not Sampled
* - Sample submitted for laboratory analysis
** - Sample and duplicate sample submitted for laboratory analysis

Table 2a. Summary of Radiological Analysis Results for Seaway Site Area B.

Area B					Parameter (pCi/g)									
					Radium-226			Thorium-230			Uranium-234		
Sample ID	Date Collected	Start Depth (ft)	End Depth (ft)	SGS (uR/h)	Concentration	Error	MDA	Concentration	Error	MDA	Concentration	Error	MDA
SWbSLCSS0001000	12/16/98	0	0.5	3	< 0.17	0.20	0.37	1.03	0.35	0.10	1.28	0.45	0.20
SWbSLCSS0002120	12/16/98	1	2	5	0.24	0.12	0.10	2.22	0.59	0.14	1.82	0.54	0.15
SWbSLCSS0002340	12/16/98	3	4	4	0.12	0.09	0.10	2.30	0.53	0.05	1.96	0.54	0.13
SWbSLCSS0003120	12/16/98	1	2	5	< 0.14	0.11	0.15	2.15	0.53	0.11	2.48	0.78	0.33
SWbSLCSS0003450	12/16/98	4	5	5	0.16	0.10	0.09	1.35	0.44	0.17	1.80	0.54	0.21
SWbSLCSS0003560	12/16/98	5	6	4	0.14	0.09	0.09	2.33	0.68	0.15	2.60	0.73	0.15
SWbSLCSS0003780	12/16/98	7	8	3	0.21	0.11	0.13	1.45	0.44	0.06	1.79	0.51	0.13
SWbSLCSS0004120	12/16/98	1	2	4	0.27	0.23	0.25	1.49	0.40	0.09	1.42	0.44	0.06
SWbSLCSS0004340	12/16/98	3	4	4	0.12	0.09	0.11	1.83	0.54	0.23	2.06	0.69	0.25
SWbSLCSS0005010	12/16/98	0	1	3	0.23	0.12	0.12	1.19	0.37	0.14	1.02	0.34	0.17
SWbSLCSS0005340	12/16/98	3	4	4	0.20	0.12	0.10	2.41	0.62	0.06	1.32	0.45	0.15
SWbSLCSS2003120	12/17/98	1	2	4	0.15	0.10	0.09	0.78	0.33	0.24	1.64	0.48	0.19
SWbSLCSS2003340	12/17/98	3	4	3	< 0.05	0.07	0.13	1.19	0.44	0.25	1.08	0.41	0.24
SWbSLCSS2004010	12/17/98	0	1	4	0.29	0.14	0.10	1.79	0.56	0.13	1.31	0.38	0.05
SWbSLCSS2004120	12/17/98	1	2	3	0.30	0.19	0.20	3.09	0.83	0.07	1.41	0.44	0.16
SWbSLCSS2004121	12/17/98	1	2	3	0.27	0.14	0.11	2.89	0.80	0.22	1.87	0.57	0.25
SWbSLCRR0001000	12/17/98	NA	NA	55	75.79	9.46	1.60	196.20	35.81	1.35	259.80	56.78	4.11

KEY:
MDA - Minimum Detectable Activity
SGS - Sample Gamma Scan
NA - Not Applicable
Negative values are obtained directly from laboratory reports, and result from the subtraction of background radiation from sample concentration.

Table 2a. Summary of Radiological Analysis Results for Seaway Site Area B.

Area B					Parameter (pCi/g)									
					Uranium-235			Uranium-238			Thorium-232		
Sample ID	Date Collected	Start Depth (ft)	End Depth (ft)	SGS (uR/h)		Concentration	Error	MDA	Concentration	Error	MDA	Concentration	Error	MDA
SWbSLCSS0001000	12/16/98	0	0.5	3	<	0.09	0.11	0.18	1.47	0.49	0.18	0.67	0.27	0.11
SWbSLCSS0002120	12/16/98	1	2	5	<	0.09	0.10	0.08	1.65	0.50	0.15	1.55	0.46	0.14
SWbSLCSS0002340	12/16/98	3	4	4	<	0.22	0.17	0.13	2.32	0.61	0.13	1.20	0.34	0.08
SWbSLCSS0003120	12/16/98	1	2	5	<	0.07	0.13	0.24	2.23	0.72	0.22	1.62	0.43	0.12
SWbSLCSS0003450	12/16/98	4	5	5	<	0.25	0.19	0.21	1.65	0.50	0.13	0.88	0.34	0.14
SWbSLCSS0003560	12/16/98	5	6	4		0.17	0.16	0.16	2.15	0.64	0.08	1.65	0.54	0.15
SWbSLCSS0003780	12/16/98	7	8	3	<	0.02	0.06	0.15	1.92	0.53	0.16	1.10	0.37	0.12
SWbSLCSS0004120	12/16/98	1	2	4	<	0.03	0.06	0.08	1.49	0.45	0.06	0.84	0.28	0.09
SWbSLCSS0004340	12/16/98	3	4	4	<	0.21	0.20	0.20	1.37	0.53	0.27	0.88	0.33	0.12
SWbSLCSS0005010	12/16/98	0	1	3	<	0.05	0.08	0.12	0.89	0.31	0.06	0.77	0.29	0.11
SWbSLCSS0005340	12/16/98	3	4	4	<	0.06	0.10	0.18	1.18	0.42	0.15	0.84	0.31	0.10
SWbSLCSS2003120	12/17/98	1	2	4	<	0.13	0.13	0.13	1.28	0.41	0.12	0.66	0.29	0.17
SWbSLCSS2003340	12/17/98	3	4	3	<	0.05	0.10	0.23	1.22	0.44	0.15	0.51	0.26	0.20
SWbSLCSS2004010	12/17/98	0	1	4		0.13	0.11	0.06	1.15	0.35	0.05	0.98	0.38	0.17
SWbSLCSS2004120	12/17/98	1	2	3		0.24	0.17	0.13	1.41	0.44	0.17	1.10	0.40	0.12
SWbSLCSS2004121	12/17/98	1	2	3	<	0.06	0.10	0.15	1.92	0.57	0.18	1.15	0.42	0.15
SWbSLCRR0001000	12/17/98	NA	NA	55		6.40	5.54	3.35	259.10	####	4.55	145.10	26.98	1.46

KEY:
MDA - Minimum Detectable Activity
SGS - Sample Gamma Scan
NA - Not Applicable
Negative values are obtained directly from laboratory reports, and result from the subtraction of background radiation from sample concentration.

Table 2a. Summary of Radiological Analysis Results for Seaway Site Area B.

Area B					Parameter (pCi/g)							
					Actinium-227				Protactinium-231			
Sample ID	Date Collected	Start Depth (ft)	End Depth (ft)	SGS (uR/h)		Concentration	Error	MDA		Concentration	Error	MDA
SWbSLCSS0001000	12/16/98	0	0.5	3	<	-0.15	0.51	0.79	<	2.41	3.45	6.34
SWbSLCSS0002120	12/16/98	1	2	5		4.35	0.61	1.25	<	3.11	3.00	5.10
SWbSLCSS0002340	12/16/98	3	4	4		7.80	0.96	2.00	<	4.75	5.59	8.14
SWbSLCSS0003120	12/16/98	1	2	5		1.96	0.58	1.09	<	-0.64	2.99	4.93
SWbSLCSS0003450	12/16/98	4	5	5		5.34	0.84	1.59	<	-3.37	4.20	6.22
SWbSLCSS0003560	12/16/98	5	6	4		2.42	0.65	1.30	<	-1.34	4.01	6.51
SWbSLCSS0003780	12/16/98	7	8	3		3.50	0.55	1.04	<	-0.05	2.71	4.26
SWbSLCSS0004120	12/16/98	1	2	4		4.89	0.67	1.38	<	-0.49	3.09	5.47
SWbSLCSS0004340	12/16/98	3	4	4		1.70	0.38	0.77	<	0.75	2.04	3.67
SWbSLCSS0005010	12/16/98	0	1	3		2.20	0.37	0.77	<	-1.53	1.93	3.19
SWbSLCSS0005340	12/16/98	3	4	4		1.31	0.58	1.05	<	1.04	3.14	5.50
SWbSLCSS2003120	12/17/98	1	2	4	<	-0.06	0.35	0.55	<	0.31	2.19	3.81
SWbSLCSS2003340	12/17/98	3	4	3	<	0.76	0.42	0.77	<	-0.08	2.76	4.67
SWbSLCSS2004010	12/17/98	0	1	4		3.74	0.59	1.20	<	0.26	4.39	5.10
SWbSLCSS2004120	12/17/98	1	2	3		2.95	0.52	1.09	<	-1.38	2.61	4.40
SWbSLCSS2004121	12/17/98	1	2	3	<	0.20	0.55	0.91	<	1.50	3.62	6.47
SWbSLCRR0001000	12/17/98	NA	NA	55		8.88	2.56	7.17	<	-7.87	21.09	24.68

KEY:
MDA - Minimum Detectable Activity
SGS - Sample Gamma Scan
NA - Not Applicable
Negative values are obtained directly from laboratory reports, and result from the subtraction of background radiation from sample concentration.

Table 2b. Summary of Radiological Analysis for Results for Seaway Site Area C

Area C					Parameter (pCi/g)								
					Radium-226			Thorium-230			Uranium-234		
Sample ID	Date Collected	Start Depth (ft)	End Depth (ft)	SGS (uR/h)	Concentration	Error	MDA	Concentration	Error	MDA	Concentration	Error	MDA
SWcSLCSS0001000	12/16/98	0	0.5	5	0.27	0.13	0.14	11.98	2.45	0.18	15.76	3.70	0.28
SWcSLCSS0001001	12/16/98	0	0.5	4	0.16	0.10	0.13	7.03	1.43	0.13	10.54	2.14	0.14
SWcSLCSS0002010	12/16/98	0	1	7	0.16	0.10	0.12	10.60	2.18	0.14	11.50	2.34	0.11
SWcSLCSS0002120	12/16/98	1	2	3	0.23	0.13	0.11	1.70	0.45	0.10	1.05	0.36	0.11
SWcSLCSS0003010	12/17/98	0	1	3	0.47	0.19	0.15	1.45	0.48	0.25	1.81	0.49	0.10
SWcSLCSS0003011	12/17/98	0	1	3	0.21	0.14	0.16	1.36	0.44	0.20	1.71	0.51	0.15
SWcSLCSS0003340	12/17/98	3	4	3	< 0.17	0.12	0.17	1.53	0.52	0.23	1.74	0.51	0.17
SWcSLCSS0004120	12/17/98	1	2	4	0.16	0.11	0.10	4.48	1.13	0.28	5.65	1.23	0.13
SWcSLCSS0004340	12/17/98	3	4	3	0.22	0.12	0.14	1.63	0.51	0.14	1.46	0.45	0.12
SWcSLCSS0004341	12/17/98	3	4	3	0.15	0.10	0.14	1.27	0.42	0.21	1.30	0.38	0.15
SWcSLCSS0005010	12/17/98	0	1	4	0.18	0.11	0.11	8.95	1.90	0.25	10.94	2.39	0.12
SWcSLCSS0005340	12/17/98	3	4	3	0.20	0.11	0.09	1.57	0.51	0.26	1.19	0.35	0.09
SWcSLCSS1001000	12/16/98	0	0.5	5	0.37	0.19	0.19	9.31	1.97	0.18	1.86	0.53	0.11
SWcSLCSS1002010	12/16/98	0	1	4	< 0.12	0.09	0.10	3.83	1.43	0.50	1.40	0.42	0.10
SWcSLCSS1002230	12/16/98	2	3	5	10.93	1.23	0.11	411.60	####	0.12	38.63	8.03	0.20
SWcSLCSS1002340	12/16/98	3	4	3	2.07	0.43	0.13	32.57	5.98	0.13	31.47	6.47	0.18
SWcSLCSS1003010	12/16/98	0	1	3	0.19	0.14	0.17	2.39	0.68	0.15	2.37	0.63	0.19
SWcSLCSS1003340	12/16/98	3	4	4	7.97	0.92	0.11	236.20	####	0.05	21.82	4.60	0.19
SWcSLCSS1004120	12/16/98	1	2	4	0.19	0.12	0.09	2.24	0.86	0.33	1.88	0.53	0.06
SWcSLCSS1004340	12/16/98	3	4	3	< 0.08	0.11	0.21	1.06	0.53	0.14	1.52	0.43	0.14
SWcSLCSS1005010	12/16/98	0	1	3	< 0.14	0.11	0.15	4.72	1.30	0.21	1.90	0.57	0.15
SWcSLCSS1005340	12/16/98	3	4	5	4.93	0.64	0.08	181.90	####	0.09	47.09	11.75	0.28
SWcSLCSS2002010	12/17/98	0	1	3	< 0.20	0.18	0.27	1.95	0.66	0.22	1.50	0.44	0.12
SWcSLCSS2005010	12/17/98	0	1	3	0.23	0.14	0.17	1.06	0.40	0.26	1.31	0.45	0.24
SWcSLCSS2005120	12/17/98	1	2	3	0.33	0.16	0.12	1.69	0.63	0.33	2.42	0.77	0.32
SWcSLCSS2006010	12/17/98	0	1	4	0.32	0.15	0.12	3.98	0.92	0.20	4.69	1.10	0.24
SWcSLCSS2006120	12/17/98	1	2	3	0.16	0.11	0.10	4.08	1.08	0.17	5.29	1.19	0.14

KEY:

R - Datum Rejected
MDA - Minimum Detectable Activity
SGS - Sample Gamma Scan

Negative values are obtained directly from laboratory reports, and result from the subtraction of background radiation from sample concentration.

Table 2b. Summary of Radiological Analysis for Results for Seaway Site Area C

Area C					Parameter (pCi/g)								
					Uranium-235			Uranium-238			Thorium-232		
Sample ID	Date Collected	Start Depth (ft)	End Depth (ft)	SGS (uR/h)	Concentration	Error	MDA	Concentration	Error	MDA	Concentration	Error	MDA
SWcSLCSS0001000	12/16/98	0	0.5	5	0.42	0.29	0.24	13.51	3.21	0.25	0.77	0.29	0.11
SWcSLCSS0001001	12/16/98	0	0.5	4	0.32	0.20	0.13	10.38	2.11	0.18	0.54	0.22	0.11
SWcSLCSS0002010	12/16/98	0	1	7	0.55	0.28	0.16	11.89	2.41	0.18	0.72	0.29	0.13
SWcSLCSS0002120	12/16/98	1	2	3	< 0.11	0.12	0.13	0.78	0.30	0.15	1.05	0.33	0.13
SWcSLCSS0003010	12/17/98	0	1	3	< 0.04	0.07	0.11	1.64	0.45	0.05	1.30	0.44	0.17
SWcSLCSS0003011	12/17/98	0	1	3	< 0.08	0.11	0.16	1.25	0.42	0.18	0.94	0.34	0.16
SWcSLCSS0003340	12/17/98	3	4	3	< 0.15	0.14	0.15	1.83	0.53	0.15	0.51	0.27	0.24
SWcSLCSS0004120	12/17/98	1	2	4	0.23	0.16	0.07	5.87	1.27	0.13	0.61	0.30	0.20
SWcSLCSS0004340	12/17/98	3	4	3	< 0.05	0.08	0.13	1.21	0.39	0.12	0.62	0.28	0.14
SWcSLCSS0004341	12/17/98	3	4	3	< 0.00	0.01	0.11	1.50	0.41	0.05	0.86	0.33	0.11
SWcSLCSS0005010	12/17/98	0	1	4	0.29	0.21	0.19	11.08	2.42	0.19	0.62	0.28	0.15
SWcSLCSS0005340	12/17/98	3	4	3	< 0.02	0.05	0.11	1.08	0.33	0.12	0.66	0.29	0.17
SWcSLCSS1001000	12/16/98	0	0.5	5	< 0.04	0.08	0.17	1.88	0.54	0.17	0.82	0.32	0.15
SWcSLCSS1002010	12/16/98	0	1	4	< 0.02	0.05	0.12	1.38	0.41	0.14	0.39	0.33	0.32
SWcSLCSS1002230	12/16/98	2	3	5	1.55	0.58	0.10	41.89	8.68	0.20	2.50	0.61	0.10
SWcSLCSS1002340	12/16/98	3	4	3	1.37	0.55	0.19	33.36	6.83	0.18	0.68	0.29	0.17
SWcSLCSS1003010	12/16/98	0	1	3	< 0.12	0.12	0.14	2.09	0.57	0.07	0.95	0.36	0.17
SWcSLCSS1003340	12/16/98	3	4	4	0.84	0.42	0.23	24.43	5.11	0.19	1.55	0.41	0.08
SWcSLCSS1004120	12/16/98	1	2	4	< 0.11	0.11	0.07	1.96	0.54	0.06	0.54	0.36	0.27
SWcSLCSS1004340	12/16/98	3	4	3	< 0.02	0.05	0.11	1.44	0.41	0.12	0.65	0.39	0.23
SWcSLCSS1005010	12/16/98	0	1	3	< 0.04	0.10	0.23	1.73	0.54	0.14	0.89	0.42	0.20
SWcSLCSS1005340	12/16/98	3	4	5	1.16	0.62	0.30	43.82	10.96	0.14	1.36	0.40	0.11
SWcSLCSS2002010	12/17/98	0	1	3	< 0.10	0.11	0.15	1.23	0.39	0.12	1.05	0.45	0.23
SWcSLCSS2005010	12/17/98	0	1	3	< 0.06	0.09	0.15	1.18	0.41	0.16	0.89	0.35	0.16
SWcSLCSS2005120	12/17/98	1	2	3	0.39	0.27	0.22	1.42	0.53	0.21	0.96	0.43	0.24
SWcSLCSS2006010	12/17/98	0	1	4	0.25	0.19	0.18	4.55	1.07	0.21	1.08	0.36	0.14
SWcSLCSS2006120	12/17/98	1	2	3	0.21	0.18	0.19	5.32	1.20	0.12	0.63	0.31	0.17

KEY:

R - Datum Rejected
MDA - Minimum Detectable Activity
SGS - Sample Gamma Scan

Negative values are obtained directly from laboratory reports, and result from the subtraction of background radiation from sample concentration.

Table 2b. Summary of Radiological Analysis for Results for Seaway Site Area C

Area C					Parameter (pCi/g)							
					Actinium-227				Protactinium-231			
Sample ID	Date Collected	Start Depth (ft)	End Depth (ft)	SGS (uR/h)		Concentration	Error	MDA		Concentration	Error	MDA
SWcSLCSS0001000	12/16/98	0	0.5	5	<	0.60	0.62	1.02	<	2.15	3.84	6.38
SWcSLCSS0001001	12/16/98	0	0.5	4	<	0.45	0.46	0.78	<	1.03	2.90	4.83
SWcSLCSS0002010	12/16/98	0	1	7		2.66	0.71	1.15	<	3.06	5.83	6.77
SWcSLCSS0002120	12/16/98	1	2	3		1.07	0.46	0.83	<	3.95	3.14	4.72
SWcSLCSS0003010	12/17/98	0	1	3		1.07	0.45	0.81	<	2.08	2.85	4.86
SWcSLCSS0003011	12/17/98	0	1	3	<	0.25	0.33	0.61	<	-0.52	2.54	4.29
SWcSLCSS0003340	12/17/98	3	4	3	<	-0.49	1.10	1.68	<	-2.58	7.80	13.16
SWcSLCSS0004120	12/17/98	1	2	4		3.25	0.65	1.22	<	1.52	4.12	6.51
SWcSLCSS0004340	12/17/98	3	4	3		2.75	0.46	0.93	<	-0.83	2.32	3.95
SWcSLCSS0004341	12/17/98	3	4	3		1.32	0.69	1.23	<	0.35	3.71	6.35
SWcSLCSS0005010	12/17/98	0	1	4	<	0.63	0.57	1.90	<	-0.40	6.70	10.35
SWcSLCSS0005340	12/17/98	3	4	3		2.63	0.38	0.81	<	-0.97	1.97	3.33
SWcSLCSS1001000	12/16/98	0	0.5	5	<	0.63	0.42	1.16	<	1.44	3.10	5.07
SWcSLCSS1002010	12/16/98	0	1	4	<	0.48	0.58	1.12	<	1.90	3.72	6.42
SWcSLCSS1002230	12/16/98	2	3	5		32.92	1.90	3.72		42.46	8.84	15.85
SWcSLCSS1002340	12/16/98	3	4	3		4.74	1.58	2.52	<	1.06	6.45	11.36
SWcSLCSS1003010	12/16/98	0	1	3		1.40	0.46	0.85	<	-1.24	2.64	3.86
SWcSLCSS1003340	12/16/98	3	4	4		24.24	1.38	2.22		51.14	9.18	15.63
SWcSLCSS1004120	12/16/98	1	2	4	<	0.15	0.22	0.41	<	-0.70	1.70	2.82
SWcSLCSS1004340	12/16/98	3	4	3		1.54	0.33	0.64	<	0.49	1.62	2.63
SWcSLCSS1005010	12/16/98	0	1	3		1.21	0.50	0.89	<	0.21	2.53	4.31
SWcSLCSS1005340	12/16/98	3	4	5		12.65	1.02	1.29		31.92	4.80	9.46
SWcSLCSS2002010	12/17/98	0	1	3	<	0.05	0.32	0.51	<	1.01	1.85	3.33
SWcSLCSS2005010	12/17/98	0	1	3	<	0.50	0.19	0.78	<	-3.50	2.80	3.71
SWcSLCSS2005120	12/17/98	1	2	3		2.68	0.52	0.99	<	1.36	2.49	4.08
SWcSLCSS2006010	12/17/98	0	1	4	<	0.72	0.64	1.15	<	2.44	4.40	7.75
SWcSLCSS2006120	12/17/98	1	2	3	R	1.06	1.24	2.07	<	-0.03	8.58	14.39

KEY:

R - Datum Rejected
MDA - Minimum Detectable Activity
SGS - Sample Gamma Scan

Negative values are obtained directly from laboratory reports, and result from the subtraction of background radiation from sample concentration.

FIGURES

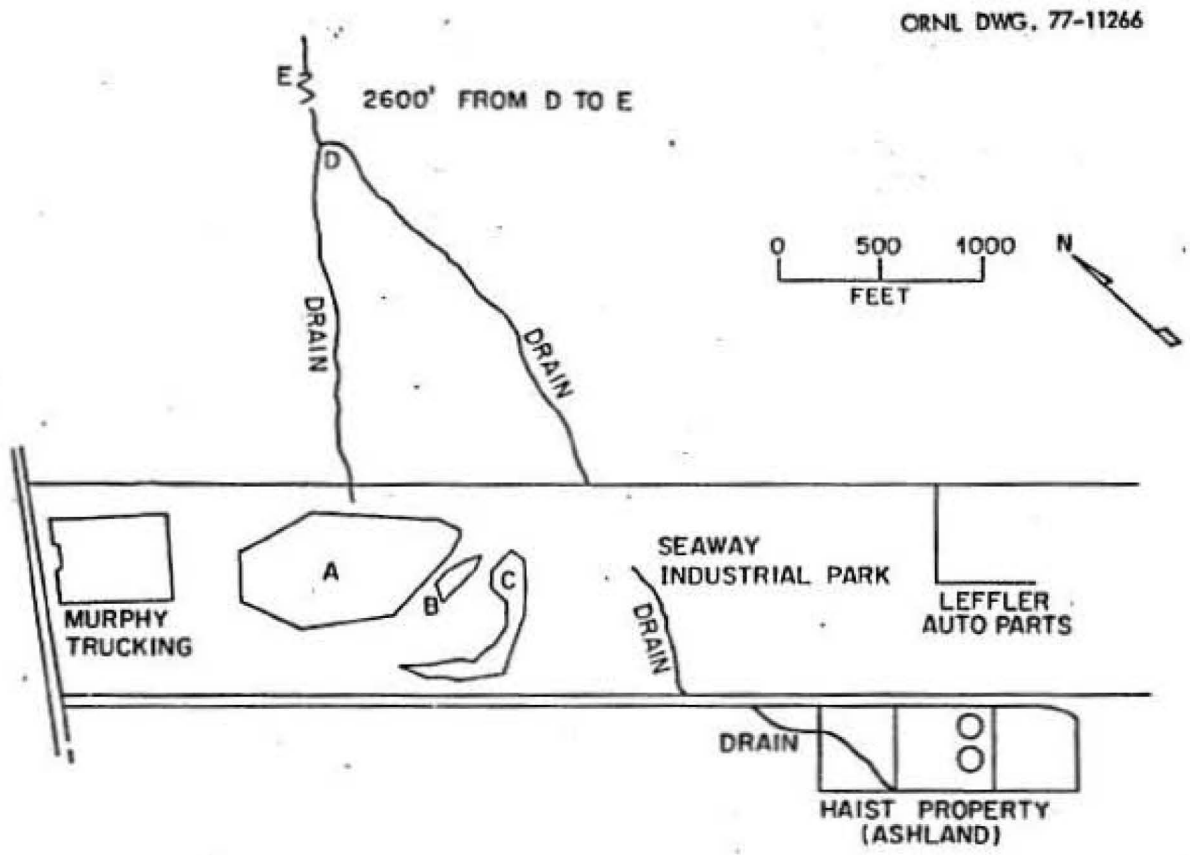

FIGURE 1
PLAN VIEW OF SEAWAY INDUSTRIAL PARK SHOWING THREE AREAS (A, B, C) WHERE RADIOACTIVE RESIDUES DUMPED

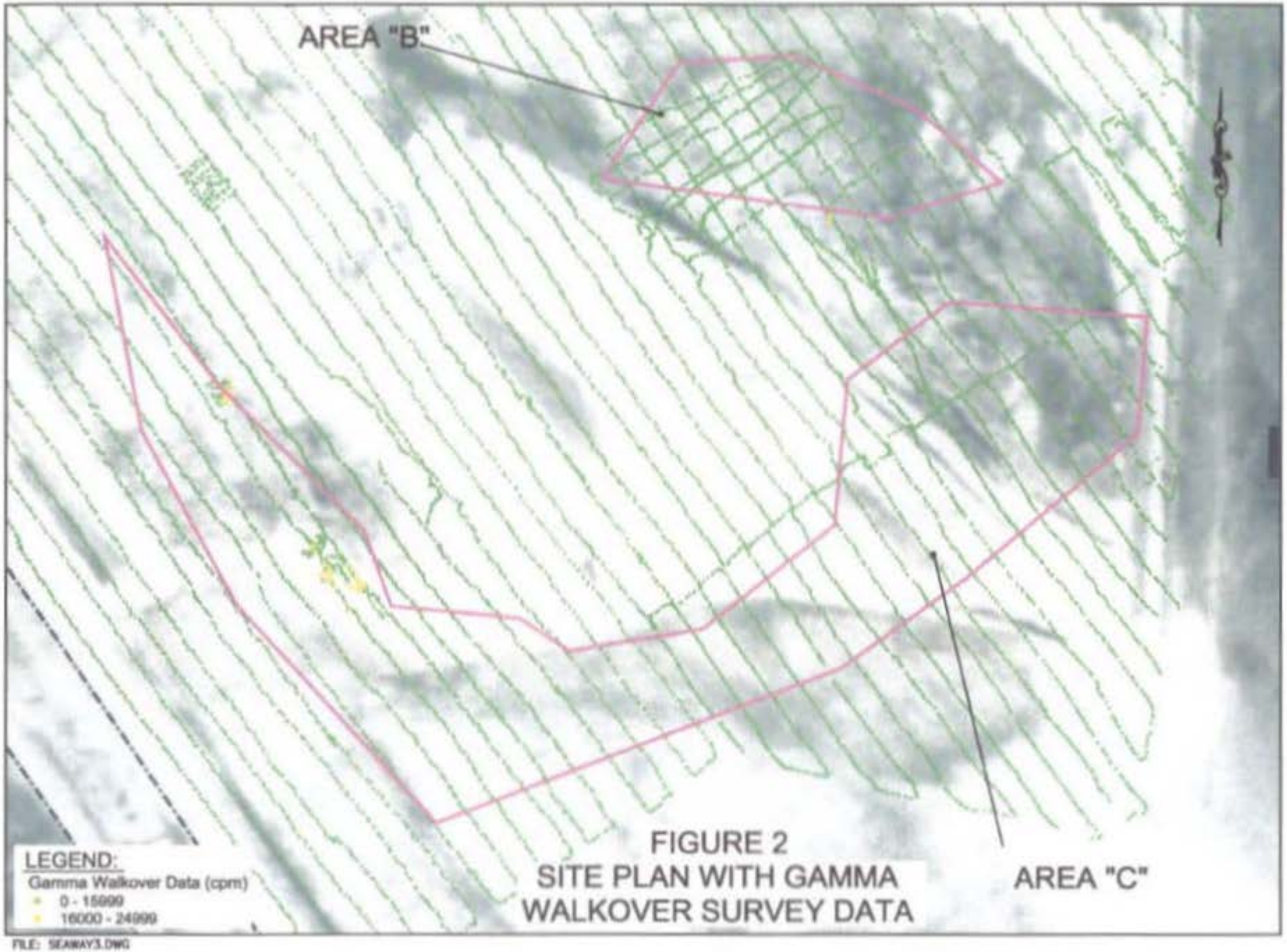

FIGURE 2
SITE PLAN WITH GAMMA
WALKOVER SURVEY DATA

FILE: SEAWAY3.DWG

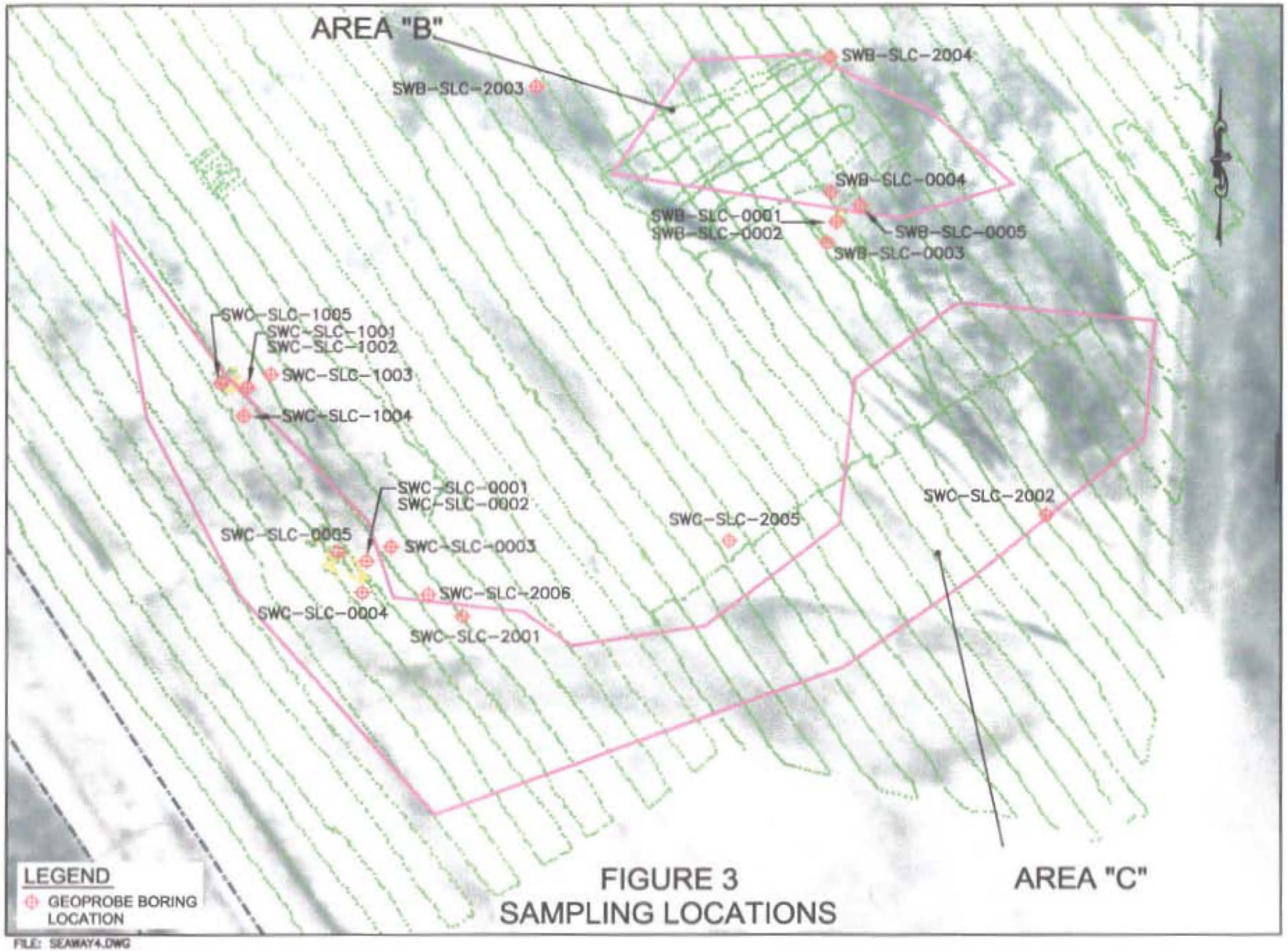

FIGURE 3
SAMPLING LOCATIONS

FILE: SEAWAY4.DWG

APPENDIX A

BORING LOGS

HTRW DRILLING LOG	DISTRICT USACE - Buffalo	HOLE NUMBER
1. COMPANY NAME SAIC	2. DRILL SUBCONTRACTOR NA	SHEET SHEETS OF

3. PROJECT SEAWAY SITE	4. LOCATION TONAWANDA N.Y.
[redacted]	6. MANUFACTURER'S DESIGNATION OF DRILL GEOPROBE SYSTEMS 5400
7. SIZE AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	8. HOLE LOCATION AREA C
MACRO CORE SOIL SAMPLER	9. SURFACE ELEVATION unknown
	10. DATE STARTED 12-17-98 15:31 / 11. DATE COMPLETED 12-17-98 15:51
12. OVERBURDEN THICKNESS >4.0 feet	13. DEPTH GROUNDWATER ENCOUNTERED Not encountered
13. DEPTH DRILLED INTO ROCK None	14. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED Not encountered
14. TOTAL DEPTH OF HOLE 4.0 feet	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY) None

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
None			None

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY %
2			Rad			

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	[redacted]
	Bentonite			

LOCATION SKETCH/COMMENTS SCALE:

Located by USACE using GPS on 12/18/98

PROJECT	HOLE NO.
SEAWAY SITE TONAWANDA N.Y.	SWC SLC 2006

ENG FORM 5056-R, AUG 94 (Proponent: CECW-EG)

Figure 2-3 Engineer Forms 5056-R and 5056 A-R for Borehole Logging

HTRW DRILLING LOG

PROJECT SEAWAY SITE TONAWANDA N.Y. [redacted]

HOLE NUMBER SWcSLC 2006

SHEET

ELEV. (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	FIELD SCREENING RESULTS (D)	GEOTECH SAMPLE OR CORE BOXING (E)	ANALYTICAL SAMPLING (F)	REMARKS (G)
		ML; Clayey Silt, 10% F-C gravel (angular) brown; hard in just 6 inches; low plasticity, dry	FID 4.2 ppm PID .1 ppm		SWcSLCSS-2006010	Geoprobe sample pushed 0-4 ft at 15:35 Recovery 3.3/4 ft
	1.0	Fill trash including wood, styrofoam; plastic garbage bag, and brown paper bag	FID 3.9 ppm PID 0.2 ppm		SWcSLCSS-2006120	FID background 1.3ppm PID background 0.1ppm
	2.0		FID 6.9 ppm PID 1.2 ppm		Sample not retained (garbage)	*Duplicate sample 2006011 collected from 0-1 ft bgs RAD readings on both samples 7-11 μR/hr
	3.0					
	4.0	Bottom of boring 4.0 ft				

Figure 2-3 (continued)

HTRW DRILLING LOG	DISTRICT USACE - Buffalo	HOLE NUMBER
1. COMPANY NAME SAIC	2. DRILL SUBCONTRACTOR NA	SHEET SHEETS OF

3. PROJECT SEAWAY SITE	4. LOCATION TONAWANDA N.Y.
[redacted]	6. MANUFACTURER'S DESIGNATION OF DRILL GEOPROBE SYSTEMS 5400
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	8. HOLE LOCATION AREA C
MACRO CORE SOIL SAMPLER	9. SURFACE ELEVATION unknown
	10. DATE STARTED 12-17-98 15:08 / 11. DATE COMPLETED 12-17-98 15:26
12. OVERBURDEN THICKNESS unknown	13. DEPTH GROUNDWATER ENCOUNTERED Not encountered
13. DEPTH DRILLED INTO ROCK None	14. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED Not encountered
14. TOTAL DEPTH OF HOLE 4.0 feet bgs	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY) None

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
None			None

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY %
2			Red			

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	[redacted]
	Bentonite			

LOCATION SKETCH/COMMENTS SCALE:

Located by USACE using GPS on 12/18/98

PROJECT	HOLE NO.
SEAWAY SITE TONAWANDA N.Y.	SWc SLC 2005

ENG FORM 5056-R, AUG 94 (Proponent: CECW-EG)

Figure 2-3 Engineer Forms 5056-R and 5056 A-R for Borehole Logging

HTRW DRILLING LOG

PROJECT SEAWAY SITE TONAWANDA N.Y. [redacted]

HOLE NUMBER SWC SLC 2005

SHEET

ELEV. (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	FIELD SCREENING RESULTS (D)	GEOTECH SAMPLE OR CORE BOX NO. (E)	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
		ML; Clayey Silt 5-10% F-M gravel; brown; low plasticity; firm, dry	FID 3 ppm PID .1 ppm		SWC SLC SS -2005010	Geoprobe sample pushed 0-4 ft at 15:15 Recovery 2.6 ft/4 ft
	1.0	ML Sandy Silt w/ trash paper, plastic				
		CL Silty Clay; 10% F-M gravel; v. dark gray to black; firm at top soft at bottom; moist	FID 105 ppm PID ppm		SWC SLC SS -2005120	FID background 3.5 ppm PID background 0 ppm
	2.0					* Duplicate sample 2005121 collected from 1-2 ft bgs
		No recovery				
	3.0					RAD reading on both samples 6-9 μR/hr
	4.0	Bottom of boring 4.0 ft				

Figure 2-3 (continued)

HTRW DRILLING LOG	DISTRICT: USACE - Buffalo	HOLE NUMBER:
1. COMPANY NAME: SAIC	2. DRILL SUBCONTRACTOR: NA	SHEET / SHEETS OF

3. PROJECT: SEAWAY SITE [redacted]	4. LOCATION: TONAWANDA N.Y.
	6. MANUFACTURER'S DESIGNATION OF DRILL: GEOPROBE SYSTEMS 5400
5. SIZE AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: MACRO CORE SOIL SAMPLER	8. HOLE LOCATION: AREA B
	9. SURFACE ELEVATION: unknown
	10. DATE STARTED: 12-17-98 11:27 / 11. DATE COMPLETED: 12-17-98 11:48
12. OVERBURDEN THICKNESS: > 4.0 feet	13. DEPTH GROUNDWATER ENCOUNTERED: Not encountered
13. DEPTH DRILLED INTO ROCK: None	14. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: Not encountered
14. TOTAL DEPTH OF HOLE: 4.0 feet bgs	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): None

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
None			None

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY %
2			Rad			

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)
	Bentonite		[redacted]

LOCATION SKETCH/COMMENTS — SCALE:

Located by USACE using GPS on 12/18/98

PROJECT	HOLE NO.
SEAWAY SITE TONAWANDA N.Y.	SWb SLC 2004

ENG FORM 5056-R, AUG 94 (Proponent: CECW-EG)

Engineer Forms 5056-R and 5056 A-R for Borehole Logging

HTRW DRILLING LOG

PROJECT: SEAWAY SITE TONAWANDA N.Y. [redacted]

BORING NO. SWbSLC 2004

SHEET

ELEV. (ft)	DEPTH (ft)	DESCRIPTION OF MATERIALS (ft)	FIELD SCREENING RESULTS (ft)	GEOTECH SAMPLE OR CORE BOX NO. (ft)	ANALYTICAL SAMPLE NO. (ft)	REMARKS (ft)
		ML Clayey Silt ; 10% F-M gravel (angular); reddish brown ; firm; low plasticity; dry	FID .5 ppm PID .2 ppm		SWbSLCSS-2004010	Geoprobe sample pushed 0-4 feet at 11:33 Recovery 2.5/4 ft
	1.0	ML Sandy Silt 20% F-M sand 5% m gravel, brown; loose; non plastic, dry	FID 50.9 ppm PID 0.87 ppm		SWbSLCSS 2004120	FID background .5 ppm PID background 0 ppm *Duplicate sample 2004121 collected from 1-2 ft interval
	2.0	Plastic bag, paper, and glass in v. dark gray clay no recovery				Two borings attempted - no recovery below 2.5 ft bgs in both
	3.0					RAD readings on samples 10-14 μR/hr
	4.0	Bottom of boring 4.0 ft				

HTRW DRILLING LOG	DISTRICT USACE- Buffalo	HOLE NUMBER
1. COMPANY NAME SAIC	2. DRILL SUBCONTRACTOR NA	SHEET SHEETS OF

3. PROJECT SEAWAY SITE	4. LOCATION TONAWANDA N.Y.
[redacted]	5. MANUFACTURERS DESIGNATION OF DRILL GEOPROBE SYSTEMS 5400
7. SIZE AND TYPE OF DRILLING AND SAMPLING EQUIPMENT	8. HOLE LOCATION AREA B
MACRO CORE SOIL SAMPLER	9. SURFACE ELEVATION unknown
	10. DATE STARTED 12-17-98 11:03 / 11. DATE COMPLETED 12-17-98 11:21
12. OVERBURDEN THICKNESS > 4.0 feet	13. DEPTH GROUNDWATER ENCOUNTERED Not encountered
13. DEPTH DRILLED INTO ROCK None	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED Not encountered
14. TOTAL DEPTH OF HOLE 4.0 feet bgs	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY) None

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
None			None

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY %
4			Rad			

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	[redacted]
	Bentonite			

LOCATION SKETCH/COMMENTS SCALE:

Located by USACE using GPS on 12/18/98

PROJECT	HOLE NO.
SEAWAY SITE TONAWANDA N.Y.	SWb SLC 2003

ENG FORM 5056-R, AUG 94 (Proponent: CECW-EG)

Engineer Forms 5056-R and 5056 A-R for Borehole Logging

HTRW DRILLING LOG

PROJECT SEAWAY SITE TONAWANDA N.Y. [redacted]

BORING NO.	DEPTH (ft)	DESCRIPTION OF MATERIALS (1)	FIELD SCREENING RESULTS (2)	SEQUENCE SAMPLE OR CORE BOX NO. (3)	ANALYTICAL SAMPLE NO. (4)	REMARKS (5)
	1.0	CL; Silty clay; 10% F-M gravel (angular); reddish brown; firm; low plasticity; dry	FID 1.5 ppm PID 0.1 ppm		SWbSLCSS-200301 0	Geoprobe sample pushed 0-4 ft at 11:07 Recovery 3.6/4 ft
	2.0	ML Clayey Silt; 20% m-c gravel; dark gray; loose dry (25% F sand brick, glass, wood, and coal	FID 1.3 ppm PID 0.3 ppm		SWbSLCSS-200312 0	FID background 1.5 ppm PID background 0 ppm
	3.0	CL; Sandy Clay 10% F-M gravel v. dark gray to black firm; non plastic moist. Fill at bottom 6" of sample includes wood, paper, and fabric	FID 102 ppm PID .91 ppm		SWbSLCSS-200323 0	RAD readings on samples 11-15 μR/hr
	4.0	Bottom of boring 4.0 ft	FID 408 ppm PID 12.1 ppm		SWbSLCSS-200334 0	

HTRW DRILLING LOG	DISTRICT USACE- Buffalo	HOLE NUMBER
1. COMPANY NAME SAIC	2. DRILL SUBCONTRACTOR NA	SHEET SHEETS OF

3. PROJECT SEAWAY SITE	4. LOCATION TONAWANDA N.Y.
[redacted]	6. MANUFACTURER'S DESIGNATION OF DRILL GEOPROBE SYSTEMS 5400
7. SIZE AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	8. HOLE LOCATION AREA C
MACRO CORE SOIL SAMPLER	9. SURFACE ELEVATION unknown
	10. DATE STARTED 12-17-98 10:40 / 11. DATE COMPLETED 12-17-98 10:57
12. OVERBURDEN THICKNESS >4.0 feet	13. DEPTH GROUNDWATER ENCOUNTERED Not encountered
13. DEPTH DRILLED INTO ROCK None	14. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED Not encountered
14. TOTAL DEPTH OF HOLE 4.0 feet bgs	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY) None

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
None			None

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY %
1			Red			

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	[redacted]
	Bentonite			

LOCATION SKETCH/COMMENTS SCALE:

Located by USACE using GPS on 12/18/98

PROJECT	HOLE NO.
SEAWAY SITE TONAWANDA N.Y.	SWc SLC 2002

ENG FORM 5056-R, AUG 94 (Proponent: CECW-EG)

Engineer Forms 5056-R and 5056 A-R for Borehole Logging

HTRW DRILLING LOG

PROJECT: SEAWAY SITE TONAWANDA N.Y.

INSPECTOR: [redacted]

BORE HOLE NO.: SWC SLC 2002

SHEET:

ELEV. (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	FIELD SCREENING RESULTS (D)	PENETRATION RESISTANCE OR DRILLING NOTES (E)	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
		ML; Clayey Silt; 20% F-C gravel (angular); brown; low% non-plastic; dry	FID 3.7 ppm PID .15 ppm		SWC SLC SS -2002 010	Geoprobe Sample pushed 0-4 ft at 10:44 Recovery 2.5/4 ft FID background 2.0 ppm PID background 0.2 ppm RAD reading on sample 7-13 μR/hr
	1.0	Newspaper cloth fabric and wood (also carpeting)	FID 5.1 ppm PID .8 ppm			
	2.0					
		No recovery				
	3.0					
	4.0					

HTRW DRILLING LOG	DISTRICT USACE- Buffalo	HOLE NUMBER
1. COMPANY NAME SAIC	2. DRILL SUBCONTRACTOR NA	SHEET SHEETS OF

3. PROJECT SEAWAY SITE	4. LOCATION TONAWANDA N.Y.
[redacted]	6. MANUFACTURER'S DESIGNATION OF DRILL GEOPROBE SYSTEMS 5400
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT MACRO CORE SOIL SAMPLER	8. HOLE LOCATION AREA C
	9. SURFACE ELEVATION unknown
	10. DATE STARTED 12-17-98 10:09 / 11. DATE COMPLETED 12-17-98 10:26
12. OVERBURDEN THICKNESS >4.0 feet	13. DEPTH GROUNDWATER ENCOUNTERED Not encountered
13. DEPTH DRILLED INTO ROCK None	14. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED Not encountered
14. TOTAL DEPTH OF HOLE 4.0 feet bgs	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY) None

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
None			None

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY %
1			Rad			

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)
	Bentonite		[redacted]

LOCATION SKETCH/COMMENTS SCALE:

Located by USACE using GPS on 12/18/98

PROJECT	HOLE NO.
SEAWAY SITE TONAWANDA N.Y.	SWC SLC 2001

ENG FORM 5056-R, AUG 94 (Proponent: CECW-EG)

Engineer Forms 5056-R and 5056 A-R for Borehole Logging

HTRW DRILLING LOG

PROJECT: SEAWAY SITE TONAWANDA N.Y. | [redacted] | HOLE NUMBER: SWeSLC 2001 | SHEET:

ELEV. (ft)	DEPTH (ft)	DESCRIPTION OF MATERIALS (ft)	FIELD HOMOGENOUS SERIES (ft)	SELECTED SAMPLE OR OTHER SERIES (ft)	ANALYTICAL SAMPLE NO. (ft)	REMARKS (ft)
		ML; Clayey silt; 20% f sand, non plastic; loose; reddish brown; dry	FID 3.2 ppm PID .51 ppm		SWeSLCSS-20010	Geoprobe Sample pushed 0-4 feet at 10:13 Recovery 2.6/4 ft
	1.0	Fill; trash including wood, paper, ceramic; black plastic garbage bag plastic cup, black asphaltic material at bottom of sample	FID 6.7 ppm PID .89 ppm		SWeSLCSS-20011 not retained	FID background 1.0ppm PID background 0ppm RAD readings on samples 6-11 μR/hr
	2.0	No recovery	FID 5.3 ppm PID .71 ppm		SWeSLCSS-20012 not retained	*Samples from 1-2 ft and 2-3 ft not retained for lab analyses because they were trash
	3.0		FID (5.8) ppm PID (.72) ppm			
	4.0	Bottom of boring 4.0 ft				

HTRW DRILLING LOG	DISTRICT USACE - Buffalo	HOLE NUMBER
1. COMPANY NAME SAIC	2. DRILL SUBCONTRACTOR NA	SHEET SHEETS OF

3. PROJECT SEAWAY SITE	4. LOCATION TONAWANDA N.Y.
[redacted]	6. MANUFACTURERS DESIGNATION OF DRILL GEOPROBE SYSTEMS 5400
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	8. HOLE LOCATION AREA C
MACRO CORE SOIL SAMPLER	9. SURFACE ELEVATION unknown
	10. DATE STARTED 12-17-98 09:21 / 11. DATE COMPLETED 12-17-98 09:33
12. OVERBURDEN THICKNESS >4.0 feet	13. DEPTH GROUNDWATER ENCOUNTERED Not encountered
15. DEPTH DRILLED INTO ROCK None	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED Not encountered
14. TOTAL DEPTH OF HOLE 4.0 feet bgs	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY) None

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
None			None

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY %
4			Rad			

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	[redacted]
	Bentonite			

LOCATION SKETCH/COMMENTS

SCALE:

Located by USACE using GPS on 12/18/98

PROJECT	HOLE NO.
SEAWAY SITE TONAWANDA N.Y.	SWc SLC 0005

ENG FORM 5056-R, AUG 94

(Proponent: CECW-EG)

Engineer Forms 5056-R and 5056 A-R for Borehole Logging

HTRW DRILLING LOG

PROJECT: SEAWAY SITE TONAWANDA N[redacted]

HOLE NUMBER: SWCSLC0005

SHEET:

SURFACE (ft)	DEPTH (ft)	DESCRIPTION OF MATERIALS (ft)	FIELD SCREENING RESULTS (ft)	DEPTH OF SAMPLE OR CORE BOX NO. (ft)	ANALYTICAL SAMPLE NO. (ft)	REMARKS (ft)
		ML Clayey Silt 20% m-c gravel (angular); brown; low plasticity; dry	FID 2.50 ppm PID 0.5 ppm		SWCSLC55-0005010	Geoprobe sample pushed 0-4 feet at 09:25 Recovery 3.35/4 ft FID Background 1.5 ppm PID Background .41 ppm All RAD readings on samples 7-10 μR/hr
	1.0	ML; Sandy Silt 20% m-c gravel (angular); grayish brown, loose, dry	FID 6.2 ppm 1.5 ppm		SWCSLC55-0005120	
	2.0	ML; Sandy Silt; same as above but black with asphaltic material	FID 4.01 ppm PID .89 ppm		SWCSLC55-0005230	
	3.0	CL; Gravelly Clay; 10% f-m gravel; reddish brown; hard; med plasticity; moist; glass fragments, plastic, and cloth over bottom of sample	FID 6.1 ppm PID .15 ppm		SWCSLC55-0005340	
	4.0	Bottom of boring 4.0 ft				

HTRW DRILLING LOG	DISTRICT: USACE- Buffalo	HOLE NUMBER
1. COMPANY NAME: SAIC	2. DRILL SUBCONTRACTOR: NA	SHEET / SHEETS OF

3. PROJECT: SEAWAY SITE	4. LOCATION: TONAWANDA N.Y.
[redacted]	6. MANUFACTURER'S DESIGNATION OF DRILL: GEOPROBE SYSTEMS 5400
7. SIZE AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: MACRO CORE SOIL SAMPLER	8. HOLE LOCATION: AREA C
	9. SURFACE ELEVATION: unknown
	10. DATE STARTED: 12-17-98 09:35 / 11. DATE COMPLETED: 12-17-98 09:51
12. OVERBURDEN THICKNESS: >4.0 feet	13. DEPTH GROUNDWATER ENCOUNTERED: Not encountered
13. DEPTH DRILLED INTO ROCK: None	14. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: Not encountered
16. TOTAL DEPTH OF HOLE: 4.0 feet bgs	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): None

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
None			None

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY %
4			Red			

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	[redacted]
	Bentonite			

LOCATION SKETCH/COMMENTS — SCALE:

Located by USACE using GPS on 12/18/98

PROJECT	HOLE NO.
SEAWAY SITE TONAWANDA N.Y.	SWC SLC0004

ENG FORM 5056-R, AUG 94 (Proponent: CECW-EG)

Engineer Forms 5056-R and 5056 A-R for Borehole Logging

HTRW DRILLING LOG

PROJECT: SEAWAY SITE TONAWANDA N.Y. | [redacted] | HOLE NUMBER: SWC SLC 0004 | SHEET:

SCALE (ft)	DEPTH (ft)	DESCRIPTION OF MATERIALS (ft)	FIELD EXPLORATION RESULTS (ft)	INSTRUMENTATION OR STORAGE INFO. (ft)	SAMPLE NUMBERS (ft)	REMARKS (ft)
		ML Clayey Silt; 10% m-c gravel (angular); brown; low plasticity, firm, dry	PID 1.65 ppm PID 0.2 ppm		SWC SLC 55 - 0004010	Geoprobe sample pushed 0-4 ft at 09:47 Recovery 3.9/4 ft
	1.0	ML Sandy Silt 20% m-c gravel (angular); grayish brown, loose, dry				
		CL; Gravely Clay; 10% F-M gravel; reddish brown, med. plasticity; hard; moist fill material throughout clay interval wood, brick, and concrete	PID 1.1 ppm PID 0.1 ppm		SWC SLC 55 - 0004120	FID background 1.5 ppm PID background 0 ppm
	2.0					All RAD readings on samples 10-13 μR/hr
			PID 1.4 ppm PID 0.1 ppm		SWC SLC 55 - 0004230	
	3.0					
			PID 30.1 ppm PID 3.6 ppm		SWC SLC 55 - 0004340	*Duplicate sample 0004341 collected
		Crushed red brick				
	4.0	Bottom of boring 4.0 ft				

HTRW DRILLING LOG	DISTRICT USACE- Buffalo	HOLE NUMBER
1. COMPANY NAME SAIC	2. DRILL SUBCONTRACTOR NA	SHEET SHEETS OF

3. PROJECT SEAWAY SITE	4. LOCATION TONAWANDA N.Y.
[redacted]	6. MANUFACTURER'S DESIGNATION OF DRILL GEOPROBE SYSTEMS 5400
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT MACRO CORE SOIL SAMPLER	8. HOLE LOCATION AREA C
	9. SURFACE ELEVATION unknown
	10. DATE STARTED 12-17-98 08:51 / 11. DATE COMPLETED 12-17-98 09:12
12. OVERBURDEN THICKNESS >4.0 feet	13. DEPTH GROUNDWATER ENCOUNTERED Not encountered
15. DEPTH DRILLED INTO ROCK None	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED Not encountered
14. TOTAL DEPTH OF HOLE 4.0 feet bgs	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY) None

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
None			None

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY %
			Rad			

22. DISPOSITION OF HOLE	BACKFILL	MONITORING WELL	OTHER (SPECIFY)
	Bentonite		[redacted]

LOCATION SKETCH/COMMENTS SCALE:

Located by USACE using GPS on 12/18/98

PROJECT	HOLE NO.
SEAWAY SITE TONAWANDA N.Y.	SWc SLC0003

ENG FORM 5056-R, AUG 94 (Proponent: CECW-EG)

Engineer Forms 5056-R and 5056 A-R for Borehole Logging

HTRW DRILLING LOG

PROJECT SEAWAY SITE TONAWANDA N.Y. | [redacted] | HOLE NUMBER SW6SLC0003 | SHEET

Depth (ft)	Description of Materials	Field Screening Results	Location Sample on Core Boring	Analytical Samples	Remarks
	ML Clayey Silt; 10% m-c gravel (angular); low plasticity; firm; dry brown	FID 1.5 ppm PID 0.9 ppm		SW6SLCSS-0003010	Geoprobe sample pushed 0-4 ft at 08:58 Recovery 2.25/4 ft
1.0	Red brick	FID 1.5 ppm PID 0.98 ppm		SW6SLCSS-0003120	FID background 2.5 ppm PID background 1.0 ppm
2.0	ML; clayey silt; red-brown to black; med. plasticity moist; fill material in interval includes cloth, plastic mesh, paper, and wood	FID 14.5 1.9 ppm PID			*Duplicate sample 0003011 collected from 0-1 ft bgs
3.0		16.2 ppm PID 2.1 ppm			RAD readings on samples 6-9 μR/hr
4.0	Bottom of boring 4.0 ft				

HTRW DRILLING LOG	DISTRICT USACE- Buffalo	HOLE NUMBER
1. COMPANY NAME SAIC	2. DRILL SUBCONTRACTOR NA	SHEET SHEETS OF

3. PROJECT SEAWAY SITE	4. LOCATION TONAWANDA N.Y.
[redacted]	5. MANUFACTURER'S DESIGNATION OF DRILL GEOPROBE SYSTEMS 5400
6. SIZE AND TYPE OF DRILLING AND SAMPLING EQUIPMENT: MACRO CORE SOIL SAMPLER	7. HOLE LOCATION AREA C
	8. SURFACE ELEVATION unknown
	9. DATE STARTED 12-16-98 16:31 / 10. DATE COMPLETED 12-16-98 16:42
11. OVERBURDEN THICKNESS >2.25 feet	12. DEPTH GROUNDWATER ENCOUNTERED Not encountered
13. DEPTH DRILLED INTO ROCK None	14. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED Not encountered
15. TOTAL DEPTH OF HOLE 2.25 feet bgs	16. OTHER WATER LEVEL MEASUREMENTS (SPECIFY) None

17. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	18. TOTAL NUMBER OF CORE BOXES
None			None

19. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY %
2	No	No	Rad	[redacted]		
22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)			
	Bentonite					

LOCATION SKETCH/COMMENTS SCALE:

Located by USACE using GPS on 12/18/98

PROJECT	HOLE NO.
SEAWAY SITE TONAWANDA N.Y.	SWcSLC0002

ENG FORM 5056-R, AUG 94 (Proponent: CECW-EG)

Figure 2-3 Engineer Forms 5056-R and 5056 A-R for Borehole Logging

HTRW DRILLING LOG

PROJECT	INSPECTOR	HOLE NO.
SEAWAY SITE TONAWANDA N.Y.	[redacted]	SWc SLC 0002

ELEV. (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	FIELD SCREENING RESULTS (D)	GEOTECH SAMPLE OR CORE BOX NO. (E)	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
		GM; Silty gravel; 10% fine sand; dark grey; loose	FID 10.3 ppm		SWcSLCSS-0002010	Geoprobe pushed 0-2.5 ft depth at 16:42 Sample recovery 2.1 ft
	1.0	ML; Clayey Silt; 5% gravel; firm; brown; moist; low plasticity; wet woody material in bottom of sample	FID 10.2 ppm		SWcSLCSS-0002120	Refusal at 2.25 ft FID Background 6.5 ppm
	2.0	- met refusal twice at 2.25 ft (2 seperate borings)				RAD reading on both samples 17-22 μR/hr

Figure 2-3 (continued)

HTRW DRILLING LOG

DISTRICT: USACE - Buffalo		HOLE NUMBER:
1. COMPANY NAME: SAIC	2. DRILL SUBCONTRACTOR: NA	SHEET ___ SHEETS OF
3. PROJECT: SEAWAY SITE	4. LOCATION: TONAWANDA N.Y.	
5. NAME OF DRILLER: NA	6. MANUFACTURER'S DESIGNATION OF DRILL: NA	
7. SIZE AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: STAINLESS STEEL BOWL AND SPOON	8. HOLE LOCATION: AREA C	
	9. SURFACE ELEVATION: unknown	
	10. DATE STARTED: 12-16-98 16:18	11. DATE COMPLETED: 12-16-98 16:30
12. OVERBURDEN THICKNESS: Unknown	13. DEPTH GROUNDWATER ENCOUNTERED: Not encountered	
15. DEPTH DRILLED INTO ROCK: None	14. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: Not encountered	
16. TOTAL DEPTH OF HOLE: 0.5 ft	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): None	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
None			None

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY %
1			Rad			

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)
			[redacted]

LOCATION SKETCH/COMMENTS — SCALE:

Located by USACE using GPS on 12/18/98

PROJECT	HOLE NO.
SEAWAY SITE TONAWANDA N.Y.	SWc SLC 0001

ENG FORM 5056-R, AUG 94 (Proponent: CECW-EG)

Engineer Forms 5056-R and 5056 A-R for Borehole Logging

HTRW DRILLING LOG

HOLE NUMBER: SWcSLC0001

PROJECT: SEAWAY SITE TONAWANDA N.Y.

[redacted]

SHEET

SYMBOL (4)	DEPTH (ft)	DESCRIPTION OF MATERIALS (5)	RESULTS (6)	OBSERVATIONS OR COMMENTS (7)	ANALYTICAL SAMPLE NO. (8)	REMARKS (9)
		ML; Clayey Silt; 25% F-C gravel (angular); brown; loose; non plastic; dry	FID 0.0ppm		SWcSLCSS-0001000	0-0.5ft surface sample collected with stainless steel bowl and spoon at 16:27
	1.0					RAD surface reading 22 μR/hr
						RAD reading at 0.5 ft depth 40 μR/hr
						*Duplicate sample -0001001 collected

HTRW DRILLING LOG	DISTRICT: USACE - Buffalo	HOLE NUMBER:
1. COMPANY NAME: SAIC	2. DRILL SUBCONTRACTOR: NA	SHEET / SHEETS OF

3. PROJECT: SEAWAY SITE	4. LOCATION: TONAWANDA N.Y.
[redacted]	6. MANUFACTURER'S DESIGNATION OF DRILL:
7. NAME AND TYPE OF DRILLING AND SAMPLING EQUIPMENT: MACRO CORE SOIL SAMPLER	8. HOLE LOCATION: AREA C
	9. SURFACE ELEVATION: unknown
	10. DATE STARTED: 12-16-98 15:52 / 11. DATE COMPLETED: 12-16-98 16:04
12. OVERBURDEN THICKNESS: > 4.0 feet	13. DEPTH GROUNDWATER ENCOUNTERED: Not encountered
13. DEPTH DRILLED INTO ROCK: None	14. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: Not encountered
14. TOTAL DEPTH OF HOLE: 4.0 feet bgs	15. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): None

16. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	18. TOTAL NUMBER OF CORE BOXES
None			None

19. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY %
4	No	No	Red			
22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY) [redacted]			
	Bentonite					

LOCATION SKETCH/COMMENTS: SCALE:

Located by USACE using GPS on 12/18/98

PROJECT	HOLE NO.
SEAWAY SITE TONAWANDA N.Y.	SWcSLC 1005

ENG FORM 5056-R, AUG 94 (Proponent: CECW-EG)

Figure 2-3 Engineer Forms 5056-R and 5056 A-R for Borehole Logging

HTRW DRILLING LOG

PROJECT: SEAWAY SITE TONAWANDA N.Y. | INSPECTOR: [redacted] | HOLE NO.: SWCSLC1005 | SHEET:

ELEV. (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	FIELD SCREENING RESULTS (D)	SECTION SAMPLE OR CORE BOX NO. (E)	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
		ML; Clayey Silt; 10% F-M gravel (angular) firm, low plasticity; dry; red brick frag. brown	FID 37 ppm		SWCSLCSS-1005010	Geoprobe sample pushed 0-4 ft at 15:58
		Concrete				Sample recovery 2.5/4 ft
	1.0		FID 71 ppm		SWCSLCSS-1005120	FID Background 2.5 ppm
		ML; Clayey Silt; 10-20% m-c gravel (angular); firm; brown				All RAD readings on samples 7-10 μR/hr
	2.0		FID 152 ppm		SWCSLCSS-1005230	
	3.0	ML; Clayey Silt; firm; dark brown; med. plasticity; moist	FID 115 ppm		SWCSLCSS-1005340	
	4.0	Bottom of boring 4.0 ft				

Figure 2-3 (continued)

HTRW DRILLING LOG	DISTRICT USACE- Buffalo	HOLE NUMBER
1. COMPANY NAME SAIC	2. DRILL SUBCONTRACTOR NA	SHEET SHEETS OF

3. PROJECT SEAWAY SITE	4. LOCATION TONAWANDA N.Y.
[redacted]	6. MANUFACTURER'S DESIGNATION OF DRILL GEOPROBE SYSTEMS 5400
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	8. HOLE LOCATION AREA C
MACRO CORE SOIL SAMPLER	9. SURFACE ELEVATION unknown
	10. DATE STARTED 12-16-98 15:34 / 11. DATE COMPLETED 12-16-98 15:46
12. OVERBURDEN THICKNESS >4.0 feet	13. DEPTH GROUNDWATER ENCOUNTERED Not encountered
15. DEPTH DRILLED INTO ROCK None	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED Not encountered
14. TOTAL DEPTH OF HOLE 4.0 feet bgs	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY) None

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
None			None

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY %
4			Rad			

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)
	Bentonite		[redacted]

LOCATION SKETCH/COMMENTS SCALE:

Located by USACE using GPS on 12/08/98

PROJECT	HOLE NO.
SEAWAY SITE TONAWANDA N.Y.	SWC SLC 1004

ENG FORM 5056-R, AUG 94 (Proponent: CECW-EG)

Figure 2-3 Engineer Forms 5056-R and 5056 A-R for Borehole Logging

HTRW DRILLING LOG

PROJECT: SEAWAY SITE TONAWANDA N.Y.

INSPECTOR: [redacted]

BORING NO.: SWC SLC 1004

SHEET:

ELEV. (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	FIELD SCREENING RESULTS (D)	GEOTECH SAMPLE OR CORE BOX NO. (E)	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
		ML; Silt; 5-10% F-M gravel; loose; dry; brown; low plasticity dry	FID 110 ppm		SWC SLC SS -100 4010	Geoprobe sample pushed 0-4 ft at 15:43
		ML; Clayey Silt; 10% F-M gravel				Hard to push
	1.0		FID 105 ppm		SWC SLC SS -100 4120	Recovery 3.4 / 4.0 ft
		Fill; Concrete; red brick; F-c sand, F-M gravel; loose; dark brown; moist				FID Background 30 ppm
	2.0		FID 144 ppm		SWC SLC SS -100 4230	All RAD readings on samples 7-11 μR/hr
		ML; Clayey Silt; 20% M-C gravel; firm; low plasticity moist				
		Concrete				
	3.0	ML; Clayey Silt; 10% M. gravel firm; v. dark gray to black; asphaltic material; wet	FID 105 ppm		SWC SLC SS -100 4340	
	4.0	Bottom of boring 4.0 ft.				

Figure 2-3 (continued)

HTRW DRILLING LOG	DISTRICT USACE- Buffalo	HOLE NUMBER
1. COMPANY NAME SAIC	2. DRILL SUBCONTRACTOR NA	SHEET NO. OF

3. PROJECT SEAWAY SITE	4. LOCATION TONAWANDA N.Y.
[redacted]	5. MANUFACTURER'S DESIGNATION OF DRILL GEOPROBE SYSTEMS 5400
AND SAMPLING EQUIPMENT	6. HOLE LOCATION AREA C
MACRO CORE SOIL SAMPLER	7. SURFACE ELEVATION unknown
	10. DATE STARTED 12-16-98 15:16 / 11. DATE COMPLETED 12-16-98 15:28
12. OVERBURDEN THICKNESS >4.0 feet	13. DEPTH GROUNDWATER ENCOUNTERED Not encountered
15. DEPTH DRILLED INTO ROCK None	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED Not encountered
14. TOTAL DEPTH OF HOLE 4.0 feet bgs	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY) None

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
None			None

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY %
4			Rad			

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	[redacted]
	Bentonite			

LOCATION SKETCH/COMMENTS SCALE:

Located by USACE using GPS on 12/18/98

PROJECT	HOLE NO.
SEAWAY SITE TONAWANDA N.Y.	SWc SLC 1003

ENG FORM 5056-R, AUG 94 (Proponent: CECW-EG)

Figure 2-3 Engineer Forms 5056-R and 5056 A-R for Borehole Logging

HTRW DRILLING LOG

PROJECT: SEAWAY SITE TONAWANDA N.Y. | DIRECTION: [redacted] | HOLE NUMBER: SWcSLC1003 | SHEET

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD TOX. TEST AND RESULTS (d)	GEOTECH. SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	REMARKS (g)
		ML; Clayey Silt; 5% F-M gravel; brown; low-plasticity; firm; dry; some roots	FID 24 ppm		SWcSLCSS-1003010	Geoprobe sample pushed at 15:21 - hard to push but did not meet refusal
	1.0	ML; Sandy Silt; 5% F-M gravel; dark brown; loose, non-plastic; dry	FID 13 ppm		SWcSLCSS-1003120	Recovery 3.45/4.0 ft FID background - 30 ppm
		ML; Clayey Silt; loose; reddish brown; dry; Fill				
	2.0	ML; Sandy Silt; 20% v. fine sand; v. dark gray - black; firm; wood; moist	FID 63 ppm		SWcSLCSS-1003230	Fill in 1.3-1.8 ft interval included glass, ceramic, wood, plastic, textile, floor tile
	3.0	CL; Clay; reddish brown, firm; high plasticity; moist	FID 90 ppm		SWcSLCSS-1003340	All RAD readings on samples 8-10 μR/hr
	4.0	Bottom of boring 4.0 ft				

Figure 2-3 (continued)

HTRW DRILLING LOG	DISTRICT USACE - Buffalo	HOLE NUMBER
1. COMPANY NAME SAIC	2. DRILL SUBCONTRACTOR NA	SHEET SHEETS OF

3. PROJECT SEAWAY SITE	4. LOCATION TONAWANDA N.Y.
[redacted]	6. MANUFACTURERS DESIGNATION OF DRILL GEOPROBE SYSTEMS 5400
7. NAME AND TYPE OF DRILLING AND SAMPLING EQUIPMENT	8. HOLE LOCATION AREA C
MACRO CORE SOIL SAMPLER	9. SURFACE ELEVATION unknown
	10. DATE STARTED 12-16-98 15:03 / 11. DATE COMPLETED 12-16-98 15:10
12. OVERBURDEN THICKNESS > 3.7 feet	13. DEPTH GROUNDWATER ENCOUNTERED Not encountered
13. DEPTH DRILLED INTO ROCK None	14. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED Not encountered
14. TOTAL DEPTH OF HOLE 3.7 feet bgs	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY) None

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
None			None

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY %
4			Rad			

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)
	Bentonite		[redacted]

LOCATION SKETCH/COMMENTS

Located by USACE using GPS on 12/18/98

PROJECT	HOLE NO.
SEAWAY SITE TONAWANDA N.Y.	SWc SLC 1002

ENG FORM 5056-R, AUG 94 (Proponent: CECW-EG)

Figure 2-3 Engineer Forms 5056-R and 5056 A-R for Borehole Logging

HTRW DRILLING LOG

PROJECT: SEAWAY SITE TONAWANDA N.Y. | WRITTER: [redacted] | HOLE NUMBER: SWC SLC 1002 | SHEET:

Elev. (m)	Depth (ft)	Description of Materials (ft)	Field Screening Results (ft)	Laboratory Sample or Core Recovery (ft)	Analytical Samples (ft)	Remarks (ft)
		ML; Silt; 10% F-C gravel, loose; brown; low plasticity dry	FID 24ppm		SWC SLC SS -1002.010	Geoprobe sample pushed at 15:07
	1.0	ML; clayey Silt; 25% m-c gravel (angular); firm; dark gray; dry	FID 46ppm		SWC SLC SS -1002.120	Refusal at 3.7 ft Recovery 2.75/4.0 ft Background FID-30 ppm
	2.0	ML; Sandy Silt; 25% v. fine sand; 5% c. gravel; non-plastic; loose; dry	FID 65ppm		SWC SLC SS -1002.230	
	3.0	Wood, newspaper, plastic mesh	FID 41ppm		SWC SLC SS -1002.340	
	4.0	Refusal Bottom of boring 3.7ft				

Figure 2-3 (continued)

HTRW DRILLING LOG	DISTRICT USACE - Buffalo	HOLE NUMBER
1. COMPANY NAME SAIC	2. DRILL SUBCONTRACTOR NA	SHEET SHEETS OF

3. PROJECT SEAWAY SITE	4. LOCATION TONAWANDA N.Y.
5. NAME OF DRILLER NA	6. MANUFACTURERS DESIGNATION OF DRILL NA
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT STAINLESS STEEL BOWL AND SPOON	8. HOLE LOCATION AREA C
	9. SURFACE ELEVATION unknown
	10. DATE STARTED 12-16-98 14:47 / 11. DATE COMPLETED 12-16-98 15:02
12. OVERBURDEN THICKNESS unknown	13. DEPTH GROUNDWATER ENCOUNTERED Not encountered
13. DEPTH DRILLED INTO ROCK None	14. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED Not encountered
16. TOTAL DEPTH OF HOLE 0.5 feet	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY) None

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
None			None

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY %
1			Rad			

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)
			[redacted]

LOCATION SKETCH/COMMENTS SCALE:

Located by USACE using GPS on 12/18/98

PROJECT	HOLE NO.
SEAWAY SITE TONAWANDA N.Y.	SWc SLC 1001

ENG FORM 5056-R, AUG 94 (Proponent: CECW-EG)

Engineer Forms 5056-R and 5056 A-R for Borehole Logging

HTRW DRILLING LOG

PROJECT: SEAWAY SITE TONAWANDA N.Y.

[redacted]

HOLE NUMBER: SWCSLC 1001

SHEET:

ELEV. (ft)	DEPTH (ft)	DESCRIPTION OF MATERIALS (7)	FIELD SCREENING RESULTS (8)	DISPOSITION SAMPLE OR OTHER BORING (9)	ANALYTICAL SAMPLE NO. (10)	REMARKS (11)
		ML; Silt; 10% m-c gravel (angular); brown; loose; non plastic; dry; roots asphaltic material near bottom of sample	FID 58 ppm		SWCSLCSS -1001000	0-0.5 ft sample collected with stainless steel bowl and spoon at 14:59
	1.0					RAD surface reading 17 μR/hr
						RAD reading at 0.5 ft depth 12 μR/hr
						FID background 20-25 ppm

HTRW DRILLING LOG	DISTRICT: USACE - Buffalo	HOLE NUMBER
1. COMPANY NAME: SAIC	2. DRILL SUBCONTRACTOR: NA	SHEET OF

3. PROJECT: SEAWAY SITE	4. LOCATION: TONAWANDA N.Y.
[redacted]	6. MANUFACTURER'S DESIGNATION OF DRILL: GEOPROBE SYSTEMS 5400
7. SIZE AND TYPE OF BIT AND SAMPLING EQUIPMENT: MACRO CORE SOIL SAMPER	8. HOLE LOCATION: AREA B
	9. SURFACE ELEVATION: unknown
	10. DATE STARTED: 12-16-98 11:08 / 11. DATE COMPLETED: 12-16-98 11:23
12. OVERBURDEN THICKNESS: > 4.0 feet	13. DEPTH GROUNDWATER ENCOUNTERED: Not encountered
13. DEPTH DRILLED INTO ROCK: None	14. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: Not encountered
14. TOTAL DEPTH OF HOLE: 4.0 feet bgs	15. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): None

16. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	18. TOTAL NUMBER OF CORE BOXES
None			None

19. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY %
4			Rad			

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)
	Bentonite		[redacted]

LOCATION SKETCH/COMMENTS — SCALE:

Located by USACE using GPS on 12/18/98

PROJECT	HOLE NO.
SEAWAY SITE TONAWANDA N.Y.	SWbSLC0005

ENG FORM 5056-R, AUG 94 (Proponent: CECW-EG)

Figure 2-3 Engineer Forms 5056-R and 5056 A-R for Borehole Logging

HTRW DRILLING LOG

PROJECT: SEAWAY SITE TONAWANDA N.Y.

BORING: [redacted]

BOREHOLE: SWb SLC 0005

SHEET:

ELEV. (ft)	DEPTH (ft)	DESCRIPTION OF MATERIALS (17)	FIELD SCREENING RESULTS (21)	PENETRATION RESISTANCE OR OTHER BOREHOLE DATA (18)	ADDITIONAL SAMPLE(S) (19)	REMARKS (20)
		ML; Clayey silt; 10% f-m gravel (angular); brown; low plasticity; soft; dry	FID 13 ppm		SWbSLCSS-0005010	Sample recovery 3.05/4 ft FID Back ground 4 ppm
	1.0	ML; Sandy silt; 20% v fine sand; loose; dry	FID 12 ppm		SWbSLCSS-0005120	No response on PID during sample screening Geoprobe sample driven at 11:12 AM
	2.0	ML; Clayey silt; 10% m-c gravel (angular); v. dark gray to black; firm; low plasticity; dry – interspersed with fill debris consisting of plastic, crushed brick, and wood	FID 18 ppm		SWbSLCSS-0005230	All RAD readings on samples 6-9 μR/hr
	3.0		FID 64 ppm		SWbSLCSS-0005340	
	4.0	BOTTOM OF BORING 4.0 ft				

Figure 2-3 (continued)

HTRW DRILLING LOG	DISTRICT USACE - Buffalo	HOLE NUMBER
1. COMPANY NAME SAIC	2. DRILL SUBCONTRACTOR NA	SHEET SHEETS OF

3. PROJECT SEAWAY SITE	4. LOCATION TONAWANDA N.Y.
[redacted]	6. MANUFACTURERS DESIGNATION OF DRILL GEOPROBE SYSTEMS 5400
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	8. HOLE LOCATION AREA B
MACRO CORE SOIL SAMPLER	9. SURFACE ELEVATION unknown
	10. DATE STARTED 12-16-98 11:27 / 11. DATE COMPLETED 12-16-98 11:46
12. OVERBURDEN THICKNESS >4.0 feet bgs	13. DEPTH GROUNDWATER ENCOUNTERED Not encountered
15. DEPTH DRILLED INTO ROCK None	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED Not encountered
14. TOTAL DEPTH OF HOLE 4.0 feet	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY) None

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
None			None

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY %
4			Red			

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	[redacted]
	Bentonite			

LOCATION SKETCH/COMMENTS SCALE:

Located by USACE using GPS on 12/18/98

PROJECT	HOLE NO.
SEAWAY SITE TONAWANDA N.Y.	SW6SLC0004

ENG FORM 5056-R, AUG 94 (Proponent: CECW-EO)

Figure 2-3 Engineer Forms 5056-R and 5056 A-R for Borehole Logging

HTRW DRILLING LOG

PROJECT: SEAWAY SITE TONAWANDA N.Y. | DIRECTION: [redacted] | HOLE NO.: SWbSLC0004 | SHEET:

ELEV. (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	FIELD RESULTS (D)	OR CORE BOX NO. (E)	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
		ML; Clayey silt; 10% F. gravel; brown; low plasticity; soft; dry	FID 4.9 ppm		SWbSLCSS 0004010	Geoprobe sample driven at 11:35 AM
	1.0	ML; Clayey silt; 10% M. gravel (angular); light gray firm; low plasticity; dry	FID 7.4 ppm		SWbSLCSS 0004120	Sample recovery 2.35 ft due to compression in sample tube
	2.0	ML; Clayey Silt; 10% m-c gravel (angular); v. dark gray to black; low plasticity firm; dry – interspersed with fill debris including plastic, newspaper, fabric, crushed brick	FID 54.4 ppm		SWbSLCSS 0004230	FID Background 4 ppm All RAD readings on samples 8-10 μR/hr
	3.0		FID 363 ppm		SWbSLCSS 0004340	
	4.0	Bottom of boring 4.0 ft				

Figure 2-3 (continued)

HTRW DRILLING LOG	DISTRICT: USACE - Buffalo	HOLE NUMBER
1. COMPANY NAME: SAIC	2. DRILL SUBCONTRACTOR: NA	SHEET SHEETS OF

3. PROJECT: SEAWAY SITE	4. LOCATION: TONAWANDA N.Y.
5. NAME OF DRILLER: [redacted]	6. MANUFACTURERS DESIGNATION OF DRILL: GEOPROBE SYSTEMS 5400
AND SAMPLING EQUIPMENT: MACRO CORE SOIL SAMPLER	8. HOLE LOCATION: AREA B
	9. SURFACE ELEVATION: unknown
	10. DATE STARTED: 12-16-98 11:48 / 11. DATE COMPLETED: 12-16-98 12:15
12. OVERBURDEN THICKNESS: > 8.0 feet	13. DEPTH GROUNDWATER ENCOUNTERED: Not encountered
15. DEPTH DRILLED INTO ROCK: None	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: Not encountered
14. TOTAL DEPTH OF HOLE: 8.0 feet bgs	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): None

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
None			None

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
8			Rad			

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)
	Bentonite		[redacted]

LOCATION SKETCH/COMMENTS — SCALE:

Located by USACE using GPS on 12/18/98

PROJECT	HOLE NO.
SEAWAY SITE TONAWANDA N.Y.	SW6SLC0003

ENG FORM 5056-R, AUG 94 (Proponent: CECW-EG)

Figure 2-3 Engineer Forms 5056-R and 5056 A-R for Borehole Logging

HTRW DRILLING LOG

PROJECT: SEAWAY SITE TONAWANDA N.Y. | [redacted] | HOLE NUMBER: SWbSLC0003 | SHEET:

SERIES (IN)	DEPTH (FT)	DESCRIPTION OF MATERIALS (ST)	FIELD SCREENING RESULTS (ST)	CONTINUOUS SAMPLE OR CORE RECOVERY (ST)	ANALYTICAL SAMPLE NO. (ST)	REMARKS (ST)
		ML; Clayey Silt; 5-10% m-c gravel; loose; brown; low plasticity; dry	FID 0.0ppm		SWbSLC55-0003010	Geoprobe sample driven at 11:54 A.m. Sample recovery 3.6 ft for 0-4 ft interval
	1.0	ML; Sandy Silt; 20% v. fine sand; loose; dark gray; dry	FID 5.3ppm		SWbSLC55-0003120	2nd Geoprobe sample pushed from 4-8 ft at 11:58 AM
	2.0	ML; Silty Clay; 10% v. fine sand; 5% m. gravel; v. dark gray; stiff; moist	FID 12.8ppm		SWbSLC55-0003230	Sample recovery 3.3 ft for 4-8 ft interval
	3.0	- plastic debris scattered in 3-4 ft interval	FID 135ppm		SWbSLC55-0003340	All RAD readings on samples 7-11μR/hr
	4.0	Wood and brick	FID 104ppm		SWbSLC55-0003450	
	5.0	ML; Silty Clay; 5-10% f.m gravel; v. dark ~~gray~~ brown; firm; moist; med. plasticity	FID 550ppm		SWbSLC55-0003560	← duplicate sample 0003561 collected
	6.0	CL; Clay; 5% m. gravel v. dark gray - black; firm; high plasticity; wet	FID 213ppm		SWbSLC55-0003670	
	7.0	CL; Clay; brown; firm; high plasticity; moist	FID 221ppm		SWbSLC55-0003780	
	8.0	Bottom of boring - 8.0 ft				

Figure 2-3 (continued)

HTRW DRILLING LOG	DISTRICT USACE - Buffalo	HOLE NUMBER
1. COMPANY NAME SAIC	2. DRILL SUBCONTRACTOR NA	SHEET SHEETS OF

3. PROJECT Seaway Site [redacted]	4. LOCATION Tonawanda N.Y.
	6. MANUFACTURER'S DESIGNATION OF DRILL Geoprobe Systems 5400
AND SAMPLING EQUIPMENT	8. HOLE LOCATION Area B
MACRO CORE SOIL SAMPLER	9. SURFACE ELEVATION Unknown
	10. DATE STARTED 12-16-98 10:40 / 11. DATE COMPLETED 12-16-98 11:02
12. OVERBURDEN THICKNESS > 4.0 feet	13. DEPTH GROUNDWATER ENCOUNTERED Not encountered
15. DEPTH DRILLED INTO ROCK None	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED Not encountered
14. TOTAL DEPTH OF HOLE 4.0 ft bgs	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY) None

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
None			None

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY %
4			Rad			

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)
	Bentonite		[redacted]

LOCATION SKETCH/COMMENTS SCALE:

Located by USACE using GPS on 12/18/98

PROJECT	HOLE NO.
Seaway Site Tonawanda N.Y.	SWbSLC0002

ENG FORM 5056-R, AUG 94 (Proponent: CECW-EG)

Figure 2-3 Engineer Forms 5056-R and 5056 A-R for Borehole Logging

HTRW DRILLING LOG

PROJECT: SEAWAY SITE TONAWANDA N.Y.

DATE: [redacted]

HOLE NO.: SWbSLC0002

SHEET

ELEV. (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	FIELD HOLE/SOIL RESULTS (D)	GEOTECH SAMPLE OR CORE BOX NO. (E)	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
		ML; Clayey Silt; 5% F-M gravel; brown; non-plastic; soft; dry	FID 4ppm		SWbSLCSS-0002010	Sample recovery 3.25/4 FID Background - 4ppm No response on PID during sample screening All RAD readings on samples 7-9 µR/hr
	1.0	Sandy Silt; ML; 20% very fine sand; very dark gray; non-plastic; loose; dry	FID 4ppm		SWbSLCSS-0002120	
	2.0	0.3 ft layer of asphaltic material	FID 43ppm		SWbSLCSS-0002230	
	3.0	ML; Sandy Silt (same as above)	FID 53ppm		SWbSLCSS-0002340	
	4.0	BOTTOM OF BORING 4.0 ft				

Figure 2-3 (continued)

HTRW DRILLING LOG	DISTRICT: USACE - Buffalo	HOLE NUMBER:
1. COMPANY NAME: SAIC	2. DRILL SUBCONTRACTOR: NA	SHEET SHEETS OF

3. PROJECT: SEAWAY SITE	4. LOCATION: TONAWANDA N.Y.
5. NAME OF DRILLER: NA	6. MANUFACTURERS DESIGNATION OF DRILL: NA
7. SIZE AND TYPE OF DRILLING AND SAMPLING EQUIPMENT: STAINLESS STEEL BOWL AND SPOON	8. HOLE LOCATION: AREA B
	9. SURFACE ELEVATION: unknown
	10. DATE STARTED: 12-16-98 12:17 / 11. DATE COMPLETED: 12-16-98 12:29
12. OVERBURDEN THICKNESS: Unknown	13. DEPTH GROUNDWATER ENCOUNTERED: Not encountered
15. DEPTH DRILLED INTO ROCK: None	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: Not encountered
14. TOTAL DEPTH OF HOLE: 0.5 ft bgs	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): None

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
None			None

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY %
1			Red			100

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)
			[redacted]

LOCATION SKETCH/COMMENTS

SCALE:

Located by USACE using GPS on 12/18/98

PROJECT	HOLE NO.
SEAWAY SITE TONAWANDA N.Y.	SWbSLC0001

ENG FORM 5056-R, AUG 94 (Proponent: CECW-EG)

Engineer Forms 5056-R and 5056 A-R for Borehole Logging

HTRW DRILLING LOG

PROJECT: SEAWAY SITE TONAWANDA N.Y.

[redacted]

BOR NUMBER: SW6SLC 0001

SHEET

ELEV. (ft)	DEPTH (ft)	DESCRIPTION OF MATERIALS (ft)	FIELD TEST RESULTS (ft)	DEPTH OF CASING OR OTHER BORING (ft)	SAMPLE NO. (ft)	REMARKS (ft)
		ML; Clayey Silt; 5-10% med. gravel; loose; brown; non-plastic; dry	FID 4.5ppm		SW6SLC 0001000	RAD reading at surface - 72 μR/hr RAD reading at 0.5ft depth on rock 0.5mR/hr 0-0.5 ft surface sample collected with stainless steel bowl and spoon
	1.0					