SITE INVESTIGATION

SOIL, SEDIMENT, AND GROUNDWATER SAMPLING

VAUGHN LANDFILL
CSX REAL PROPERTY

CSX Transportation
Greenville, South Carolina

March, 1995

APPLIED ENGINEERING & SCIENCE, INC.

Atlanta, Georgia

Applied Engineering & Science

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August 17, 1995

Mr. Ralph Roberts
NG03C4 Power Company
13339 Hagers Ferry Road
Huntersville, NC 28078-7929

4365A

Dear Mr. Roberts:

Enclosed as you requested is a copy of the report prepared by Applied Engineering and Science, Inc. (AES) on behalf of CSX Transportation following the site investigation conducted on CSXT property on Bramlette Road in Greenville, South Carolina. The report was submitted to DHEC in March, 1995.

As agreed in our telephone conversation of Monday, August 14, AES will submit the workplan for further investigation of the Bramlette Road site to DHEC before August 25, 1995 and will forward a copy of the workplan to you.

If you have any questions, please call me at (404) 454-1810.

Sincerely,

Dave Butler
Project Manager

Enclosure

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EXECUTIVE SUMMARY

CSX Transportation owns several properties west of the City of Greenville, South Carolina which contain trackage, equipment storage buildings, and a small office for crew transfers. Included in these properties is a sixteen acre tract east of the Reedy River along Bramlette Road. Much of the tract lies in the river's floodplain and contains potential wetlands according to the U.S. Army Corps of Engineers.

This sixteen acre tract was used as an unpermitted landfill by Vaughn Construction and Demolition Company of Greenville for over seven years. Materials deposited in the landfill included wood, concrete, brick, metal, plastic, and organic yard waste. Over eight acres of the property were filled to a depth of up to fourteen feet. Landfilling operations were halted in 1994 by order of the South Carolina Department of Health and Environmental Control (SCDHEC) and the U.S. Army Corps of Engineers because the landfill was unpermitted and filling was taking place in a potential wetland.

DHEC requested that CSX conduct a site investigation to determine the impact of the landfill on the soils, surface waters, and groundwater at the site. Applied Engineering and Science, Inc. (AES) was retained by CSX in September 1994 to prepare and execute a workplan for the site investigation. Following approval of the workplan by DHEC in December 1994, AES began coordination of activities for mobilization to the site. Sample collection activities began on February 6, 1995 and were completed on February 21, 1995.

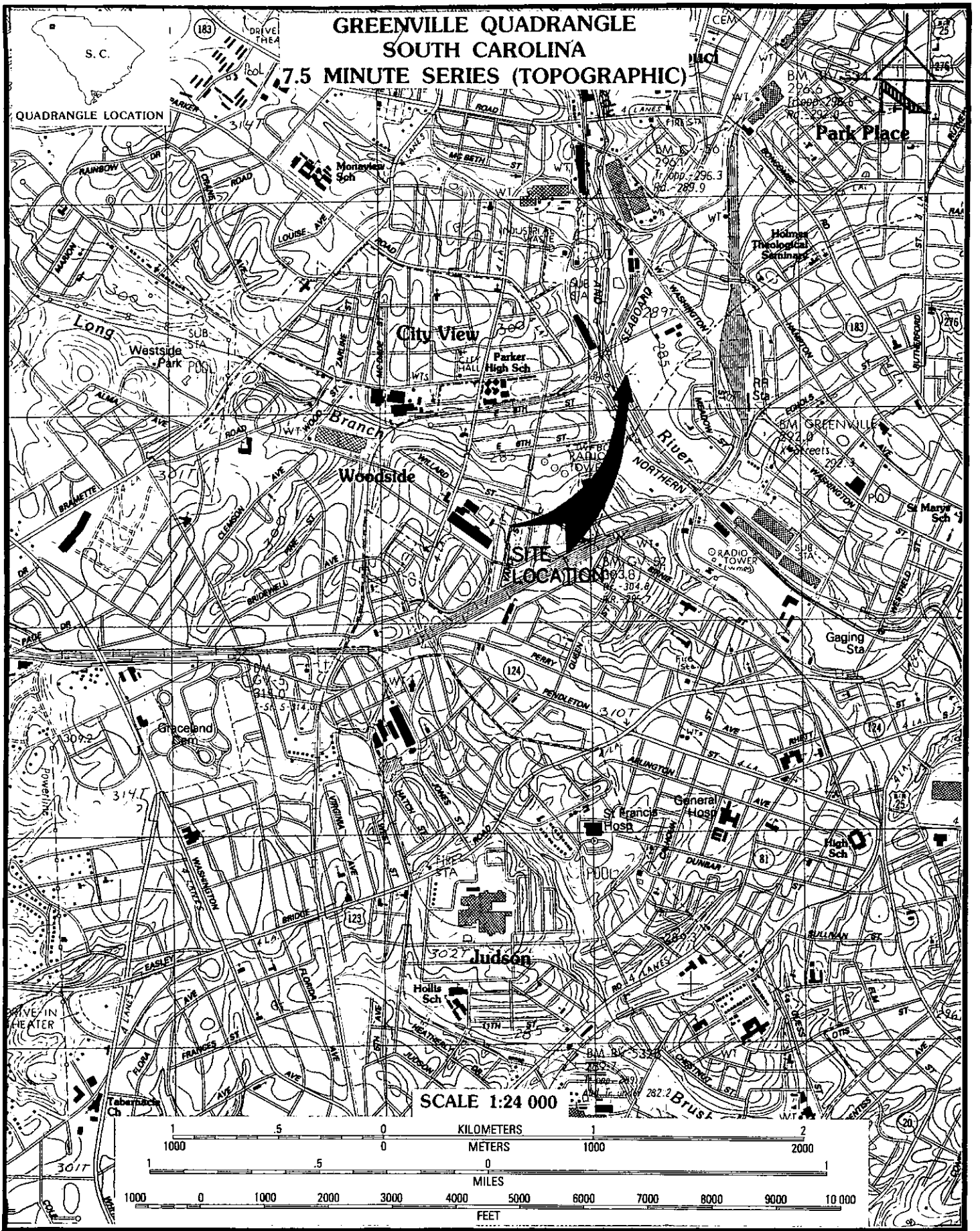
I. INTRODUCTION

Applied Engineering and Science, Inc. (AES) was retained by CSX Transportation to conduct an environmental investigation of a sixteen acre tract of CSX property in Greenville, South Carolina. The property is the site of an unpermitted landfill in the floodplain of the Reedy River. AES began the investigation in September 1994.

A. Background

In 1988, Mr. Robert Vaughn of Vaughn Construction and Demolition attempted to purchase approximately sixteen acres of property (the site) from CSX Transportation (CSXT) for the purpose of constructing a solid waste landfill. Figure 1 is a Site Location Map which identifies the location of the property west of the City of Greenville, South Carolina. This section of Greenville (known locally as City View) includes residences, small businesses, schools, and several rail facilities. CSXT owns several properties in the area of Bramlette Road at the Reedy River and maintains an office there for crew transfers and scheduling activities. Figure 2 - Site Plan is a diagram of CSXT properties in the area.

The property which was to have been sold to Mr. Vaughn lies east of the CSXT office and south of Bramlette Road. Figure 2 indicates the position of the landfill and the



SCALE ---	Applied Engineering & Science	SITE LOCATION MAP VAUGHN LANDFILL CSXT PROPERTY GREENVILLE, S.C.	DATE OCT.,1994
DWN. BY SKN			DWG. NO. 4365A
CHK'D. BY GEW			SHEET NO.
APPR. BY GEW			

surrounding floodplain. Following the payment of a deposit on the purchase, Mr. Vaughn began landfilling activities in 1988. The property transfer was never completed but landfilling by Vaughn continued, unknown to CSXT officials in Jacksonville, Florida.

B. Site Description

The floodplain and potential wetlands are at an elevation of 285 feet above mean sea level (msl) in the piedmont region of northwestern South Carolina. Approximately seven acres of the site have been filled with debris to an average depth of 10 feet. The fill area has been cut through by a ditch which allows water to flow from the floodplain on the east side of the fill to the floodplain on the west and into the Reedy River. This ditch is located approximately 300 feet from the entrance to the landfill off Bramlette Road. A dirt covered culvert allows vehicle access to the back of the landfill.

Some of the materials noted during a site visit by AES included concrete, bricks, wood, plastic, metals, roofing materials, insulation, and glass. A large portion of the landfill has been covered with a thin layer of soil to allow passage of dump trucks to the rear where dumping continued until recently. The back 100 feet of the fill area is open which allows debris to blow away and is unsightly.

C. Regulatory Involvement

CSXT officials became aware of the landfilling operations in 1993 when the U.S. Army Corps of Engineers notified CSXT of an unpermitted landfill in a potential wetland on the site. At that time, CSXT ordered Mr. Vaughn to cease landfilling activities and the site was closed.

In a letter dated August 1994 to Mr. Marshall Williams, CSXT Director of Environmental Real Estate Transactions, the South Carolina Department of Health and Environmental Control (DHEC), in conjunction with the Army Corps, requested a work plan to assess the types and extent of contaminants on the property.

CSXT retained Applied Engineering and Science, Inc. (AES) to prepare and implement a workplan to investigate possible impacts from the landfilling and other historical activities. AES submitted the workplan entitled Workplan - Soil, Sediment, and Groundwater Sampling - CSX/Vaughn Landfill - CSX Transportation to DHEC in October 1994. Following a meeting between representatives of CSXT, AES, and DHEC in Greenville in October, an addendum to the workplan was submitted by AES to DHEC on November 7, 1994.

The workplan called for a series of borings to be installed in the landfill to collect soil samples from native soils beneath the fill and groundwater samples from the surficial aquifer. Sediment and surface water samples were also to be collected from the area surrounding the fill. A black, sludge-like material had been reported in the flooded areas around the fill and a sample of the sludge was to be collected and analyzed.

Proposed sample analyses included RCRA metals, volatile organic compounds (VOCs), semi-volatile compounds (semi-VOCs), PCBs, and total petroleum hydrocarbons (TPH).

Equipment for the sample collection activities included a Strataprobe push-type sampling rig, a trackhoe for excavating impenetrable materials, and hand augers for floodplain sampling.

AES received approval from DHEC for the workplan and addendum on December 2, 1994. Approval for groundwater sampling was received on December 6, 1994. Copies of the approval letters are included in Appendix A - Workplan Approval Letters.

II. FIELD ACTIVITIES

A grid of thirty-three sample locations (as outlined in the workplan) was staked out by AES personnel during the week of February 1, 1995. AES mobilized to the site and began sampling activities on February 6, 1995. Field activities began with the construction of a temporary decon pad for the cleaning of hand augers, Strataprobe rods, stainless steel spoons, and any other equipment used in direct contact with sampled soils or groundwater. The decon pad was constructed of wood and 4-mil black plastic sheeting. Tap water was provided by a hose from the CSX office adjacent to the Site. Deionized water, hydrochloric acid, and isopropanol were kept in stainless steel, pressurized spray cans. Certified clean drums were kept by the pad for the containment of rinse liquids.

The Strataprobe unit was provided by Transglobal Environmental Geochemistry (TEG) from Kennesaw, Georgia. The trackhoe and front-end loader were provided by JB Russell and Sons Construction Company, Inc. (Russell) of Spartanburg, South Carolina. Before sampling activities began, AES held an orientation and health and safety meeting with all personnel. A copy of the health and safety plan is included in Appendix B - Health and Safety Plan.

A. Landfill Sampling

1. Soils - A total of thirty-four samples was collected from the landfill area. Thirty-three were collected below the fill in native soils. An additional sample was collected from sediments in the drainage ditch which bisects the fill (designated DD001). Soil sample collection was performed by AES with the assistance of either TEG or Russell depending on the type of fill encountered. Generally, TEG assisted with sample collection at the north end of the landfill where the material was relatively easy to penetrate. Russell excavated the more difficult debris at locations toward the south end of the landfill.

Depth of the fill material ranged from eight feet at the north end of the landfill to fourteen feet in the south central portion of the fill. TEG used the Strataprobe push system to advance collection rods through the fill material into the native soils. The lock screw was released and the rods advanced an additional 1.5 feet to allow soils to enter the rods. Within the steel rods, a plastic tube encases the soils. The rods were pulled and the tube with the discrete sample was removed. A 3-inch section of the tube was cut and capped, and labeled for VOC analysis. This method decreased the likelihood of volatile loss from excessive sample handling. The remaining soil was placed in sample containers for poly-chlorinated biphenyls (PCB) and RCRA metals analyses. A small amount of soil was field

screened for volatile content using a 128 Foxboro organic vapor analyzer (OVA) flame ionization detector (FID). Those samples which produced a positive FID reading were sent to the laboratory for VOC analysis. Table 1 - Sample Location Information provides the sample method, depth of sample collection, OVA readings, and analyses performed for each soil sample.

The depth to native soils below the fill was estimated by looking at the edge of the fill closest to the sample location. Generally, a distinct change in rod advancement was noted when the fill was perforated and native soil entered. If, upon retrieval of the rods, a complete soil sample was not produced, the rods were reinserted into the borehole and another sample collected. This happened infrequently when wood or other debris blocked the collection rod.

If TEG could not penetrate the fill material at a sample location or if the location was inaccessible by the Strataprobe vehicle, Russell Construction used the trackhoe to excavate the fill materials down to native soils. A bucket of soil was then removed from which samples were collected with a stainless steel spoon. This method also allowed the inspection of landfill materials. Depth to the native soil surface was measured in each excavation.

TABLE 1
SAMPLE LOCATION INFORMATION
VAUGHN LANDFILL
CSXT PROPERTY
GREENVILLE, SOUTH CAROLINA
AES, February 1995

LATITUDE 34° 51' 35" LONGTITUDE 82° 24' 50"				
SAMPLE ID	**METHOD OF SAMPLE COLLECTION**	**DEPTH (ft)**	**FIELD SCREENING OVA (ppm)**	**ANALYSES PERFORMED**
LF001	Russell	9.5	NA	RCRA Metals, PCBs, VOCs
LF002	Russell	6.0	NA	RCRA Metals, PCBs, VOCs
LF003	Russell	10.0	>1,000	RCRA Metals, PCBs, VOCs
LF004	TEG	9.5	300	RCRA Metals, PCBs, VOCs, Semi-VOCs
LF005	TEG	10.0	300	RCRA Metals, PCBs, VOCs
LF006	TEG	9.0	28	RCRA Metals, PCBs, VOCs
LF007	TEG	17.5	7	RCRA Metals, PCBs, VOCs
LF008	TEG	14.0	70	RCRA Metals, PCBs, VOCs
LF009	Russell	14.0	400	RCRA Metals, PCBs, VOCs
LF010	Russell	12.0	400	RCRA Metals, PCBs, VOCs
LF011	Russell	13.5	760	RCRA Metals, PCBs, VOCs
LF012	Russell	8.0	17	RCRA Metals, PCBs, VOCs
LF013	TEG	12.0	0	RCRA Metals, PCBs, VOCs

For samples beginning with the prefix LF, depths given are from top of fill

TABLE 1 (cont'd)

LATITUDE 34° 51' 35" LONGTITUDE 82° 24' 50"				
SAMPLE ID	METHOD OF SAMPLE COLLECTION	DEPTH (ft)	FIELD SCREENING OVA (ppm)	ANALYSES PERFORMED
LF014	TEG	12.0	NA	RCRA Metals, PCBs, VOCs
LF015	TEG	10.5	NA	RCRA Metals, PCBs, VOCs
LF016	TEG	10.0	NA	RCRA Metals, PCBs, VOCs
LF017	TEG	15.0	<5	RCRA Metals, PCBs, VOCs
LF018	TEG	14.0	30	RCRA Metals, PCBs, VOCs
LF019	Russell	14.0	>1,000	RCRA Metals, PCBs, VOCs
LF020	Russell	12.0	40	RCRA Metals, PCBs, VOCs
LF021	Russell	13.0	22	RCRA Metals, PCBs, VOCs
LF022	Russell	6.0	90	RCRA Metals, PCBs, VOCs
LF023	TEG	11.0	400	RCRA Metals, PCBs, VOCs
LF024	TEG	9.0	32	RCRA Metals, PCBs, VOCs
LF025	TEG	11.5	610	RCRA Metals, PCBs, VOCs
LF026	Russell	8.0	>1,000	RCRA Metals, PCBs, VOCs
LF027	Russell	7.0	>1,000	RCRA Metals, PCBs, VOCs, TPH, Semi-VOCs
LF028	Russell	10.0	250	RCRA Metals, PCBs, VOCs
LF029	Russell	13.0	140	RCRA Metals, PCBs, VOCs

For samples beginning with the prefix LF, depths given are from top of fill

TABLE 1 (cont'd)

LATITUDE 34° 51' 35" LONGTITUDE 82° 24' 50"				
SAMPLE ID	**METHOD OF SAMPLE COLLECTION**	**DEPTH (ft)**	**FIELD SCREENING OVA (ppm)**	**ANALYSES PERFORMED**
LF030	Russell	14.0	610	RCRA Metals, PCBs, VOCs
LF031	Russell	6.0	0	RCRA Metals, PCBs, VOCs
LF032	Russell	10.0	590	RCRA Metals, PCBs, VOCs
LF033	Russell	11.0	120	RCRA Metals, PCBs, VOCs
DD001	Hand Auger	1.0	10	RCRA Metals, PCBs, VOCs, TPH, Semi-VOCs
DD002	Hand Auger	1.0	NA	RCRA Metals, PCBs, VOCs, TPH, Semi-VOCs
WE001	Hand Auger	1.0	100	RCRA Metals, PCBs, VOCs, TPH, Semi-VOCs
WE002	Hand Auger	1.0	NA	RCRA Metals, PCBs, VOCs, TPH, Semi-VOCs
WS001	Hand Auger	1.0	NA	RCRA Metals, PCBs, VOCs, TPH, Semi-VOCs
WS002	Hand Auger	1.0	7	RCRA Metals, PCBs, VOCs, TPH, Semi-VOCs
WW001	Hand Auger	1.0	NA	RCRA Metals, PCBs, VOCs, TPH, Semi-VOCs
WW002	Hand Auger	1.0	NA	RCRA Metals, PCBs, VOCs, TPH, Semi-VOCs

For samples beginning with the prefix LF, depths given are from top of fill

Field activities revealed fill materials composed primarily of demolition debris including wood, concrete, bricks, metal, roofing material, plastic, household appliances, yard waste, and fiberglass insulation. The fill also included soil which was apparently used as cover during filling operations. No drums, tanks, cylinders or other containers which may have contained hazardous materials were observed.

Soils below the fill in several sample locations appeared discolored and oily and exhibited a strong hydrocarbon odor. Several samples contained a thick, black, tarry substance and strong odor. Two areas of visible tars with distinct odors were in the vicinity of:

1.) Sample locations LF004 and LF014

2.) Sample locations LF027, LF028, LF029, and LF032

Other samples exhibited varying degrees of hydrocarbon odor but did not contain tars or discoloration. Samples collected toward the south end of the fill (LF012, LF021, LF022, LF030, LF031, and LF031) had little or no odor and none of the tarry substance.

Figure 4 - Cross Section A - A' includes a soil profile of LF019 which is typical of the soil types found beneath the fill. The cross section also indicates the thickness of the fill material at ten sample locations along the landfill from north

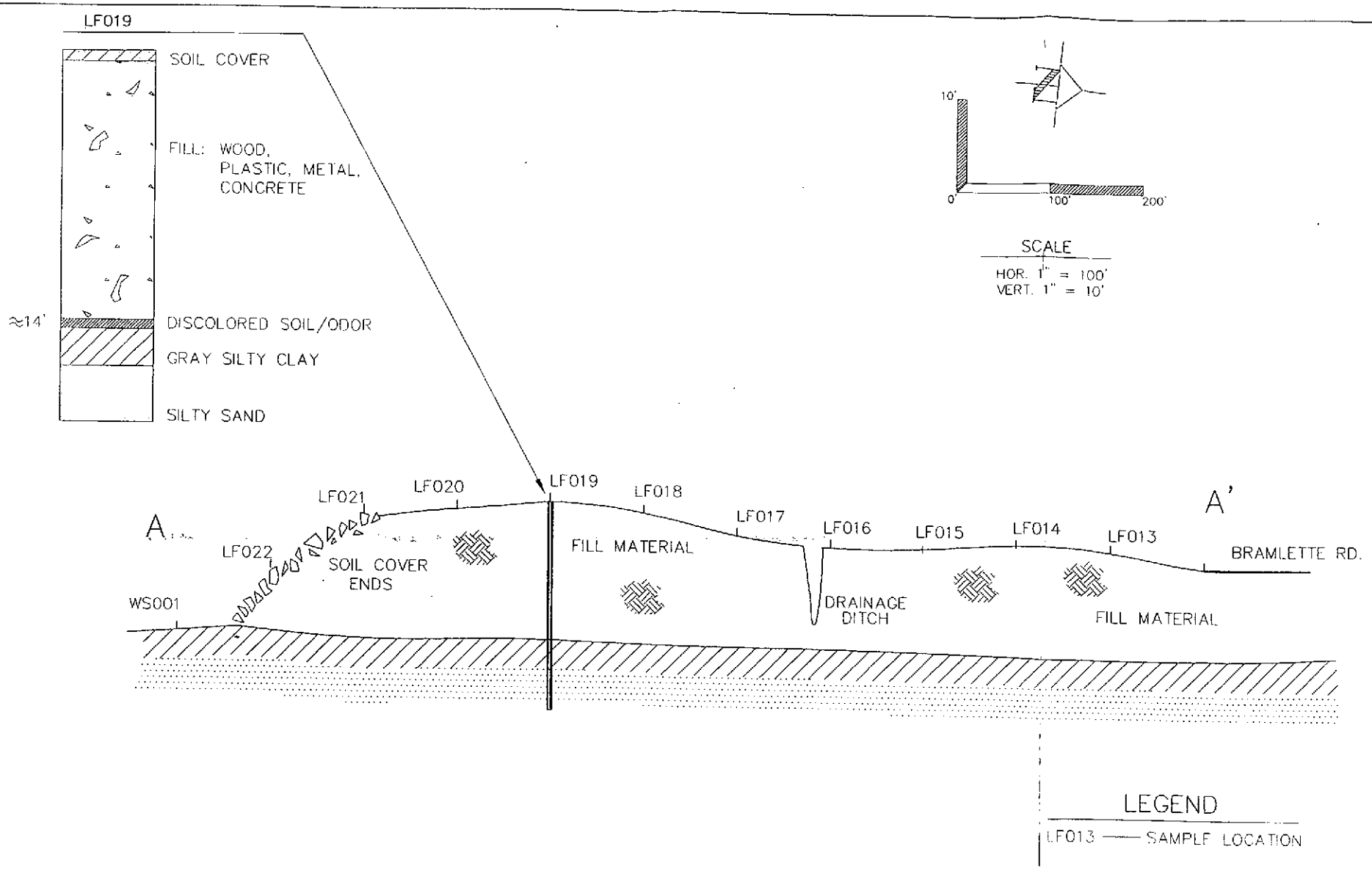


FIGURE 4

SCALE AS SHOWN	NO.	DATE	REVISION DESCRIPTION
DWN. BY SA			
CHK'D. BY KK			
APPR. BY DB			

Applied Engineering & Science — Atlanta Georgia

CROSS SECTION A-A'
VAUGHN LANDFILL
CSXT PROPERTY
GREENVILLE, SC

DATE: MAR., 1995
DWG. NO.: 4365A
SHEET NO.:

4365ASSA.DWG

to south. Figure 3 contains the cross sectional line A - A' indicating the section of the landfill shown in the diagram.

According to the Soil Conservation Service map for the site, the sandy loams and silty clays of the native soils found in the upper two to three feet belong to the Cartecay and Chewacla series. Both are alluvium found in floodplains and are considered hydric. The presence of hydric soils is one criteria for evaluating potential wetlands. Relatively clean sands were found beneath the clay layers to depths of at least twenty feet.

2. Groundwater - Groundwater samples were collected from seven sample locations in the fill area. Circled sample locations on Figure 3 indicate the location of groundwater samples collected.

Samples LF001(A) and LF003(A) from the southeast end of the fill area, and samples LF027(A), LF029(A), and LF031(A) from the west side of the fill were collected from excavations dug by Russell Construction. TEG assissted with sample collection by the use of a stainless steel screen connected to tubing lowered into the groundwater which entered the excavation. Samples LF023(A) and LF025(A) were collected by driving push rods with the Strataprobe to the water table, pulling back the rods approximately 1 foot, and allowing the infiltration of

groundwater into the borehole. Samples were then collected by AES using a peristaltic pump.

Groundwater removed from LF023(A) contained an oily substance with strong petroleum odor (see photographs, Appendix C). Sample jars filled for analysis became coated with the oil. Depth for collection of LF023(A) was between 16 and 18 feet below the surface of the fill. The sample was analyzed for RCRA metals, PCBs, VOCs, and semi-VOCs. Sample LF025(A) did not contain oil but did have a petroleum odor. LF025(A) was analyzed for RCRA metals, PCBs, and VOCs.

Because of the presence of discolored soils and a coal tar-like odor in the excavated soils, sample LF027(A) was analyzed for Semi-VOCs as well as RCRA metals, PCBs, and VOCs. The remaining groundwater samples were analyzed for RCRA metals, PCBs, and VOCs.

B. Floodplain Sampling

1. Soils - Representatives of DHEC had mentioned the presence of a dark, sludge-like substance in at least one area of the floodplain surrounding the landfill. The workplan called for the collection of at least two samples from the floodplain on

each side of the fill. Using hand augers, AES collected sediment samples from seven locations:

- Two samples were collected from the floodplain east of the fill and designated WE001 and WE002.
- Two samples were collected from the floodplain south of the fill and designated WS001 and WS002.
- Two samples were collected from the floodplain west of the fill and designated WW001 and WW002.

An additional sample was collected from the drainage ditch which lies between the landfill and the CSX office at the northwest corner of the landfill. This sample was designated DD002.

2. Surface Water - Standing water lies in sections of the floodplain, especially during the winter months, primarily to the east and west of the fill material. At the time of field activities in February, standing water was up to 1 foot deep. Potential wetland conditions exist in the area surrounding the landfill; however, no formal wetland delineation has been undertaken on the property. South of the fill, soil conditions were saturated but no standing water was present. Surface water samples were collected at locations WE001, WE002, WW001, and WW002 and are designated with the prefix SW.

Figure 3 indicates the locations of the sediment and surface water samples collected in the floodplain and the ditch. Appendix C - Photographs contains photos of sampling activities, excavations, and landfill debris.

III. ANALYTICAL RESULTS

Sample analyses were performed by Accura Analytical Laboratory, Inc. of Norcross, Georgia. Samples were shipped daily from Greenville under chain-of-custody packed in iced coolers.

A. Landfill - Soils

Thirty-three soil samples were collected from beneath the fill in native soils. An additional sample (DD001) was collected from sediments in the drainage ditch which bisects the fill. Laboratory analyses included RCRA metals, PCBs, and, if soil vapor screening indicated positive results, VOCs. At three locations, LF004, LF027, and DD001 semi-volatile analysis was performed because of the presence of a thick tar-like substance in the samples.

1. RCRA Metals - Table 2 summarizes the results of RCRA metals analysis. Parameters include arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver. The results are compared to background values for naturally occurring elements (NOE) in the Carolina piedmont.

TABLE 2
RCRA METALS ANALYTICAL RESULTS – LANDFILL SOILS
VAUGHN LANDFILL
CSXT PROPERTY
GREENVILLE, SOUTH CAROLINA
AES, February 1995

SAMPLE ID	NOE*	ARSENIC	BARIUM	CADMIUM	CHROMIUM	LEAD	MERCURY	SELENIUM	SILVER
		41	300	na	500	<10	1.2	0.6	na
LF001		BDL	132.0	BDL	29.6	101.0	BDL	BDL	BDL
LF002		BDL	105.0	BDL	21.7	51.4	BDL	BDL	BDL
LF003		BDL	91.3	BDL	24.3	50.8	BDL	BDL	BDL
LF004		BDL	67.4	BDL	11.9	16.8	BDL	BDL	BDL
LF005		BDL	165.0	BDL	20.2	25.0	BDL	BDL	BDL
LF006		BDL	164.0	BDL	36.7	112.0	BDL	BDL	BDL
LF007		BDL	19.4	BDL	6.0	13.9	BDL	BDL	BDL
LF008		BDL	128.0	BDL	37.1	76.9	BDL	BDL	BDL
LF009		BDL	118.0	BDL	22.9	51.8	BDL	BDL	BDL
LF010		BDL	104.0	BDL	30.9	69.6	BDL	BDL	BDL
LF011		BDL	145.0	BDL	28.9	76.9	BDL	BDL	BDL
LF012		BDL	87.5	BDL	24.6	105.0	BDL	BDL	BDL
LF013		BDL	226.0	BDL	33.3	52.8	BDL	BDL	BDL
LF014		BDL	209.0	BDL	42.6	68.0	BDL	BDL	BDL
LF015		BDL	132.0	BDL	40.6	64.2	BDL	BDL	BDL
LF016		BDL	86.4	BDL	19.2	143.0	BDL	BDL	BDL
LF017		BDL	237.0	BDL	31.4	45.6	BDL	BDL	BDL
LF018		BDL	118.0	BDL	37.0	63.4	BDL	BDL	BDL
LF019		BDL	33.3	BDL	27.0	147.0	BDL	BDL	BDL
LF020		BDL	178.0	BDL	36.6	148.0	BDL	BDL	BDL
LF021		BDL	63.1	BDL	26.8	53.4	BDL	BDL	BDL
LF022		BDL	53.7	BDL	18.9	35.6	BDL	BDL	5.34
LF023		BDL	149.0	BDL	36.8	99.0	BDL	BDL	BDL
LF024		BDL	557.0	40.4	79.9	1538.0	BDL	BDL	BDL
LF025		BDL	202.0	0.58	33.3	55.6	BDL	BDL	BDL
LF026		BDL	138.0	BDL	35.6	216.0	BDL	BDL	BDL
LF027		BDL	154.0	BDL	24.8	225.0	BDL	BDL	BDL
LF028		BDL	191.0	BDL	30.4	56.1	BDL	BDL	BDL
LF029		BDL	224.0	BDL	38.2	176.0	BDL	BDL	BDL
LF030		BDL	126.0	BDL	38.6	72.8	BDL	BDL	BDL
LF031		BDL	127.0	BDL	20.6	47.9	BDL	BDL	BDL
LF032		BDL	177.0	BDL	38.6	84.6	BDL	BDL	BDL
LF033		BDL	122.0	BDL	31.9	64.2	BDL	BDL	BDL
DD001		BDL	65.4	0.57	13.2	104.0	BDL	BDL	BDL

* NOE – Concentrations of naturally occurring elements in soils typical of those found in northwestern South Carolina; from *"Element Concentrations in Soils and Other Surficial Materials of the Conterminous United States", USGS 1984*

BDL – Below method detection limits

Shaded range indicates exceptional concentrations

All concentrations reported in mg/kg