Phase II Sampling for Radionuclides and Metal Distribution in L-Lake Sediments

by

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FINAL REPORT

Phase II Sampling for Radionuclides and Metal Distribution in L-Lake Sediments

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LIST OF ACRONYMS

ASTM	American Society for Testing and Materials
bgs	below ground surface
COC	Chain of Custody
EMS	Environmental Monitoring Section
GEL	General Engineering Labs
GPS	Global Positioning System
hp	horse power
QC	Quality Control
SAIC	Science Applications International Corporation
SRS	Savannah River Site
TAL	Target Analyte List
USCS	Unified Soil Classification System
UTM	Universal Transverse Mercator
USGS	United States Geological Survey
WSRC	Westinghouse Savannah River Company

1.0 INTRODUCTION

Science Applications International Corporation (SAIC) was tasked by Westinghouse Savannah River Company (WSRC) under subcontract C001015P to provide environmental sampling services on L-Lake at the Savannah River Site (SRS). Athena Technologies, Inc. was subcontracted by SAIC to provide vibracoring services. The project consisted of vibracore sampling of lake bottom sediments at 23 locations within L-Lake. Field activities were performed from August 8 through August 22, 1996. This report describes the activities associated with the task.

1.1 Project Background

L-Lake is a 400-hectare (1000-acre) man-made reservoir located in the southeastern quadrant of the SRS. The lake, constructed in 1985, was created by impounding the middle reaches of Steel Creek. Once completed, L-Lake served as a once through cooling reservoir for L Reactor. The reservoir's purpose was to limit thermal damage caused by secondary cooling water released to the lower reaches of Steel Creek.

Operation of L and P Reactors began in 1954. At that time, stream discharge in Steel Creek increased from approximately 1 cubic meter per second to a maximum of 24 cubic meters per second with secondary cooling water pumped from the Savannah River. This secondary cooling water was released to SRS streams at temperatures as high as 70°C. P Reactor cooling water was diverted from Steel Creek to Par Pond in 1963, and L Reactor was placed on standby and shut down in 1968. L Reactor was restarted in 1985.

During the construction of L-Lake, soils were dredged from the streambed and floodplain of Steel Creek at the dam and placed in a planned waste containment pit. The dredged soil was allowed to dry, leveled, and covered with 1.6 meters of clean soil. Approximately 46,400 cubic meters of contaminated soil material was removed from the dam site. Although only the upper 1.2 meters of streambed material was considered contaminated, the streambed was excavated to a depth of 3 meters. This contaminated soil material was estimated to contain 0.2 curies of cesium-137, and 0.02 curies of cobalt-60. The buried waste containment pit was covered by the reservoir when the lake was filled.

In 1985, prior to the filling of L-Lake, EG&G Energy Measurements, Inc. used aerial gamma survey measurements to establish a baseline radiological survey of the Steel Creek drainage basin. Gamma maps of the area, created from the overflight data, confirmed the deposition of man-made radionuclides in the Steel Creek streambed, which was subsequently covered by the reservoir.

In order to maintain the current water level at L-Lake, water from the Savannah River is pumped at a rate of 1.5 cubic meters per second. However, this river water pumping may no longer be needed to support current missions at the SRS. If the river water pumping system is considered an unnecessary and surplus component of the site infrastructure, operating costs may be significantly reduced by decreasing or discontinuing river water pumping.

In order to assess and understand the environmental impacts of lowering the L-Lake water level and exposing surface sediments, a four phase L-Lake site characterization plan was developed and implemented. This program was designed to develop a complete and defensible list of contaminants for L-Lake and to identify all contaminants of concern in the sediments of L-Lake. Phase I involved sampling surface sediments in the submerged portions of L-Lake and sampling reference (background) soils at locations surrounding L-Lake (Dunn, 1986).

This report identifies field operations conducted during Phase II of the program, which involved sampling submerged sediments by vibracoring at 23 predetermined locations on L-Lake.

1.2 Scope of Work

The scope of work for the sampling event at L-Lake consisted of:

- Vibracore sampling at 23 locations on L-Lake
- Determination of sampling locations using a Global Positioning System (GPS)
- Geologic descriptions of each core
- Sample processing in accordance with WSRC Manual 3Q5 (WSRC, 1992)
- Decontamination of sampling equipment in accordance with WSRC 3Q5

- Health and safety oversight of all field activities
- Maintaining proper sample chain of custody and properly packing and shipping samples to two WSRC contract laboratories
- Accurate documentation of all sampling and sample processing activities including WSRC-Environmental Monitoring Services (EMS) "Red Book" Logs

2.0 METHODS

2.1 Sampling Locations

Sampling locations were provided to SAIC in the form of Universal Transverse Mercator (UTM) coordinates for L-Lake. The UTM coordinates were converted to longitude/latitude coordinates corrected to the 1927 North American datum, corresponding to the 7.5 minute quadrangle base map of the lake. Sample locations were then plotted on a United States Geological Survey (USGS) quadrangle so that coring equipment could be mobilized to sample stations using map/visual techniques (landmarks, topographic features, etc.). A MagellanTM Model 1500 GPS was then used to obtain position data in the form of longitude/latitude coordinates, and final location adjustments of coring equipment were made prior to sampling.

These coordinates were recorded in a bound field logbook, and are presented in Table 2-1.

2.2 Vibracoring

The method used for obtaining samples from the bottom of L-Lake was vibracoring. The vibracore machine consisted of a gasoline powered 8.5 horsepower (hp) HondaTM engine equipped with a vibrating head on a flexible steel vibrating wire. This equipment is typical of the equipment used in the construction industry for vibrating wet concrete. Attached to the vibrating head was an open, rounded clamp, with a closed diameter of approximately 3 inches. This clamp was closed around a 3-inch diameter, thin walled, aluminum pipe approximately 15 feet in length with a beveled bottom. The pipe was raised to a vertical position with the beveled end resting against the ground surface. When the engine was engaged, the vibrating head advanced the aluminum tube into the sediment, capturing a solid core of material.

2.2.1 Lake Bottom Sampling

For lake bottom sampling, the equipment consisted of three major components: (1) the vibracoring apparatus; (2) a coring platform (barge); and (3) an outboard launch. The

Table 2-1. Location Information

Sample ID	Date Sampled	Proposed Locations				GPS Coordinates		
		UTM		Geographic ¹		Geographic ¹		Water Depth (ft)
		X Coordinate	Y Coordinate	Longitude	Latitude	Longitude	Latitude	
LLEIS2-01	12-Aug-96	442465	3673952	81-37-02	33-12-16	81-37-01	33-12-16	4.0
LLEIS2-02	13-Aug-96	441850	3673899	81-37-26	33-12-14	81-37-25	33-12-14	9.0
LLEIS2-03	13-Aug-96	441757	3673545	81-37-29	33-12-03	81-37-29	33-12-03	14.0
LLEIS2-04	13-Aug-96	441823	3673542	81-37-27	33-12-03	81-37-27	33-12-03	14.0
LLEIS2-05	14-Aug-96	441361	3673120	81-37-44	33-11-49	81-37-44	33-11-48	7.0
LLEIS2-06	14-Aug-96	440874	3672812	81-38-03	33-11-39	81-38.051	33-11.647	9.0
LLEIS2-07	14-Aug-96	441159	3672721	81-37-52	33-11-36	81-37.873	33-11.603	9.0
LLEIS2-08	15-Aug-96	440476	3671952	81-38-18	33-11-11	81-38.304	33-11.174	27.0
LLEIS2-09	16-Aug-96	441120	3671693	81-37-53	33-11-03	81-37.882	33-11.050	25.0
LLEIS2-10	19-Aug-96	440415	3670963	81-38-20	33-10-39	81-38.341	33-10.658	9.0
LLEIS2-11	19-Aug-96	440839	3670635	81-38-04	33-10-28	81-38.078	33-10.463	14.0
LLEIS2-12	21-Aug-96	441188	3670114	81-37-50	33-10-11	81-37.831	33-10.197	27.0
LLEIS2-13	20-Aug-96	440406	3670231	81-38-20	33-10-15	81-38.353	33-10.251	45.0
LLEIS2-14	22-Aug-96	441148	3669635	81-37-52	33-09-56	81-37.872	33-09.938	53.0
LLEIS2-15	21-Aug-96	440786	3670110	81-38-06	33-10-11	81-38.097	33-10.186	18.0
LLEIS2-16	21-Aug-96	440781	3670014	81-38-06	33-10-08	81-38.099	33-10.144	19.0
LLEIS2-17	22-Aug-96	440980	3669712	81-37-58	33-09-58	81-37.987	33-09.981	51.0
LLEIS2-18	13-Aug-96	442055	3675323	81-37-18	33-12-02	81-37-17	33-12-03	20.0
LLEIS2-19	15-Aug-96	441122	3672779	81-37-53	33-11-38	81-37.904	33-11.639	33.0
LLEIS2-20	15-Aug-96	441013	3672743	81-37-58	33-11-37	81-37.965	33-11.609	37.0
LLEIS2-21	20-Aug-96	440584	3670297	81-38-14	33-10-17	81-38.235	33-10.293	54.0
LLEIS2-22	16-Aug-96	440437	3671164	81-38-19	33-10-45	81-38.343	33-10.764	9.0
LLEIS2-23	15-Aug-96	440912	3671640	81-38-01	33-11-01	81-38.024	33-11.029	N/A*

¹ Longitude/Latitude in degrees-minutes-seconds or degrees-minutes

* Water depth not recorded

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LLEIS2-23	15-Aug-96	440912	3671640	81-38-01	33-11-01	81-38.024	33-11.029	N/A*

¹ Longitude/Latitude in degrees-minutes-seconds or degrees-minutes

* Water depth not recorded

launch was a 17-foot long McKee CraftTM equipped with a 115 hp JohnsonTM outboard motor. This craft was used to transport personnel to and from the coring barge, to move the coring barge from location to location, and to reconnoiter sampling locations.

The coring barge consisted of four metal panels filled with foam flotation that were bolted together to form a platform. The platform created from these panels was approximately 10 feet by 10 feet square. It was surrounded by a steel cable barricade with three vertical posts and two horizontal cables on each of the four sides. In its center was a rectangular hole approximately 2 feet by 4 feet. Bolted to the deck and over the rectangular hole was a steel derrick approximately 10 feet in height, used for guiding the coring drill string through the platform.

The vibracoring apparatus on the coring barge was as previously described and equipped with some additional features that allowed for advancing the pipe under water. These features consisted of a check valve assembly and lengths of 2-inch diameter galvanized pipe with quick connect couplings. The core pipe was lowered through the barge deck, and drill pipe lengths were added until the bottom of the core pipe rested on the lake bottom. The water depth was recorded with a fathometer unit on the power launch. When coring commenced, the drill string advanced via vibration and was allowed to continue for approximately five minutes or to refusal, whichever occurred first. Normally, initial penetration occurred very rapidly while the pipe advanced through the very soft, organic-rich layers. When the denser, more cohesive layers were encountered, penetration slowed or stopped. A strap was then wrapped around the drill string forming a foot sling and a crew member would step onto the sling using his body weight to increase the penetration and ensure that a plug of cohesive material was collected to facilitate core recovery.

After turning off the machine, a combination of electric and manual winching was employed to pull the core pipe out of the sediments and onto the barge. The check valve assembly ensured that suction was maintained on the core to prevent it from sliding out of the pipe.

Once on deck, the core pipe bevel was cut off, and the bottom end was labeled and capped. The check valve assembly was then removed and the liquid in the top portion of

the core pipe was gently decanted by pouring at a very shallow angle. After decanting the fluid, a tape measure was inserted into the top of the pipe to measure both the core recovery and the length of the empty portion of pipe. This empty portion was then cut away using a hacksaw. The top end was labeled and capped, and the core was placed inside a fiberglass, insulated cooler with ice, on board the power launch.

2.2.2 Coring Difficulties

Coring difficulties encountered throughout the project consisted mainly of core loss and sample tube refusal.

Core loss can be attributed to loose sediments sliding out of the sample tube during extraction. Although each sample tube collected had some degree of core loss, only two samples, LLEIS2-18-03 and LLEIS2-21-03, could not be sent for laboratory analyses. At each of these locations, two attempts were made to retrieve the bottom interval (4-8 feet); however, the lithology (loose sands and gravels) present prevented adequate core recovery.

Sample tube refusal was mainly due to the thinness of recently deposited sediments. Refusal occurred at two sampling stations (LLEIS2-15 and -17). At station LLEIS2-15, three attempts were made to core the planned 8-foot interval; however, the deepest penetration was 3.0 feet below ground surface (bgs). Therefore only two of the planned three samples were collected; sample LLEIS2-15-03 (4-8 feet) was not collected. At sample station LLEIS2-17, sample tube refusal was encountered, and three samples could not be collected (i.e., LLEIS2-17-01, 02, and 03). Four attempts were made to core the 0.0 to 8.0 feet interval but each attempt resulted in either core tube failure or recovery so poor that no samples could be processed. The deepest penetration achieved was 3.0 feet and what little core was retrieved was a light gray, very dense, coarse sand.

Difficulties retrieving the core tube due to penetration into dense or very tight sediments occurred at several sampling stations. Core tube sections were lost at the following stations: LLEIS2-04, -17, -19, and -21. Table 2-2 summarizes the results of core tube losses.

Table 2-2. Core Tube Loss

Station #	Penetration (ft)	Sample Recovery (ft)	Core Tube Section Lost (ft)	H ₂ O Depth (ft)	Stickup Depth Below H ₂ O Surface
LLEIS2-04	5.4	0	5.5	14	4 ft stick-up ∴ 10 ft H ₂ O
LLEIS2-17	3.0	0	4.0	51	3 ft stick-up ∴ 48 ft H ₂ O
LLEIS2-19	5.0	2.0	3.0	33	2 ft stick-up ∴ 31 ft H ₂ O
LLEIS2-21	5.9	0	9.0	54	8 ft stick-up ∴ 46 ft H ₂ O

The shallowest of the four core tube sections (station LLEIS2-04) appears to be at least 10 feet below the water surface, therefore posing no hazards to boating activities on L-Lake.

2.3 Sample Processing

Following retrieval, cores were transported to the sample processing facility. This facility was a tented shelter located uphill from the L-Lake boat ramp. Building 772-7B was used as a source of deionized water and for overnight sample storage and refrigeration. A sample logbook ("Red Book") was maintained to document sample times, dates, IDs, etc. for all samples collected during the project.

2.3.1 L-Lake Sample Processing

At the processing facility, the core tubes were cut open longitudinally using a circular saw. Each core was divided into the sample intervals prescribed in the sampling and analysis plan. Four-foot cores were sampled at 0 to 1 foot and 1 to 4 feet intervals and 8-foot cores were sampled at 0 to 1 foot, 1 to 4 feet, and 4 to 8 feet intervals. In a few cases, core recovery was insufficient to process all samples (see Section 2.2.3).

Immediately upon opening the core tubes, the field geologist described the core in detail and recorded his observations on a geologic log. Then the soils were composited (homogenized) by interval in a stainless steel mixing bowl using a stainless steel spoon. When the interval was adequately homogenized, sample containers were filled in the following order: (1) Target Analyte List (TAL) inorganics without cyanide, (2) gross alpha, nonvolatile beta, Pu series, U series, and (3) gamma spectroscopy. Each sample container was labeled with the sample ID, date, time, and appropriate analyte.

As the samples were placed in containers, a sample logbook ("Red Book") was completed along with the Chain of Custody (COC) forms of the interval being sampled. Filled sample containers were immediately placed on ice in a portable cooler. Upon completion of sample processing each day, the portable cooler was transported to SRS Building 772-7B, and samples were placed in the dedicated refrigerator there under custody seal.

Following overnight refrigeration, samples were prepared for shipping. This task was performed at SRS Building 772-7B in an air-conditioned room. Sample containers were bubble wrapped and placed in a cooler lined with bubble wrap, a plastic bag, and a minimum of ten packs of blue ice. The blue ice was placed around and on top of the samples. The plastic bag was sealed with tape and then the cooler lid was taped shut.

Two analytical laboratories were used for this project. The primary laboratory was General Engineering Labs (GEL) of Charleston, South Carolina, and laboratory split samples were shipped to Roy F. Weston Labs in Lionsville, Pennsylvania.

For GEL, the COCs and coolers were passed directly to a GEL representative at SRS Building 772-7B. For Roy F. Weston split samples, the coolers and COCs were taken to WSRC Shipping and Receiving in the Central Shops Area of SRS. The COCs were sealed inside the coolers and shipped to Weston Labs. Table 2-3 lists all samples collected during this project.

Table 2-3. Comprehensive Sample List

SAMPLE ID		SAMPLE DATE	PROCESSING DATE	SHIPPING DATE	CORE	
Station ID	EPD/EMS ID				Penetrated	Recovery
LLEIS2-01-01	108700	12-Aug-96	12-Aug-96	13-Aug-96	4.08	3.35
LLEIS2-01-02	108701	12-Aug-96	12-Aug-96	13-Aug-96	4.08	3.35
LLEIS2-02-01	108702	13-Aug-96	13-Aug-96	14-Aug-96	10.00	5.80
LLEIS2-02-02	108703	13-Aug-96	13-Aug-96	14-Aug-96	10.00	5.80
LLEIS2-02-02A	108704	13-Aug-96	13-Aug-96	14-Aug-96	10.00	7.30
LLEIS2-02-03	108705	13-Aug-96	13-Aug-96	14-Aug-96	10.00	5.80
LLEIS2-03-03D	108706	13-Aug-96	13-Aug-96	14-Aug-96	10.00	7.30
LLEIS2-03-01	108707	13-Aug-96	13-Aug-96	14-Aug-96	8.80	5.50
LLEIS2-03-02	108708	13-Aug-96	13-Aug-96	14-Aug-96	8.80	5.50
LLEIS2-03-03	108709	13-Aug-96	13-Aug-96	14-Aug-96	8.80	5.50
LLEIS2-04-01	108711	13-Aug-96	14-Aug-96	15-Aug-96	4.15	3.50
LLEIS2-04-02	108712	13-Aug-96	14-Aug-96	15-Aug-96	4.15	3.50
LLEIS2-05-01	108715	14-Aug-96	14-Aug-96	15-Aug-96	7.50	4.20
LLEIS2-05-02	108716	14-Aug-96	14-Aug-96	15-Aug-96	7.50	4.20
LLEIS2-06-01	108717	14-Aug-96	14-Aug-96	15-Aug-96	8.25	3.10
LLEIS2-06-02	108718	14-Aug-96	14-Aug-96	15-Aug-96	8.25	3.10
LLEIS2-07-01	108719	14-Aug-96	15-Aug-96	16-Aug-96	6.70	3.80
LLEIS2-07-02	108720	14-Aug-96	15-Aug-96	16-Aug-96	6.70	3.80
LLEIS2-08-01	108728	15-Aug-96	15-Aug-96	16-Aug-96	5.20	3.20
LLEIS2-08-02	108729	15-Aug-96	15-Aug-96	16-Aug-96	5.20	3.20
LLEIS2-09-01	108733	16-Aug-96	16-Aug-96	19-Aug-96	5.50	4.40
LLEIS2-09-02	108734	16-Aug-96	16-Aug-96	19-Aug-96	5.50	4.40
LLEIS2-10-01	108739	19-Aug-96	19-Aug-96	20-Aug-96	4.00	3.40
LLEIS2-10-02	108740	19-Aug-96	19-Aug-96	20-Aug-96	4.00	3.40
LLEIS2-11-01	108742	19-Aug-96	19-Aug-96	20-Aug-96	4.00	2.60
LLEIS2-11-02	108743	19-Aug-96	19-Aug-96	20-Aug-96	4.00	2.60
LLEIS2-12-01	108750	21-Aug-96	21-Aug-96	22-Aug-96	4.70	4.40
LLEIS2-12-02	108751	21-Aug-96	21-Aug-96	22-Aug-96	4.70	4.40
LLEIS2-13-01	108744	20-Aug-96	20-Aug-96	21-Aug-96	6.00	4.90
LLEIS2-13-02	108745	20-Aug-96	20-Aug-96	21-Aug-96	6.00	4.90
LLEIS2-14-01	108757	22-Aug-96	22-Aug-96	23-Aug-96	3.50	3.30
LLEIS2-14-02	108758	22-Aug-96	22-Aug-96	23-Aug-96	3.50	3.30
LLEIS2-15-01	108748	21-Aug-96	21-Aug-96	22-Aug-96	3.00	2.80
LLEIS2-15-02	108749	21-Aug-96	21-Aug-96	22-Aug-96	3.00	2.80
LLEIS2-15-03	NA	21-Aug-96	NA	NA	3.00	2.80
LLEIS2-16-01	108752	21-Aug-96	21-Aug-96	22-Aug-96	8.50	7.20
LLEIS2-16-02	108753	21-Aug-96	21-Aug-96	22-Aug-96	8.50	7.20
LLEIS2-16-02A	108754	21-Aug-96	21-Aug-96	22-Aug-96	10.90	8.20
LLEIS2-16-03	108755	21-Aug-96	21-Aug-96	22-Aug-96	10.90	8.20
LLEIS2-16-03D	108756	21-Aug-96	21-Aug-96	22-Aug-96	10.90	8.20

Table 2-3. Comprehensive Sample List (Continued)

SAMPLE ID		SAMPLE DATE	PROCESSING DATE	SHIPPING DATE	CORE	
Station ID	EPD/EMS ID				Penetrated	Recovery
LLEIS2-17-01	NA	22-Aug-96	NA	NA	3.00	0.00
LLEIS2-17-02	NA	22-Aug-96	NA	NA	3.00	0.00
LLEIS2-17-03	NA	22-Aug-96	NA	NA	3.00	0.00
LLEIS2-18-01	108713	13-Aug-96	14-Aug-96	15-Aug-96	10.85	3.10
LLEIS2-18-02	108714	13-Aug-96	14-Aug-96	15-Aug-96	10.85	3.10
LLEIS2-18-03	NA	13-Aug-96	NA	NA	10.85	3.10
LLEIS2-19-01	108725	15-Aug-96	15-Aug-96	16-Aug-96	9.00	5.80
LLEIS2-19-02	108726	15-Aug-96	16-Aug-96	19-Aug-96	5.20	4.80
LLEIS2-19-03	108727	15-Aug-96	15-Aug-96	16-Aug-96	9.00	5.80
LLEIS2-20-01	108721	15-Aug-96	15-Aug-96	16-Aug-96	5.30	3.60
LLEIS2-20-02	108722	15-Aug-96	15-Aug-96	16-Aug-96	5.30	3.60
LLEIS2-02-02A	108723	15-Aug-96	15-Aug-96	16-Aug-96	5.30	3.60
LLEIS2-20-03	108724	15-Aug-96	15-Aug-96	16-Aug-96	5.30	3.60
LLEIS2-21-01	108746	20-Aug-96	20-Aug-96	21-Aug-96	7.50	3.30
LLEIS2-21-02	108747	20-Aug-96	20-Aug-96	21-Aug-96	7.50	3.30
LLEIS2-21-03	NA	20-Aug-96	NA	NA	7.50	3.30
LLEIS2-22-01	108735	16-Aug-96	16-Aug-96	19-Aug-96	7.50	4.40
LLEIS2-22-02	108736	16-Aug-96	16-Aug-96	19-Aug-96	7.50	4.40
LLEIS2-22-02D	108737	16-Aug-96	16-Aug-96	19-Aug-96	5.00	4.50
LLEIS2-22-03	108738	16-Aug-96	16-Aug-96	19-Aug-96	7.50	4.40
LLEIS2-23-01	108730	15-Aug-96	16-Aug-96	19-Aug-96	9.50	5.60
LLEIS2-23-02	108731	15-Aug-96	16-Aug-96	19-Aug-96	9.50	5.60
LLEIS2-23-03	108732	15-Aug-96	16-Aug-96	19-Aug-96	9.50	5.60
LLEIS2-RB-01-E	108710	13-Aug-96	13-Aug-96	14-Aug-96	-	-
LLEIS2-RB-02-E	108741	19-Aug-96	19-Aug-96	20-Aug-96	-	-

NA = Core sample not recovered

2.3.2 Quality Control Samples

Quality control (QC) samples used for the project consisted of duplicates, rinsates and laboratory split samples. Split samples were collected at three locations: LLEIS2-02, -16, and -22. Duplicates were also collected from three locations: LLEIS2-02, -16, and -20. Rinsate samples were collected to verify the effectiveness of field decontamination procedures applied to sampling equipment. First the sampling equipment (core tube) was decontaminated per WSRC Manual 3Q5 procedures. Then deionized water from the well building (772-7B) source was poured through the core tube and collected in the sample container with a separate ID. The sample logbook ("Red Book") cross references the rinsate sample to the soil sample taken with the equipment. For this project, two rinsate samples were collected.

2.4 Decontamination

Soil sampling equipment such as stainless steel spoons, spatulas, and bowls were decontaminated between each sampling interval in accordance with WSRC Manual 3Q5, Chapter 16, page 18, Section 4.0, which includes the following steps:

- (1) Alconox wash
- (2) Deionized water rinse
- (3) Deionized water spray
- (4) Isopropanol spray (twice)
- (5) Air dry
- (6) Wrap with aluminum foil

The deionized water source was located in SRS Building 772-7B. Decontamination solutions, soil, mud, etc., removed during the decontamination process were disposed of on the ground outside the sample processing facility as directed by WSRC personnel.

The vibracore sample tubes did not require continuous decontamination because each sample had its own dedicated sampling tube.

2.5 Lake Geology

Cores from each sample location were examined and described by an experienced field geologist. This was accomplished after the cores were opened and laid out on the sampling table, in most cases prior to sample processing.

Cores were described using the Unified Soil Classification System (USCS) which follows American Society for Testing and Materials (ASTM) Method D 2488, "Standard Practice for Description and Identification of Soils (Visual-Manual Procedure)" (ASTM, 1984). A MunsellTM color chart was used for color descriptions and a sand comparison card based on the Wentworth scale was used for grain size descriptions. Determination of clay and silt presence and content was accomplished using the thread and smear tests as outlined in WSRC 3Q5, Chapter 5, p. 9-10, Section 5.3.3.2.

The geologic descriptions were recorded on a geological log form OSR 14-366. The logs are included as Appendix A. A careful study of the logs provides the thickness and character of the recent lacustrine and channel fill sediments, depth to undisturbed, recognizable soil horizons, and descriptions of distinct lithologic types within both the recent and older horizons.

2.5.1 Lithology and Thickness of Recent Sediments

Recent sediments encountered at L-Lake included organic-rich, anoxic material representing recent deposition/bioactivity, coarse grained sands representing channel fill and perhaps recent storm deposition, and silty and clayey sands possibly indicative of less recent, buried lake bottom. Five distinct lithologic units were identified among the 23 sampling locations. No stratigraphic correlation was attempted nor is any inferred, however, lithologic similarities observed may provide some evidence of depositional processes and may prove useful when attempting to correlate contaminant concentrations observed in sediments. The five lithologic types are described in the following paragraphs.

2.5.1.1 Lithology 1

Lithology 1 was observed most frequently in shallow locations at L-Lake and usually as the uppermost layer. It was associated with areas where bottom vegetation is present and active decay processes are evident. The soil was described as a fine grained sandy silt to silty sand, and ranged in color from grayish black to black. It was typically soft and saturated, and contained abundant organic material including roots and decaying twigs, sometimes with a strong earthy or sulfurous odor.

2.5.1.2 Lithology 2

Lithology 2 was similar to Lithology 1, but was lighter in color and contained less distinguishable organic material. It was described as a coarse grained sand with silt ranging from 10 to 20 percent. Organic material (very thin roots) was usually present comprising approximately 10 percent of the soil type. The color varied from dusky yellowish brown to yellowish-gray, light brown to brownish-gray, and dark gray. The layer's texture was soft with a distinct lack of density, possibly representing a later stage or organic decay than Lithology 1.

2.5.1.3 Lithology 3

This lithology includes medium to coarse, and coarse grained loose sands. These are typical of alluvial channel fill, or in the case of shallow locations, alluvium or storm deposits. The color ranged from light to dark gray, medium to dark reddish orange, greenish gray and dark yellowish orange. The sands did not contain organic material.

2.5.1.4 Lithology 4

Lithology 4 was usually a sand with a higher silt/clay content which made the soils firmer and more cohesive. These soils were described as silty and clayey sands with a grain size ranging from medium to granular and appeared in color as light to moderate olive-gray, pale to moderate greenish-yellow, pale olive, and pale brown.

2.5.1.5 Lithology 5

This lithology is distinct from all others in that it includes a small to moderate percentage of matrix clay. The unit was encountered at seven shallow locations at L-Lake. The soil type is typical of the "B" horizon at SRS as described by Looney et al. (1989) and consistently occurred as the lower-most unit penetrated by the vibracore sampling tube. This "B" horizon was never fully penetrated throughout the project. The unit was described as a medium to coarse grained clayey sand with a 20 to 35 percent silt/clay content. Colors observed in the unit were predominantly moderate reddish-brown to grayish-red with variegated colors of moderate yellow, pale red, brownish-yellow, light brown, and light gray.

At L-Lake, the "B" soil horizon was encountered at 7 of the 23 sampling locations and only in non-channel, shallow water areas of the lake (LLEIS2-06, -10, -12, -15, -16, -22, and -23). Undisturbed soils were encountered at four other locations and recent sediments were not fully penetrated at the remaining twelve sampling stations. Recent sediment thickness ranged from 1.2 to > 8.0 feet. Table 2-4 lists the thickness of recent sediments for each sampling location.

Table 2-4. Recent Sediment Thickness

SAMPLE LOCATION	LOCATION TYPE	WATER DEPTH (FEET)	THICKNESS OF RECENT SEDIMENT (FEET)	UNDISTURBED SOIL MARKER	RECENT MATERIAL
LLEIS2-01	Shallow	4	2.3	Dk Yellowish-Orange Sand	Lt-dk gray sand
LLEIS2-02/2A	Shallow	9	> 7.3	NA	Pale olive clayey sand over organic soil
LLEIS2-03	Shallow	14	> 5.5	NA	Organic soil over silty clay and sand
LLEIS2-04	Shallow	14	2.7	Pale Greenish Yellow Clay	Organic soil over sand
LLEIS2-05	Shallow	7	> 4.2	NA	Grayish black to lt brown sand
LLEIS2-06	Shallow	9	3	Variegated "B" Soil	Sand
LLEIS2-07	Shallow	9	4.6	Lt Brown Sand	Grayish black to brownish gray sand
LLEIS2-08	Shallow	27	>3.2	NA	Grayish black to lt gray sand
LLEIS2-09	Shallow	25	>4.4	NA	Yellowish brown to lt gray sand
LLEIS2-10	Shallow	9	2.2	Variegated "B" Soil	Brownish gray silty sand and sand
LLEIS2-11	Shallow	14	2	Dk Reddish orange Sand	Yellowish brown sand
LLEIS2-12	Shallow	27	4.1	Variegated "B" Soil	Dk gray to yellowish brown sand
LLEIS2-13	Channel	45	>4.9	NA	Olive gray to yellowish brown sand
LLEIS2-14	Channel	53	>3.3	NA	Sandy silt/sand over organic soil
LLEIS2-15	Shallow	18	1.2	Variegated "B" Soil	Pale brown to reddish brown clayey sand
LLEIS2-16/16A	Shallow	19	4.4	Variegated "B" Soil	Greenish orange to mod. gray sand
LLEIS2-17	Channel	51	No recovery	-	-
LLEIS2-18	Channel	20	>3.1	NA	Organic soil over olive gray granular sand
LLEIS2-19	Channel	33	>5.8	NA	Grayish green sandy clay over organic soil
LLEIS2-20/20A	Channel	37	>3.6	NA	Greenish gray granular sand over organic soil
LLEIS2-21	Channel	54	>3.3	NA	Organic soil over lt gray sand
LLEIS2-22/22A	Shallow	9	2.4	Variegated "B" Soil	Olive gray to yellowish brown silty sand
LLEIS2-23	Shallow	*	2	Mod. Reddish brown Sand	Brownish black to grayish red sand

* Water depth not recorded

3.0 SUMMARY

Twenty-three lake bottom sample locations were vibracored at L-Lake between August 8 and August 22, 1996. Fifty-nine of the proposed 65 samples were collected; sample loss was due to poor recovery and thinner than expected recent lacustrine deposition.

A Global Positioning System was employed to provide longitude/latitude coordinates for each sampling location. Map/visual techniques were used to site the coring equipment as close as possible to proposed map locations.

Four distinct lithologic units were distinguished within the recent lacustrine and alluvial sediments and a fifth lithologic unit, the "B" horizon, was encountered at seven sampling locations. Although no stratigraphic correlation was attempted, identification of these units may enhance future efforts to correlate contaminant concentrations in a geologic context.

Sample processing and shipping were accomplished in accordance with WSRC specifications.

4.0 REFERENCES

ASTM, 1984. American Society for Testing and Materials. *Standard Practice for Description and Identification of Soils*. Standard D2488.

Looney, B.B., Ramdeen, M., Pickett, J., Rogers, V., Shirley, P.A., and Scott, M.T., 1989. *Geochemical and Physical Properties of Soils and Shallow Sediments at the Savannah River Plant*, WSRC-RP-90-1031, E.I. du Pont de Nemours and Company, Savannah River Plant, Aiken, SC

Appendix A-Soil Boring Log

SRS

SOIL BORING LOG

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PROJECT L-LAKE SEDIMENT CORING		DATE 08/12/96
		AREA L-LAKE
BORING NO. LLE152-01	SRS COORDINATES N E	REFERENCE ELEVATION
DRILLER Jerry Sexton	DRILLING SUBCONTRACTOR ATHENA	TOTAL HOLE DEPTH 4.0 ft 4.08 ft
TECHNICAL OVERSIGHT BRAD BAKER	GROUNDWATER DEPTHS DATE TIME DEPTH	DRILLING METHODS AND DEPTHS Vibra Coring 0-4.0 ft 0-4.08 ft
OVERSIGHT COMPANY SAIC		

SAMPLING			6-INCH BLOW COUNTS	IN. DRIV. IN. REC.	% REC.	LITH- OLOGY	DESCRIPTION
NO	TYPE	DEPTH					
LLE152-01-01		0					0.0-0.5 ft
		1					SAND; med gravel; silt ~15%; dk gray
		2					N3; med sorted; moist; sub rounded
LLE152-01-02		4					0.5-2.3 ft
		5					SAND; med gravel - 55%; silt ~15%; lt. gray
							N7; med sorted; sub rounded; moist
							2.3-4.0 ft
							SAND; coarse 90% silt/clay ~20%; dk
							yellowish orange 10% R/L; pebbles present;
		10					poorly sorted; sub rounded; moist
		15					Recovery: 3.35 ft 2 Rec: 82.1%
							2 Compaction: 17.9%
							Recovery: 3.25 ft 2 Recovery: 81.2%
							Compaction: 16.75%
		20					

Samples Submitted for Laboratory Tests

LLE152-01-01	
LLE152-01-02	

NOTE: Standard Penetration Resistance is Sum of Blows for
2nd - 6" and 3rd - 6" to Drive 1-3/8" I.D., 2" O.D. Split
Barrel Sampler with 140 pound hammer falling 30 inches.

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PROJECT L-LAKE SEDIMENT CORING		DATE 08/12/96
		AREA L-LAKE
BORING NO. LLG152-02	SRS COORDINATES N E	REFERENCE ELEVATION
DRILLER JERRY SEXTON	DRILLING SUBCONTRACTOR ATHENA	TOTAL HOLE DEPTH 10 ft
TECHNICAL OVERSIGHT BRAD BAKER	GROUNDWATER DEPTHS DATE TIME DEPTH	DRILLING METHODS AND DEPTHS VIBRA CORING
OVERSIGHT COMPANY SAIL		

SAMPLING			6-INCH BLOW COUNTS	IN. DRIV. IN. REC.	% REC.	LITH- OLOGY	DESCRIPTION
NO	TYPE	DEPTH					
		0					
UWISZ-CZ-01							0.0 - 4.0 ft (using composition %)
UWISZ-CZ-02							(Heavy SAND); sand: med - 55%, silt/clay = 45%
UWISZ-DZ-02A							Pale Olive 10Y 5/2; subrounded; poorly sorted;
		4					v. moist
		5					(Int. banded sandy clay ~1.0; see 2A log)
UWISZ-CZ-03							4.0 - 10 ft
UWISZ-CZ-03D							Sandy SILT; sand ~30%, silt ~35%, roots and
		8					organic ~35%; Blanks M1; subrounded;
							very poorly sorted
		10					
		15					
							Total recovery: 5.9 ft ∴ 58%
							Note 42% compaction
		20					

Samples Submitted for Laboratory Tests

LE152-02-01		
LE152-02-02	LE152-02-05D	
LE152-02-03A	LE152-02-03	

NOTE: Standard Penetration Resistance is Sum of Blows for 2nd - 6" and 3rd - 6" to Drive 1-3/8" I.D., 2" O.D. Split Barrel Sampler with 140 pound hammer falling 30 inches.

SOIL BORING LOG

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PROJECT <i>LLEIS 2</i>		DATE <i>13 Aug 96</i>
		AREA <i>L-Area</i>
BORING NO. <i>LLEIS2-02A</i>	SRS COORDINATES N E	REFERENCE ELEVATION
DRILLER <i>Terry Sexton</i>	DRILLING SUBCONTRACTOR	TOTAL HOLE DEPTH <i>10.0 ft</i>
TECHNICAL OVERSIGHT <i>Brad Baker</i>	GROUNDWATER DEPTHS DATE TIME DEPTH	DRILLING METHODS AND DEPTHS <i>Vibracoring</i>
OVERSIGHT COMPANY <i>SAIC</i>		

SAMPLING			6-INCH BLOW COUNTS	IN. DRIV. IN. REC.	% REC.	LITH- OLOGY	DESCRIPTION
NO.	TYPE	DEPTH					
		0					0.0-2.0 ft (composition factor added) Clayey SAND; sand med ~55, silt/clay ~45% pale olive 10Y 5/6, subrounded, poorly sorted, v. moist
		5					2.0-3.0 ft Sandy Clay; sand med ~25%, clay ~75% pale yellowish orange 10YR 5/6; subrounded, v. poorly sorted; moist
		10					3.0-10.0 ft Sandy SILT; sand ~30%, silt ~70% roots and organics ~35%; Black 10Y 1/1; subrounded; v. poorly sorted
		15					
		20					10.0 corod; 7.3 ft recovered i. 73% recovered; 27% compacted

Samples Submitted for Laboratory Tests

NOTE: Standard Penetration Resistance is Sum of Blows for
2nd - 6" and 3rd - 6" to Drive 1-3/8" I.D., 2" O.D. Split
Barrel Sampler with 140 pound hammer falling 30 inches.

SOIL BORING LOG

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PROJECT L-LAKE SEDIMENT CORING		DATE 08/13/96
		AREA L-LAKE
BORING NO. LLE152-03	SRS COORDINATES N E	REFERENCE ELEVATION
DRILLER Jerry Sexton	DRILLING SUBCONTRACTOR ATHENA	TOTAL HOLE DEPTH 6.8 ft
TECHNICAL OVERSIGHT BRAD BAKER	GROUNDWATER DEPTHS DATE TIME DEPTH	DRILLING METHODS AND DEPTHS VIBRA CORING
OVERSIGHT COMPANY SAIL		

SAMPLING			6-INCH BLOW COUNTS	IN. DRIV. IN. REC.	% REC.	LITH- OLOGY	DESCRIPTION
NO	TYPE	DEPTH					
		0					0.0 - 3.0 ft (compaction ?)
	LLE152-03-01	1.5					Silty CLAY; sand: med = 15%, silt/clay 80%, roots/organics ~35%; black M, subrounded; v. poorly sorted; saturated.
	LLE152-03-02	4					3.0 - 4.0 ft
		5					Silty CLAY; sand: med = 10%, clay = 60%; roots/organics ~30%; Med yellowish orange; subrounded; clay w/ interbedded laminated organics; v. poorly sorted; moist
	LLE152-03-03	8					4.0 - 8.8 ft
		10					SAND; med = 80%, silt = 10%, roots = 10%; med gray, subrounded, banded lt yellowish brown; poorly sorted; moist
		15					
		20					
							5.5 ft Cored 8.8 ft; recovered 62.5 ft Compaction 37.5%

Samples Submitted for Laboratory Tests

	LLE152-01	LLE152-03-01
WFB	LLE152-02	LLE152-03-02
WFB	LLE152-03	LLE152-03-03

NOTE: Standard Penetration Resistance is Sum of Blows for
2nd - 6" and 3rd - 6" to Drive 1-3/8" I.D., 2" O.D. Split
Barrel Sampler with 140 pound hammer falling 30 inches.

SOIL BORING LOG

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PROJECT L-LAKE VIBRA CORE SAMPLING		DATE 08/14/96
		AREA L-LAKE
BORING NO. LLE152-04	SRS COORDINATES N E	REFERENCE ELEVATION
DRILLER Jerry Sexton	DRILLING SUBCONTRACTOR ATHENA	TOTAL HOLE DEPTH 4.15 ft
TECHNICAL OVERSIGHT BRAD BAKER	GROUNDWATER DEPTHS DATE TIME DEPTH	DRILLING METHODS AND DEPTHS VIBRA CORE
OVERSIGHT COMPANY SAIL		

SAMPLING			6-INCH BLOW COUNTS	IN. DRIV. IN. REC.	% REC.	LITH- OLOGY	DESCRIPTION
NO	TYPE	DEPTH					
LLE152-04-01		0					2.0 ft 0.0-0.5 ft (compaction used)
		1					sandy silt; sand: med ~30%; silt ~40%;
LLE152-04-02							organic roots ~30%; black N1; subrounded;
		4					v. poorly sorted; saturated.
		5					0.5-1.5 1.0-2.0 ft
							SAND; sand: fine-med ~85% silt ~15%;
							Pale greenish yellow 10Y 5/2, subrounded;
							med sorted; moist
							2.0-2.5 2.0-3.5 ft
		10					CLAY; sand: fine-med ~20% clay ~80%;
							Pale greenish yellow 10Y 5/2 variegated yellowish
							orange and lt. gray; subrounded;
							v. poorly sorted; moist
							2.5 3.5 ft - 4.15 ft
		15					SAND; sand 80% coarse, 20% silt;
							med yellow 5Y 5/2 variegated lt gray;
							subrounded; poorly sorted; moist
							cored at 4.15 ft recovered 3.5 ft
							% bu: 84.3% compaction 15.7%
		20					

Samples Submitted for Laboratory Tests

LLE152-04-01	
LLE152-04-02	

NOTE: Standard Penetration Resistance is Sum of Blows for
2nd - 6" and 3rd - 6" to Drive 1-3/8" I.D., 2" O.D. Split
Barrel Sampler with 140 pound hammer falling 30 inches.

SOIL BORING LOG

PAGE 6 OF 26

PROJECT L-LAKE VIBRA CORE SAMPLING		DATE 14 Aug 76
		AREA L-LAKE
BORING NO. 11E152-05	SRS COORDINATES N E	REFERENCE ELEVATION
DRILLER Jerry Sexton	DRILLING SUBCONTRACTOR ATHENA	TOTAL HOLE DEPTH 7.5
TECHNICAL OVERSIGHT BRAD BAKER	GROUNDWATER DEPTHS DATE TIME DEPTH	DRILLING METHODS AND DEPTHS VIBRA CORE
OVERSIGHT COMPANY SAIL		

SAMPLING			6-INCH BLOW COUNTS	IN. DRIV. IN. REC.	% REC.	LITH- OLOGY	DESCRIPTION
NO	TYPE	DEPTH					
11E152-05-01		0					0.0 - 1.0 ft SAND; coarse ~ 80%, silt ~ 20%;
		1					grayish black N2; subrounded; med sorted;
11E152-05-02							moist.
		4					
		5					1.0 - 3.0 ft
							SAND; coarse ~ 85% silt ~ 15%; brownish
							gray 57K $\frac{3}{4}$; med sorted; subrounded;
							moist
		10					3.0 - 7.5 ft
							SAND; coarse ~ 85%; silt 15%; H brown
							57K $\frac{3}{4}$; med sorted; subrounded; moist
		15					
							Rec 4.2 ft (at 7.5 ft)
							9. Rec 56%; comp. on 44%
		20					

Samples Submitted for Laboratory Tests

11E152-05-01	
11E152-05-02	

NOTE: Standard Penetration Resistance is Sum of Blows for
2nd - 6" and 3rd - 6" to Drive 1-3/8" I.D., 2" O.D. Split
Barrel Sampler with 140 pound hammer falling 30 inches.

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PROJECT L-LAKE VIBRA CORE SAMPLING		DATE 08/14/96
		AREA L-LAKE
BORING NO. UE152-06	SRS COORDINATES N E	REFERENCE ELEVATION
DRILLER Jerry Sexton	DRILLING SUBCONTRACTOR ATHENA	TOTAL HOLE DEPTH 8.25
TECHNICAL OVERSIGHT BRAD BAKER	GROUNDWATER DEPTHS DATE TIME CEPTH	DRILLING METHODS AND DEPTHS VIBRA CORE
OVERSIGHT COMPANY SAIL		

[illegible]

Samples Submitted for Laboratory Tests

226152-16-01		
226152-16-02		

NOTE: Standard Penetration Resistance is Sum of Blows for 2nd - 6" and 3rd - 6" to Drive 1-3/8" I.D., 2" O.D. Split Barrel Sampler with 140 pound hammer falling 30 inches.

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SRS

SOIL BORING LOG

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PROJECT LLEISZ		DATE 14 Aug 96
		AREA L-Area
BORING NO. LLEISZ-07	SRS COORDINATES N E	REFERENCE ELEVATION
DRILLER Jerry Sexton	DRILLING SUBCONTRACTOR ATHENA	TOTAL HOLE DEPTH 6.70 ft
TECHNICAL OVERSIGHT Paul Baker	GROUNDWATER DEPTHS DATE TIME DEPTH	DRILLING METHODS AND DEPTHS Vibro core
OVERSIGHT COMPANY SAFC		

SAMPLING			6-INCH BLOW COUNTS	IN. DRIV. IN. REC.	% REC.	LITH- OLOGY	DESCRIPTION
NO	TYPE	DEPTH					
LLEISZ-07-01		0					No Compaction accounted for
		1					0-1.5 ft
LLEISZ-07-02							SAND; v. coarse - 85%; silt - 15%;
		4					grayish black MZ; med sorted;
		5					subrounded; moist
							1.5-3.0 ft
							SAND; v. coarse - 85%; silt - 15%;
							Brownish gray SYR 1/4; med sorted;
							subrounded; moist
		10					
							3.0-6.7 ft
							SAND; coarse - 85%; silt - 15%; Lt Brown
							SYR 5/8; med sorted; subrounded;
							moist
		15					
							Run: 6.7 ft Rec: 3.4 ft
		20					To Rec: 56.7% Compaction 43.3%

Samples Submitted for Laboratory Tests

LLEISZ-07-01		
LLEISZ-07-02		

NOTE: Standard Penetration Resistance is Sum of Blows for
2nd - 6" and 3rd - 6" to Drive 1-3/8" I.D., 2" O.D. Split
Barrel Sampler with 140 pound hammer falling 30 inches.

SOIL BORING LOG

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PROJECT LLEISZ		DATE 15 Aug 96
		AREA L-Area
BORING NO. LLEISZ-08	SRS COORDINATES N E	REFERENCE ELEVATION
DRILLER Jerry Sexton	DRILLING SUBCONTRACTOR ATHENA	TOTAL HOLE DEPTH 5.2
TECHNICAL OVERSIGHT Brad Baker	GROUNDWATER DEPTHS DATE TIME DEPTH	DRILLING METHODS AND DEPTHS Vibro coring
OVERSIGHT COMPANY SAIC		

SAMPLING			6-INCH BLOW COUNTS	IN. DRIV. IN. REC.	% REC.	LITH- OLOGY	DESCRIPTION
NO	TYPE	DEPTH					
		0					
		1					
		2					
		3					
		4					
		5					
		6					
		7					
		8					
		9					
		10					
		11					
		12					
		13					
		14					
		15					
		16					
		17					
		18					
		19					
		20					

9.0 Corrosion applied
 D.O. - 1.5 ft
 SAND; coarse - 65% silt ~15% clayish
 black N/2; med sorted; sub rounded;
 moist
 1.5 - 3.2 ft
 SAND; med - 60% fine - 30%, silt ~10%
 Med light gray N/6; med sorted; sub rounded;
 moist
 Cored: 5.2 ft Rec: 3.2 ft
 Rec: 61.5% Corrosion: 38.5%

Samples Submitted for Laboratory Tests

LLEISZ-08-01		
LLEISZ-08-02		

NOTE: Standard Penetration Resistance is Sum of Blows for
 2nd - 6" and 3rd - 6" to Drive 1-3/8" I.D., 2" O.D. Split
 Barrel Sampler with 140 pound hammer falling 30 inches.

SOIL BORING LOG

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PROJECT LLEISZ		DATE 16 Aug 96
		AREA L-Area
BORING NO. LLEISZ-09	SRS COORDINATES N E	REFERENCE ELEVATION
DRILLER Jerry Sexton	DRILLING SUBCONTRACTOR Athena	TOTAL HOLE DEPTH 5.5
TECHNICAL OVERSIGHT Brad Baker	GROUNDWATER DEPTHS DATE TIME DEPTH	DRILLING METHODS AND DEPTHS Vibracoring
OVERSIGHT COMPANY SAIC		

SAMPLING			6-INCH BLOW COUNTS	IN. DRIV.		% REC.	LITH- OLOGY	DESCRIPTION
NO	TYPE	DEPTH		IN.	REC.			
LLEISZ-09-01		0						0.0 - 1.0 ft
		1						SAND; coarse ~ 80%; silt ~ 15%; organics/
								roots ~ 5%; Dusky yellowish brown
LLEISZ-09-02								10YR 7/2; subrounded; poorly sorted;
		4						v. moist.
		5						1.0 - 4.4 ft
								SAND; coarse ~ 85%; silt ~ 15%;
								H gray N7; banded grayish orange;
								subrounded; med sorted; moist
		10						
		15						
								Termed: 3.5 ft Rec: 4.4 ft
								Termed: 80% Lost 1.1 ft in 0.2 m penetration
		20						

Samples Submitted for Laboratory Tests

LLEISZ-09-01	
LLEISZ-09-02	

NOTE: Standard Penetration Resistance is Sum of Blows for 2nd - 6" and 3rd - 6" to Drive 1-3/8" I.D., 2" O.D. Split Barrel Sampler with 140 pound hammer falling 30 inches.

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PROJECT <i>LLEISZ</i>		DATE <i>19 Aug 96</i>
		AREA <i>L. Area</i>
BORING NO. <i>LLEISZ-10</i>	SRS COORDINATES N E	REFERENCE ELEVATION
DRILLER <i>Jerry Sexton</i>	DRILLING SUBCONTRACTOR <i>Athena</i>	TOTAL HOLE DEPTH <i>4.0 ft</i>
TECHNICAL OVERSIGHT <i>Brad Baker</i>	GROUNDWATER DEPTHS DATE TIME CEPTH	DRILLING METHODS AND DEPTHS <i>Vibrocoring</i>
OVERSIGHT COMPANY <i>SATC</i>		

SAMPLING			6-INCH BLOW COUNTS	IN. DRIV. IN. REC.	% REC.	LITH- OLOGY	DESCRIPTION
NO	TYPE	DEPTH					
1	LC 152-10-01	0					0 - 0.4 ft
		1					silty SAND; med-coarse ~70%, 30% silt;
	LC 152-10-02	2					trace roots; brownish gray 5% $\frac{1}{4}$;
		3					poorly sorted; subrounded; waterworn
		4					
		5					0.4 - 2.2 ft
		6					SAND; med-coarse ~85% silt ~15%;
		7					lt brownish gray 5% $\frac{1}{4}$;
		8					med sorted; subrounded; moist
		9					
		10					2.2 - 3.4 ft
		11					Clayey SAND; coarse ~75% clay ~25%;
		12					med reddish brown 10% $\frac{1}{4}$; variegated
		13					lt brown; poorly sorted; subrounded;
		14					moist
		15					
		16					
		17					
		18					
		19					
		20					cored 4.0 ft Rec 3.4 ft
							To be: 85% No compaction

Samples Submitted for Laboratory Tests

LEE152-10-01		
LEE152-10-02		

**NOTE: Standard Penetration Resistance is Sum of Blows for
2nd - 6" and 3rd - 6" to Drive 1-3/8" I.D., 2" O.D. Split
Barrel Sampler with 140 pound hammer falling 30 inches.**

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PROJECT <i>LLEIS 2</i>		DATE <i>19 Aug 96</i>
		AREA <i>L-Area</i>
BORING NO. <i>LLEIS 2-11</i>	SRS COORDINATES N E	REFERENCE ELEVATION
DRILLER <i>Jerry Sexton</i>	DRILLING SUBCONTRACTOR <i>Athena</i>	TOTAL HOLE DEPTH <i>4.0</i>
TECHNICAL OVERSIGHT <i>Brad Baker</i>	GROUNDWATER DEPTHS DATE TIME DEPTH	DRILLING METHODS AND DEPTHS <i>Vibro coring</i>
OVERSIGHT COMPANY <i>SATEL</i>		

SAMPLING			6-INCH BLOW COUNTS	IN. DRIV.	%	LITH-	DESCRIPTION
NO	TYPE	DEPTH		IN. REC.	REC.	OLOGY	
9	UC152-11-C	0					0.0 - 2.0 ft
	UC152-11-C2	1					SAND; coarse ~ 85% silt ~ 15%. Pale Yellowish Brown 10YR 6/2; med sorted; subrounded; moist
		2.6'					2.0 - 2.6 ft
		5					SAND; coarse 80%, silt/clay 20%; DK Reddish Orange 10R 14/6; poorly sorted; subrounded; moist
		10					
		15					
		20					Rec 2.6 ft Corel 4.0 % Rec: 65%

Samples Submitted for Laboratory Tests

LEE152-11-01		
LEE152-11-02		

NOTE: Standard Penetration Resistance is Sum of Blows for 2nd - 6" and 3rd - 6" to Drive 1-3/8" I.D., 2" O.D. Split Barrel Sampler with 140 pound hammer falling 30 inches.

SOIL BORING LOG

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PROJECT <i>LLEIS-2</i>		DATE <i>21 Aug 96</i>	
		AREA <i>L-Area</i>	
BORING NO. <i>LLEIS 2-12</i>	SRS COORDINATES N E	REFERENCE ELEVATION	
DRILLER <i>Jerry Sexton</i>	DRILLING SUBCONTRACTOR <i>Athena</i>	TOTAL HOLE DEPTH <i>4.7</i>	
TECHNICAL OVERSIGHT <i>Brad Baker</i>	GROUNDWATER DEPTHS DATE TIME DEPTH	DRILLING METHODS AND DEPTHS <i>Vibrocoring</i>	
OVERSIGHT COMPANY <i>SAIL</i>			

SAMPLING			6-INCH BLOW COUNTS	IN. DRIV. IN. REC.	% REC.	LITH- OLOGY	DESCRIPTION
NO	TYPE	DEPTH					
		0					<i>0-0.4 ft</i>
							<i>SAND; coarse ~85%, silt ~15%;</i>
							<i>Med dk gray N4; med sorted;</i>
							<i>subrounded; moist</i>
		5					<i>0.4-1.5 ft</i>
							<i>SAND; med ~85%, silt ~15%;</i>
							<i>pale yellowish brown 10YR 6/2; subrounded;</i>
							<i>med sorted; moist</i>
		10					<i>1.5-4.1 ft</i>
							<i>SAND; med ~80%, silt ~20%;</i>
							<i>yellowish gray 5Y 7/2; med. sorted; subrounded;</i>
							<i>moist</i>
		15					<i>4.1-4.4 ft</i>
							<i>Clayey sand; sand med. ~65%, clay ~35%;</i>
							<i>Med Reddish Brown 10R 4/6 variegated</i>
							<i>lt. brownish yellow and med. gray;</i>
							<i>subrounded; poorly sorted; moist</i>
		20					<i>Cored: 4.7 ft Rec 4.4 ft</i>
							<i>2 Rec: 93.6% 0% compaction</i>

Samples Submitted for Laboratory Tests

<i>LLEIS2-12-01</i>		
<i>LLEIS2-12-02</i>		

NOTE: Standard Penetration Resistance is Sum of Blows for
2nd - 6" and 3rd - 6" to Drive 1-3/8" I.D., 2" O.D. Split
Barrel Sampler with 140 pound hammer falling 30 inches.

SRS
STANDARD BORING LOG

SOIL BORING LOG

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PROJECT LLEISZ		DATE 20 Apr 96
		AREA L-Area
BORING NO. LLEISZ-13	SRS COORDINATES N E	REFERENCE ELEVATION
DRILLER Anthony G. 7 Jerry Sexton	DRILLING SUBCONTRACTOR Athena	TOTAL HOLE DEPTH 4.9 ft + 6.0
TECHNICAL OVERSIGHT David Panko	GROUNDWATER DEPTHS DATE TIME DEPTH	DRILLING METHODS AND DEPTHS Vibra coring
OVERSIGHT COMPANY SATC		

SAMPLING			6-INCH BLOW COUNTS	IN. DRIV.		% REC.	LITH- OLOGY	DESCRIPTION
NO.	TYPE	DEPTH		IN.	REC.			
1		0						0 - 0.8
		1						silty SAND; med ~ 75% silt ~ 25%;
		2						olive gray 5 1/4"; subrounded; poorly
		3						sorted; saturated
		4						
		5						0.8 - 2.5
		6						SAND; coarse 65% silt ~ 15%;
		7						DK grayish brown 10% 3/4"; subrounded;
		8						med sorted; moist
		9						
		10						2.5 - 4.9 ft
		11						SAND; med ~ 65% silt ~ 15%;
		12						light yellowish brown 10% 3/4";
		13						interbedded dk gray silty sand w/ roots
		14						(3.3 - 3.5' and 4.4 - 4.9')
		15						subrounded; med sorted; moist
		16						
		17						
		18						
		19						
		20						Cored 6.0 but 4.9
								Cased 4.9 ft Rec 4.9 ft
								To Rec 10.2 No compact. in
								To Rec 81.7

Samples Submitted for Laboratory Tests

LLEISZ-13-01	
LLEISZ-13-02	

NOTE: Standard Penetration Resistance is Sum of Blows for
2nd - 6" and 3rd - 6" to Drive 1-3/8" I.D., 2" O.D. Split
Barrel Sampler with 140 pound hammer falling 30 inches.

SOIL BORING LOG

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PROJECT LLEIS-2		DATE 22 Aug 96	
		AREA L - Area	
BORING NO. LLEIS2-14	SRS COORDINATES N E	REFERENCE ELEVATION	
DRILLER Jerry Sexton	DRILLING SUBCONTRACTOR Athena	TOTAL HOLE DEPTH 3.5 ft	
TECHNICAL OVERSIGHT Brad Baker	GROUNDWATER DEPTHS DATE TIME CEPT	DRILLING METHODS AND DEPTHS Vibra coring	
OVERSIGHT COMPANY SAIC			

SAMPLING			6-INCH BLOW COUNTS	IN. DRIV. IN. REC.	% REC.	LITH- OLOGY	DESCRIPTION
NO	TYPE	DEPTH					
		0					0.0-0.4 ft Sandy silt; silt ~65%, med sand ~35%; Black N1; subrounded; v. poorly sorted; saturated
		5					0.4-2.0 ft SAND; med ~80%, silt ~20%; med dk gray N4; med sorted; subrounded; v. moist
		10					2.0-2.6 ft SAND; coarse ~65%, silt ~15%; lt brownish gray 5YR 6/1; med sorted; subrounded; moist
		15					2.6-3.3 ft Silty SAND; coarse ~55%; silt ~25%; organics/roots ~20%; Black N1; sub rounded; v. poorly sorted; saturated
		20					total: 3.5 ft Recommended: 3.3 ft 94.3% Rec 0% Compaction

Samples Submitted for Laboratory Tests

LLEIS2-14-01		
LLEIS2-14-02		

NOTE: Standard Penetration Resistance is Sum of Blows for
2nd - 6" and 3rd - 6" to Drive 1-3/8" I.D., 2" O.D. Split
Barrel Sampler with 140 pound hammer falling 30 inches.

SOIL BORING LOG

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PROJECT LLEIS-2		DATE 21 Aug 96
		AREA L-Area
BORING NO. LLEIS2-15	SRS COORDINATES N E	REFERENCE ELEVATION
DRILLER Jerry Sexton	DRILLING SUBCONTRACTOR Athena	TOTAL HOLE DEPTH 3.0
TECHNICAL OVERSIGHT Brad Baker	GROUNDWATER DEPTHS DATE TIME DEPTH	DRILLING METHODS AND DEPTHS Vibrocoring
OVERSIGHT COMPANY SAIC		

SAMPLING			6-INCH BLOW COUNTS	IN. DRIV.		% REC.	LITH- OLOGY	DESCRIPTION
NO	TYPE	DEPTH		IN.	REC.			
		0						0.0-0.2 ft Clayey SAND; med ~70% clay ~30%; Red Brown 5/8" $\frac{1}{2}$; sub rounded; poorly sorted; v. moist.
		5						0.2-1.2 ft Clayey SAND; coarse ~70% clay ~30%; Med Reddish Brown 10R $\frac{1}{4}$; sub rounded; poorly sorted; moist.
		10						1.2-2.8 ft Clayey SAND; sand med ~70% clay ~30%; Med Reddish Brown 10R $\frac{1}{4}$; var. graded H brownish yellow and v. H gray; sub rounded; poorly sorted; moist.
		15						
		20						Core: 3.0 ft Rec: 2.8 ft Rec: 93.3% 0% compaction

Samples Submitted for Laboratory Tests

LLEIS2-15-01		
LLEIS2-15-02		

NOTE: Standard Penetration Resistance is Sum of Blows for
2nd - 6" and 3rd - 6" to Drive 1-3/8" I.D., 2" O.D. Split
Barrel Sampler with 140 pound hammer falling 30 inches.

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PROJECT <i>LLEIS-2</i>		DATE <i>21 Aug 96</i>
		AREA <i>L - Area</i>
BORING NO. <i>LLEIS2-16</i>	SRS COORDINATES N E	REFERENCE ELEVATION
DRILLER <i>Jerry Sexton</i>	DRILLING SUBCONTRACTOR <i>Athena</i>	TOTAL HOLE DEPTH <i>8.5</i>
TECHNICAL OVERSIGHT <i>Brad Baker</i>	GROUNDWATER DEPTHS DATE TIME DEPTH	DRILLING METHODS AND DEPTHS <i>Vibro coring</i>
OVERSIGHT COMPANY <i>SAIC</i>		

SAMPLING			6-INCH BLOW COUNTS	IN. DRIV.	%	LITH-	DESCRIPTION
NO	TYPE	DEPTH			REC.	OLOGY	
		0					0.0-2.2 ft
							SAND; coarse 80%; silt ~20%;
							grayish orange 10YR 7/4; subround;
							mod. sorted; v. moist
		5					2.2-4.4 ft
							SAND; coarse 75%, granular ~10%; silt ~15%
							Mud Gray N5; subangular; poorly sorted,
							v. moist.
		10					4.4-7.2 ft
							SAND; coarse ~40%, silty clay ~20%;
							Mud Reddish Orange 10YR 8/6; subangular.
							poorly sorted; moist; variegated
		15					mud yellow and pale red
							(cored: 8.5 ft Rec.: 7.2 ft)
							% Rec.: 84.7%. 0% compaction
		20					

Samples Submitted for Laboratory Tests

52-16-01	11E52-16-01	
11E52-16-02	11E52-16-02	11E52-16-02A
	11E52-16-03	11E52-16-03D

NOTE: Standard Penetration Resistance is Sum of Blows for 2nd - 6" and 3rd - 6" to Drive 1-3/8" I.D., 2" O.D. Split Barrel Sampler with 140 pound hammer falling 30 inches.

SOIL BORING LOG

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PROJECT LLEIS-2		DATE 21 Aug 96	
		AREA L - Area	
BORING NO. LLEIS2-16A	SRS COORDINATES N E	REFERENCE ELEVATION	
DRILLER Jerry Sexton	DRILLING SUBCONTRACTOR Athena	TOTAL HOLE DEPTH 10.9	
TECHNICAL OVERSIGHT Brad Baker	GROUNDWATER DEPTHS DATE TIME CEPTH	DRILLING METHODS AND DEPTHS Vibrocoring	
OVERSIGHT COMPANY SAIC			

SAMPLING			6-INCH BLOW COUNTS	IN. DRIV. IN. REC.	% REC.	LITH- OLOGY	DESCRIPTION
NO	TYPE	DEPTH					
		0					0.0-1.7 ft
							SAND; coarse 45%, silt 15%, grayish orange,
							10 YR 7.5; subrounded; med. sorted;
							v. moist
		5					1.7-4.2 ft
							SAND; coarse 75%, granules 10%, silt 15%.
							Med Gray N5; subangular, poorly sorted;
							v. moist; banded med. yellow sand.
							4.2-6.2 ft
		10					SAND; coarse 40%, silt 16%, Med
							Reddish Orange 10 YR 7.5; subrounded; poorly
							sorted; moist; variegated med yellow
							and pale red
							6.2-8.2 ft
		15					SAND; med-45%, silt 15%; Grayish Orange
							10 YR 7.5; banded Olive Gray (7.9-8.2 ft);
							med sorted; subrounded; moist.
							Local: 10.9 ft Rec: 8.2 ft
		20					2 Rec: 75.2% No Compaction

Samples Submitted for Laboratory Tests

LLEIS2-16-01	LLEIS2-16-01
LLEIS2-16-02	LLEIS2-16-02
LLEIS2-16-03	LLEIS2-16-03

NOTE: Standard Penetration Resistance is Sum of Blows for
2nd - 6" and 3rd - 6" to Drive 1-3/8" I.D., 2" O.D. Split
Barrel Sampler with 140 pound hammer falling 30 inches.

SOIL BORING LOG

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PROJECT L-LAKE VIBRA CORE SAMPLING		DATE 13 Aug 96
		AREA L-LAKE
BORING NO. LLEIS2-18	SRS COORDINATES N E	REFERENCE ELEVATION
DRILLER Jerry Sexton	DRILLING SUBCONTRACTOR ATHENA	TOTAL HOLE DEPTH 10.85
TECHNICAL OVERSIGHT BRAD BAKER	GROUNDWATER DEPTHS DATE TIME DEPTH	DRILLING METHODS AND DEPTHS VIBRA CORE
OVERSIGHT COMPANY SAIL		

SAMPLING			6-INCH BLOW COUNTS	IN. DRIV.		% REC.	LITH- OLOGY	DESCRIPTION
NO	TYPE	DEPTH		IN.	REC.			
LLEIS2-18-01		0						0.0 - 1.0 ft
		1						Sandy SILT; sand; med-coarse - 30% silt - 30%
LLEIS2-18-02								clayey silt; med-coarse - 40%; black M1; subrounded;
		4						v. poorly sorted; v. moist
		5						1.0 - 2.5 ft
								SAND; sand; coarse 60% v. coarser - 30%; silt - 10%;
								Lt Olive Gray 5 Y 6; med sorted;
								subrounded; moist
		10						2.5 ft - 3.1 ft
								Gravelly; gravel 80%; v. coarse sand - 20%;
								Lt Olive Gray 5 Y 6; v. poorly sorted;
								subrounded; moist
		15						
								Rec: 28.5% ∴ Sample represents 1:1 comp
								Core: 10.85 ft Recovered: 3.10 ft
								originally had 4.10 ft; 1 ft lost upon retrieval
		20						Rec: 37.8 compaction 62.2%

Samples Submitted for Laboratory Tests

LLEIS2-18-01		
LLEIS2-18-02		

NOTE: Standard Penetration Resistance is Sum of Blows for 2nd - 6" and 3rd - 6" to Drive 1-3/8" I.D., 2" O.D. Split Barrel Sampler with 140 pound hammer falling 30 inches.

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PROJECT <i>LLEIS 2</i>		DATE <i>15 Aug 96</i>
		AREA <i>L-Area</i>
BORING NO. <i>LLEIS 2 - 19</i>	SRS COORDINATES N E	REFERENCE ELEVATION
DRILLER <i>Terry Sexton</i>	DRILLING SUBCONTRACTOR <i>Athena</i>	TOTAL HOLE DEPTH <i>9.0</i>
TECHNICAL OVERSIGHT <i>Brad Baker</i>	GROUNDWATER DEPTHS DATE TIME DEPTH	DRILLING METHODS AND DEPTHS <i>Vibroaving</i>
OVERSIGHT COMPANY <i>BAIC</i>		

SAMPLING			6-INCH BLOW COUNTS	IN. DRIV.		% REC.	LITH- OLOGY	DESCRIPTION
NO	TYPE	DEPTH			IN. REC.			
JLLISZ-19-CV		0						No Compaction Applied
		1						0.0 - 2.0 ft
								Sandy CLAY; sand: med ~ 30% clay ~ 70%
		4						Greenish brown LBTS; subrounded; v. poorly sorted; v. moist
		5						To Dft = 8:0 ft
LGISZ-19-C3								silty SAND; sand coarse ~ 40%, silt ~ 30%; organics/beds proty ~ 30%; black N.I.; subrounded; v. poorly sorted; v. moist
		8						
		10						8.0 - 9.0 ft
								silty SAND; sand med ~ 60% silt ~ 30%; 10% organics/beds; Lt olive-gray STS; subrounded; poorly sorted; moist
		15						
								Cored: 9.0 ft Rec: 5.8 ft
		20						to Rec 64% Layered ~ 36%

Samples Submitted for Laboratory Tests

UC 152-14-C1		
UC 152-14-C3		

NOTE: Standard Penetration Resistance is Sum of Blows for 2nd - 6" and 3rd - 6" to Drive 1-3/8" I.D., 2" O.D. Split Barrel Sampler with 140 pound hammer falling 30 inches.

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PROJECT <i>LLEIS 2</i>		DATE <i>15 Aug 96</i>
		AREA <i>L-Area</i>
BORING NO. <i>LLEIS-19R</i>	SRS COORDINATES N E	REFERENCE ELEVATION
DRILLER <i>Jerry Sexton</i>	DRILLING SUBCONTRACTOR <i>Athena</i>	TOTAL HOLE DEPTH <i>5.2 ft</i>
TECHNICAL OVERSIGHT <i>Brian Baker</i>	GROUNDWATER DEPTHS DATE TIME CEPTH	DRILLING METHODS AND DEPTHS <i>Vibro coring</i>
OVERSIGHT COMPANY <i>SAIC</i>		

SAMPLING			6-INCH BLOW COUNTS	IN. DRIV.	%	LITH-	DESCRIPTION
NO	TYPE	DEPTH		IN. REC.	REC.	OLOGY	
		0					(Comp. % accounted)
b-		1					0.0-1.0 ft
							Organic clayey silt: sand: med ~ 20%;
LL152-19-EZ							organics/roots ~ 35% silt ~ 45%;
		4					Olive gray SY $\frac{1}{2}$; subangular; v. poorly
		5					sorted; saturated
							log 18 Aug 96
							1.0-3.3 ft 1.0-5.2 ft
							silt (Std 1). sand: coarse ~ 40%, silt ~ 30%;
		10					organics/roots 30%; Black N1. poor
							subangular. v. poorly sorted; moist
							3.3-3.9 ft Interbedded wood.
							3.3-5.2 ft
							log
							18 Aug 96
		15					
		20					
							Cored 5.2 ft; Rec 4.8 ft
							To Rec: 92.3% comp. 7.7%

Samples Submitted for Laboratory Tests

66-152-19-22		

NOTE: Standard Penetration Resistance is Sum of Blows for
2nd - 6" and 3rd - 6" to Drive 1-3/8" I.D., 2" O.D. Split
Barrel Sampler with 140 pound hammer falling 30 inches.

SRS

SOIL BORING LOG

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PROJECT LLEISZ		DATE 15 Aug 96	
		AREA L-Area	
BORING NO. LLEISZ-20A, 20	SRS COORDINATES N E	REFERENCE ELEVATION	
DRILLER Jerry Sexton	DRILLING SUBCONTRACTOR ATHENA	TOTAL HOLE DEPTH 5.3 ft	
TECHNICAL OVERSIGHT Brad Baker	GROUNDWATER DEPTHS DATE TIME DEPTH	DRILLING METHODS AND DEPTHS Vibro coring	
OVERSIGHT COMPANY SAIC			

SAMPLING			6-INCH BLOW COUNTS	IN. DRIV. IN. REC.	% REC.	LITH- OLOGY	DESCRIPTION
NO	TYPE	DEPTH					
LLEISZ-20-01		0					Completion & applied
		1					0.0 - 1.0 ft
LLEISZ-20-02, 02A							Granular SAND; granular ~30% sand coarse 60% silt 10%; DK greenish gray 56 1/2% subrounded; poorly sorted; moist
		4					1.0 - 1.5 ft
		5					SAND; coarse ~80% silt ~20%; DK greenish gray 56 1/2%; poorly sorted; subrounded; moist
LLEISZ-20-03							1.5 - 4.8 ft
		8					Cherty Organic SAND; sand - coarse ~35%; clay ~35% organic/crude - gray ~30%; Block N1; v. poorly sorted; subrounded; v. moist
		10					4.8 - 9.3 ft 9.0'
		15					SAND; med ~70% silt ~15%; organics ~15% lt brownish gray 57 1/2%; poorly sorted; subrounded; moist
		20					Cored: 5.3 ft Rec: 3.6 ft % Rec: 67.9% Core: 32.1%

Samples Submitted for Laboratory Tests

LLEISZ-20-01	LLEISZ-20-03
LLEISZ-20-02	
LLEISZ-20-02A	

NOTE: Standard Penetration Resistance is Sum of Blows for
2nd - 6" and 3rd - 6" to Drive 1-3/8" I.D., 2" O.D. Split
Barrel Sampler with 140 pound hammer falling 30 inches.

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SAMPLING			6-INCH BLOW COUNTS	IN. DRIV. IN. REC.	% REC.	LITH- OLOGY	DESCRIPTION
NO	TYPE	DEPTH					
UC 152-21-01		0					0.0 - 1.0 ft
		1					silty SAND; sand: mud ~ 60%, silt ~ 30%; organics/clay ~ 10%.
UC 152-21-02		3.3					Grayish Black #2; subrounded; v. poorly sorted, saturated.
		5					1.0 - 3.3 ft
							SAND; mud ~ 90% silt ~ 10%; lt gray #7; subrounded; well sorted; moist
		10					
		15					
		20					
							Cored: 7.5 ft Rec: 3.3 ft
							Recovery: 44% 4.2 ft lost recovery

NOTE: Standard Penetration Resistance is Sum of Blows for 2nd - 6" and 3rd - 6" to Drive 1-3/8" I.D., 2" O.D. Split Barrel Sampler with 140 pound hammer falling 30 inches.

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PROJECT <i>LLEISZ</i>		DATE <i>16 Aug 96</i>
		AREA <i>L-Area</i>
BORING NO. <i>LLEISZ-22</i>	SRS COORDINATES N E	REFERENCE ELEVATION
DRILLER <i>Jerry Sexton</i>	DRILLING SUBCONTRACTOR <i>Athena</i>	TOTAL HOLE DEPTH <i>7.5</i>
TECHNICAL OVERSIGHT <i>Brad Baker</i>	GROUNDWATER DEPTHS DATE TIME DEPTH	DRILLING METHODS AND DEPTHS <i>Vibra coring</i>
OVERSIGHT COMPANY <i>SAIC</i>		

[illegible]

Samples Submitted for Laboratory Tests:

44152-22-61		
44152-22-62	44152-22-62D	
44152-22-63		

NOTE: Standard Penetration Resistance is Sum of Blows for 2nd - 6" and 3rd - 6" to Drive 1-3/8" I.D., 2" O.D. Split Barrel Sampler with 140 pound hammer falling 30 inches.

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PROJECT <i>LLEISZ</i>		DATE <i>16 Aug 96</i>
		AREA <i>L-Area</i>
BORING NO. <i>LLEISZ-22A</i>	SRS COORDINATES N E	REFERENCE ELEVATION
DRILLER <i>Jerry Sexton</i>	DRILLING SUBCONTRACTOR <i>Athena</i>	TOTAL HOLE DEPTH <i>5.0</i>
TECHNICAL OVERSIGHT <i>Brian Baker</i>	GROUNDWATER DEPTHS DATE TIME DEPTH	DRILLING METHODS AND DEPTHS <i>Vibrocoring</i>
OVERSIGHT COMPANY <i>SAIL</i>		

SAMPLING			6-INCH BLOW COUNTS	IN. DRIV. IN. REC.	% REC.	LITH- OLOGY	DESCRIPTION
NO	TYPE	DEPTH					
		0					
		1					(Est 10% compaction)
							See log for #22
		4					
		5					
		10					
		15					
		20					

Cored: 5.0 ft Recor: 4.5 ft
To Rec 90%, comp ~ 10% ∴ soils to 4.95 ft

Samples Submitted for Laboratory Tests

66-152-22-02	66-152-22-02	

NOTE: Standard Penetration Resistance is Sum of Blows for 2nd - 6" and 3rd - 6" to Drive 1-3/8" I.D., 2" O.D. Split Barrel Sampler with 140 pound hammer falling 30 inches.

SRS

SOIL BORING LOG

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PROJECT LLEISZ		DATE 13 Aug 96	
		AREA L-Area	
BORING NO. LLEISZ-23	SRS COORDINATES N E	REFERENCE ELEVATION	
DRILLER Terry Sexton	DRILLING SUBCONTRACTOR Athena	TOTAL HOLE DEPTH 9.5	
TECHNICAL OVERSIGHT Brad Baker	GROUNDWATER DEPTHS DATE TIME DEPTH	DRILLING METHODS AND DEPTHS Vibro coring	
OVERSIGHT COMPANY SAIC			

[illegible]

Samples Submitted for Laboratory Tests

LE152-23-01		
LE152-23-02		
LE152-23-03		

NOTE: Standard Penetration Resistance is Sum of Blows for 2nd - 6" and 3rd - 6" to Drive 1-3/8" I.D., 2" O.D. Split Barrel Sampler with 140 pound hammer falling 30 inches.