WORKPLAN

SITE INVESTIGATION AND MONITORING WELL INSTALLATIONS

CSX/VAUGHN LANDFILL

CSX Transportation
Greenville, South Carolina
August, 1995

APPLIED ENGINEERING & SCIENCE, INC.

Atlanta, Georgia

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I. INTRODUCTION

Applied Engineering and Science, Inc. (AES), on behalf of CSX Transportation, Inc. (CSXT), submitted to the South Carolina Department of Health and Environmental Control (SCDHEC) a report entitled Site Investigation; Soil, Sediment, and Groundwater Sampling; Vaughn Landfill, CSX Real Property in March 1995. The report included background information and results of a site investigation conducted in February 1995 by AES on CSXT property located on Bramlette Road in Greenville. The site had been used as an unpermitted landfill by Vaughn Construction and Demolition Company of Greenville. The results and recommendations of the report are summarized below.

"Approximately seven acres of floodplain of the Reedy River have been filled with demolition debris and yard waste to a depth of up to 14 feet. Excavations through the fill and borings advanced through the fill into the underlying native soils revealed the presence of a tar-like substance at the fill/soil interface. Additional hand auger samples collected in the surrounding floodplain soils also contained tars.

Laboratory analysis of the samples indicated a band of volatile and semi-volatile contamination in soils trending northeast to southwest through the fill. This band extends from the floodplain northeast of the fill through the northern half of the fill material, through the southwest corner of the fill, and into the floodplain southwest of the landfill.

Groundwater was encountered at or below the native soil surface. Three groundwater samples contained elevated levels of volatile and semi-volatile compounds. Impacted groundwater was found along the west side of the landfill and likely extends west in the suspected downgradient direction toward the Reedy River.

Elevated levels of lead were revealed in soil samples throughout the site. Metals levels in sample LF024 were especially high. Groundwater metals levels were below MCLs except for arsenic slightly over MCLs in one sample and lead slightly over MCLs in two samples. Several surface water samples contained metals levels which slightly exceeded MCLs.

No source of metals, VOC, or semi-VOC contamination was identified in the landfill materials. Volatile and semi-volatile compounds appear to be the result of the tar-like substance which lies in native soils below the fill. No source for the tars was found; however, a coal gasification plant operated across Bramlette road northeast of the site until the 1960s. Semi-volatile compounds identified during the landfill investigation are consistent with those produced during coal gasification processes.

AES recommends the installation of monitoring wells to assess the vertical and horizontal extent of groundwater contamination. A minimum of six wells is recommended.

Additional soil sampling should be conducted to assess the extent of the tar substance and to assess a possible source.

Location LF024 should be excavated to assess the source of heavy metals contamination at that location.

The south end of the landfill should be covered with clean soil to control odors and vermin, to keep debris from blowing away, and to improve appearances. An impermeable cap is not recommended for this landfill. Because the water table is at or close to the surface, water flows beneath and through the base of the fill. A cap would not prevent this type of infiltration."

In a letter to CSXT dated May 11, 1995, DHEC responded to the above referenced report and requested a workplan be submitted for further assessment at the site (DHEC letter, Appendix A). The letter requests further information on the following:

1) The extent of the tar substance
2) The source of the tar substance
3) The vertical and horizontal extent of groundwater contamination
4) Pathways of contaminant migration to possible receptors
5) The source of heavy metals contamination at location LF024

6) A site characterization including soils, geology, hydrology, and hydrogeology

This workplan has been prepared to address the concerns listed above and will outline proposed methods, expected results, and a schedule of events.

II. FIELD ACTIVITIES

Proposed field activities have been divided into six separate tasks which address the concerns raised by DHEC.

A. Extent of the Tar Substance

The tar-like substance identified during the initial investigation appeared to lie within the natural surface soils below the landfill materials and in parts of the floodplain adjacent to the fill.

East of the fill material, the substance was present in sample WE001 but was absent in sample WE002. Several hand auger samples will be collected in the area of WE001 and field screened both visually and with an organic vapor analyzer (FID, etc.). Once it appears the limits of the tar substance have been identified, confirmatory samples will be collected and analyzed by a laboratory for volatile and semi-volatile content.

West of the fill material, the substance was present in soil sample WW002, but was absent in both samples WW001 and DD002. As on the east side of the fill, hand auger samples will be collected and field screening performed to assess the limits of the tar-like substance.

South of the fill, no tar-like substance was noted in samples WS001 or WS002. No further sampling is planned for this area.

Because of the likelihood that the tar substance originated at the coal gasification plant north of Bramlette Road, several samples will be collected directly across the road from the landfill to assess the limits of the tar in that direction. The area has been filled since the plant ceased operations; therefore, the samples will be collected by either push-type technology (Geoprobe) or a standard drill rig equipped with split spoons to reach native soils.

B. Source of the Tar Substance

Interviews with several area residents, aerial photos from the 1950s, and past investigations indicate the former coal gasification plant at the corner of West Washington Street and Bramlette Road as the probable source of the tar substance on the site. Additional samples collected north of Bramlette Road during the next phase of the investigation may add further evidence for this possibility. Other possibilities for the source of the contamination will be considered and investigated.

C. Vertical and Horizontal Extent of Groundwater Contamination

Groundwater samples collected during the first investigation indicated an oily substance in the groundwater around sample location LF023. BTEX compounds and several PAHs were identified in groundwater samples LF023(A), LF025(A), and LF027(A) (trace amounts of ethylbenzene and xylenes were also identified in LF031(A)).

AES proposes to install six (6) monitoring wells to assess vertical and horizontal extent of groundwater contamination. Figure 1 is a site plan which includes the proposed well locations. The rationale for the proposed locations is as follows:

MW-1 - To be installed at the northeast corner of the landfill site along Bramlette Road, MW-1 will be used to assess groundwater quality in the suspected upgradient direction. The well will be installed within the surficial aquifer and will be screened across the water table. The water table is expected to lie within 10 feet of the surface.

MW-2 - Installed at the northwest corner of CSXT property adjacent to the CSX railroad office, MW-2 will be used to assess groundwater quality in the suspected downgradient direction of the landfill. This well will also be installed in the surficial aquifer and will be screened across the water table.

MW-3D - To be installed in the landfill in the area of LF025, MW-3D will be used to assess groundwater quality vertically. Native soils directly below the landfill materials consist of dense clay of varying thickness. Below the clay lies fairly uniform sands. MW-3D will be installed in the sand aquifer at the next confining unit or at 30 feet, whichever is encountered first. Continuous split-spoon sampling will be performed to determine the stratigraphy of the borehole. The surficial clay unit will be cased to prohibit the migration of contaminants to the sand unit through the borehole.

MW-4 - To be installed east of the landfill at the east side of CSXT property, MW-4 will be used to assess groundwater quality in the suspected upgradient direction. The well will be installed in the surficial aquifer and will be screened across the water table. Laboratory analysis of groundwater samples LF001(A) and LF003(A) indicated no volatile or semi-volatile compounds present. The sample from MW-4 will be used to confirm the initial findings. It is possible that a temporary access road will need to be constructed to reach this well location.

MW-5 - MW-5 will be installed west of the fill material at the west edge of the CSXT property adjacent to the rail lines. The well will be installed in the surficial aquifer and will be screened across the water table. A sample will be used to

assess groundwater quality in the suspected downgradient direction from the landfill in line with LF029(A).

MW-6 - The location of MW-6 is tentative and depends on the results of further soil sampling and the extent of the tar substance. The actual location may be further south in the floodplain or along the rail bed. The water sample collected from this well will be used to attempt to determine the horizontal extent of groundwater contamination in the southerly direction.

All monitoring wells will be installed by a South Carolina certified driller and will be constructed in accordance with the guidelines set forth in the document South Carolina Well Standards and Regulations, enacted June 2, 1985. The wells will be labeled with permanent identification plates indicating the date of installation, driller, top-of-casing elevation, total depth, screened interval, and static water level. The wells will be constructed of 2-inch Schedule 40 PVC casing and screen. Slot size of the screens will be 0.010 inch. It is expected that all wells will be constructed with casings extending above the ground surface and will be completed with steel enclosures with locking caps. If necessary, flush mount manhole covers will be used in areas of high traffic volume (adjacent to the CSX office). General well construction diagrams are included as Appendix B. Specific well construction diagrams and boring logs will be submitted for all wells following construction.

Following completion, the wells will be developed according to R.61.71.6-D to ensure sample collection of groundwater typical of the aquifer. Turbidity, pH, and specific conductance will be used as parameters to assess development.

Groundwater samples will be collected within 24 hours of development using clean disposable bailers. Samples will be analyzed for volatile and semi-volatile constituents (EPA methods 8260 and 8270). A laboratory certified in South Carolina will be chosen to perform the analyses.

The methods to be utilized in collecting the samples for this study will strictly adhere to the EPA Region IV Standard Operating Precedures and Quality Assurance Manual, issued Feburary 1, 1991. The standard operating procedures utilized by AES personnel in all sampling activities follow a standardized QA/QC procedure. The procedures are documented in the AES Field Operations Manual. Health and safety procedures will be reviewed each day before operations commence particularly those specified by CSX Transportation for all contractors on railroad property.

D. Contaminant Pathways

Included in this portion of the investigation will be an assessment of groundwater contamination and a characterization of the hydrogeology of the site to assess possible

contaminant migration off-site. The possibility of surface migration of contaminants in runoff into the Reedy River will also be evaluated. Downstream surface water users and groundwater supply users will be identified. A well survey was conducted previously in the area and that information will be included. The potential impact of volatile contaminants on air quality will also be addressed. The information provided may be used to determine appropriate remedial actions if necessary.

E. Location LF024; Metals

Barium, cadmium, chromium, and lead concentrations at sample location LF024 were higher than other levels in samples collected within the landfill. That location will be excavated with a backhoe to attempt to identify the source of the heavy metals. All fill materials within a radius of ten feet of LF024 will be screened. Additional samples may be collected to confirm the previous findings. Information provided will be used to determine the need for and type of remediation at that location.

F. Site Characterization

A site characterization will be developed which includes soils, geology, hydrology, and hydrogeology. Information will be collected from site visits, previous investigations, well installations, state and federal publications, maps, and aerial photographs. Human

activities on the site will be reviewed. This information will provide an overview of the site and a basis for future risk-based assessments.

III. SCHEDULE OF EVENTS

Following approval of this workplan by DHEC, AES will begin preparations for field activities. The scheduling of well drillers, the Geoprobe, a backhoe, and a South Carolina certified laboratory must be coordinated. AES estimates three weeks preparation time. The completion of field activities may require another two and one-half to three weeks. Once laboratory results are received and the data reviewed, an estimated thirty days will be required for graphics and report preparation and review. Given these estimates, a completed report may be submitted to DHEC approximately thirteen (13) weeks following approval of the workplan.

APPENDIX

APPLIED ENGINEERING AND SCIENCE, INC.
ATLANTA, GEORGIA

APPENDIX A

SCDHEC LETTER TO CSX

South Carolina
DHEC
Department of Health and Environmental Control

Appalachia II
Environmental Quality Control
301 University Ridge, Suite 5800
Greenville, SC 29601-3677
803-241-1090 Fax 803-241-1092

Serving
Greenville and Pickens Counties

Promoting Health, Protecting the Environment

May 11, 1995

Mr. Marshall Williams
CSX Railroad
6737 Southpoint Drive South
Suite 100
Jacksonville, FL 32216

Re: Vaughn Landfill/CSX Real Property
Bramlette Road Property
Greenville County

Dear Mr. Williams:

Our office has received and reviewed your consultant's report on the above referenced site (Applied Engineering & Science, Site Investigation, March, 1995). We appreciate your expedient assessment and hope to facilitate continued investigation at the site.

After reviewing the Site Investigation we agree that further assessment at the site is necessary. The information gathered to date suggests that soils and groundwater at the site are being impacted by the tar substance identified at the site. Please prepare a Work Plan that will provide the information necessary to determine if remedial action is necessary at the site and if so, what form should it take. The work plan should provide for flexibility to be modified as the assessment proceeds.

Objectives for this workplan should include:

1) Determine the extent of the tar substance.
2) Determine the source of the tar substance.
3) Determine the vertical and horizontal extent of groundwater contamination.
4) Determine pathways of contamination migration to possible receptors.
5) Assess location LF024 for the source of heavy metals contamination.
6) Develop a site characterization including soils, geology, hydrology, and hydrogeology.

This workplan should be submitted to this office within 30 days of receiving this letter. If a problem meeting this timeframe develops, or if you have any questions, please contact me at (803) 241-1090.

Sincerely,

Charles Bristow

Charles Bristow
Appalachia II EQC

APPENDIX B

WELL DIAGRAMS

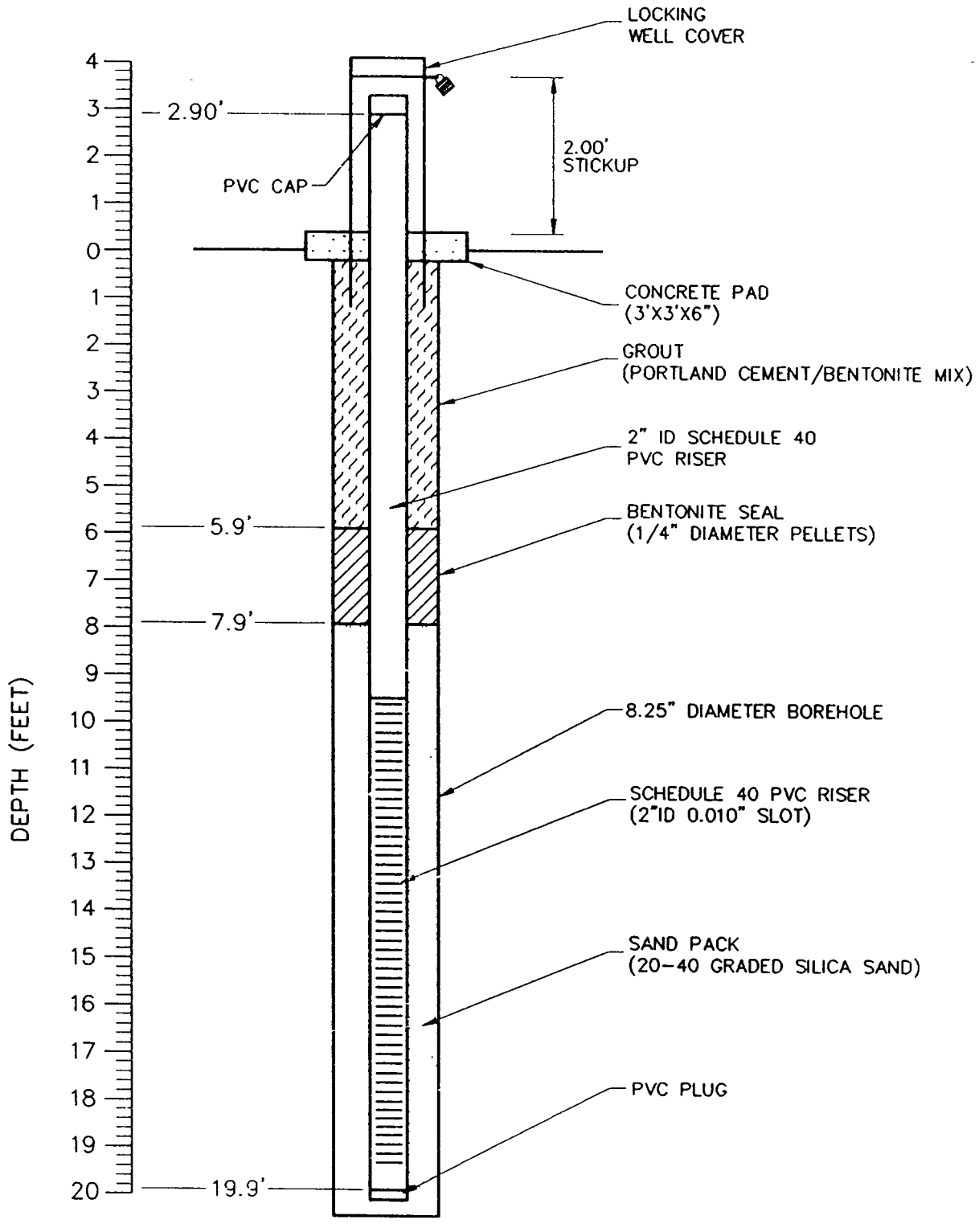

FIGURE 4

SCALE NTS	Applied Engineering & Science	GENERAL WELL CONSTRUCTION DIAGRAM	DATE DEC, 1992
DWN. BY BAA			DWG. NO. 2278 A
CHK'D. BY SM			SHEET NO.
APPR. BY JM			

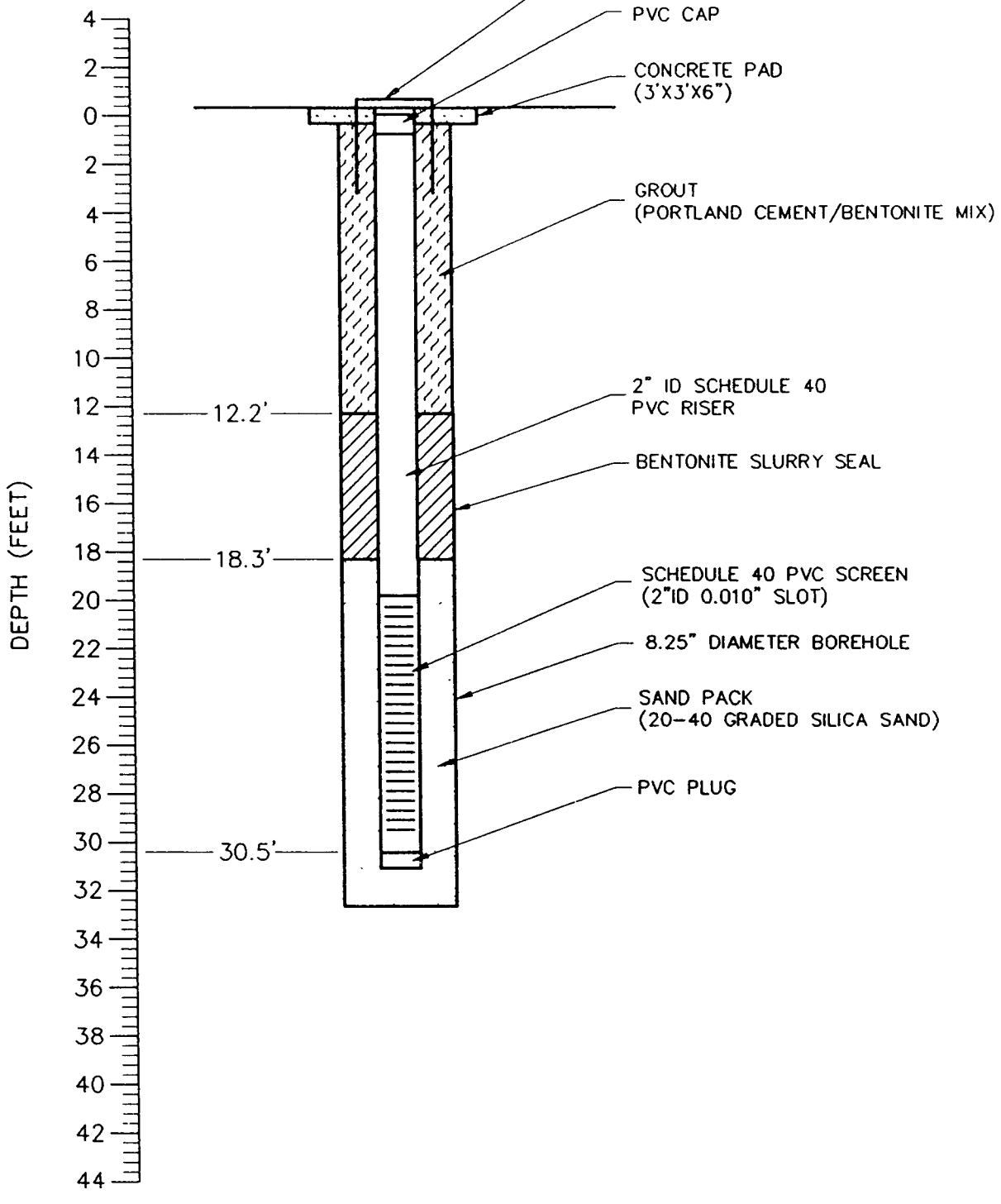

FIGURE 5

SCALE NTS DWN. BY BAA CHK'D. BY SM APPR. BY JM	Applied Engineering & Science	GENERAL WELL CONSTRUCTION DIAGRAM	DATE DEC, 1992 DWG. NO. 2278 A SHEET NO.

APPENDIX C

FIGURE 1

LEGEND

CSXT PROPERTY

PROPOSED MONITORING WELL LOCATION

4365A301

DRAWN BY GOE	SCALE 1" = 200'	NO.	DATE	REVISION DESCRIPTION	NO.	DATE	REVISION DESCRIPTION	
CHECKED BY KMK	DATE JUNE 1995							
APPROVED BY DAB								

Applied Engineering & Science — Atlanta Georgia

PROPOSED MONITORING WELL LOCATIONS
CSX TRANSPORTATION COMPANY
GREENVILLE S.C.

SITE PLAN

DWG. NO 4365A301

SHEET NO. 1 of 1