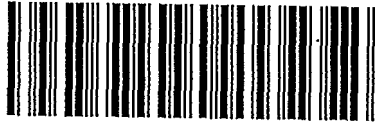


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Docket No. E-2, Sub 1219



3/7/2011

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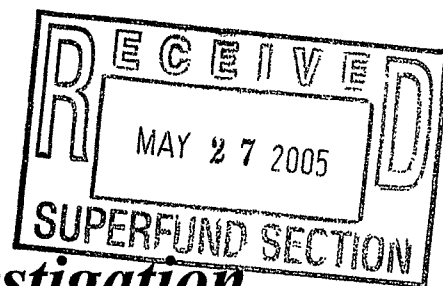
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**REPORT**

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***Phase II Remedial Investigation  
Report for the Former Ash Disposal  
Area***

***L.V. Sutton Steam Electric Plant,  
Wilmington, NC***

**Progress Energy Service Company, LLC.  
Raleigh, North Carolina**

**May 2005**

**BBL<sup>®</sup>**  
BLASLAND, BOUCK & LEE, INC.  
*engineers, scientists, economists*



CERTIFICATION STATEMENT

REGISTERED SITE MANAGER CERTIFICATION STATEMENT (.0306(b)(1))

PROGRESS ENERGY CAROLINAS INC.  
L.V. SUTTON STEAM ELECTRIC PLANT  
WILMINGTON, NORTH CAROLINA  
NCD 000 830 646

PHASE II REMEDIAL INVESTIGATION REPORT

"I certify under penalty of law that I am personally familiar with the information contained in this submittal, including any and all supporting documents accompanying this certification, and that the material and information contained herein is, to the best of my knowledge and belief, true, accurate and complete and complies with the Inactive Hazardous Sites Response Act G.S. 130A-310, et seq, and the voluntary remedial action program Rules 15A NCAC 13C .0300. I am aware that there are significant penalties for willfully submitting false, inaccurate or incomplete information."

Gary R. Cameron, P.E.

Printed Name

*Gary R. Cameron*  
Signature

6/9/05  
Date

North Carolina

State

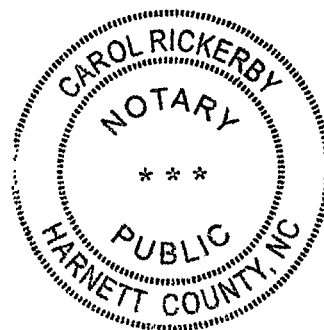
Wake

County

I, CAROL RICKERBY, a Notary Public of <sup>HARNETT</sup>~~said~~ County and State, do hereby  
certify that GARY R. CAMERON did personally appear and sign before me  
this the 9<sup>th</sup> day of June, 2005.

*Carol Rickerby*  
Notary Public Signature

My commission expires: My Commission Expires 11-30-2009.



CERTIFICATION STATEMENT

REMEDIATING PARTY CERTIFICATION STATEMENT (.0306(b)(2))

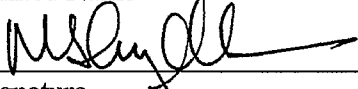
PROGRESS ENERGY CAROLINAS INC.  
SUTTON STEAM PLANT  
WILMINGTON, NORTH CAROLINA  
NCD 000 830 646

PHASE II REMEDIAL INVESTIGATION REPORT

"I certify under penalty of law that I have personally examined and am familiar with the information contained in this submittal, including any and all documents accompanying this certification, and that, based on my inquiry of those individuals immediately responsible for obtaining the information, the material and information contained herein is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for willfully submitting false, inaccurate or incomplete information."

Michael Shawn Longfellow

Printed Name



Signature

5-16-05

Date

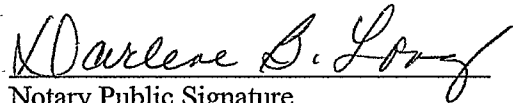
North Carolina

State

New Hanover

County

I, Darlene B. Long, a Notary Public of said ~~County~~ and State, do hereby  
certify that M. S. Longfellow did personally appear and sign before me  
this the 16 day of May, 2005.



Notary Public Signature

My commission expires: 1-22-06

**REMEDIAL INVESTIGATION COMPLETION CERTIFICATION**  
**15A NCAC 13C.0306(b)(5)(B)**

Site Name L.V. SUTTON STEAM ELECTRIC PLANT Street Address 801 SUTTON STEAM PLANT RD.  
County NEW HANOVER WILMINGTON, NC  
Site ID No. NCD 000 830646

The remedial investigation, which is the subject of this certification has, to the best of my knowledge, been completed in compliance with the Inactive Hazardous Sites Response Act G.S. 130A-310, et seq. and the voluntary remedial action program Rules 15A NCAC 13C .0300, and BLASLAND, BOUCK & LEE, INC. is in compliance with Rules .0305(b)(2) and .0305(b)(3), of this section. I am aware that there are significant penalties for willfully submitting false, inaccurate or incomplete information.

[Signature]  
RSM Signature

5/23/05  
Date

GARY R. CAMERON,  
RSM Name

BLASLAND, BOUCK & LEE, INC.  
REC Name

3700 REGENCY PKWY/SUITE 140  
Mailing Address

REC No. \_\_\_\_\_

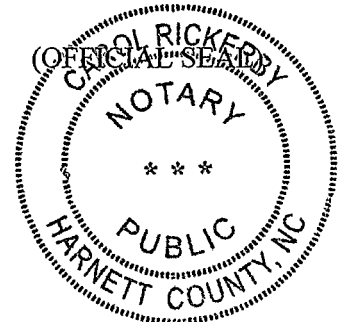
CARY, NC 27511  
City, State, ZIP

NORTH CAROLINA (Enter State)  
WAKE COUNTY

I, CAROL RICKERBY, a Notary Public of HARNETT County and State, do hereby certify that GARY R. CAMERON did personally appear and sign before me this the 23 day of MAY, 2005.

[Signature]  
Notary Public (signature)

My Commission Expires 11-30-2009.  
My commission expires: \_\_\_\_\_



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# 1. Introduction

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This Phase II Remedial Investigation Report (Phase II RIR) addresses the Former Ash Disposal Area (FADA) at the Carolina Power & Light doing business as Progress Energy Carolina's (Progress Energy) L.V. Sutton Steam Electric Plant (the Site) located at 801 Sutton Steam Plant Road in Wilmington, North Carolina (NCD000830646). This Phase II RIR has been prepared pursuant to a voluntary Administrative Agreement (Docket Number 03-SF-217) signed by Progress Energy and the North Carolina Department of Environment and Natural Resources (NCDENR) Division of Waste Management, Inactive Hazardous Sites Branch (effective date December 30, 2003). The work conducted under the Administrative Agreement is intended to meet the applicable requirements of North Carolina General Statute 130-310.9(c) (Statute); 15A North Carolina Administrative Code (NCAC) 13C .0300 Rules (Rules); and 15A NCAC 13C .0300, *Registered Environmental Consultant Program Rules and Implementation Guidance* (REC Guidance), dated August 2004. Blasland, Bouck, and Lee, Inc. (BBL) has been designated as the Registered Environmental Consultant (REC) for the project.

The Sutton Site is located along the east bank of the Cape Fear River near Wilmington, New Hanover County, North Carolina. The location of the Site is shown on a portion of the United States Geological Survey (USGS) 7.5-minute topographic quadrangle maps for Castle Hayne and Leland, North Carolina, and is presented as **Figure 1-1**. The FADA was used between 1954 and 1972 for the placement of coal ash generated at the Site. A general site plan that includes the FADA is shown on **Figure 1-2**.

## 1.1 Background

BBL prepared a *Phase I Remedial Investigation Work Plan* (RIWP), which was submitted to the NCDENR in March 2004 (BBL, 2004a) to investigate the FADA. Field activities specified in the Phase I RIWP were conducted between May and July 2004. Phase I RI activities included:

- test pitting and soil boring advancement to delineate the FADA;
- soil boring advancement and sample collection;
- groundwater monitoring well and piezometer installation;
- groundwater sampling and analysis; and,
- surface-water and sediment sampling and analysis in the Cape Fear River.

In September 2004, BBL submitted to the NCDENR a *Phase I Remedial Investigation Report* (Phase I RIR) for the FADA that summarized the Phase I RI activities completed by BBL (BBL, 2004b). Based on the results of the Phase I RI, Progress Energy and BBL identified certain data gaps that needed to be addressed to complete the RI in accordance with the REC Guidance. Therefore, a Phase II RIWP was prepared to address the data gaps and was submitted to the NCDENR on January 25, 2005 (BBL, 2005). Field activities for the Phase II RI were conducted from January 25, 2005 to February 4, 2005. The scope of work for the Phase II RI included:

- background soil sampling;
- soil boring advancement to further delineate the FADA;
- soil boring advancement and sampling for petroleum hydrocarbons;
- groundwater monitoring well and temporary piezometer installation; and,
- groundwater sampling and analysis.

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## 1.2 Purpose and Objectives

The purpose of the Phase II RI was to collect the data necessary to complete the RI for the FADA. To accomplish this, the Phase II RI was designed to achieve the following objectives:

- **Collection of Background Soil Samples** – Background soil samples were collected to evaluate natural metal concentrations near the FADA.
- **Additional Delineation of Ash within the FADA** - Additional soil borings were advanced to further characterize the horizontal and vertical extent of the coal ash within the heavily vegetated area located on the northern portion of the FADA.
- **Additional Delineation of Petroleum Hydrocarbons in the FADA** – A thin discontinuous layer (generally < 1-inch) of petroleum hydrocarbons were observed in three areas within the FADA during test pitting and soil boring advancement activities conducted as part of the Phase I RI. Analytical results for the Phase I RI soil samples indicated that the material is consistent with a heavy petroleum hydrocarbon material, such as No. 6 fuel oil. Additional Phase II RI soil samples were collected in each of the three areas to delineate the petroleum hydrocarbons at each area.
- **Evaluation of Groundwater and Movement in the FADA** – Additional groundwater elevation data along the western, southern, and central portions of the FADA were needed to confirm overall groundwater flow in and around the FADA.
- **Horizontal and Vertical Delineation of Arsenic in Groundwater Proximate to the FADA** - Shallow groundwater appears to have been impacted with arsenic above the groundwater remediation goal (RG) of 10 micrograms per liter (µg/L) based on samples collected from three shallow monitoring wells (MW-13, MW-14, and MW-15) installed during the Phase I RI. Therefore, one additional shallow and four deep monitoring wells were installed to delineate arsenic in groundwater horizontally and vertically in accordance with the REC Guidance.

## 1.3 Report Organization

Following this introduction, **Section 2** provides the details of the Phase II RI activities. **Section 3** discusses the Phase II RI results. **Section 4** presents the conclusions and recommendations based on the results of the Phase II RI. **Section 5** presents the required certification documents and **Section 6** presents the references used to prepare this Phase II RIR.

## **2. Phase II RI Activities**

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This section presents details regarding the data collected during the Phase II RI. Information is presented regarding the number and location of soil samples, soil borings, temporary piezometers, permanent groundwater monitoring wells, groundwater samples, laboratory analytical methods, and any variances from the Phase II RIWP. All site activities were conducted in accordance with the REC Guidance (NCDENR, 2004) and the U.S. Environmental Protection Agency (USEPA) Environmental Investigations Standard Operating Procedures and Quality Assurance Manual (EISOPQAM) (USEPA, 2001).

### **2.1 Soil Investigation**

The following soil sampling activities were conducted as part of the Phase II RI.

#### **2.1.1 Collection of Background Soil Samples**

Five background soil samples (SF-2 through SF-6) were collected as required per the REC Guidance and in accordance with the procedures contained in the EISOPQAM. Background soil sample locations are depicted on **Figure 2-1**. Background soil samples were collected from 0.5 to 1.0 feet below ground surface (ft bgs) using a stainless steel hand trowel. Field equipment was decontaminated prior to and after each sample in accordance with EISOPQAM procedures. Background soil samples were analyzed for Hazardous Substance List (HSL) metals by USEPA Methods 6010B and 7470A (for mercury only). The HSL metals include:

- antimony;
- arsenic;
- beryllium;
- cadmium;
- chromium;
- copper;
- lead;
- manganese;
- mercury;
- nickel;
- selenium;
- silver;
- thallium; and
- zinc

Background soil samples were collected and stored separately from all other samples, placed on ice, and maintained under full chain-of-custody procedures. Samples were then transported directly to CompuChem Laboratory in Cary, North Carolina (CompuChem) (NC Certification No. 79).

Quality assurance/quality control (QA/QC) samples were also submitted to CompuChem for analysis along with the samples collected in the field in accordance with the REC Guidance.



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### 2.1.2 Additional Ash Delineation

As part of the Phase I RI, 19 hand-auger borings and 20 test pits were advanced to facilitate delineation of the FADA (see **Figure 2-2**). Based on the Phase I RI delineation activities, three distinct units were identified above the water table as follows:

- **Ash Unit** – The ash unit consists of a distinctive layer of dark to light grey colloids that are typically laminated in appearance.
- **Definable Ash Unit and Sand** – This unit consists of a definable ash layer as described above combined with a grey sand and ash mixture that may be present above or below the ash layer.
- **Sand and Ash Mixture** – This unit consists of medium grey sand mixed with ash material between sand grains with no definable ash layer present.

To further characterize these units, BBL advanced two soil borings (SB-19 and SB-20) using a stainless steel hand auger within the heavily vegetated area located on the northern portion of the FADA. Field equipment was decontaminated prior to and after borehole advancement in accordance with EISOPQAM procedures. All boreholes were backfilled with native materials upon completion. **Figure 2-2** depicts the locations of all soil borings advanced within the FADA.

### 2.1.3 Additional Delineation of Petroleum Hydrocarbons

Petroleum hydrocarbons were observed in three areas (TP-1, TP-12, and TP-16/20) within the FADA during the Phase I RI; therefore, additional soil sampling was conducted to delineate these areas as part of the Phase II RI.

Each proposed soil boring location was staked in the field by the BBL field scientist. Final soil borings were surveyed by a North Carolina-licensed surveyor. Each of the three identified areas are described below.

#### Test Pit TP-1 Area

Four soil borings (SF-7 through SF-10) were advanced 20 feet north, south, east and west of former test pit TP-1 to delineate the horizontal and vertical extent of petroleum hydrocarbon impacted soil observed during the Phase I RI. No petroleum hydrocarbons were visually observed during borehole advancement.

#### Test Pit TP-12 Area

Four soil borings (SB-21, SB-23, SB-25, and SB-27) were advanced 20 feet north south, east, and west of former test pit TP-12 to delineate the horizontal and vertical extent of petroleum hydrocarbons observed during the Phase I RI field activities. Based on field observations, four additional soil borings (SB-22, SB-24, SB-26, and SB-28) were advanced 20 feet north south, east, and west of the initial soil borings to ensure the area proximate to TP-12 was adequately delineated.

#### Test Pits TP-16/20 Area

Four soil borings (SB-29, SB-30, SB-31, and SB-32) were advanced proximate to former test pit locations TP-16 and TP-20 to delineate the horizontal and vertical extent of petroleum hydrocarbons observed during the Phase I RI. No petroleum hydrocarbons were visually observed during borehole advancement.

Soil boring and test pit locations are depicted on **Figure 2-3**.

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Field equipment was decontaminated prior to and after borehole advancement in accordance with EISOPQAM procedures. Soil borings were advanced using a stainless steel hand auger until the water table or apparent petroleum hydrocarbon impacted soils were visually observed. Continuous soil samples were collected during borehole advancement and screened for organics using an organic vapor analyzer equipped with a photo-ionization detector (PID).

Upon completion of the petroleum hydrocarbon delineation at each test pit area, representative soil samples were collected based on field observations and PID readings. All soil samples were submitted to Severn Trent Laboratory (STL) (NC Certification No. 314) in Pensacola, Florida and analyzed for extractable petroleum hydrocarbons (EPH) and volatile petroleum hydrocarbons (VPH) using Massachusetts Department of Environmental Protection (MADEP) methodology. QA/QC samples were submitted to STL for analysis along with the samples collected in the field in accordance with the REC Guidance.

## **2.2 Groundwater Investigation**

### **2.2.1 Evaluation of Groundwater and Movement in the FADA**

Based on the Phase I RI results, groundwater flow in the FADA appeared to converge toward the central portion of the FADA from the discharge canal to the north and Lake Sutton to the west. This groundwater flow pattern appeared to limit potential impacts to these surface-water bodies; however, additional groundwater flow data along the western, southern, and central portions of the FADA were needed to confirm overall groundwater movement proximate to the FADA. The additional data collected to confirm overall groundwater flow within the FADA are described below.

#### **2.2.2 Temporary Piezometer Installation**

BBL advanced six temporary shallow piezometers (PZ-11 through PZ-16) to facilitate the determination of shallow groundwater flow direction in and around the FADA. All piezometers were hand driven and were constructed with 1-inch-diameter flush-joint threaded schedule 80 polyvinyl chloride (PVC) riser with an appropriate length of 0.010-inch slotted PVC well screen. All temporary piezometers were completed above grade with an approximately 2-foot PVC riser stick-up. After each piezometer was installed, BBL conducted a preliminary survey of the temporary piezometers to calculate groundwater elevations at each location in order to construct a shallow potentiometric surface map for the FADA. These data, along with groundwater elevations collected from an existing piezometer (PZ-10) and shallow monitoring wells (MW-13 through 15), enabled BBL to prepare a potentiometric surface map in the field that was used to properly locate the monitoring well cluster (MW-20/20D) to assess the groundwater quality downgradient of the FADA. The locations of the temporary piezometers and monitoring wells are depicted on **Figure 2-4**.

Upon completion of the Phase II RI field activities, the temporary piezometers were manually removed, backfilled, and combined with other investigation-derived waste (IDW) generated during the Phase II RI.

#### **2.2.3 Permanent Monitoring Well Installation**

Four permanent monitoring wells (MW-13, MW-14, MW-15, and MW-16) were installed around the FADA to assess shallow groundwater quality as part of the Phase I RI. One of the wells (MW-16) was installed to assess background groundwater quality conditions near the FADA. The locations of the monitoring wells installed during the Phase I RI are depicted on **Figure 2-4**.

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As part of the Phase II RI, one new shallow monitoring well (MW-20) and four deep monitoring wells (MW-13D, MW-15D, MW-16D, and MW-20D) were installed by a North Carolina-licensed well driller in accordance to EISOPQAM procedures to assess the horizontal and vertical groundwater quality in and around the FADA. The locations of the new monitoring wells are shown on **Figure 2-4**. The shallow monitoring well (MW-20) was installed using 4.25-inch-inner-diameter hollow-stem augers. All deep monitoring wells were installed utilizing mud-rotary drilling methods. Soil samples were collected at 5-foot intervals during borehole advancement using 2-inch-diameter, 2-foot-long split-spoon samplers. Each sample was screened with a Photo Ionization Detector (PID) and the results were recorded in the site logbook. Well construction details are provided in **Table 2-1**.

MW-20 was constructed of 2-inch-diameter flush-joint threaded schedule 40 PVC riser with a 10-foot length of 0.010-inch slotted PVC well screen. The screened interval was positioned so that it intersected the water table at the time of construction. The deep monitoring wells (MW-13D, MW-15D, MW-16D, and MW-20D) were constructed of 2-inch-diameter flush-joint threaded schedule 40 PVC riser with a 5-foot length of 0.010-inch slotted PVC well screen. A sand pack was placed from the boring terminus to two-feet above the top of the screened interval. A hydrated bentonite pellet seal (minimum of 2 feet) was placed on top of the filter pack. Grout was then pumped by the tremie method into the annular space around the casing to the ground surface. After a 24-hour period, the wells were completed by installing a surface pad and an above-grade protective steel casing. Following another 24-hour period, the wells were developed in accordance with the EISOPQAM procedures. Well construction records and boring logs are included in **Appendix A**. A generalized geologic cross-section across the FADA is provided as **Figure 2-5**. Additional FADA cross-sections are provided in the Phase I RIR (BBL, 2004b).

## **2.2.4 Groundwater Sampling and Analysis**

As part of the Phase I RI, shallow monitoring wells MW-13, MW-14, MW-15, and MW-16 were sampled to assess the shallow groundwater quality within and around the FADA. The analysis of these samples resulted in the following:

- Five HSL metals (arsenic, chromium, copper, thallium, zinc) were detected in groundwater samples above the method detection limit (MDL) from the FADA wells; however, all metal concentrations were well below their respective RGs, with the exception of arsenic. Arsenic was detected at concentrations above the groundwater RG (10 µg/L) in groundwater samples collected from monitoring wells MW-13 (70.6 µg/L), MW-14 (10.9 µg/L), and MW-15 (41.3 µg/L). Arsenic was detected below the RG at 3.5 µg/L in the sample collected from background well MW-16.
- No target compound list (TCL) volatile organic compounds (VOCs) or semivolatile organic compounds (SVOCs) exceeded available RGs in groundwater samples from the FADA. Therefore, these parameters were not included in the Phase II RI analytical program.

### **2.2.4.1 Phase II RI Groundwater Sampling and Analysis Program**

The Phase II RI parameter list was focused on the five HSL metals listed above and a select list of geochemical parameters.

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One synoptic round of groundwater-level measurements was collected during the Phase II RI from all FADA permanent monitoring wells, permanent piezometer PZ-10, and all temporary piezometers. The measurements were made with a properly decontaminated electronic water-level probe. Depth-to-water measurements were measured from the surveyed top of inner casing to the nearest 0.01 foot and recorded in the site logbook.

All FADA monitoring wells were sampled utilizing low-flow purging and sampling methods. This involves the use of a peristaltic pump equipped with dedicated silicone and Teflon®-lined polyethylene (PE) tubing. The PE tubing was positioned in the well such that the intake was situated at the middle of the well screen. The purge rate (ranging from 200 to 300 milliliters per minute) was adjusted such that the water level within the wells was not lowered by more than 0.3 foot. The water level within the well was monitored throughout the duration of the purge. Additionally, field parameters (pH, temperature, specific conductivity, dissolved oxygen [DO], oxidation-reduction potential [ORP], and turbidity) were monitored continuously using a Hydro-Lab® water-quality meter with a flow-through-cell assembly. BBL personnel recorded all field parameters, as well as the color of the purge water, and the presence or absence of a sheen and odor throughout the duration of the purge. Each monitoring well was purged until three consecutive field measurements (taken at 5-minute intervals) of pH, specific conductivity, DO, and ORP stabilize to within 1 standard unit, 3%, 10%, and 10 millivolts, respectively. Additionally, purging continued until turbidity readings were below 10 nephelometric turbidity units (NTU). The locations of the monitoring wells are depicted on **Figure 2-4**.

Groundwater samples were collected from the Teflon®-lined PE tubing upon field parameter stabilization, placed in coolers on ice, and maintained under full chain-of-custody procedures. Samples were shipped via overnight delivery to CompuChem for the following:

- Site-specific HSL metals (arsenic, chromium, copper, thallium, zinc) via USEPA SW-846 Method 6010B/3030C preparation.

In addition, samples were analyzed for several geochemical indicator parameters as follows:

- calcium using USEPA Method 6010B;
- sulfate using USEPA Method 375.4;
- chloride using USEPA Method 325.2; and
- total organic carbon (TOC) using USEPA Method 415.1.

QA/QC samples were shipped via overnight delivery to CompuChem for analysis along with the samples collected in the field.

#### **2.2.4.2 Groundwater Microbiological Community Data**

The measurement of the biological activity of iron-reducing bacteria in groundwater was conducted during the Phase II RI groundwater sampling event to determine whether microbial populations that could support iron reduction were present in the aquifer. Reduction of iron-containing minerals associated with aquifer sediments could facilitate the release of sorbed arsenic into groundwater (Nagorski and Moore, 1999; Dowling et al., 2002). Microbial population field test kits (Iron Related Bacteria Test – IRB-BART™, and Heterotrophic Aerobic Bacteria Biological Activity Reactivity Test – HAB-BART™) manufactured by Droycon Bioconcepts, Inc., Regina, SK, Canada were used to evaluate the presence of iron-utilizing bacteria and/or aerobic bacteria. A

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small amount of groundwater sampled from each monitoring well was added to a dedicated test vial that contained a microbial growth substrate specific to the bacteria family of interest. The vials were observed for approximately one week to determine whether or not bacteria grew in each sample.

### **2.3 Phase II RI Work Plan Variances**

Two variances occurred during the Phase II RI field program. First, BBL collected the five above-referenced IRB and HRB- BART™ groundwater samples to evaluate the biological activity in the FADA. Second, four additional soil borings were advanced around TP-12 based on field observations during soil sample collection to evaluate the presence of petroleum hydrocarbons in the FADA. All other field activities were consistent with the Phase II RIWP.

### **2.4 Investigation-Derived Waste**

Investigation-Derived Waste (IDW) (e.g., drill/soil cuttings, well development/purge water, decontamination fluids) generated as part of the Phase II RI activities were containerized in properly labeled 55-gallon United Nations-approved steel drums and staged at the Site. This material was managed in accordance with the REC and EISOPQAM guidance.

## 3. Phase II RI Results

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This section presents the results of the soil and groundwater investigation conducted as part of the Phase II RI. Laboratory reports of the results for the samples collected during the Phase II RI are presented in **Appendix B**.

### 3.1 Soil Investigation Results

#### 3.1.1 Additional Ash Delineation

BBL advanced two soil borings (SB-19 and SB-20) using a stainless steel hand auger to further characterize the horizontal and vertical extent of the coal ash within the heavily vegetated area located on the northern portion of the FADA. The findings are as follows:

- SB-19 (0 – 4 ft bgs): An ash unit was observed from 0.2 to 2.0 ft bgs transitioning to a definable ash and sand unit (i.e. interbedded ash layers and grey sand) to 2.5 ft bgs. Medium-grained, brown sand was present from 2.5 ft bgs to the terminal boring depth of 4 ft bgs.
- SB-20 (0 – 7 ft bgs): A definable ash unit and sand was observed from 0.2 to 2.0 ft bgs transitioning into a distinct ash unit to 4.0 ft bgs. From 4.0 to 5.5 ft bgs was a definable ash and sand unit, which was underlain by a definable ash unit to 6.0 ft bgs. The ash unit transitioned to a definable ash and sand unit from 6.0 to 6.5 ft bgs. Medium-grained, brown sand was present from 6.5 ft bgs to the terminal boring depth of 7 ft bgs.

**Figure 2-2** depicts the spatial distribution of the three distinct units observed within the FADA based on the delineation data collected during the Phase I and Phase II RI. Soil boring descriptions are presented in **Table 3-1**. As shown on **Figure 2-2**, RI test pitting and soil boring data indicate that there is an area in the central portion of the FADA that is composed primarily of a definable ash and sand unit, which is surrounded by a sand and ash mixture. The definable ash and sand unit identified on **Figure 2-2** appears to correspond to a former topographic depression in the FADA based on a review of historical topographic maps of the site.

#### 3.1.2 Petroleum Hydrocarbon Soil Sampling Results

Sixteen soil borings were advanced proximate to test pits TP-1, TP-12, TP-16/20 to delineate the horizontal and vertical extent of petroleum hydrocarbons in the FADA. BBL collected four soil samples around each test pit within the FADA for EPH and VPH analyses by the MADEP Method. Soil analytical results are summarized in **Table 3-2** and depicted on **Figure 2-3**. Soil sampling results are summarized below.

##### Test Pit TP-1 Area Results

Analytical results for all EPH and VPH soil samples were below the Maximum Soil Contaminant Concentrations (MSCC) soil-to-groundwater criteria with the exception of C11-C22 (EPH) aromatics (soil-to-groundwater limit of 34 milligrams per kilogram [mg/kg]) in two soil samples. The C11-C22 aromatics (EPH) concentration in the soil sample from SF-7 (0.5 – 1.0 ft bgs) was reported as 120 mg/kg. The J-qualified (estimated) C11-C22 aromatic (EPH) concentration in the duplicate soil sample of SF-9 (SF-91) (44 mg/kg) location slightly exceeded the MSCC. It should be noted that the parent soil sample collected from SF-9 (estimated concentration of 33 mg/kg) was below the MSCC soil-to-groundwater criteria for EPH C11-C22.

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#### Test Pit TP-12 Area Results

The four soil samples (SB-22,-24,-26, and -28) collected proximate to test pit TP-12 were all below the EPH and VPH MSCC soil-to-groundwater criteria.

#### Test Pits TP-16/20 Area Results

The four soil samples (SB-29,-30,-31, and -32) collected proximate to test pits TP-16 and TP-20 were all below the EPH and VPH MSCC soil-to-groundwater criteria. Laboratory data are provided in **Appendix B**.

### **3.1.3 Background Metals Soil Sampling Results**

Five background soil samples (SF-2 through SF-6) were collected at the Site at the locations shown on **Figure 2-1**. Analytical results indicate that six metals (antimony, cadmium, mercury, selenium, silver and thallium) were not detected above their respective detection limits in any of the background soil samples. Eight metals (arsenic, beryllium, chromium, copper, lead, manganese, nickel, and zinc) were detected in background concentrations ranging from 0.01 mg/kg for beryllium to 2.5 mg/kg for zinc. Complete analytical results for background soil samples are provided in **Table 3-3**. Laboratory data are provided in **Appendix B**.

## **3.2 Groundwater Investigation Results**

### **3.2.1 Evaluation of Groundwater and Movement in the FADA**

Shallow groundwater measurements collected from six temporary piezometers, permanent piezometer PZ-10 and five permanent monitoring wells ranged from 0.90 ft bgs at PZ-16 to 3.33 ft bgs at PZ-15 on February 4, 2005. Deep groundwater measurements collected from four permanent groundwater monitoring wells ranged from 0.53 ft bgs at MW-15D to 4.97 ft bgs at MW-20D. Depth-to-groundwater measurements from the February 2005 monitoring event were converted to groundwater elevations and were used to create potentiometric surface maps for wells screened near the water table (shallow groundwater) and toward the base of the surficial aquifer unit (deep groundwater). Potentiometric surface maps for shallow and deep groundwater for the February 2005 monitoring event are presented as **Figures 3-1** and **3-2**. As shown, groundwater within the FADA generally flows to the south and southwest. A summary of the site survey data is provided in **Table 3-4**. Groundwater elevation data are provided in **Table 2-1**. Historical groundwater elevation data are provided in **Table 3-5**. Lastly, **Figure 2-5** presents a geologic cross-section that illustrates the subsurface conditions along the groundwater flow path within the FADA.

### **3.2.2 Groundwater Elevation and Gradient Data**

The horizontal component of the hydraulic gradient in the shallow and deep groundwater was determined for the Site using the February 4, 2005 groundwater elevation data presented in **Table 2-1**. The average horizontal gradient in the shallow groundwater is approximately 0.0025 foot per foot (ft/ft) towards the south and southwest. The average horizontal gradient in the deep groundwater is approximately 0.0034 (ft/ft) towards the southwest. Historical groundwater elevation data are presented in **Table 3-5**.

To evaluate the potential interaction of groundwater flow between different levels of the surficial aquifer, the vertical component of the hydraulic gradient between the shallow and deep groundwater wells was also evaluated by comparing groundwater elevations from clustered wells MW-13 (shallow well) and MW-13D

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(deep well), MW-15 (shallow well) and MW-15D (deep well), MW-16 (shallow well) and MW-16D (deep well), and MW-20 (shallow well) and MW-20D (deep well). The calculated vertical gradients for each well cluster are 0.0011 ft/ft (upward), 0.0011 ft/ft (downward), 0.0029 ft/ft (downward), and 0.0005 (downward), respectively.

### 3.2.3 Groundwater Flow Data

The average linear groundwater velocity, or seepage velocity, ( $v$ ) for the FADA can be estimated from the following relation between hydraulic conductivity ( $K$ ), hydraulic gradient ( $i$ ), and effective porosity ( $\eta$ ):

$$v = K \times i / \eta$$

Heath (1989) estimated an average transmissivity ( $T$ ) value of 11,000 square feet per day (ft<sup>2</sup>/day) for the surficial sand aquifer. Assuming an aquifer thickness of 48 feet based on the boring logs for the deep wells, a typical hydraulic conductivity ( $K$ ) value of 229 feet/day (ft/day) was calculated for the FADA. An average horizontal hydraulic gradient of 0.00295 ft/ft was used for ( $i$ ). An effective porosity ( $\eta$ ) of 0.30 for fine sand was assumed. Based on these values, the average linear groundwater velocity ( $v$ ) in the FADA was approximately 242.6 feet/year.

### 3.2.4 Groundwater Sampling Results

#### *Field Parameter Data – Shallow Groundwater*

Stabilized field parameter data for the February 2005 monitoring period are presented in **Table 3-6**. Values of pH ranged from 7.85 (MW-20) to 9.65 (MW-14) std. units. These values indicate that shallow groundwater within the FADA is neutral to slightly basic. Specific conductivity ranged from 180 (MW-16) to 585 (MW-13) microseimens per centimeter ( $\mu$ S/cm). DO values range from 0.28 (MW-20) to 0.51 (MW-16) milligrams per liter (mg/L). ORP ranged from 45 (MW-20) to 143 (MW-15) millivolts (mV). These data indicate that oxidizing to slightly reducing conditions are present in shallow groundwater within the FADA. Stabilized groundwater turbidity results were nine Nephelometric Turbidity Units (NTUs) or less within all shallow wells.

#### *Field Parameter Data – Deep Groundwater*

Stabilized field parameter data for the February 2005 monitoring period are presented in **Table 3-6**. Values of pH ranged from 6.68 (MW-16D) to 8.66 (MW-15) std. units. These values indicate that deep groundwater within the FADA is neutral to slightly basic. Specific conductivity ranged from 498 (MW-15D) to 898 (MW-13D)  $\mu$ S/cm. DO values range from 0.28 (MW-20) to 0.51 (MW-16) mg/L. ORP ranged from 127 (MW-20D) to 252 (MW-16D) mV. These data indicate that oxidizing to slightly reducing conditions are present in shallow groundwater within the FADA. Stabilized groundwater turbidity results were seven NTUs or less within all deep wells.

#### *HSL Metal Results*

Groundwater samples from the five shallow and four deep FADA monitoring wells were analyzed for site-specific HSL metals (arsenic, chromium, copper, thallium, and zinc) to evaluate site groundwater quality. Four of the five HSL metals were detected in groundwater samples from the FADA wells; however, all metal concentrations were well below their respective RGs with the exception of arsenic. Arsenic was detected at concentrations above the RG (10  $\mu$ g/L) in groundwater samples collected from shallow monitoring wells MW-13 (99.1  $\mu$ g/L) and MW-15 (44  $\mu$ g/L) only. HSL metals results are presented in **Table 3-7** and depicted on **Figure 3-3**. Historical groundwater analytical results are presented in **Table 3-8**.



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### ***Geochemistry Data***

Coal ash leachate typically contains calcium, chloride, sulfate, and total organic carbon which form its primary constituents (Conn, et al., 1999; Murarka, et al., 2002). Therefore, groundwater samples were collected for analysis of calcium, chloride, sulfate, and TOC as potential indicator compounds to evaluate whether or not leachate from coal ash may be affecting groundwater proximate to the FADA. **Table 3-7** presents the results of these geochemical parameters.

Calcium concentrations in groundwater samples collected from background wells MW-16 (shallow groundwater) and MW-16D (deep groundwater) were 5.39 and 33.7 mg/L, respectively. Calcium concentrations ranged from 34.1 (MW-14) to 125 (MW-13) mg/L in shallow groundwater, and 35.9 (MW-16D) to 84.4 (MW-13D) mg/L in deep groundwater. Calcium concentrations were greater in shallow groundwater samples with the exception of the sample from MW-16 which was less than the MW-16D deep groundwater sample.

Chloride concentrations in the groundwater samples collected from background wells MW-16 and MW-16D were 21.4 and 76.4 mg/L, respectively. Chloride concentrations ranged from 2.35 (MW-20) to 46.2 (MW-14) mg/L in shallow groundwater. Chloride concentrations in deep groundwater samples ranged from 54.7 (MW-15D) to 154 (MW-13D) mg/L. Overall, chloride concentrations were greater in groundwater samples from deep monitoring wells.

Sulfate concentrations in the groundwater samples collected from background wells MW-16 and MW-16D were 25.2 and 128 mg/L, respectively. Sulfate concentrations ranged from 8.82 (MW-13) to 44.7 (MW-20) mg/L in shallow groundwater samples, and 74.5 (MW-15D) to 141 (MW-13D) mg/L in deep groundwater samples. Sulfate concentrations were greater in the samples collected from deep monitoring wells.

Groundwater concentrations of TOC in background wells MW-16 and MW-16D were 6.63 and 3.41 (estimated value) mg/L, respectively. TOC concentrations ranged from non-detect at (MW-13) to 14.0 mg/L (MW-14) in shallow groundwater, and 3.99 (MW-15D) to 9.28 (MW-13D) mg/L in deep groundwater. TOC concentrations were greater in shallow groundwater samples from MW-15 and MW-16 compared to MW-15D and MW-16D. TOC concentrations were greater in samples from MW-13D and MW-20D compared to MW-13 and MW-20.

### ***Groundwater Microbiological Community Results***

Heterotrophic aerobic bacteria were identified in groundwater samples collected at all sampled monitoring wells (**Table 3-9**). These results indicate that sufficient nutrients, energy sources, and oxidizing conditions exist to support the growth of these aerobic bacteria in groundwater in the vicinity of the FADA. Mixed heterotrophic iron-related bacteria (*Pseudomonads* and *Enterics*) were identified in groundwater samples collected at monitoring wells MW-13D, MW-15D, and MW-20. Mixed anaerobic bacteria including iron-related bacteria were identified in groundwater samples collected at monitoring wells MW-16D and MW-20D. The presence of mixed heterotrophic and anaerobic iron-related bacteria indicates that under proper geochemical and nutrient conditions, reduction of iron can occur.

Mixed heterotrophic aerobic and mixed anaerobic bacterial communities were observed for groundwater samples collected from MW-16D and MW-20D. The potential for the co-existence of aerobic and anaerobic bacteria in site groundwater is supported by ORP values that indicate mildly oxidizing to mildly reducing conditions.

### 3.2.4.1 Hydrophobic Sorption and COC Retardation

Sorption refers to the chemical transport process whereby chemicals, such as metals dissolved in groundwater, partition preferentially to solid phase aquifer materials. The quantity of chemicals that can partition to solid phase materials is directly proportional to the affinity of the dissolved chemical to sorb to the solid phase material. For metals, this affinity is described by the soil-water partition coefficient ( $K_d$ ). The result of this process is that some quantity of the chemical mass is removed from groundwater during transport, and the rate of constituent, in this case arsenic, migration in groundwater can be less than the average linear groundwater velocity. Sorption is, therefore, a natural physical groundwater attenuation process that results in the retardation of arsenic relative to the average linear groundwater velocity.

To evaluate the role that sorption plays in the rate of arsenic movement relative to the average linear groundwater velocity in FADA soils, a site specific retardation factor for arsenic was estimated based on the following equation (Freeze and Cherry, 1979).

$$R_c = 1 + [\rho_b \times K_d / n]$$

where  $R_c$  is the retardation factor for a specific chemical ( $c$ ),  $\rho_b$  is the bulk density of the soil,  $K_d$  is the chemical-specific soil-water partition coefficient, and  $n$  is the effective soil porosity. The assumed aquifer bulk density is  $1.65 \text{ gm/cm}^3$  and the assumed effective soil porosity is 0.30 (Freeze and Cherry, 1979). A  $K_d$  value of  $29 \text{ mg/g}$  for arsenic was obtained from the Risk Assessment Information System Toxicity and Chemical-Specific Factors Data Base ([http://risk.lsd.ornl.gov/cgi-bin/tox/TOX\\_select?select=csf](http://risk.lsd.ornl.gov/cgi-bin/tox/TOX_select?select=csf)). The following table presents the site-specific retardation factor for arsenic based on this equation:

Site COC	$K_d$ (ml/g)	$R_c$	$v_c$ (ft/yr)
Arsenic	29	160.5	1.5

As shown, site-specific the retardation factor for arsenic was calculated to be 160.5 indicating relatively high retardation. The velocity of arsenic transport in groundwater is related to the velocity of groundwater by the following equation:

$$v_c = v_{gw} / R_c$$

where  $v_c$  is COC velocity, in this case arsenic and  $v_{gw}$  is groundwater velocity. As shown, based on the maximum estimated groundwater velocity ( $242.6 \text{ ft/yr}$ ), arsenic velocity in groundwater is approximately  $1.5 \text{ ft/yr}$ . This indicates that arsenic is significantly less mobile in groundwater relative to the overall groundwater velocity at the site.

It should be noted that  $K_d$  values for arsenic can vary several orders of magnitude depending upon local soil type and soil organic content. The value shown is "typical" and may not be fully representative of actual site conditions. Ideally, for solute transport modeling efforts, site-specific  $K_d$  information is developed for the range of aqueous and geological conditions of the system to be modeled. However, the retardation data provided above appear to be reflective of site conditions based on the limited distribution of arsenic observed in groundwater proximate to the FADA.

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### 3.3 Quality Assurance/Quality Control Data

QA/QC samples were collected during Phase II RI field activities, including duplicates for each media sampled, matrix spike/matrix spike duplicate (MS/MSD) samples, and field equipment (rinsate) blanks. Duplicate sample results are shown in brackets in **Tables 3-2, 3-3 and 3-7**. **Table 3-10** presents the analytical results for equipment blank and VOC trip blank samples. Overall, duplicate samples results compare well to their corresponding samples. Equipment blank results indicated very low levels of antimony and zinc which are often detected as laboratory artifacts and are not consistent with the constituents of concern at the Site. Therefore, these constituents do not appear to be site related. An estimated concentration of C9-C10 VPH (4.9 JB µg/L) was detected in the trip blank sample for the soil samples collected within the FADA. BBL contacted STL in Pensacola, Florida to discuss the results of the trip blank water sample. According to STL, the cause of the low level detection was due to laboratory cross-contamination during the analysis of the trip blank water sample.

### 3.4 Data Validation

Analytical data generated for the Phase II RI were evaluated by a BBL data validation specialist to determine the acceptability of the data generated by the analytical laboratory. A data validation/review was completed on the level III data packages submitted by the laboratory for each sample delivery group in accordance with the Quality Assurance Project Plan (QAPP) (BBL, 2004c) included as part of the Phase I RIWP. Data validation/review was conducted in accordance to the *Contract Laboratory Program National Functional Guidelines for Inorganic and Organic Data Review*. The data validation reports are included with the laboratory data in **Appendix B**. Several EPH sample results were recorded as estimated values due to the surrogate recoveries associated with the EPH analysis were determined to be outside the laboratory control limits. A "U" qualifier was given to all EPH soil samples exhibiting concentrations less than the blank action level associated with the trip blank water sample analyses. Overall, the data validation reports found the data acceptable and usable. None of the data within the data set were rejected due to any deviation cited in the data validation reports.

## 4. Conclusions and Recommendations

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### 4.1 Conclusions

The following conclusions have been developed based on the results of the Phase I and II RI.

- The FADA has been adequately delineated horizontally and vertically based on the test pit and hand auger boring data collected as part of the Phase I and Phase II RI. Three related ash units have been identified within the FADA: a definable ash layer, definable ash layers interbedded with a sand and ash mixture, and a sand and ash mixture with no definable ash layer present. The additional Phase II RI data, combined with the Phase I RI data, indicate that an east-west channel-like feature appears to be present in the central portion of the FADA. This feature corresponds to a topographic low feature present on historical topographic maps for the area.
- The petroleum hydrocarbon material observed in soil at three former test pit areas (TP-1, TP-12, and TP-16/20) within the FADA appear to be discontinuous localized areas of a heavy residual petroleum hydrocarbon compound such as No. 6 fuel oil. This is consistent with historical records that indicate a possible release from one of the ASTs overlying the FADA. All soil samples collected proximate to the three former test pit areas were below EPH/VPH soil-to-groundwater standards with exception of two surface soil samples proximate to TP-1 which contained J-qualified (estimated) values above the soil-to-groundwater standard for C11-C22 aromatic hydrocarbons. Overall, there does not appear to be a significant impact to groundwater related to the residual hydrocarbons observed in soil. No light non-aqueous phase liquids have been detected in FADA monitoring wells, the permanent piezometer, or the six temporary piezometers. A possible explanation for this is that heavier petroleum hydrocarbons such as No. 6 fuel oil typically have low solubility limits in groundwater and are hydrophobic (i.e. they do not readily partition into groundwater) (Fetter, 1994; Murphy and Morrison, 2002).
- Based on the additional data collected during the Phase II RI, groundwater flow in the FADA appears to flow toward the south-southwest.
- All target HSL metals were below their respective RGs in groundwater samples collected from the nine FADA monitoring wells with the exception of arsenic, which was present in two shallow monitoring wells (MW-13 and MW-15). Arsenic was not detected in groundwater samples from any of the deep monitoring wells, or the sample from the downgradient shallow well (MW-20). Groundwater data collected in the FADA indicate that arsenic in groundwater is likely limited to localized areas within the FADA where coal ash leachate is proximate to well screens. This finding is consistent with the retardation calculations for arsenic which indicate that arsenic has very low mobility in groundwater (1.5 ft/yr) relative to the overall groundwater flow rate (242.6 ft/yr) in the FADA. In addition, the lack of arsenic in groundwater sampled at the deep FADA wells indicates that arsenic likely is not being transported from the FADA into the deeper portion of the aquifer.
- pH values above 9.0 were measured in shallow groundwater samples from MW-13, MW-14, and MW-15, possibly indicating that coal ash leachate from the FADA is creating more basic conditions in shallow groundwater. With the exception of groundwater at MW-15D, calcium concentrations were above background at all sampling locations. Chloride concentrations were above background in groundwater samples collected at MW-13D, MW-14, and MW-15D. Sulfate was above background concentration only at MW-20 while TOC concentrations were above background at MW-13D, MW-14,

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MW-15, and MW-20D. These results indicate that leachate from the FADA may be contributing calcium and TOC to groundwater in the vicinity of the FADA. However, there was no clear indication of contributions of chloride or sulfate to groundwater from the FADA.

- The BART test results indicate that groundwater microbial populations included aerobic bacteria at all sampled locations. Iron reducing bacteria were observed only at upgradient well MW-16 and downgradient well MW-20D. These results are consistent with ORP values that indicated groundwater in the vicinity of the FADA was slightly aerobic to mildly reducing. These geochemical conditions shed some insight on the potential for arsenic transport in groundwater in the vicinity of the FADA. Arsenic concentrations above 2L standards were observed in shallow groundwater at two locations. At both locations, the monitoring well may have been partially screened across ash-containing layers. The observed lack of arsenic at other shallow groundwater sampling locations and in the deeper portion of the aquifer may be due to adsorption of dissolved arsenic from coal ash leachate onto mineral surfaces in the aquifer matrix. Arsenic typically is less mobile under aerobic or mildly reducing conditions, such as those observed for groundwater in the vicinity of the FADA, and sorption of arsenic is favorable under these geochemical conditions (Kneebone et al., 2002; Dowling et al, 2002). Under more reducing conditions, arsenic may be released to groundwater due to reduction of iron- and manganese oxides and release of sorbed or co-precipitated arsenic (Dowling et al., 2002). However, the more strongly reducing conditions required for these reduction reactions to occur were not observed in groundwater in the vicinity of the FADA. These results indicate that impacts from the FADA are localized and that mobility of arsenic in groundwater in the vicinity of the FADA is limited.
- Based on the above findings, arsenic impacts in groundwater within the FADA have been adequately delineated.

## 4.2 Recommendations

Sufficient RI data have been collected to address the soil and groundwater conditions within the FADA; therefore, BBL and Progress Energy have determined that the RI process is complete. BBL recommends that a focused remedial action plan (RAP) should be prepared and submitted to the NCDENR as required under Section .0306 (1) and applicable portions of Appendix A of the REC Guidance to address the limited arsenic impacts detected in shallow groundwater within the FADA. The RAP will likely consist of a combination groundwater monitoring, and the use of institutional controls to address the limited groundwater impacts in the FADA.

## ***5. Certifications***

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Progress Energy (the Remediating party) and the Registered Site Manager (RSM) have completed the proper certification forms for the Phase II RI Report. RI Completion Certification forms (Form G-II) required under 15A NCAC 13C.0306(b)(5)(B) are provided at the front of this document. Each of these statements has been properly notarized, as required under the REC program regulations.

## 6. References

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## *Tables*

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Table 2-1  
Well and Piezometer Construction Details and Water Elevation Data (February, 2005)  
Phase II Remedial Investigation - Former Ash Disposal Area  
Progress Energy - L.V. Sutton Steam Electric Plant  
Wilmington, North Carolina

Well Designation	Completion Date	Well Diameter (inches)	Screen Interval (ft bgs)	Total Boring Depth (ft bgs)	TOC/Meas. Pt. Elevation <sup>1</sup> (ft msl)	Depth to Water (ft btoc)	Water Level Elevation (ft msl)	Groundwater Unit Depth
<b>Permanent Monitoring Wells</b>								
MW-13	5/25/04	2	3 - 13	13.0	18.21	7.89	10.32	Shallow
MW-13D	1/28/05	2	33 - 38	38.0	18.16	7.81	10.35	Deep
MW-14	5/25/04	2	1 - 11	11.0	14.15	4.23	9.92	Shallow
MW-15	5/25/04	2	1 - 11	11.0	11.47	3.35	8.12	Shallow
MW-15D	1/31/05	2	40 - 45	45.0	11.21	3.13	8.08	Deep
MW-16	6/7/04	2	2 - 12	12.0	16.91	6.75	10.16	Shallow
MW-16D	1/27/05	2	42 - 47	47.0	16.43	6.38	10.05	Deep
MW-20	2/2/05	2	4 - 14	14.0	13.70	7.92	5.78	Shallow
MW-20D	2/2/05	2	43 - 48	48.0	13.66	7.90	5.76	Deep
<b>Permanent Piezometer</b>								
PZ-10	5/25/04	2	1 - 11	11.0	12.82	3.43	9.39	Shallow
<b>Temporary Piezometers (Abandoned)</b>								
PZ-11	1/25/05	1	1-6	6.0	18.31	7.98	10.33	Shallow
PZ-12	1/25/05	1	1-6	6.0	15.90	7.14	8.76	Shallow
PZ-13	1/25/05	1	1-6	6.0	16.72	6.54	10.18	Shallow
PZ-14	1/25/05	1	1-6	6.0	15.80	4.23	11.57	Shallow
PZ-15	1/25/05	1	1-6	6.0	15.30	8.58	6.72	Shallow
PZ-16	1/25/05	1	1-6	6.0	9.97	2.86	7.11	Shallow

**Notes:**

1. Surveyed elevations based on TWT surveys conducted June 2004 and February 2005.

ft bgs = feet below ground surface.

ft msl = feet above mean sea level.

ft btoc = Feet below top of casing.

TOC = Top of casing.

Water level measurements taken on February 4, 2005.

**Table 3-1**  
**Test Pit and Soil Boring Descriptions for the Former Ash Disposal Area**  
**Progress Energy L.V. Sutton Electric Steam Plant**  
**Wilmington, North Carolina**

Location ID.	Date	Maximum Depth (ft bgs)	Depth Interval (ft bgs)	Lithologic Description	USCS Classification <sup>1</sup>	ASH Layer	Comments
<b>Test Pit ID.</b>							
TP-1	5/24/2004	1.8	(0.0-0.8)	Topsoil, brown Sand with Clay and organic matter, roots, moist.	Pt		
			(0.8-1.1)	SAND, black, medium grained, trace organics, roots, moist, trace oil substance visible.	SM		Petroleum staining observed.
			(1.1-1.8)	SAND, gray, medium grained, wet.	SM		
TP-2	5/24/2004	2.6	(0.0-0.2)	Topsoil, brown Sand with Clay and organic matter, roots, moist.	Pt		
			(0.2-2.6)	CLAYEY SAND, black to brown, trace organics, wet.	SC		
TP-3	5/24/2004	6.2	(0.0-0.4)	Topsoil, brown Sand with Clay and organic matter, roots, moist.	Pt		
			(0.4-1.5)	ASH, dark gray, silty, laminated.			
			(1.5-1.55)	SAND, light gray, fine grained.	SM		
			(1.55-2.05)	ASH, dark gray, silty, laminated.			
			(2.05-2.6)	SAND, dark gray, medium grained.	SM		
			(2.6-6.2)	ASH and SAND, dark gray, silt to fine grained, laminated.			Sample collected for laboratory analysis at 4 ft bgs.
TP-4	5/25/2004	4	(0.0-0.9)	Topsoil, brown Sand with Clay and organic matter, roots, moist.	Pt		
			(0.9-1.5)	SAND with trace ASH, brown, silt to medium grained.			
			(1.5-1.6)	SAND, light gray, medium grained.	SM		
			(1.6-1.9)	ASH, dark gray, silty.			
			(1.9-4)	SAND and ASH, dark gray, silt to fine grained.			
TP-5	5/25/2004	2.6	(0.0-0.3)	Topsoil, brown Sand with Clay and organic matter, roots, moist.	Pt		
			(0.3-1)	SAND, brown to tan, medium grained, wet.	SM		
			(1-1.8)	SAND, dark brown to black, fine to medium grained, wet.	SM		
			(1.8-2.6)	SAND, black, fine to medium grained.	SM		
TP-6	5/25/2004	4.6	(0.0-0.2)	Topsoil, brown Sand with Clay and organic matter, roots, moist.	Pt		
			(0.2-1.7)	ASH, dark gray, silty, trace organics.			
			(1.7-2.1)	SAND, dark gray to brown to gray, medium grained, visible roots.	SM		
			(2.1-4.6)	SAND and ASH, gray, silt to medium grained.			
TP-7	5/25/2004	7.0	(0.0-0.2)	Topsoil, brown Sand with Clay and organic matter, roots, moist.	Pt		
			(0.2-1.2)	SAND, dark gray, fine to medium grained.	SM		
			(1.2-3.3)	SAND, dark brown, medium grained.	SM		
			(3.3-3.5)	SAND, tan, medium grained, wet.	SM		
			(3.5-4.8)	SAND and ASH, fine to medium grained, laminated.			
			(4.8-7.0)	SAND, dark brown, medium grained, high organic content, roots.	SM		Perched groundwater at base of the SAND layer.
TP-8	5/25/2004	4.0	(0.0-0.3)	Topsoil, brown Sand with Clay and organic matter, roots, moist.	Pt		
			(0.3-0.9)	SAND, dark gray, fine to medium grained.	SM		
			(0.9-2.0)	SAND, brown to dark gray, medium grained.	SM		
			(2.0-4.0)	SAND, light gray, medium to coarse grained.	SM		Excavation unstable, undercaving

**Table 3-1**  
**Test Pit and Soil Boring Descriptions for the Former Ash Disposal Area**  
**Progress Energy L.V. Sutton Electric Steam Plant**  
**Wilmington, North Carolina**

Location ID.	Date	Maximum Depth (ft bgs)	Depth Interval (ft bgs)	Lithologic Description	USCS Classification <sup>1</sup>	ASH Layer	Comments
<b>Test Pit ID.</b>							
TP-9	5/25/2004	4.0	(0.0-0.2)	Topsoil, brown Sand with Clay and organic matter, roots, moist.	Pt		Excavation unstable, undercaving of lower SAND units.
			(0.2-1.2)	SAND, dark gray, medium grained, organics, roots.	SM		
			(1.2-2.9)	SAND, light brown to gray, medium grained, roots.	SM		
			(2.9-4.0)	SAND, light gray, medium to coarse grained.	SM		
TP-10	5/25/2004	7.4	(0.0-0.4)	Topsoil, brown Sand with Clay and organic matter, roots, moist.	Pt		Groundwater observed at 6.9 ft bgs. Overlying ash layer appears to retard groundwater in this area.
			(0.4-2.6)	SAND and ASH, gray, silt to medium grained.			
			(2.6-3.4)	SAND, brown, medium grained, moist.	SM		
			(3.4-6.9)	SAND and ASH, silt to medium grained, laminated, moist.			
TP-11	5/26/2004	6.2	(6.9-7.4)	SAND, dark gray, medium to coarse grained, organics, roots, wet.	SM		Groundwater observed at approximately 5 ft bgs Sample collected for laboratory analysis at 5 ft bgs.
			(0.0-0.4)	Topsoil, brown Sand with Clay and organic matter, roots, moist.	SM		
			(0.4-1.0)	SAND, light brown to dark brown, fine to medium grained.	SM		
			(1.0-2.6)	SAND and ASH, dark brown to black, silt to medium grained.			
TP-12	5/26/2004	8.6	(2.6-3.5)	SAND and ASH, dark gray to black, silt to fine grained.			Groundwater observed at approximately 8.4 ft bgs Petroleum staining observed. Sample collected for laboratory analysis at 5 ft bgs.
			(3.5-6.2)	SAND and ASH, silt to fine grained, laminated.			
			(0.0-0.4)	Topsoil, brown Sand with Clay and organic matter, roots, moist.	Pt		
			(0.4-1.8)	SAND and ASH, black, silt to fine grained.			
TP-13	5/26/2004	3.8	(1.8-3.9)	SAND, light brown to black, medium grained.	SM		Excavation unstable, undercaving.
			(3.9-4.6)	SAND, black, medium grained, trace organics and roots, moist.	SM		
			(4.6-8.6)	SAND and ASH, black and gray, fine grained, laminated.			
			(0.0-0.4)	Topsoil, brown Sand with Clay and organic matter, roots, moist.	Pt		
TP-14	5/26/2004	5.0	(0.4-1.2)	SAND, light to dark brown, medium grained.	SM		Groundwater observed at approximately 4 ft bgs.
			(1.2-1.6)	SAND, gray to black, medium grained.	SM		
			(1.6-3.8)	SAND, light brown to orange-brown, medium grained.	SM		
			(0.0-1.1)	Topsoil, brown Sand with Clay and organic matter, roots, moist.	SM		
TP-15	5/26/2004	7.0	(1.1-5.0)	SAND, orange-brown, fine to medium grained.	SM		Groundwater observed at approximately 4 ft bgs.
			(0.0-0.9)	SAND, gray, medium grained, organics, roots.	SM		
			(0.9-3.5)	SAND, light to dark brown, medium grained.	SM		
			(3.5-7.0)	ASH, gray, silty.			
TP-16	5/26/2004	4.5	(0.0-1.5)	SAND, gray, medium grained, organics, roots.	SM		Ash beds truncate at the south end of test pit, returning to SAND, orange-brown, medium grain at 2.8 ft bgs. Petroleum staining observed at 2.8 ft bgs. Sample collected for DRO and TN EPH laboratory analysis.
			(1.5-2.8)	SAND, dark brown, medium grained.	SM		
			(2.8-3.0)	SAND, black, medium grained, moist.	SM		
			(3.0-4.5)	SAND and ASH, gray to black, fine grained, laminated.			
TP-17	5/26/2004	5.0	(0.0-0.1)	Topsoil, brown Sand with Clay and organic matter, roots, moist.	Pt		
			(0.1-5)	SAND, light brown to gray, medium grained.	SM		

**Table 3-1**  
**Test Pit and Soil Boring Descriptions for the Former Ash Disposal Area**  
**Progress Energy L.V. Sutton Electric Steam Plant**  
**Wilmington, North Carolina**

Location ID.	Date	Maximum Depth (ft bgs)	Depth Interval (ft bgs)	Lithologic Description	USCS Classification <sup>1</sup>	ASH Layer	Comments
Test Pit ID.							
TP-18	5/26/2004	5.5	(0.0-0.4)	Topsoil, brown Sand with Clay and organic matter, roots, moist.	Pt		SAND, grey, medium grained, truncates at western edge. ASH layers and petroleum stained SAND truncates on the western edge to SAND, light brown to orange-brown.
			(0.4-1.9)	SAND, brown to gray, medium grained.	SM		
			(1.9-3.8)	SAND, light brown to black, medium grained.	SM		
			(3.8-4)	SAND, black, medium grained, moist.	SM		
			(4-4.8)	SAND and ASH, gray and black, silt to fine grained, laminated.			
			(4.8-5.5)	SAND, orange-brown, medium grained.	SM		
TP-19	5/26/2004	6.0	(0.0-0.6)	Topsoil, brown Sand with Clay and organic matter, roots, moist.	Pt		
			(0.6-1.2)	SAND, brown, gray to black, medium grained, visible cross bedding.	SM		
			(1.2-1.8)	SAND, light gray to white, medium grained.	SM		
			(1.8-6)	SAND, orange-brown to gray to black, medium grained, visible cross bedding.	SM		
TP-20	5/26/2004	5.0	(0.0-0.4)	Topsoil, brown Sand with Clay and organic matter, roots, moist.	Pt		Groundwater observed at approximately 4.5 ft bgs.
			(0.4-2.3)	SAND, dark brown to gray, medium grained.	SM		Visible petroleum sheen observed in groundwater.
			(2.3-3.1)	SAND and ASH, black, silt to fine grained.			
			(3.1-3.3)	SAND, black, medium grained, moist.	SM		Petroleum staining observed.
			(3.3-5)	SAND and ASH, black and gray, laminated.			
Soil Boring ID.							
SB-1	5/27/2004	4.0	(0.0-0.6)	Topsoil, brown Sand with Clay and organic matter, roots, moist.	Pt		
			(0.6-1.0)	SAND, gray, fine to medium grained.	SM		
			(1.0-2.6)	SAND, light brown to orange-brown, medium grained.	SM		
			(2.6-3.0)	SAND, dark brown, medium grained.	SM		
			(3.0-4.0)	SAND, black, medium grained.	SM		
SB-2	5/27/2004	6	(0.0-0.6)	Topsoil, brown Sand with Clay and organic matter, roots, moist.	Pt		
			(0.6-1.0)	SAND, gray to black, medium fine grained.	SM		
			(1.0-2.0)	SAND, black to brown, fine to medium grained.	SM		
			(2.0-4.0)	SAND and ASH, gray to brown, silt to fine grained, moist.			
			(4.0-4.25)	SAND and ASH, gray to white, medium grained.			
			(4.25-5.5)	SAND, gray to white, medium grained.	SM		
			(5.5-6.0)	ASH, gray, silty, wet, no odor.			
SB-3	5/27/2004	3.2	(0.0-0.3)	Topsoil, brown Sand with Clay and organic matter, roots, moist.	Pt		
			(0.3-2.0)	SAND, brown, medium grained.	SM		
			(2.0-3.0)	SAND, light brown to gray, medium grained.	SM		
			(3.0-3.2)	SAND, black, medium grained.	SM		
SB-4	5/27/2004	3	(0.0-0.6)	Topsoil, brown Sand with Clay and organic matter, roots, moist.	Pt		
			(0.6-1.0)	SAND, brown, medium grained, trace organics.	SM		
			(1.0-2.5)	SAND, light brown to gray, medium grained, trace fine gravel.	SM		
			(2.5-3.0)	SAND, orange-brown, medium grained.	SM		
SB-5	5/27/2004	3.9	(0.0-0.6)	Topsoil, brown Sand with Clay and organic matter, roots, moist.	Pt		
			(0.6-3.0)	SAND, white to gray, medium grained.	SM		
			(3.0-3.9)	SAND, dark brown to black, fine to medium grained, wet.	SM		

**Table 3-1**  
**Test Pit and Soil Boring Descriptions for the Former Ash Disposal Area**  
**Progress Energy L.V. Sutton Electric Steam Plant**  
**Wilmington, North Carolina**

Location ID.	Date	Maximum Depth (ft bgs)	Depth Interval (ft bgs)	Lithologic Description	USCS Classification <sup>1</sup>	Comments
<b>Test Pit ID.</b>						
SB-6	5/27/2004	5	(0.0-0.6)	Topsoil, brown Sand with Clay and organic matter, roots, moist.	Pt	
			(0.6-2.0)	SAND, brown, medium grained.	SM	
			(2.0-4.5)	SAND, black, medium grained, moist.	SM	Petroleum staining observed.
			(4.5-5)	ASH, black, silty.		Petroleum staining observed.
SB-7	5/27/2004	4.5	(0.0-0.5)	Topsoil, brown Sand with Clay and organic matter, roots, moist.	Pt	
			(0.5-1.0)	SAND and ASH, black, silt to fine grained.		
			(1.0-1.7)	SAND and ASH, black and gray, silt to fine grained, laminated.		
			(1.7-2.0)	SAND, light gray to brown, medium grained.	SM	
			(2.0-4.5)	SAND, light gray, medium grained.	SM	
SB-8	5/27/2004	5.2	(0.0-0.4)	Topsoil, brown Sand with Clay and organic matter, roots, moist.	Pt	
			(0.4-0.8)	SAND and ASH, black, silt to fine grained.		
			(0.8-1.5)	SAND and ASH, black and gray, fine grained, laminated.		
			(1.5-2.5)	ASH, gray, silty.		
			(2.5-3.2)	SAND and ASH, black and gray, silt to fine grained, laminated.		
			(3.2-4.8)	SAND and ASH, black, silt to fine grained.		
SB-9	5/27/2004	4.5	(4.8-5.2)	SAND, brown to orange-brown, medium grained.	SM	
			(0.0-0.6)	Topsoil, brown Sand with Clay and organic matter, roots, moist.	Pt	
			(0.6-1.0)	SAND, light brown, fine to medium grained.	SM	
			(1.0-1.5)	SAND, light to dark brown, medium grained.	SM	
			(1.5-3.5)	SAND and ASH, black and gray, silt to fine grained.		
			(3.5-4.0)	ASH, black, silty.		
SB-10	6/9/2004	4.0	(4.0-4.5)	SAND, dark brown, medium grained.	SM	
			(0.0-0.4)	Topsoil, brown Sand with Clay and organic matter, roots, moist.	Pt	
			(0.4-2.3)	SAND, dark brown to gray, medium grained.	SM	
			(2.3-3.1)	SAND and ASH, black, silt to fine grained.		
			(3.1-3.5)	SAND, black, medium grained, moist.	SM	Visible petroleum sheen observed in groundwater.
SB-11	6/9/2004	4.5	(3.5-4.0)	SAND, dark gray to black, silt to fine grained, wet.	SM	Soil sample collected for laboratory analysis.
			(0.0-0.4)	Topsoil, brown Sand with Clay and organic matter, roots, moist.	Pt	
			(0.4-1.8)	SAND and ASH, black, silt to fine grained.		
			(1.8-3.9)	SAND, light brown to black, medium grained.	SM	Visible petroleum sheen observed in groundwater.
SB-12	6/9/2004	4.0	(4.0-4.5)	SAND, dark gray to black, fine grained, wet.	SM	Soil sample collected for laboratory analysis.
			(0.0-2.0)	SAND, light brown to light gray, fine to medium grained.	SM	
			(2.0-4.0)	SAND and ASH, light gray, fine grained with trace silts, wet.		
SB-13	6/9/2004	4.0	(0.0-1.5)	SAND, brown to light brown, fine grained.	SM	
			(1.5-2.0)	SAND and ASH, gray, silt to fine grained, damp.		
			(2.0-4.0)	SAND, light brown to brown, fine to medium grained.	SM	
SB-14	6/9/2004	4.0	(0.0-1.0)	SAND, dark gray, fine to medium grained with trace silts.	SM	
			(1.0-4.0)	SAND, light brown to tan, fine to medium grained, damp to wet.	SM	
SB-15	6/9/2004	4.2	(0.0-4.2)	SAND, light brown, fine to medium grained, loose, damp to wet.	SM	
SB-16	6/9/2004	4.0	(0.0-3.5)	SAND and ASH, light gray to gray, silt to fine grained, wet.		
			(3.5-4.0)	SAND, brown, fine to medium grained, trace fine gravel, wet.	SM	
SB-17	6/9/2004	4.0	(0.0-4.2)	SAND and ASH, gray, mottled brown, silt to fine grained.		
SB-18	6/9/2004	4.0	(0.0-1.5)	SAND and ASH, gray, silt to fine grained.		
			(1.5-4.0)	SAND, light gray, fine to medium grained, trace coarse grains.	SM	

**Table 3-1**  
**Test Pit and Soil Boring Descriptions for the Former Ash Disposal Area**  
**Progress Energy L.V. Sutton Electric Steam Plant**  
**Wilmington, North Carolina**

Location ID.	Date	Maximum Depth (ft bgs)	Depth Interval (ft bgs)	Lithologic Description	USCS Classification <sup>1</sup>	ASH Layer	Comments
Test Pit ID.							
SB-19	1/25/2005	4.0	(0.0-0.2)	Topsoil, brown organic leaf litter.	Pt		
			(0.2-2.0)	ASH, light to dark gray, trace fine grained sand.			
			(2.0-2.5)	SAND and ASH, dark gray to black, fine to medium grained, wet.			
			(2.5-3.0)	SAND, dark brown, fine to medium grained, wet.	SM		
			(3.0-4.0)	SAND, brown, fine to medium grained, wet.	SM		
SB-20	1/25/2005	7.0	(0.0-0.2)	Topsoil, brown organic leaf litter.	Pt		
			(0.2-1.0)	SAND, gray, medium grained, trace ash.	SM		
			(1.0-2.0)	SAND and ASH, dark gray to black, fine to medium grained, moist.			
			(2.0-3.0)	ASH, light to dark gray, trace fine grained sand.			
			(3.0-4.0)	ASH, light to dark gray, trace fine grained sand, wet.			
			(4.0-4.5)	SAND and ASH, gray, fine grained, wet.			
			(4.5-5.0)	SAND and ASH, gray, medium to coarse grained, wet.			
			(5.0-5.5)	SAND and ASH, gray, fine grained, wet.			
			(5.5-6.0)	ASH, light gray, trace fine grained sand, wet.			
			(6.0-6.5)	SAND and ASH, gray,medium grained, wet.			
(6.5-7.0)	SAND, brown, medium grained, wet.	SM					
Surface Soil ID.							
SF-1	6/9/2004	1.2	(0.0-1.2)	SAND, dark brown to black, fine to medium grained, damp to wet.	SM		Surface soil sample collected at 0.8'-1.2', Petroleum staining observed.
SF-2	1/25/2005	1.0	(0.5-1.0)	SAND, brown to orange-brown, fine to medium grained.	SM		Background surface soil sample collected at 0.5'-1.0'.
SF-3	1/25/2005	1.0	(0.5-1.0)	SAND, gray to light gray, fine to medium grained, loose.	SM		Background surface soil sample collected at 0.5'-1.0'.
SF-4	1/25/2005	1.0	(0.5-1.0)	SAND, gray, fine to medium grained, loose.	SM		Background surface soil sample collected at 0.5'-1.0'.
SF-5	1/25/2005	1.0	(0.5-1.0)	SAND, brown to light brown, fine to medium grained.	SM		Background surface soil sample collected at 0.5'-1.0'.
SF-6	1/25/2005	1.0	(0.5-1.0)	SAND, brown to orange-brown, fine to medium grained.	SM		Background surface soil sample collected at 0.5'-1.0'.
SF-7	1/26/2005	1.0	(0.5-1.0)	SAND, brown, fine to medium grained, wet.	SM		Surface soil sample collected at 0.5'-1.0'.
SF-8	1/26/2005	1.0	(0.5-1.0)	SAND, brown, fine to medium grained, wet.	SM		Surface soil sample collected at 0.5'-1.0'.
SF-9	1/26/2005	1.0	(0.5-1.0)	SAND, brown, fine to medium grained, wet.	SM		Surface soil sample collected at 0.5'-1.0'.
SF-10	1/26/2005	1.0	(0.5-1.0)	SAND, brown, fine to medium grained, wet.	SM		Surface soil sample collected at 0.5'-1.0'.

**Notes:**



 - Indicates ash was observed during test pitting or hand augering.  
 - Indicates a sand and ash mix was observed during test pitting or hand augering.  
TP: "Test Pits" performed with a backhoe.  
SB: "Soil borings" advanced with a 2-inch stainless steel hand auger.  
SF: Surface soil sample.  
USCS: Unified Soil Classification System.  
1. Based on field observation.

Table 3-2  
Summary of Analytes Detected in Soil  
Phase II Remedial Investigation - Former Ash Disposal Area  
Progress Energy - L.V. Sutton Steam Electric Plant  
Wilmington, North Carolina

Sample ID: Sample Depth(ft bgs): Date Collected:	MSCC Residential Criteria	MSCC Soil-to Groundwater Criteria	Units	SB-22 (4.0-4.5) 4.0 - 4.5 01/26/05	SB-24 (4.0-4.5) 4.0 - 4.5 01/26/05	SB-26 (4.5-5.0) 4.5 - 5.0 01/26/05	SB-28 (4.0-4.5) 4.0 - 4.5 01/26/05	SB-29 (3.5-4.0) 3.5 - 4.0 01/27/05	SB-30 (2.5-3.0) 2.5 - 3.0 01/27/05	SB-31 (2.5-3.0) 2.5 - 3.0 01/27/05	SB-32 (3.5-4.0) 3.5 - 4.0 01/27/05	SF-7 (0.5-1.0) 0.5 - 1.0 01/26/05	SF-8 (0.5-1.0) 0.5 - 1.0 01/26/05	SF-9 (0.5-1.0) 0.5 - 1.0 01/26/05	SF-10 (0.5-1.0) 0.5 - 1.0 01/26/05
<b>MADEP - EPH/VPH*</b>															
C9-C18 Aliphatic Hydrocarbons (EPH)	9,386	3255	mg/kg	4 U	1.8 U	2.1 U	22	2.1 U [2.3 U]	1.8 U	2.1 U	2.2 U	51 J	4.4 U	9 J [13]	18 J
C11-C22 Aromatic Hydrocarbons (EPH)	469	34	mg/kg	9.2	5.9 J	5.9 J	26	7.1 J [3.3 J]	3.5 J	1.9 J	2.8 J	120 J	24 J	33 J [44 J]	20 J
C19-C36 Aliphatic Hydrocarbons (EPH)	93,860	considered immobile	mg/kg	28	59	12	99	20 [17]	6.4	3.5 U	4.6 U	280 J	49	82 J [98]	120 J
C5-C8 Aliphatic Hydrocarbons (VPH)	939	72	mg/kg	10	9.6	9.2	9.1	8.7 [9.2]	9.6	8.2	9.9	9.9	4.5	8.5 [10]	8.9
C9-C10 Aromatic Hydrocarbons (VPH)	469	34	mg/kg	1.6 U	1.6 U	2.8	2.3 J	16 [0.98 U]	1.1 U	0.87 U	1.4 U	6.9	1.5 U	2.2 J [5.6]	4.3
C9-C12 Aliphatic Hydrocarbons (VPH)	9,386	3255	mg/kg	5.2	5	4.8	4.7	4.5 [4.8]	5	4.3	5.1	5.1	2.4	4.4 [1.8 J]	4.6

Notes:

\* VPH samples were collected as an unmixed grab sample.

MADEP-EPH: Massachusetts Department of Environmental Protection Extractable Petroleum Hydrocarbon Method.

MADEP-VPH: Massachusetts Department of Environmental Protection Volatile Petroleum Hydrocarbon Method.

MSCC: Maximum Soil Contaminant Concentration, NCDENR 2001.

**Bolded and shaded** values indicate that the constituent exceeded the MSCC Soil-to-Groundwater Criteria.

mg/kg: milligrams per kilogram.

ft bgs: feet below ground surface.

SB: Soil Boring Sample.

SF: Surface Soil Sample.

NA: Not analyzed.

[ ]: Bracketed values are duplicate sample results.

Laboratory Qualifiers:

U: This flag indicates the analyte was analyzed for but not detected.

J: This flag indicates an estimated value.

**Table 3-3**  
**Summary of Analytes Detected in Background Soil**  
**Phase II Remedial Investigation - Former Ash Disposal Area**  
**Progress Energy - L.V. Sutton Steam Electric Plant**  
**Wilmington, North Carolina**

Sample ID:		RGs	SF-2 (0.5-1.0)	SF-3 (0.5-1.0)	SF-4 (0.5-1.0)	SF-5 (0.5-1.0)	SF-6 (0.5-1.0)
Sample Depth (ft bgs):			0.5 - 1.0	0.5 - 1.0	0.5 - 1.0	0.5 - 1.0	0.5 - 1.0
Date Collected:	Units		01/25/05	01/25/05	01/25/05	01/25/05	01/25/05
<b>HSL Metals by USEPA Method 6010 / 7470A (Hg only)</b>							
Antimony	mg/kg	6.2	0.2 U	0.21 U [0.2 U]	0.21 U	0.2 U	0.22 U
Arsenic	mg/kg	4.4	0.26 B	0.21 U [0.2 U]	0.21 U	0.38 B	0.43 B
Beryllium	mg/kg	30	0.02 B	0.01 U [0.01 U]	0.01 B	0.01 U	0.02 B
Cadmium	mg/kg	7.4	0.03 U	0.03 U [0.03 U]	0.03 U	0.03 U	0.03 U
Chromium	mg/kg	24000	1.8	0.06 U [0.06 U]	0.07 B	0.78 B	0.93 B
Copper	mg/kg	580	0.44 B	0.25 B [0.14 B]	0.19 B	0.27 B	0.31 B
Lead	mg/kg	400	2.4	0.42 [0.42]	0.84	2.3	1.7
Manganese	mg/kg	360	2.2	0.39 B [0.37B]	0.66 B	1.3	1.5
Mercury	mg/kg	4.6	0.016 U	0.015 U [0.015 U]	0.017 U	0.016 U	0.018 U
Nickel	mg/kg	320	0.36 B	0.08 U [0.08 U]	0.24 B	0.08 U	0.17 B
Selenium	mg/kg	78	0.26 U	0.27 U [0.26 U]	0.27 U	0.26 U	0.29 U
Silver	mg/kg	78	0.08 U	0.08 U [0.08 U]	0.08 U	0.08 U	0.09 U
Thallium	mg/kg	1.04	0.29 U	0.3 U [0.29U]	0.3 U	0.29 U	0.32 U
Zinc	mg/kg	4600	2.5	0.85 U [1.1 U]	0.87 U	1.5 B	1.4 B

**Notes:**

mg/kg: milligrams per kilogram.

RGs: Soil Remediation Goals, Inactive Hazardous Sites Branch, updated August 2003.

HSL: Hazardous Substance List.

[ ]: Bracketed values are duplicate sample results.

SF: Surface soil sample.

ft bgs: feet below ground surface.

**Laboratory Qualifiers:**

U: This flag indicates the analyte was analyzed for but not detected.

B: The analyte was less than the contract required detection limit, but greater than or equal to the instrument detection limit.



**Table 3-4**  
**Site Survey Data**  
**Phase II Remedial Investigation - Former Ash Disposal Area**  
**Progress Energy - L.V. Sutton Steam Electric Plant**  
**Wilmington, North Carolina**

Well Designation	Northing	Easting	Ground <sup>1</sup> Elevation (ft msl)	Top of Casing Elevation (ft msl)
<b>Permanent Monitoring Wells</b>				
MW-13	197948.14	2305008.16	15.09	18.21
MW-13D	197965.38	2305017.45	15.53	18.16
MW-14	197252.17	2306178.43	10.96	14.15
MW-15	196475.65	2306044.01	8.53	11.47
MW-15D	196476.98	2306061.06	8.61	11.21
MW-16	196975.93	2306753.16	14.11	16.91
MW-16D	196962.70	2306758.11	14.00	16.43
MW-20	196257.98	2305318.10	10.78	13.70
MW-20D	196256.89	2305326.09	10.73	13.66
<b>Permanent Piezometer</b>				
PZ-10	196897.50	2306271.49	10.15	12.82
<b>Temporary Piezometers</b>				
PZ-11	197824.56	2305109.88	15.76	18.31
PZ-12	197004.43	2305068.36	11.17	15.90
PZ-13	197188.14	2305495.92	11.21	16.72
PZ-14	196911.31	2305327.01	10.58	15.80
PZ-15	196508.86	2305223.83	10.05	15.30
PZ-16	196384.40	2305681.97	8.01	9.97
<b>Surface Water and Sediment Sample Locations</b>				
SW-1/SD-1	196378.52	2302994.45	-1.00	NA
SW-2/SD-2	193800.36	2304984.17	-1.00	NA

**Notes:**

Surveyed elevations based on TWT survey conducted in June 2004 and February 2005.

ft msl = feet above mean sea level.

NA = Not applicable.

1. SW-1/SW-2 elevation is feet below mean sea level.

**Table 3-5**  
**Historical Groundwater Elevation Data**  
**Phase II Remedial Investigation - Former Ash Disposal Area**  
**Progress Energy - L.V. Sutton Steam Electric Plant**  
**Wilmington, North Carolina**

Well Designation	Date	Top of Casing Elevation (ft amsl)	Depth to Water (ft btoc)	Groundwater Elevation (ft msl)
<b>Permanent Monitoring Wells</b>				
MW-13	6/04	18.21	8.96	9.25
	2/04	18.21	7.89	10.32
MW-13D	2/04	18.16	7.81	10.35
MW-14	6/04	14.15	5.16	8.99
	2/04	14.15	4.23	9.92
MW-15	6/04	11.47	2.94	8.53
	2/04	11.47	3.35	8.12
MW-15D	2/04	11.21	3.13	8.08
MW-16	6/04	16.91	7.60	9.31
	2/04	16.91	6.75	10.16
MW-16D	2/04	16.43	6.38	10.05
MW-20	2/04	13.70	7.92	5.78
MW-20D	2/04	13.66	7.90	5.76
<b>Permanent Piezometer</b>				
PZ-10	6/04	12.82	4.31	8.51
	2/04	12.82	3.43	9.39

**Notes:**

ft amsl = feet above mean sea level.

ft msl = feet mean sea level.

ft btoc = feet below top of casing.

D denotes deep groundwater monitoring well.

**Table 3-6**  
**Stabilized Field Parameter Measurements - February 2005**  
**Phase II Remedial Investigation - Former Ash Disposal Area**  
**Progress Energy - L.V. Sutton Steam Electric Plant**  
**Wilmington, North Carolina**

<b>Sample Designation</b>	<b>pH (Std. Units)</b>	<b>Specific Conductivity (μS/cm)</b>	<b>Temperature (°F)</b>	<b>Dissolved Oxygen (mg/L)</b>	<b>ORP (mV)</b>	<b>Turbidity (NTUs)</b>
MW-13	9.18	585	61.0	0.40	94	5.0
MW-13D	8.30	898	66.0	0.32	158	7.0
MW-14	9.65	360	52.0	0.40	110	9.0
MW-15	9.13	296	57.0	0.31	143	9.0
MW-15D	8.66	498	65.0	0.29	175	1.0
MW-16	8.45	180	60.0	0.51	107	9.0
MW-16D	6.68	528	68.0	0.31	252	0.0
MW-20	7.85	326	63.1	0.28	45	4.0
MW-20D	7.80	561	62.7	0.55	127	5.0

**Notes:**

Field parameter measurement collected utilizing an Horiba U-22 water quality meter.

ORP = Oxidation-reduction potential.

uS = Microsiemens.

°F = Degrees Fahrenheit.

mg/L = Milligrams per liter.

mV = Millivolts.

NTU = Nephelometric turbidity units.

Table 3-7  
Summary of Analytes Detected in Groundwater  
Phase II Remedial Investigation - Former Ash Disposal Area  
Progress Energy- L.V. Sutton Steam Electric Plant  
Wilmington, North Carolina

Sample ID: Date Collected:	RGs	Units	MW-13 02/02/05	MW-13D 02/02/05	MW-14 02/02/05	MW-15 02/02/05	MW-15D 02/02/05	MW-16 02/02/05	MW-16D 02/02/05	MW-20 02/04/05	MW-20D 02/04/05
<b>HSL Metals by USEPA Method 6010B</b>											
Arsenic	10	ug/L	<b>99.1 [103]</b>	3.6 U	9.6 B	<b>44</b>	3.6 U	3.6 U	4.3 B	3.6 U [3.6 U]	3.6 U
Chromium	50	ug/L	0.9 UJ [0.9 UJ]	0.9 UJ	0.9 UJ	0.9 UJ	0.9 UJ	0.9 UJ	0.9 UJ	0.9 UJ [0.9 UJ]	0.9 UJ
Copper	1000	ug/L	0.55 B [0.5 U]	0.5 U	0.59 B	0.5 U	0.5 U	0.65 B	0.5 U	0.59 B [0.91 B]	1.1 B
Thallium	NL	ug/L	10 UJ [6.2 UJ]	10 UJ	6.2 UJ	10 UJ	6.2 UJ	6.9 UJ	8 UJ	6.2 UJ [6.2 UJ]	6.2 UJ
Zinc	2100	ug/L	20 U [20 U]	20 U	20 U	20 U	20 U	23 U	35.3 U	24.3 U [26.2 U]	21.9 U
<b>Geochemical Parameters</b>											
Calcium	NL	mg/L	125 [129]	84.4	34.1	63.4	35.9	5.39	33.7	79.9 [84.2]	65.3
Chloride	NL	mg/L	3.11 [3.14]	154	46.2	2.84	54.7	21.4	76.4	2.35 [2.08]	68.7
Sulfate	NL	mg/L	8.82 [8.0]	141	9.87	16.8	74.5	25.2	128	44.7 [43.5]	96.8
Total Organic Carbon	NL	mg/L	5 U [2.91 J]	9.28	14	13.7	3.99 J	6.63	3.41 J	5.27 [5.51]	9.08

**Notes:**

ug/L: micrograms per liter.

mg/L: milligrams per liter.

RGs: Remediation Goals based on NCAC 2L Groundwater Standards.

HSL: Hazardous Substance List.

[ ]: Bracketed values are duplicate sample results.

NL: No established RG.

**Shaded and bolded** values indicate that the constituent exceeded the groundwater RGs.

**Organic Laboratory Qualifiers:**

U: This flag indicates the analyte was analyzed for but not detected.

J: This flag indicates an estimated value.

**Inorganic Laboratory Qualifiers:**

UJ: This flag indicates the analyte was not detected and the detection limit is an estimated value.

U: This flag indicates the analyte was analyzed for but not detected.

B: The analyte was less than the contract required detection limit, but greater than or equal to the instrument detection limit.

J: This flag indicates an estimated value.

Table 3-8  
Summary of Historical Analytes Detected in Groundwater  
Phase II Remedial Investigation - Former Ash Disposal Area  
Progress Energy- L.V. Sutton Steam Electric Plant  
Wilmington, North Carolina

Sample ID: Date Collected:	RGs	MW-13 06/21/04	MW-13 02/02/05	MW-13D 02/02/05	MW-14 06/21/04	MW-14 02/02/05	MW-15 06/21/04	MW-15 02/02/05	MW-15D 02/02/05	MW-16 06/21/04	MW-16D 02/02/05	MW-20 02/02/05	MW-20D 02/02/05
<b>Volatile Organic Compounds by USEPA Method 8260</b>													
2-Hexanone	--	2.5 U	NS	NS	0.5 J	NS	2.5 U [0.53 J]	NS	NS	2.5 U	NS	NS	NS
Acetone	700	3.3	NS	NS	6.6	NS	5.5 [6.2]	NS	NS	2.5 U	NS	NS	NS
Methylene Chloride	5	0.26 J	NS	NS	0.25 J	NS	0.24 J [0.13 J]	NS	NS	0.19 J	NS	NS	NS
Toluene	1000	0.39 J	NS	NS	0.38 J	NS	0.56 [0.56]	NS	NS	0.26 J	NS	NS	NS
<b>Semi-Volatile Organic Compounds by USEPA Method 8270</b>													
None Detected	--	--	NS	NS	--	NS	--	NS	NS	--	NS	NS	NS
<b>HSL Metals by USEPA Method 6010</b>													
Antimony	--	1.9 U*	NS	NS	1.9 U*	NS	1.9 U* [2.1 B*]	NS	NS	2.8 B*	NS	NS	NS
Arsenic	10	70.6 *	99.1 [103]	3.6 U	10.9 *	9.6 B	41.3 * [44.1*]	44	3.6 U	3.5 B*	4.3 B	3.6 U [3.6 U]	3.6 U
Chromium	50	0.8 U*	0.9 UJ [0.9 UJ]	0.9 UJ	1.1 B*	0.9 UJ	0.8 U* [2.4 B*]	0.9 UJ	0.9 UJ	0.8 U*	0.9 UJ	0.9 UJ [0.9 UJ]	0.9 UJ
Copper	1000	1.3 U*	0.55 B [0.5 U]	0.5 U	1.3 U*	0.59 B	1.4 B* [1.3 U*]	0.5 U	0.5 U	1.4 B*	0.5 U	0.59 B [0.91 B]	1.1 B
Nickel	100	0.7 U*	NS	NS	0.72 B*	NS	0.7 U* [0.70 U]	NS	NS	0.93 B*	NS	NS	NS
Thallium	--	3.2 UN*	10 UJ [6.2 UJ]	10 UJ	3.2 UN*	6.2 UJ	3.2 UN* [3.2 U]	10 UJ	6.2 UJ	4.7 BN*	8 UJ	6.2 UJ [6.2 UJ]	6.2 UJ
Zinc	2100	10.2 B*	20 U [20 U]	20 U	11.2 B*	20 U	11.7 B* [11.7 B*]	20 U	20 U	11.6 B*	35.3 U	24.3 U [26.2 U]	21.9 U

**Notes:**

All concentrations in micrograms per liter (ug/L).

RGs: Remediation Goals based on NCAC 2L Groundwater Standards.

HSL: Hazardous Substance List.

Bold values Indicates that the constituent was detected.

Shaded values indicates that the constituent exceeded the RGs.

**Organic Laboratory Qualifiers:**

U: This flag indicates the analyte was analyzed for but not detected.

J: This flag Indicates an estimated value.

**Inorganic Laboratory Qualifiers:**

UJ: This flag indicates that the analyte was not detected and the detection limit is an estimated value.

U: This flag indicates the analyte was analyzed for but not detected.

B: The analyte was less than the contract required detection limit, but greater than or equal to the instrument detection limit.

N: This flag Indicates the sample spike recovery is outside of control limits.

\*: This flag is used for duplicate analysis when the sample and the sample duplicate results are not within the control limits.

**Table 3-9**  
**Microbiological Community Data - February 2005**  
**Phase II Remedial Investigation - Former Ash Disposal Area**  
**Progress Energy - L.V. Sutton Steam Electric Plant**  
**Wilmington, North Carolina**

Sample Designation	Sample Date	Present or Absent	Dominant Bacteria
<b>Heterotrophic Aerobic Bacteria (HAB) Results<sup>1</sup></b>			
MW-13D	2/2/05	Present	Aerobic
MW-15D	2/2/05	Present	Aerobic
MW-16D	2/2/05	Present	Aerobic
MW-20	2/4/05	Present	Aerobic
MW-20D	2/4/05	Present	Aerobic
<b>Iron Related Bacteria (IRB) Results<sup>1</sup></b>			
MW-13D	2/2/05	Present	Pseudomonads & Enterics
MW-15D	2/2/05	Present	Pseudomonads & Enterics
MW-16D	2/2/05	Present	IRB
MW-20	2/4/05	Present	Pseudomonads & Enterics
MW-20D	2/4/05	Present	IRB

Notes:

Aerobic: Characterized by the presence of free oxygen.

IRB: Iron Related Bacteria.

1. All samples collected per manufacturer specifications.

**Table 3-10**  
**Summary of Quality Assurance and Quality Control Analytical Results**  
**Phase II Remedial Investigation - Former Ash Disposal Area**  
**Progress Energy - L.V. Sutton Steam Electric Plant**  
**Wilmington, North Carolina**

Sample ID: Date Collected:	Units	EB-012505 01/25/05	EB-012605 01/26/05	EB-020205 02/02/05	TB-012705 01/27/05
<b>HSL Metals by USEPA Method 6010</b>					
Antimony	ug/L	13	NA	NA	NA
Copper	ug/L	1.4 B	NA	0.5 U	NA
Lead	ug/L	1.6 B	NA	NA	NA
Manganese	ug/L	0.24 B	NA	NA	NA
Zinc	ug/L	20.6	NA	13 B	NA
<b>MADEP-VPH/EPH</b>					
C11-C22 Aromatic Hydrocarbons (EPH)	ug/L	NA	49 J	NA	NA
C19-C36 Aliphatic Hydrocarbons (EPH)	ug/L	NA	68 B	NA	NA
C9-C18 Aliphatic Hydrocarbons (EPH)	ug/L	NA	21 JB	NA	NA
C9-C10 Aromatic Hydrocarbons (VPH)	ug/L	NA	5.8 JB	NA	4.9 JB

**Notes:**

MADEP-EPH: Massachusetts Department of Environmental Protection Extractable Petroleum Hydrocarbon Method.

MADEP-VPH: Massachusetts Department of Environmental Protection Volatile Petroleum Hydrocarbon Method.

HSL: Hazardous Substance List.

NA: Not analyzed for constituent.

EB: Equipment Rinsate Blank.

TB: VOC Trip Blank.

**Organic Laboratory Qualifiers:**

J: This flag indicates an estimated value.

B: The analyte was found in the associated method blank.

**Inorganic Laboratory Qualifiers:**

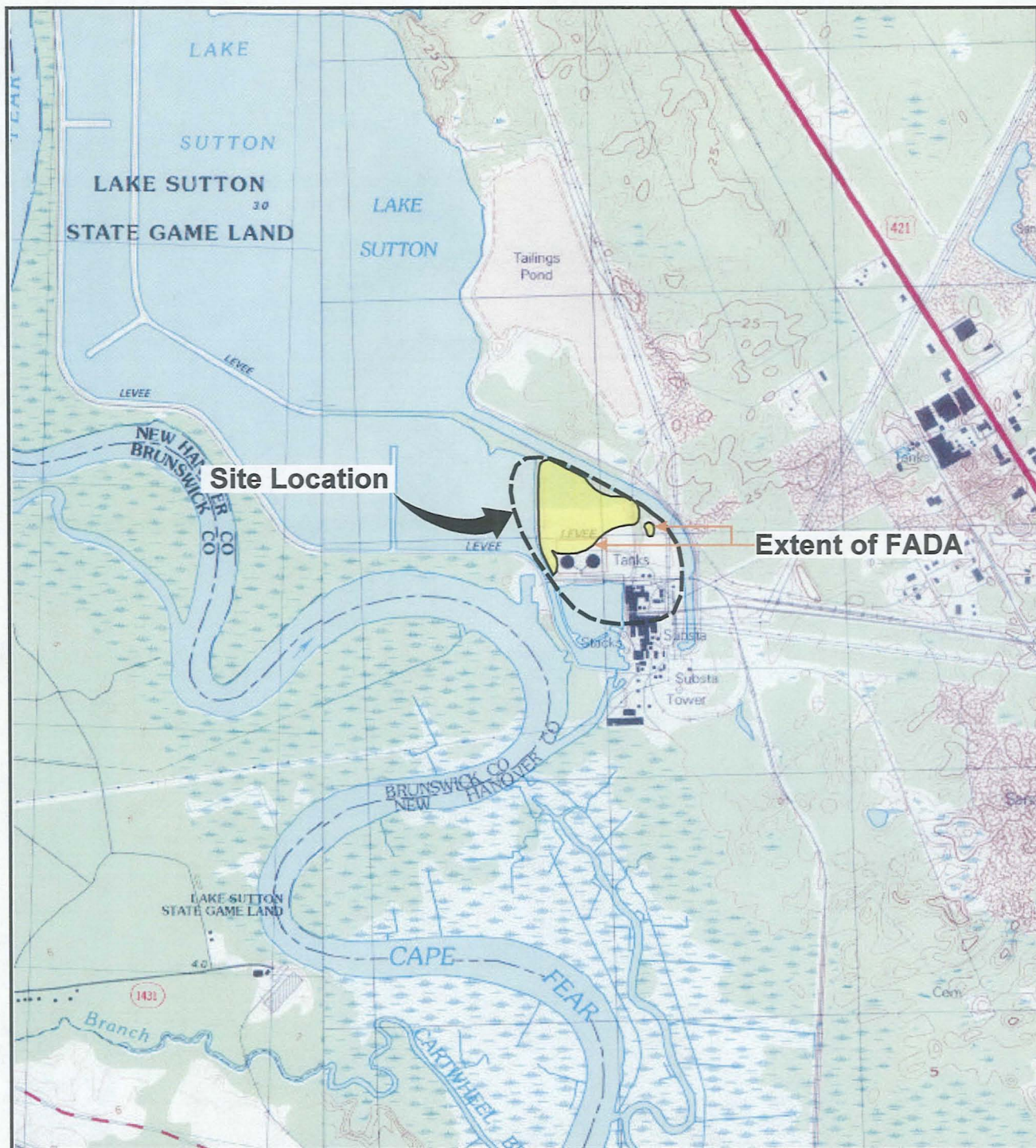
U: This flag indicates the analyte was analyzed for but not detected.

B: The analyte was less than the contract required detection limit, but greater than or equal to the instrument detection limit.

## *Figures*

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REFERENCE: BASE MAP USGS 7.5 MIN. QUADS., CASTLE HAYNE, NC, 1997, AND LELAND, NC, 1997.

2000' 0 2000'  
Approximate Scale: 1" = 2000'



Area Location

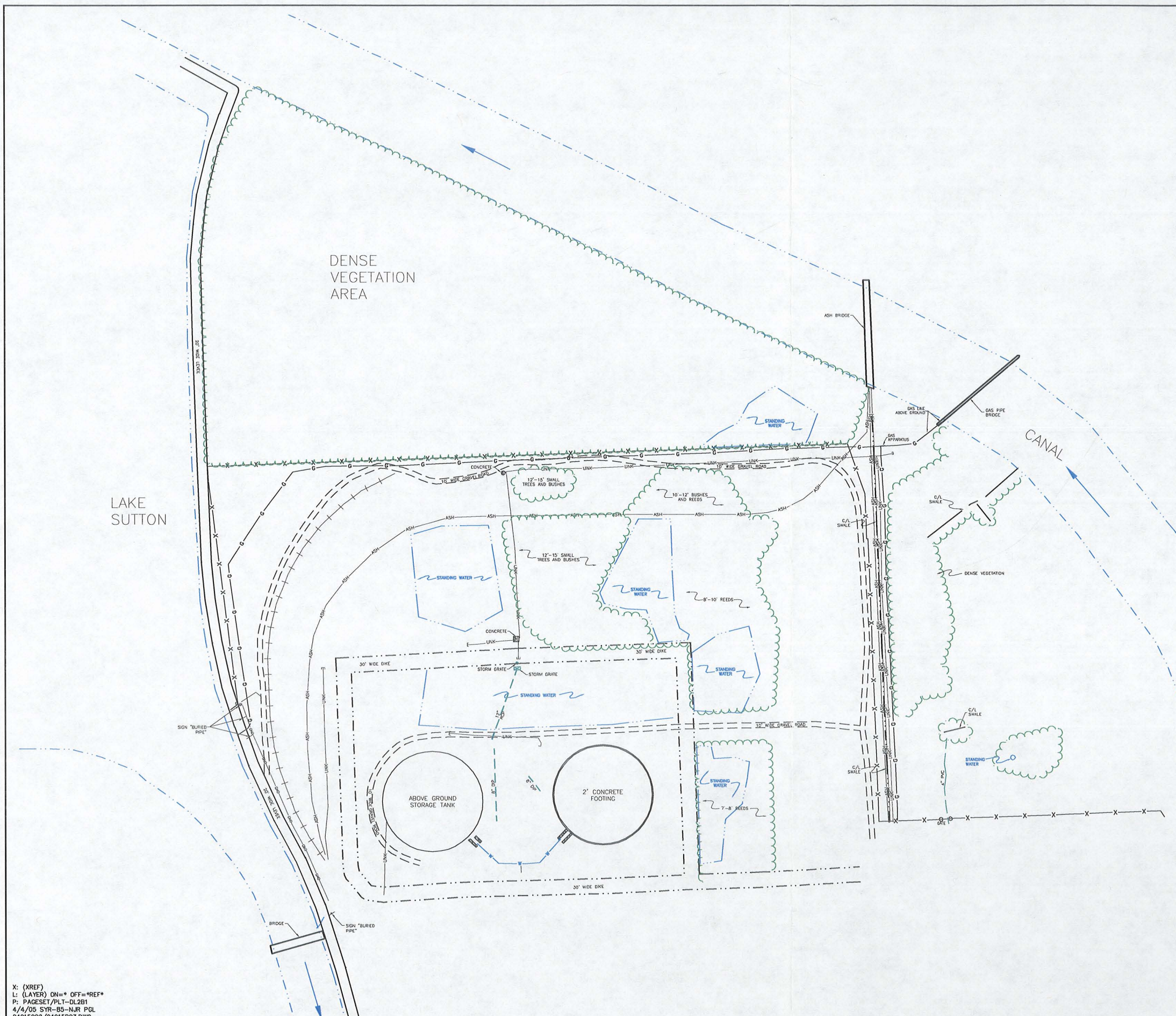
PROGRESS ENERGY  
L. V. SUTTON STEAM ELECTRIC PLANT, WILMINGTON, N.C.  
PHASE II REMEDIAL INVESTIGATION REPORT -  
FORMER ASH DISPOSAL AREA

## SITE LOCATION MAP

**BBL**  
BLASLAND, BOUCK & LEE, INC.  
engineers, scientists, economists

FIGURE  
1-1



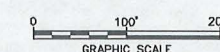


# LINE LEGEND

— X — X — X — X —	FENCE LINE
— G — G — G — G —	GAS LINE
— ASH — ASH — ASH —	ASH LINE
— GND — GND — GND —	GROUND WIRE LINE
— W — W — W — W —	UNDERGROUND ELECTRIC
— — — — —	WATER LINE
— — — — —	DIKE LINE
— — — — —	STANDING WATER
— — — — —	STORM PIPE
— + — + — + — + —	RAILROAD TRACK (C/L)
— — — — —	TREE/VEGETATION LINE
— UNK — UNK — UNK —	UNKNOWN LINE
— — — — —	GRAVEL ROAD

## NOTE:

1. SOURCE: SURVEY PROVIDED BY 'TAYLOR, WISEMAN & TAYLOR', 3500 Regency Parkway, Suite H, Cary N.C., 919-297-0085, (PROJECT NO. 70488.0005) DATED JUNE 23, 2004. REVISIONS MADE ON JULY 7, 2004 AND FEB. 23, 2005.



PROGRESS ENERGY  
L.V. SUTTON STEAM ELECTRIC PLANT, WILMINGTON, N.C.  
PHASE II REMEDIAL INVESTIGATION REPORT

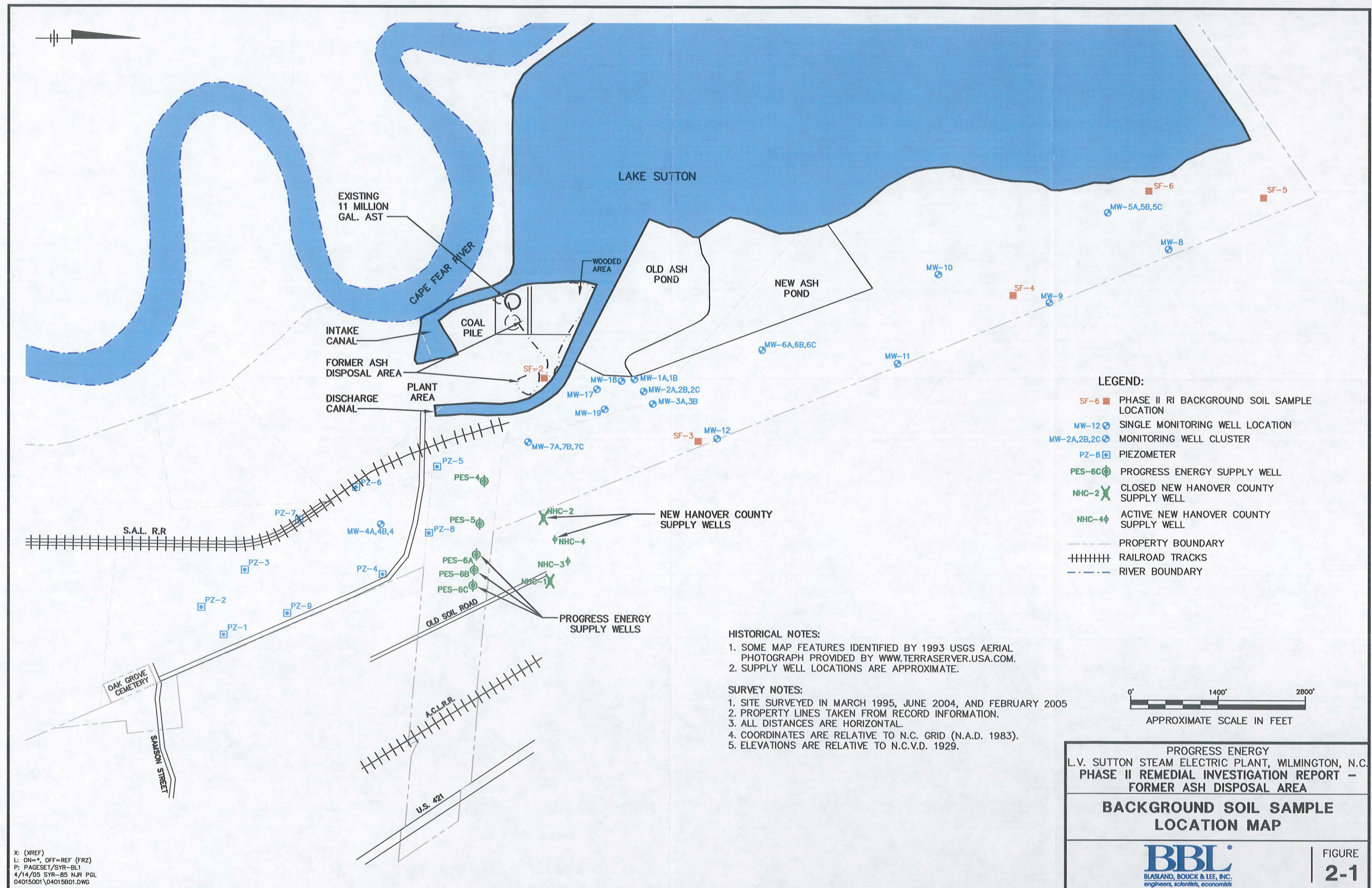
## SITE PLAN

**BBL**  
BLASLAND, BOUCK & LEE, INC.  
engineers, scientists, economists

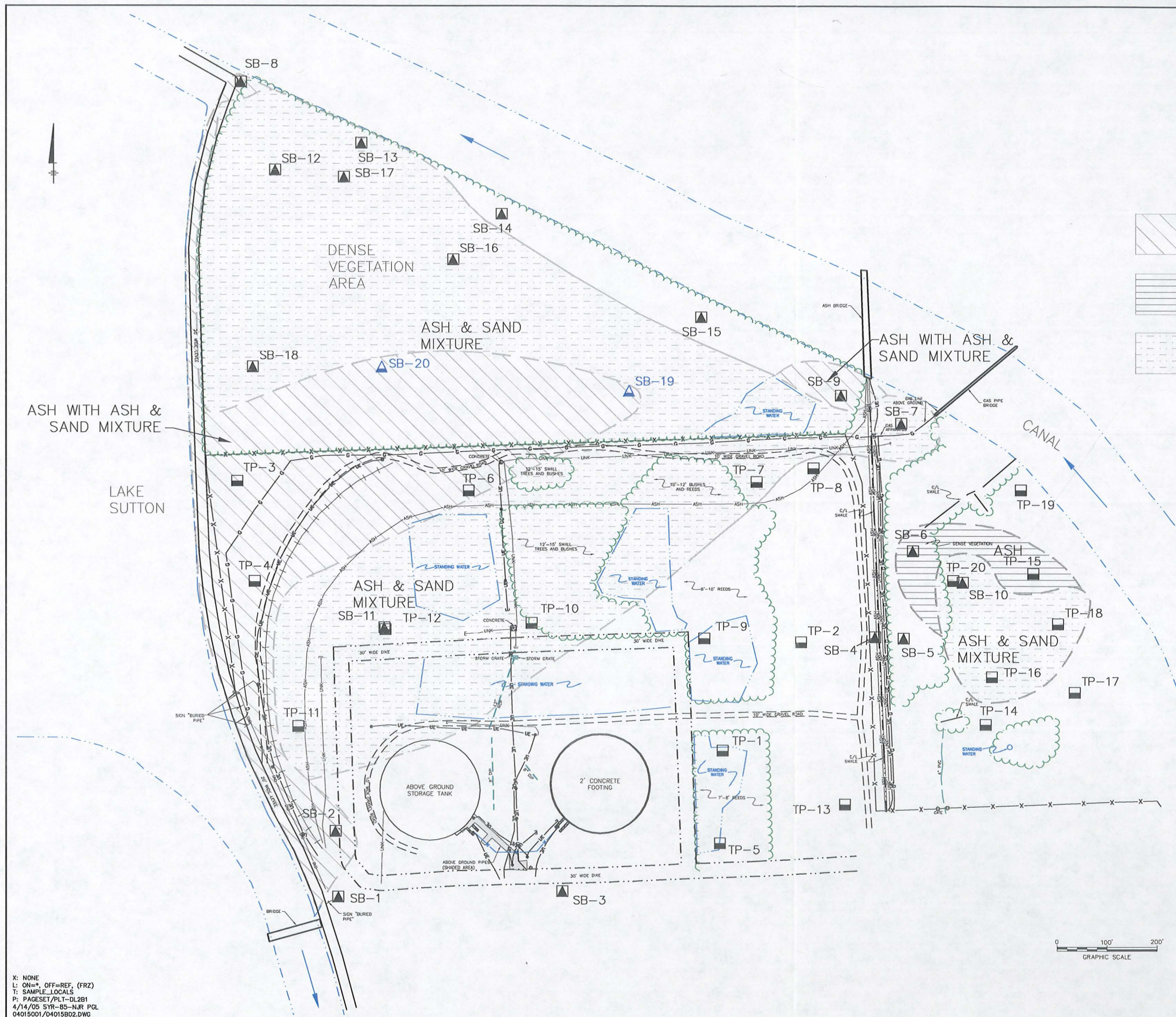
FIGURE  
1-2

X: (XREF)  
L: (LAYER) ON=+ OFF=-REF\*  
P: PAGESET/PLT-DL2B1  
4/4/05 SYR-B5-NJR PGL  
04015002/04015803.DWG









## SYMBOL LEGEND

- UTILITY RISER
- \* LIGHT POLE
- PHASE I RI TEST PIT LOCATION
- ▲ PHASE I RI SOIL BORING LOCATION
- ▲ PHASE II RI SOIL BORING LOCATION
- APPROXIMATE EXTENT OF ASH; ASH & SAND MIXTURE (DASHED WHERE INFERRED)
- ▨ DEFINABLE ASH LAYER PRESENT WITH ALTERNATING LAYERS OF SAND AND ASH MIXTURE
- ▨ DEFINABLE ASH LAYER VARYING IN DEPTH AND THICKNESS AND BOUND BY SAND LAYERS
- ▨ ALTERNATING LAYERS OF AN ASH & SAND MIXTURE WITH INTERBEDDED SANDS; A DISTINCT ASH LAYER IS NOT PRESENT

## LINE LEGEND

- X—X—X—X— FENCE LINE
- G—G—G—G— GAS LINE
- ASH—ASH—ASH—ASH— ASH LINE
- GND—GND—GND—GND— GROUND WIRE LINE
- UE—UE—UE—UE— UNDERGROUND ELECTRIC
- W—W—W—W— WATER LINE
- DIKE LINE
- STANDING WATER
- STORM PIPE
- RAILROAD TRACK (C/L)
- TREE/VEGETATION LINE
- UNKNOWN LINE
- GRAVEL ROAD

## NOTES:

1. DELINEATION BASED ON TEST PIT, SOIL BORING, AND WELL INSTALLATION DURING PHASE I AND II REMEDIAL INVESTIGATION (MAY 2004 THROUGH FEBRUARY 2005).
2. SOURCE: SURVEY PROVIDED BY 'TAYLOR, WISEMAN & TAYLOR', 3500 Regency Parkway, Suite H, Cary N.C., 919-297-0085, (PROJECT NO. 70488.0005) DATED JUNE 23, 2004. REVISIONS MADE ON JULY 7, 2004 AND FEB. 23, 2005.

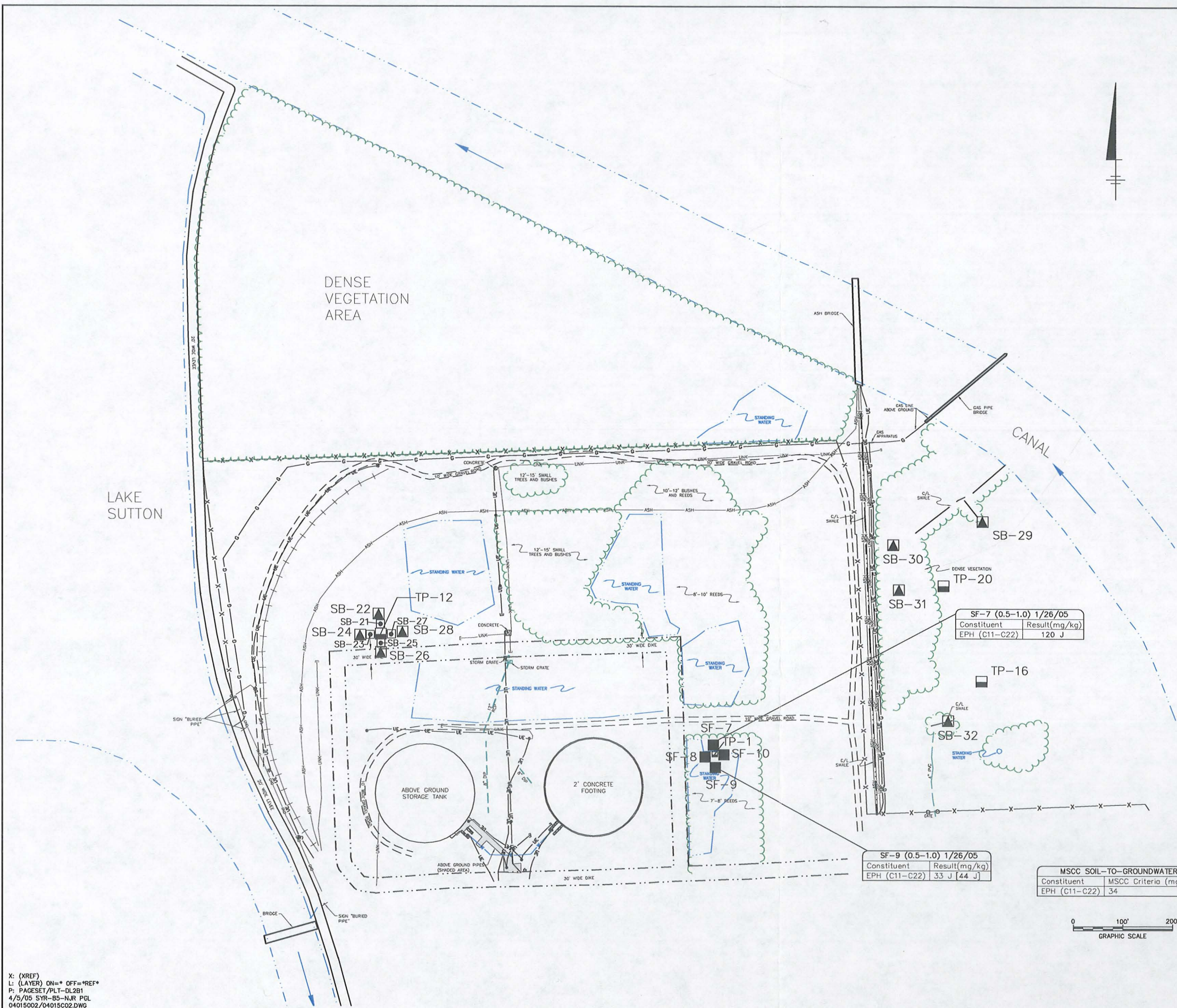
X: NONE  
L: ON=\*, OFF=REF, (FRZ)  
T: SAMPLE LOCALS  
P: PAGESET/PLT-DL2B1  
4/14/05 SYR-85-NJR PGL  
04015001/04015B02.DWG

PROGRESS ENERGY  
L.V. SUTTON STEAM ELECTRIC PLANT, WILMINGTON, N.C.  
PHASE II REMEDIAL INVESTIGATION REPORT  
- FORMER ASH DISPOSAL AREA  
HORIZONTAL EXTENT OF ASH  
WITHIN THE  
FORMER ASH DISPOSAL AREA

**BBL**  
BURNING BROS. & CO., INC.  
BURNING BROS. & CO., INC.

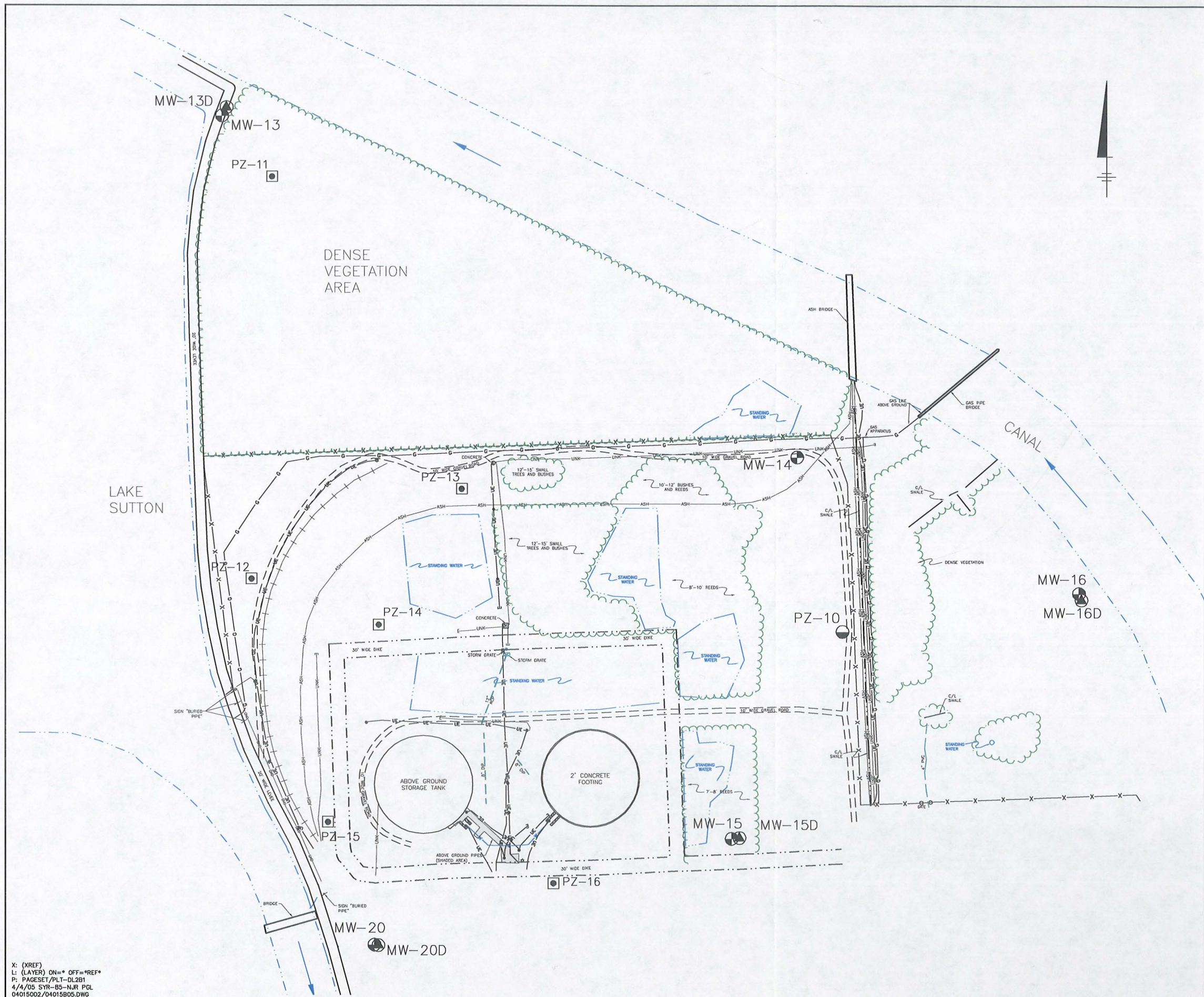
FIGURE  
**2-2**





X: (XREF)  
L: (LAYER) ON= OFF=REF  
P: PAGESET/PLT-DL2B1  
4/5/05 SYR-B5-NJR PGL  
04015002/04015002.DWG





# SYMBOL LEGEND

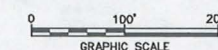
- EXISTING DEEP MONITORING WELL
- EXISTING SHALLOW MONITORING WELL
- TEMPORARY PIEZOMETER (1-INCH)
- PERMANENT PIEZOMETER
- UTILITY RISER
- LIGHT POLE

# LINE LEGEND

- FENCE LINE
- GAS LINE
- ASH LINE
- GROUND WIRE LINE
- UNDERGROUND ELECTRIC
- WATER LINE
- DIKE LINE
- STANDING WATER
- STORM PIPE
- RAILROAD TRACK (C/L)
- TREE/VEGETATION LINE
- UNKNOWN LINE
- GRAVEL ROAD

# NOTE:

1. SOURCE: SURVEY PROVIDED BY 'TAYLOR, WISEMAN & TAYLOR', 3500 Regency Parkway, Suite H, Cary N.C., 919-297-0085, (PROJECT NO. 70488.0005) DATED JUNE 23, 2004. REVISIONS MADE ON JULY 7, 2004 AND FEB. 23, 2005.



PROGRESS ENERGY  
L.V. SUTTON STEAM ELECTRIC PLANT, WILMINGTON, N.C.  
PHASE II REMEDIAL INVESTIGATION REPORT

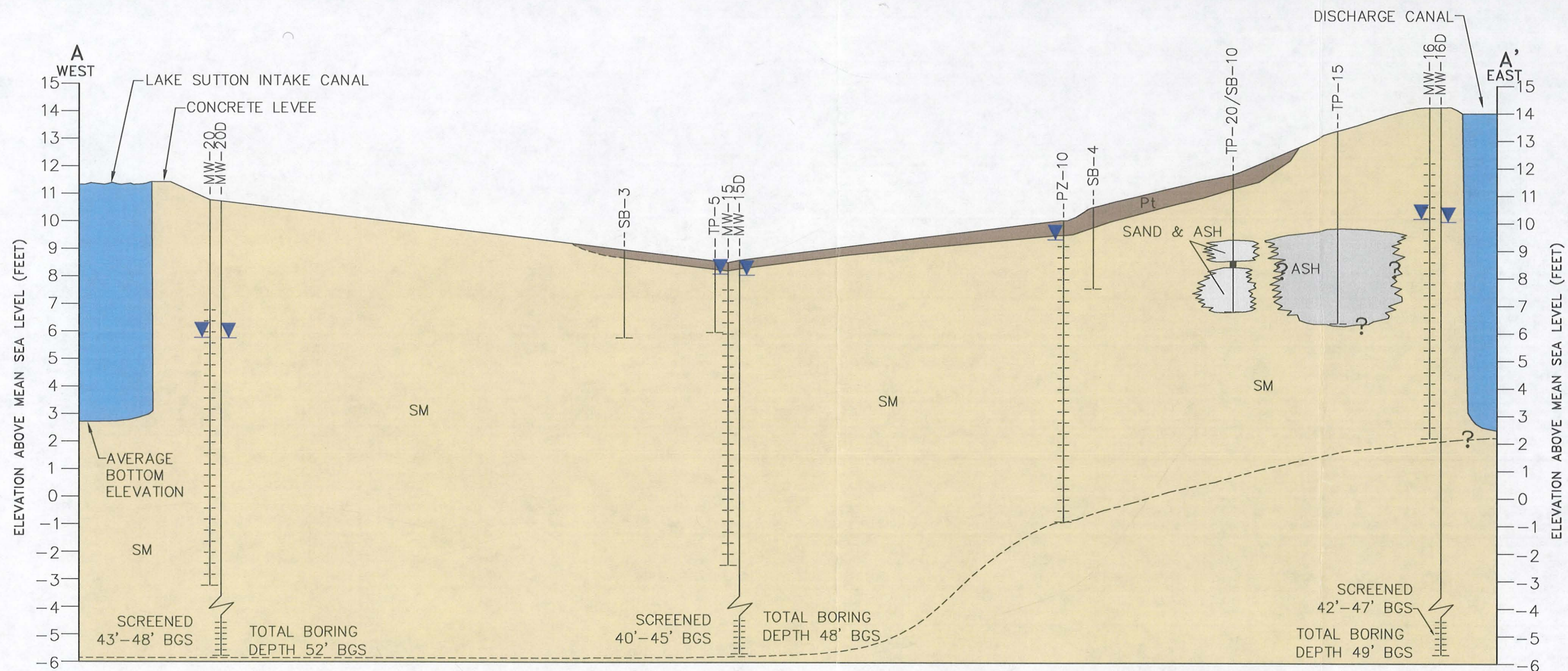
TEMPORARY PIEZOMETER, PERMANENT  
PIEZOMETER, AND PERMANENT  
MONITORING WELL LOCATION MAP

**BBL**  
BLASLAND, BOUCK & LEE, INC.  
engineers, scientists, economists

FIGURE  
**2-4**

X: (XREF)  
L: (LAYER) ON=\* OFF=\*REF\*  
P: PAGESET/PLT-DL2B1  
4/4/05 SYR-B5-NJR PGL  
04015002/04015B05.DWG



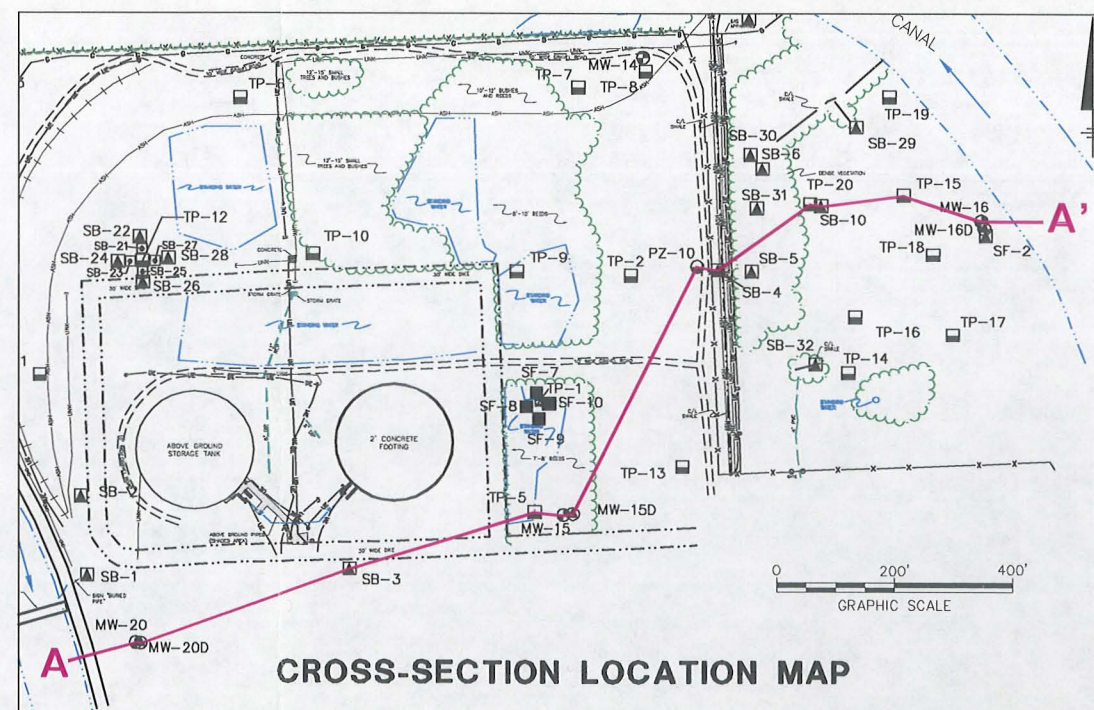


#### LEGEND:

- (SM) SILTY SANDS, SOME FINE TO COARSE
- SAND AND ASH MIXTURE
- ASH, GRAY, SILT TO CLAY SIZED PARTICLES
- (Pt) SOILS WITH HIGH ORGANIC CONTENT
- PETROLEUM-IMPACTED SOIL OBSERVED DURING PHASE I RI
- STATIC DEPTH-TO-WATER (GROUNDWATER ELEVATIONS BASED ON FEBRUARY 4, 2005 GAUGING EVENT)
- VERTICAL SCALE NOT ADJUSTED FOR DEEP MONITORING WELLS
- SCREENED INTERVAL (BGS)

#### NOTES:

1. DASHED WHERE INFERRED.
2. SURVEY DATA PROVIDED BY TAYLOR, WISEMAN & TAYLOR (PROJECT NO. 70488.0005) DATED JUNE 23, 2004. REVISIONS MADE ON JULY 7, 2004 AND FEBRUARY 23, 2005.
3. BGS = BELOW GROUND SURFACE



PROGRESS ENERGY  
L.V. SUTTON STEAM ELECTRIC PLANT, WILMINGTON, N.C.  
PHASE II REMEDIAL INVESTIGATION REPORT

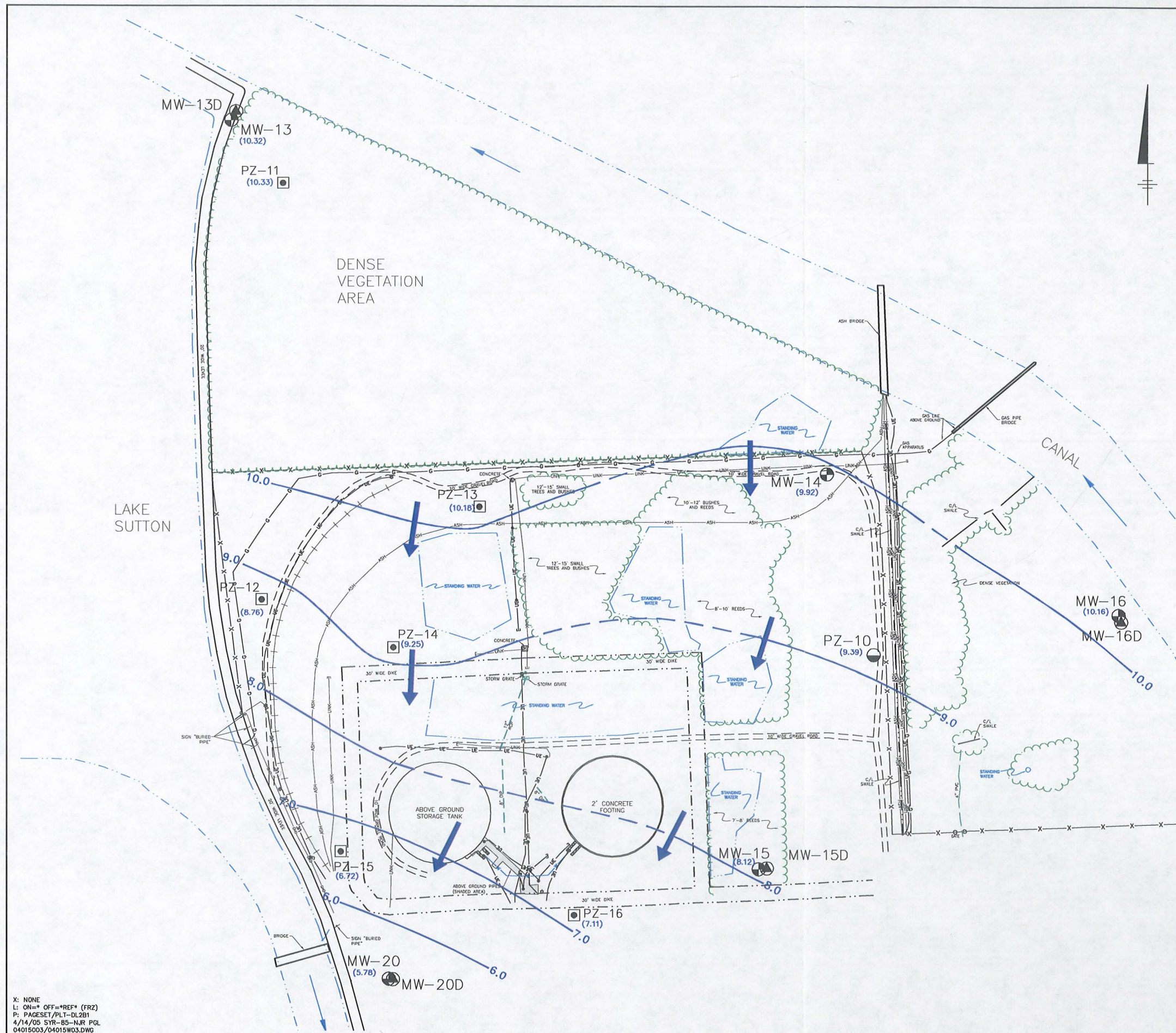
#### GEOLOGIC CROSS-SECTION A - A'

**BBL**  
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engineers, scientists, economists

FIGURE  
**2-5**

X: 04015002/04015B06.DWG  
L: (LAYER) ON= \* OFF=\*REF\* (FRZ)  
P: PAGESET/PLT-DL2B1  
4/11/05 SYR-B5-NJR PGL  
04015002/04015V02.DWG





## SYMBOL LEGEND

- EXISTING DEEP MONITORING WELL
- EXISTING SHALLOW MONITORING WELL
- TEMPORARY PIEZOMETER (1-INCH)
- PERMANENT PIEZOMETER
- UTILITY RISER
- ☆ LIGHT POLE
- (9.39) GROUNDWATER ELEVATION

9.0 — GROUNDWATER ELEVATION CONTOUR LINE (DASHED WHERE INFERRED). CONTOUR INTERVAL = 1.0 FT.

← DIRECTION OF GROUNDWATER FLOW

## LINE LEGEND

- X—X—X—X— FENCE LINE
- G—G—G—G— GAS LINE
- ASH—ASH—ASH—ASH— ASH LINE
- GND—GND—GND—GND— GROUND WIRE LINE
- UE—UE—UE—UE— UNDERGROUND ELECTRIC
- W—W—W—W— WATER LINE
- DIKE—DIKE—DIKE—DIKE— DIKE LINE
- STANDING WATER—STANDING WATER— STANDING WATER
- STORM PIPE—STORM PIPE— STORM PIPE
- RAILROAD TRACK (C/L)—RAILROAD TRACK (C/L)— RAILROAD TRACK (C/L)
- TREE/VEGETATION LINE—TREE/VEGETATION LINE— TREE/VEGETATION LINE
- UNKNOWN LINE—UNKNOWN LINE— UNKNOWN LINE
- GRAVEL ROAD—GRAVEL ROAD— GRAVEL ROAD

## NOTE:

1. SOURCE: SURVEY PROVIDED BY 'TAYLOR, WISEMAN & TAYLOR', 3500 Regency Parkway, Suite H, Cary N.C., 919-297-0085, (PROJECT NO. 70488.0005) DATED JUNE 23, 2004. REVISIONS MADE ON JULY 7, 2004 AND FEB. 23, 2005.

0 100' 200'  
GRAPHIC SCALE

PROGRESS ENERGY  
L.V. SUTTON STEAM ELECTRIC PLANT, WILMINGTON, N.C.  
PHASE II REMEDIAL INVESTIGATION REPORT

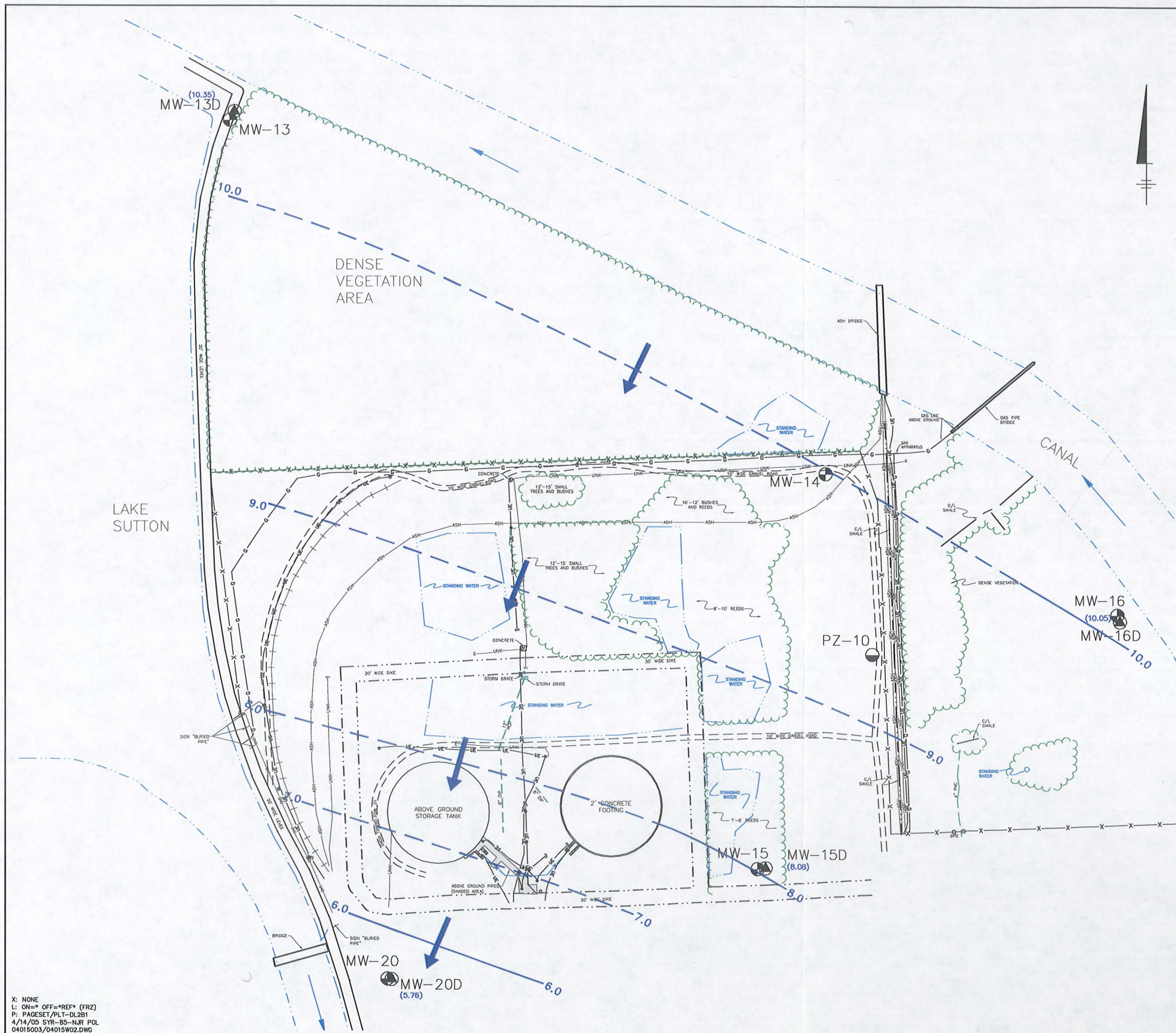
SHALLOW GROUNDWATER  
POTENTIOMETRIC SURFACE MAP -  
FORMER ASH DISPOSAL AREA -  
FEBRUARY 4, 2005

**BBL**  
BLASLAND, BOUCK & LEE, INC.  
engineers, scientists, economists

FIGURE  
**3-1**

X: NONE  
L: ON= OFF=REF\* (FRZ)  
P: PAGESET/PLT-DL2B1  
4/14/05 SYR-B5-NJR PGL  
04015003/04015W03.DWG





### SYMBOL LEGEND

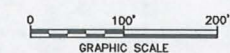
- ⊙ EXISTING DEEP MONITORING WELL
- ⊕ EXISTING SHALLOW MONITORING WELL
- PERMANENT PIEZOMETER
- UTILITY RISER
- ☆ LIGHT POLE
- (8.08) GROUNDWATER ELEVATION
- 9.0 — GROUNDWATER ELEVATION CONTOUR LINE (DASHED WHERE INFERRED). CONTOUR INTERVAL = 1.0 FT.
- ← DIRECTION OF GROUNDWATER FLOW

### LINE LEGEND

- X—X—X—X— FENCE LINE
- G—G—G—G— GAS LINE
- ASH—ASH—ASH—ASH— ASH LINE
- GND—GND—GND—GND— GROUND WIRE LINE
- UE—UE—UE—UE— UNDERGROUND ELECTRIC
- W—W—W—W— WATER LINE
- DIKE LINE
- STANDING WATER
- STORM PIPE
- RAILROAD TRACK (C/L)
- TREE/VEGETATION LINE
- UNKNOWN LINE
- GRAVEL ROAD

### NOTE:

1. SOURCE: SURVEY PROVIDED BY 'TAYLOR, WISEMAN & TAYLOR', 3500 Regency Parkway, Suite H, Cary N.C., 919-297-0085, (PROJECT NO. 70488.0005) DATED JUNE 23, 2004. REVISIONS MADE ON JULY 7, 2004 AND FEB. 23, 2005.



X: NONE  
L: ON= OFF=REF\* (FRZ)  
P: PAGESET/PLT-DL2B1  
4/14/05 SYR-B5-NJR PGL  
04015003/04015W02.DWG

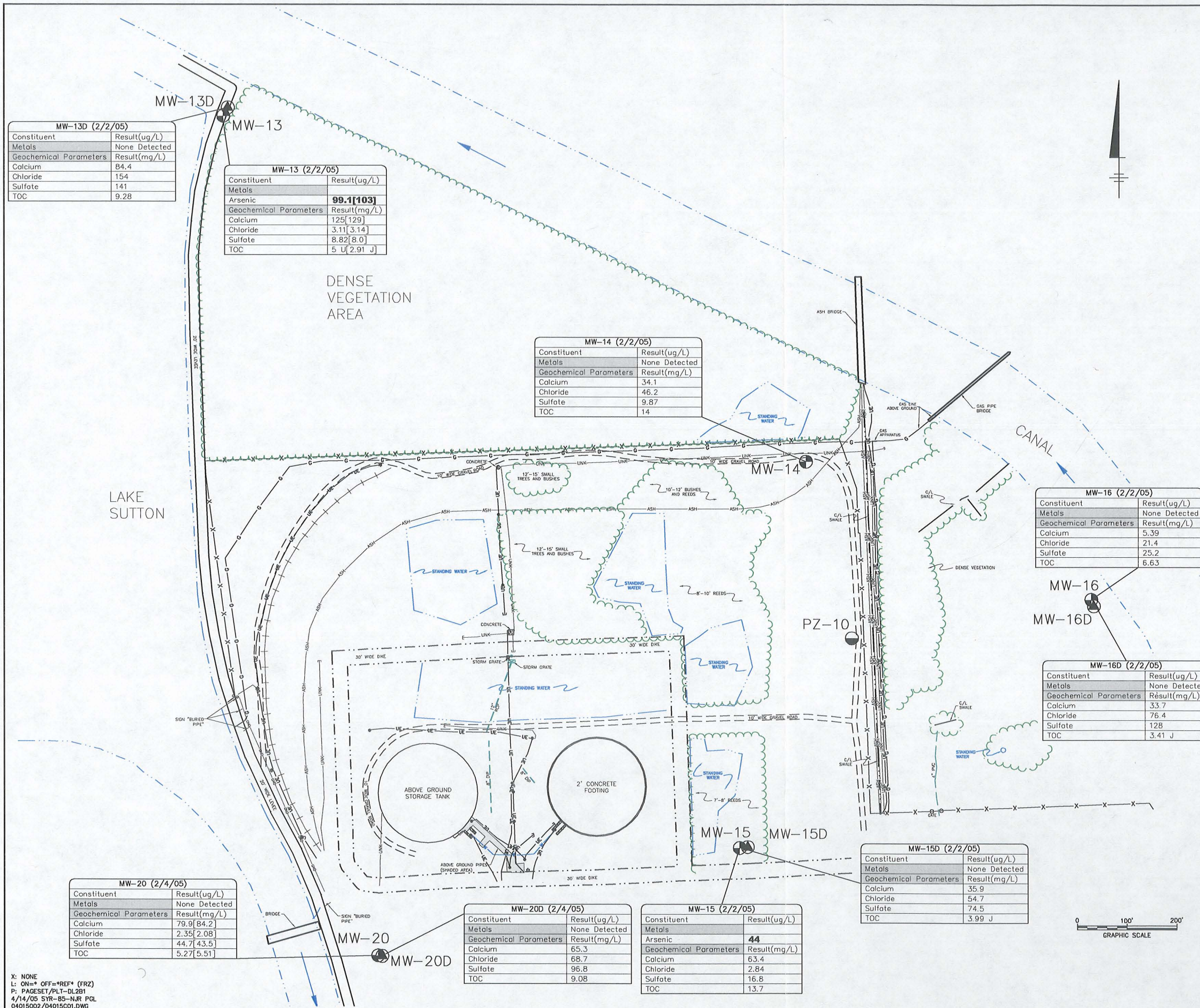
PROGRESS ENERGY  
L.V. SUTTON STEAM ELECTRIC PLANT, WILMINGTON, N.C.  
PHASE II REMEDIAL INVESTIGATION REPORT

DEEP GROUNDWATER POTENTIOMETRIC  
SURFACE MAP - FORMER ASH  
DISPOSAL AREA - FEBRUARY 4, 2005

**BBL**  
BLASLAND, BOUCK & LEE, INC.  
engineers, scientists, economists

FIGURE  
**3-2**





# SYMBOL LEGEND

- EXISTING DEEP MONITORING WELL
- EXISTING SHALLOW MONITORING WELL
- PERMANENT PIEZOMETER
- UTILITY RISER
- LIGHT POLE

# LINE LEGEND

- FENCE LINE
- GAS LINE
- ASH LINE
- GROUND WIRE LINE
- UNDERGROUND ELECTRIC
- WATER LINE
- DIKE LINE
- STANDING WATER
- STORM PIPE
- RAILROAD TRACK (C/L)
- TREE/VEGETATION LINE
- UNKNOWN LINE
- GRAVEL ROAD

Remediation Goals (RG)		
Constituent	RG	Units
Arsenic	10	ug/L

# NOTE:

- SOURCE: SURVEY PROVIDED BY 'TAYLOR, WISEMAN & TAYLOR', 3500 Regency Parkway, Suite H, Cary N.C., 919-297-0085, (PROJECT NO. 70488.0005) DATED JUNE 23, 2004. REVISIONS MADE ON JULY 7, 2004 AND FEB. 23, 2005.
- J = ESTIMATED VALUE.
- U = ANALYTE WAS ANALYZED FOR BUT NOT DETECTED.
- [ ] = REPRESENTS A DUPLICATE SAMPLE.
- BOLD RESULTS EXCEED 2L GROUNDWATER STANDARDS.
- TOC = TOTAL ORGANIC CARBON.
- mg/L = MILLIGRAMS PER LITER.
- ug/L = MICROGRAMS PER LITER.
- OTHER METALS CONSTITUENTS WERE NOT IDENTIFIED IN GROUNDWATER AT CONCENTRATIONS GREATER THAN REMEDIATION GOALS.

# PROGRESS ENERGY L.V. SUTTON STEAM ELECTRIC PLANT, WILMINGTON, N.C. PHASE II REMEDIAL INVESTIGATION REPORT

# GROUNDWATER QUALITY RESULTS



FIGURE  
**3-3**

X: NONE  
L: ON= OFF=REF\* (FRZ)  
P: PAGESET/PLT-DL2B1  
4/14/05 SYR-B5-NJR PGL  
04015002/04015001.DWG



## ***Appendix A***

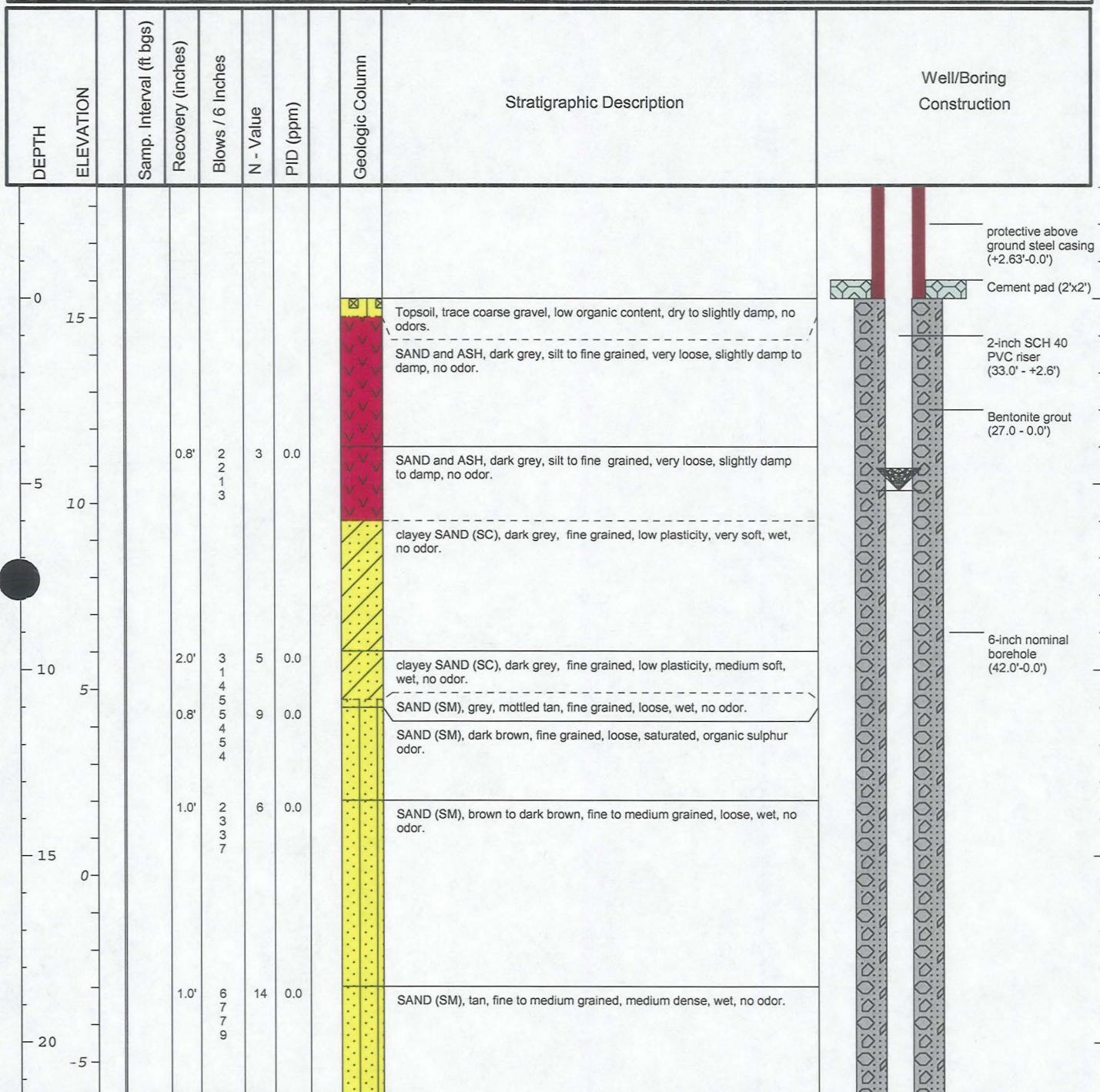
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# **Soil Boring Logs and Well Construction Records**

**Date Start/Finish:** 1/28/05  
**Drilling Company:** Parratt Wolfe  
**Driller's Name:** Arnold Chapel  
**Drilling Method:** Mud Rotary  
**Bit Size:** 5.87-inch roller-bit  
**Auger Size:**  
**Rig Type:** B-61 Mobile Rig  
**Sampling Method:** 24-inch splitspoon

**Northing:** 197965.38  
**Easting:** 2305017.45  
**Casing Elevation:** 18.16  
**Borehole Depth:** 42 ft bgs  
**Surface Elevation:** 15.53  
**Logged by:** Brian Lovgren

**Well/Boring ID:** MW-13D (FADA)  
**Client:** Progress Energy Carolinas Inc.  
**Location:** Progress Energy L.V. Sutton Steam Electric Plant  
 Wilmington, NC



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 engineers, scientists, economists

**Remarks:**  
 NA: Not Applicable  
 ft bgs: feet below ground surface  
 PID: Photoionization Detector

**Water Level Data**

Date	Depth	Elev.
2/4/05	7.81	10.35

Depth measured from top of casing\*



**Client:**  
Progress Energy Carolinas Inc.

**Site Location:**  
Progress Energy  
L.V. Sutton Steam  
Electric Plant

**Well/Boring ID:** MW-13D (FADA)

**Borehole Depth:** 42 ft bgs

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	Blows / 6 Inches	N - Value	PID Headspace (ppm)	Iron Staining	Geologic Column	Stratigraphic Description	Well/Boring Construction
25	-10			1.0'	4 11 20 20	31	0.0			SAND (SM), tan, fine to medium grained, dense, wet, no odor.	
30	-15			1.0'	8 10 12 13	22	0.0			SAND (SM), tan, fine to medium grained, medium dense, wet, no odor.	Bentonite chips (31.0' - 27.0')
35	-20			1.0'	9 6 4 6	10	0.0			SAND (SM), tan to light gray, fine to medium grained, medium dense, wet, no odor.	Well Gravel Pack No. 1 (42.0' - 31.0')
40	-25			2.0'	3 2 4 4	6	0.0			clayey SAND (SC), brown, mottled orange, low plasticity, medium dense, wet, no odor.	2-inch 0.010 slot PVC screen (38.0' - 33.0')
										clayey SAND (SC), gray, low plasticity, medium dense, wet, no odor.	
										CLAY (CL) observed on roller bit upon completion of drilling activities.	

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**Remarks:**  
NA: Not Applicable  
ft bgs: feet below ground surface  
PID: Photoionization Detector

**Water Level Data**

Date	Depth	Elev.
2/4/05	7.81	10.35

Depth measured from top of casing\*

## WELL CONSTRUCTION RECORD

North Carolina - Department of Environment and Natural Resources - Division of Water Quality - Groundwater Section

WELL CONTRACTOR (INDIVIDUAL) NAME (print) ARNOLD CHAPEL CERTIFICATION # 2487

WELL CONTRACTOR COMPANY NAME PARRATT-WOLFF, INC. PHONE # (919) 644-2814

STATE WELL CONSTRUCTION PERMIT# \_\_\_\_\_ ASSOCIATED WQ PERMIT# \_\_\_\_\_  
(if applicable) (if applicable)

1. WELL USE (Check Applicable Box): Residential ☐ Municipal/Public ☐ Industrial ☐ Agricultural ☐  
Monitoring ☒ Recovery ☐ Heat Pump Water Injection ☐ Other ☐ If Other, List Use \_\_\_\_\_

2. WELL LOCATION:

Nearest Town: WILMINGTON County NEW HANOVER  
801 SUTTON STEAM PLANT ROAD  
(Street Name, Numbers, Community, Subdivision, Lot No., Zip Code)

Topographic/Land setting  
☐ Ridge ☐ Slope ☐ Valley ☐ Flat  
(check appropriate box)

Latitude/longitude of well location  
N34 16.99'W77 58.98'

(degrees/minutes/seconds)

Latitude/longitude source: ☐ GPS ☒ Topographic map  
(check box)

3. OWNER: PROGRESS ENERGY

Address 801 SUTTON STEAM PLANT ROAD

(Street or Route No.)  
WILMINGTON NC 28401  
City or Town State Zip Code

( )-  
Area code- Phone number

4. DATE DRILLED 1/27-1/28/05

5. TOTAL DEPTH: 43.0'

6. DOES WELL REPLACE EXISTING WELL? YES ☐ NO ☒

7. STATIC WATER LEVEL Below Top of Casing: 5.0 FT.

(Use "+" if Above Top of Casing)

8. TOP OF CASING IS 0 FT. Above Land Surface\*

\*Top of casing terminated at/or below land surface requires a  
variance in accordance with 15A NCAC 2C .0118.

9. YIELD (gpm): N/A METHOD OF TEST N/A

10. WATER ZONES (depth): N/A

DEPTH DRILLING LOG  
From To Formation Description

From	To	Formation Description
0	14.0'	Black/brown, moist, medium dense, fine/coarse SAND; trace fine/coarse gravel

LOCATION SKETCH

Show direction and distance in miles from at least  
two State Roads or County Roads. Include the road  
numbers and common road names.

11. DISINFECTION: Type N/A Amount N/A

12. CASING: Wall Thickness

From	To	Depth	Diameter	Wall Thickness or Weight/Ft.	Material
From 0	To 33.5	Ft.	2"	SCH 40	PVC
From	To	Ft.			
From	To	Ft.			

13. GROUT: Depth Material Method

From	To	Depth	Material	Method
From 0	To 27	Ft.	PORTLAND	TREMIE
From 27	To 30	Ft.	BENTONITE	TREMIE

14. SCREEN: Depth Diameter Slot Size Material

From	To	Depth	Diameter	Slot Size	Material
From 33.5	To 38.5	Ft.	2 in.	.010 in.	PVC
From	To	Ft.			

15. SAND/GRAVEL PACK:

From	To	Depth	Size	Material
From 30	To 43	Ft.	#1	SAND
From	To	Ft.		

16. REMARKS: MW-13D SEE MAP ON BACK

I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15A NCAC 2C, WELL  
CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER

*Arnold H. Chapel*

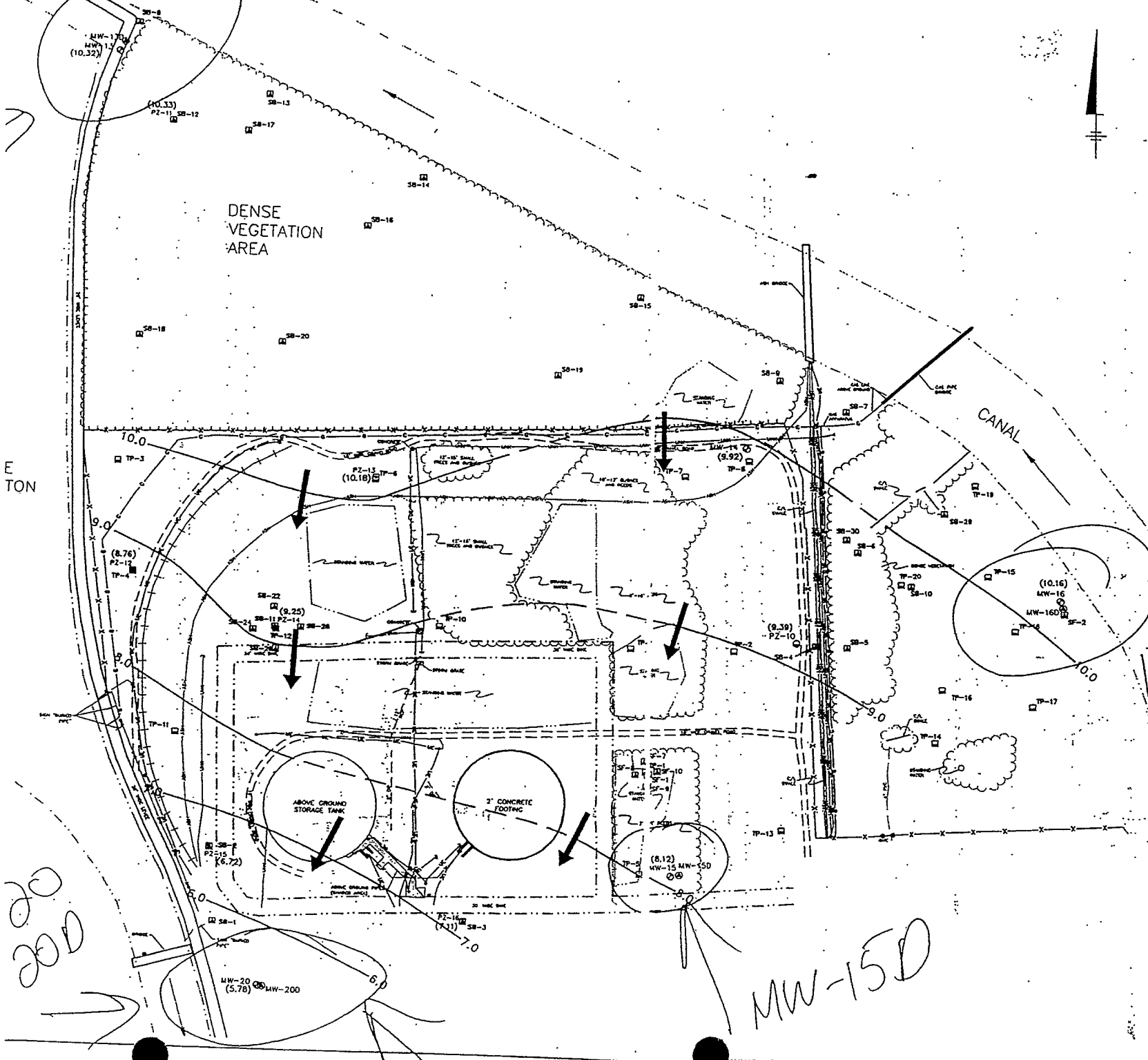
SIGNATURE OF PERSON CONSTRUCTING THE WELL

2/18/05

DATE

Submit the original to the Division of Water Quality, Groundwater Section, 1636 Mail Service Center - Raleigh, NC  
27699-1636 Phone No. (919) 733-3221, within 30 days.

GW-1 REV. 07/2001



# SYMBOL LEGEND

- EXISTING DEEP MONITORING WELL
- EXISTING SHALLOW MONITORING WELL
- TEMPORARY PIEZOMETER (1-IN)
- PERMANENT PIEZOMETER
- UTILITY RISER
- ◇ LIGHT POLE
- EXISTING TEST PIT
- EXISTING SOIL BORINGS

GROUNDWATER ELEVATION (FEB. 2005) (DASHED WHERE NO DATA)  
 GROUNDWATER ELEVATION CONTOUR INTERVAL = 1.0 FT.  
 DIRECTION OF GROUNDWATER FLOW (FEB. 2005)

## LINE LEGEND

- X-X- FENCE LINE
- C- GAS LINE
- A- ASH LINE
- W- GROUND WIRE LINE
- W- UNDERGROUND ELECTRIC
- W- WATER LINE
- W- DIKE LINE
- W- STANDING WATER
- W- STORM PIPE
- W- RAILROAD TRACK (C/A)
- W- TREE/VEGETATION LINE
- W- UNKNOWN LINE
- W- GRAVEL ROAD

## NOTE:

1. SOURCE: SURVEY PROVIDED BY TAYLOR, WISEMAN & TAYLOR, 3500 Regency Parkway, Suite K, Cary, N.C. 919-297-0085, (PROJECT NO. 70488.0005) DATED JULY 13, 2004. SURVEY DATA COLLECTED ON JUNE 23, 2004.

0 100' 200'  
 GRAPHIC SCALE

PROGRESS ENERGY  
 L.V. SUTTON STEAM ELECTRIC PLANT, W  
 PHASE II REMEDIAL INVESTIGATION

SHALLOW GROUNDWATER POTENTIAL  
 SURFACE MAP - FORMER ASH  
 AREA - FEBRUARY 4, 2005

**BBL**  
 BULLAND, BOUCK & LEE, INC.  
 CONSULTING ENGINEERS, SCIENTISTS, ECONOMISTS



**Date Start/Finish:** 1/31/05  
**Drilling Company:** Parratt Wolfe  
**Driller's Name:** Arnold Chapel  
**Drilling Method:** Mud Rotary  
**Bit Size:** 5.87-inch roller-bit  
**Auger Size:**  
**Rig Type:** B-61 Mobile Rig  
**Sampling Method:** 24-inch splitspoon

**Northing:** 196476.98  
**Easting:** 2306061.06  
**Casing Elevation:** 11.21  
  
**Borehole Depth:** 48 ft bgs  
**Surface Elevation:** 8.61  
  
**Logged by:** Brian Lovgren

**Well/Boring ID:** MW-15D (FADA)  
  
**Client:** Progress Energy Carolinas Inc.  
  
**Location:** Progress Energy L.V. Sutton Steam Electric Plant  
 Wilmington, NC

DEPTH	ELEVATION	Samp. Interval (ft bgs)	Recovery (inches)	Blows / 6 inches	N - Value	PID (ppm)	Geologic Column	Stratigraphic Description	Well/Boring Construction
10									
0								Topsoil, high organic content, slightly damp to damp, no odor.	protective above ground steel casing (+2.6'-0.0')
								SAND (SM), gray, fine to medium grained, loose, moist to wet, no odor.	Cement pad (2'x2')
								SAND (SM), gray, fine to medium grained, loose, wet, no odor.	2-inch SCH 40 PVC riser (40.0' - +2.5')
5		2.0'	5	6	0.0			SAND (SM), light gray, mottled white, fine to medium grained, loose, wet, no odor.	Bentonite grout (35.5' - 0.0')
-5			2					SAND (SM), dark brown, fine grained, loose, wet, no odor.	
		2.0'	4	7	0.0				6-inch nominal borehole (45.0'-0.0')
-10			3					SAND (SM), tan, fine grained, loose, wet, no odor.	
		1.0'	1	2	0.0			SAND (SM), tan, fine to medium grained, very loose, wet, no odor.	
-15			2						
		1.2'	9	25	0.0			SAND (SM), tan, fine to medium grained, medium dense, wet, no odor.	
-20			12						2-inch SCH 40 PVC riser (40.0' - +2.5')
			13						
-25		0.8'	4	6	0.0			SAND (SM), tan, fine to coarse grained, loose, wet, no odor.	
-30			3						
-35			3						

**BBL**<sup>®</sup>  
**BLASLAND, BOUCK & LEE, INC.**  
 engineers, scientists, economists

**Remarks:**  
 NA: Not Applicable  
 ft bgs: feet below ground surface  
 PID: Photoionization Detector  
 NR: No Recovery

**Water Level Data**

Date	Depth	Elev.
2/4/05	3.13	8.08

Depth measured from top of casing\*



**Client:**  
Progress Energy Carolinas Inc.

**Well/Boring ID:** MW-15D (FADA)

**Site Location:**  
Progress Energy  
L.V. Sutton Steam  
Electric Plant

**Borehole Depth:** 48 ft bgs

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	Blows / 6 Inches	N - Value	PID Headspace (ppm)	Iron Staining	Geologic Column	Stratigraphic Description	Well/Boring Construction
25											Bentonite grout (35.5' - 0.0')
-20				0.8'	3 3 3 4	6	0.0				6-inch nominal borehole (45.0'-0.0')
-25				1.0'	5 8 11 13	19	0.0			SAND (SM), tan, fine to coarse grained, medium dense, wet, no odor.	
-30				1.0'	10 11 14 15	15	0.0			SAND (SM), brown, mottled orange, fine to coarse grained, medium dense, wet, no odor.	Bentonite chips (38.0'-35.5')
-40										SAND (SM), brown, fine to coarse grained, medium dense, wet, no odor.	Well Gravel Pack No. 2 (45.0' - 38.0')
-35				1.2'	3 2 4 3	6	0.0			SAND (SM), brown, mottled orange, fine to coarse grained, loose, wet, no odor.	2-inch 0.010 slot PVC screen (45.0' - 40.0')
-45				1.2'	24 45 34 NR	79	0.0			SAND (SM), dark gray, silt to fine fine grained, very dense, wet, no odor.	1.5-inch nominal borehole (48.0'-45.0') Natural Collapse

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engineers, scientists, economists

**Remarks:**

NA: Not Applicable  
ft bgs: feet below ground surface  
PID: Photoionization Detector  
NR: No Recovery

**Water Level Data**

Date	Depth	Elev.
2/4/05	3.13	8.08

Depth measured from top of casing\*

## WELL CONSTRUCTION RECORD

North Carolina - Department of Environment and Natural Resources - Division of Water Quality - Groundwater Section

WELL CONTRACTOR (INDIVIDUAL) NAME (print) ARNOLD CHAPEL CERTIFICATION # 2487

WELL CONTRACTOR COMPANY NAME PARRATT-WOLFF, INC. PHONE # (919) 644-2814

STATE WELL CONSTRUCTION PERMIT# \_\_\_\_\_ ASSOCIATED WQ PERMIT# \_\_\_\_\_  
(if applicable) (if applicable)

1. WELL USE (Check Applicable Box): Residential ☐ Municipal/Public ☐ Industrial ☐ Agricultural ☐  
Monitoring ☒ Recovery ☐ Heat Pump Water Injection ☐ Other ☐ If Other, List Use \_\_\_\_\_

2. WELL LOCATION:

Nearest Town: WILMINGTON County NEW HANOVER

801 SUTTON STEAM PLANT ROAD

(Street Name, Numbers, Community, Subdivision, Lot No., Zip Code)

3. OWNER: PROGRESS ENERGY

Address 801 SUTTON STEAM PLANT ROAD

(Street or Route No.)

WILMINGTON NC 28401

City or Town State Zip Code

( ) - \_\_\_\_\_

Area code- Phone number

4. DATE DRILLED 1/31/05

5. TOTAL DEPTH: 47.5'

6. DOES WELL REPLACE EXISTING WELL? YES ☐ NO ☒

7. STATIC WATER LEVEL Below Top of Casing: 2.0 FT.

(Use "+" if Above Top of Casing)

8. TOP OF CASING IS 0 FT. Above Land Surface\*

\*Top of casing terminated at/or below land surface requires a variance in accordance with 15A NCAC 2C .0118.

9. YIELD (gpm): N/A METHOD OF TEST N/A

10. WATER ZONES (depth): N/A

11. DISINFECTION: Type N/A

Amount N/A

12. CASING:

Wall Thickness

From	To	Depth	Diameter	or Weight/Ft.	Material
From <u>0</u>	To <u>40</u>	Ft. <u>2"</u>	<u>SCH 40</u>	<u>PVC</u>	
From _____	To _____	Ft. _____	_____	_____	
From _____	To _____	Ft. _____	_____	_____	

13. GROUT:

From	To	Depth	Material	Method
From <u>0</u>	To <u>35.5</u>	Ft. <u>PORTLAND</u>	<u>TREMI</u>	
From <u>35.5</u>	To <u>37.5</u>	Ft. <u>BENTONITE</u>	<u>TREMI</u>	

14. SCREEN:

From	To	Depth	Diameter	Slot Size	Material
From <u>40</u>	To <u>45</u>	Ft. <u>2</u>	<u>in.</u>	<u>.010</u>	<u>in. PVC</u>
From _____	To _____	Ft. _____	<u>in.</u>	<u>in.</u>	_____

15. SAND/GRAVEL PACK:

From	To	Depth	Size	Material
From <u>37.5</u>	To <u>47.5</u>	Ft. <u>#1</u>	<u>SAND</u>	
From _____	To _____	Ft. _____	_____	

16. REMARKS: MW-15D SEE MAP ON BACK

I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15A NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER

Arnold Chapel

SIGNATURE OF PERSON CONSTRUCTING THE WELL

2/18/05

DATE

Submit the original to the Division of Water Quality, Groundwater Section, 1636 Mail Service Center - Raleigh, NC 27699-1636 Phone No. (919) 733-3221, within 30 days. GW-1 REV. 07/2001

Topographic/Land setting  
☐ Ridge ☐ Slope ☐ Valley ☐ Flat  
(check appropriate box)

Latitude/longitude of well location

N34 16.99/W77 58.98'

(degrees/minutes/seconds)

Latitude/longitude source: ☐ GPS ☒ Topographic map  
(check box)

DEPTH

From To

0 13.0'

13.0 47.5

DRILLING LOG

Formation Description

White/brown/gray, wet, very

loose/dense, fine/coarse

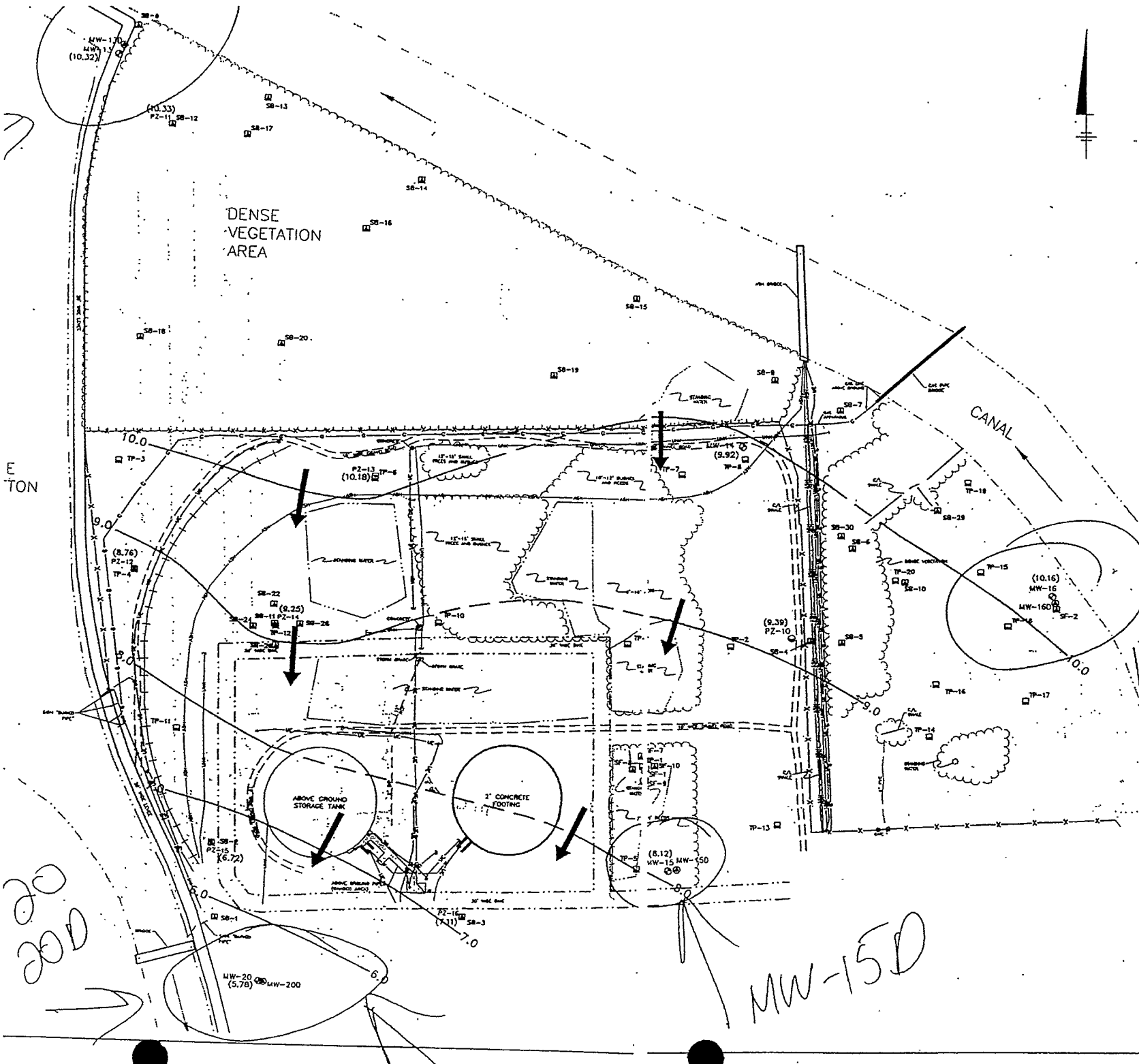
SAND; trace silt

Green/gray, moist, hard SILT

and fine SAND; trace clay

LOCATION SKETCH

Show direction and distance in miles from at least two State Roads or County Roads. Include the road numbers and common road names.



# SYMBOL LEGEND

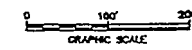
- EXISTING DEEP MONITORING WELL
- EXISTING SHALLOW MONITORING WELL
- TEMPORARY PIEZOMETER (1-W)
- PERMANENT PIEZOMETER
- UTILITY RISER
- ☆ LIGHT POLE
- EXISTING TEST PIT
- EXISTING SOIL BORINGS

(9.39) GROUNDWATER ELEVATION (FEB. 2005) DASHED WHERE NO CONTOUR INTERVAL = 1.0 FT.  
 9.0  
 DIRECTION OF GROUNDWATER FLOW (FEB. 2005)

# LINE LEGEND

- X-X- FENCE LINE
- C- GAS LINE
- ASH- ASH LINE
- W- UNDERGROUND WIRE LINE
- UE- UNDERGROUND ELECTRIC
- W- WATER LINE
- DWE- DWE LINE
- SW- STANDING WATER
- SP- STORM PIPE
- RAIL- RAILROAD TRACK (C/L)
- TREE- TREE/VEGETATION LINE
- UNK- UNKNOWN LINE
- GRV- GRAVEL ROAD

NOTE:  
 1. SOURCE: SURVEY PROVIDED BY TAYLOR, WISDOM & TAYLOR, 3500 Regency Parkway, Suite H, Cary, N.C. 919-297-0085, (PROJECT NO. 70488.0005) DATED JULY 13, 2004. SURVEY DATA COLLECTED ON JUNE 23, 2004.



PROGRESS ENERGY  
 L.V. SUTTON STEAM ELECTRIC PLANT, W  
 PHASE II REMEDIAL INVESTIGATION

SHALLOW GROUNDWATER POTENTIAL  
 SURFACE MAP - FORMER AS  
 AREA - FEBRUARY 4, 2004

**BBL**  
 BLASLAND, BOUCK & LEE, INC.  
 ENGINEERS, SCIENTISTS, ECONOMISTS



**Date Start/Finish:** 1/26/05  
**Drilling Company:** Parratt Wolffe  
**Driller's Name:** Arnold Chapel  
**Drilling Method:** Mud Rotary  
**Bit Size:** 5.87-inch roller-bit  
**Auger Size:**  
**Rig Type:** B-61 Mobile Rig  
**Sampling Method:** 24-inch splitspoon

**Northing:** 196962.70  
**Easting:** 2306758.11  
**Casing Elevation:** 16.43  
**Borehole Depth:** 47 ft bgs  
**Surface Elevation:** 14.00  
**Logged by:** Brian Lovgren

**Well/Boring ID:** MW-16D (FADA)  
**Client:** Progress Energy Carolinas Inc.  
**Location:** Progress Energy L.V. Sutton Steam Electric Plant  
 Wilmington, NC

DEPTH	ELEVATION	Samp. Interval (ft bgs)	Recovery (inches)	Blows / 6 inches	N - Value	PID (ppm)	Geologic Column	Stratigraphic Description	Well/Boring Construction
15									
0									protective above ground steel casing (+2.43'-0.0')
									Cement pad (2'x2')
						2.9		SAND (SM), brown, fine grained, very loose, trace organics, dry, no odor.	
						0.0		SAND (SM), white, mottled tan, fine, very loose, dry, no odor.	2-inch SCH 40 PVC riser (42.0' - +2.5')
10		2.0'	1 2 2 1	4	0.0			SAND (SM), white, mottled tan, fine, very loose, wet, no odor.	Bentonite grout (36.0 - 0.0')
5		2.0'	1 6 6 7	12	0.0			SAND (SM), light gray, mottled white, fine to medium grained, medium dense, wet, no odor.	
10		1.0'	4 10 16 13	26	0.0				6-inch nominal borehole (47.0'-0.0')
15		1.0'	5 5 4 4	9	0.0			SAND (SM), tan, fine, loose, wet, no odor.	
20		1.2'	5 5 4	9	0.0			SAND (SM), tan, fine to coarse grained, loose, wet, no odor.	
-10									

**BBL**<sup>®</sup>  
**BLASLAND, BOUCK & LEE, INC.**  
 engineers, scientists, economists

**Remarks:**  
 NA: Not Applicable  
 ft bgs: feet below ground surface  
 PID: Photoionization Detector

#### Water Level Data

Date	Depth	Elev.
2/4/05	6.38	10.05

Depth measured from top of casing\*



**Client:**

Progress Energy Carolinas Inc.

**Well/Boring ID:** MW-16D (FADA)**Site Location:**Progress Energy  
L.V. Sutton Steam  
Electric Plant**Borehole Depth:** 47 ft bgs

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	Blows / 6 Inches	N - Value	PID Headspace (ppm)	Iron Staining	Geologic Column	Stratigraphic Description	Well/Boring Construction
-25					8						
-15				1.0'	2 1 2 2	3	0.0				
-20				1.0'	2 2 3 2	5	0.0				
-25				1.0'	1 2 3 3	5	0.0			SAND (SM), tan, mottled orange, fine to coarse grained, loose, wet, no odor.	Bentonite chips (40.0'-36.0')
-30				1.0'	9 11 8 6	19	0.0				Well Gravel Pack No. 2 (47.0' - 40.0')
-35				1.5'	10 19 16 24	35	0.0			SAND (SM), gray, fine, dense, wet, no odor.	2-inch 0.010 slot PVC screen (47.0' - 42.0')
										Boring terminated at 49.0 ft bls	1.5-inch nominal borehole (49.0' - 47.0') Natural Collapse

**BBL**®BLASLAND, BOUCK & LEE, INC.  
engineers, scientists, economists**Remarks:**NA: Not Applicable  
ft bgs: feet below ground surface  
PID: Photoionization Detector**Water Level Data**

Date	Depth	Elev.
2/4/05	6.38	10.05

Depth measured from top of casing\*

## WELL CONSTRUCTION RECORD

North Carolina - Department of Environment and Natural Resources - Division of Water Quality - Groundwater Section

WELL CONTRACTOR (INDIVIDUAL) NAME (print) ARNOLD CHAPEL CERTIFICATION # 2487

WELL CONTRACTOR COMPANY NAME PARRATT-WOLFF, INC. PHONE # (919) 644-2814

STATE WELL CONSTRUCTION PERMIT# \_\_\_\_\_ ASSOCIATED WQ PERMIT# \_\_\_\_\_  
(if applicable) (if applicable)

1. WELL USE (Check Applicable Box): Residential ☐ Municipal/Public ☐ Industrial ☐ Agricultural ☐  
Monitoring ☒ Recovery ☐ Heat Pump Water Injection ☐ Other ☐ If Other, List Use \_\_\_\_\_

2. WELL LOCATION:

Nearest Town: WILMINGTON County NEW HANOVER

801 SUTTON STEAM PLANT ROAD

(Street Name, Numbers, Community, Subdivision, Lot No., Zip Code)

3. OWNER: PROGRESS ENERGY

Address 801 SUTTON STEAM PLANT ROAD

(Street or Route No.)

WILMINGTON NC 28401  
City or Town State Zip Code

( ) -  
Area code- Phone number

4. DATE DRILLED 1/26-1/27/05

5. TOTAL DEPTH: 50.5'

6. DOES WELL REPLACE EXISTING WELL? YES ☐ NO ☒

7. STATIC WATER LEVEL Below Top of Casing: 4.5 FT.

(Use "+" if Above Top of Casing)

8. TOP OF CASING IS 0 FT. Above Land Surface\*

\*Top of casing terminated at/or below land surface requires a  
variance in accordance with 15A NCAC 2C .0118.

9. YIELD (gpm): N/A METHOD OF TEST N/A

10. WATER ZONES (depth): N/A

11. DISINFECTION: Type N/A Amount N/A

12. CASING: Wall Thickness  
From 0 To 42 Ft. 2" SCH 40 Material PVC  
From \_\_\_\_\_ To \_\_\_\_\_ Ft. \_\_\_\_\_  
From \_\_\_\_\_ To \_\_\_\_\_ Ft. \_\_\_\_\_

13. GROUT: Depth Material Method  
From 0 To 36 Ft. PORTLAND TREMIE  
From 36 To 40 Ft. BENTONITE TREMIE

14. SCREEN: Depth Diameter Slot Size Material  
From 42 To 47 Ft. 2 in. .010 in. PVC  
From \_\_\_\_\_ To \_\_\_\_\_ Ft. \_\_\_\_\_ in. \_\_\_\_\_ in. \_\_\_\_\_

15. SAND/GRAVEL PACK:  
From 40 To 50.5 Ft. #1 SAND  
From \_\_\_\_\_ To \_\_\_\_\_ Ft. \_\_\_\_\_

16. REMARKS: MW-16D SEE MAP ON BACK

I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15A NCAC 2C, WELL  
CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER

Arnold H. Chapel

SIGNATURE OF PERSON CONSTRUCTING THE WELL

2/18/05

DATE

Submit the original to the Division of Water Quality, Groundwater Section, 1636 Mail Service Center - Raleigh, NC  
27699-1636 Phone No. (919) 733-3221, within 30 days. GW-1 REV. 07/2001

Topographic/Land setting  
☐ Ridge ☐ Slope ☐ Valley ☐ Flat  
(check appropriate box)

Latitude/longitude of well location

N34 16.99'W77 58.98'

(degrees/minutes/seconds)

Latitude/longitude source: ☐ GPS ☒ Topographic map  
(check box)

DEPTH DRILLING LOG  
From To Formation Description

0 16.0' White/brown/gray, wet, loose/

medium dense, fine/coarse

SAND; some fine gravel;

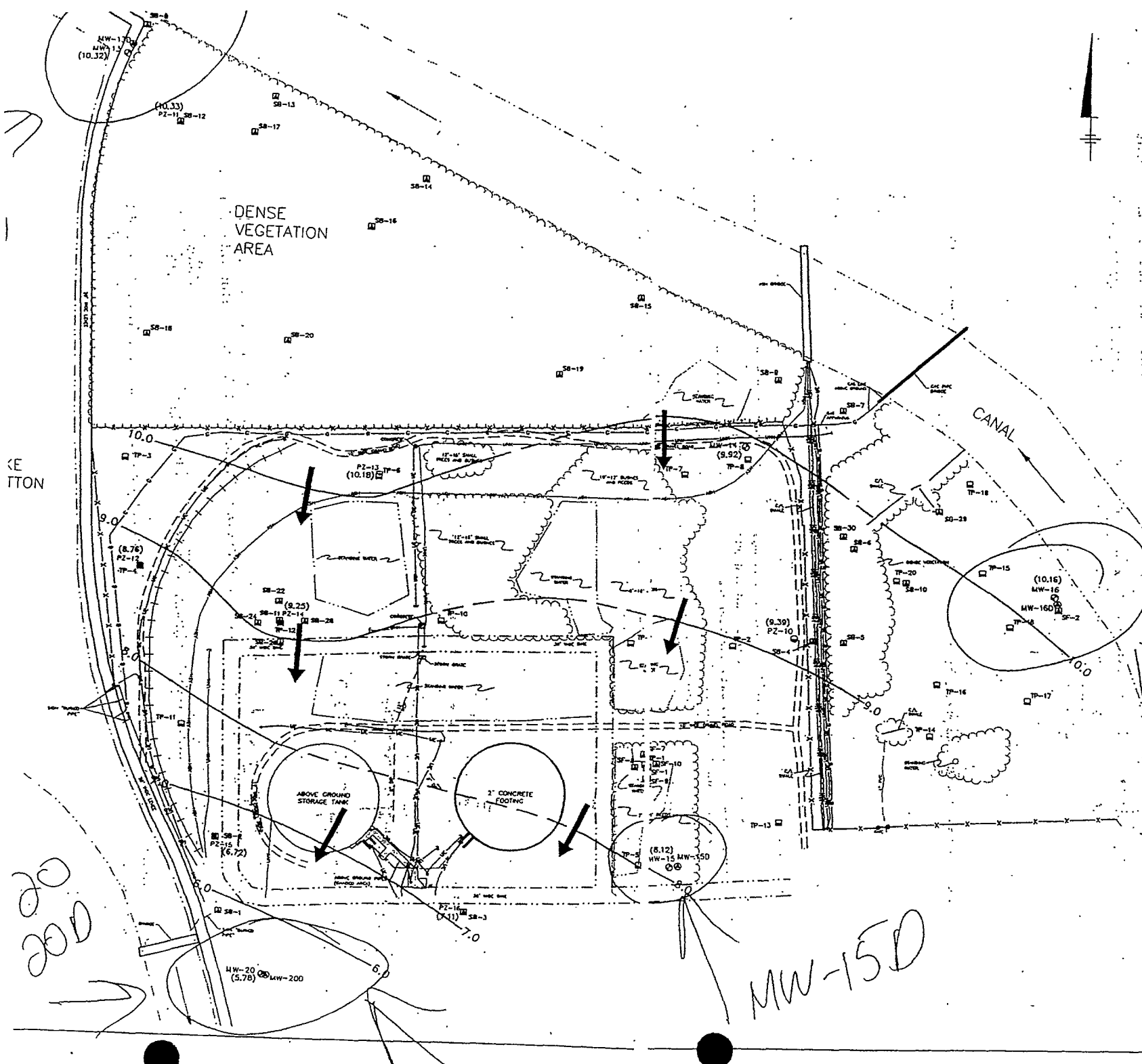
trace silt

16.0 49.0 Green, wet, very dense fine/

medium SAND; trace silt

LOCATION SKETCH

Show direction and distance in miles from at least  
two State Roads or County Roads. Include the road  
numbers and common road names.



# SYMBOL LEGEND

- EXISTING DEEP MONITORING
- EXISTING SHALLOW MONITORING
- TEMPORARY PIEZOMETER (1-)
- PERMANENT PIEZOMETER
- UTILITY RISER
- ☆ LIGHT POLE
- EXISTING TEST PIT
- EXISTING SOIL BORINGS

(9.39) GROUNDWATER ELEVATION (F)  
 9.0 — GROUNDWATER ELEVATION CO  
 (FEB. 2005) (DASHED WHERE  
 CONTOUR INTERVAL = 1.0 FT.)  
 ← DIRECTION OF GROUNDWATER  
 (FEB. 2005)

# LINE LEGEND

- FENCE LINE
- GAS LINE
- ASH LINE
- GROUND WIRE LINE
- UNDERGROUND ELECTRIC
- WATER LINE
- DRINK LINE
- STANDING WATER
- STORM PIPE
- RAILROAD TRACK (C/L)
- TREE/VEGETATION LINE
- UNKNOWN LINE
- GRAVEL ROAD

# NOTE:

1. SOURCE: SURVEY PROVIDED BY TAYLOR,  
 WISEMAN & TAYLOR, 3500 Regency  
 Parkway, Suite H, Cary N.C.  
 919-297-0085, (PROJECT NO. 70488.0005)  
 DATED JULY 13, 2004. SURVEY DATA  
 COLLECTED ON JUNE 23, 2004.

0 100' 200'  
 GRAPHIC SCALE

PROGRESS ENERGY  
 L.V. SUTTON STEAM ELECTRIC PLANT, W  
 PHASE II. REMEDIAL INVESTIGA

SHALLOW GROUNDWATER POTI  
 SURFACE MAP - FORMER ASH  
 AREA - FEBRUARY 4, 2

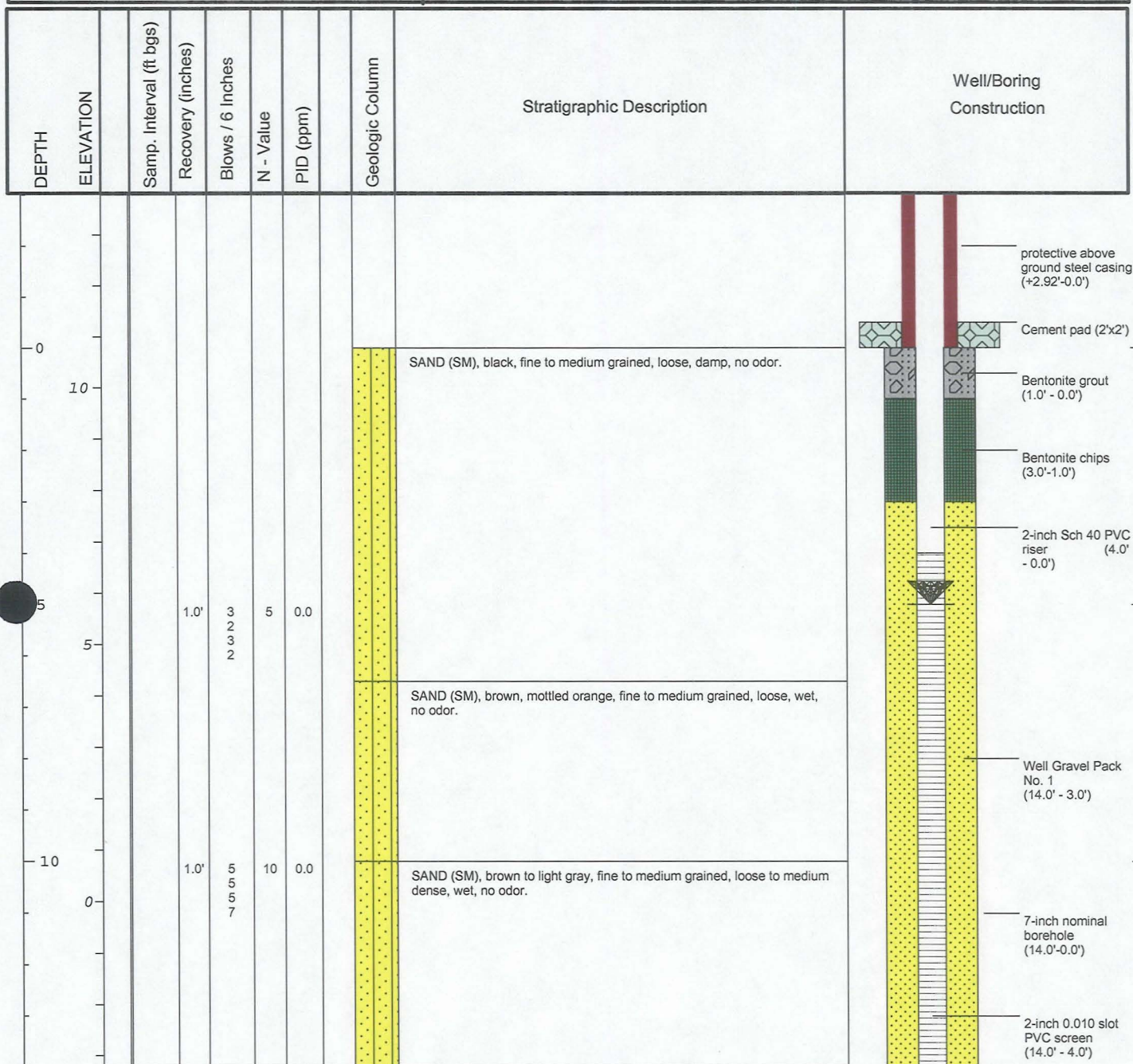
**BBL**  
 BUCK & LEE, INC.  
 scientific, economic



**Date Start/Finish:** 2/2/05  
**Drilling Company:** Parratt Wolffe  
**Driller's Name:** Arnold Chapel  
**Drilling Method:** HSA  
**Bit Size:** NA  
**Auger Size:** 3.25-inch (ID)  
**Rig Type:** B-61 Mobile Rig  
**Sampling Method:**

**Northing:** 196257.98  
**Easting:** 2305318.10  
**Casing Elevation:** 13.70  
  
**Borehole Depth:** 14 ft bgs  
**Surface Elevation:** 10.78  
  
**Logged by:** Brian Lovgren

**Well/Boring ID:** MW-20 (FADA)  
  
**Client:** Progress Energy Carolinas Inc.  
  
**Location:** Progress Energy L.V. Sutton Steam Electric Plant  
 Wilmington, NC



**BBL**<sup>®</sup>  
 BLASLAND, BOUCK & LEE, INC.  
 engineers, scientists, economists

**Remarks:**  
 HSA: Hollow-Stem Auger  
 NA: Not Applicable  
 ft bgs: feet below ground surface  
 PID: Photoionization Detector

Water Level Data		
Date	Depth	Elev.
2/4/05	7.92	5.78
Depth measured from top of casing*		



## WELL CONSTRUCTION RECORD

North Carolina - Department of Environment and Natural Resources - Division of Water Quality - Groundwater Section

WELL CONTRACTOR (INDIVIDUAL) NAME (print) ARNOLD CHAPEL CERTIFICATION # 2487

WELL CONTRACTOR COMPANY NAME PARRATT-WOLFF, INC. PHONE # (919) 644-2814

STATE WELL CONSTRUCTION PERMIT# \_\_\_\_\_ ASSOCIATED WQ PERMIT# \_\_\_\_\_  
(if applicable) (if applicable)

1. WELL USE (Check Applicable Box): Residential ☐ Municipal/Public ☐ Industrial ☐ Agricultural ☐  
Monitoring ☒ Recovery ☐ Heat Pump Water Injection ☐ Other ☐ If Other, List Use \_\_\_\_\_

2. WELL LOCATION:

Nearest Town: WILMINGTON County NEW HANOVER  
801 SUTTON STEAM PLANT ROAD

(Street Name, Numbers, Community, Subdivision, Lot No., Zip Code)

Topographic/Land setting  
☐ Ridge ☐ Slope ☐ Valley ☐ Flat  
(check appropriate box)

Latitude/longitude of well location  
N34 16.99'/W77 58.98'

(degrees/minutes/seconds)

Latitude/longitude source: ☐ GPS ☒ Topographic map  
(check box)

3. OWNER: PROGRESS ENERGY

Address 801 SUTTON STEAM PLANT ROAD  
(Street or Route No.)

WILMINGTON NC 28401  
City or Town State Zip Code

Area code- Phone number

4. DATE DRILLED 2/2/05

5. TOTAL DEPTH: 14.0'

6. DOES WELL REPLACE EXISTING WELL? YES ☐ NO ☒

7. STATIC WATER LEVEL Below Top of Casing: 5.5 FT.  
(Use "+" if Above Top of Casing)

8. TOP OF CASING IS 0 FT. Above Land Surface\*

\*Top of casing terminated at/or below land surface requires a  
variance in accordance with 15A NCAC 2C .0118.

9. YIELD (gpm): N/A METHOD OF TEST N/A

10. WATER ZONES (depth): N/A

DEPTH DRILLING LOG  
From To Formation Description

NO SAMPLES TAKEN

LOCATION SKETCH

Show direction and distance in miles from at least  
two State Roads or County Roads. Include the road  
numbers and common road names.

11. DISINFECTION: Type N/A Amount N/A

12. CASING: Wall Thickness

From	To	Depth	Diameter	or Weight/Ft.	Material
From <u>0</u>	To <u>4</u>	Ft. <u>2"</u>	<u>SCH 40</u>	<u>PVC</u>	
From _____	To _____	Ft. _____	_____	_____	
From _____	To _____	Ft. _____	_____	_____	

13. GROUT: Depth Material Method

From	To	Depth	Material	Method
From <u>0</u>	To <u>1</u>	Ft. <u>PORTLAND</u>	<u>TREMIE</u>	
From <u>1</u>	To <u>3</u>	Ft. <u>BENTONITE</u>	<u>TREMIE</u>	

14. SCREEN: Depth Diameter Slot Size Material

From	To	Depth	Diameter	Slot Size	Material
From <u>4</u>	To <u>14</u>	Ft. <u>2</u>	<u>in.</u>	<u>.010</u>	<u>in.</u>
From _____	To _____	Ft. _____	_____	_____	_____

15. SAND/GRAVEL PACK:

From	To	Depth	Size	Material
From <u>3</u>	To <u>14</u>	Ft. <u>#1</u>	<u>SAND</u>	
From _____	To _____	Ft. _____	_____	

16. REMARKS: MW-20 SEE MAP ON BACK

I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15A NCAC 2C, WELL  
CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER

Arnold Chapel

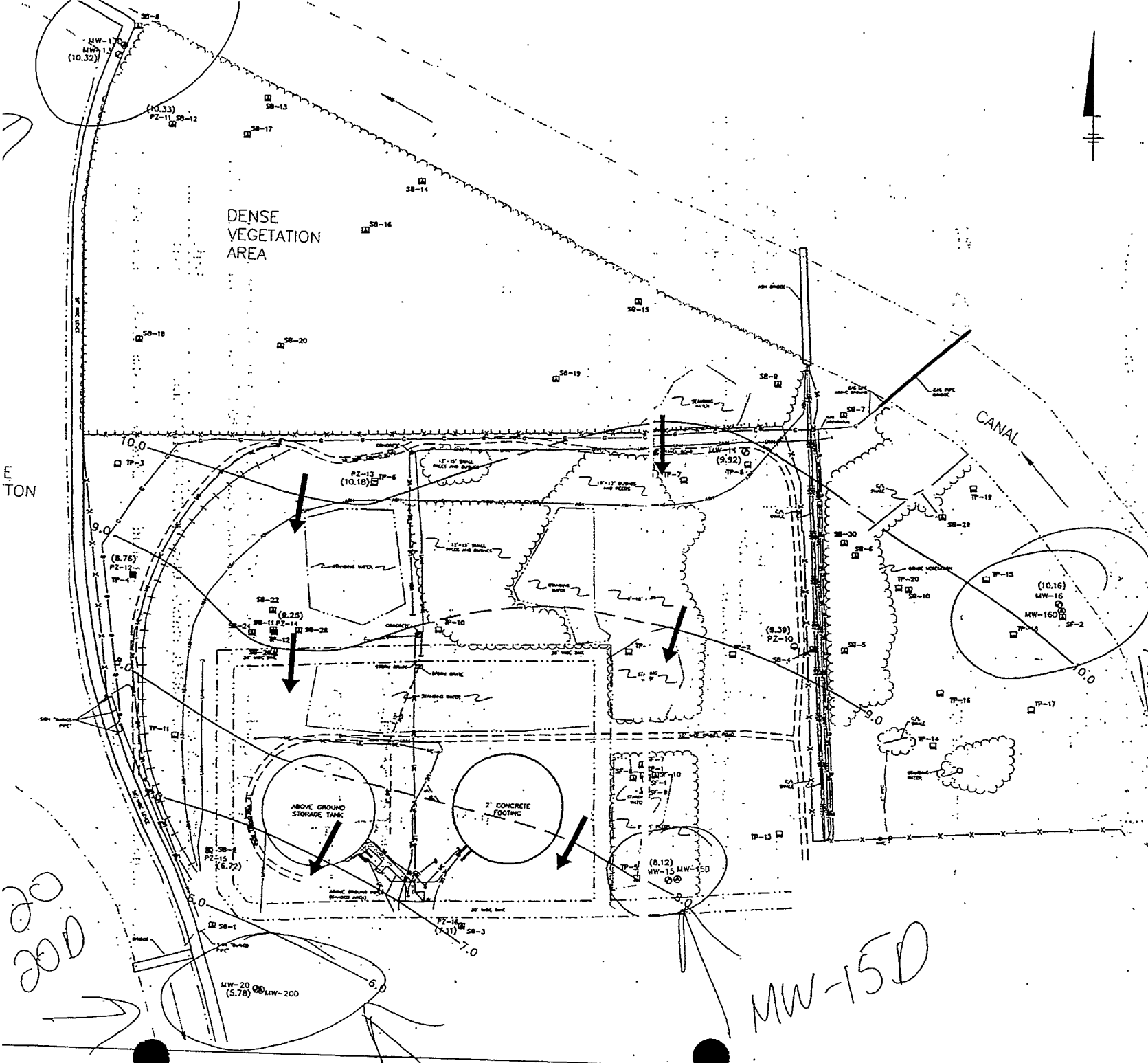
SIGNATURE OF PERSON CONSTRUCTING THE WELL

2/16/05

DATE

Submit the original to the Division of Water Quality, Groundwater Section, 1636 Mail Service Center - Raleigh, NC  
27699-1636 Phone No. (919) 733-3221, within 30 days.

GW-1 REV. 07/2001



**SYMBOL LEGEND**

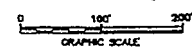
- EXISTING DEEP MONITORING WELL
- EXISTING SHALLOW MONITORING WELL
- TEMPORARY PIEZOMETER (1-IN)
- PERMANENT PIEZOMETER
- UTILITY RISER
- LIGHT POLE
- EXISTING TEST PIT
- EXISTING SOIL BORINGS

GROUNDWATER ELEVATION (FEB. 2005) (9.39)  
 9.0 — GROUNDWATER ELEVATION CONTOUR (FEB. 2005) (DASHED WHERE IN CONTOUR INTERVAL = 1.0 FT.)  
 ← DIRECTION OF GROUNDWATER FLOW (FEB. 2005)

**LINE LEGEND**

- FENCE LINE
- GAS LINE
- ASH LINE
- GROUND WIRE LINE
- UNDERGROUND ELECTRIC
- WATER LINE
- DRAIN LINE
- STANDING WATER
- STORM PIPE
- RAILROAD TRACK (C/L)
- TREE/VEGETATION LINE
- UNKNOWN LINE
- GRAVEL ROAD

**NOTE:**  
 1. SOURCE: SURVEY PROVIDED BY TAYLOR, WISEMAN & TAYLOR, 3500 Regency Parkway, Suite 10, Cary, N.C. 919-297-0005, (PROJECT NO. 70488.0005) DATED JULY 13, 2004. SURVEY DATA COLLECTED ON JUNE 23, 2004.



**PROGRESS ENERGY**  
**L.V. SUTTON STEAM ELECTRIC PLANT, WISCONSIN**  
**PHASE II REMEDIAL INVESTIGATION**

**SHALLOW GROUNDWATER POTENTIAL SURFACE MAP - FORMER ASH AREA - FEBRUARY 4, 2005**

**BBL**  
 BOND, BOUCK & LEE, INC.  
 ENGINEERS, SCIENTISTS, ECONOMISTS

**Date Start/Finish:** 2/2/05  
**Drilling Company:** Parratt Wolfe  
**Driller's Name:** Arnold Chapel  
**Drilling Method:** Mud Rotary  
**Bit Size:** 5.87-inch roller-bit  
**Auger Size:**  
**Rig Type:** B-61 Mobile Rig  
**Sampling Method:** 24-inch splitspoon

**Northing:** 196256.89  
**Easting:** 2305326.09  
**Casing Elevation:** 13.66  
  
**Borehole Depth:** 52 ft bgs  
**Surface Elevation:** 10.73  
  
**Logged by:** Brian Lovgren

**Well/Boring ID:** MW-20D (FADA)  
  
**Client:** Progress Energy Carolinas Inc.  
  
**Location:** Progress Energy L.V. Sutton Steam Electric Plant  
 Wilmington, NC

DEPTH	ELEVATION	Samp. Interval (ft bgs)	Recovery (inches)	Blows / 6 Inches	N - Value	PID (ppm)	Geologic Column	Stratigraphic Description	Well/Boring Construction
0									protective above ground steel casing (+2.93'-0.0')
10									Cement pad (2'x2')
								SAND (SM), black, fine to medium grained, loose, damp, no odor.	2-inch SCH 40 PVC riser (43.0' - +2.9')
5		1.0'	322	5	0.0				Bentonite grout (37.0' - 0.0')
								SAND (SM), brown, mottled orange, fine to medium grained, loose, wet, no odor.	
10		1.0'	557	10	0.0			SAND (SM), brown to light gray, fine to medium grained, loose to medium dense, wet, no odor.	6-inch nominal borehole (48.0'-0.0')
15		1.0'	678	15	0.0			SAND (SM), brown to tan, fine to medium grained, medium dense, wet, no odor.	
20		1.5'	131718	34	0.0			SAND (SM), tan, fine to medium grained, dense, wet, no odor.	2-inch SCH 40 PVC riser (43.0' - +2.9')

**BBL**<sup>®</sup>  
 BLASLAND, BOUCK & LEE, INC.  
 engineers, scientists, economists

**Remarks:**  
 NA: Not Applicable  
 ft bgs: feet below ground surface  
 PID: Photoionization Detector  
 NR: No Recovery

**Water Level Data**

Date	Depth	Elev.
2/4/05	7.90	5.76

Depth measured from top of casing\*



**Client:**

Progress Energy Carolinas Inc.

**Well/Boring ID:** MW-20D (FADA)**Site Location:**Progress Energy  
L.V. Sutton Steam  
Electric Plant**Borehole Depth:** 52 ft bgs

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	Blows / 6 Inches	N - Value	PID Headspace (ppm)	Iron Staining	Geologic Column	Stratigraphic Description	Well/Boring Construction
25 -15				1.5'	4 10 8 13	18	0.0			SAND (SM), tan, fine to medium grained, medium dense, wet, no odor.	Bentonite grout (37.0' - 0.0')
30 -20				1.0'	3 3 3 4	6	0.0			SAND (SM), tan, fine to medium grained, loose, wet, no odor.	6-inch nominal borehole (48.0' - 0.0')
35 -25				1.0'	1 1 1 1	2	0.0			SAND (SM), dark brown, fine to medium grained, very loose, wet, no odor.	Bentonite chips (41.0' - 37.0')
40 -30				1.0'	1 1 1 1	2	0.0				Well Gravel Pack No. 1 (48.0' - 41.0')
45 -35				0.8'	4 7 7 8	14	0.0			SAND (SM), dark brown, fine to medium grained, medium dense, wet, no odor.	2-inch 0.010 slot PVC screen (48.0' - 43.0')
50 -40				1.5'	14 26 24 19	50	0.0			SAND (SM), green to dark gray, silt to fine grained, very dense, wet, no odor.	1.5-inch nominal borehole (48.0' - 45.0')
Boring terminated at 52.0 ft bls											Natural Collapse

**BBL**®BLASLAND, BOUCK & LEE, INC.  
engineers, scientists, economists**Remarks:**NA: Not Applicable  
ft bgs: feet below ground surface  
PID: Photoionization Detector  
NR: No Recovery**Water Level Data**

Date	Depth	Elev.
2/4/05	7.90	5.76

Depth measured from top of casing\*

## WELL CONSTRUCTION RECORD

North Carolina - Department of Environment and Natural Resources - Division of Water Quality - Groundwater Section

WELL CONTRACTOR (INDIVIDUAL) NAME (print) ARNOLD-CHAPEL CERTIFICATION # 2487

WELL CONTRACTOR COMPANY NAME PARRATT-WOLFF, INC. PHONE # (919) 644-2814

STATE WELL CONSTRUCTION PERMIT# \_\_\_\_\_ ASSOCIATED WQ PERMIT# \_\_\_\_\_  
(if applicable) (if applicable)

1. WELL USE (Check Applicable Box): Residential ☐ Municipal/Public ☐ Industrial ☐ Agricultural ☐  
Monitoring ☒ Recovery ☐ Heat Pump Water Injection ☐ Other ☐ If Other, List Use \_\_\_\_\_

2. WELL LOCATION:

Nearest Town: WILMINGTON County NEW HANOVER

801 SUTTON STEAM PLANT ROAD

(Street Name, Numbers, Community, Subdivision, Lot No., Zip Code)

3. OWNER: PROGRESS ENERGY

Address 801 SUTTON STEAM PLANT ROAD

(Street or Route No.)

WILMINGTON

NC

28401

City or Town

State

Zip Code

( ) -

Area code- Phone number

4. DATE DRILLED 2/1/05

5. TOTAL DEPTH: 52.0'

6. DOES WELL REPLACE EXISTING WELL? YES ☐ NO ☒

7. STATIC WATER LEVEL Below Top of Casing: 5.5 FT.

(Use "+" if Above Top of Casing)

8. TOP OF CASING IS 0 FT. Above Land Surface\*

\*Top of casing terminated at/or below land surface requires a variance in accordance with 15A NCAC 2C .0118.

9. YIELD (gpm): N/A METHOD OF TEST N/A

10. WATER ZONES (depth): N/A

11. DISINFECTION: Type N/A Amount N/A

12. CASING: Wall Thickness  
From 0 To 43 Ft. 2" SCH 40 Material PVC  
From \_\_\_\_\_ To \_\_\_\_\_ Ft. \_\_\_\_\_  
From \_\_\_\_\_ To \_\_\_\_\_ Ft. \_\_\_\_\_

13. GROUT: Depth Material Method  
From 0 To 37 Ft. PORTLAND TREMIE  
From 37 To 41 Ft. BENTONITE TREMIE

14. SCREEN: Depth Diameter Slot Size Material  
From 43 To 48 Ft. 2 in. .010 in. PVC  
From \_\_\_\_\_ To \_\_\_\_\_ Ft. \_\_\_\_\_ in. \_\_\_\_\_ in. \_\_\_\_\_

15. SAND/GRAVEL PACK: Depth Size Material  
From 41 To 52 Ft. #1 SAND  
From \_\_\_\_\_ To \_\_\_\_\_ Ft. \_\_\_\_\_

16. REMARKS: MW-20D SEE MAP ON BACK

I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15A NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER

Arnold Chapel 2/1/05  
SIGNATURE OF PERSON CONSTRUCTING THE WELL DATE

Submit the original to the Division of Water Quality, Groundwater Section, 1636 Mail Service Center - Raleigh, NC  
27699-1636 Phone No. (919) 733-3221, within 30 days. GW-1 REV. 07/2001

Topographic/Land setting  
☐ Ridge ☐ Slope ☐ Valley ☐ Flat  
(check appropriate box)

Latitude/longitude of well location

N34 16.99'W77 58.98'

(degrees/minutes/seconds)

Latitude/longitude source: ☐ GPS ☒ Topographic map  
(check box)

DEPTH

From To

0 5.0'

5.0 25.0

25.0 42.0

42.0 52.0

DRILLING LOG

Formation Description

Black/brown, wet, dense/loose,

fine/coarse SAND; trace

fine/coarse gravel and silt

Gray, wet, dense/loose, fine/

coarse SAND

Gray, wet, very loose, fine

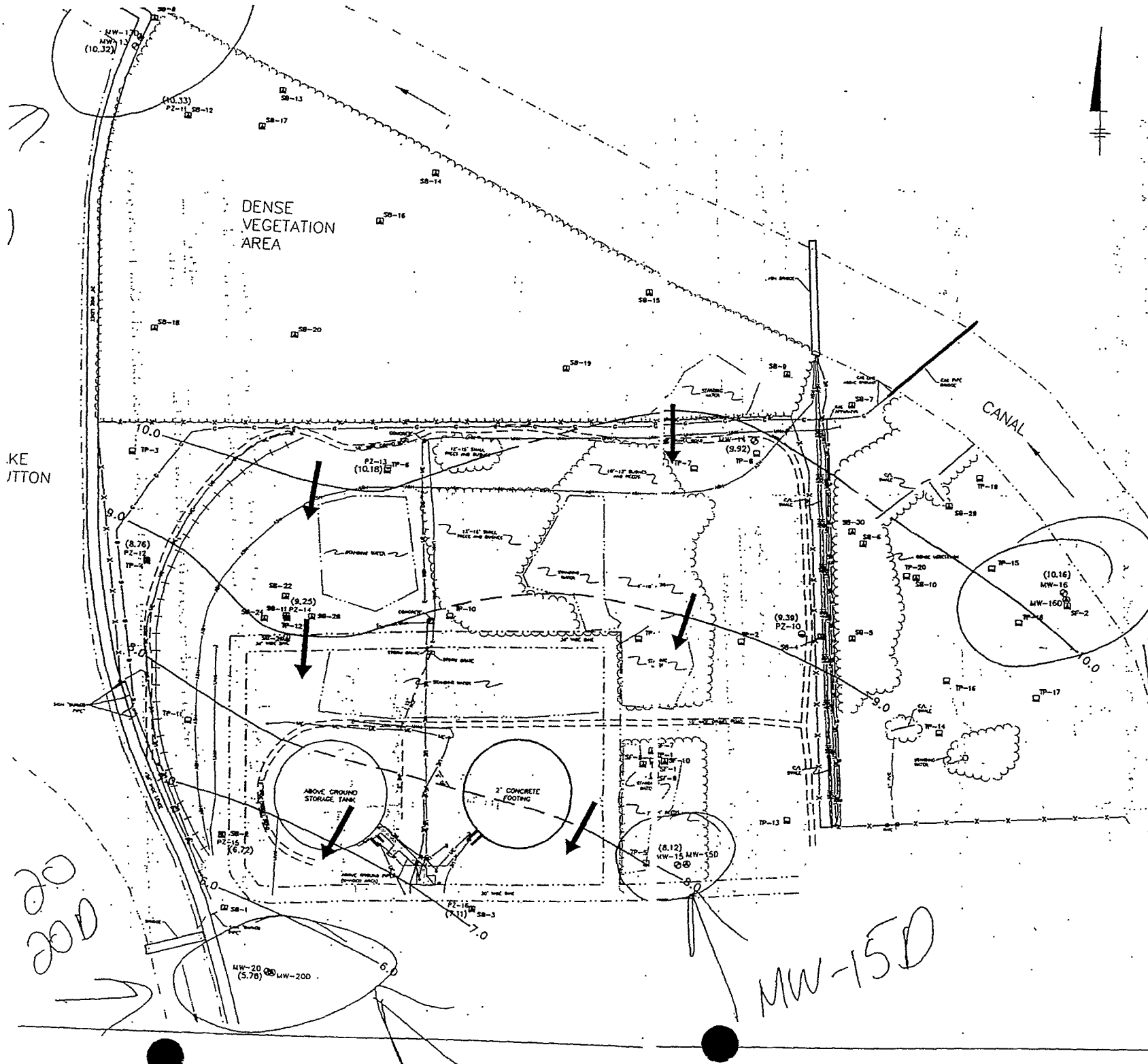
SAND

Green, wet, very dense, fine

SAND; trace clay and silt

LOCATION SKETCH

Show direction and distance in miles from at least two State Roads or County Roads. Include the road numbers and common road names.



# SYMBOL LEGEND

- EXISTING DEEP MONITORING POINT
- EXISTING SHALLOW MONITORING POINT
- TEMPORARY PIEZOMETER
- PERMANENT PIEZOMETER
- UTILITY RISER
- LIGHT POLE
- EXISTING TEST PIT
- EXISTING SOIL BORINGS

- (9.30) GROUNDWATER ELEVATION
- 9.0 GROUNDWATER ELEVATION (FEB. 2005) DASHED WHEN CONTOUR INTERVAL = 1.0
- ← DIRECTION OF GROUNDWATER FLOW (FEB. 2005)

## LINE LEGEND

- FENCE LINE
- GAS LINE
- ASH LINE
- GROUND WIRE LINE
- UNDERGROUND ELECTRIC
- WATER LINE
- DIKE LINE
- STANDING WATER
- STORM PIPE
- RAILROAD TRACK (C/L)
- TREE/VEGETATION LINE
- UNKNOWN LINE
- GRAVEL ROAD

## NOTE:

1. SOURCE: SURVEY PROVIDED BY TAYLOR, WISEMAN & TAYLOR, 3500 Regency Parkway, Suite 100, Cary, N.C. 919-297-0085, (PROJECT NO. 70488.0005) DATED JULY 13, 2004. SURVEY DATA COLLECTED ON JUNE 23, 2004.

0 100' 200'  
GRAPHIC SCALE

PROGRESS ENERGY  
L.V. SUTTON STEAM ELECTRIC PLANT, W  
PHASE II REMEDIAL INVESTIGATION

SHALLOW GROUNDWATER POTENTIAL  
SURFACE MAP - FORMER ASI  
AREA - FEBRUARY 4, 2005

**BBL**  
BOUCK & LEE, INC.  
SCIENTISTS, ENGINEERS

## ***Appendix B***

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# **Data Validation Reports and Laboratory Data**

# MEMORANDUM



**To:** Scott Davies  
**From:** Dennis Capria  
**Re:** Data Review

**Date:** 3/21/2005

Data for sample collected from the Progress Energy-Sutton site in North Carolina during January 2005 were reviewed for quality assurance/quality control compliance. The data report from CompuChem, Inc. of Cary, North Carolina was reviewed. Included in the review are data from the following sample delivery group (SDG): C501739. The following summarizes the findings of the QA/QC review:

## Volatile/Semi-volatile

- One data set was reviewed, including 14 soil sample 1 equipment blank and 1 trip blank.
- Samples were analyzed for following:

Analysis	Method
Volatile Petroleum Hydrocarbons (MADEP- VPH)	MADEP-VPH-04-1.1
Extractable Petroleum Hydrocarbons (MADEP-EPH)	MADEP-EPH-04-1.1

- All samples were analyzed within the method-specified holding time.
- All reported laboratory control sample recoveries were within control limits.
- Several target compounds were detected in the method blanks within this SDG. Associated Sample results less than the blank action level have been qualified as non-detect.
- Several surrogate recoveries associated with the EPH analysis were outside of the control limits. The associated sample results were either qualified estimated.
- No calibration data was provided.

The data were presented in a reduced deliverables format. Therefore, only a limited data review could be performed. Since no raw data were provided, no verification of compound identification and quantitation could be performed.



Other than for the deviations noted in this review, the reported data quality is within method specifications and the data is considered acceptable for use as reported by the laboratory.

## Analytical Data Report

Lab Sample ID	Description	Matrix	Date Received	Date Sampled	SDG#
01739-1	SF-7 (0.5-1.0)	Solid	01/28/05	01/26/05 09:00	
01739-2	SF-8 (0.5-1.0)	Solid	01/28/05	01/26/05 09:15	
01739-3	SF-9 (0.5-1.0)	Solid	01/28/05	01/26/05 09:40	
01739-4	SF-10 (0.5-1.0)	Solid	01/28/05	01/26/05 10:00	
01739-5	SF-91 (0.5-1.0)	Solid	01/28/05	01/26/05	

Parameter	Units	Sample ID				
		01739-1 SF-7 (0.5-1.0)	01739-2 SF-8 (0.5-1.0)	01739-3 SF-9 (0.5-1.0)	01739-4 SF-10 (0.5-1.0)	01739-5 SF-91 (0.5-1.0)

## Volatile Petroleum Hydrocarbons (MADEP-VPH)

C5-C8 Aliphatic Hydrocarbons (Unadjusted)	mg/kg dw	<9.9	<4.5	<8.5	<8.9	<10
C9-C12 Aliphatic Hydrocarbons (Unadjusted)	mg/kg dw	<5.1	<2.4	<4.4	<4.6	1.8J
C9-C10 Aromatic Hydrocarbons (Unadjusted)	mg/kg dw	6.9B	1.5B ✓	2.2JB	4.3B	5.6B
Surrogate-a,a,a-Trifluorotoluene (PID) *	%	122 %	112 %	99 %	107 %	117 %
Surrogate-a,a,a-Trifluorotoluene (FID) *	%	123 %	113 %	100 %	109 %	117 %
Percent Solids		78	81	79	77	80
Dilution Factor		143	68	125	127	150
Prep Date		02/01/05	02/02/05	02/01/05	02/02/05	02/02/05
Analysis Date		02/01/05	02/02/05	02/01/05	02/02/05	02/02/05
Batch ID		TR5009B	TR5009B	TR5009B	TR5009B	TR5009B
Prep Method		MADEP-VPH	MADEP-VPH	MADEP-VPH	MADEP-VPH	MADEP-VPH
Analyst		CP	CP	CP	CP	CP
Quantitation Factor		183	84	158	165	188

## Extractable Petroleum Hydrocarbons (MADEP-EPH)

C9-C18 Aliphatic Hydrocarbons (Unadjusted)	mg/kg dw	51B J	4.4B ✓	9B J	18B J	13B
C19-C36 Aliphatic Hydrocarbons (Unadjusted)	mg/kg dw	280B J	49B	82B J	120B J	98B

## Analytical Data Report

Lab Sample ID	Description	Matrix	Date Received	Date Sampled	SDG#
01739-1	SF-7 (0.5-1.0)	Solid	01/28/05	01/26/05 09:00	
01739-2	SF-8 (0.5-1.0)	Solid	01/28/05	01/26/05 09:15	
01739-3	SF-9 (0.5-1.0)	Solid	01/28/05	01/26/05 09:40	
01739-4	SF-10 (0.5-1.0)	Solid	01/28/05	01/26/05 10:00	
01739-5	SF-91 (0.5-1.0)	Solid	01/28/05	01/26/05	

Parameter	Units	Sample ID				
		01739-1 SF-7 (0.5-1.0)	01739-2 SF-8 (0.5-1.0)	01739-3 SF-9 (0.5-1.0)	01739-4 SF-10 (0.5-1.0)	01739-5 SF-91 (0.5-1.0)

## Extractable Petroleum Hydrocarbons (MADEP-EPH)

## Surrogate -

1-Chloro-octadecane *	%	13 %D	76 %	39 %D	39 %D	84 %
Percent Solids		78	81	79	77	80
Dilution Factor		5	1	2	2	1
Prep Date		02/01/05	02/01/05	02/01/05	02/01/05	02/01/05
Analysis Date		02/04/05	02/03/05	02/04/05	02/04/05	02/03/05
Batch ID		FPS2008	FPS2008	FPS2008	FPS2008	FPS2008
Prep Method		3550B	3550B	3550B	3550B	3550B
Analyst		IE	IE	IE	IE	IE
Quantitation Factor		6.4	1.2	2.5	2.6	1.3

## Extractable Petroleum Hydrocarbons (MADEP-EPH)

## C11-C22 Aromatic Hydrocarbons

(Unadjusted)	mg/kg dw	120 J	24 J	33 J	20 J	44 J
Surrogate - o-Terphenyl *	%	69 %	80 %	104 %	66 %	96 %
Surrogate - 2-Fluorobiphenyl *	%	112 %	135 %	<del>154 %</del>	44 %	<del>149 %</del>
Surrogate -						
2-Bromonaphthalene *	%	<del>28 %</del>	<del>35 %</del>	<del>26 %</del>	<del>6 %</del>	<del>36 %</del>
Percent Solids		78	81	79	77	80
Dilution Factor		1	1	1	1	1
Prep Date		02/01/05	02/01/05	02/01/05	02/01/05	02/01/05
Analysis Date		02/04/05	02/03/05	02/03/05	02/03/05	02/03/05
Batch ID		FPS2008	FPS2008	FPS2008	FPS2008	FPS2008
Prep Method		3550	3550	3550	3550	3550
Analyst		IE	IE	IE	IE	IE
Quantitation Factor		1.3	1.2	1.3	1.3	1.3

## Analytical Data Report

Lab Sample ID	Description	Matrix	Date Received	Date Sampled	SDG#
01739-6	SB-22 (4.0-4.5)	Solid	01/28/05	01/26/05 13:00	
01739-7	SB-24 (4.0-4.5)	Solid	01/28/05	01/26/05 13:55	
01739-8	SB-26 (4.5-5.0)	Solid	01/28/05	01/26/05 15:25	
01739-9	SB-28 (4.0-4.5)	Solid	01/28/05	01/26/05 16:00	
01739-10	SB-29 (3.5-4.0)	Solid	01/28/05	01/27/05 07:45	

Parameter	Units	Sample ID				
		01739-6 SB-22 (4.0-4.5)	01739-7 SB-24 (4.0-4.5)	01739-8 SB-26 (4.5-5.0)	01739-9 SB-28 (4.0-4.5)	01739-10 SB-29 (3.5-4.0)

## Volatile Petroleum Hydrocarbons (MADEP-VPH)

C5-C8 Aliphatic Hydrocarbons (Unadjusted)	mg/kg dw	<10	<9.6	<9.2	<9.1	<8.7
C9-C12 Aliphatic Hydrocarbons (Unadjusted)	mg/kg dw	<5.2	<5.0	<4.8	<4.7	<4.5
C9-C10 Aromatic Hydrocarbons (Unadjusted)	mg/kg dw	1.6JB ✓	1.5JB ✓	2.8B	2.3JB	16B
Surrogate-a,a,a-Trifluorotoluene (PID) *	%	118 %	112 %	116 %	114 %	105 %
Surrogate-a,a,a-Trifluorotoluene (FID) *	%	118 %	111 %	118 %	115 %	106 %
Percent Solids		78	81	81	80	82
Dilution Factor		145	143	139	135	132
Prep Date		02/02/05	02/02/05	02/02/05	02/02/05	02/02/05
Analysis Date		02/02/05	02/02/05	02/02/05	02/02/05	02/02/05
Batch ID		TR5009B	TR5009B	TR5009B	TR5009B	TR5009B
Prep Method		MADEP-VPH	MADEP-VPH	MADEP-VPH	MADEP-VPH	MADEP-VPH
Analyst		CP	CP	CP	CP	CP
Quantitation Factor		186	177	171	169	161

## Extractable Petroleum Hydrocarbons (MADEP-EPH)

C9-C18 Aliphatic Hydrocarbons (Unadjusted)	mg/kg dw	4.0B ✓	0.82JB ✓	2.1B ✓	22B	2.1B ✓
C19-C36 Aliphatic Hydrocarbons (Unadjusted)	mg/kg dw	28B	59B	12B	99B	20B

## Analytical Data Report

Lab Sample ID	Description	Matrix	Date Received	Date Sampled	SDG#
01739-6	SB-22 (4.0-4.5)	Solid	01/28/05	01/26/05 13:00	
01739-7	SB-24 (4.0-4.5)	Solid	01/28/05	01/26/05 13:55	
01739-8	SB-26 (4.5-5.0)	Solid	01/28/05	01/26/05 15:25	
01739-9	SB-28 (4.0-4.5)	Solid	01/28/05	01/26/05 16:00	
01739-10	SB-29 (3.5-4.0)	Solid	01/28/05	01/27/05 07:45	

Parameter	Units	Sample ID				
		01739-6	01739-7	01739-8	01739-9	01739-10
		SB-22 (4.0-4.5)	SB-24 (4.0-4.5)	SB-26 (4.5-5.0)	SB-28 (4.0-4.5)	SB-29 (3.5-4.0)

## Extractable Petroleum Hydrocarbons (MADEP-EPH)

## Surrogate -

1-Chloro-octadecane *	%	85 %	77 %	67 %	70 %	70 %
Percent Solids		78	81	81	80	82
Dilution Factor		1	1	1	1	1
Prep Date		02/01/05	02/01/05	02/01/05	02/01/05	02/01/05
Analysis Date		02/04/05	02/04/05	02/04/05	02/04/05	02/04/05
Batch ID		FPS2008	FPS2008	FPS2008	FPS2008	FPS2008
Prep Method		3550B	3550B	3550B	3550B	3550B
Analyst		IE	IE	IE	IE	IE
Quantitation Factor		1.3	1.2	1.2	1.3	1.2

## Extractable Petroleum Hydrocarbons (MADEP-EPH)

## C11-C22 Aromatic Hydrocarbons

(Unadjusted)	mg/kg dw	9.2	5.9 J	5.9 J	26	7.1 J
Surrogate - o-Terphenyl *	%	97 %	90 %	90 %	103 %	94 %
Surrogate - 2-Fluorobiphenyl *	%	139 %	<del>146 %</del>	<del>146 %</del>	138 %	<del>142 %</del>
Surrogate -						
2-Bromonaphthalene *	%	43 %	75 %	75 %	51 %	77 %
Percent Solids		78	81	81	80	82
Dilution Factor		1	1	1	1	1
Prep Date		02/01/05	02/01/05	02/01/05	02/01/05	02/01/05
Analysis Date		02/04/05	02/04/05	02/04/05	02/04/05	02/04/05
Batch ID		FPS2008	FPS2008	FPS2008	FPS2008	FPS2008
Prep Method		3550	3550	3550	3550	3550
Analyst		IE	IE	IE	IE	IE
Quantitation Factor		1.3	1.2	1.2	1.3	1.2

## Analytical Data Report

Lab Sample ID	Description	Matrix	Date Received	Date Sampled	SDG#
01739-11	SB-30 (2.5-3.0)	Solid	01/28/05	01/27/05 08:10	
01739-12	SB-32 (3.5-4.0)	Solid	01/28/05	01/27/05 11:10	
01739-13	SB-31 (2.5-3.0)	Solid	01/28/05	01/27/05 08:55	
01739-14	SB-92 (3.5-4.0)	Solid	01/28/05	01/27/05	

Parameter	Units	Sample ID			
		01739-11 SB-30 (2.5-3.0)	01739-12 SB-32 (3.5-4.0)	01739-13 SB-31 (2.5-3.0)	01739-14 SB-92 (3.5-4.0)

## Volatile Petroleum Hydrocarbons (MADEP-VPH)

C5-C8 Aliphatic Hydrocarbons (Unadjusted)	mg/kg dw	<9.6	<9.9	<8.2	<9.2
C9-C12 Aliphatic Hydrocarbons (Unadjusted)	mg/kg dw	<5.0	<5.1	<4.3	<4.8
C9-C10 Aromatic Hydrocarbons (Unadjusted)	mg/kg dw	1.1JB ✓	1.4JB ✓	0.87JB ✓	0.98JB ✓
Surrogate-a,a,a-Trifluorotoluene (PID) *	%	103 %	94 %	96 %	96 %
Surrogate-a,a,a-Trifluorotoluene (FID) *	%	104 %	95 %	97 %	97 %
Percent Solids		78	76	82	84
Dilution Factor		139	139	125	144
Prep Date		02/03/05	02/03/05	02/03/05	02/03/05
Analysis Date		02/03/05	02/03/05	02/03/05	02/03/05
Batch ID		TRS009B	TRS009B	TRS009B	TRS009B
Prep Method		MADEP-VPH	MADEP-VPH	MADEP-VPH	MADEP-VPH
Analyst		CP	CP	CP	CP
Quantitation Factor		178	183	152	171

## Extractable Petroleum Hydrocarbons (MADEP-EPH)

C9-C18 Aliphatic Hydrocarbons (Unadjusted)	mg/kg dw	1.8JB ✓	1.5JB 2.20	0.87JB 2.10	2.3JB ✓
C19-C36 Aliphatic Hydrocarbons (Unadjusted)	mg/kg dw	6.4JB ✓	4.6JB ✓	3.5JB ✓	17JB ✓
Surrogate - 1-Chloro-octadecane *	%	78 %	72 %	77 %	72 %
Percent Solids		78	76	82	84
Dilution Factor		1	1	1	1
Prep Date		02/01/05	02/01/05	02/01/05	02/01/05
Analysis Date		02/04/05	02/04/05	02/04/05	02/04/05
Batch ID		FPS2008	FPS2008	FPS2008	FPS2008
Prep Method		3550B	3550B	3550B	3550B
Analyst		IE	IE	IE	IE
Quantitation Factor		1.3	1.3	1.2	1.2

Analytical Data Report

Lab Sample ID	Description	Matrix	Date Received	Date Sampled	SDG#
01739-11	SB-30 (2.5-3.0)	Solid	01/28/05	01/27/05 08:10	
01739-12	SB-32 (3.5-4.0)	Solid	01/28/05	01/27/05 11:10	
01739-13	SB-31 (2.5-3.0)	Solid	01/28/05	01/27/05 08:55	
01739-14	SB-92 (3.5-4.0)	Solid	01/28/05	01/27/05	

Parameter	Units	Sample ID			
		01739-11 SB-30 (2.5-3.0)	01739-12 SB-32 (3.5-4.0)	01739-13 SB-31 (2.5-3.0)	01739-14 SB-92 (3.5-4.0)

Extractable Petroleum Hydrocarbons (MADEP-EPH)

C11-C22 Aromatic Hydrocarbons					
(Unadjusted)	mg/kg dw	3.5 J	2.8 J	1.9 J	3.3 J
Surrogate - o-Terphenyl *	%	110 %	126 %	108 %	98 %
Surrogate - 2-Fluorobiphenyl *	%	115 %	186 %*	151 %*	114 %
Surrogate -					
2-Bromonaphthalene *	%	11 %*	32 %*	24 %*	9 %*
Percent Solids		78	76	82	84
Dilution Factor		1	1	1	1
Prep Date		02/01/05	02/01/05	02/01/05	02/01/05
Analysis Date		02/04/05	02/04/05	02/04/05	02/04/05
Batch ID		FPS2008	FPS2008	FPS2008	FPS2008
Prep Method		3550	3550	3550	3550
Analyst		IE	IE	IE	IE
Quantitation Factor		1.3	1.3	1.2	1.2

Analytical Data Report

Lab Sample ID	Description	Matrix	Date Received	Date Sampled	SDG#
01739-15	EB-012605	Liquid	01/28/05	01/26/05 16:15	
Sample ID					
Parameter	Units	01739-15			
		EB-012605			

Volatile Petroleum Hydrocarbons (MADEP-VPH)

C5-C8 Aliphatic Hydrocarbons		
(Unadjusted)	ug/l	<26
C9-C12 Aliphatic Hydrocarbons		
(Unadjusted)	ug/l	<11
C9-C10 Aromatic Hydrocarbons		
(Unadjusted)	ug/l	5.8JB
Surrogate-a,a,a-Trifluorotoluene (PID) *	%	100 %
Surrogate-a,a,a-Trifluorotoluene (FID) *	%	103 %
Dilution Factor		1
Prep Date		02/01/05
Analysis Date		02/01/05
Batch ID		TRW012A
Prep Method		MADEP-VPH
Analyst		CP
Quantitation Factor		1

Extractable Petroleum Hydrocarbons (MADEP-EPH)

C9-C18 Aliphatic Hydrocarbons		
(Unadjusted)	ug/l	21JB
C19-C36 Aliphatic Hydrocarbons (Unadjusted)	ug/l	68B
Surrogate -		
1-Chloro-octadecane *	%	88 %
Dilution Factor		1
Prep Date		02/01/05
Analysis Date		02/04/05
Batch ID		FPS2008
Prep Method		3550B
Analyst		IE
Quantitation Factor		1.0



Analytical Data Report

Lab Sample ID	Description	Matrix	Date Received	Date Sampled	SDG#
01739-15	EB-012605	Liquid	01/28/05	01/26/05 16:15	
Sample ID					
Parameter	Units	01739-15			
		EB-012605			

Extractable Petroleum Hydrocarbons (MADEP-EPH)

C11-C22 Aromatic Hydrocarbons

(Unadjusted)	ug/l	49J
Surrogate - o-Terphenyl *	%	117 %
Surrogate - 2-Fluorobiphenyl *	%	137 %
Surrogate -		
2-Bromonaphthalene *	%	13 %*
Dilution Factor		1
Prep Date		02/01/05
Analysis Date		02/04/05
Batch ID		FPS2008
Prep Method		3550
Analyst		IE
Quantitation Factor		1

Analytical Data Report

Lab Sample ID	Description	Matrix	Date Received	Date Sampled	SDG#
01739-16	TB-012705	Liquid	01/28/05	01/27/05	
Sample ID					
Parameter	Units	01739-16			
		TB-012705			

Volatile Petroleum Hydrocarbons (MADEP-VPH)

C5-C8 Aliphatic Hydrocarbons (Unadjusted)	ug/l	<26
C9-C12 Aliphatic Hydrocarbons (Unadjusted)	ug/l	<11
C9-C10 Aromatic Hydrocarbons (Unadjusted)	ug/l	4.9JB
Surrogate-a,a,a-Trifluorotoluene (PID) *	%	93 %
Surrogate-a,a,a-Trifluorotoluene (FID) *	%	95 %
Dilution Factor		1
Prep Date		02/01/05
Analysis Date		02/01/05
Batch ID		TRW012A
Prep Method		MADEP-VPH
Analyst		CP
Quantitation Factor		1

## Analytical Report

**For:** Mr. Scott Davies  
Blasland, Bouck & Lee, Inc.  
3700 Regency Parkway, Suite 140  
Cary, NC 27511

**CC:**

Order Number: C501739  
SDG Number:  
Client Project ID: SUTTON STEAM PLANT  
Project: FADA-PHASE II  
Report Date: 02/10/2005  
Sampled By: Client  
Sample Received Date: 01/28/2005  
Requisition Number:  
Purchase Order:



Stephanie Akers, Project Manager  
SAkers@stl-inc.com

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

STL Pensacola 3355 McLemore Drive - Pensacola FL 32514 Telephone: (850) 474-1001 Fax: (850) 478-2671

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## Sample Summary

Order: C501739  
Date Received: 01/28/2005Client: Blasland, Bouck & Lee, Inc.  
Project: FADA-PHASE II

Client Sample ID	Lab Sample ID	Matrix	Date Sampled
SF-7 (0.5-1.0)	C501739*1	Solid	01/26/2005 09:00
SF-8 (0.5-1.0)	C501739*2	Solid	01/26/2005 09:15
SF-9 (0.5-1.0)	C501739*3	Solid	01/26/2005 09:40
SF-10 (0.5-1.0)	C501739*4	Solid	01/26/2005 10:00
SF-91 (0.5-1.0)	C501739*5	Solid	01/26/2005
SB-22 (4.0-4.5)	C501739*6	Solid	01/26/2005 13:00
SB-24 (4.0-4.5)	C501739*7	Solid	01/26/2005 13:55
SB-26 (4.5-5.0)	C501739*8	Solid	01/26/2005 15:25
SB-28 (4.0-4.5)	C501739*9	Solid	01/26/2005 16:00
SB-29 (3.5-4.0)	C501739*10	Solid	01/27/2005 07:45
SB-30 (2.5-3.0)	C501739*11	Solid	01/27/2005 08:10
SB-32 (3.5-4.0)	C501739*12	Solid	01/27/2005 11:10
SB-31 (2.5-3.0)	C501739*13	Solid	01/27/2005 08:55
SB-92 (3.5-4.0)	C501739*14	Solid	01/27/2005
EB-012605	C501739*15	Liquid	01/26/2005 16:15
TB-012705	C501739*16	Liquid	01/27/2005

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**Analytical Data Report**

Lab Sample ID	Description	Matrix	Date Received	Date Sampled	SDG#
01739-1	SF-7 (0.5-1.0)	Solid	01/28/05	01/26/05 09:00	
01739-2	SF-8 (0.5-1.0)	Solid	01/28/05	01/26/05 09:15	
01739-3	SF-9 (0.5-1.0)	Solid	01/28/05	01/26/05 09:40	
01739-4	SF-10 (0.5-1.0)	Solid	01/28/05	01/26/05 10:00	
01739-5	SF-91 (0.5-1.0)	Solid	01/28/05	01/26/05	

Parameter	Units	Sample ID				
		01739-1 SF-7 (0.5-1.0)	01739-2 SF-8 (0.5-1.0)	01739-3 SF-9 (0.5-1.0)	01739-4 SF-10 (0.5-1.0)	01739-5 SF-91 (0.5-1.0)

**Volatile Petroleum Hydrocarbons (MADEP-VPH)**

C5-C8 Aliphatic Hydrocarbons (Unadjusted)	mg/kg dw	<9.9	<4.5	<8.5	<8.9	<10
C9-C12 Aliphatic Hydrocarbons (Unadjusted)	mg/kg dw	<5.1	<2.4	<4.4	<4.6	1.83
C9-C10 Aromatic Hydrocarbons (Unadjusted)	mg/kg dw	6.9B	1.5B	2.2JB	4.3B	5.6B
Surrogate-a,a,a-Trifluorotoluene (PID) *	%	122 %	112 %	99 %	107 %	117 %
Surrogate-a,a,a-Trifluorotoluene (FID) *	%	123 %	113 %	100 %	109 %	117 %
Percent Solids		78	81	79	77	80
Dilution Factor		143	68	125	127	150
Prep Date		02/01/05	02/02/05	02/01/05	02/02/05	02/02/05
Analysis Date		02/01/05	02/02/05	02/01/05	02/02/05	02/02/05
Batch ID		TRS009B	TRS009B	TRS009B	TRS009B	TRS009B
Prep Method		MADEP-VPH	MADEP-VPH	MADEP-VPH	MADEP-VPH	MADEP-VPH
Analyst		CP	CP	CP	CP	CP
Quantitation Factor		183	84	158	165	188

**Extractable Petroleum Hydrocarbons (MADEP-EPH)**

C9-C18 Aliphatic Hydrocarbons (Unadjusted)	mg/kg dw	51B	4.4B	9B	18B	13B
C19-C36 Aliphatic Hydrocarbons (Unadjusted)	mg/kg dw	280B	49B	82B	120B	98B



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**Analytical Data Report**

Lab Sample ID	Description	Matrix	Date Received	Date Sampled	SDG#
01739-1	SF-7 (0.5-1.0)	Solid	01/28/05	01/26/05 09:00	
01739-2	SF-8 (0.5-1.0)	Solid	01/28/05	01/26/05 09:15	
01739-3	SF-9 (0.5-1.0)	Solid	01/28/05	01/26/05 09:40	
01739-4	SF-10 (0.5-1.0)	Solid	01/28/05	01/26/05 10:00	
01739-5	SF-91 (0.5-1.0)	Solid	01/28/05	01/26/05	

Parameter	Units	Sample ID				
		01739-1 SF-7 (0.5-1.0)	01739-2 SF-8 (0.5-1.0)	01739-3 SF-9 (0.5-1.0)	01739-4 SF-10 (0.5-1.0)	01739-5 SF-91 (0.5-1.0)

**Extractable Petroleum Hydrocarbons (MADEP-EPH)**

Surrogate -						
1-Chloro-octadecane *	%	13 %D	76 %	39 %D	39 %D	84 %
Percent Solids		78	81	79	77	80
Dilution Factor		5	1	2	2	1
Prep Date		02/01/05	02/01/05	02/01/05	02/01/05	02/01/05
Analysis Date		02/04/05	02/03/05	02/04/05	02/04/05	02/03/05
Batch ID		FPS2008	FPS2008	FPS2008	FPS2008	FPS2008
Prep Method		3550B	3550B	3550B	3550B	3550B
Analyst		IE	IE	IE	IE	IE
Quantitation Factor		6.4	1.2	2.5	2.6	1.3

**Extractable Petroleum Hydrocarbons (MADEP-EPH)**

<b>C11-C22 Aromatic Hydrocarbons</b>						
(Unadjusted)	mg/kg dw	120	24	33	20	44
Surrogate - o-Terphenyl *	%	69 %	80 %	104 %	66 %	96 %
Surrogate - 2-Fluorobiphenyl *	%	112 %	135 %	154 %*	44 %	149 %*
Surrogate -						
2-Bromonaphthalene *	%	28 %*	35 %*	26 %*	6 %*	36 %*
Percent Solids		78	81	79	77	80
Dilution Factor		1	1	1	1	1
Prep Date		02/01/05	02/01/05	02/01/05	02/01/05	02/01/05
Analysis Date		02/04/05	02/03/05	02/03/05	02/03/05	02/03/05
Batch ID		FPS2008	FPS2008	FPS2008	FPS2008	FPS2008
Prep Method		3550	3550	3550	3550	3550
Analyst		IE	IE	IE	IE	IE
Quantitation Factor		1.3	1.2	1.3	1.3	1.3

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## Analytical Data Report

Lab Sample ID	Description	Matrix	Date Received	Date Sampled	SDG#
01739-6	SB-22 (4.0-4.5)	Solid	01/28/05	01/26/05 13:00	
01739-7	SB-24 (4.0-4.5)	Solid	01/28/05	01/26/05 13:55	
01739-8	SB-26 (4.5-5.0)	Solid	01/28/05	01/26/05 15:25	
01739-9	SB-28 (4.0-4.5)	Solid	01/28/05	01/26/05 16:00	
01739-10	SB-29 (3.5-4.0)	Solid	01/28/05	01/27/05 07:45	

Parameter	Units	Sample ID				
		01739-6 SB-22 (4.0-4.5)	01739-7 SB-24 (4.0-4.5)	01739-8 SB-26 (4.5-5.0)	01739-9 SB-28 (4.0-4.5)	01739-10 SB-29 (3.5-4.0)

## Volatile Petroleum Hydrocarbons (MADEP-VPH)

C5-C8 Aliphatic Hydrocarbons (Unadjusted)	mg/kg dw	<10	<9.6	<9.2	<9.1	<8.7
C9-C12 Aliphatic Hydrocarbons (Unadjusted)	mg/kg dw	<5.2	<5.0	<4.8	<4.7	<4.5
C9-C10 Aromatic Hydrocarbons (Unadjusted)	mg/kg dw	1.6JB	1.6JB	2.8B	2.3JB	16B
Surrogate-a,a,a-Trifluorotoluene (PID) *	%	118 %	112 %	116 %	114 %	105 %
Surrogate-a,a,a-Trifluorotoluene (FID) *	%	118 %	111 %	118 %	115 %	106 %
Percent Solids		78	81	81	80	82
Dilution Factor		145	143	139	135	132
Prep Date		02/02/05	02/02/05	02/02/05	02/02/05	02/02/05
Analysis Date		02/02/05	02/02/05	02/02/05	02/02/05	02/02/05
Batch ID		TRS009B	TRS009B	TRS009B	TRS009B	TRS009B
Prep Method		MADEP-VPH	MADEP-VPH	MADEP-VPH	MADEP-VPH	MADEP-VPH
Analyst		CP	CP	CP	CP	CP
Quantitation Factor		186	177	171	169	161

## Extractable Petroleum Hydrocarbons (MADEP-EPH)

C9-C18 Aliphatic Hydrocarbons (Unadjusted)	mg/kg dw	4.0B	0.82JB	2.1B	22B	2.1B
C19-C36 Aliphatic Hydrocarbons (Unadjusted)	mg/kg dw	28B	59B	12B	99B	20B

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**Analytical Data Report**

Lab Sample ID	Description	Matrix	Date Received	Date Sampled	SDG#
01739-6	SB-22 (4.0-4.5)	Solid	01/28/05	01/26/05 13:00	
01739-7	SB-24 (4.0-4.5)	Solid	01/28/05	01/26/05 13:55	
01739-8	SB-26 (4.5-5.0)	Solid	01/28/05	01/26/05 15:25	
01739-9	SB-28 (4.0-4.5)	Solid	01/28/05	01/26/05 16:00	
01739-10	SB-29 (3.5-4.0)	Solid	01/28/05	01/27/05 07:45	

Parameter	Units	Sample ID				
		01739-6 SB-22 (4.0-4.5)	01739-7 SB-24 (4.0-4.5)	01739-8 SB-26 (4.5-5.0)	01739-9 SB-28 (4.0-4.5)	01739-10 SB-29 (3.5-4.0)

**Extractable Petroleum Hydrocarbons (MADEP-EPH)**

Surrogate -						
1-Chloro-octadecane *	%	85 %	77 %	67 %	70 %	70 %
Percent Solids		78	81	81	80	82
Dilution Factor		1	1	1	1	1
Prep Date		02/01/05	02/01/05	02/01/05	02/01/05	02/01/05
Analysis Date		02/04/05	02/04/05	02/04/05	02/04/05	02/04/05
Batch ID		FPS2008	FPS2008	FPS2008	FPS2008	FPS2008
Prep Method		3550B	3550B	3550B	3550B	3550B
Analyst		IE	IE	IE	IE	IE
Quantitation Factor		1.3	1.2	1.2	1.3	1.2

**Extractable Petroleum Hydrocarbons (MADEP-EPH)**

C11-C22 Aromatic Hydrocarbons						
(Unadjusted)	mg/kg dw	9.2	5.9	5.9	26	7.1
Surrogate - o-Terphenyl *	%	97 %	90 %	90 %	103 %	94 %
Surrogate - 2-Fluorobiphenyl *	%	139 %	146 %*	146 %*	138 %	142 %*
Surrogate -						
2-Bromonaphthalene *	%	43 %	75 %	75 %	51 %	77 %
Percent Solids		78	81	81	80	82
Dilution Factor		1	1	1	1	1
Prep Date		02/01/05	02/01/05	02/01/05	02/01/05	02/01/05
Analysis Date		02/04/05	02/04/05	02/04/05	02/04/05	02/04/05
Batch ID		FPS2008	FPS2008	FPS2008	FPS2008	FPS2008
Prep Method		3550	3550	3550	3550	3550
Analyst		IE	IE	IE	IE	IE
Quantitation Factor		1.3	1.2	1.2	1.3	1.2

## Analytical Data Report

Lab Sample ID	Description	Matrix	Date Received	Date Sampled	SDG#
01739-11	SB-30 (2.5-3.0)	Solid	01/28/05	01/27/05 08:10	
01739-12	SB-32 (3.5-4.0)	Solid	01/28/05	01/27/05 11:10	
01739-13	SB-31 (2.5-3.0)	Solid	01/28/05	01/27/05 08:55	
01739-14	SB-92 (3.5-4.0)	Solid	01/28/05	01/27/05	

Parameter	Units	Sample ID			
		01739-11 SB-30 (2.5-3.0)	01739-12 SB-32 (3.5-4.0)	01739-13 SB-31 (2.5-3.0)	01739-14 SB-92 (3.5-4.0)

## Volatile Petroleum Hydrocarbons (MADEP-VPH)

C5-C8 Aliphatic Hydrocarbons (Unadjusted)	mg/kg dw	<9.6	<9.9	<8.2	<9.2
C9-C12 Aliphatic Hydrocarbons (Unadjusted)	mg/kg dw	<5.0	<5.1	<4.3	<4.8
C9-C10 Aromatic Hydrocarbons (Unadjusted)	mg/kg dw	1.1JB	1.4JB	0.87JB	0.98JB
Surrogate-a,a,a-Trifluorotoluene (PID) *	%	103 %	94 %	96 %	96 %
Surrogate-a,a,a-Trifluorotoluene (FID) *	%	104 %	95 %	97 %	97 %
Percent Solids		78	76	82	84
Dilution Factor		139	139	125	144
Prep Date		02/03/05	02/03/05	02/03/05	02/03/05
Analysis Date		02/03/05	02/03/05	02/03/05	02/03/05
Batch ID		TRS009B	TRS009B	TRS009B	TRS009B
Prep Method		MADEP-VPH	MADEP-VPH	MADEP-VPH	MADEP-VPH
Analyst		CP	CP	CP	CP
Quantitation Factor		178	183	152	171

## Extractable Petroleum Hydrocarbons (MADEP-EPH)

C9-C18 Aliphatic Hydrocarbons (Unadjusted)	mg/kg dw	1.8B	1.5JB	0.87JB	2.3B
C19-C36 Aliphatic Hydrocarbons (Unadjusted)	mg/kg dw	6.4B	4.6B	3.5B	17B
Surrogate - 1-Chloro-octadecane *	%	78 %	72 %	77 %	72 %
Percent Solids		78	76	82	84
Dilution Factor		1	1	1	1
Prep Date		02/01/05	02/01/05	02/01/05	02/01/05
Analysis Date		02/04/05	02/04/05	02/04/05	02/04/05
Batch ID		FPS2008	FPS2008	FPS2008	FPS2008
Prep Method		3550B	3550B	3550B	3550B
Analyst		IE	IE	IE	IE
Quantitation Factor		1.3	1.3	1.2	1.2

### Analytical Data Report

Lab Sample ID	Description	Matrix	Date Received	Date Sampled	SDG#
01739-11	SB-30 (2.5-3.0)	Solid	01/28/05	01/27/05 08:10	
01739-12	SB-32 (3.5-4.0)	Solid	01/28/05	01/27/05 11:10	
01739-13	SB-31 (2.5-3.0)	Solid	01/28/05	01/27/05 08:55	
01739-14	SB-92 (3.5-4.0)	Solid	01/28/05	01/27/05	

Parameter	Units	Sample ID			
		01739-11 SB-30 (2.5-3.0)	01739-12 SB-32 (3.5-4.0)	01739-13 SB-31 (2.5-3.0)	01739-14 SB-92 (3.5-4.0)

#### Extractable Petroleum Hydrocarbons (MADEP-EPH)

##### C11-C22 Aromatic Hydrocarbons

(Unadjusted)	mg/kg dw	3.5	2.8	1.9	3.3
Surrogate - o-Terphenyl *	%	110 %	126 %	108 %	98 %
Surrogate - 2-Fluorobiphenyl *	%	115 %	186 %*	151 %*	114 %
Surrogate - 2-Bromonaphthalene *	%	11 %*	32 %*	24 %*	9 %*
Percent Solids		78	76	82	84
Recovery Factor		1	1	1	1
Sample Date		02/01/05	02/01/05	02/01/05	02/01/05
Analysis Date		02/04/05	02/04/05	02/04/05	02/04/05
Batch ID		FPS2008	FPS2008	FPS2008	FPS2008
Prep Method		3550	3550	3550	3550
Analyst		IE	IE	IE	IE
Quantitation Factor		1.3	1.3	1.2	1.2

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Analytical Data Report

Lab Sample ID	Description	Matrix	Date Received	Date Sampled	SDG#
01739-15	EB-012605	Liquid	01/28/05	01/26/05 16:15	
Sample ID					
Parameter	Units	01739-15 EB-012605			

Volatile Petroleum Hydrocarbons (MADEP-VPH)

C5-C8 Aliphatic Hydrocarbons (Unadjusted)	ug/l	<26
C9-C12 Aliphatic Hydrocarbons (Unadjusted)	ug/l	<11
C9-C10 Aromatic Hydrocarbons (Unadjusted)	ug/l	5.8JB
Surrogate-a,a,a-Trifluorotoluene (PID) *	%	100 %
Surrogate-a,a,a-Trifluorotoluene (FID) *	%	103 %
Dilution Factor		1
Prep Date		02/01/05
Analysis Date		02/01/05
Batch ID		TRW012A
Prep Method		MADEP-VPH
Analyst		CP
Quantitation Factor		1

Extractable Petroleum Hydrocarbons (MADEP-EPH)

C9-C18 Aliphatic Hydrocarbons (Unadjusted)	ug/l	21JB
C19-C36 Aliphatic Hydrocarbons (Unadjusted)	ug/l	68B
Surrogate - 1-Chloro-octadecane *	%	88 %
Dilution Factor		1
Prep Date		02/01/05
Analysis Date		02/04/05
Batch ID		FPS2008
Prep Method		3550B
Analyst		IE
Quantitation Factor		1.0



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Analytical Data Report

Lab Sample ID	Description	Matrix	Date Received	Date Sampled	SDG#
01739-15	EB-012605	Liquid	01/28/05	01/26/05 16:15	
Sample ID					
Parameter	Units	01739-15			
		EB-012605			

Extractable Petroleum Hydrocarbons (MADEP-EPH)

C11-C22 Aromatic Hydrocarbons		
(Unadjusted)	ug/l	49J
Surrogate - o-Terphenyl *	%	117 %
Surrogate - 2-Fluorobiphenyl *	%	137 %
Surrogate -		
2-Bromonaphthalene *	%	13 %*
Dilution Factor		1
Prep Date		02/01/05
Analysis Date		02/04/05
Batch ID		FPS2008
Method		3550
Analyst		IE
Quantitation Factor		1

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Analytical Data Report

Lab Sample ID	Description	Matrix	Date Received	Date Sampled	SDG#
01739-16	TB-012705	Liquid	01/28/05	01/27/05	
Sample ID					
Parameter	Units	01739-16 TB-012705			

Volatile Petroleum Hydrocarbons (MADEP-VPH)

C5-C8 Aliphatic Hydrocarbons (Unadjusted)	ug/l	<26
C9-C12 Aliphatic Hydrocarbons (Unadjusted)	ug/l	<11
C9-C10 Aromatic Hydrocarbons (Unadjusted)	ug/l	4.9JB
Surrogate-a,a,a-Trifluorotoluene (PID) *	%	93 %
Surrogate-a,a,a-Trifluorotoluene (FID) *	%	95 %
Dilution Factor		1
Prep Date		02/01/05
Analysis Date		02/01/05
Batch ID		TRW012A
Prep Method		MADEP-VPH
Analyst		CP
Quantitation Factor		1

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**Analytical Data Report**

Lab Sample ID	Description	Matrix	Date Received	Date Sampled	SDG#
01739-17	Method Blank	Solid	01/28/05		
01739-18	Lab Control Standard % Recovery	Solid	01/28/05		
01739-19	LCS Accuracy Control Limit (%R)	Solid	01/28/05		

Parameter	Units	Sample ID			~
		01739-17 Method Blank	01739-18 Lab Control	01739-19 StanLCS Accuracy Con	

**Volatile Petroleum Hydrocarbons (MADEP-VPH)**

C5-C8 Aliphatic Hydrocarbons (Unadjusted)	mg/kg dw	<2.7	101 %	70-130
C9-C12 Aliphatic Hydrocarbons (Unadjusted)	mg/kg dw	<1.4	130 %	70-130
C9-C10 Aromatic Hydrocarbons (Unadjusted)	mg/kg dw	0.34J	100 %	70-130
Surrogate-a,a,a-Trifluorotoluene (PID) *	%	109 %	107 %	70-130
Surrogate-a,a,a-Trifluorotoluene (FID) *	%	110 %	109 %	70-130
Dilution Factor		50		
Prep Date		02/02/05		
Analysis Date		02/02/05		
Batch ID		TRS009B	TRS009B	
Prep Method		MADEP-VPH		
Analyst		CP		
Quantitation Factor		50		

**Extractable Petroleum Hydrocarbons (MADEP-EPH)**

C9-C18 Aliphatic Hydrocarbons (Unadjusted)	mg/kg dw	1.2J	79 %	40-140
C19-C36 Aliphatic Hydrocarbons (Unadjusted)	mg/kg dw	0.87J	96 %	40-140
Surrogate - 1-Chloro-octadecane *	%	71 %	70 %	40-140
Dilution Factor		1		
Prep Date		02/01/05		
Analysis Date		02/03/05		
Batch ID		FPS2008	FPS2008	
Prep Method		3550B		
Analyst		IE		
Quantitation Factor		1.0		

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## Analytical Data Report

Lab Sample ID	Description	Matrix	Date Received	Date Sampled	SDG#
01739-17	Method Blank	Solid	01/28/05		
01739-18	Lab Control Standard % Recovery	Solid	01/28/05		
01739-19	LCS Accuracy Control Limit (%R)	Solid	01/28/05		

Parameter	Units	Sample ID		
		01739-17 Method Blank	01739-18 Lab Control	01739-19 StanLCS Accuracy Con

## Extractable Petroleum Hydrocarbons (MADEP-EPH)

## C11-C22 Aromatic Hydrocarbons

(Unadjusted)	mg/kg dw	<1.6	28.333	40-140
Surrogate - o-Terphenyl *	%	74 %	125.000	40-140
Surrogate - 2-Fluorobiphenyl *	%	108 %	100.000	40-140
Surrogate -				
2-Bromonaphthalene *	%	18 %*	100.000	40-140
Dilution Factor		1		
Prep Date		02/01/05		
Analysis Date		02/03/05		
Batch ID		FPS2008	FPS2008	
Prep Method		3550		
Analyst		IE		
Quantitation Factor		1		

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## Analytical Data Report

Lab Sample ID	Description	Matrix	Date Received	Date Sampled	SDG#
01739-20	Method Detection Limit (MDL)	Solid	01/28/05		
01739-21	Reporting Limit (RL)	Solid	01/28/05		

Parameter	Units	Sample ID		
		01739-20	01739-21	
		Method Detection	Reporting Limit	

## Volatile Petroleum Hydrocarbons (MADEP-VPH)

C5-C8 Aliphatic Hydrocarbons (Unadjusted)	mg/kg dw	0.011	0.054
C9-C12 Aliphatic Hydrocarbons (Unadjusted)	mg/kg dw	0.0093	0.028
C9-C10 Aromatic Hydrocarbons (Unadjusted)	mg/kg dw	0.0053	0.015

## Extractable Petroleum Hydrocarbons (MADEP-EPH)

C18 Aliphatic Hydrocarbons (Unadjusted)	mg/kg dw	0.37	1.6
C19-C36 Aliphatic Hydrocarbons (Unadjusted)	mg/kg dw	0.44	1.6

## Extractable Petroleum Hydrocarbons (MADEP-EPH)

C11-C22 Aromatic Hydrocarbons (Unadjusted)	mg/kg dw	0.37	1.6
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## Analytical Data Report

Lab Sample ID	Description	Matrix	Date Received	Date Sampled	SDG#
01739-22	Method Blank	Liquid	01/28/05		
01739-23	Lab Control Standard % Recovery	Liquid	01/28/05		
01739-24	LCS Accuracy Control Limit (%R)	Liquid	01/28/05		

Parameter	Units	Sample ID		
		01739-22 Method Blank	01739-23 Lab Control	01739-24 StanLCS Accuracy Con

## Volatile Petroleum Hydrocarbons (MADEP-VPH)

C5-C8 Aliphatic Hydrocarbons (Unadjusted)	ug/l	<26	109 %	70-130
C9-C12 Aliphatic Hydrocarbons (Unadjusted)	ug/l	<11	98 %	70-130
C9-C10 Aromatic Hydrocarbons (Unadjusted)	ug/l	<7.0	90 %	70-130
Surrogate-a,a,a-Trifluorotoluene (PID) *	%	100 %	99 %	70-130
Surrogate-a,a,a-Trifluorotoluene (FID) *	%	102 %	102 %	70-130
Dilution Factor		1		
Prep Date		02/01/05		
Analysis Date		02/01/05		
Batch ID		TRW012A	TRW012A	
Prep Method		MADEP-VPH		
Analyst		CP		
Quantitation Factor		1		



STL Pensacola 3355 McLemore Drive - Pensacola FL 32514 Telephone:(850) 474-1001 Fax:(850) 478-2671

## Analytical Data Report

Lab Sample ID	Description	Matrix	Date Received	Date Sampled	SDG#
01739-25	Method Detection Limit (MDL)	Liquid	01/28/05		
01739-26	Reporting Limit (RL)	Liquid	01/28/05		
Sample ID					
Parameter	Units	01739-25	01739-26		
		Method Detection	Reporting Limit		

## Volatile Petroleum Hydrocarbons (MADEP-VPH)

C5-C8 Aliphatic Hydrocarbons			
(Unadjusted)	ug/l	4.5	26
C9-C12 Aliphatic Hydrocarbons			
(Unadjusted)	ug/l	4.2	11
C9-C10 Aromatic Hydrocarbons			
(Unadjusted)	ug/l	4.6	7.0

**STL Pensacola** 3355 McLemore Drive - Pensacola FL 32514 Telephone:(850) 474-1001 Fax:(850) 478-2671

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Order Number: C501739

These test results meet all the requirements of NELAC. All questions regarding this test report should be directed to the STL Project Manager who signed this test report.

## VPH (Aliphatics/Aromatics) Laboratory Reporting Form

Client Name BBL  
 Project Name FADA-PHASE II  
 Site Location NC

Laboratory Name STL PENSACOLA  
 NC Certification # (Lab) 314  
 Sample Matrix SOIL

### Sample Information and Analytical Results

Method for Ranges: MADEP VPH  VPH Surrogate Standards Aliphatic: aaa-trifluorotoluene Aromatic: aaa-trifluorotoluene		Sample Identification			C501739-1	C501739-2	C501739-3	C501739-4
		Collection Option (for soil)*			OPTION 3	OPTION 3	OPTION 3	OPTION 3
		Date Collected			1/26/05	1/26/05	1/26/05	1/26/05
		Date Received			1/28/05	1/28/05	1/28/05	1/28/05
		Date Extracted			1/26/05	1/26/05	1/26/05	1/26/05
		Date Analyzed			2/1/05	2/2/05	2/1/05	2/2/05
		% Dry Solids			78	81	79	77
		Dilution Factor			143	68	125	127
Hydrocarbon Ranges	Units of Measure	MDL	RL	Blank				
C5 - C8 Aliphatics**	mg/kg_dw	0.56	2.7	<0.56	<9.9	<4.5	<8.5	<8.9
C9 - C12 Aliphatics**	mg/kg_dw	0.47	1.4	<0.47	<5.1	<2.4	<4.4	<4.6
C9 - C10 Aromatics**	mg/kg_dw	0.27	0.75	0.34 J	6.9 B	1.5 B	2.2 J B	4.3 B
Sample Surrogate Acceptance Range				70-130%	70-130%	70-130%	70-130%	70-130%
Aromatic Surrogate % Recovery - PID				109%	122%	112%	99%	107%
Aliphatic Surrogate % Recovery - FID				110%	123%	113%	100%	109%

\* Option 1 = Established fill line on vial    Option 2 = Sampling Device (indicate brand, e.g. EnCore™)    Option 3 = Field weight of soil  
 \*\* Unadjusted value. Should exclude the concentration of any surrogate(s), internal standards, and/or concentrations of other ranges that elute within the specified range.  
 MDL = Method Detection Limit    RL = Reporting Limit    Blank = Laboratory Method Blank or Trip Blank whichever is higher (indicate type)

VPH rev. 11/00

Were all performance/acceptance standards for required QA/QC procedures achieved?

Yes

Were any significant modifications to the VPH method made?

Yes - Method Modifications are specified in  
 STL Pensacola SOP 435

## VPH (Aliphatics/Aromatics) Laboratory Reporting Form

Client Name BBL  
 Project Name FADA-PHASE II  
 Site Location NC

Laboratory Name STL PENSACOLA  
 NC Certification # (Lab) 314  
 Sample Matrix SOIL

### Sample Information and Analytical Results

Method for Ranges: MADEP VPH  VPH Surrogate Standards Aliphatic: aaa-trifluorotoluene Aromatic: aaa-trifluorotoluene		Sample Identification			C501739-5	C501739-6	C501739-7	C501739-8
		Collection Option (for soil)*			OPTION 3	OPTION 3	OPTION 3	OPTION 3
		Date Collected			1/26/05	1/26/05	1/26/05	1/26/05
		Date Received			1/28/05	1/28/05	1/28/05	1/28/05
		Date Extracted			1/26/05	1/26/05	1/26/05	1/26/05
		Date Analyzed			2/2/05	2/2/05	2/2/05	2/2/05
		% Dry Solids			80	78	81	81
		Dilution Factor			150	145	143	139
Hydrocarbon Ranges	Units of Measure	MDL	RL	Blank				
C5 - C8 Aliphatics**	mg/kg_dw	0.56	2.7	<0.56	<10	<10	<9.6	<9.2
C9 - C12 Aliphatics**	mg/kg_dw	0.47	1.4	<0.47	1.8 J	<5.2	<5.0	<4.8
C9 - C10 Aromatics**	mg/kg_dw	0.27	0.75	0.34 J	5.6 B	1.6 J B	1.6 J B	2.8 B
Sample Surrogate Acceptance Range				70-130%	70-130%	70-130%	70-130%	70-130%
Aromatic Surrogate % Recovery - PID				109%	117%	118%	112%	116%
Aliphatic Surrogate % Recovery - FID				110%	117%	118%	111%	118%

\* Option 1 = Established fill line on vial    Option 2 = Sampling Device (indicate brand, e.g. EnCore™)    Option 3 = Field weight of soil  
 \*\* Unadjusted value. Should exclude the concentration of any surrogate(s), internal standards, and/or concentrations of other ranges that elute within the specified range.  
 MDL = Method Detection Limit    RL = Reporting Limit    Blank = Laboratory Method Blank or Trip Blank whichever is higher (indicate type)

VPH rev. 11/00

Were all performance/acceptance standards for required QA/QC procedures achieved?

Yes

Were any significant modifications to the VPH method made?

Yes - Method Modifications are specified in  
 STL Pensacola SOP 435

## VPH (Aliphatics/Aromatics) Laboratory Reporting Form

Client Name BBL  
 Project Name FADA-PHASE II  
 Site Location NC

Laboratory Name STL PENSACOLA  
 NC Certification # (Lab) 314  
 Sample Matrix SOIL

### Sample Information and Analytical Results

<b>Method for Ranges: MADEP VPH</b>  <b>VPH Surrogate Standards</b> Aliphatic: aaa-trifluorotoluene Aromatic: aaa-trifluorotoluene		Sample Identification			C501739-9	C501739-10	C501739-11	C501739-12
		Collection Option (for soil)*			OPTION 3	OPTION 3	OPTION 3	OPTION 3
		Date Collected			1/26/05	1/27/05	1/27/05	1/27/05
		Date Received			1/28/05	1/28/05	1/28/05	1/28/05
		Date Extracted			1/26/05	1/27/05	1/27/05	1/27/05
		Date Analyzed			2/2/05	2/2/05	2/3/05	2/3/05
		% Dry Solids			80	82	78	76
		Dilution Factor			135	132	139	139
Hydrocarbon Ranges	Units of Measure	MDL	RL	Blank				
C5 - C8 Aliphatics**	mg/kg_dw	0.56	2.7	<0.56	<9.1	<8.7	<9.6	<9.9
C9 - C12 Aliphatics**	mg/kg_dw	0.47	1.4	<0.47	<4.7	<4.5	<5.0	<5.1
C9 - C10 Aromatics**	mg/kg_dw	0.27	0.75	0.34 J	2.3 J B	16 B	1.1 J B	1.4 J B
Sample Surrogate Acceptance Range				70-130%	70-130%	70-130%	70-130%	70-130%
Aromatic Surrogate % Recovery - PID				109%	114%	105%	103%	94%
Aliphatic Surrogate % Recovery - FID				110%	115%	106%	104%	95%

\* Option 1 = Established fill line on vial    Option 2 = Sampling Device (indicate brand, e.g. EnCore™)    Option 3 = Field weight of soil  
 \*\* Unadjusted value. Should exclude the concentration of any surrogate(s), internal standards, and/or concentrations of other ranges that elute within the specified range.  
 MDL = Method Detection Limit    RL = Reporting Limit    Blank = Laboratory Method Blank or Trip Blank whichever is higher (indicate type)

VPH rev. 11/00

Were all performance/acceptance standards for required QA/QC procedures achieved?

Yes

Were any significant modifications to the VPH method made?

Yes - Method Modifications are specified in  
 STL Pensacola SOP 435

## VPH (Aliphatics/Aromatics) Laboratory Reporting Form

Client Name BBL  
 Project Name FADA-PHASE II  
 Site Location NC

Laboratory Name STL PENSACOLA  
 NC Certification # (Lab) 314  
 Sample Matrix SOIL

### Sample Information and Analytical Results

<b>Method for Ranges: MADEP VPH</b>  <b>VPH Surrogate Standards</b> Aliphatic: aaa-trifluorotoluene Aromatic: aaa-trifluorotoluene		<b>Sample Identification</b>			C501739-13	C501739-14		
		<b>Collection Option (for soil)*</b>			OPTION 3	OPTION 3		
		<b>Date Collected</b>			1/27/05	1/27/05		
		<b>Date Received</b>			1/28/05	1/28/05		
		<b>Date Extracted</b>			1/27/05	1/27/05		
		<b>Date Analyzed</b>			2/3/05	2/3/05		
		<b>% Dry Solids</b>			82	84		
		<b>Dilution Factor</b>			125	144		
<b>Hydrocarbon Ranges</b>	<b>Units of Measure</b>	<b>MDL</b>	<b>RL</b>	<b>Blank</b>				
C5 - C8 Aliphatics**	mg/kg_dw	0.56	2.7	<0.56	<8.2	<9.2		
C9 - C12 Aliphatics**	mg/kg_dw	0.47	1.4	<0.47	<4.3	<4.8		
C9 - C10 Aromatics**	mg/kg_dw	0.27	0.75	0.34 J	0.87 J B	0.98 J B		
<b>Sample Surrogate Acceptance Range</b>				<b>70-130%</b>	<b>70-130%</b>	<b>70-130%</b>		
<b>Aromatic Surrogate % Recovery - PID</b>				109%	96%	96%		
<b>Aliphatic Surrogate % Recovery - FID</b>				110%	97%	97%		

\* Option 1 = Established fill line on vial    Option 2 = Sampling Device (indicate brand, e.g. EnCore™)    Option 3 = Field weight of soil  
 \*\* Unadjusted value. Should exclude the concentration of any surrogate(s), internal standards, and/or concentrations of other ranges that elute within the specified range.  
 MDL = Method Detection Limit    RL = Reporting Limit    Blank = Laboratory Method Blank or Trip Blank whichever is higher (indicate type)

VPH rev. 11/00

Were all performance/acceptance standards for required QA/QC procedures achieved?

Yes

Were any significant modifications to the VPH method made?

Yes - Method Modifications are specified in  
 STL Pensacola SOP 435



## VPH (Aliphatics/Aromatics) Laboratory Reporting Form

Client Name BBL  
 Project Name FADA-PHASE II  
 Site Location NC

Laboratory Name STL PENSACOLA  
 NC Certification # (Lab) 314  
 Sample Matrix LIQUID

### Sample Information and Analytical Results

Method for Ranges: MADEP VPH  VPH Surrogate Standards Aliphatic: Aromatic:		Sample Identification			C501739-15	C501739-16		
		Collection Option (for soil)*			N/A	N/A		
		Date Collected			1/26/05	1/27/05		
		Date Received			1/28/05	1/28/05		
		Date Extracted			N/A	N/A		
		Date Analyzed			2/1/05	2/1/05		
		% Dry Solids			N/A	N/A		
		Dilution Factor			1	1		
Hydrocarbon Ranges	Units of Measure	MDL	RL	Blank				
C5 - C8 Aliphatics**	ug/l	4.45	26	<4.5	<26	<26		
C9 - C12 Aliphatics**	ug/l	4.24	11	<4.2	<11	<11		
C9 - C10 Aromatics**	ug/l	4.59	7.0	<4.6	5.8 J	4.9 J		
Sample Surrogate Acceptance Range				70-130%	70-130%	70-130%		
Aliphatic Surrogate % Recovery - PID				100%	100%	93%		
Aromatic Surrogate % Recovery - FID				102%	103%	95%		

\* Option 1 = Established fill line on vial    Option 2 = Sampling Device (indicate brand, e.g. EnCore™)    Option 3 = Field weight of soil  
 \*\* Unadjusted value. Should exclude the concentration of any surrogate(s), internal standards, and/or concentrations of other ranges that elute within the specified range.  
 MDL = Method Detection Limit    RL = Reporting Limit    Blank = Laboratory Method Blank or Trip Blank whichever is higher (indicate type)

VPH rev. 11/00

Were all performance/acceptance standards for required QA/QC procedures achieved?

Yes

Were any significant modifications to the VPH method made?

Yes - Method Modifications are specified  
 in STL Pensacola SOP 435

# EPH (Aliphatics/Aromatics) Laboratory Reporting Form

Client Name BBL  
 Project Name FADA-PHASE II  
 Site Location NORTH CAROLINA

Laboratory Name STL PENSACOLA  
 NC Certification # (Lab) 314  
 Sample Matrix SOIL

## Sample Information and Analytical Results

Method for Ranges: NC EPH		Sample Identification			C501739-1	C501739-2	C501739-3	C501739-4	C501739-5	C501739-6	C501739-7	C501739-8	C501739-9
EPH Surrogate Standards		Date Collected											
Aliphatic: 1-CHLORO-OCTADECANE		Date Received			1/26/2005	1/26/2005	1/26/2005	1/26/2005	1/26/2005	1/26/2005	1/26/2005	1/26/2005	1/26/2005
Aromatic:O-TERPHENYL		Date Extracted			2/1/2005	2/1/2005	2/1/2005	2/1/2005	2/1/2005	2/1/2005	2/1/2005	2/1/2005	2/1/2005
EPH Fractionation Surrogates		Date Analyzed			2/4/2005	2/3/2005	2/4/2005	2/4/2005	2/3/2005	2/4/2005	2/4/2005	2/4/2005	2/4/2005
#1:2-FLUOROBIPHENYL		% Dry Solids			78%	81%	79%	77%	80%	78%	81%	81%	80%
#2:2-BROMONAPHTHALENE		Dilution Factor			X5/X1	X1	X2/X1	X2/X1	X1	X1	X1	X1	X1
Hydrocarbon Ranges	Units of Measure	MDL	RL	Blank									
C9 - C18 Aliphatics*	mg/kg	0.37	1.6	1.2J	51B	4.4B	9.0B	18B	13B	4.0B	0.82JB	2.1B	22B
C19 - C36 Aliphatics*	mg/kg	0.44	1.6	0.87J	280B	49B	82B	120B	98B	28B	5.9B	12B	99B
C11 - C22 Aromatics*	mg/kg	0.37	1.6	<1.6	120	24	33	20	44	9.2	4.1	5.9	26
Sample Surrogate Acceptance Range				40-140%	40-140%	40-140%	40-140%	40-140%	40-140%	40-140%	40-140%	40-140%	40-140%
Aliphatic Surrogate % Recovery				71%	13%D	76%	39%D	39%D	84%	85%	77%	67%	70%
Aromatic Surrogate % Recovery				74%	69%	80%	104%	66%	96%	97%	120%	90%	103%
Fractionation Surrogate Acceptance Range				40-140%	40-140%	40-140%	40-140%	40-140%	40-140%	40-140%	40-140%	40-140%	40-140%
Fractionation Surrogate #1 % Recovery				108%	112%	135%	154%*	44%	139%	139%	152%*	146%*	138%
Fractionation Surrogate #2 % Recovery				18%*	28 %*	35%*	26%*	6%*	43%	43%	65%	75%	51%

\* Unadjusted value. Should exclude the concentration of any surrogate(s), internal standards, and/or concentrations of other ranges that elute within the specified range.

MDL = Method Detection Limit RL = Reporting Limit Blank = Laboratory Method Blank

EPH rev. 11/00

Were all performance/acceptance standards for required QA/QC procedures achieved?

Yes

Was blank correction applied as a significant modification of the method?

Yes

Were any significant modifications to the EPH method made?

Yes - Method Modifications are specified in  
 STL Pensacola SOP 646

# EPH (Aliphatics/Aromatics) Laboratory Reporting Form

Client Name BBL  
 Project Name FADA-PHASE II  
 Site Location NORTH CAROLINA

Laboratory Name STL PENSACOLA  
 NC Certification # (Lab) 314  
 Sample Matrix SOIL

## Sample Information and Analytical Results

Method for Ranges: NC EPH		Sample Identification			C501739-10	C501739-11	C501739-12	C501739-13	C501739-14
EPH Surrogate Standards		Date Collected							
Aliphatic: 1-CHLORO-OCTADECANE		Date Received			1/27/2005	1/27/2005	1/27/2005	1/27/2005	1/27/2005
Aromatic: O-TERPHENYL		Date Extracted			2/1/2005	2/1/2005	2/1/2005	2/1/2005	2/1/2005
EPH Fractionation Surrogates		Date Analyzed			2/4/2005	2/4/2005	2/4/2005	2/4/2005	2/4/2005
#1:2-FLUOROBIPHENYL		% Dry Solids			82%	78%	76%	82%	84%
#2:2-BROMONAPHTHALENE		Dilution Factor			X1	X1	X1	X1	X1
Hydrocarbon Ranges	Units of Measure	MDL	RL	Blank					
C9 - C18 Aliphatics*	mg/kg	0.37	1.6	1.2 J	2.1 B	1.8 B	1.5 JB	0.87 JB	2.3 B
C19 - C36 Aliphatics*	mg/kg	0.44	1.6	0.87 J	20 B	6.4 B	4.6 B	3.5 B	17 B
C11 - C22 Aromatics*	mg/kg	0.37	1.6	<1.6	7.1	3.5	2.8	1.9	3.3
Sample Surrogate Acceptance Range				40-140%	40-140%	40-140%	40-140%	40-140%	40-140%
Aliphatic Surrogate % Recovery				71%	70%	78%	72%	77%	72%
Aromatic Surrogate % Recovery				74%	94%	110%	126%	108%	98%
Fractionation Surrogate Acceptance Range				40-140%	40-140%	40-140%	40-140%	40-140%	40-140%
Fractionation Surrogate #1 % Recovery				108%	142%*	115%	186%*	151%*	114%
Fractionation Surrogate #2 % Recovery				18%*	77%	11%*	32%*	24%*	9%*
* Unadjusted value. Should exclude the concentration of any surrogate(s), internal standards, and/or concentrations of other ranges that elute within the specified range.									
MDL = Method Detection Limit RL = Reporting Limit Blank = Laboratory Method Blank									

EPH rev. 11/00

Were all performance/acceptance standards for required QA/QC procedures achieved?

Yes

Was blank correction applied as a significant modification of the method ?

Yes

Were any significant modifications to the EPH method made?

Yes - Method Modifications are specified in  
 STL Pensacola SOP 646

## EPH (Aliphatics/Aromatics) Laboratory Reporting Form

Client Name BBL  
 Project Name FADA-PHASELL  
 Site Location NORTH CAROLINA

Laboratory Name STL PENSACOLA  
 NC Certification # (Lab) 314  
 Sample Matrix WATER

### Sample Information and Analytical Results

Method for Ranges: NC EPH EPH Surrogate Standards Aliphatic: 1-CHLORO-OCTADECANE Aromatic: O-TERPHENYL EPH Fractionation Surrogates #1: 2-FLUOROBIPHENYL #2: 2-BROMONAPHTHALENE		Sample Identification		C501739-15			
		Date Collected		1/26/2005			
		Date Received					
		Date Extracted		2/1/2005			
		Date Analyzed		2/4/2005			
		% Dry Solids					
		Dilution Factor		X1			
Hydrocarbon Ranges	Units of Measure	MDL	RL	Blank			
C9 - C18 Aliphatics*	µg/L	9.49	50	1.2 J	21 BJ		
C19 - C36 Aliphatics*	µg/L	10.75	50	0.87 J	68 B		
C11 - C22 Aromatics*	µg/L	11.33	50	< 1.6	49 J		
Sample Surrogate Acceptance Range				40-140%	40-140%		
Aliphatic Surrogate % Recovery				71%	88%		
Aromatic Surrogate % Recovery				74%	117%		
Fractionation Surrogate Acceptance Range				40-140%	40-140%		
Fractionation Surrogate #1 % Recovery				108%	137%		
Fractionation Surrogate #2 % Recovery				18%*	13%*		

\* Unadjusted value. Should exclude the concentration of any surrogate(s), internal standards, and/or concentrations of other ranges that elute within the specified range.  
 MDL = Method Detection Limit    RL = Reporting Limit    Blank = Laboratory Method Blank

EPH rev. 11/00

Were all performance/acceptance standards for required QA/QC procedures achieved?

Yes

Was blank correction applied as a significant modification of the method ?

Yes

Were any significant modifications to the EPH method made?

Yes - Method Modifications are  
 specified in STL Pensacola SOP 646



SERIAL NUMBER: 19045

## ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD

SEVERN  
TRENT

STL

STL Pensacola  
3355 McLemore Drive  
Pensacola, FL 32514Phone: 850-474-1001  
Fax: 850-478-2671  
Website: www.stl-inc.com

QUOTE NO.

BOTTLE ORDER NO.

ORDER - LOG-IN NO.

C501739

CLIENT <b>BBL, Inc</b>		ADDRESS <b>3700 Regency Pkwy Suite 140 Cary, NC 27511</b>		REQUESTED ANALYSIS		PAGE <b>1</b>		OF <b>2</b>	
PROJECT NAME <b>FADA-Phase II</b>		PROJECT NO. <b>Sutton Steam Plant</b>		CLIENT/PROJECT MANAGER <b>Scott Davies</b>		PROJECT LOC. (STATE) <b>North Carolina</b>		POSSIBLE HAZARD IDENTIFICATION	
SAMPLED BY <b>Brian Lovgren</b>		CONTRACT / P.O. NO.		PRESERVATIVE		MATRIX		<input type="checkbox"/> NON-HAZARD <input type="checkbox"/> FLAMMABLE <input type="checkbox"/> RADIOACTIVE <input type="checkbox"/> POISON B <input type="checkbox"/> UNKNOWN <input type="checkbox"/> OTHER:	
CLIENT PHONE <b>919-469-1952 X17</b>		CLIENT E-MAIL OR FAX <b>SEB@BBL-INC.COM</b>		No Preservative HCL - Hydrochloric Acid HNO3 - Nitric Acid H2SO4 - Sulfuric Acid or H3PO4 NaOH - Sodium Hydroxide CH3OH - Methanol NaHSO4 - Sodium Bisulfate Na2SO3 - Sodium Thiosulfate Other:		Drinking Water Aqueous GW, SW, WW Solid, Semisolid, Sediment Air NonAqueous (Oil, Solvent, etc.)		NO. OF COOLERS PER SHIPMENT: SPECIAL INSTRUCTIONS/ CONDITIONS OF RECEIPT	
TAT REQUESTED: RUSH NEEDS LAB PREAPPROVAL <input type="checkbox"/> NORMAL - 10 BUSINESS DAYS		<input type="checkbox"/> 1 DAY <input type="checkbox"/> 2 DAYS <input type="checkbox"/> 3 DAYS <input type="checkbox"/> 5 DAYS <input type="checkbox"/> 20 DAYS (Package) <input type="checkbox"/> OTHER:		<input type="checkbox"/> SEE CONTRACT <input type="checkbox"/> OTHER:		NUMBER OF CONTAINERS SUBMITTED			
SAMPLE		SAMPLE IDENTIFICATION							
DATE	TIME								
1-26-05	0900	SF-7 (0.5-1.0)		2				3	1
1-26-05	0915	SF-8 (0.5-1.0)		2				3	1
1-26-05	0940	SF-9 (0.5-1.0)		2				3	1
1-26-05	1000	SF-10 (0.5-1.0)		2				3	1
1-26-05	1000	SF-10 (0.5-1.0) MS		2				3	1
1-26-05	1000	SF-10 (0.5-1.0) MS D		2				3	1
1-26-05	NIR	SF-91 (0.5-1.0)		2				3	1
1-26-05	1300	SB-22 (4.0-4.5)		2				3	1
1-26-05	1355	SB-24 (4.0-4.5)		2				3	1
1-26-05	1525	SB-26 (4.5-5.0)		2				3	1
1-26-05	1600	SB-28 (4.0-4.5)		2				3	1
1-26-05	1615	EB-012605		5				3	2
1-27-05	NIR	TB-012705		2				2	
RELINQUISHED BY: (SIGNATURE) EMDTV CONTAINERS		DATE	TIME	RELINQUISHED BY: (SIGNATURE) <i>[Signature]</i>		DATE	TIME	RELINQUISHED BY: (SIGNATURE) <i>[Signature]</i>	
RECEIVED BY: (SIGNATURE)		DATE	TIME	RECEIVED BY: (SIGNATURE) <i>[Signature]</i>		DATE	TIME	RECEIVED BY: (SIGNATURE)	
LABORATORY USE ONLY									
RECEIVED FOR LABORATORY BY: <i>[Signature]</i>		DATE	TIME	CUSTODY INTACT? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	CUSTODY SEAL NO. <i>644428</i> <i>1044438</i>	REMARKS:			

LAB USE ONLY - SAMPLE NUMBER



# STL Pensacola PROJECT SAMPLE INSPECTION FORM



STL

Lab Order #: \_\_\_\_\_

Date Received: 01/28/05

- |  |  |
|--|--|
| <p>1. Was there a Chain of Custody? <u>Yes</u> No<sup>+</sup></p> <p>2. Was Chain of Custody properly filled out and relinquished? <u>Yes</u> No<sup>+</sup></p> <p>3. Were all samples properly labeled and identified? <u>Yes</u> No<sup>+</sup></p> <p>4. Were samples received cold? <u>Yes</u> No<sup>+</sup> N/A<br/>(Criteria: 0.1° - 6°C: STL-SOP 1055)</p> <p>5. Did samples require splitting or compositing<sup>+</sup>? Yes<sup>+</sup> <u>No</u></p> <p>6. Were samples received in proper containers for analysis requested? <u>Yes</u> No<sup>+</sup></p> <p>7. Were all sample containers received intact? <u>Yes</u> No<sup>+</sup></p> | <p>8. Were samples checked for preservative? <u>Yes</u> No<sup>+</sup> N/A<br/>(Check pH of all H<sub>2</sub>O requiring preservative (STL-PN SOP 917) except VOA vials that require zero headspace)<sup>+</sup></p> <p>9. Is there sufficient volume for analysis requested? <u>Yes</u> No<sup>+</sup> N/A (Can)</p> <p>10. Were samples received within Holding Time? <u>Yes</u> No<sup>+</sup></p> <p>11. Is Headspace (bubble) visible &gt; ¼" diameter in VOA vial(s)?<sup>+</sup> Yes<sup>+</sup> <u>No</u> N/A</p> <p>12. Were Trip Blanks Received? <u>Yes</u> No N/A</p> <p>13. If yes, was analysis of Trip Blanks requested? <u>Yes</u> No N/A</p> <p>14. Were MS/MSD-specific bottles provided? <u>Yes</u> No<sup>+</sup> N/A</p> <p>15. If any issues, how was PM notified? PSIF <input type="checkbox"/> Verbal <input type="checkbox"/></p> |
|--|--|

Airbill Number(s): 848373385328

Delivery By: UPS FedEx HD BUS DHL PE

(HD - Hand Delivery)

Cooler Number(s) & Temp(s) °C: Client 0.3 and 2.0°C IR-1

(IE. #340L, 4°C, IR-1 - COOLER NUMBER, TEMPERATURE, THERMOMETER NUMBER)

Comments (reference item numbers above and list sample IDs/Tests where appropriate):

Inspected By: QW

Date: 01/28/05

Logged By: LLK

Date: 29-JAN-05

Note all Out-of-Control and/or questionable events on Comment Section of this form. For holding times, the analytical department will flag immediate hold time samples (pH, Dissolved O2, Residual CL) as out of hold time, therefore, these samples will not be documented on this PSIF.

All volatile samples requested to be split or composited must be done in the Volatile Lab. Document: "Volatile sample values may be compromised due to sample splitting (compositing)".

All pH results for North Carolina, and other requested projects are to be recorded on the pH log provided (STL-SOP 938).

According to EPA, a bubble of ¼" or less is acceptable in 40 ml vials requiring volatile analysis. According to Florida DEP, excess headspace in liquid TCLP volatile containers shall be documented.

ProjectManagement\Pensvr31\Forms\PSIF.DOC June 18, 2004

ANY PERSON MAKING OR ADDING COMMENTS TO ANY PART OF THIS PSIF MUST INITIAL AND DATE ALL CORRECTIONS, COMMENTS AND/OR INSTRUCTIONS.

**Organic Data Qualifiers for Final Report**

B	The analyte was detected in the method blank and in the client's sample.
D	The result was obtained from a dilution.
E	The result exceeds the calibration range.
J	Estimated value because the analyte concentration is less than the reporting limit.
M	A matrix effect was present.
N	Presumptive evidence of a compound. The compound was identified qualitatively or as a Tentatively Identified Compound.
N/C	Not Calculable. Either the sample spiked was > 4X spike concentration, or the compound was diluted out, or the results of sample duplicate analysis were <RL.
P	Second-column or detector confirmation exceeded method criteria. Appropriate value is reported and data is flagged/qualified as instructed by method/regulation.
U or < or ND	The analyte was not detected.
*	The result is not within control limit(s).

**Inorganic Data Qualifiers for Final Report**

B	The analyte was detected in the method blank and in the client's sample.
E	The reported value is estimated because of the presence of interference.
J	Estimated value because the analyte concentration is less than the reporting limit.
N	The spiked sample recovery is not within control limits.
N/C	Not Calculable. Either the sample spiked was > 4X spike concentration, or the compound was diluted out, or the results of sample duplicate analysis were <RL.
U or < or ND	The analyte was not detected.
	Duplicate analysis not within control limits
M	The duplicate injection precision was not met.
S	The reported value was determined by the Method of Standard Addition (MSA).
W	Post-digestion spike for Furnace AA analysis is out of control limits (85-115%), while sample absorbance is less than 50% of spike absorbance and post spike recovery is greater than or equal to 40%, the sample is flagged with a "W" and no further action is required.
+	The Standard Additions Correlation Coefficient is <0.995.
L	The result is not within control limit(s).

It is permissible to submit an Out-of-Control Events/Corrective Action form and/or Case Narrative in lieu of using above qualifiers.

When the laboratory receives a sample that does not meet EPA requirements for sample collection, preservation or holding time, the laboratory is required to reject the samples. The client must be notified and asked whether the lab should proceed with analysis. Data from any samples that do not meet sample acceptance criteria (collection, preservation and holding time), must be flagged, or noted on a corrective action form or case narrative, or addressed on the Project Sample Inspection Form (PSIF) in an unambiguous manner clearly defining the nature and substance of the variation. NPDES samples from North Carolina that do not meet EPA requirements for sample collection, preservation or holding time are non-reportable for NPDES compliance monitoring.

**Abbreviations**

ND	Not Detected at or above the STL Pensacola reporting limit (RL)
NS	Not Submitted
NA	Not Applicable
MDL	STL Pensacola Method Detection Limit
RL	STL Pensacola Reporting Limit
NoMS	Not enough sample provided to prepare and/or analyze a method-required matrix spike (MS) and/or duplicate (MSD)
TIC	Tentatively Identified Compound

**Florida Projects Inorganic/Organic**

Refer to FL DEP 62-160; Table 4 Data Qualifier Codes. FL DEP Rule 62-160, Table 1 lists the Florida sites which require data qualifiers.

**Arizona DEQ Projects**

Any qualified data submitted to Arizona DEQ (ADEQ) after January 1, 2001 must be designated using the Arizona Data Qualifiers as developed by the Arizona ELAC technical subcommittee. Refer to the ADEQ qualifier list.

**Severn Trent Laboratories Inc.**

STL Pensacola • 3355 McLemore Dr • Pensacola, FL 32514  
Tel 850 474 1001 Fax 850 484 5315 • [www.stl-inc.com](http://www.stl-inc.com)





# STL

## **STL PENSACOLA** **Certifications, Memberships & Affiliations**

**Alabama** Department of Environmental Management, Laboratory ID No. 40150 (Drinking Water by Reciprocity with FL)

**Arizona** Department of Health Services, Lab ID No. AZ0589 (Hazardous Waste & Wastewater)

**Arkansas** Department of Pollution Control and Ecology, (88-0689) (Environmental)

**California** Department of Health Services, **ELAP** Laboratory ID No. 2510 (Hazardous Waste and Wastewater)

**Connecticut** Department of Health Services, Connecticut Lab Approval No. PH-0697 (D W, H W and Wastewater)

**Florida** DOH, **NELAP** Laboratory ID No. E81010 (Drinking Water, Hazardous Waste and Wastewater)

**Florida** DEP/DOH CompQAP # 980156

**Illinois** Environmental Laboratory Accreditation Program (ELAP), **NELAP** Laboratory ID No. 200041 (Wastewater and Hazardous Waste)

**Iowa** Department of Natural Resources, Laboratory ID No. 367 (Wastewater, UST, Solid Waste, & Contaminated Sites)

**Kansas** Department of Health & Environment, **NELAP** Laboratory ID No. E10253 (Wastewater and Hazardous Waste)

**Kentucky** NR&EPC, Laboratory ID No. 90043 (Drinking Water)

**Kentucky** Petroleum Storage Tank Env Assurance Fund, Laboratory ID No. 0053 (UST)

**Louisiana** DEQ, LELAP, **NELAP** Laboratory ID No. 02075, Agency Interest ID 30748 (Environmental)

**Maryland** DH&MH Laboratory ID No. 233 (Drinking Water by Reciprocity with Florida)

**Massachusetts** DEP, Laboratory ID No. M-FL094 (Wastewater)

**Michigan** Bureau of E&Occh, Laboratory ID No.9912 (Drinking Water by Reciprocity with Florida)

**New Hampshire** DES ELAP, **NELAP** Laboratory ID No. 250502 (Drinking Water & Wastewater)

**New Jersey** DEP&E, **NELAP** Laboratory ID No. FL006 (Wastewater and Hazardous Waster)

**North Carolina** DENR, Laboratory ID No. 314 (Hazardous Waste and Wastewater)

**North Dakota** DH&Consol Labs, Laboratory ID No. R-108 Wastewater and Hazardous Waste by Reciprocity with Arizona)

**Oklahoma** Department of Environmental Quality, Laboratory ID No. 9810 (Hazardous Waste and Wastewater)

**Pennsylvania** Department of Environmental Resources, **NELAP** Laboratory ID No. 68-467 (Drinking Water & Wastewater)

**South Carolina** DH&EC, Laboratory ID No. 96026 (Wastewater & Solids/Hazardous Waste by Reciprocity with FL)

**Tennessee** Department of Health & Environment, Laboratory ID No. 02907 (Drinking Water)

**Virginia** Department of General Services, Laboratory ID No. 00008 (Drinking Water by Reciprocity with FL)

**West Virginia** DOE, Office of Water Resources, Laboratory ID No. 136 (Haz Waste and Wastewater)

**EPA ICR** (Information Collection Rule) Approved Laboratory, Laboratory ID No. ICRFL031

**NFESC** (Naval Facilities Engineering Services Center)

**USACE** (United States Army Corps. of Engineers), MRD

STL Pensacola also has a foreign soil permit to accept soils from locations other than the continental United States. Permit No. S-37599

**To:** Scott Davies**Date:** 3/21/2005**From:** Dennis Capria**Re:** Data Review

Data for sample collected from the Progress Energy-Sutton site in North Carolina during February 2005 were reviewed for quality assurance/quality control compliance. The data report from CompuChem, Inc. of Cary, North Carolina was reviewed. Included in the review are data from the following sample delivery group (SDG): 5634 and 5635. The following summarizes the findings of the QA/QC review:

Metals

- One data set was reviewed, including 6 soil sample 1 equipment blank.
- Samples were analyzed for following:

Analysis	Method
Metals	EPA SW-846 6010B

- All samples were analyzed within the method-specified holding time.
- Matrix spike (MS) and laboratory duplicate analyses was performed on the sample location SF-6 (0.5-1.0). MS recoveries and laboratory duplicate relative percent differences were within control limits.
- All reported laboratory control sample recoveries were within control limits.
- Several target analytes were detected in the method blanks within this SDG. Associated Sample results of Zinc less than the blank action level, associated sample results of Thallium and Zinc data have been qualified as non-detect.
- No calibration data was provided.

The data were presented in a reduced deliverables format. Therefore, only a limited data review could be performed. Since no raw data were provided, no verification of compound identification and quantitation could be performed.

Other than for the deviations noted in this review, the reported data quality is within method specifications and the data is considered acceptable for use as reported by the laboratory.

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## INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

SF-3-0.5-1.0

Lab Name: COMPUCHEM Contract: \_\_\_\_\_  
Lab Code: LIBRTY Case No.: \_\_\_\_\_ SAS No.: \_\_\_\_\_ SDG No.: 5634  
Matrix (soil/water): SOIL Lab Sample ID: 563402  
Level (low/med): LOW Date Received: 01/28/05  
% Solids: 95.3

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7440-36-0	Antimony	0.21	U		P
7440-38-2	Arsenic	0.21	U		P
7440-41-7	Beryllium	0.01	U		P
7440-43-9	Cadmium	0.03	U		P
7440-47-3	Chromium	0.06	U		P
7440-50-8	Copper	0.25	B		P
7439-92-1	Lead	0.42			P
7439-97-6	Mercury	0.015	U		CV
7439-96-5	Manganese	0.39	B		P
7440-02-0	Nickel	0.08	U		P
7782-49-2	Selenium	0.27	U		P
7440-22-4	Silver	0.08	U		P
7440-28-0	Thallium	0.30	U		P
7440-66-6	Zinc	0.85	B	U	P

Color Before: BLACK Clarity Before: \_\_\_\_\_ Texture: COARSE  
Color After: YELLOW Clarity After: \_\_\_\_\_ Artifacts: \_\_\_\_\_

Comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

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## INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

SF-4-0.5-1.0

Lab Name: COMPUCHEM Contract: \_\_\_\_\_  
Lab Code: LIBRTY Case No.: \_\_\_\_\_ SAS No.: \_\_\_\_\_ SDG No.: 5634  
Matrix (soil/water): SOIL Lab Sample ID: 563403  
Level (low/mad): LOW Date Received: 01/28/05  
% Solids: 95.7

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7440-36-0	Antimony	0.21	U		P
7440-38-2	Arsenic	0.21	U		P
7440-41-7	Beryllium	0.01	B		P
7440-43-9	Cadmium	0.03	U		P
7440-47-3	Chromium	0.07	B		P
7440-50-8	Copper	0.19	B		P
7439-92-1	Lead	0.84			P
7439-97-6	Mercury	0.017	U		CV
7439-96-5	Manganese	0.66	B		P
7440-02-0	Nickel	0.24	B		P
7782-49-2	Selenium	0.27	U		P
7440-22-4	Silver	0.08	U		P
7440-28-0	Thallium	0.30	U		P
7440-66-6	Zinc	0.87	B	U	P

Color Before: BROWN Clarity Before: \_\_\_\_\_ Texture: COARSE  
Color After: YELLOW Clarity After: \_\_\_\_\_ Artifacts: \_\_\_\_\_  
Comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



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## INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

SF-5-0.5-1.0

Lab Name: COMPUCHEM Contract: \_\_\_\_\_  
Lab Code: LIBRTY Case No.: \_\_\_\_\_ SAS No.: \_\_\_\_\_ SDG No.: 5634  
Matrix (soil/water): SOIL Lab Sample ID: 563404  
Level (low/med): LOW Date Received: 01/28/05  
% Solids: 94.9

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7440-36-0	Antimony	0.20	U		P
7440-38-2	Arsenic	0.38	B		P
7440-41-7	Beryllium	0.01	U		P
7440-43-9	Cadmium	0.03	U		P
7440-47-3	Chromium	0.78	B		P
7440-50-8	Copper	0.27	B		P
7439-92-1	Lead	2.3			P
7439-97-6	Mercury	0.016	U		CV
7439-96-5	Manganese	1.3			P
7440-02-0	Nickel	0.08	U		P
7782-49-2	Selenium	0.26	U		P
7440-22-4	Silver	0.08	U		P
7440-28-0	Thallium	0.29	U		P
7440-66-6	Zinc	1.5	B		P

Color Before: GRAY Clarity Before: \_\_\_\_\_ Texture: COARSE  
Color After: YELLOW Clarity After: \_\_\_\_\_ Artifacts: \_\_\_\_\_

Comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

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## INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

SF-6-0.5-1.0

Lab Name: COMPUCHEM Contract: \_\_\_\_\_  
Lab Code: LIBRTY Case No.: \_\_\_\_\_ SAS No.: \_\_\_\_\_ SDG No.: 5634  
Matrix (soil/water): SOIL Lab Sample ID: 563406  
Level (low/med): LOW Date Received: 01/28/05  
% Solids: 93.6

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7440-36-0	Antimony	0.22	U		P
7440-38-2	Arsenic	0.43	B		P
7440-41-7	Beryllium	0.02	B		P
7440-43-9	Cadmium	0.03	U		P
7440-47-3	Chromium	0.93	B		P
7440-50-8	Copper	0.31	B		P
7439-92-1	Lead	1.7			P
7439-97-6	Mercury	0.018	U		CV
7439-96-5	Manganese	1.5			P
7440-02-0	Nickel	0.17	B		P
7782-49-2	Selenium	0.29	U		P
7440-22-4	Silver	0.09	U		P
7440-28-0	Thallium	0.32	U		P
7440-66-6	Zinc	1.4	B		P

Color Before: BROWN Clarity Before: \_\_\_\_\_ Texture: COARSE  
Color After: YELLOW Clarity After: \_\_\_\_\_ Artifacts: \_\_\_\_\_

Comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

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## INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

SF-90-0.5-1.0

Lab Name: COMPUCHEM Contract: \_\_\_\_\_  
Lab Code: LIBERTY Case No.: \_\_\_\_\_ SAS No.: \_\_\_\_\_ SDG No.: 5634  
Matrix (soil/water): SOIL Lab Sample ID: 563405  
Level (low/med): LOW Date Received: 01/28/05  
% Solids: 96.2

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7440-36-0	Antimony	0.20	U		P
7440-38-2	Arsenic	0.20	U		P
7440-41-7	Beryllium	0.01	U		P
7440-43-9	Cadmium	0.03	U		P
7440-47-3	Chromium	0.06	U		P
7440-50-8	Copper	0.14	B		P
7439-92-1	Lead	0.42			P
7439-97-6	Mercury	0.015	U		CV
7439-96-5	Manganese	0.37	B		P
7440-02-0	Nickel	0.08	U		P
7782-49-2	Selenium	0.26	U		P
7440-22-4	Silver	0.08	U		P
7440-28-0	Thallium	0.29	U		P
7440-66-6	Zinc	1.1	B	U	P

Color Before: BROWN Clarity Before: \_\_\_\_\_ Texture: COARSE  
Color After: YELLOW Clarity After: \_\_\_\_\_ Artifacts: \_\_\_\_\_

Comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

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## INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

EB-012505

Lab Name: COMPUCHEM Contract: \_\_\_\_\_  
Lab Code: LIBERTY Case No.: \_\_\_\_\_ SAS No.: \_\_\_\_\_ SDG No.: 5635  
Matrix (soil/water): WATER Lab Sample ID: 563501  
Level (low/med): LOW Date Received: 01/28/05  
% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7440-36-0	Antimony	13.0			P
7440-38-2	Arsenic	2.1	U		P
7440-41-7	Beryllium	0.10	U		P
7440-43-9	Cadmium	0.30	U		P
7440-47-3	Chromium	0.60	U		P
7440-50-8	Copper	1.4	B		P
7439-92-1	Lead	1.6	B		P
7439-97-6	Mercury	0.10	U		CV
7439-96-5	Manganese	0.24	B		P
7440-02-0	Nickel	0.80	U		P
7782-49-2	Selenium	2.7	U		P
7440-22-4	Silver	0.80	U		P
7440-28-0	Thallium	3.0	U		P
7440-66-6	Zinc	20.6			P

Color Before: COLORLESS Clarity Before: CLEAR Texture: \_\_\_\_\_Color After: COLORLESS Clarity After: CLEAR Artifacts: \_\_\_\_\_Comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_





**CompuChem**

a division of Liberty Analytical Corp.

10-Feb-05

SCOTT DAVIES  
BLASLAND, BOUCK & LEE, INC.  
3700 REGENCY PARKWAY  
SUITE 140  
Cary, NC 27511

Subject:

Report of Data-Project: SUTTON STEAM Workorder: 5634

Attn.: SCOTT DAVIES

Enclosed are the results of analytical work performed in accordance with the referenced account number.

This report covers sample(s) appearing on the attached listing.

Thank you for selecting CompuChem for your sample analysis. If you should have questions or require additional analytical services, please contact your representative at 1-800-833-5097.

Sincerely,

CompuChem

A Division of Liberty Analytical

Attachment

TOTAL NUMBER OF PAGES_____
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**CompuChem, a division of Liberty Analytical**

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Hsn	Client ID	Wordorder	Matrix	Account	Project	Report
563401	SF-2-0.5-1.0	5634	S	BB&L	SUTTON STEAM	
563402	SF-3-0.5-1.0	5634	S	BB&L	SUTTON STEAM	
563403	SF-4-0.5-1.0	5634	S	BB&L	SUTTON STEAM	
563404	SF-5-0.5-1.0	5634	S	BB&L	SUTTON STEAM	
563405	SF-90-0.5-1.0	5634	S	BB&L	SUTTON STEAM	
563406	SF-6-0.5-1.0	5634	S	BB&L	SUTTON STEAM	

## COVER PAGE - INORGANIC ANALYSES DATA PACKAGE

Name: COMPUCHEM Contract: \_\_\_\_\_Lab Code: LIBERTY Case No.: \_\_\_\_\_ SAS No.: \_\_\_\_\_ SDG No.: 5634SOW No.: SW-846

EPA Sample No.	Lab Sample ID.
SF-2-0.5-1.0	563401
SF-3-0.5-1.0	563402
SF-4-0.5-1.0	563403
SF-5-0.5-1.0	563404
SF-6-0.5-1.0	563406
SF-6-0.5-1.0D	59118
SF-6-0.5-1.0D	59123
SF-6-0.5-1.0S	59119
SF-6-0.5-1.0S	59124
SF-6-0.5-1.0SD	59120
SF-6-0.5-1.0SD	59125
SF-90-0.5-1.0	563405

Were ICP interelement corrections applied? Yes/No YESWere ICP background corrections applied? Yes/No YESIf yes-were raw data generated before  
application of background corrections? Yes/No NOComments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hardcopy data package and in the computer-readable data submitted on diskette has been authorized by the Laboratory Manager or the Manager's designee, as verified by the following signature.

Signature: Thomas R. ColeName: Thomas R. ColeDate: February 10, 2005Title: Data Reviewer II

**CompuChem**

**a Division of Liberty Analytical Corp.**

501 Madison Avenue Cary, NC 27513

**INORGANIC CASE SUMMARY NARRATIVE**

**SDG # 5634**

**PROTOCOL # SW-846**

The indicated Sample Delivery Group (SDG) consisting of six (6) soil samples was received into the laboratory management system (LIMS) on January 28, 2005 intact and in good condition with Chain of Custody (COC) records in order. Sample ID's reported in this data package are noted by the receiving department on the COC if they differ from those listed by the samplers on the COC.

The samples were analyzed for total antimony, arsenic, beryllium, cadmium, chromium, copper, lead, manganese, mercury, nickel, selenium, silver, thallium, and zinc using analytical methods delineated in SW-846 (Third Edition)-Update III.

NOTE: Thallium in the method blank was found to be below the negative side of the reporting limit; however, no thallium was found in the samples.

**SAMPLE IDs:**

Customer IDs and correlating laboratory IDs are listed on the cover page.

**INSTRUMENTAL QUALITY CONTROL:**

All calibration verification solutions (ICV & CCV), blanks (ICB, & CCB), and interference check samples (ICSA & ICSAB) associated with this data were confirmed to be within SW-846 allowable limits.

**SAMPLE PREPARATION QUALITY CONTROL:**

The above note modifies the following statement.

The sample preparation procedure verifications (LCSS & PBS) were found to be within acceptable ranges and all field samples were prepared and analyzed within the contract specified holding times.

**MATRIX RELATED QUALITY CONTROL:**

The sample matrix spike, CCN = 59119 and 59124 (SF-6-0.5-1.0S) and the sample matrix spike duplicate, CCN = 59120 and 59125 (SF-6-0.5-1.0SD) were found to be inside control limits for the requested analytes.

SW-846 control limits for matrix spike recoveries are set at 75% to 125% of the analyte quantity added unless original sample concentrations exceed the true values of these "spikes" by a factor of four or more. In this case, affected analytes are not flagged even if recoveries are outside percentage recovery control limits.

The sample matrix duplicate, CCN = 59118 and 59123 (SF-6-0.5-1.0D) was inside control limits for the requested analytes.

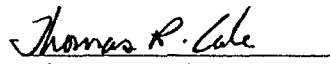
SW-846 control limits for duplicate determinations are  $\pm 20\%$  Relative Percent Difference (RPD) for concentrations greater than or equal to five times the PQL in both the original and duplicate samples, and  $\pm$  the PQL for concentrations less than five times the PQL. The RPD is not calculated if both the original and duplicate values fall below the IDL.

A five-fold serial dilution of sample, CCN = 563406 (SF-6-0.5-1.0L) was performed in accordance with SW-846 requirements for ICP analysis.

The adjusted sample concentrations were inside control limits for the requested analytes.

SW-846 control limits for serial dilution are defined as a deviation less than or equal to 10% in the dilution-adjusted concentrations from the original values for all analyte concentrations with values greater than fifty (50) times their respective Instrument Detection Limit (IDL) in the original sample.

The laboratory manager or his designee, as verified by the following signature has authorized release of the data contained in this hard copy data package.

  
Thomas R. Cole  
Data Reviewer II  
February 10, 2005





501 Madison Ave.

Cary, NC 27513

Phone: 919-379-4100 Fax 919-379-4040

Page \_\_\_\_ of \_\_\_\_

**Courier**

Airbill No.

Sampling Complete? Y or N

Company Name <b>BBL, Inc</b>			Project Name <b>FADA-Phase II Progress Energy</b>			<div style="display: flex; justify-content: space-between;"> <div> <p>4 of 1</p> <p>HSL Metals (14 Total) Serial</p> </div> <div> <p>GW - Ground water</p> <p>WW - Waste water</p> <p>SW - Surface water</p> <p>SO - Soil/Sediment</p> <p>TB - Trip Blank</p> <p>RI - Rinsate</p> <p>WP - Wipe</p> <p>O - Other</p> </div> </div>																					
Address <b>3700 Regency Pkwy Suite 140</b>			Sampling Location <b>Wilmington, NC Sutton</b>																								
City <b>Cary</b>	State <b>NC</b>	Zip <b>27511</b>	Turnaround time <b>Standard</b>																								
Project Contact <b>Scott Davies</b>			Batch QC or Project Specific? If Specific, which Sample ID?																								
Phone # <b>919-469-1952 X17</b>			Are aqueous samples field filtered for metals? Y or N																								
Sampler's Name <b>Brian Lovgren</b>			Are high concentrations expected? Y or N? If yes, which ID(s)?																								
		Collection				Number of Preserved Bottles																					
Field ID		Date	Time	Matrix	# of bottles	HCl	NaOH	HNO3	H2SO4	MeOH	Other																
563401		SF-2(0.5-1.0)	1-25-05	1640	Soil	1						1	1														
563402		SF-3(0.5-1.0)	1-25-05	1650	Soil	1						1	1														
563403		SF-4(0.5-1.0)	1-25-05	1715	Soil	1						1	1														
563404		SF-5(0.5-1.0)	1-25-05	1745	Soil	1						1	1														
563405		SF-6(0.5-1.0)	1-25-05	1810	Soil	1						1	1														
↓		SF-6(0.5-1.0)MS/MS	1-25-05	1810	Soil	1						1	1														
563405		SF-90(0.5-1.0)	1-25-05	N/R	Soil	1						1	1														
563501		EB-012505	1-25-05	1750	Water	1			1				1	12													
Sample Unpacked By: <i>[Signature]</i>						Cyanide samples checked for sulfide & chlorine? Y or NA																					
Sample Order Entry By: <i>[Signature]</i>						625 & Phenol samples checked for chlorine? Y or NA																					
Samples Received in Good Condition (Y or N)						608 samples checked for pH between 5.0-9.0? Y or NA																					
If no, explain:																											
Relinquished by: <i>[Signature]</i>						Date/Time: 1/27/05 1500						Received by: <i>[Signature]</i>						Date/Time: 1/27/05 11500									
Relinquished by:						Date/Time:						Received by:						Date/Time: 1-26-05 10:15									
Subcontact? Y or N If yes, where?						Custody Seal(s) intact? Y or N						On Ice? (Y or N)						Cooler Temp: 2.8 °C									

**Samples stored 60 days after date report mailed at no extra charge.**

White & Yellow copy to lab • Pink copy for customer



# CompuChem

a division of Liberty Analytical Corp.

## WORKORDER SUMMARY REPORT

Workorder: 5634      Account: BB&L      Project: SUTTON STEAM  
SDG-Case: PROGRESS      Status:      QC Type: CLIENT SPECIFIC MS/MSD  
Report Style: COMPUCHEM STYLE 3 WITH EDD

SAMPLE ID	CLIENT ID	COLLECT DATE	RECEIVE DATE	DUE DATE	COMMENTS
563401	SF-2-0.5-1.0	1/25/2005	1/28/2005	2/10/2005	** HSL METALS=Sb,As,Be,Cd,Cr, Cu,Pb,Hg,Ni,Se,Ag,Tl,Zn
S	DRY WEIGHT	Dry Weight			
S	MS6010VAR	METAL 6010B VARIABLE SOIL			
S	MS7471HG	MERCURY ONLY 7471A SOIL			
563402	SF-3-0.5-1.0	1/25/2005	1/28/2005	2/10/2005	HSL METALS=Sb,As,Be,Cd,Cr, Cu,Pb,Hg,Ni,Se,Ag,Tl,Zn
S	DRY WEIGHT	Dry Weight			
S	MS6010VAR	METAL 6010B VARIABLE SOIL			
S	MS7471HG	MERCURY ONLY 7471A SOIL			
563403	SF-4-0.5-1.0	1/25/2005	1/28/2005	2/10/2005	HSL METALS=Sb,As,Be,Cd,Cr, Cu,Pb,Hg,Ni,Se,Ag,Tl,Zn
S	DRY WEIGHT	Dry Weight			
S	MS6010VAR	METAL 6010B VARIABLE SOIL			
S	MS7471HG	MERCURY ONLY 7471A SOIL			
563404	SF-5-0.5-1.0	1/25/2005	1/28/2005	2/10/2005	HSL METALS=Sb,As,Be,Cd,Cr, Cu,Pb,Hg,Ni,Se,Ag,Tl,Zn
S	DRY WEIGHT	Dry Weight			
S	MS6010VAR	METAL 6010B VARIABLE SOIL			
S	MS7471HG	MERCURY ONLY 7471A SOIL			
563405	SF-90-0.5-1.0	1/25/2005	1/28/2005	2/10/2005	HSL METALS=Sb,As,Be,Cd,Cr, Cu,Pb,Hg,Ni,Se,Ag,Tl,Zn
S	DRY WEIGHT	Dry Weight			
S	MS6010VAR	METAL 6010B VARIABLE SOIL			
S	MS7471HG	MERCURY ONLY 7471A SOIL			
563406	SF-6-0.5-1.1	1/25/2005	1/28/2005	2/10/2005	**USE FOR QC** HSL METALS=Sb,As,Be,Cd,Cr, Cu,Pb,Hg,Ni,Se,Ag,Tl,Zn
S	DRY WEIGHT	Dry Weight			
S	MS6010VAR	METAL 6010B VARIABLE SOIL			
S	QCS-6010	QC-6010B METALS SOIL			
S	MS7471HG	MERCURY ONLY 7471A SOIL			
S	QCS-7471HG	QC-7471 HG SOIL			



# CompuChem

a division of Liberty Analytical Corp.

## WORKORDER SUMMARY REPORT

Workorder: 5635      Account: BB&L      Project: SUTTON STEAM  
SDG-Case: PROGRESS      Status:      QC Type: CLIENT SPECIFIC MS/MSD  
Report Style: COMPUCHEM STYLE 3 WITH EDD

SAMPLE ID	CLIENT ID	COLLECT DATE	RECEIVE DATE	DUE DATE	COMMENTS
563501	EB-012505	1/25/2005	1/28/2005	2/10/2005	**REQUIRES 3030C PREP FOR HSL METALS=Sb,As,Be,Cd,Cr, Cu,Pb,Hg,Ni,Se,Ag,Tl,Zn
W	MW6010VAR	METAL 6010B VARIABLE WATER			
W	MW7470HG	MERCURY ONLY 7470A WATER			

**CompuChem**

**a Division of Liberty Analytical Corp.**

501 Madison Avenue Cary, NC 27513

**DATA REPORTING QUALIFIERS FOR INORGANICS**

On Form I, under the column labeled "C" for concentration qualifier and "Q" for qualifier, each result is flagged with the specific data reporting qualifiers listed below, as appropriate. Up to five qualifiers may be reported on Form I for each analyte.

**The C (concentration) qualifiers used are:**

- U:** This flag indicates the analyte was analyzed for but not detected. This reported value was obtained from a reading that was less than the Instrument Detection Limit (IDL). The IDL will be adjusted to reflect any dilution and, for soils, the percent moisture.
- B:** This flag indicates the analyte was analyzed for and the reported value was obtained from a reading that was less than the Contract Required Detection Limit (CRDL) but greater than or equal to the Instrument Detection Limit (IDL).

**The Q qualifiers used are:**

- E:** This flag indicates an estimated value. This flag is used:
1. When the serial dilution (a five fold dilution for CLP and a five fold dilution for SW-846 method 6010B) results are not within 10%. The analyte concentration must be sufficiently high (minimally a factor of 50X above the IDL in the original sample).
- N:** This flag indicates the sample spike recovery is outside of control limits:
- \*:** This flag is used for duplicate analysis when the sample and the sample duplicate results are not within control limits.

**The extensions: D, S, SD, L, A, added to the end of the client ID represent as follows:**

- D: matrix duplicate  
S: matrix spike  
SD: matrix spike duplicate  
L: serial dilution  
A: post digestion spike

**Method Codes:**

- P: ICP PLASMA  
CV: MERCURY COLD VAPOR AA  
CA: MIDI-DISTILLATION SPECTROPHOTOMETRIC

## INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

SF-2-0.5-1.0

Lab Name: COMPUCHEM Contract: \_\_\_\_\_  
Lab Code: LIBERTY Case No.: \_\_\_\_\_ SAS No.: \_\_\_\_\_ SDG No.: 5634  
Matrix (soil/water): SOIL Lab Sample ID: 563401  
Level (low/med): LOW Date Received: 01/28/05  
% Solids: 96.6

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7440-36-0	Antimony	0.20	U		P
7440-38-2	Arsenic	0.26	B		P
7440-41-7	Beryllium	0.02	B		P
7440-43-9	Cadmium	0.03	U		P
7440-47-3	Chromium	1.8			P
7440-50-8	Copper	0.44	B		P
7439-92-1	Lead	2.4			P
7439-97-6	Mercury	0.016	U		CV
7439-96-5	Manganese	2.2			P
7440-02-0	Nickel	0.36	B		P
7782-49-2	Selenium	0.26	U		P
7440-22-4	Silver	0.08	U		P
7440-28-0	Thallium	0.29	U		P
7440-66-6	Zinc	2.5			P

Color Before: GRAY Clarity Before: \_\_\_\_\_ Texture: COARSE  
Color After: YELLOW Clarity After: \_\_\_\_\_ Artifacts: \_\_\_\_\_

Comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



## INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

SF-3-0.5-1.0

Lab Name: COMPUCHEM Contract: \_\_\_\_\_  
Lab Code: LIBERTY Case No.: \_\_\_\_\_ SAS No.: \_\_\_\_\_ SDG No.: 5634  
Matrix (soil/water): SOIL Lab Sample ID: 563402  
Level (low/med): LOW Date Received: 01/28/05  
% Solids: 95.3

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7440-36-0	Antimony	0.21	U		P
7440-38-2	Arsenic	0.21	U		P
7440-41-7	Beryllium	0.01	U		P
7440-43-9	Cadmium	0.03	U		P
7440-47-3	Chromium	0.06	U		P
7440-50-8	Copper	0.25	B		P
7439-92-1	Lead	0.42			P
7439-97-6	Mercury	0.015	U		CV
7439-96-5	Manganese	0.39	B		P
7440-02-0	Nickel	0.08	U		P
7782-49-2	Selenium	0.27	U		P
7440-22-4	Silver	0.08	U		P
7440-28-0	Thallium	0.30	U		P
7440-66-6	Zinc	0.85	B		P

Color Before: BLACK Clarity Before: \_\_\_\_\_ Texture: COARSE  
Color After: YELLOW Clarity After: \_\_\_\_\_ Artifacts: \_\_\_\_\_

Comments: \_\_\_\_\_  
\_\_\_\_\_  
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\_\_\_\_\_

## INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

SF-4-0.5-1.0

Lab Name: COMPUCHEM Contract: \_\_\_\_\_

Lab Code: LIBERTY Case No.: \_\_\_\_\_ SAS No.: \_\_\_\_\_ SDG No.: 5634

Matrix (soil/water): SOIL Lab Sample ID: 563403

Level (low/med): LOW Date Received: 01/28/05

% Solids: 95.7

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7440-36-0	Antimony	0.21	U		P
7440-38-2	Arsenic	0.21	U		P
7440-41-7	Beryllium	0.01	B		P
7440-43-9	Cadmium	0.03	U		P
7440-47-3	Chromium	0.07	B		P
7440-50-8	Copper	0.19	B		P
7439-92-1	Lead	0.84			P
7439-97-6	Mercury	0.017	U		CV
7439-96-5	Manganese	0.66	B		P
7440-02-0	Nickel	0.24	B		P
7782-49-2	Selenium	0.27	U		P
7440-22-4	Silver	0.08	U		P
7440-28-0	Thallium	0.30	U		P
7440-66-6	Zinc	0.87	B		P

Color Before: BROWN Clarity Before: \_\_\_\_\_ Texture: COARSEColor After: YELLOW Clarity After: \_\_\_\_\_ Artifacts: \_\_\_\_\_

Comments: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

## INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

SF-5-0.5-1.0

Lab Name: COMPUCHEM

Contract: \_\_\_\_\_

Lab Code: LIBRTY

Case No.: \_\_\_\_\_

SAS No.: \_\_\_\_\_

SDG No.: 5634Matrix (soil/water): SOILLab Sample ID: 563404Level (low/med): LOWDate Received: 01/28/05% Solids: 94.9Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7440-36-0	Antimony	0.20	U		P
7440-38-2	Arsenic	0.38	B		P
7440-41-7	Beryllium	0.01	U		P
7440-43-9	Cadmium	0.03	U		P
7440-47-3	Chromium	0.78	B		P
7440-50-8	Copper	0.27	B		P
7439-92-1	Lead	2.3			P
7439-97-6	Mercury	0.016	U		CV
7439-96-5	Manganese	1.3			P
7440-02-0	Nickel	0.08	U		P
7782-49-2	Selenium	0.26	U		P
7440-22-4	Silver	0.08	U		P
7440-28-0	Thallium	0.29	U		P
7440-66-6	Zinc	1.5	B		P

Color Before: GRAY

Clarity Before: \_\_\_\_\_

Texture: COARSEColor After: YELLOW

Clarity After: \_\_\_\_\_

Artifacts: \_\_\_\_\_

Comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

## INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

SF-6-0.5-1.0

Lab Name: COMPUCHEM Contract: \_\_\_\_\_  
Lab Code: LIBERTY Case No.: \_\_\_\_\_ SAS No.: \_\_\_\_\_ SDG No.: 5634  
Matrix (soil/water): SOIL Lab Sample ID: 563406  
Level (low/med): LOW Date Received: 01/28/05  
% Solids: 93.6

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7440-36-0	Antimony	0.22	U		P
7440-38-2	Arsenic	0.43	B		P
7440-41-7	Beryllium	0.02	B		P
7440-43-9	Cadmium	0.03	U		P
7440-47-3	Chromium	0.93	B		P
7440-50-8	Copper	0.31	B		P
7439-92-1	Lead	1.7			P
7439-97-6	Mercury	0.018	U		CV
7439-96-5	Manganese	1.5			P
7440-02-0	Nickel	0.17	B		P
7782-49-2	Selenium	0.29	U		P
7440-22-4	Silver	0.09	U		P
7440-28-0	Thallium	0.32	U		P
7440-66-6	Zinc	1.4	B		P

Color Before: BROWN Clarity Before: \_\_\_\_\_ Texture: COARSE  
Color After: YELLOW Clarity After: \_\_\_\_\_ Artifacts: \_\_\_\_\_

Comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

## INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

SF-90-0.5-1.0

Lab Name: COMPUCHEM Contract: \_\_\_\_\_

Lab Code: LIBRTY Case No.: \_\_\_\_\_ SAS No.: \_\_\_\_\_ SDG No.: 5634

Matrix (soil/water): SOIL Lab Sample ID: 563405

Level (low/med): LOW Date Received: 01/28/05

% Solids: 96.2

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7440-36-0	Antimony	0.20	U		P
7440-38-2	Arsenic	0.20	U		P
7440-41-7	Beryllium	0.01	U		P
7440-43-9	Cadmium	0.03	U		P
7440-47-3	Chromium	0.06	U		P
7440-50-8	Copper	0.14	B		P
7439-92-1	Lead	0.42			P
7439-97-6	Mercury	0.015	U		CV
7439-96-5	Manganese	0.37	B		P
7440-02-0	Nickel	0.08	U		P
7782-49-2	Selenium	0.26	U		P
7440-22-4	Silver	0.08	U		P
7440-28-0	Thallium	0.29	U		P
7440-66-6	Zinc	1.1	B		P

Color Before: BROWN Clarity Before: \_\_\_\_\_ Texture: COARSE

Color After: YELLOW Clarity After: \_\_\_\_\_ Artifacts: \_\_\_\_\_

Comments: \_\_\_\_\_



SW-846

3

BLANKS

Lab Name: COMPUCHEM Contract: \_\_\_\_\_Lab Code: LIBRTY Case No.: \_\_\_\_\_ SAS No.: \_\_\_\_\_ SDG No.: 5634Preparation Blank Matrix (soil/water): SOILPreparation Blank Concentration Units (ug/L or mg/kg): MG/KG

Analyte	Initial Calib. Blank (ug/L)	Continuing Calibration Blank (ug/L)						Preparation Blank		M
		1	2	3						
Antimony	2.1 U	2.1 U	2.1 U	2.1 U				0.308	B	P
Arsenic	2.1 U	2.1 U	2.1 U	2.1 U				-0.270	B	P
Beryllium	0.1 U	0.1 U	0.2 B	0.2 B				0.010	U	P
Cadmium	0.3 U	0.3 U	0.3 U	0.3 U				-0.055	B	P
Chromium	-1.7 B	-1.6 B	-1.7 B	-1.6 B				0.060	U	P
Copper	-0.5 B	0.4 U	0.4 U	0.4 U				0.040	U	P
Lead	1.3 U	1.3 U	1.3 U	1.3 U				0.130	U	P
Mercury	0.100 U	0.100 U	0.100 U	0.100 U				0.017	U	CV
Manganese	0.2 U	0.2 U	0.2 U	0.2 U				0.060	B	P
Nickel	0.8 U	0.8 U	0.8 U	0.8 U				0.080	U	P
Selenium	2.7 U	2.7 U	2.7 U	2.7 U				0.270	U	P
Silver	0.8 U	0.8 U	0.8 U	0.8 U				0.080	U	P
Thallium	3.0 U	3.0 U	3.0 U	3.0 U				-1.181		P
Zinc	1.2 U	1.2 U	1.2 U	1.2 U				0.247	B	P

SW-846

5A

## SPIKE SAMPLE RECOVERY

SAMPLE NO.

SF-6-0.5-1.0S

Lab Name: COMPUCHEM Contract: \_\_\_\_\_Lab Code: LIBRTY Case No.: \_\_\_\_\_ SAS No.: \_\_\_\_\_ SDG No.: 5634Matrix (soil/water): SOIL Level (low/med): LOW% Solids for Sample: 93.6Concentration Units (ug/L or mg/kg dry weight): MG/KG

Analyte	Control Limit %R	Spiked Sample Result (SSR)	C	Sample Result (SR)	C	Spike Added (SA)	%R	Q	M
Antimony	75 - 125	44.4235		0.2244	U	53.42	83.2		P
Arsenic	75 - 125	4.0775		0.4321	B	4.27	85.4		P
Beryllium	75 - 125	5.3995		0.0187	B	5.34	100.8		P
Cadmium	75 - 125	4.9634		0.0321	U	5.34	92.9		P
Chromium	75 - 125	22.1959		0.9314	B	21.37	99.5		P
Copper	75 - 125	25.7008		0.3097	B	26.71	95.1		P
Lead	75 - 125	3.5967		1.7057		2.14	88.4		P
Mercury	75 - 125	0.1937		0.0178	U	0.18	107.6		CV
Manganese	75 - 125	55.2713		1.5453		53.42	100.6		P
Nickel	75 - 125	51.0065		0.1702	B	53.42	95.2		P
Selenium	75 - 125	1.0070		0.2885	U	1.07	94.1		P
Silver	75 - 125	4.8446		0.0855	U	5.34	90.7		P
Thallium	75 - 125	4.0766		0.3205	U	5.34	76.3		P
Zinc	75 - 125	52.6503		1.3831	B	53.42	96.0		P

Comments:

SW-846

5A

## SPIKE SAMPLE RECOVERY

SAMPLE NO.

SF-6-0.5-1.0SD

Lab Name: COMPUCHEM Contract: \_\_\_\_\_Lab Code: LIBRTY Case No.: \_\_\_\_\_ SAS No.: \_\_\_\_\_ SDG No.: 5634Matrix (soil/water): SOIL Level (low/med): LOW% Solids for Sample: 93.6Concentration Units (ug/L or mg/kg dry weight): MG/KG

Analyte	Control Limit %R	Spiked Sample Result (SSR)	C	Sample Result (SR)	C	Spike Added (SA)	%R	Q	M
Antimony	75 - 125	44.7850		0.2244	U	53.42	83.8		P
Arsenic	75 - 125	3.9261		0.4321	B	4.27	81.8		P
Beryllium	75 - 125	5.3690		0.0187	B	5.34	100.2		P
Cadmium	75 - 125	4.9106		0.0321	U	5.34	92.0		P
Chromium	75 - 125	22.0633		0.9314	B	21.37	98.9		P
Copper	75 - 125	25.6256		0.3097	B	26.71	94.8		P
Lead	75 - 125	3.7131		1.7057		2.14	93.8		P
Mercury	75 - 125	0.1891		0.0178	U	0.18	105.1		CV
Manganese	75 - 125	54.8590		1.5453		53.42	99.8		P
Nickel	75 - 125	50.5042		0.1702	B	53.42	94.2		P
Selenium	75 - 125	1.1657		0.2885	U	1.07	108.9		P
Silver	75 - 125	4.8114		0.0855	U	5.34	90.1		P
Thallium	75 - 125	4.2037		0.3205	U	5.34	78.7		P
Zinc	75 - 125	52.3219		1.3831	B	53.42	95.4		P

Comments:

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## DUPLICATES

SAMPLE NO.

SF-6-0.5-1.0D

Lab Name: COMPUCHEM Contract: \_\_\_\_\_Lab Code: LIBRTY Case No.: \_\_\_\_\_ SAS No.: \_\_\_\_\_ SDG No.: 5634Matrix (soil/water): SOIL Level (low/med): LOW% Solids for Sample: 93.6 % Solids for Duplicate: 93.6Concentration Units (ug/L or mg/kg dry weight): MG/KG

Analyte	Control Limit	Sample (S)	C	Duplicate (D)	C	RPD	Q	M
Antimony		0.2244	U	0.2414	B	200.0		P
Arsenic		0.4321	B	0.2244	U	200.0		P
Beryllium		0.0187	B	0.0151	B	21.3		P
Cadmium		0.0321	U	0.0321	U			P
Chromium	1.1	0.9314	B	1.1639		22.2		P
Copper		0.3097	B	0.3825	B	21.0		P
Lead	0.3	1.7057		1.4985		12.9		P
Mercury		0.0178	U	0.0178	U			CV
Manganese	1.1	1.5453		1.7263		11.1		P
Nickel		0.1702	B	0.3289	B	63.6		P
Selenium		0.2885	U	0.2885	U			P
Silver		0.0855	U	0.0855	U			P
Thallium		0.3205	U	0.3205	U			P
Zinc		1.3831	B	2.1277	B	42.4		P

## LABORATORY CONTROL SAMPLE

Lab Name: COMPUCHEM Contract: \_\_\_\_\_Lab Code: LIBRTY Case No.: \_\_\_\_\_ SAS No.: \_\_\_\_\_ SDG No.: 5634Solid LCS Source: EPA

Aqueous LCS Source: \_\_\_\_\_

Analyte	Aqueous (ug/L)			Solid (mg/kg)					
	True	Found	%R	True	Found	C	Limits	%R	
Antimony				68.9	49.41		18.8	119.0	71.7
Arsenic				136.0	121.55		101.0	171.0	89.4
Beryllium				95.3	92.56		74.7	116.0	97.1
Cadmium				118.0	113.30		90.4	145.0	96.0
Chromium				89.3	81.53		71.3	107.0	91.3
Copper				117.0	120.35		95.7	138.0	102.9
Lead				138.0	125.75		105.0	170.0	91.1
Mercury				2.5	2.5		1.7	3.3	100.8
Manganese				341.0	312.73		272.0	409.0	91.7
Nickel				156.0	149.74		122.0	190.0	96.0
Selenium				87.6	80.63		64.9	110.0	92.0
Silver				119.0	118.97		88.8	150.0	100.0
Thallium				139.0	124.06		79.6	199.0	89.3
Zinc				66.0	53.30		42.9	89.1	80.8



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## ICP SERIAL DILUTIONS

SAMPLE NO.

SF-6-0.5-1.0L

Lab Name: COMPUCHEM

Contract: \_\_\_\_\_

Lab Code: LIBRTY

Case No.: \_\_\_\_\_

SAS No.: \_\_\_\_\_

SDG No.: 5634Matrix (soil/water): SOILLevel (low/med): LOW

Concentration Units: ug/L

Analyte	Initial Sample Result (I)			Serial Dilution Result (S)			% Differ- ence	Q	M
			C			C			
Antimony	2.10	U		10.50	U				P
Arsenic	4.04	B		10.50	U	100.0			P
Beryllium	0.17	B		0.50	U	100.0			P
Cadmium	0.30	U		1.50	U				P
Chromium	8.72	B		3.00	U	100.0			P
Copper	2.90	B		4.23	B	45.9			P
Lead	15.97			14.37	B	10.0			P
Manganese	14.46			14.84	B	2.6			P
Nickel	1.59	B		4.00	U	100.0			P
Selenium	2.70	U		13.50	U				P
Silver	0.80	U		4.00	U				P
Thallium	3.00	U		15.00	U				P
Zinc	12.95	B		21.10	B	62.9			P

## INSTRUMENT DETECTION LIMITS (QUARTERLY)

Lab Name: COMPUCHEM Contract: \_\_\_\_\_Lab Code: LIBRTY Case No.: \_\_\_\_\_ SAS No.: \_\_\_\_\_ SDG No.: 5634ICP ID Number: P4 Date: 01/15/05

Flame AA ID Number: \_\_\_\_\_

Furnace AA ID Number: \_\_\_\_\_

Analyte	Wave-length (nm)	Back-ground	CRQL (ug/L)	IDL (ug/L)	M
Antimony	206.84		10	2.1	P
Arsenic	189.04		10	2.1	P
Beryllium	313.04		5	0.1	P
Cadmium	226.50		5.0	0.3	P
Chromium	267.72		10	0.6	P
Copper	324.70		5	0.4	P
Lead	220.35		3	1.3	P
Manganese	257.61		10	0.2	P
Nickel	231.60		40	0.8	P
Selenium	196.03		5	2.7	P
Silver	328.07		5	0.8	P
Thallium	190.86		10	3.0	P
Zinc	206.20		20	1.2	P

Comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

## INSTRUMENT DETECTION LIMITS (QUARTERLY)

Lab Name: COMPUCHEM Contract: \_\_\_\_\_

Lab Code: LIBRTY Case No.: \_\_\_\_\_ SAS No.: \_\_\_\_\_ SDG No.: 5634

ICP ID Number: \_\_\_\_\_ Date: 01/15/05

Flame AA ID Number: V3

Furnace AA ID Number: \_\_\_\_\_

Analyte	Wave-length (nm)	Back-ground	CRQL (ug/L)	IDL (ug/L)	M
Mercury	253.70		0.20	0.10	CV

Comments: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_



**CompuChem**

a division of Liberty Analytical Corp.

10-Feb-05

SCOTT DAVIES  
BLASLAND, BOUCK & LEE, INC.  
3700 REGENCY PARKWAY  
SUITE 140  
Cary, NC 27511

Subject:

Report of Data-Project: SUTTON STEAM Workorder: 5635

Attn.: SCOTT DAVIES

Enclosed are the results of analytical work performed in accordance with the referenced account number.

This report covers sample(s) appearing on the attached listing.

Thank you for selecting CompuChem for your sample analysis. If you should have questions or require additional analytical services, please contact your representative at 1-800-833-5097.

Sincerely,

CompuChem

A Division of Liberty Analytical

Attachment

TOTAL NUMBER OF PAGES_____
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**CompuChem, a division of Liberty Analytical**

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Hsn	Client ID	Wordorder	Matrix	Account	Project	Report
563501	EB-012505	5635	W	BB&L	SUTTON STEAM	



## COVER PAGE - INORGANIC ANALYSES DATA PACKAGE

Name: COMPUCHEM Contract: \_\_\_\_\_  
Lab Code: LIBERTY Case No.: \_\_\_\_\_ SAS No.: \_\_\_\_\_ SDG No.: 5635  
SOW No.: SW-846  
EPA Sample No. EB-012505 Lab Sample ID. 563501

Were ICP interelement corrections applied?

Yes/No YES

Were ICP background corrections applied?

Yes/No YESIf yes-were raw data generated before  
application of background corrections?Yes/No NOComments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hardcopy data package and in the computer-readable data submitted on diskette has been authorized by the Laboratory Manager or the Manager's designee, as verified by the following signature.

Signature: Thomas R. ColeName: Thomas R. ColeDate: February 10, 2005Title: Data Reviewer II

**INORGANIC CASE SUMMARY NARRATIVE**

**SDG # 5635**

**PROTOCOL # SW-846**

The indicated Sample Delivery Group (SDG) consisting of one (1) water sample was received into the laboratory management system (LIMS) on January 28, 2005 intact and in good condition with Chains of Custody (COC) records in order. Sample ID's reported in this data package are noted by the receiving department on the COC if they differ from those listed by the samplers on the COC.

The sample was analyzed for total antimony, arsenic, beryllium, cadmium, chromium, copper, lead, manganese, mercury, nickel, selenium, silver, thallium, and zinc using analytical methods delineated in SW-846 (Third Edition)-Update III.

**SAMPLE IDs:**

Customer IDs and correlating laboratory IDs are listed on the cover page.

**INSTRUMENTAL QUALITY CONTROL:**

All calibration verification solutions (ICV & CCV), blanks (ICB, CCB), and interference check samples (ICSA & ICSAB) associated with this data were confirmed to be within SW-846 allowable limits.

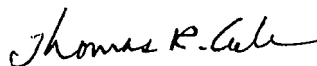
**SAMPLE PREPARATION QUALITY CONTROL:**

The sample preparation procedure verifications (LCSW & PBW) were found to be within acceptable ranges and all field samples were prepared and analyzed within the contract specified holding times.

**MATRIX RELATED QUALITY CONTROL:**

No matrix quality control samples were prepared and analyze in this case.

The laboratory manager or his designee, as verified by the following signature has authorized release of the data contained in this hard copy data package.



Thomas R. Cole  
Data Reviewer II  
February 10, 2005



# CompuChem

a division of Liberty Analytical Corp.

## WORKORDER SUMMARY REPORT

Workorder: 5634

Account: BB&L

Project: SUTTON STEAM

SDG-Case: PROGRESS

Status:

QC Type: CLIENT SPECIFIC MS/MSD

Report Style: COMPUCHEM STYLE 3 WITH EDD

SAMPLE ID	CLIENT ID	COLLECT DATE	RECEIVE DATE	DUE DATE	COMMENTS
563401	SF-2-0.5-1.0	1/25/2005	1/28/2005	2/10/2005	** HSL METALS=Sb,As,Be,Cd,Cr, Cu,Pb,Hg,Ni,Se,Ag,Tl,Zn
S	DRY WEIGHT	Dry Weight			
S	MS6010VAR	METAL 6010B VARIABLE SOIL			
S	MS7471HG	MERCURY ONLY 7471A SOIL			
563402	SF-3-0.5-1.0	1/25/2005	1/28/2005	2/10/2005	HSL METALS=Sb,As,Be,Cd,Cr, Cu,Pb,Hg,Ni,Se,Ag,Tl,Zn
S	DRY WEIGHT	Dry Weight			
S	MS6010VAR	METAL 6010B VARIABLE SOIL			
S	MS7471HG	MERCURY ONLY 7471A SOIL			
563403	SF-4-0.5-1.0	1/25/2005	1/28/2005	2/10/2005	HSL METALS=Sb,As,Be,Cd,Cr, Cu,Pb,Hg,Ni,Se,Ag,Tl,Zn
S	DRY WEIGHT	Dry Weight			
S	MS6010VAR	METAL 6010B VARIABLE SOIL			
S	MS7471HG	MERCURY ONLY 7471A SOIL			
563404	SF-5-0.5-1.0	1/25/2005	1/28/2005	2/10/2005	HSL METALS=Sb,As,Be,Cd,Cr, Cu,Pb,Hg,Ni,Se,Ag,Tl,Zn
S	DRY WEIGHT	Dry Weight			
S	MS6010VAR	METAL 6010B VARIABLE SOIL			
S	MS7471HG	MERCURY ONLY 7471A SOIL			
563405	SF-90-0.5-1.0	1/25/2005	1/28/2005	2/10/2005	HSL METALS=Sb,As,Be,Cd,Cr, Cu,Pb,Hg,Ni,Se,Ag,Tl,Zn
S	DRY WEIGHT	Dry Weight			
S	MS6010VAR	METAL 6010B VARIABLE SOIL			
S	MS7471HG	MERCURY ONLY 7471A SOIL			
563406	SF-6-0.5-1.1	1/25/2005	1/28/2005	2/10/2005	**USE FOR QC** HSL METALS=Sb,As,Be,Cd,Cr, Cu,Pb,Hg,Ni,Se,Ag,Tl,Zn
S	DRY WEIGHT	Dry Weight			
S	MS6010VAR	METAL 6010B VARIABLE SOIL			
S	QCS-6010	QC-6010B METALS SOIL			
S	MS7471HG	MERCURY ONLY 7471A SOIL			
S	QCS-7471HG	QC-7471 HG SOIL			



# CompuChem

a division of Liberty Analytical Corp.

## WORKORDER SUMMARY REPORT

Workorder: 5635      Account: BB&L      Project: SUTTON STEAM  
SDG-Case: PROGRESS      Status:      QC Type: CLIENT SPECIFIC MS/MSD  
Report Style: COMPUCHEM STYLE 3 WITH EDD

SAMPLE ID	CLIENT ID	COLLECT DATE	RECEIVE DATE	DUE DATE	COMMENTS
563501	EB-012505	1/25/2005	1/28/2005	2/10/2005	**REQUIRES 3030C PREP FOR HSL METALS=Sb,As,Be,Cd,Cr,Cu,Pb,Hg,Ni,Se,Ag,Tl,Zn
W	MW6010VAR	METAL 6010B VARIABLE WATER			
W	MW7470HG	MERCURY ONLY 7470A WATER			

## **CompuChem**

### **a Division of Liberty Analytical Corp.**

501 Madison Avenue Cary, NC 27513

## **DATA REPORTING QUALIFIERS FOR INORGANICS**

On Form I, under the column labeled "C" for concentration qualifier and "Q" for qualifier, each result is flagged with the specific data reporting qualifiers listed below, as appropriate. Up to five qualifiers may be reported on Form I for each analyte.

### **The C (concentration) qualifiers used are:**

- U:** This flag indicates the analyte was analyzed for but not detected. This reported value was obtained from a reading that was less than the Instrument Detection Limit (IDL). The IDL will be adjusted to reflect any dilution and, for soils, the percent moisture.
- B:** This flag indicates the analyte was analyzed for and the reported value was obtained from a reading that was less than the Contract Required Detection Limit (CRDL) but greater than or equal to the Instrument Detection Limit (IDL).

### **The Q qualifiers used are:**

- E:** This flag indicates an estimated value. This flag is used:
1. When the serial dilution (a five fold dilution for CLP and a five fold dilution for SW-846 method 6010B) results are not within 10%. The analyte concentration must be sufficiently high (minimally a factor of 50X above the IDL in the original sample).
- N:** This flag indicates the sample spike recovery is outside of control limits:
- \*:** This flag is used for duplicate analysis when the sample and the sample duplicate results are not within control limits.

### **The extensions: D, S, SD, L, A, added to the end of the client ID represent as follows:**

- D: matrix duplicate  
S: matrix spike  
SD: matrix spike duplicate  
L: serial dilution  
A: post digestion spike

### **Method Codes:**

- P: ICP PLASMA  
CV: MERCURY COLD VAPOR AA  
CA: MIDI-DISTILLATION SPECTROPHOTOMETRIC



## INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

EB-012505

Lab Name: COMPUCHEM Contract: \_\_\_\_\_

Lab Code: LIBRTY Case No.: \_\_\_\_\_ SAS No.: \_\_\_\_\_ SDG No.: 5635

Matrix (soil/water): WATER Lab Sample ID: 563501

Level (low/med): LOW Date Received: 01/28/05

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7440-36-0	Antimony	13.0			P
7440-38-2	Arsenic	2.1	U		P
7440-41-7	Beryllium	0.10	U		P
7440-43-9	Cadmium	0.30	U		P
7440-47-3	Chromium	0.60	U		P
7440-50-8	Copper	1.4	B		P
7439-92-1	Lead	1.6	B		P
7439-97-6	Mercury	0.10	U		CV
7439-96-5	Manganese	0.24	B		P
7440-02-0	Nickel	0.80	U		P
7782-49-2	Selenium	2.7	U		P
7440-22-4	Silver	0.80	U		P
7440-28-0	Thallium	3.0	U		P
7440-66-6	Zinc	20.6			P

Color Before: COLORLESS Clarity Before: CLEAR Texture: \_\_\_\_\_

Color After: COLORLESS Clarity After: CLEAR Artifacts: \_\_\_\_\_

Comments: \_\_\_\_\_

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## BLANKS

Lab Name: COMPUCHEM Contract: \_\_\_\_\_Lab Code: LIBRTY Case No.: \_\_\_\_\_ SAS No.: \_\_\_\_\_ SDG No.: 5635Preparation Blank Matrix (soil/water): WATERPreparation Blank Concentration Units (ug/L or mg/kg): UG/L

Analyte	Initial Calib. Blank (ug/L)		Continuing Calibration Blank (ug/L)						Preparation Blank		M
	C		1	C	2	C	3	C	C		
Antimony	4.2	B	3.1	B	3.7	B	3.2	B	2.100	U	P
Arsenic	2.1	U	2.1	U	2.1	U	2.1	U	2.100	U	P
Beryllium	0.1	U	0.1	U	0.1	B	0.1	U	0.100	U	P
Cadmium	0.3	U	0.3	U	0.3	U	0.3	U	0.300	U	P
Chromium	-0.6	B	0.6	U	-0.6	B	0.6	U	0.600	U	P
Copper	0.4	U	0.4	U	0.4	U	0.4	U	0.510	B	P
Lead	1.3	U	1.3	U	1.3	U	1.3	U	1.300	U	P
Mercury	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U	CV
Manganese	0.2	U	0.2	U	0.2	U	0.2	U	1.165	B	P
Nickel	0.8	U	0.8	U	0.8	U	0.8	U	0.800	U	P
Selenium	2.7	U	2.7	U	2.7	U	2.7	U	2.700	U	P
Silver	0.8	U	0.8	U	0.8	U	0.8	U	0.800	U	P
Thallium	3.0	U	3.0	U	3.0	U	3.0	U	3.000	U	P
Zinc	1.2	U	1.2	U	1.2	U	1.6	B	7.692	B	P

## LABORATORY CONTROL SAMPLE

Lab Name: COMPUCHEM Contract: \_\_\_\_\_Lab Code: LIBRTY Case No.: \_\_\_\_\_ SAS No.: \_\_\_\_\_ SDG No.: 5635

Solid LCS Source: \_\_\_\_\_

Aqueous LCS Source: HIPUR

Analyte	Aqueous (ug/L)			Solid (mg/kg)					
	True	Found	%R	True	Found	C	Limits	%R	
Antimony	6000.0	5890.08	98.2						
Arsenic	1000.0	1008.64	100.9						
Beryllium	500.0	511.42	102.3						
Cadmium	500.0	468.42	93.7						
Chromium	1000.0	954.02	95.4						
Copper	2500.0	2413.54	96.5						
Lead	300.0	281.38	93.8						
Mercury	3.0	2.76	92.0						
Manganese	1500.0	1461.37	97.4						
Nickel	4000.0	3728.60	93.2						
Selenium	500.0	501.94	100.4						
Silver	1000.0	969.88	97.0						
Thallium	1000.0	887.34	88.7						
Zinc	2000.0	1852.63	92.6						

## INSTRUMENT DETECTION LIMITS (QUARTERLY)

Lab Name: COMPUCHEM Contract: \_\_\_\_\_Lab Code: LIBERTY Case No.: \_\_\_\_\_ SAS No.: \_\_\_\_\_ SDG No.: 5635ICP ID Number: P4 Date: 01/15/05

Flame AA ID Number: \_\_\_\_\_

Furnace AA ID Number: \_\_\_\_\_

Analyte	Wave-length (nm)	Back-ground	CRQL (ug/L)	IDL (ug/L)	M
Antimony	206.84		10	2.1	P
Arsenic	189.04		10	2.1	P
Beryllium	313.04		5	0.1	P
Cadmium	226.50		5.0	0.3	P
Chromium	267.72		10	0.6	P
Copper	324.70		5	0.4	P
Lead	220.35		3	1.3	P
Manganese	257.61		10	0.2	P
Nickel	231.60		40	0.8	P
Selenium	196.03		5	2.7	P
Silver	328.07		5	0.8	P
Thallium	190.86		10	3.0	P
Zinc	206.20		20	1.2	P

Comments: \_\_\_\_\_

## INSTRUMENT DETECTION LIMITS (QUARTERLY)

Lab Name: COMPUCHEM

Contract: \_\_\_\_\_

Lab Code: LIBRTY Case No.: \_\_\_\_\_SAS No.: \_\_\_\_\_ SDG No.: 5635

ICP ID Number: \_\_\_\_\_

Date: 01/15/05Flame AA ID Number: V3

Furnace AA ID Number: \_\_\_\_\_

Analyte	Wave-length (nm)	Back-ground	CRQL (ug/L)	IDL (ug/L)	M
Mercury	253.70		0.20	0.10	CV

Comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

# MEMORANDUM



**To:** Scott Davies  
**From:** Dennis Capria  
**Re:** Data Review

**Date:** 3/21/2005

Data for sample collected from the Progress Energy-Sutton site in North Carolina during February 2005 were reviewed for quality assurance/quality control compliance. The data report from CompuChem, Inc. of Cary, North Carolina was reviewed. Included in the review are data from the following sample delivery group (SDG): 5674. The following summarizes the findings of the QA/QC review:

## Metals

- One data set was reviewed, including 11 water sample 1 equipment blank.
- Samples were analyzed for following:

Analysis	Method
Metals	EPA SW-846 6010B
Sulfate	EPA 375.4
Chloride	EPA 325.2
TOC	EPA 415.1

- All samples were analyzed within the method-specified holding time.
- Matrix spike (MS) and laboratory duplicate analyses was performed on the sample location MW-16. The MS recovery of thallium exhibited a recovery less than the control limit. All associate thallium sample results were qualified as estimated. The laboratory duplicate analysis of chromium exhibited a relative percent difference (RPD) greater than the control limit. All associated sample results were qualified as estimated. All other MS recoveries and laboratory duplicate RPDs were within control limits
- All reported laboratory control sample recoveries were within control limits.
- Several target analytes were detected in the method blanks within this SDG. Associated Sample results of Thallium and Zinc less than the blank action level, associated sample results of Thallium and Zinc data have been qualified as non-detect.
- No calibration data was provided.



The data were presented in a reduced deliverables format. Therefore, only a limited data review could be performed. Since no raw data were provided, no verification of compound identification and quantitation could be performed.

Other than for the deviations noted in this review, the reported data quality is within method specifications and the data is considered acceptable for use as reported by the laboratory.

SW-846

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## INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

MW-13

Lab Name: COMPUCHEM Contract: \_\_\_\_\_  
Lab Code: LIBRTY Case No.: \_\_\_\_\_ SAS No.: \_\_\_\_\_ SDG No.: 5674  
Matrix (soil/water): WATER Lab Sample ID: 567406  
Level (low/med): LOW Date Received: 02/03/05  
% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	99.1			P
7440-70-2	Calcium	125000			P
7440-47-3	Chromium	0.90	U	<del>N</del>	P
7440-50-8	Copper	0.55	B		P
7440-28-0	Thallium	10 8.9	B	<del>N</del>	P
7440-66-6	Zinc	20 9.9	B	U	P

Color Before: COLORLESS Clarity Before: CLEAR Texture: \_\_\_\_\_  
Color After: COLORLESS Clarity After: CLEAR Artifacts: \_\_\_\_\_  
Comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

SW-846

## INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

MW-13D

Lab Name: COMPUCHEM Contract: \_\_\_\_\_  
Lab Code: LIBRTY Case No.: \_\_\_\_\_ SAS No.: \_\_\_\_\_ SDG No.: 5674  
Matrix (soil/water): WATER Lab Sample ID: 567407  
Level (low/med): LOW Date Received: 02/03/05  
% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	3.6	U		P
7440-70-2	Calcium	84400			P
7440-47-3	Chromium	0.90	U	4 J	P
7440-50-8	Copper	0.50	U		P
7440-28-0	Thallium	10 8.2	B	ND J	P
7440-66-6	Zinc	20 18.3	B	U	P

Color Before: COLORLESS Clarity Before: CLEAR Texture: \_\_\_\_\_  
Color After: COLORLESS Clarity After: CLEAR Artifacts: \_\_\_\_\_  
Comments: \_\_\_\_\_  
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SW-846

-1-

## INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

MW-14

Lab Name: COMPUCHEM Contract: \_\_\_\_\_  
Lab Code: LIBRTY Case No.: \_\_\_\_\_ SAS No.: \_\_\_\_\_ SDG No.: 5674  
Matrix (soil/water): WATER Lab Sample ID: 567401  
Level (low/med): LOW Date Received: 02/03/05  
% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	9.6	B		P
7440-70-2	Calcium	34100			P
7440-47-3	Chromium	0.90	U	*J	P
7440-50-8	Copper	0.59	B		P
7440-28-0	Thallium	6.2 6.2	B	W	P
7440-66-6	Zinc	20 17.8	B	U	P

Color Before: COLORLESS Clarity Before: CLOUDY Texture: \_\_\_\_\_  
Color After: COLORLESS Clarity After: CLOUDY Artifacts: \_\_\_\_\_  
Comments: \_\_\_\_\_  
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SW-846

-1-

## INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

MW-15

Lab Name: COMPUCHEM Contract: \_\_\_\_\_  
Lab Code: LIBRTY Case No.: \_\_\_\_\_ SAS No.: \_\_\_\_\_ SDG No.: 5674  
Matrix (soil/water): WATER Lab Sample ID: 567408  
Level (low/med): LOW Date Received: 02/03/05  
% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	44.0			P
7440-70-2	Calcium	63400			P
7440-47-3	Chromium	0.90	U	X	P
7440-50-8	Copper	0.50	U		P
7440-28-0	Thallium	10 5.6	B	N	P
7440-66-6	Zinc	20 13.8	B	U	P

Color Before: COLORLESS Clarity Before: CLOUDY Texture: \_\_\_\_\_  
Color After: COLORLESS Clarity After: CLOUDY Artifacts: \_\_\_\_\_

Comments: \_\_\_\_\_  
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SW-846

-1-

## INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

MW-15D

Lab Name: COMPUCHEM Contract: \_\_\_\_\_  
Lab Code: LIBERTY Case No.: \_\_\_\_\_ SAS No.: \_\_\_\_\_ SDG No.: 5674  
Matrix (soil/water): WATER Lab Sample ID: 567409  
Level (low/med): LOW Date Received: 02/03/05  
% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	3.6	U		P
7440-70-2	Calcium	35900			P
7440-47-3	Chromium	0.90	U	*J	P
7440-50-8	Copper	0.50	U		P
7440-28-0	Thallium	6.2	U	NJ	P
7440-66-6	Zinc	20 13.6	B	U	P

Color Before: COLORLESS Clarity Before: CLEAR Texture: \_\_\_\_\_  
Color After: COLORLESS Clarity After: CLEAR Artifacts: \_\_\_\_\_

Comments: \_\_\_\_\_  
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SW-846

-1-

## INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

EB-020205

Lab Name: COMPUCHEM Contract: \_\_\_\_\_  
Lab Code: LIBREY Case No.: \_\_\_\_\_ SAS No.: \_\_\_\_\_ SDG No.: 5674  
Matrix (soil/water): WATER Lab Sample ID: 567404  
Level (low/med): LOW Date Received: 02/03/05  
% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	3.6	U		P
7440-70-2	Calcium	104	B	B	P
7440-47-3	Chromium	0.90	U	J	P
7440-50-8	Copper	0.50	U		P
7440-28-0	Thallium	6.2	U	J	P
7440-66-6	Zinc	13.0	B		P

Color Before: COLORLESS Clarity Before: CLEAR Texture: \_\_\_\_\_  
Color After: COLORLESS Clarity After: CLEAR Artifacts: \_\_\_\_\_

Comments: \_\_\_\_\_  
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SW-846

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## INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

MW-20

Lab Name: COMPUCHEM Contract: \_\_\_\_\_  
Lab Code: LIBERTY Case No.: \_\_\_\_\_ SAS No.: \_\_\_\_\_ SDG No.: 5674  
Matrix (soil/water): WATER Lab Sample ID: 567410  
Level (low/med): LOW Date Received: 02/04/05  
% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	3.6	U		P
7440-70-2	Calcium	79900			P
7440-47-3	Chromium	0.90	U	X	P
7440-50-8	Copper	0.59	B		P
7440-28-0	Thallium	6.2	U	NJ	P
7440-66-6	Zinc	24.3		10	P

Color Before: COLORLESS Clarity Before: CLEAR Texture: \_\_\_\_\_  
Color After: COLORLESS Clarity After: CLEAR Artifacts: \_\_\_\_\_  
Comments: \_\_\_\_\_  
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SW-846

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## INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

MW-20D

Lab Name: COMPUCHEM Contract: \_\_\_\_\_  
Lab Code: LIBRTY Case No.: \_\_\_\_\_ SAS No.: \_\_\_\_\_ SDG No.: 5674  
Matrix (soil/water): WATER Lab Sample ID: 567411  
Level (low/med): LOW Date Received: 02/04/05  
% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	3.6	U		P
7440-70-2	Calcium	65300			P
7440-47-3	Chromium	0.90	U	+	P
7440-50-8	Copper	1.1	B		P
7440-28-0	Thallium	6.2	U	N	P
7440-66-6	Zinc	21.9		( )	P

Color Before: COLORLESS Clarity Before: CLEAR Texture: \_\_\_\_\_  
Color After: COLORLESS Clarity After: CLEAR Artifacts: \_\_\_\_\_  
Comments: \_\_\_\_\_  
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SW-846

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## INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

MW-90

Lab Name: COMPUCHEM Contract: \_\_\_\_\_

Lab Code: LIBERTY Case No.: \_\_\_\_\_ SAS No.: \_\_\_\_\_ SDG No.: 5674

Matrix (soil/water): WATER Lab Sample ID: 567405

Level (low/med): LOW Date Received: 02/03/05

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	103			P
7440-70-2	Calcium	129000			P
7440-47-3	Chromium	0.90	U	X	P
7440-50-8	Copper	0.50	U		P
7440-28-0	Thallium	6.2	U	N	P
7440-66-6	Zinc	20	16.4	10	P

Color Before: COLORLESS Clarity Before: CLEAR Texture: \_\_\_\_\_

Color After: COLORLESS Clarity After: CLEAR Artifacts: \_\_\_\_\_

Comments: \_\_\_\_\_

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SW-846

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## INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

MW-91

Lab Name: COMPUCHEM Contract: \_\_\_\_\_  
Lab Code: LIBERTY Case No.: \_\_\_\_\_ SAS No.: \_\_\_\_\_ SDG No.: 5674  
Matrix (soil/water): WATER Lab Sample ID: 567412  
Level (low/med): LOW Date Received: 02/04/05  
% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	3.6	U		P
7440-70-2	Calcium	84200			P
7440-47-3	Chromium	0.90	U	<i>✓</i>	P
7440-50-8	Copper	0.91	B		P
7440-28-0	Thallium	6.2	U	<i>✓</i>	P
7440-66-6	Zinc	<i>26.2</i> <del>26.2</del>		<i>U</i>	P

Color Before: COLORLESS Clarity Before: CLEAR Texture: \_\_\_\_\_  
Color After: COLORLESS Clarity After: CLEAR Artifacts: \_\_\_\_\_  
Comments: \_\_\_\_\_  
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SW-846

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## INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

MW-16

Lab Name: COMPUCHEM

Contract: \_\_\_\_\_

Lab Code: LIBRTY

Case No.: \_\_\_\_\_

SAS No.: \_\_\_\_\_

SDG No.: 5674Matrix (soil/water): WATERLab Sample ID: 567402Level (low/med): LOWDate Received: 02/03/05% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight):

UG/L

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	3.6	U		P
7440-70-2	Calcium	5390			P
7440-47-3	Chromium	0.90	U	* J	P
7440-50-8	Copper	0.65	B		P
7440-28-0	Thallium	6.9	B	N V J	P
7440-66-6	Zinc	23.0		U	P

Color Before: COLORLESSClarity Before: CLEAR

Texture: \_\_\_\_\_

Color After: COLORLESSClarity After: CLEAR

Artifacts: \_\_\_\_\_

Comments: \_\_\_\_\_  
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SW-846

-1-

## INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

MW-16D

Lab Name: COMPUCHEM Contract: \_\_\_\_\_  
Lab Code: LIBERTY Case No.: \_\_\_\_\_ SAS No.: \_\_\_\_\_ SDG No.: 5674  
Matrix (soil/water): WATER Lab Sample ID: 567403  
Level (low/med): LOW Date Received: 02/03/05  
% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	4.3	B		P
7440-70-2	Calcium	33700			P
7440-47-3	Chromium	0.90	U	<i>1.5</i>	P
7440-50-8	Copper	0.50	U		P
7440-28-0	Thallium	8.0	B	<i>NV</i>	P
7440-66-6	Zinc	35.3		<i>1.0</i>	P

Color Before: COLORLESS Clarity Before: CLEAR Texture: \_\_\_\_\_  
Color After: COLORLESS Clarity After: CLEAR Artifacts: \_\_\_\_\_  
Comments: \_\_\_\_\_  
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## EPA SAMPLE NO.

MW-14

Concentration Units (ug/L or mg/kg dry weight): mg/L

[illegible]

Comments:

EPA SAMPLE NO.

MW-16

Lab Name: COMPUCHEM Contract: PROGRESS

Lab Code: CompuChe Case No.: PROGRESS NRAS No.: \_\_\_\_\_ SDG No.: PROGRESS E

Matrix: (soil/water) WATER Lab Sample ID: 567402

Level: (low/med) LOW Date Received: 02/03/2005

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): mg/L

[illegible]

Color Before: \_\_\_\_\_ Clarity Before: \_\_\_\_\_ Texture: \_\_\_\_\_

Color After: \_\_\_\_\_ Clarity After: \_\_\_\_\_ Artifacts: \_\_\_\_\_

Comments:

1A-IN  
INORGANIC ANALYSIS DATA SHEET

MW-16D

Concentration Units (ug/L or mg/kg dry weight): mg/L

[illegible]

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## EPA SAMPLE NO.

MM-90

Concentration Units (ug/L or mg/kg dry weight): mg/L

[illegible]

Color Before: \_\_\_\_\_ Clarity Before: \_\_\_\_\_ Texture: \_\_\_\_\_  
Color After: \_\_\_\_\_ Clarity After: \_\_\_\_\_ Artifacts: \_\_\_\_\_  
Comments: \_\_\_\_\_

Comments:



## EPA SAMPLE NO.

MW-13

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): mg/L

[illegible]

Comments:

1A-IN  
INORGANIC ANALYSIS DATA SHEET

MW-13D

Concentration Units (ug/L or mg/kg dry weight): mg/L

[illegible]

• • Comments:

1A-IN  
INORGANIC ANALYSIS DATA SHEET

MW-13D

§ Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): mg/L

[illegible]

Comments:

ILM05.2

## EPA SAMPLE NO.

Lab Name: COMPUCHEM Contract: PROGRESS  
Lab Code: CompuChe Case No.: PROGRESS NRAS No.: \_\_\_\_\_ SDG No.: PROGRESS E  
Matrix: (soil/water) WATER Lab Sample ID: 567408  
Level: (low/med) LOW Date Received: 02/03/2005  
% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): mg/L

[illegible]

Color Before: \_\_\_\_\_ Clarity Before: \_\_\_\_\_ Texture: \_\_\_\_\_  
Color After: \_\_\_\_\_ Clarity After: \_\_\_\_\_ Artifacts: \_\_\_\_\_  
Comments: \_\_\_\_\_

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## EPA SAMPLE NO.

MM-15D

Concentration Units (ug/L or mg/kg dry weight): mg/L

[illegible]

Name: 
 Email: 
 Password: 
 Confirm Password: 
 Register

1A-IN  
INORGANIC ANALYSIS DATA SHEET

MM-20

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): mg/L

[illegible]

Comments:

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\_\_\_\_\_



1A-IN  
INORGANIC ANALYSIS DATA SHEET

MR-20D

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): mg/L

[illegible]

Comments:

ILM05.2

## EPA SAMPLE NO.

Lab Name: COMPUCHEM Contract: PROGRESS

Matrix: (soil/water) WATER Lab Sample ID: 567412

% Solids: 0.0

[illegible]

Color After: \_\_\_\_\_ Clarity After: \_\_\_\_\_ Artifacts: \_\_\_\_\_

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**CompuChem**

a division of Liberty Analytical Corp.

17-Feb-05

SCOTT DAVIES  
BLASLAND, BOUCK & LEE, INC.  
3700 REGENCY PARKWAY

CARY, NC 27511

Subject:

Report of Data-Project:      PROGRESS                      Workorder:    5674

Attn.:    SCOTT DAVIES

Enclosed are the results of analytical work performed in accordance with the referenced account number.

This report covers sample(s) appearing on the attached listing.

Thank you for selecting CompuChem for your sample analysis. If you should have questions or require additional analytical services, please contact your representative at 1-800-833-5097.

Sincerely,

CompuChem

A Division of Liberty Analytical

Attachment

TOTAL NUMBER OF PAGES <u>26</u>
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**CompuChem, a division of Liberty Analytical**

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Hsn	Client ID	Wordorder	Matrix	Account	Project	Report
567401	MW-14	5674	W	BB&L	PROGRESS	
567402	MW-16	5674	W	BB&L	PROGRESS	
567403	MW-16D	5674	W	BB&L	PROGRESS	
567404	EB-020205	5674	W	BB&L	PROGRESS	
567405	MW-90	5674	W	BB&L	PROGRESS	
567406	MW-13	5674	W	BB&L	PROGRESS	
567407	MW-13D	5674	W	BB&L	PROGRESS	
567408	MW-15	5674	W	BB&L	PROGRESS	
567409	MW-15D	5674	W	BB&L	PROGRESS	
567410	MW-20	5674	W	BB&L	PROGRESS	
567411	MW-20D	5674	W	BB&L	PROGRESS	
567412	MW-91	5674	W	BB&L	PROGRESS	

# **NOTICE!**

**CompuChem's Wet  
Chemistry reports have a new  
look.**

**Please contact your  
CompuChem Project  
Manager if you have  
questions.**



**Wet Chemistry Notice**

WO No. 5674

Case/SDG 5674

**The C (concentration) qualifiers used in this report are:**

J = The reported value was obtained from a reading that was less than the reporting limit but greater than or equal to the MDL.

U = The analytical result was less than the MDL.

**The Q qualifiers used in this report are:**

N = Spiked sample recovery is not within control limits.

\* = Duplicate analysis not within control limits.

**Notice:**

CompuChem's wet chemistry reporting policy is consistent with the current US EPA contract laboratory program (CLP) inorganic statement of work (SOW) ILM05.2/ILM05.3 requirements.

The SOW requires a set number of decimal places for the Forms 3, 5, and 6. For this reason, more decimal places may be reported on these forms than were found in the raw data.

The SOW requires the RPD and %R values to be rounded to the nearest whole number on the Forms 5, 6, and 7.

**Additional Comments:**

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I certify that this data package and these test results comply with the requirements of NELAC and CompuChem's QA Program unless otherwise indicated. The laboratory manager or designee has authorized the release of this data package and any associated electronic deliverables, as verified by the following signature.

Signature

Date

2-16-05



EPA SAMPLE NO.

MW-14

Lab Name: COMPUCHEM Contract: PROGRESS

Lab Code: CompuChe Case No.: PROGRESS NRAS No.: \_\_\_\_\_ SDG No.: PROGRESS E

Matrix: (soil/water) WATER Lab Sample ID: 567401

Level: (low/med) LOW Date Received: 02/03/2005

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): mg/L

[illegible]

Color Before: \_\_\_\_\_ Clarity Before: \_\_\_\_\_ Texture: \_\_\_\_\_

Color After: \_\_\_\_\_ Clarity After: \_\_\_\_\_ Artifacts: \_\_\_\_\_

Comments:

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## EPA SAMPLE NO.

MW-16

Lab Code: CompuChe Case No.: PROGRESS NRAS No.: \_\_\_\_\_ SDG No.: PROGRESS E

Level: (low/med) LOW Date Received: 02/03/2005

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% Solids: 0.0
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Concentration Units (ug/L or mg/kg dry weight): mg/L

[illegible]

Color After: \_\_\_\_\_ Clarity After: \_\_\_\_\_ Artifacts: \_\_\_\_\_

Comments:

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1A-IN  
INORGANIC ANALYSIS DATA SHEET

EB-020205

% Solids: 0.0

[illegible]

Comments:

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EPA SAMPLE NO.

MW-90

Lab Name: COMPUCHEM Contract: PROGRESS

Lab Code: CompuChe Case No.: PROGRESS NRAS No.: \_\_\_\_\_ SDG No.: PROGRESS E

Matrix: (soil/water) WATER      Lab Sample ID: 567405

Level: (low/med) LOW Date Received: 02/03/2005

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): mg/L

[illegible]

Color Before: \_\_\_\_\_ Clarity Before: \_\_\_\_\_ Texture: \_\_\_\_\_

Color After: \_\_\_\_\_ Clarity After: \_\_\_\_\_ Artifacts: \_\_\_\_\_

Comments:

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EPA SAMPLE NO.

MW-13D

Lab Name: COMPUCHEM Contract: PROGRESS

Lab Code: CompuChe Case No.: PROGRESS NRAS No.: \_\_\_\_\_ SDG No.: PROGRESS E

Matrix: (soil/water) WATER Lab Sample ID: 567407

Level: (low/med) LOW Date Received: 02/03/2005

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): mg/L

[illegible]

Color Before: \_\_\_\_\_ Clarity Before: \_\_\_\_\_ Texture: \_\_\_\_\_

Color After: \_\_\_\_\_ Clarity After: \_\_\_\_\_ Artifacts: \_\_\_\_\_

• : Comments:



1A-IN  
INORGANIC ANALYSIS DATA SHEET

MW-13D

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): mg/L

[illegible]

Color Before: \_\_\_\_\_ Clarity Before: \_\_\_\_\_ Texture: \_\_\_\_\_

Color After:                      Clarity After:                      Artifacts: \_\_\_\_\_

Comments:

1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 14. 15. 16. 17. 18. 19. 20. 21. 22. 23. 24. 25. 26. 27. 28. 29. 30. 31. 32. 33. 34. 35. 36. 37. 38. 39. 40. 41. 42. 43. 44. 45. 46. 47. 48. 49. 50. 51. 52. 53. 54. 55. 56. 57. 58. 59. 60. 61. 62. 63. 64. 65. 66. 67. 68. 69. 70. 71. 72. 73. 74. 75. 76. 77. 78. 79. 80. 81. 82. 83. 84. 85. 86. 87. 88. 89. 90. 91. 92. 93. 94. 95. 96. 97. 98. 99. 100. 101. 102. 103. 104. 105. 106. 107. 108. 109. 110. 111. 112. 113. 114. 115. 116. 117. 118. 119. 120. 121. 122. 123. 124. 125. 126. 127. 128. 129. 130. 131. 132. 133. 134. 135. 136. 137. 138. 139. 140. 141. 142. 143. 144. 145. 146. 147. 148. 149. 150. 151. 152. 153. 154. 155. 156. 157. 158. 159. 160. 161. 162. 163. 164. 165. 166. 167. 168. 169. 170. 171. 172. 173. 174. 175. 176. 177. 178. 179. 180. 181. 182. 183. 184. 185. 186. 187. 188. 189. 190. 191. 192. 193. 194. 195. 196. 197. 198. 199. 200. 201. 202. 203. 204. 205. 206. 207. 208. 209. 210. 211. 212. 213. 214. 215. 216. 217. 218. 219. 220. 221. 222. 223. 224. 225. 226. 227. 228. 229. 230. 231. 232. 233. 234. 235. 236. 237. 238. 239. 240. 241. 242. 243. 244. 245. 246. 247. 248. 249. 250. 251. 252. 253. 254. 255. 256. 257. 258. 259. 260. 261. 262. 263. 264. 265. 266. 267. 268. 269. 270. 271. 272. 273. 274. 275. 276. 277. 278. 279. 280. 281. 282. 283. 284. 285. 286. 287. 288. 289. 290. 291. 292. 293. 294. 295. 296. 297. 298. 299. 300. 301. 302. 303. 304. 305. 306. 307. 308. 309. 310. 311. 312. 313. 314. 315. 316. 317. 318. 319. 320. 321. 322. 323. 324. 325. 326. 327. 328. 329. 330. 331. 332. 333. 334. 335. 336. 337. 338. 339. 340. 341. 342. 343. 344. 345. 346. 347. 348. 349. 350. 351. 352. 353. 354. 355. 356. 357. 358. 359. 360. 361. 362. 363. 364. 365. 366. 367. 368. 369. 370. 371. 372. 373. 374. 375. 376. 377. 378. 379. 380. 381. 382. 383. 384. 385. 386. 387. 388. 389. 390. 391. 392. 393. 394. 395. 396. 397. 398. 399. 400. 401. 402. 403. 404. 405. 406. 407. 408. 409. 410. 411. 412. 413. 414. 415. 416. 417. 418. 419. 420. 421. 422. 423. 424. 425. 426. 427. 428. 429. 430. 431. 432. 433. 434. 435. 436. 437. 438. 439. 440. 441. 442. 443. 444. 445. 446. 447. 448. 449. 450. 451. 452. 453. 454. 455. 456. 457. 458. 459. 460. 461. 462. 463. 464. 465. 466. 467. 468. 469. 470. 471. 472. 473. 474. 475. 476. 477. 478. 479. 480. 481. 482. 483. 484. 485. 486. 487. 488. 489. 490. 491. 492. 493. 494. 495. 496. 497. 498. 499. 500. 501. 502. 503. 504. 505. 506. 507. 508. 509. 510. 511. 512. 513. 514. 515. 516. 517. 518. 519. 520. 521. 522. 523. 524. 525. 526. 527. 528. 529. 530. 531. 532. 533. 534. 535. 536. 537. 538. 539. 540. 541. 542. 543. 544. 545. 546. 547. 548. 549. 550. 551. 552. 553. 554. 555. 556. 557. 558. 559. 560. 561. 562. 563. 564. 565. 566. 567. 568. 569. 570. 571. 572. 573. 574. 575. 576. 577. 578. 579. 580. 581. 582. 583. 584. 585. 586. 587. 588. 589. 590. 591. 592. 593. 594. 595. 596. 597. 598. 599. 600. 601. 602. 603. 604. 605. 606. 607. 608. 609. 610. 611. 612. 613. 614. 615. 616. 617. 618. 619. 620. 621. 622. 623. 624. 625. 626. 627. 628. 629. 630. 631. 632. 633. 634. 635. 636. 637. 638. 639. 640. 641. 642. 643. 644. 645. 646. 647. 648. 649. 650. 651. 652. 653. 654. 655. 656. 657. 658. 659. 660. 661. 662. 663. 664. 665. 666. 667. 668. 669. 670. 671. 672. 673. 674. 675. 676. 677. 678. 679. 680. 681. 682. 683. 684. 685. 686. 687. 688. 689. 690. 691. 692. 693. 694. 695. 696. 697. 698. 699. 700. 701. 702. 703. 704. 705. 706. 707. 708. 709. 710. 711. 712. 713. 714. 715. 716. 717. 718. 719. 720. 721. 722. 723. 724. 725. 726. 727. 728. 729. 730. 731. 732. 733. 734. 735. 736. 737. 738. 739. 740. 741. 742. 743. 744. 745. 746. 747. 748. 749. 750. 751. 752. 753. 754. 755. 756. 757. 758. 759. 760. 761. 762. 763. 764. 765. 766. 767. 768. 769. 770. 771. 772. 773. 774. 775. 776. 777. 778. 779. 780. 781. 782. 783. 784. 785. 786. 787. 788. 789. 790. 791. 792. 793. 794. 795. 796. 797. 798. 799. 800. 801. 802. 803. 804. 805. 806. 807. 808. 809. 810. 811. 812. 813. 814. 815. 816. 817. 818. 819. 820. 821. 822. 823. 824. 825. 826. 827. 828. 829. 830. 831. 832. 833. 834. 835. 836. 837. 838. 839. 840.

EPA SAMPLE NO.

MW-15

Lab Name: COMPUCHEM Contract: PROGRESS

Lab Code: CompuChe Case No.: PROGRESS NRAS No.: \_\_\_\_\_ SDG No.: PROGRESS E

Matrix: (soil/water) WATER Lab Sample ID: 567408

Level: (low/med) LOW Date Received: 02/03/2005

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% Solids: 0.0
```

Concentration Units (ug/L or mg/kg dry weight): mg/L

[illegible]

Color Before: \_\_\_\_\_ Clarity Before: \_\_\_\_\_ Texture: \_\_\_\_\_

Color After: \_\_\_\_\_ Clarity After: \_\_\_\_\_ Artifacts: \_\_\_\_\_

Comments:

1A-IN  
INORGANIC ANALYSIS DATA SHEET

MW-15D

% Solids: 0.0

[illegible]

Comments:

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EPA SAMPLE NO.

MW-20

Lab Name: COMPUCHEM Contract: PROGRESS

Lab Code: CompuChe Case No.: PROGRESS NRAS No.: \_\_\_\_\_ SDG No.: PROGRESS E

Matrix: (soil/water) WATER Lab Sample ID: 567410

Level: (low/med) LOW Date Received: 02/04/2005

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): mg/L

[illegible]

Color Before: \_\_\_\_\_ Clarity Before: \_\_\_\_\_ Texture: \_\_\_\_\_

Color After: \_\_\_\_\_ Clarity After: \_\_\_\_\_ Artifacts: \_\_\_\_\_

Comments:

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

1A-IN  
INORGANIC ANALYSIS DATA SHEET

MW-20D

Concentration Units (ug/L or mg/kg dry weight): mg/L

[illegible]

Comments:

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1A-IN  
INORGANIC ANALYSIS DATA SHEET

MW-91

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): mg/L

[illegible]

Comments:

ILM05.2

3-IN  
BLANKS

Preparation Blank Concentration Units (ug/L or mg/kg): mg/L

[illegible]



3-IN  
BLANKS

Preparation Blank Matrix (soil/water): WATER

Preparation Blank Concentration Units (ug/L or mg/kg): mg/L[illegible]

5A-IN  
MATRIX SPIKE SAMPLE RECOVERY

MW-16MS

Concentration Units (ug/L or mg/kg dry weight): mg/L

[illegible]

5A-IN  
MATRIX SPIKE SAMPLE RECOVERY

MW-16MSD

% Solids for Sample: 0.0

[illegible]

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5A-IN  
MATRIX SPIKE SAMPLE RECOVERY

MW-16MS

% Solids for Sample: 0.0

[illegible]

Comments:

[illegible]

5A-IN  
MATRIX SPIKE SAMPLE RECOVERY

EPA SAMPLE NO.

MW-16MSD

Lab Name: COMPUCHEM Contract: PROGRESS

Lab Code: CompuChe Case No.: PROGRESS NRAS No.: \_\_\_\_\_ SDG No.: PROGRESS E

Matrix: (soil/water) WATER Level: (low/med) LOW

% Solids for Sample: 0.0

Concentration Units (ug/L or mg/kg dry weight): mg/L

[illegible]

Comments:

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USEPA - CLP

7-IN

LABORATORY CONTROL SAMPLE

Lab Name: COMPUCHEM Contract: PROGRESS  
Lab Code: CompuChe Case No.: PROGRESS NRAS No.: \_\_\_\_\_ SDG No.: PROGRESS E  
Solid LCS Source: \_\_\_\_\_  
Aqueous LCS Source: NA \_\_\_\_\_

[illegible]

7-IN  
LABORATORY CONTROL SAMPLE

Lab Name: COMPUCHEM Contract: PROGRESS  
Lab Code: CompuChe Case No.: PROGRESS NRAS No.: \_\_\_\_\_ SDG No.: PROGRESS E  
Solid LCS Source: \_\_\_\_\_  
Aqueous LCS Source: NA

[illegible]





## CHAIN OF CUSTODY

501 Madison Ave

Cary, NC 27513

Phone: 919-379-4100 Fax: ~~919-379-4040~~

№ 005006

Page 1 of 2

Courier

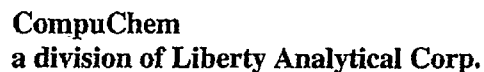
Airbill No.

Sampling Complete? Y or **(N)**

[illegible]

Samples stored 60 days after date report mailed at no extra charge.

White & Yellow copy to lab • Pink copy for customer



501 Madison Ave.

Cary, NC 27513

Phone: 919-379-4100 Fax 919-379-4040

Page 2 of 2

Courier

Airbill No.

Sampling Complete? Y or **N**

[illegible]

**Samples stored 60 days after date report mailed at no extra charge.**

White & Yellow copy to lab • Pink copy for customer



# CompuChem

a division of Liberty Analytical Corp.

## WORKORDER SUMMARY REPORT

Workorder: 5674      Account: BB&L      Project: PROGRESS  
SDG-Case: PROGRESS      Status:      QC Type: CLIENT SPECIFIC MS/MSD  
Report Style: COMPUCHEM STYLE 3 WITH EDD

| SAMPLE ID | CLIENT ID | COLLECT DATE | RECEIVE DATE | DUE DATE  | COMMENTS   |
|-----------|-----------|--------------|--------------|-----------|--|
| 567401    | MW-14     | 2/2/2005     | 2/3/2005     | 2/16/2005 | REQ'S 3030C PREP RPT HSL<br>MTLS=As,Cr,Cu,Tl,Zn,Ca,<br>RPT BY 6010**RPT<br>SULFATE;CHLORIDE<br>AND TOC**<br><br>W MW6010VAR METAL 6010B VARIABLE WATER<br>W WW300.0-1 300.0 IC WATER OPTION 1<br>W WW415.1TOC TTL ORGNC CRBN (TOC) 415.1 W               |
| 567402    | MW-16     | 2/2/2005     | 2/3/2005     | 2/16/2005 | **USE FOR QC**REQ'S 3030C PREP RPT HSL<br>MTLS=As,Cr,Cu,Tl,Zn,Ca,<br>RPT BY 6010**RPT<br>SULFATE;CHLORIDE<br>AND TOC**<br><br>W MW6010VAR METAL 6010B VARIABLE WATER<br>W WW415.1TOC TTL ORGNC CRBN (TOC) 415.1 W<br>W WW300.0-1 300.0 IC WATER OPTION 1 |
| 567403    | MW-16D    | 2/2/2005     | 2/3/2005     | 2/16/2005 | REQ'S 3030C PREP RPT HSL<br>MTLS=As,Cr,Cu,Tl,Zn,Ca,<br>RPT BY 6010**RPT<br>SULFATE;CHLORIDE<br>AND TOC**<br><br>W MW6010VAR METAL 6010B VARIABLE WATER<br>W WW300.0-1 300.0 IC WATER OPTION 1<br>W WW415.1TOC TTL ORGNC CRBN (TOC) 415.1 W               |
| 567404    | EB-020205 | 2/2/2005     | 2/3/2005     | 2/16/2005 | REQ'S 3030C PREP RPT HSL<br>MTLS=As,Cr,Cu,Tl,Zn,Ca,<br>RPT BY 6010**RPT<br>SULFATE;CHLORIDE<br>AND TOC**<br><br>W MW6010VAR METAL 6010B VARIABLE WATER<br>W WW300.0-1 300.0 IC WATER OPTION 1<br>W WW415.1TOC TTL ORGNC CRBN (TOC) 415.1 W               |
| 567405    | MW-90     | 2/2/2005     | 2/3/2005     | 2/16/2005 | REQ'S 3030C PREP RPT HSL<br>MTLS=As,Cr,Cu,Tl,Zn,Ca,<br>RPT BY 6010**RPT<br>SULFATE;CHLORIDE<br>AND TOC**   |



# CompuChem

a division of Liberty Analytical Corp.

## WORKORDER SUMMARY REPORT

Workorder: 5674      Account: BB&L      Project: PROGRESS  
SDG-Case: PROGRESS      Status:      QC Type: CLIENT SPECIFIC MS/MSD  
Report Style: COMPUCHEM STYLE 3 WITH EDD

| SAMPLE ID | CLIENT ID  | COLLECT DATE                 | RECEIVE DATE | DUE DATE  | COMMENTS  |
|-----------|------------|------------------------------|--------------|-----------|---|
| W         | WW415.1TOC | TTL ORGNC CRBN (TOC) 415.1 W |              |           |   |
| W         | MW6010VAR  | METAL 6010B VARIABLE WATER   |              |           |   |
| W         | WW300.0-1  | 300.0 IC WATER OPTION 1      |              |           |   |
| 567406    | MW-13      | 2/2/2005                     | 2/3/2005     | 2/16/2005 | REQ'S 3030C PREP RPT<br>HSL<br>MTLS=As,Cr,Cu,Tl,Zn,Ca,<br>RPT BY 6010**RPT<br>SULFATE;CHLORIDE<br>AND TOC** |
| W         | MW6010VAR  | METAL 6010B VARIABLE WATER   |              |           |   |
| W         | WW300.0-1  | 300.0 IC WATER OPTION 1      |              |           |   |
| W         | WW415.1TOC | TTL ORGNC CRBN (TOC) 415.1 W |              |           |   |
| 567407    | MW-13D     | 2/2/2005                     | 2/3/2005     | 2/16/2005 | REQ'S 3030C PREP RPT<br>HSL<br>MTLS=As,Cr,Cu,Tl,Zn,Ca,<br>RPT BY 6010**RPT<br>SULFATE;CHLORIDE<br>AND TOC** |
| W         | WW415.1TOC | TTL ORGNC CRBN (TOC) 415.1 W |              |           |   |
| W         | MW6010VAR  | METAL 6010B VARIABLE WATER   |              |           |   |
| W         | WW300.0-1  | 300.0 IC WATER OPTION 1      |              |           |   |
| 567408    | MW-15      | 2/2/2005                     | 2/3/2005     | 2/16/2005 | REQ'S 3030C PREP RPT<br>HSL<br>MTLS=As,Cr,Cu,Tl,Zn,Ca,<br>RPT BY 6010**RPT<br>SULFATE;CHLORIDE<br>AND TOC** |
| W         | MW6010VAR  | METAL 6010B VARIABLE WATER   |              |           |   |
| W         | WW300.0-1  | 300.0 IC WATER OPTION 1      |              |           |   |
| W         | WW415.1TOC | TTL ORGNC CRBN (TOC) 415.1 W |              |           |   |
| 567409    | MW-15D     | 2/2/2005                     | 2/3/2005     | 2/16/2005 | REQ'S 3030C PREP RPT<br>HSL<br>MTLS=As,Cr,Cu,Tl,Zn,Ca,<br>RPT BY 6010**RPT<br>SULFATE;CHLORIDE<br>AND TOC** |
| W         | WW415.1TOC | TTL ORGNC CRBN (TOC) 415.1 W |              |           |   |
| W         | MW6010VAR  | METAL 6010B VARIABLE WATER   |              |           |   |
| W         | WW300.0-1  | 300.0 IC WATER OPTION 1      |              |           |   |



**CompuChem**

a division of Liberty Analytical Corp.

17-Feb-05

SCOTT DAVIES  
BLASLAND, BOUCK & LEE, INC.  
3700 REGENCY PARKWAY

CARY, NC 27511

Subject:

Report of Data-Project:      PROGRESS      Workorder:    5674

Attn.:    SCOTT DAVIES

Enclosed are the results of analytical work performed in accordance with the referenced account number.

This report covers sample(s) appearing on the attached listing.

Thank you for selecting CompuChem for your sample analysis. If you should have questions or require additional analytical services, please contact your representative at 1-800-833-5097.

Sincerely,

CompuChem

A Division of Liberty Analytical

Attachment

|                                    |
|------------------------------------|
| TOTAL NUMBER<br>OF PAGES <u>33</u> |
|------------------------------------|

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**CompuChem, a division of Liberty Analytical**

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| Hsn    | Client ID | Wordorder | Matrix | Account | Project  | Report |
|--------|-----------|-----------|--------|---------|----------|--------|
| 567401 | MW-14     | 5674      | W      | BB&L    | PROGRESS |        |
| 567402 | MW-16     | 5674      | W      | BB&L    | PROGRESS |        |
| 567403 | MW-16D    | 5674      | W      | BB&L    | PROGRESS |        |
| 567404 | EB-020205 | 5674      | W      | BB&L    | PROGRESS |        |
| 567405 | MW-90     | 5674      | W      | BB&L    | PROGRESS |        |
| 567406 | MW-13     | 5674      | W      | BB&L    | PROGRESS |        |
| 567407 | MW-13D    | 5674      | W      | BB&L    | PROGRESS |        |
| 567408 | MW-15     | 5674      | W      | BB&L    | PROGRESS |        |
| 567409 | MW-15D    | 5674      | W      | BB&L    | PROGRESS |        |
| 567410 | MW-20     | 5674      | W      | BB&L    | PROGRESS |        |
| 567411 | MW-20D    | 5674      | W      | BB&L    | PROGRESS |        |
| 567412 | MW-91     | 5674      | W      | BB&L    | PROGRESS |        |

Tuesday, February 15, 2005

## COVER PAGE - INORGANIC ANALYSES DATA PACKAGE

Name: COMPUCHEM Contract: \_\_\_\_\_  
Lab Code: LIBERTY Case No.: \_\_\_\_\_ SAS No.: \_\_\_\_\_ SDG No.: 5674  
SOW No.: SW-846

| EPA Sample No. | Lab Sample ID. |
|----------------|----------------|
| EB-020205      | 567404         |
| MW-13          | 567406         |
| MW-13D         | 567407         |
| MW-14          | 567401         |
| MW-15          | 567408         |
| MW-15D         | 567409         |
| MW-16          | 567402         |
| MW-16D         | 59417          |
| MW-16D         | 567403         |
| MW-16S         | 59418          |
| MW-16SD        | 59419          |
| MW-20          | 567410         |
| MW-20D         | 567411         |
| MW-90          | 567405         |
| MW-91          | 567412         |

Were ICP interelement corrections applied? Yes/No YES  
Were ICP background corrections applied? Yes/No YES  
If yes-were raw data generated before application of background corrections? Yes/No NO

Comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hardcopy data package and in the computer-readable data submitted on diskette has been authorized by the Laboratory Manager or the Manager's designee, as verified by the following signature.

Signature: Thomas R. Cole Name: Thomas R. Cole  
Date: February 14, 2005 Title: Data Reviewer II



**INORGANIC CASE SUMMARY NARRATIVE**

**SDG # 5674**

**PROTOCOL # SW-846**

The indicated Sample Delivery Group (SDG) consisting of twelve (12) water samples was received into the laboratory management system (LIMS) on February 3, 2005 intact and in good condition with Chain of Custody (COC) records in order. Sample ID's reported in this data package are noted by the receiving department on the COC if they differ from those listed by the samplers on the COC.

The samples were prepared by 3030C and then analyzed for total arsenic, calcium, chromium, copper, thallium, and zinc using analytical methods delineated in SW-846 (Third Edition)-Update III.

NOTE: Thallium in the LCSW was found to be outside the control limits; however, no re-preparation was possible for the samples.

**SAMPLE IDs:**

Customer IDs and correlating laboratory IDs are listed on the cover page.

**INSTRUMENTAL QUALITY CONTROL:**

All calibration verification solutions (ICV & CCV), blanks (ICB, & CCB), and interference check samples (ICSA & ICSAB) associated with this data were confirmed to be within SW-846 allowable limits.

**SAMPLE PREPARATION QUALITY CONTROL:**

The above note modifies the following statement.

The sample preparation procedure verifications (LCSW & PBW) were found to be within acceptable ranges and all field samples were prepared and analyzed within the contract specified holding times.

**MATRIX RELATED QUALITY CONTROL:**

The sample matrix spike, CCN = 59418 (MW-16S) and the sample matrix spike duplicate, CCN = 59419 (MW-16SD) were found to be outside control limits for thallium. The reported concentrations are flagged with an "N" on all associated Form 1 and on Form 5a.

SW-846 control limits for matrix spike recoveries are set at 75% to 125% of the analyte quantity added unless original sample concentrations exceed the true values of these "spikes" by a factor of four or more. In this case, affected analytes are not flagged even if recoveries are outside percentage recovery control limits.

The sample matrix duplicate, CCN = 59417 (MW-16D) was outside control limits for chromium. The reported concentrations are flagged with an "\*" on all associated Form 1 and on Form 6.

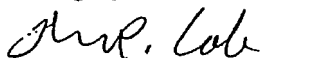
SW-846 control limits for duplicate determinations are  $\pm 20\%$  Relative Percent Difference (RPD) for concentrations greater than or equal to five times the PQL in both the original and duplicate samples, and  $\pm$  the PQL for concentrations less than five times the PQL. The RPD is not calculated if both the original and duplicate values fall below the IDL.

A five-fold serial dilution of sample, CCN = 567402 (MW-16L) was performed in accordance with SW-846 requirements for ICP analysis.

The adjusted sample concentrations were inside control limits for the requested analytes.

SW-846 control limits for serial dilution are defined as a deviation less than or equal to 10% in the dilution-adjusted concentrations from the original values for all analyte concentrations with values greater than fifty (50) times their respective Instrument Detection Limit (IDL) in the original sample.

The laboratory manager or his designee, as verified by the following signature has authorized release of the data contained in this hard copy data package.



Thomas R. Cole  
Data Reviewer II  
February 14, 2005



**CompuChem**  
a division of Liberty Analytical Corp.

# CHAIN OF CUSTODY

501 Madison Ave  
Cary, NC 27513

Phone: 919-379-4100 Fax: 919-379-4040

No 005006

Page 1 of 2

Courier  
Airbill No.  
Sampling Complete? Y or ☒ N

|   |                    |                     |  |  |  |
|---|--------------------|---------------------|--|--|--|
| Company Name<br><b>BBK, Inc</b>               |                    |                     | Project Name<br><b>FADA-Phase II Progress Energy</b>                                   |  |  |
| Address<br><b>3700 Regency Pkwy Suite 140</b> |                    |                     | Sampling Location<br><b>Wilmington, NC Sutton Steam Plant</b>                          |  |  |
| City<br><b>Cary</b>                           | State<br><b>NC</b> | Zip<br><b>27511</b> | Turnaround time<br><b>Standard</b>   |  |  |
| Project Contact<br><b>Scott Paves</b>         |                    |                     | Batch QC or Project Specific? If Specific, which Sample ID?                            |  |  |
| Phone #<br><b>919-469-1952 x17</b>            |                    |                     | Are aqueous samples field filtered for metals? Y or <input checked="" type="radio"/> N |  |  |
| Sampler's Name<br><b>Brian Lovgren</b>        |                    |                     | Are high concentrations expected? Y or N? If yes, which ID(s)?                         |  |  |

| Field ID | Date       | Time   | Matrix | # of bottles | Number of Preserved Bottles |      |      |       |      |       |   | Analyte | Concentration | Units | Remarks |
|----------|------------|--------|--------|--------------|-----------------------------|------|------|-------|------|-------|---|---------|---------------|-------|---------|
|          |            |        |        |              | HCl                         | NaOH | HNO3 | H2SO4 | MeOH | Other |   |         |               |       |         |
| 567401   | MW-14      | 2-2-05 | 0905   | Aqueous      | 5                           |      | 1    | 3     | 1    | 1     | 1 | 3       |               |       | 42.42   |
| 567402   | MW-16      | 2-2-05 | 1050   | Aqueous      | 5                           |      | 1    | 3     | 1    | 1     | 1 | 3       |               |       | 42.42   |
|          | MW-16(MS)  | 2-2-05 | 1050   | Aqueous      | 5                           |      | 1    | 3     | 1    | 1     | 1 | 3       |               |       | 42.42   |
|          | MW-16(MSD) | 2-2-05 | 1050   | Aqueous      | 5                           |      | 1    | 3     | 1    | 1     | 1 | 3       |               |       | 42.42   |
| 567403   | MW-16D     | 2-2-05 | 1150   | Aqueous      | 5                           |      | 1    | 3     | 1    | 1     | 1 | 3       |               |       | 42.42   |
| 567404   | EB-020205  | 2-2-05 | 1215   | Aqueous      | 5                           |      | 1    | 3     | 1    | 1     | 1 | 3       |               |       | 42.42   |
| 567405   | MW-90      | 2-2-05 | NIR    | Aqueous      | 5                           |      | 1    | 3     | 1    | 1     | 1 | 3       |               |       | 42.42   |

|   |   |
|---|---|
| Sample Unpacked By: <i>[Signature]</i>  | Cyanide samples checked for sulfide & chlorine? Y or NA |
| Sample Order Entry By: <i>[Signature]</i>                                     | 625 & Phenol samples checked for chlorine? Y or NA      |
| Samples Received in Good Condition? Y or N                                    | 608 samples checked for pH between 5.0-9.0? Y or NA     |
| If no, explain: <b>MW14 Red Broken 140 mL TOC MW16D Rec'd with Broken Lid</b> |   |
| Relinquished by: <b>Brian Lovgren</b>   | Date/Time: <b>2/2/05 1830</b>                           |
| Relinquished by:  | Date/Time:  |
| Subcontract? Y or N If yes, where?  | Custody Seal(s) intact? Y or N                          |
|   | On Ice? Y or N  |
|   | Cooler Temp: <b>3.9</b> °C                              |

Samples stored 60 days after date report mailed at no extra charge.

White & Yellow copy to lab • Pink copy for customer



501 Madison Ave.

Cary, NC 27513

Phone: 919-379-4100 Fax 919-379-4040

№ 005007

Page 2 of 2

**Courier**

Airbill No.

Sampling Complete? Y or **N**

[illegible]

Samples stored 60 days after date report mailed at no extra charge.

White & Yellow copy to lab • Pink copy for customer



## 501 Madison Ave

Cary, NC 27513

Phone: 919-379-4100 Fax 919-379-4040

№ 005008

Page 1 of       

**Courier**

Airbill No.

Sampling Complete? Y or N

[illegible]

**Samples stored 60 days after date report mailed at no extra charge.**

White & Yellow copy to lab • Pink copy for customer



# CompuChem

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## WORKORDER SUMMARY REPORT

Workorder: 5674      Account: BB&L      Project: PROGRESS  
SDG-Case: PROGRESS      Status:      QC Type: CLIENT SPECIFIC MS/MSD  
Report Style: COMPUCHEM STYLE 3 WITH EDD

| SAMPLE ID | CLIENT ID | COLLECT DATE | RECEIVE DATE | DUE DATE  | COMMENTS   |
|-----------|-----------|--------------|--------------|-----------|--|
| 567401    | MW-14     | 2/2/2005     | 2/3/2005     | 2/17/2005 | REQ'S 3030C PREP RPT HSL<br>MTLS=As,Cr,Cu,Tl,Zn,Ca,<br>RPT BY 6010**RPT<br>SULFATE;CHLORIDE<br>AND TOC**<br><br>W MW6010VAR METAL 6010B VARIABLE WATER<br>W WW300.0-1 300.0 IC WATER OPTION 1<br>W WW415.1TOC TTL ORGNC CRBN (TOC) 415.1 W               |
| 567402    | MW-16     | 2/2/2005     | 2/3/2005     | 2/17/2005 | **USE FOR QC**REQ'S 3030C PREP RPT HSL<br>MTLS=As,Cr,Cu,Tl,Zn,Ca,<br>RPT BY 6010**RPT<br>SULFATE;CHLORIDE<br>AND TOC**<br><br>W MW6010VAR METAL 6010B VARIABLE WATER<br>W WW415.1TOC TTL ORGNC CRBN (TOC) 415.1 W<br>W WW300.0-1 300.0 IC WATER OPTION 1 |
| 567403    | MW-16D    | 2/2/2005     | 2/3/2005     | 2/17/2005 | REQ'S 3030C PREP RPT HSL<br>MTLS=As,Cr,Cu,Tl,Zn,Ca,<br>RPT BY 6010**RPT<br>SULFATE;CHLORIDE<br>AND TOC**<br><br>W MW6010VAR METAL 6010B VARIABLE WATER<br>W WW300.0-1 300.0 IC WATER OPTION 1<br>W WW415.1TOC TTL ORGNC CRBN (TOC) 415.1 W               |
| 567404    | EB-020205 | 2/2/2005     | 2/3/2005     | 2/17/2005 | REQ'S 3030C PREP RPT HSL<br>MTLS=As,Cr,Cu,Tl,Zn,Ca,<br>RPT BY 6010**RPT<br>SULFATE;CHLORIDE<br>AND TOC**<br><br>W MW6010VAR METAL 6010B VARIABLE WATER<br>W WW300.0-1 300.0 IC WATER OPTION 1<br>W WW415.1TOC TTL ORGNC CRBN (TOC) 415.1 W               |
| 567405    | MW-90     | 2/2/2005     | 2/3/2005     | 2/17/2005 | REQ'S 3030C PREP RPT HSL<br>MTLS=As,Cr,Cu,Tl,Zn,Ca,<br>RPT BY 6010**RPT<br>SULFATE;CHLORIDE<br>AND TOC**   |



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## WORKORDER SUMMARY REPORT

Workorder: 5674      Account: BB&L      Project: PROGRESS  
SDG-Case: PROGRESS      Status:      QC Type: CLIENT SPECIFIC MS/MSD  
Report Style: COMPUCHEM STYLE 3 WITH EDD

| SAMPLE ID | CLIENT ID  | COLLECT<br>DATE              | RECEIVE<br>DATE | DUE<br>DATE | COMMENTS  |
|-----------|------------|------------------------------|-----------------|-------------|---|
| W         | WW415.1TOC | TTL ORGNC CRBN (TOC) 415.1 W |                 |             |   |
| W         | MW6010VAR  | METAL 6010B VARIABLE WATER   |                 |             |   |
| W         | WW300.0-1  | 300.0 IC WATER OPTION 1      |                 |             |   |
| 567406    | MW-13      | 2/2/2005                     | 2/3/2005        | 2/17/2005   | REQ'S 3030C PREP RPT<br>HSL<br>MTLS=As,Cr,Cu,Tl,Zn,Ca,<br>RPT BY 6010**RPT<br>SULFATE;CHLORIDE<br>AND TOC** |
| W         | MW6010VAR  | METAL 6010B VARIABLE WATER   |                 |             |   |
| W         | WW300.0-1  | 300.0 IC WATER OPTION 1      |                 |             |   |
| W         | WW415.1TOC | TTL ORGNC CRBN (TOC) 415.1 W |                 |             |   |
| 567407    | MW-13D     | 2/2/2005                     | 2/3/2005        | 2/17/2005   | REQ'S 3030C PREP RPT<br>HSL<br>MTLS=As,Cr,Cu,Tl,Zn,Ca,<br>RPT BY 6010**RPT<br>SULFATE;CHLORIDE<br>AND TOC** |
| W         | WW415.1TOC | TTL ORGNC CRBN (TOC) 415.1 W |                 |             |   |
| W         | MW6010VAR  | METAL 6010B VARIABLE WATER   |                 |             |   |
| W         | WW300.0-1  | 300.0 IC WATER OPTION 1      |                 |             |   |
| 567408    | MW-15      | 2/2/2005                     | 2/3/2005        | 2/17/2005   | REQ'S 3030C PREP RPT<br>HSL<br>MTLS=As,Cr,Cu,Tl,Zn,Ca,<br>RPT BY 6010**RPT<br>SULFATE;CHLORIDE<br>AND TOC** |
| W         | MW6010VAR  | METAL 6010B VARIABLE WATER   |                 |             |   |
| W         | WW300.0-1  | 300.0 IC WATER OPTION 1      |                 |             |   |
| W         | WW415.1TOC | TTL ORGNC CRBN (TOC) 415.1 W |                 |             |   |
| 567409    | MW-15D     | 2/2/2005                     | 2/3/2005        | 2/17/2005   | REQ'S 3030C PREP RPT<br>HSL<br>MTLS=As,Cr,Cu,Tl,Zn,Ca,<br>RPT BY 6010**RPT<br>SULFATE;CHLORIDE<br>AND TOC** |
| W         | WW415.1TOC | TTL ORGNC CRBN (TOC) 415.1 W |                 |             |   |
| W         | MW6010VAR  | METAL 6010B VARIABLE WATER   |                 |             |   |
| W         | WW300.0-1  | 300.0 IC WATER OPTION 1      |                 |             |   |





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## WORKORDER SUMMARY REPORT

Workorder: 5674      Account: BB&L      Project: PROGRESS  
SDG-Case: PROGRESS      Status:      QC Type: CLIENT SPECIFIC MS/MSD  
Report Style: COMPUCHEM STYLE 3 WITH EDD

| SAMPLE ID | CLIENT ID  | COLLECT DATE                 | RECEIVE DATE | DUE DATE  | COMMENTS  |
|-----------|------------|------------------------------|--------------|-----------|---|
| 567410    | MW-20      | 2/4/2005                     | 2/4/2005     | 2/17/2005 | REQ'S 3030C PREP RPT<br>HSL<br>MTLS=As,Cr,Cu,Tl,Zn,Ca,<br>RPT BY 6010**RPT<br>SULFATE;CHLORIDE<br>AND TOC** |
| W         | MW6010VAR  | METAL 6010B VARIABLE WATER   |              |           |   |
| W         | WW300.0-1  | 300.0 IC WATER OPTION 1      |              |           |   |
| W         | WW415.1TOC | TTL ORGNC CRBN (TOC) 415.1 W |              |           |   |
| 567411    | MW-20D     | 2/4/2005                     | 2/4/2005     | 2/17/2005 | REQ'S 3030C PREP RPT<br>HSL<br>MTLS=As,Cr,Cu,Tl,Zn,Ca,<br>RPT BY 6010**RPT<br>SULFATE;CHLORIDE<br>AND TOC** |
| W         | MW6010VAR  | METAL 6010B VARIABLE WATER   |              |           |   |
| W         | WW300.0-1  | 300.0 IC WATER OPTION 1      |              |           |   |
| W         | WW415.1TOC | TTL ORGNC CRBN (TOC) 415.1 W |              |           |   |
| 567412    | MW-91      | 2/4/2005                     | 2/4/2005     | 2/17/2005 | REQ'S 3030C PREP RPT<br>HSL<br>MTLS=As,Cr,Cu,Tl,Zn,Ca,<br>RPT BY 6010**RPT<br>SULFATE;CHLORIDE<br>AND TOC** |
| W         | MW6010VAR  | METAL 6010B VARIABLE WATER   |              |           |   |
| W         | WW300.0-1  | 300.0 IC WATER OPTION 1      |              |           |   |
| W         | WW415.1TOC | TTL ORGNC CRBN (TOC) 415.1 W |              |           |   |

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501 Madison Avenue Cary, NC 27513

**DATA REPORTING QUALIFIERS FOR INORGANICS**

On Form I, under the column labeled "C" for concentration qualifier and "Q" for qualifier, each result is flagged with the specific data reporting qualifiers listed below, as appropriate. Up to five qualifiers may be reported on Form I for each analyte.

**The C (concentration) qualifiers used are:**

- U:** This flag indicates the analyte was analyzed for but not detected. This reported value was obtained from a reading that was less than the Instrument Detection Limit (IDL). The IDL will be adjusted to reflect any dilution and, for soils, the percent moisture.
- B:** This flag indicates the analyte was analyzed for and the reported value was obtained from a reading that was less than the Contract Required Detection Limit (CRDL) but greater than or equal to the Instrument Detection Limit (IDL).

**The Q qualifiers used are:**

- E:** This flag indicates an estimated value. This flag is used:
1. When the serial dilution (a five fold dilution for CLP and a five fold dilution for SW-846 method 6010B) results are not within 10%. The analyte concentration must be sufficiently high (minimally a factor of 50X above the IDL in the original sample).
- N:** This flag indicates the sample spike recovery is outside of control limits:
- \*:** This flag is used for duplicate analysis when the sample and the sample duplicate results are not within control limits.

**The extensions: D, S, SD, L, A, added to the end of the client ID represent as follows:**

- D:** matrix duplicate  
**S:** matrix spike  
**SD:** matrix spike duplicate  
**L:** serial dilution  
**A:** post digestion spike

**Method Codes:**

- P:** ICP PLASMA  
**CV:** MERCURY COLD VAPOR AA  
**CA:** MIDI-DISTILLATION SPECTROPHOTOMETRIC

## INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

EB-020205

Lab Name: COMPUCHEM Contract: \_\_\_\_\_  
Lab Code: LIBRTY Case No.: \_\_\_\_\_ SAS No.: \_\_\_\_\_ SDG No.: 5674  
Matrix (soil/water): WATER Lab Sample ID: 567404  
Level (low/med): LOW Date Received: 02/03/05  
% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

| CAS No.   | Analyte  | Concentration | C | Q | M |
|-----------|----------|---------------|---|---|---|
| 7440-38-2 | Arsenic  | 3.6           | U |   | P |
| 7440-70-2 | Calcium  | 104           | B |   | P |
| 7440-47-3 | Chromium | 0.90          | U | * | P |
| 7440-50-8 | Copper   | 0.50          | U |   | P |
| 7440-28-0 | Thallium | 6.2           | U | N | P |
| 7440-66-6 | Zinc     | 13.0          | B |   | P |

Color Before: COLORLESS Clarity Before: CLEAR Texture: \_\_\_\_\_  
Color After: COLORLESS Clarity After: CLEAR Artifacts: \_\_\_\_\_

Comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

## INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

MW-13

Lab Name: COMPUCHEM Contract: \_\_\_\_\_  
Lab Code: LIBRTY Case No.: \_\_\_\_\_ SAS No.: \_\_\_\_\_ SDG No.: 5674  
Matrix (soil/water): WATER Lab Sample ID: 567406  
Level (low/med): LOW Date Received: 02/03/05  
% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

| CAS No.   | Analyte  | Concentration | C | Q | M |
|-----------|----------|---------------|---|---|---|
| 7440-38-2 | Arsenic  | 99.1          |   |   | P |
| 7440-70-2 | Calcium  | 125000        |   |   | P |
| 7440-47-3 | Chromium | 0.90          | U | * | P |
| 7440-50-8 | Copper   | 0.55          | B |   | P |
| 7440-28-0 | Thallium | 8.9           | B | N | P |
| 7440-66-6 | Zinc     | 9.9           | B |   | P |

Color Before: COLORLESS Clarity Before: CLEAR Texture: \_\_\_\_\_  
Color After: COLORLESS Clarity After: CLEAR Artifacts: \_\_\_\_\_

Comments: \_\_\_\_\_  
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## INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

MW-13D

Lab Name: COMPUCHEM Contract: \_\_\_\_\_  
Lab Code: LIBRTY Case No.: \_\_\_\_\_ SAS No.: \_\_\_\_\_ SDG No.: 5674  
Matrix (soil/water): WATER Lab Sample ID: 567407  
Level (low/med): LOW Date Received: 02/03/05  
% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

| CAS No.   | Analyte  | Concentration | C | Q | M |
|-----------|----------|---------------|---|---|---|
| 7440-38-2 | Arsenic  | 3.6           | U |   | P |
| 7440-70-2 | Calcium  | 84400         |   |   | P |
| 7440-47-3 | Chromium | 0.90          | U | * | P |
| 7440-50-8 | Copper   | 0.50          | U |   | P |
| 7440-28-0 | Thallium | 8.2           | B | N | P |
| 7440-66-6 | Zinc     | 18.3          | B |   | P |

Color Before: COLORLESS Clarity Before: CLEAR Texture: \_\_\_\_\_  
Color After: COLORLESS Clarity After: CLEAR Artifacts: \_\_\_\_\_

Comments: \_\_\_\_\_  
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\_\_\_\_\_  
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## INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

MW-14

Lab Name: COMPUCHEM Contract: \_\_\_\_\_  
Lab Code: LIBERTY Case No.: \_\_\_\_\_ SAS No.: \_\_\_\_\_ SDG No.: 5674  
Matrix (soil/water): WATER Lab Sample ID: 567401  
Level (low/med): LOW Date Received: 02/03/05  
% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

| CAS No.   | Analyte  | Concentration | C | Q | M |
|-----------|----------|---------------|---|---|---|
| 7440-38-2 | Arsenic  | 9.6           | B |   | P |
| 7440-70-2 | Calcium  | 34100         |   |   | P |
| 7440-47-3 | Chromium | 0.90          | U | * | P |
| 7440-50-8 | Copper   | 0.59          | B |   | P |
| 7440-28-0 | Thallium | 6.2           | U | N | P |
| 7440-66-6 | Zinc     | 17.8          | B |   | P |

Color Before: COLORLESS Clarity Before: CLOUDY Texture: \_\_\_\_\_  
Color After: COLORLESS Clarity After: CLOUDY Artifacts: \_\_\_\_\_

Comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

## INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

MW-15

Lab Name: COMPUCHEM Contract: \_\_\_\_\_  
Lab Code: LIBERTY Case No.: \_\_\_\_\_ SAS No.: \_\_\_\_\_ SDG No.: 5674  
Matrix (soil/water): WATER Lab Sample ID: 567408  
Level (low/med): LOW Date Received: 02/03/05  
% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

| CAS No.   | Analyte  | Concentration | C | Q | M |
|-----------|----------|---------------|---|---|---|
| 7440-38-2 | Arsenic  | 44.0          |   |   | P |
| 7440-70-2 | Calcium  | 63400         |   |   | P |
| 7440-47-3 | Chromium | 0.90          | U | * | P |
| 7440-50-8 | Copper   | 0.50          | U |   | P |
| 7440-28-0 | Thallium | 6.6           | B | N | P |
| 7440-66-6 | Zinc     | 13.8          | B |   | P |

Color Before: COLORLESS Clarity Before: CLOUDY Texture: \_\_\_\_\_  
Color After: COLORLESS Clarity After: CLOUDY Artifacts: \_\_\_\_\_

Comments: \_\_\_\_\_  
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\_\_\_\_\_



## INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

MW-15D

Lab Name: COMPUCHEM Contract: \_\_\_\_\_  
Lab Code: LIBERTY Case No.: \_\_\_\_\_ SAS No.: \_\_\_\_\_ SDG No.: 5674  
Matrix (soil/water): WATER Lab Sample ID: 567409  
Level (low/med): LOW Date Received: 02/03/05  
% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

| CAS No.   | Analyte  | Concentration | C | Q | M |
|-----------|----------|---------------|---|---|---|
| 7440-38-2 | Arsenic  | 3.6           | U |   | P |
| 7440-70-2 | Calcium  | 35900         |   |   | P |
| 7440-47-3 | Chromium | 0.90          | U | * | P |
| 7440-50-8 | Copper   | 0.50          | U |   | P |
| 7440-28-0 | Thallium | 6.2           | U | N | P |
| 7440-66-6 | Zinc     | 13.6          | B |   | P |

Color Before: COLORLESS Clarity Before: CLEAR Texture: \_\_\_\_\_  
Color After: COLORLESS Clarity After: CLEAR Artifacts: \_\_\_\_\_

Comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

## INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

MW-16

Lab Name: COMPUCHEM Contract: \_\_\_\_\_  
Lab Code: LIBRTY Case No.: \_\_\_\_\_ SAS No.: \_\_\_\_\_ SDG No.: 5674  
Matrix (soil/water): WATER Lab Sample ID: 567402  
Level (low/med): LOW Date Received: 02/03/05  
% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

| CAS No.   | Analyte  | Concentration | C | Q | M |
|-----------|----------|---------------|---|---|---|
| 7440-38-2 | Arsenic  | 3.6           | U |   | P |
| 7440-70-2 | Calcium  | 5390          |   |   | P |
| 7440-47-3 | Chromium | 0.90          | U | * | P |
| 7440-50-8 | Copper   | 0.65          | B |   | P |
| 7440-28-0 | Thallium | 6.9           | B | N | P |
| 7440-66-6 | Zinc     | 23.0          |   |   | P |

Color Before: COLORLESS Clarity Before: CLEAR Texture: \_\_\_\_\_  
Color After: COLORLESS Clarity After: CLEAR Artifacts: \_\_\_\_\_

Comments: \_\_\_\_\_  
\_\_\_\_\_  
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\_\_\_\_\_

SW-846

-1-

## INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

MW-16D

Lab Name: COMPUCHEM Contract: \_\_\_\_\_  
Lab Code: LIBRTY Case No.: \_\_\_\_\_ SAS No.: \_\_\_\_\_ SDG No.: 5674  
Matrix (soil/water): WATER Lab Sample ID: 567403  
Level (low/med): LOW Date Received: 02/03/05  
% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

| CAS No.   | Analyte  | Concentration | C | Q | M |
|-----------|----------|---------------|---|---|---|
| 7440-38-2 | Arsenic  | 4.3           | B |   | P |
| 7440-70-2 | Calcium  | 33700         |   |   | P |
| 7440-47-3 | Chromium | 0.90          | U | * | P |
| 7440-50-8 | Copper   | 0.50          | U |   | P |
| 7440-28-0 | Thallium | 8.0           | B | N | P |
| 7440-66-6 | Zinc     | 35.3          |   |   | P |

Color Before: COLORLESS Clarity Before: CLEAR Texture: \_\_\_\_\_  
Color After: COLORLESS Clarity After: CLEAR Artifacts: \_\_\_\_\_  
Comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

## INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

MW-20

Lab Name: COMPUCHEM Contract: \_\_\_\_\_  
Lab Code: LIBERTY Case No.: \_\_\_\_\_ SAS No.: \_\_\_\_\_ SDG No.: 5674  
Matrix (soil/water): WATER Lab Sample ID: 567410  
Level (low/med): LOW Date Received: 02/04/05  
% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

| CAS No.   | Analyte  | Concentration | C | Q | M |
|-----------|----------|---------------|---|---|---|
| 7440-38-2 | Arsenic  | 3.6           | U |   | P |
| 7440-70-2 | Calcium  | 79900         |   |   | P |
| 7440-47-3 | Chromium | 0.90          | U | * | P |
| 7440-50-8 | Copper   | 0.59          | B |   | P |
| 7440-28-0 | Thallium | 6.2           | U | N | P |
| 7440-66-6 | Zinc     | 24.3          |   |   | P |

Color Before: COLORLESS Clarity Before: CLEAR Texture: \_\_\_\_\_  
Color After: COLORLESS Clarity After: CLEAR Artifacts: \_\_\_\_\_  
Comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

## INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

MW-20D

Lab Name: COMPUCHEM Contract: \_\_\_\_\_  
Lab Code: LIBRTY Case No.: \_\_\_\_\_ SAS No.: \_\_\_\_\_ SDG No.: 5674  
Matrix (soil/water): WATER Lab Sample ID: 567411  
Level (low/med): LOW Date Received: 02/04/05  
% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

| CAS No.   | Analyte  | Concentration | C | Q | M |
|-----------|----------|---------------|---|---|---|
| 7440-38-2 | Arsenic  | 3.6           | U |   | P |
| 7440-70-2 | Calcium  | 65300         |   |   | P |
| 7440-47-3 | Chromium | 0.90          | U | * | P |
| 7440-50-8 | Copper   | 1.1           | B |   | P |
| 7440-28-0 | Thallium | 6.2           | U | N | P |
| 7440-66-6 | Zinc     | 21.9          |   |   | P |

Color Before: COLORLESS Clarity Before: CLEAR Texture: \_\_\_\_\_  
Color After: COLORLESS Clarity After: CLEAR Artifacts: \_\_\_\_\_

Comments: \_\_\_\_\_  
\_\_\_\_\_  
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## INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

MW-90

Lab Name: COMPUCHEM Contract: \_\_\_\_\_  
Lab Code: LIBRTY Case No.: \_\_\_\_\_ SAS No.: \_\_\_\_\_ SDG No.: 5674  
Matrix (soil/water): WATER Lab Sample ID: 567405  
Level (low/med): LOW Date Received: 02/03/05  
% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

| CAS No.   | Analyte  | Concentration | C | Q | M |
|-----------|----------|---------------|---|---|---|
| 7440-38-2 | Arsenic  | 103           |   |   | P |
| 7440-70-2 | Calcium  | 129000        |   |   | P |
| 7440-47-3 | Chromium | 0.90          | U | * | P |
| 7440-50-8 | Copper   | 0.50          | U |   | P |
| 7440-28-0 | Thallium | 6.2           | U | N | P |
| 7440-66-6 | Zinc     | 16.4          | B |   | P |

Color Before: COLORLESS Clarity Before: CLEAR Texture: \_\_\_\_\_  
Color After: COLORLESS Clarity After: CLEAR Artifacts: \_\_\_\_\_  
Comments: \_\_\_\_\_  
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## INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

MW-91

Lab Name: COMPUCHEM Contract: \_\_\_\_\_  
Lab Code: LIBERTY Case No.: \_\_\_\_\_ SAS No.: \_\_\_\_\_ SDG No.: 5674  
Matrix (soil/water): WATER Lab Sample ID: 567412  
Level (low/med): LOW Date Received: 02/04/05  
% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

| CAS No.   | Analyte  | Concentration | C | Q | M |
|-----------|----------|---------------|---|---|---|
| 7440-38-2 | Arsenic  | 3.6           | U |   | P |
| 7440-70-2 | Calcium  | 84200         |   |   | P |
| 7440-47-3 | Chromium | 0.90          | U | * | P |
| 7440-50-8 | Copper   | 0.91          | B |   | P |
| 7440-28-0 | Thallium | 6.2           | U | N | P |
| 7440-66-6 | Zinc     | 26.2          |   |   | P |

Color Before: COLORLESS Clarity Before: CLEAR Texture: \_\_\_\_\_  
Color After: COLORLESS Clarity After: CLEAR Artifacts: \_\_\_\_\_  
Comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
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## SW-846

3

## BLANKS

Lab Name: COMPUCHEM Contract: \_\_\_\_\_Lab Code: LIBRTY Case No.: \_\_\_\_\_ SAS No.: \_\_\_\_\_ SDG No.: 5674Preparation Blank Matrix (soil/water): WATERPreparation Blank Concentration Units (ug/L or mg/kg): UG/L

| Analyte  | Initial<br>Calib.<br>Blank<br>(ug/L) | Continuing Calibration<br>Blank (ug/L) |   |        |   |        |   | Preparation<br>Blank | C | M |
|----------|--------------------------------------|--|---|--------|---|--------|---|----------------------|---|---|
|          |                                      | 1                                      | C | 2      | C | 3      | C |                      |   |   |
| Arsenic  | 3.6 U                                | 3.6 U                                  |   | 3.6 U  |   | 3.6 U  |   | 3.600                | U | P |
| Calcium  | 23.6 U                               | 29.8 B                                 |   | 25.8 B |   | 35.7 B |   | 93.287               | B | P |
| Chromium | -1.4 B                               | 0.9 U                                  |   | 0.9 U  |   | 0.9 U  |   | 0.900                | U | P |
| Copper   | 0.5 U                                | -0.5 B                                 |   | -0.6 B |   | -0.8 B |   | 0.500                | U | P |
| Thallium | 6.2 U                                | 6.2 U                                  |   | 6.2 U  |   | 7.4 B  |   | 6.734                | B | P |
| Zinc     | 3.6 U                                | 3.6 U                                  |   | 3.6 U  |   | 3.6 U  |   | 8.492                | B | P |



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3

BLANKS

Lab Name: COMPUCHEM Contract: \_\_\_\_\_Lab Code: LIBRTY Case No.: \_\_\_\_\_ SAS No.: \_\_\_\_\_ SDG No.: 5674Preparation Blank Matrix (soil/water): WATERPreparation Blank Concentration Units (ug/L or mg/kg): UG/L

| Analyte  | Initial<br>Calib.<br>Blank<br>(ug/L) | Continuing Calibration<br>Blank (ug/L) |   |        |   |        |   | Preparation<br>Blank | C | M |
|----------|--------------------------------------|--|---|--------|---|--------|---|----------------------|---|---|
|          |                                      | 1                                      | C | 2      | C | 3      | C |                      |   |   |
| Arsenic  | 2.1 U                                | 2.1 U                                  |   | 2.1 U  |   | 2.1 U  |   | 2.100                | U | P |
| Calcium  | 17.0 U                               | 17.0 U                                 |   | 17.0 U |   | 17.0 U |   | 76.827               | B | P |
| Chromium | -0.6 B                               | 0.6 U                                  |   | -0.7 B |   | 0.6 U  |   | 0.600                | U | P |
| Copper   | -0.7 B                               | -0.8 B                                 |   | -0.6 B |   | -0.8 B |   | -0.403               | B | P |
| Thallium | 3.0 U                                | 3.0 U                                  |   | 3.0 U  |   | 3.0 U  |   | 3.000                | U | P |
| Zinc     | 1.2 U                                | 1.2 U                                  |   | 1.2 U  |   | 1.2 U  |   | 8.164                | B | P |

SW-846

5A

## SPIKE SAMPLE RECOVERY

SAMPLE NO.

MW-16S

Lab Name: COMPUCHEM Contract: \_\_\_\_\_Lab Code: LIBRTY Case No.: \_\_\_\_\_ SAS No.: \_\_\_\_\_ SDG No.: 5674Matrix (soil/water): WATER Level (low/med): LOW% Solids for Sample: 0.0Concentration Units (ug/L or mg/kg dry weight): UG/L

| Analyte  | Control<br>Limit %R | Spiked Sample<br>Result (SSR) | C | Sample<br>Result (SR) | C | Spike<br>Added (SA) | %R   | Q | M |
|----------|---------------------|-------------------------------|---|-----------------------|---|---------------------|------|---|---|
| Arsenic  | 75 - 125            | 39.3617                       |   | 3.6000                | U | 40.00               | 98.4 |   | P |
| Chromium | 75 - 125            | 178.6466                      |   | 0.9000                | U | 200.00              | 89.3 |   | P |
| Copper   | 75 - 125            | 225.6006                      |   | 0.6511                | B | 250.00              | 90.0 |   | P |
| Thallium | 75 - 125            | 34.8071                       |   | 6.9232                | B | 50.00               | 55.8 | N | P |
| Zinc     | 75 - 125            | 467.7613                      |   | 22.9609               |   | 500.00              | 89.0 |   | P |

Comments:  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

SW-846

5A

## SPIKE SAMPLE RECOVERY

SAMPLE NO.

MW-16SD

Lab Name: COMPUCHEM Contract: \_\_\_\_\_Lab Code: LIBRTY Case No.: \_\_\_\_\_ SAS No.: \_\_\_\_\_ SDG No.: 5674Matrix (soil/water): WATER Level (low/med): LOW% Solids for Sample: 0.0Concentration Units (ug/L or mg/kg dry weight): UG/L

| Analyte  | Control<br>Limit %R | Spiked Sample<br>Result (SSR) C | Sample<br>Result (SR) C | Spike<br>Added (SA) | %R    | Q | M |
|----------|---------------------|---------------------------------|-------------------------|---------------------|-------|---|---|
| Arsenic  | 75 - 125            | 40.3958                         | 3.6000 U                | 40.00               | 101.0 |   | P |
| Chromium | 75 - 125            | 186.4589                        | 0.9000 U                | 200.00              | 93.2  |   | P |
| Copper   | 75 - 125            | 233.6648                        | 0.6511 B                | 250.00              | 93.2  |   | P |
| Thallium | 75 - 125            | 34.8625                         | 6.9232 B                | 50.00               | 55.9  | N | P |
| Zinc     | 75 - 125            | 495.4473                        | 22.9609                 | 500.00              | 94.5  |   | P |

Comments:  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

SW-846

5B

POST DIGEST SPIKE SAMPLE RECOVERY

SAMPLE NO.

MW-16A

Lab Name: COMPUCHEM Contract: \_\_\_\_\_

Lab Code: LIBRTY Case No.: \_\_\_\_\_ SAS No.: \_\_\_\_\_ SDG No.: 5674

Matrix (soil/water): WATER Level (low/med): LOW

Concentration Units: ug/L

| Analyte  | Control<br>Limit %R | Spiked Sample<br>Result (SSR) | C | Sample<br>Result (SR) | C | Spike<br>Added (SA) | %R   | Q | M |
|----------|---------------------|-------------------------------|---|-----------------------|---|---------------------|------|---|---|
| Thallium |                     | 26.61                         |   | 6.92                  | B | 20.0                | 98.4 |   | P |

Comments: \_\_\_\_\_

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## DUPLICATES

SAMPLE NO.

MW-16D

Lab Name: COMPUCHEM Contract: \_\_\_\_\_Lab Code: LIBRTY Case No.: \_\_\_\_\_ SAS No.: \_\_\_\_\_ SDG No.: 5674Matrix (soil/water): WATER Level (low/med): LOW% Solids for Sample: 0.0 % Solids for Duplicate: 0.0Concentration Units (ug/L or mg/kg dry weight): UG/L

| Analyte  | Control Limit | Sample (S) | C | Duplicate (D) | C | RPD   | Q | M |
|----------|---------------|------------|---|---------------|---|-------|---|---|
| Arsenic  |               | 3.6000     | U | 3.6000        | U |       |   | P |
| Calcium  | 5000.0        | 5385.1920  |   | 5792.8940     |   | 7.3   |   | P |
| Chromium | 10.0          | 0.9000     | U | 116.5681      |   | 200.0 | * | P |
| Copper   |               | 0.6511     | B | 0.7347        | B | 12.1  |   | P |
| Thallium |               | 6.9232     | B | 6.2000        | U | 200.0 |   | P |
| Zinc     |               | 22.9609    |   | 13.2792       | B | 53.4  |   | P |

## LABORATORY CONTROL SAMPLE

Lab Name: COMPUCHEM Contract: \_\_\_\_\_Lab Code: LIBERTY Case No.: \_\_\_\_\_ SAS No.: \_\_\_\_\_ SDG No.: 5674

Solid LCS Source: \_\_\_\_\_

Aqueous LCS Source: HIPUR

| Analyte  | Aqueous (ug/L) |          |      | Solid (mg/kg) |       |   |        |    |  |
|----------|----------------|----------|------|---------------|-------|---|--------|----|--|
|          | True           | Found    | %R   | True          | Found | C | Limits | %R |  |
| Arsenic  | 1000.0         | 891.39   | 89.1 |               |       |   |        |    |  |
| Calcium  | 50000.0        | 46365.96 | 92.7 |               |       |   |        |    |  |
| Chromium | 1000.0         | 848.80   | 84.9 |               |       |   |        |    |  |
| Copper   | 2500.0         | 2122.94  | 84.9 |               |       |   |        |    |  |
| Thallium | 1000.0         | 744.67   | 74.5 |               |       |   |        |    |  |
| Zinc     | 2000.0         | 1732.77  | 86.6 |               |       |   |        |    |  |

## LABORATORY CONTROL SAMPLE

Lab Name: COMPUCHEM Contract: \_\_\_\_\_Lab Code: LIBERTY Case No.: \_\_\_\_\_ SAS No.: \_\_\_\_\_ SDG No.: 5674

Solid LCS Source: \_\_\_\_\_

Aqueous LCS Source: HIPUR

| Analyte  | Aqueous (ug/L) |          |       | Solid (mg/kg) |       |   |        |    |
|----------|----------------|----------|-------|---------------|-------|---|--------|----|
|          | True           | Found    | %R    | True          | Found | C | Limits | %R |
| Arsenic  | 1000.0         | 1082.70  | 108.3 |               |       |   |        |    |
| Calcium  | 50000.0        | 53257.11 | 106.5 |               |       |   |        |    |
| Chromium | 1000.0         | 1009.59  | 101.0 |               |       |   |        |    |
| Copper   | 2500.0         | 2576.04  | 103.0 |               |       |   |        |    |
| Thallium | 1000.0         | 994.27   | 99.4  |               |       |   |        |    |
| Zinc     | 2000.0         | 2061.25  | 103.1 |               |       |   |        |    |

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## ICP SERIAL DILUTIONS

SAMPLE NO.

MW-16L

Lab Name: COMPUCHEM

Contract: \_\_\_\_\_

Lab Code: LIBRTY

Case No.: \_\_\_\_\_

SAS No.: \_\_\_\_\_

SDG No.: 5674Matrix (soil/water): WATER

Level (low/med): \_\_\_\_\_

LOW

Concentration Units: ug/L

| Analyte  | Initial Sample<br>Result (I) |   | Serial Dilution<br>Result (S) |   | % Differ-<br>ence | Q | M |
|----------|------------------------------|---|-------------------------------|---|-------------------|---|---|
|          |                              | C |                               | C |                   |   |   |
| Arsenic  | 3.60                         | U | 18.00                         | U |                   |   | P |
| Calcium  | 5385.19                      |   | 5471.05                       | B | 1.6               |   | P |
| Chromium | 0.90                         | U | 4.50                          | U |                   |   | P |
| Copper   | 0.65                         | B | 2.50                          | U | 100.0             |   | P |
| Thallium | 6.92                         | B | 31.00                         | U | 100.0             |   | P |
| Zinc     | 22.96                        |   | 19.41                         | B | 15.5              |   | P |



## INSTRUMENT DETECTION LIMITS (QUARTERLY)

Lab Name: COMPUCHEM Contract: \_\_\_\_\_  
Lab Code: LIBRTY Case No.: \_\_\_\_\_ SAS No.: \_\_\_\_\_ SDG No.: 5674  
ICP ID Number: P3 Date: 01/15/05  
Flame AA ID Number: \_\_\_\_\_  
Furnace AA ID Number: \_\_\_\_\_

| Analyte  | Wave-length (nm) | Back-ground | CRQL (ug/L) | IDL (ug/L) | M |
|----------|------------------|-------------|-------------|------------|---|
| Arsenic  | 189.04           |             | 10          | 3.6        | P |
| Calcium  | 317.93           |             | 5000        | 23.6       | P |
| Chromium | 267.72           |             | 10          | 0.9        | P |
| Copper   | 324.70           |             | 5           | 0.5        | P |
| Thallium | 190.86           |             | 10          | 6.2        | P |
| Zinc     | 213.86           |             | 20          | 3.6        | P |

Comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

## INSTRUMENT DETECTION LIMITS (QUARTERLY)

Lab Name: COMPUCHEM Contract: \_\_\_\_\_

Lab Code: LIBRTY Case No.: \_\_\_\_\_ SAS No.: \_\_\_\_\_ SDG No.: 5674

ICP ID Number: P4 Date: 01/15/05

Flame AA ID Number: \_\_\_\_\_

Furnace AA ID Number: \_\_\_\_\_

| Analyte  | Wave-length (nm) | Back-ground | CRQL (ug/L) | IDL (ug/L) | M |
|----------|------------------|-------------|-------------|------------|---|
| Arsenic  | 189.04           |             | 10          | 2.1        | P |
| Calcium  | 317.93           |             | 5000        | 17.0       | P |
| Chromium | 267.72           |             | 10          | 0.6        | P |
| Copper   | 324.70           |             | 5           | 0.4        | P |
| Thallium | 190.86           |             | 10          | 3.0        | P |
| Zinc     | 206.20           |             | 20          | 1.2        | P |

Comments: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

94IHS113

I/A

Hart Exhibit 64  
Docket No. E-2, Sub 1219



3/7/2011

DocumentID NCD000830646

Site Name CAROLINA P&L CO. SUTTON STEAM

DocumentType Remedial Action Plan

RptSegment 1

DocDate 3/24/2006

DocRcvd 3/31/2006

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AccessLevel PUBLIC

Division WASTE MANAGEMENT

Section SUPERFUND

Program IHS

DocCat Facility

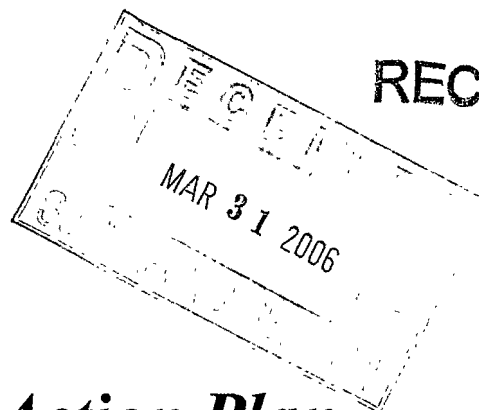
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Apr 13 2020

# REPORT

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REC-LEAD



## *Remedial Action Plan L.V. Sutton Steam Electric Plant, Wilmington, NC*

**Progress Energy Carolinas, Inc.**

**March 2006**

**BBL<sup>®</sup>**  
BLASLAND, BOUCK & LEE, INC.  
engineers, scientists, economists

CERTIFICATION STATEMENT

REMEDIATING PARTY CERTIFICATION STATEMENT (.0306(b)(2))

PROGRESS ENERGY CAROLINAS INC.  
L.V. SUTTON STEAM ELECTRIC PLANT  
WILMINGTON, NORTH CAROLINA  
NCD 000 830 646

REMEDIAL ACTION PLAN

"I certify under penalty of law that I have personally examined and am familiar with the information contained in this submittal, including any and all documents accompanying this certification, and that, based on my inquiry of those individuals immediately responsible for obtaining the information, the material and information contained herein is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for willfully submitting false, inaccurate or incomplete information."

Michael Shawn Longfellow

Printed Name

  
Signature

3/24/06  
Date

North Carolina

State

New Hanover

County

I, DARLENE B. LONG, a Notary Public of said ~~County~~ and State, do hereby  
certify that MICHAEL SHAWN LONGFELLOW did personally appear and sign before me  
this the 24~~th~~ day of MARCH, 2006.

  
Notary Public Signature

My commission expires: 1 - 22 - 2011.

CERTIFICATION STATEMENT

REGISTERED SITE MANAGER CERTIFICATION STATEMENT (.0306(b)(1))

PROGRESS ENERGY CAROLINAS INC.  
L.V. SUTTON STEAM ELECTRIC PLANT  
WILMINGTON, NORTH CAROLINA  
NCD 000 830 646

REMEDIAL ACTION PLAN

"I certify under penalty of law that I am personally familiar with the information contained in this submittal, including any and all supporting documents accompanying this certification, and that the material and information contained herein is, to the best of my knowledge and belief, true, accurate and complete and complies with the Inactive Hazardous Sites Response Act G.S. 130A-310, et seq, and the voluntary remedial action program Rules 15A NCAC 13C .0300. I am aware that there are significant penalties for willfully submitting false, inaccurate or incomplete information."

Gary R. Cameron, P.E.  
Printed Name

*Gary R. Cameron*  
Signature

3/24/06  
Date

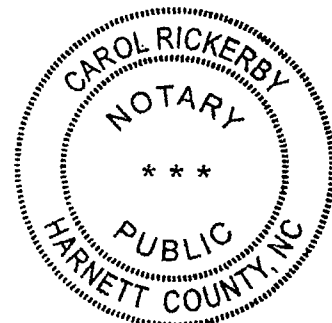
North Carolina  
State

Wake  
County

I, CAROL RICKERBY, a Notary Public of said HARNETT County and State, do hereby  
certify that GARY R. CAMERON did personally appear and sign before me  
this the 24 day of March, 2006.

*Carol Rickerby*  
Notary Public Signature

My commission expires: My Commission Expires 11-30-2009.



**VOLUNTARY CONSENT TO IMPOSITION OF LAND USE RESTRICTITONS**

**L.V. Sutton Steam Electric Plant, New Hanover County, North Carolina**

Carolina Power & Light Company (CP&L), owner in fee simple of real property located at 801 Sutton Steam Plant Road, Wilmington, New Hanover County, North Carolina which includes the Former Ash Disposal Area Superfund site (the "Site"), is agreeable to the imposition of Land Use Restrictions ("Restrictions") partially or completely in lieu of actual remediation of hazardous substances at the Site. CP&L understands that it will be required to document any agreement to the actual Restrictions approved for the Site by the North Carolina Department of Environment and Natural Resources, and that it may refuse to consent upon review of the actual Restrictions.

IN WITNESS WHEREOF, Carolina Power & Light Company has caused these presents to be executed in its name by John R. McArthur, its Senior Vice President, this 28<sup>th</sup> day of March, 2006.

Carolina Power & Light Company  
By: John R. McArthur  
its Senior Vice President

Signatory's name typed or printed: John R. McArthur

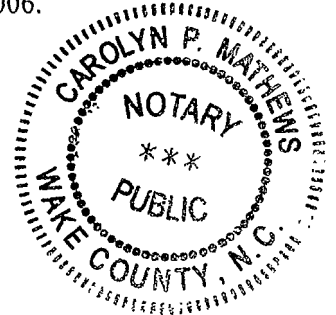
**STATE OF NORTH CAROLINA  
COUNTY OF**

I, Carolyn P. Mathews, a Notary Public, do hereby certify that John R. McArthur personally appeared before me this day and acknowledged that he is the Senior Vice President of Carolina Power & Light Company and that by authority duly given, and as the act of Carolina Power & Light Company the foregoing instrument was signed in its name by such Senior Vice President.

WITNESS my hand and official seal this 28<sup>th</sup> day of March, 2006.

Carolyn P. Mathews  
Notary Public

My commission expires 9/17/2010.



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# 1. Introduction

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## 1.1 Introduction

This Remedial Action Plan (RAP) has been prepared for Carolina Power and Light Company d/b/a Progress Energy-Carolinas, Inc.'s (Progress Energy) L.V. Sutton Steam Electric Plant (the Site) located in Wilmington, North Carolina (NCD000830646). This RAP has been prepared pursuant to a voluntary Administrative Agreement (Docket Number 03-SF-217) signed by Progress Energy and the North Carolina Department of Environment and Natural Resources (NCDENR) Division of Waste Management, Inactive Hazardous Sites Branch (effective date December 30, 2003). The work conducted under the Administrative Agreement is intended to meet the applicable requirements of North Carolina General Statute 130-310.9(c) (Statute); 15A North Carolina Administrative Code (NCAC) 13C .0300 Rules (Rules); and 15A NCAC 13C .0300, *Registered Environmental Consultant Program Rules and Implementation Guidance* (REC Guidance), dated August 2004. Blasland, Bouck, and Lee, Inc. (BBL) has been designated as the Registered Environmental Consultant (REC) for the project.

The Site is located along the east bank of the Cape Fear River near Wilmington, New Hanover County, North Carolina. The location of the Site is shown on a portion of the United States Geological Survey (USGS) 7.5-minute topographic quadrangle maps for Castle Hayne and Leland, North Carolina, and is presented as **Figure 1-1**.

## 1.2 Background

The Site consists of three coal-fired boiler (steam) units and three internal combustion turbine (CT) generator units for use in generating electricity for Progress Energy's customers. The steam units primarily operate on bituminous coal but also burn American Society of Testing Materials (ASTM) Grade No. 2 fuel oil for startup/shutdown of Site boilers and flame stabilization. Although the CT generator units primarily operate on No. 2 fuel oil, they can also burn natural gas.

The Site receives its process cooling water from the 1,110-acre Lake Sutton, which is an off-stream cooling water reservoir that stores water and dissipates heat absorbed by the water as it passes through the plant condensers. The lake is located along the east bank of the Cape Fear River immediately upstream (north) from the plant area (see **Figure 1-1**), and is a closed body of water with no channels or other uncontrolled connections between the Cape Fear River and other natural bodies of water. Lake Sutton is considered a cooling lake; therefore, it is not considered navigable water.

The requirements of the Administrative Agreement are focused on the Former Ash Disposal Area (FADA) at the Site. The FADA was used between 1954 and 1972 for the placement of coal ash generated at the Site. Electricity at the Site is, in part, generated by the combustion of coal. Coal ash is a non-hazardous waste and is a by-product of the coal combustion process in accordance with 40 CFR 261.4(b)(4). Ninety-five percent of coal ash consists of naturally occurring minerals such as silicon, aluminum, iron, and calcium in their oxide forms. The remaining five percent consists primarily of magnesium, potassium, sodium, and titanium. In addition, trace elements such as antimony, arsenic, barium, cadmium, chromium, lead, mercury, selenium, and other trace metals can be present in coal ash (Grubbs, 1999). Their relative concentrations typically vary depending on the source of the coal.

Within the FADA, one of the two large aboveground storage tanks (ASTs) (the western tank) is still present. The eastern tank was removed in the late 1990s. The ASTs formerly contained No.6 fuel Oil from 1971 through

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1981. Thereafter, they were used to store process liquors for a paper manufacturing company (R. Catlin and Associates, 1995). A general site plan that includes the FADA is shown on **Figure 1-2**.

### **1.2.1 Remedial Investigation Activities**

From May 2004 through February 2005, BBL conducted a Phase I and Phase II Remedial Investigation (RI) to evaluate the FADA at the Site in accordance with the Phase I and II work plans (BBL 2004a and 2005a). RI activities included the following:

#### ***Phase I RI Activities:***

- test pitting to delineate the FADA;
- soil boring advancement;
- soil sampling and analysis;
- groundwater monitoring well and piezometer installation;
- groundwater sampling and analysis; and
- surface-water and sediment sampling and analysis in the Cape Fear River.

#### ***Phase II RI Activities:***

- background soil sampling;
- soil boring advancement to further delineate the FADA;
- soil boring advancement and sampling for petroleum hydrocarbons;
- groundwater monitoring well and temporary piezometer installation; and
- groundwater sampling and analysis.

Based on the RI data, BBL and Progress Energy have determined that the RI process is complete for the FADA. Results of the RI are provided in BBL's Phase I (BBL, 2004b) and Phase II RI reports (BBL, 2005b), and are summarized in Section 2 of this RAP.

### **1.3 RAP Objectives .0306(I)(2)**

The general objectives of this RAP are as follows:

1. Develop an appropriate remedial strategy for arsenic in groundwater within the FADA based on the results of the Phase I and II RI;
2. Develop an appropriate remedial strategy for the limited number of COCs in soil within the FADA based on the results of the Phase I and II RI;
3. Develop a remedial approach for soil and groundwater that considers the long-term use of the entire Site with emphasis on the FADA, and potential exposure pathways; and
4. Fulfill Progress Energy's requirements under the Administrative Agreement.

Information regarding proposed remediation goals (RGs) for the site is presented in Section 6.1.

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## 1.4 Report Organization

Following this introduction, **Section 2** summarizes the results of the RI activities. **Section 3** presents the feasibility study for the FADA. **Section 4** presents the proposed remedy for the FADA and supporting justification. **Section 5** presents the activities necessary for implementation, and the procedures and schedule for RAP implementation. **Section 6** presents the proposed criteria for remedial action completion. **Section 7** discusses the community health and safety plan. **Section 8** presents the required certification documents, and **Section 9** presents the references used to prepare this RAP.

## **2. RI Results .0306(I)(1)**

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The following sections summarize the results of the RI activities conducted at the FADA.

### **2.1 Surface Water and Sediment Sampling**

Two surface-water and sediment samples were collected from the Cape Fear River upstream (SW-1/SD-1) and downstream (SW-2/SD-2) of the FADA during the Phase I RI. The sampling locations are depicted on **Figure 2-1**. The samples were analyzed for the following parameters:

- Target compound list (TCL) volatile organic compounds (VOCs) using United States Environmental Protection Agency (USEPA) SW-846 Method 8260;
- TCL semi-volatile organic compounds (SVOCs) using USEPA SW-846 Method 8270C; and
- 13 Hazardous substance list (HSL) metals (antimony, arsenic, beryllium, cadmium, chromium, copper, lead, mercury, nickel, selenium, silver, thallium, and zinc) using USEPA SW-846 Method 6010B/7470 (mercury only).

#### **2.1.1 RI Sediment Results**

HSL metals, TCL VOCs and SVOCs results for the sediment samples are presented in **Table 2-1** and are summarized below:

- All metal concentrations were below their respective RGs with the exception of arsenic and mercury which were detected in the upstream sample at 5.4 milligrams per kilogram (mg/kg) and 0.22 mg/kg, respectively, slightly above the RG of 4.4 mg/kg for arsenic and 0.13 mg/kg for mercury. Overall, metals concentrations in the upstream sediment sample were higher than concentrations in the downstream sample indicating a source other than the FADA.
- All VOC concentrations were below available RGs.
- No SVOCs were detected in either of the sediment samples collected from the Cape Fear River.

No remedial action is considered necessary based on the sediment sampling results.

#### **2.1.2 RI Surface Water Results**

HSL metals, TCL VOCs and SVOCs results for the surface water samples are presented in **Table 2-2** and are summarized below:

- All metal concentrations were below their respective RGs. Overall, metals concentrations in the upstream sample were higher than concentrations in the downstream sample.
- All VOC concentrations were below available RGs.
- No SVOCs were detected in surface-water samples collected from the Cape Fear River.

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No remedial action is considered necessary based on the surface-water sampling results.

## 2.2 Soil Sampling Program

Soil samples were not included in the Phase I RI because the ash material is considered a waste-like material and not native soil. Furthermore, it was considered unlikely that native soil would be present in the FADA especially since the depth to groundwater underlying the FADA is shallow (i.e. ash material would occupy the majority of the unsaturated zone). Therefore, a test pitting/soil boring program combined with limited ash sample collection was used for the Phase I RI. This approach is consistent with approaches used at other similar landfill-like sites within the REC program, and therefore, replaced the specific requirements for grid-based soil sampling within release areas called for in the REC Guidance. This approach was reviewed with Mr. John Powers of the NCDENR and agreed upon in September 2003.

### 2.2.1 Phase I RI Test Pitting and Soil Boring Advancement

Twenty test pits (TP-1 through TP-20) and twenty soil borings (SB-1 through SB-20) were advanced in the study area to delineate the FADA during the Phase I RI activities. The test pit and soil boring locations are presented on **Figure 2-2**.

Based on the RI delineation activities, three general ash units were identified above the water table as follows:

- **Ash Unit** – The ash unit consists of a distinctive layer of dark to light grey colloids that are typically laminated in appearance.
- **Definable Ash Unit and Sand** – This unit consists of a definable ash layer as described above combined with a grey sand and ash mixture that may be present above or below the ash layer.
- **Sand and Ash Mixture** – This unit consists of medium grey sand mixed with ash material between sand grains with no definable ash layer present.

The spatial distribution of ash within the FADA is depicted on **Figure 2-2**. Descriptions of the material encountered are provided in **Table 2-3**. The soil boring data collected generally confirmed the description of the FADA discussed in Section 2.2 above. The data indicates a layer of topsoil and sandy soil is present from ground surface to an average depth of 1.4 feet below ground surface (ft bgs). Ash material is present from 1.4 to 4.0 ft bgs on average. The average depth to groundwater in the FADA is 4.5 ft bgs.

Three ash samples were collected and archived for possible future characterization using the Synthetic Precipitation Leaching Procedure (SPLP) test during the RI test pitting and soil boring activities. SPLP analysis did not appear to be necessary based on the following:

- the relatively low concentrations of arsenic were detected in shallow groundwater; and
- available SPLP data for the old ash pond area that serves as a surrogate for the FADA (see section 4.2.3 for details).

### 2.2.2 Phase I RI Soil Sampling Activities

The Phase I RI soil sampling program was originally limited to the collection of three ash samples for possible SPLP analysis for the reasons provided in Section 2.2 above. However, an apparent petroleum hydrocarbon material was observed above the water table in three test pit areas (TP-1, TP-12, and TP-16/20) within or

proximate to the FADA during the Phase I RI activities. Test pits TP-12 and TP-16/20 are located within the ash area whereas TP-1 was located in native soil (see Figure 2-2). Therefore, a field decision was made to collect additional “soil”<sup>1</sup> samples per the REC Guidance. It was determined that the source of the petroleum hydrocarbon material was likely related to a historical release of No. 6 fuel oil from one of the ASTs overlying the FADA based on discussions with Progress Energy site personnel<sup>2</sup>. This was consistent with the visual observations during test pit operations (i.e. the petroleum hydrocarbon material appeared to be a heavy fuel type). Four “soil” samples, one from each test pit area, were collected and analyzed for the following in accordance with the REC Guidance:

- TCL VOCs using USEPA SW-846 Method 8260B.
- TCL SVOCs using USEPA SW-846 Method 8270C.
- 13 HSL metals (antimony, arsenic, beryllium, cadmium, chromium, copper, lead, mercury, nickel, selenium, silver, thallium, and zinc) using USEPA SW-846 Method 6010 B/7470 (mercury only).
- One soil sample was also collected from test pit TP-16 (2.8 – 3.0 ft.) and was analyzed using USEPA SW-846 Method 8015 for total petroleum hydrocarbons (TPH).

### 2.2.3 Phase I RI Soil Sampling Results

HSL metals, TCL VOC, and SVOC results for the “soil” samples are presented in **Table 2-4** and are summarized below:

- All metal concentrations were below their respective RGs with the exception of arsenic and thallium in the sample from SB-10. Arsenic was detected in the soil sample from SB-10 (3.5 – 4 ft bgs) at a concentration of 13.3 mg/kg, and thallium was detected at 2.0 mg/kg. This sample was collected from the ash material.
- All VOC concentrations were below their available RGs.
- All SVOC concentrations were below their respective RGs with the exception of benzo (a) pyrene which was a laboratory estimated value detected at 91 micrograms per kilograms (µg/kg) in the sample from SB-11 (the RG is 62 µg/kg). This sample was also located within the defined ash material near to test pit TP-12.
- The initial TPH DRO concentration for TP-16 was 7,300 mg/kg; however, BBL requested that the laboratory re-analyze the sample and extend the run time to evaluate the presence of heavier petroleum compounds. Subsequently, the laboratory re-analyzed the soil sample via the Tennessee extractable petroleum hydrocarbon (EPH) method. Analytical results indicated a TPH (EPH) concentration of 31,000 mg/kg. The main portion of the TPH was concentrated in the heavier fuel range and is indicative of No. 6 fuel oil.

Phase I RI “soil” sample results are shown on **Figure 2-3**.

<sup>1</sup> Soil is qualified with parentheses because samples collected from TP-12 and TP-16/20 were within the ash material.

<sup>2</sup> The release of the No. 6 Fuel Oil in the AST area was previously reported to the NCDENR and assessed by Progress Energy (see Appendix D of the Phase I RI Work Plan).



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## 2.2.4 Phase II RI Soil Sampling Activities

Sixteen “soil” borings were advanced proximate to test pits TP-1, TP-12, TP-16/20 to delineate the horizontal extent of petroleum hydrocarbons detected during the Phase I RI activities (**Figure 2-3**). BBL collected four soil samples around the three test pit areas for EPH and volatile petroleum hydrocarbons (VPH) analyses by the Massachusetts Department of Environmental Protection (MADEP) Methodology. This method is consistent with the approach used by the NCDENR for underground storage tank sites impacted with petroleum hydrocarbons.

In addition, five background soil samples (SF-2 through SF-6) were collected from 0.5 to 1.0 feet below ground surface (ft bgs) as required per the REC Guidance. Background soil sample locations are depicted on **Figure 2-4**. The HSL metals include:

- antimony;
- arsenic;
- beryllium;
- cadmium;
- chromium;
- copper;
- lead;
- manganese;
- mercury;
- nickel;
- selenium;
- silver;
- thallium; and
- zinc

## 2.2.5 Phase II RI Soil Sampling Results

EPH and VPH results for the soil samples are presented in **Table 2-4** and are summarized below.

### Test Pit TP-1 Area Results

- All EPH and VPH soil samples were below the unrestricted use Maximum Soil Contaminant Concentrations (MSCC) soil-to-groundwater criteria with the exception of C9-C22 EPH aromatics (soil-to-groundwater limit of 34 milligrams per kilogram [mg/kg]) in two soil samples. The C9-C22 aromatics EPH concentration in the soil sample from SF-7 (0.5 – 1.0 ft bgs) was reported at an estimated concentration of 126.9 mg/kg. The J-qualified (estimated) C9-C22 aromatic EPH concentration in the sample from SF-9 slightly exceeded the MSCC at 35.2 mg/kg. Sample SF-91, a duplicate sample for SF-9, had a C9-C22 aromatic EPH concentration of 49.6 mg/kg.

### Test Pit TP-12 Area Results

- The four soil samples (SB-22,-24,-26, and -28) collected proximate to test pit TP-12 were all below the EPH and VPH MSCC soil-to-groundwater criteria.

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### Test Pits TP-16/20 Area Results

- The four soil samples (SB-29,-30,-31, and -32) collected proximate to test pits TP-16 and TP-20 were all below the EPH and VPH MSCC soil-to-groundwater criteria.

### Background Soil Sample Results

- Soil sample analytical results indicate that six metals (antimony, cadmium, mercury, selenium, silver and thallium) were not detected above their respective detection limits in any of the background soil samples. Eight metals (arsenic, beryllium, chromium, copper, lead, manganese, nickel, and zinc) were detected in background concentrations ranging from 0.01 mg/kg for beryllium to 2.5 mg/kg for zinc. Background soil sample results are provided in **Table 2-5**.

Phase II RI soil sample results for the test pit area samples are presented on Figure 2-3. The location of the background soil sample locations are shown on Figure 2-4.

## **2.3 Groundwater Investigation**

Five permanent monitoring wells (MW-13, MW-14, MW-15, MW-16, and MW-20) were installed in and around the FADA to assess shallow groundwater quality during the RI activities. In addition, one permanent piezometer (PZ-10) was installed proximate to the FADA to help determine shallow groundwater flow direction in and around the FADA. Monitoring well MW-16 was installed to assess background groundwater quality near the FADA. Well and piezometer construction details are provided in **Table 2-6**.

Four deep monitoring wells (MW-13D, MW-15D, MW-16D, and MW-20D) were installed during the Phase II RI in and around the FADA to assess deeper groundwater quality during the RI activities. The locations of the monitoring wells and piezometer are depicted on **Figure 2-5**.

In addition, six temporary piezometers (PZ-11 through PZ-16) were installed proximate to the FADA as part of Phase II RI activities to provide a more detailed understanding of shallow groundwater flow in and around the FADA. After the temporary piezometers were installed, BBL conducted a preliminary survey of the piezometers to calculate groundwater elevations at each location and construct a shallow potentiometric surface map for the FADA during the Phase II RI. These data, along with groundwater elevations collected from an existing piezometer (PZ-10) and shallow monitoring wells (MW-13 through 16), enabled BBL to prepare a potentiometric surface map in the field which was used to locate the downgradient monitoring well cluster (MW-20/20D). Survey data for the groundwater monitoring wells and piezometers are summarized in **Table 2-7**.

### **2.3.1 Groundwater Movement and Gradient Data in the FADA**

Depth to shallow groundwater measurements were collected from MW-13, MW-14, MW-15, MW-16, and MW-20 during the Phase I and II RI activities. Depth to deep groundwater measurements were collected from MW-13D, MW-15D, MW-16D, and MW-20D during the Phase II RI activities only. Additional water level data were obtained on July 27, 2005 for all FADA monitoring wells and piezometer PZ-10. Potentiometric surface maps for the shallow and deep groundwater for the July 2005 monitoring event are presented as **Figures 2-6 and 2-7**. A summary of historical water level measurements are provided in **Table 2-8**.

The average horizontal component of the hydraulic gradient for the shallow groundwater was approximately 0.0028 foot per foot (ft/ft) towards the south and southwest during the most recent monitoring event in July

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2005. The average horizontal component of the hydraulic gradient in the deep groundwater was approximately 0.0022 (ft/ft) towards the southwest.

To evaluate the potential interaction of groundwater flow between different levels of the surficial aquifer, the vertical component of the hydraulic gradient between the shallow and deep groundwater wells was also evaluated by comparing groundwater elevations from clustered wells MW-13 (shallow well) and MW-13D (deep well), MW-15 (shallow well) and MW-15D (deep well), MW-16 (shallow well) and MW-16D (deep well), and MW-20 (shallow well) and MW-20D (deep well). The calculated vertical component of the hydraulic gradients for each well cluster were 0.0007 ft/ft (upward), 0.0014 ft/ft (downward), 0.0035 ft/ft (downward), and 0.0014 (downward), respectively.

### **2.3.2 Groundwater Sampling and Activities**

Two groundwater sampling events (June 2004 and February 2005) were conducted during the Phase I and II RI activities to assess the groundwater quality in and around the FADA. Groundwater analytical results for the RI activities are summarized in **Table 2-9** and provided below.

### **2.3.3 Phase I RI Groundwater Sampling Results**

During the Phase I RI, shallow monitoring wells MW-13, MW-14, MW-15, and MW-16 were sampled utilizing low-flow purging and sampling methods. Analytical results for these samples indicated the following:

- Five HSL metals (arsenic, chromium, copper, thallium, zinc) were detected in groundwater samples above the method detection limit (MDL) from the FADA wells; however, all metal concentrations were well below their respective RGs, with the exception of arsenic. Arsenic was detected at concentrations above the groundwater RG (10 µg/L) in groundwater samples collected from monitoring wells MW-13 (70.6 µg/L), MW-14 (10.9 µg/L), and MW-15 (41.3 µg/L). Arsenic was detected below the RG at 3.5 µg/L in the sample collected from background well MW-16.
- No TCL VOCs or SVOCs exceeded available RGs in groundwater samples from the FADA.

### **2.3.4 Phase II RI Groundwater Sampling Results**

The Phase II RI parameter list was focused on the five HSL metals listed above (arsenic, chromium, copper, thallium, and zinc) based on the Phase I RI results. In addition, a select list of geochemical parameters (calcium, sulfate, chloride, and total organic carbon [TOC]) were selected for analysis to allow for a better understanding of the geochemical conditions in FADA groundwater. Groundwater from the nine FADA monitoring wells (5 shallow and 4 deep wells) were sampled in February 2005 utilizing low-flow purging and sampling methods. Analytical results for these samples indicated the following:

- Four of the five HSL metals were detected in groundwater samples from the FADA wells; however, all metal concentrations were well below their respective RGs with the exception of arsenic. Arsenic was detected at concentrations above the RG (10 µg/L) in groundwater samples collected from shallow monitoring wells MW-13 (99.1 µg/L) and MW-15 (44 µg/L) only.
- Calcium concentrations in groundwater samples collected from background wells MW-16 (shallow groundwater) and MW-16D (deep groundwater) were 5.39 and 33.7 mg/L, respectively. Calcium concentrations ranged from 34.1 (MW-14) to 125 (MW-13) mg/L in shallow groundwater, and 35.9 (MW-16D) to 84.4 (MW-13D) mg/L in deep groundwater. Calcium concentrations were greater in

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shallow groundwater samples with the exception of the sample from MW-16 which was less than the MW-16D deep groundwater sample.

- Chloride concentrations in the groundwater samples collected from background wells MW-16 and MW-16D were 21.4 and 76.4 mg/L, respectively. Chloride concentrations ranged from 2.35 (MW-20) to 46.2 (MW-14) mg/L in shallow groundwater. Chloride concentrations in deep groundwater samples ranged from 54.7 (MW-15D) to 154 (MW-13D) mg/L. Overall, chloride concentrations were greater in groundwater samples from deep monitoring wells.
- Sulfate concentrations in the groundwater samples collected from background wells MW-16 and MW-16D were 25.2 and 128 mg/L, respectively. Sulfate concentrations ranged from 8.82 (MW-13) to 44.7 (MW-20) mg/L in shallow groundwater samples, and 74.5 (MW-15D) to 141 (MW-13D) mg/L in deep groundwater samples. Sulfate concentrations were greater in the samples collected from deep monitoring wells.
- Groundwater concentrations of TOC in background wells MW-16 and MW-16D were 6.63 and 3.41 (estimated value) mg/L, respectively. TOC concentrations ranged from non-detect at (MW-13) to 14.0 mg/L (MW-14) in shallow groundwater, and 3.99 (MW-15D) to 9.28 (MW-13D) mg/L in deep groundwater. TOC concentrations were greater in shallow groundwater samples from MW-15 and MW-16 compared to MW-15D and MW-16D. TOC concentrations were greater in samples from MW-13D and MW-20D compared to MW-13 and MW-20.

## 2.4 Summary of RI Results

The RI results indicate that a limited number of COCs exceeded their respective RGs under the REC program. **Table 2-10** presents a list of the COCs that were detected above their RGs for each type of media investigated. Several key findings should be emphasized based on the RI results for the FADA. These include:

- The FADA has been adequately delineated horizontally and vertically based on the test pit and hand auger boring data collected as part of the Phase I and Phase II RI. Three related ash units have been identified within the FADA: a definable ash layer, definable ash layers interbedded with a sand and ash mixture, and a sand and ash mixture with no definable ash layer present. The RI data indicates that an east-west channel-like feature appears to be present in the central portion of the FADA. This feature corresponds to a topographic low feature present on historical topographic maps for the area.
- The petroleum hydrocarbon material observed in soil at three former test pit areas (TP-1, TP-12, and TP-16/20) within the FADA appear to be discontinuous localized areas of a heavy residual petroleum hydrocarbon compound such as No. 6 fuel oil. This is consistent with historical records that indicate a possible release from one of the ASTs overlying the FADA. All soil samples collected proximate to the three former test pit areas were below EPH/VPH soil-to-groundwater standards with exception of two surface soil samples proximate to TP-1 which contained J-qualified (estimated) values above the soil-to-groundwater standard for C11-C22 aromatic hydrocarbons. Overall, there does not appear to be a significant impact to groundwater related to the residual hydrocarbons observed in soil. No light non-aqueous phase liquids have been detected in FADA monitoring wells, the permanent piezometer, or the six temporary piezometers. A possible explanation for this is that heavier petroleum hydrocarbons such as No. 6 fuel oil typically have low solubility limits in groundwater and are hydrophobic (i.e. they do not readily partition into groundwater).

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- The lack of COCs above RGs in the downgradient shallow and deep monitoring well cluster (MW-20 and 20D) indicate that arsenic has limited migration potential in the FADA groundwater system;
  - Arsenic was not detected in any of the deep monitoring wells installed within the FADA. This indicates that vertical downward transportation of arsenic is not occurring within the FADA groundwater;
  - Overall, there does not appear to be a definable arsenic plume in FADA groundwater, rather, isolated detections of arsenic generally occur in areas where ash is in close proximity to shallow well screens (e.g., MW-13). RI findings support the conclusion that arsenic is present in only in isolated areas in shallow groundwater within the FADA, and its presence appears to be limited based on site-specific geochemical conditions in the FADA as described above.

### **3. Feasibility Study .0306 (1)(3)**

A focused feasibility study (FS) was conducted for the FADA based on the limited ash/soil and groundwater impacts above RGs as summarized in Section 2 above. This approach was discussed with NCDENR and agreed upon during a meeting with the Department on June 7, 2005. Three remedial alternatives were evaluated for the FADA FS as required in the REC Guidance. A description of each alternative is provided below. Each alternative is evaluated using the eight criteria required in section .0306 (1)(3)(A-H) of the REC Guidance. **Table 3-1** summarizes the feasibility study results presented below.

#### **3.1 Remedial Alternatives Analysis**

##### **3.1.1 Remedial Alternative No.1 – Monitored Natural Attenuation to Address Groundwater Access Controls and Land Use Restrictions to Address Soil**

###### **Technical Description**

This alternative consists of monitored natural attenuation (MNA) to address the limited impacts to groundwater combined with access controls (ACs) and land use restrictions (LURs) to limit potential human contact with ash. MNA is described first followed by a description of ACs and LURs proposed for the FADA.

The REC Guidance allows consideration of MNA as a potential remedy under section .0306 (1)(5). A key objective of the RAP is to present an approach to address the limited impacts to shallow groundwater in the FADA. In this case, arsenic is the only COC in FADA groundwater above applicable RGs. Therefore, to meet this objective, an MNA evaluation of arsenic in FADA groundwater is proposed as a remedial alternative. Natural attenuation (NA) is an in-situ remedial method based on the intrinsic assimilative capacity of the subsurface that allows in-place cleanup of impacted sites (Lin and Puls, 2003). NA is a potential remedial option for groundwater impacted with arsenic based on its geochemical behavior in the subsurface (Lin and Puls, 2003). NA of arsenic in groundwater may involve processes such as adsorption, desorption, reduction and oxidation, co-precipitation, and dissolution (Lin and Puls, 2003). Therefore, MNA is the remedial approach that is selected after NA processes are demonstrated to be effective at a given site.

The geochemical processes that control fate, transformation, and transport of arsenic are complex due to temporally variable oxidation-reduction conditions (Lin and Puls, 2003). Overall, the RI data collected in the FADA to date indicates that NA processes are effective in controlling the presence of arsenic based on its limited distribution in groundwater. RI data also suggests that there is some variability in geochemical parameters such as pH, temperature, and ORP based on seasonal changes. Therefore, additional site-specific data needs to be collected to determine whether or not MNA is applicable for the FADA.

The MNA monitoring program would initially consist of using the existing FADA monitoring well network (5 shallow wells, 4 deep wells, and 1 shallow piezometer) to collect four quarters of monitoring data to evaluate arsenic and geochemical conditions under different seasonal conditions. Selected geochemical parameters would be sampled to evaluate groundwater conditions in the FADA. Samples would also be collected for total arsenic and arsenic speciation for arsenic (III) and arsenic (IV) to further evaluate the mobility of arsenic in groundwater. After the first year of monitoring is completed, the data would be evaluated to determine a future monitoring program for the FADA. The MNA monitoring program for the FADA is expected to be long-term in nature (i.e., multiple years); however, additional data is needed to better project how long monitoring will be required. For the purposes of estimating the cost of this alternative, annual monitoring for five years following the initial year of quarterly monitoring was assumed.

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ACs are often used as a component of remedial actions. ACs are defined as physical controls (e.g. fencing or barriers) that help minimize the potential for human exposure to site-related impacts. The use of ACs for the FADA appears to be an appropriate approach to manage potential human exposure to ash material within the FADA. ACs that may be employed at the FADA include the following:

**Limited Groundwater Use** – FADA groundwater is not used as a source of drinking or bathing water at the Sutton Plant.

**Property Buffer** – A substantial property buffer exists around the FADA. The FADA is located well within site property thereby greatly limiting access to the general public (see **Figure 1-2**).

**Security Fencing** – The majority of the FADA is surrounded by fencing as shown on **Figure 2-2**. Access to the FADA is controlled by a remote controlled gate that is closed at all times. To enter into the FADA, personnel must contact the Sutton facility's operations control center and obtain permission. Access to the FADA by the general public is prohibited. It should be noted that fencing is not present along the northern, densely vegetated portion of the FADA as shown on **Figure 2-2**. Access is limited to this area by the discharge canal along the northern FADA boundary; however, it appears that this area may occasionally be accessed by trespassers and fisherman traveling up the discharge canal. Therefore, additional ACs would be required in this area to further limit access to this area.

**Physical Barriers** – The FADA currently has several physical barriers that limit potential exposure to COCs in the FADA. These barriers include:

- **Soil and Grass Cover** – The majority of the FADA is covered with grass and topsoil from 0.0 to 0.5 feet bgs. The average depth to ash in the FADA is 1.4 feet bgs based on the test pit and soil boring logs summarized in **Table 2-3**. This cover minimizes direct human contact with the underlying ash material. The northern portion of the FADA is covered with a more sandy soil cover that may be mixed with ash material locally; however, the dense vegetation in this area tends to limit contact with ash material by potential trespassers.
- **Pipe Bridges** – Two pipe bridges are present across the discharge canal along the northern boundary of the FADA. These bridges are designed to convey ash material via piping to the ash ponds currently in use at the Sutton facility, or allow for dewatering of the ash ponds in accordance with the site's NPDES permit. The presence of these of pipe bridges reduces access to the eastern part of the northern portion of the FADA by boaters.
- **Sandstone Cap** – A hard sandstone barrier is present along the western boundary of the FADA. This cap extends approximately three feet below the water surface and forms the east bank of Lake Sutton. This barrier appears to be effective in limiting potential contact by lake users with ash material.

**Personal Protective Equipment (PPE)** – A limited number of Progress Energy employees need to access the FADA as part of their job function. These job activities include grass cutting, maintenance of the aboveground storage tank and associated equipment, and inspection and maintenance of the ash piping within the FADA. Although exposure potential is limited, appropriate PPE used by on-site workers that need to access the subsurface for maintenance of underground equipment can further reduce direct contact with ash material.

LURs are a form of institutional control which the USEPA defines as non-engineered instruments that help to minimize the potential for human exposure to site-related impacts, and to protect the integrity of the selected remedy (USEPA, 2004). Under the REC program, LURs may be proposed for soil in cases where unrestricted land use RGs cannot be met. LURs combined with ACs may be an appropriate remedial option to address the

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limited COCs detected in soil and ash material above unrestricted use RGs. The LUR proposed for the FADA would limit use of the FADA to only industrial/commercial activities.

### Evaluation Criteria

#### .0306 (1)(3)(A) - Protection of Human Health and the Environment

If MNA is demonstrated to be an effective remedial approach for groundwater based on the initial evaluation proposed in Section 5, MNA would be considered protective of human health and the environment because the MNA data will provide confirmation that the distribution of arsenic in FADA groundwater is controlled. ACs are protective of human health because the combined effect of the ACs listed above greatly limits human contact with ash material and provides notification to authorized and unauthorized personnel who may access (or try to access) the FADA. LURs would be protective of human health because they would provide additional control on the future use of the FADA.

#### .0306 (1)(3)(B) – Compliance with Applicable Federal, State & Local Regulations

MNA, ACs, and LURs are often each used as components of remedial actions by USEPA and the NCDENR. Under this alternative, a portion of the site would likely have exceedances of unrestricted use “soil” (ash is not soil) RGs for arsenic and a few other COCs. Portions of the FADA groundwater would continue to have exceedances of 2L Groundwater Quality Standards for arsenic. This alternative would comply with other federal, state, and local regulations.

#### .0306 (1)(3)(C) – Long-term Effectiveness & Permanence

Under this alternative, there may be a limited presence of COCs in soil/ash and groundwater above the final RGs established for the FADA. The residual risk of leaving this material in place would be mitigated through the combination of MNA monitoring, and minimization of potential human contact through the ACs and LUR. The adequacy and reliability of the MNA program, ACs, and LUR would be dependent on the quality of the monitoring program established for each component. MNA would likely be effective over the long-term assuming groundwater quality demonstrates stable and/or declining trends. Groundwater conditions would be monitored throughout the MNA program, and data trends can be analyzed to verify that arsenic in FADA groundwater is controlled. If groundwater conditions change, appropriate response actions can be taken. ACs would be effective over the long-term if they are properly maintained through an AC maintenance plan. LURs would be effective over the long-term because a notice would be filed with the New Hanover County Register of Deeds describing the condition and restrictions in place for the area or unit in question. An inspection plan for the LUR would also be required under the REC program so that the LUR is maintained over time. The REC program also requires regular progress reporting to NCDENR to demonstrate that the established controls are properly maintained.

#### .0306 (1)(3)(D) – Reduction of Toxicity, Mobility, & Volume

If NA processes are determined to be effective for FADA groundwater, a reduction in mobility and volume of arsenic in groundwater would occur over time. ACs and LURs do not directly contribute to the reduction of toxicity, mobility or volume of COCs; however, they would be effective in minimizing contact with site COCs thereby limiting potential toxic effects of COCs.



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.0306 (I)(3)(E) – Short-term Effectiveness

This alternative could be implemented with minimal disruption of the environment and local community. Each component of the proposed alternative could be implemented in the short-term (i.e., within several months) following RAP approval. Potential exposure to workers would be minimal and could be further reduced through the use of appropriate PPE. Environmental impacts over the short-term would be negligible.

.0306 (I)(3)(F) – Implementability

This alternative would be reliable and could be implemented using readily available equipment and resources, and would be technically and administratively feasible. Coordination with plant personnel would be required to limit disruption to on-going plant operations. An MNA monitoring plan would be prepared to guide effective implementation of the program for the groundwater remedy.

.0306 (I)(3)(G) – Cost

The estimated cost of this alternative is \$203,000. See **Table 3-2** for details. These costs assume a six year monitoring program, in which monitoring would be completed on a quarterly basis the first year and annually thereafter. This scenario may need to be adjusted based on actual MNA monitoring data results.

.0306 (I)(3)(H) – Community Acceptance

This alternative would be minimally disruptive, and therefore, should be acceptable to the local community. The public will also be provided an opportunity to comment as part of the public notice requirements during the RAP approval process.

### **3.1.2 Remedial Alternative No. 2 – Capping and MNA for Groundwater**

**Technical Description**

This alternative consists of capping the FADA with approximately 1.5 feet of soil cover with a vegetative cover over the entire FADA. The purpose of this cap would be to minimize potential human contact with ash material. The cap would cover approximately 34 acres within the FADA requiring the delivery and placement of approximately 82,000 cubic yards of material. Capping would require adding cover material to certain portions of the FADA and regrading of the FADA to control drainage. The heavy vegetation in the northern portion of the FADA would need to be removed to allow for placement of the cap. In accordance with the REC Guidance, an LUR would also be required as part of this alternative if COCs remained above unrestricted use soil RGs.

Groundwater would be addressed using MNA as described in Alternative No. 1. The evaluation criteria presented for the MNA remedy for groundwater in Alternative No. 1 would also apply for this alternative.

**Evaluation Criteria**

.0306 (I)(3)(A) - Protection of Human Health and the Environment

Capping of ash would be protective of human health and the environment by minimizing contact with the source of COCs within the FADA. It should be noted that the existing conditions in the FADA generally consist of well vegetated grass cover underlain by an average of 1.4 feet of topsoil and sandy soil which overlies the ash

material. These conditions provide natural cover that is effective in limiting potential human exposure to the ash material; therefore, the value of an engineered cap would likely be incremental in nature.

.0306 (1)(3)(B) – Compliance with Applicable Federal, State & Local Regulations

Under this alternative, a portion of the site would likely have exceedances of unrestricted use RGs for “soil” (ash is not soil) for arsenic and possibly a few other COCs. Portions of the FADA would continue to have exceedances of 2L Groundwater Quality Standards for arsenic. However, capping and MNA would be compliant with federal and state regulations and is often used as a component of remedial actions by USEPA and NCDENR. It should be noted that capping is not a preferred remedial approach under the REC program.

.0306 (1)(3)(C) – Long-term Effectiveness & Permanence

Under this alternative, there may be a limited presence of COCs in ash/soil and groundwater above the final RGs established for the FADA. The residual risk of leaving this material in place would be further mitigated by minimizing potential human contact through the presence of the cap, the MNA monitoring program, and the LUR. The adequacy and reliability of these remedies would be dependent on the quality of the maintenance and/or monitoring program established for each component.

?  
-relative to  
not  
capping?

.0306 (1)(3)(D) – Reduction of Toxicity, Mobility, & Volume

Capping of soil and ash would not contribute to the reduction in toxicity or volume of COCs in the FADA. There may some reduction in COC mobility due to a decrease in groundwater infiltration. The effect of capping on groundwater is less clear. Groundwater is shallow in the FADA and appears to be in periodic contact with the ash due to groundwater fluctuations and arsenic has shown to have limited mobility in groundwater under current conditions as detailed in Section 4.2.3.

.0306 (1)(3)(E) – Short-term Effectiveness

Capping would be disruptive to operations during installation at the Sutton plant because trucks transporting the cap materials would have to cross active rail lines which are used to deliver coal for power generation. The capping alternative would require approximately 6,000 truck loads of material to be delivered to the site; trucks would travel on existing roadways through commercial areas to access the site. Potential exposure to workers would be greater due to the greater number of workers required to install the, dust issues and potential contact with the ash material in portions of the FADA. This possible exposure scenario could be reduced through the use of appropriate PPE for workers. The current environmental setting of the FADA would be disrupted over the short-term due to placement of the cap.

.0306 (1)(3)(F) – Implementability

This alternative would be reliable and could be implemented using readily available equipment and resources, and would be technically and administratively feasible. However, the location of the FADA would require trucks and equipment to frequently cross over vital rail lines used for shipping coal to the Sutton facility, which may disrupt normal operating conditions at the site.

.0306 (1)(3)(G) – Cost

The estimated cost of this alternative is \$12,431,000, which includes MNA monitoring costs. See Table 3-1 for details.

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.0306 (I)(3)(H) – Community Acceptance

Capping may be moderately disruptive to the local community due to the large volume of cap material that would need to be transported through the local community to the FADA. The public will also be provided an opportunity to comment as part of the public notice requirements during the RAP approval process.

### **3.1.3 Remedial Alternative No. 3 – Ash/Soil Excavation and MNA for Groundwater**

**Technical Description**

Excavation of ash material was evaluated as a remedial alternative as required under .0306 (I)(5). This alternative would involve removing approximately 215,000 tons of soil and ash material based on the delineation of the FADA completed during the RI investigations. Two areas would require excavation as shown on Figure 2-2. The large triangular shaped area is approximately 1,700 feet long by 1,600 along each of the two legs of the triangle. The second smaller area is approximately 370 feet long by 350 feet wide. An average ash thickness of 2.6 feet was used to calculate volume of ash based on the RI boring and test pit data. Approximately one-half of the ash material is located in the heavily vegetated area in the northern portion of the FADA. Prior to excavating, the vegetation in this area would need to be removed using heavy equipment. The ash material would likely be characterized as non-hazardous waste based on the RI data collected to date. Excavated ash material would be transported to a Resource Conservation and Recovery Act Subtitle D landfill for disposal.

Groundwater would be addressed using MNA as described in Alternative No. 1. The evaluation criteria presented for the MNA remedy for groundwater in Alternative No. 1 would also apply for this alternative.

**Evaluation Criteria**

**.0306 (I)(3)(A) - Protection of Human Health and the Environment**

Excavation of ash would be protective of human health and the environment by removing the source of COCs within the FADA.

**.0306 (I)(3)(B) – Compliance with Applicable Federal, State & Local Regulations**

This alternative would be generally compliant with federal, state and local regulations. Excavation of source material is often used as a component of remedial actions by USEPA and NCDENR and would not leave soil or ash material above unrestricted use soil RGs in the FADA. Portions of the FADA would likely have exceedances of 2L Groundwater Quality Standards for arsenic for some period of time after source removal was completed.

**.0306 (I)(3)(C) – Long-term Effectiveness & Permanence**

This alternative would be effective over the long-term through removal of the ash and soil source material. The magnitude of residual risk would likely be minimal since the source material would be removed; however, limited impacts to groundwater would be expected to remain after removal ash in the FADA for some period of time. The MNA program would address residual impacts in groundwater, which would be adequate and reliable provided the monitoring program is properly implemented and maintained over time. The REC program also requires regular progress reporting to confirm that the monitoring program is appropriate for the site.

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.0306 (I)(3)(D) – Reduction of Toxicity, Mobility, & Volume

Excavation of soil and ash would contribute to the reduction of toxicity, mobility and volume of COCs in the FADA; its effect on groundwater is less clear. RI results indicate that residual arsenic concentrations in FADA groundwater appear to be stable; therefore, excavation of ash material may not have a significant effect on groundwater quality in the short-term.

.0306 (I)(3)(E) – Short-term Effectiveness

Soil and ash excavation and disposal would be disruptive to operations at Sutton plant because trucks transporting the ash and soil material would have to cross active rail lines which are used to deliver coal for power generation. The environment at the FADA would be disrupted due to the large excavation required and the destruction of the vegetation in the northern portion of the FADA. Potential exposure to workers would be greater due to the greater number of workers required to perform excavation and backfilling operations, dust control issues, and potential contact with the ash material would also be a potential concern. This possible exposure scenario could be reduced through the use of appropriate PPE for workers.

.0306 (I)(3)(F) – Implementability

This alternative would be reliable and could be implemented using readily available equipment and resources, and would be technically and administratively feasible. However, excavation would also be logistically complex due to the large volume of material that would need to be removed and transported off-site. Approximately 10,760 trucks would be needed to excavate the ash material in the FADA.

.0306 (I)(3)(G) – Cost

The estimated cost of this alternative is approximately \$18,576,000. See Table 3-1 for details. Excavation would be inordinately expensive given the large amount of material that would require excavation, especially given the limited number of COCs detected in soil and ash.

.0306 (I)(3)(H) – Community Acceptance

Excavation would be the most disruptive of the alternatives to the local community due to the large volume of material that would need to be transported through the local community; therefore, community acceptance may be unfavorable. ?

## **4. Proposed Remedy and Justification .0306 (I)(3)**

This section discusses the proposed remedial approach to address the limited number of COCs above unrestricted use RGs in soil/ash and shallow groundwater in the FADA.

### **4.1 Proposed Remedy .0306(I)(4)**

The proposed remedy for the FADA is Alternative No. 1. The selected remedial approach consists of:

- MNA of arsenic in groundwater in the FADA; and,
- ACs and LURs to address the limited number of soil and ash impacts within the FADA above unrestricted use RGs; and,

### **4.2 Justification for Selection of Proposed Remedy .0306(I)(5)**

#### **4.2.1 MNA of Arsenic in Groundwater**

As stated above, evaluation of MNA of arsenic in groundwater is the proposed remedy for FADA groundwater. MNA is proposed to provide sufficient evidence that NA processes are limiting the presence and distribution of arsenic in groundwater over the long-term. Justification in support of MNA is provided below.

Initially, a literature review of general arsenic behavior in groundwater and the applicability of MNA as a remedial alternative for arsenic in groundwater were conducted. The literature reviewed indicated that MNA of arsenic may be a viable remedial strategy (e.g., Hering, 2003; Dixit and Hering, 2003; Lin and Puls, 2003).

The literature review was followed by evaluating multiple lines of evidence to evaluate whether or not NA is occurring at the site based on the available RI data. Available groundwater arsenic and NA indicator parameter data were evaluated for NA processes, and to determine the dominant fate and transport processes contributing to remediation of arsenic in the FADA. The evaluation method used was generally consistent with NCDENR and USEPA MNA guidance (NCDENR, 2000; USEPA, 1998) and included the following steps:

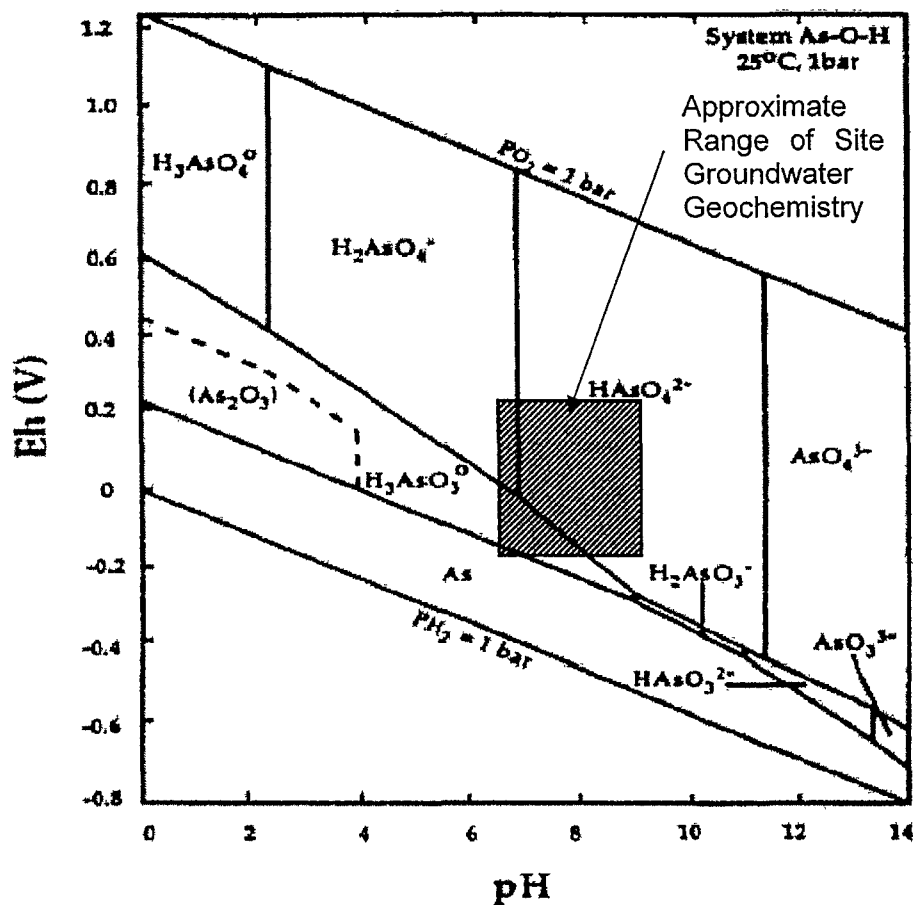
- review of arsenic geochemistry;
- screening site-specific data generated during the RI including:
  - geochemical indicator parameter data;
  - aquifer physical characteristics; and
  - evaluation of physical processes such as advection, dispersion, and sorption, on arsenic migration for evidence of natural groundwater remediation processes.

The results of these evaluation techniques were used to evaluate MNA as a component of the overall remedy for the site. The methods used and the results of the natural groundwater remediation evaluation are provided in the following sections.

#### **4.2.2 Arsenic Geochemistry in Groundwater**

Arsenic is a multivalent element that can occur in valence states of +5 (V), +3 (III), +1 (I), 0, and -3 (-III). However, arsenic occurs mainly in two stable oxidation states: arsenate (V) and arsenite (III). Arsenate species include  $\text{H}_3\text{AsO}_4$ ,  $\text{H}_2\text{AsO}_4^-$ ,  $\text{HAsO}_4^{2-}$ , and  $\text{AsO}_4^{3-}$ . Arsenite species include  $\text{H}_3\text{AsO}_3$ ,  $\text{H}_2\text{AsO}_3^-$ ,  $\text{HAsO}_3^{2-}$ ,  $\text{AsO}_3^{3-}$ ,

and  $\text{HAsO}_2^{-2}$ . The speciation of arsenic is strongly influenced by pH and redox potential. As shown on **Figure 4-1** below, arsenate generally predominates under oxidizing conditions (Dixit and Hering, 2003). The monovalent arsenate anion  $\text{H}_2\text{AsO}_4^-$  would be expected to predominate between pH 3 and pH 7, and the divalent anion  $\text{HAsO}_4^{2-}$  would be expected to predominate from pH 7 to pH 11 (Hem, 1989). Arsenite predominates when conditions are sufficiently reducing and mildly reducing conditions favor the arsenite uncharged ion  $\text{H}_3\text{AsO}_3$ .



**Figure 4-1. Example Eh-pH Diagram for Dissolved Arsenic (As).**

(source: [http://etd.lib.fsu.edu/theses/available/etd-11222004-215827/unrestricted/03\\_HA\\_Chap2.pdf](http://etd.lib.fsu.edu/theses/available/etd-11222004-215827/unrestricted/03_HA_Chap2.pdf))

Several mechanisms affect arsenic mobility in the subsurface environment including adsorption and desorption reactions and solid-phase precipitation and dissolution reactions (Lin and Puls, 2003). In addition, microbial reduction of As(V) and oxidation of As(III), reductive dissolution of iron oxyhydroxide phases, and competition of solutes for sorption sites may affect arsenic mobility (Dixit and Hering, 2003; Lin and Puls, 2003). The roles of these processes in controlling concentrations of arsenic in groundwater are described below.

#### **Adsorption-Desorption**

Dissolved arsenic species can be adsorbed by minerals including silicates, clays, and iron hydroxides. The strength of adsorption and desorption reactions between different arsenic species and solid-phase surfaces in

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aquifers varies, in part, because of differences in charge in the arsenic species that affect the electrostatic interactions between species and surfaces (Hinkle and Polette, 1999). Both As(V) and As(III) sorb strongly to iron oxides (Hem, 1989) and sorption of arsenic species to iron oxides may be two or more orders of magnitude greater than sorption of arsenic to clays and feldspars (Lin and Puls, 2003). Under most conditions, adsorption of arsenate is generally greater than adsorption of arsenite (Lin and Puls, 2003).

Arsenic adsorption and desorption reactions are influenced by changes in pH, occurrence of redox reactions, presence of competing anions, and solid-phase structural changes at the atomic level (Hinkle and Polette, 1999). Adsorption of arsenic to iron oxide surfaces is favored under acidic and near-neutral pH conditions. Desorption of arsenic becomes favored as pH values become alkaline. At pH values above about 8, the negative net charge of iron oxide can repel negatively charged ions such as arsenate (Hinkle and Polette, 1999). Redox reactions can affect aqueous arsenic concentrations by their effects on arsenic speciation, and hence, arsenic adsorption and desorption. For example, reduction of arsenate to arsenite can promote arsenic mobility because arsenite is generally less strongly adsorbed than is arsenate. Arsenic adsorption can be affected by the presence of other anions such as phosphate and oxyanions such as molybdenum, selenium, and vanadium that compete with arsenic anions for sorption sites.

#### ***Precipitation-Dissolution***

Precipitation and dissolution reactions may affect groundwater arsenic concentrations. Solid-phase precipitation and dissolution reactions are controlled by solution chemistry, including pH, redox state, and chemical composition (Hinkle and Polette, 1999). Under reducing conditions, the concentration of dissolved arsenite may become elevated because arsenic bound to ferric iron hydroxides is released into groundwater due to the reduction of ferrous iron to ferric iron and the reduction of arsenate to arsenite (Fetter, 1999). The presence of ferric iron hydroxide may slow the reduction of As(V) to As(III) (Inskeep et al., 1999). Under sulfate reducing conditions, reduced arsenic can be precipitated as the sulfur minerals realgar (AsS) or orpiment (As<sub>2</sub>S<sub>3</sub>) (O'Day, 2003). Reduced arsenic does not substitute into pyrite (FeS). In systems in which the rate of microbial sulfate reduction is limited and the ratio of iron to sulfide is relatively high, removal of sulfide by FeS precipitation leads to a maximum in dissolved As(III) concentrations (O'Day, 2003; Root et al., 2003).

Iron mineral formation can be an important sink for arsenic accumulation in subsurface systems and high arsenic contents (from 9 to 20%) can be accumulated as ferric arsenate precipitates (Leblanc et al., 1996). The behavior of minerals with respect to arsenic indicates that some minerals could serve as mineral indicators for assessment of the potential of natural attenuation of arsenic-impacted groundwater (Lin and Puls, 2003). The measurement of iron oxide content of aquifer materials, in conjunction with an evaluation of aquifer redox conditions, may provide a good measurement of the assimilative capacity of subsurface materials to sequester arsenic.

### **4.2.3 Evaluation of Site-Specific RI Data**

#### ***Groundwater Quality and Geochemical Data in FADA Groundwater***

Arsenic has been detected above the 2L criteria of 10 µg/L in groundwater collected at FADA monitoring wells MW-13 (70.6 µg/L and 99.1 [103 µg/L duplicate]), MW-14 (10.9 µg/L), and MW-15 (44 µg/L and 41.3 [44.1 µg/L duplicate]). These monitoring wells are generally located within, or close to, the footprint of the FADA indicating that the extent of arsenic exceedances in groundwater is generally limited. Arsenic concentrations in groundwater at other FADA monitoring wells were below 4.5 µg/L, or were below the laboratory reporting limit of 3.6 µg/L. These wells are located upgradient and downgradient from the FADA footprint. The limited mobility of arsenic in groundwater is supported by the lack of arsenic exceedances in surface-water samples collected from nearby Lake Sutton (Progress Energy, 2002).

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Groundwater pH at the three monitoring wells with arsenic exceedances ranged from 6.5 to 6.8 (neutral) in June 2004 and from 9.1 to 9.6 (alkaline) in February 2005. Groundwater oxidation-reduction potential (ORP) values ranged from -197 to -100 mV (moderately reducing) in June 2004 and from 94 to 143 mV (mildly reducing) in February 2005. Groundwater pH at the monitoring wells with no arsenic exceedances was 6.4 in June 2004 and ranged from 7.8 to 8.7 in February 2005. Groundwater ORP values were -125 mV in June 2004 and ranged from 45 to 252 mV in February 2005. **Table 4-1** presents a summary of the field parameter data. Microbiological data for groundwater samples collected from select monitoring wells in February 2005 indicated that aerobic heterotrophic bacteria and aerobic iron-related bacteria were present in the aquifer (See **Table 4-2** presents a summary of the microbiological data.

These results indicate that groundwater pH and ORP conditions at the FADA are variable with time. Based on available groundwater data, there appears to be differing groundwater geochemical regimes at different times of the year. The cause of this variability is currently uncertain. In June 2004, pH was neutral and ORP values indicated moderately reducing conditions (iron reducing range). Although pH was favorable for arsenic adsorption, redox conditions were sufficiently reducing for iron reduction to occur, potentially resulting in the release of arsenic from iron hydroxides. Under these moderately reducing conditions, As (III) may predominate. In February 2005, pH was alkaline and ORP values indicated mildly reducing conditions (nitrate reducing to manganese reducing range). Although the higher pH observed in February 2005 was less favorable for arsenic adsorption, redox conditions were favorable for stability of iron oxides precipitates. Under these mildly reducing conditions, As(V) may predominate.

To further evaluate the presence of iron oxides in FADA groundwater, samples for ferrous iron were collected on July 27, 2005 (MW-15 and MW-15D were sampled on August 9, 2005) using the Hach field method. These data indicate that ferrous iron concentrations from shallow groundwater samples ranged from 0.6 mg/L for background well MW-16 to 4.6 mg/L in the sample from MW-14. Samples from shallow wells proximate to the FADA ranged from 2.8 mg/L to 4.6 mg/L indicating that ferrous iron may be present in association with the ash unit. Ferrous iron concentrations were significantly lower in deep FADA groundwater ranging from 0.2 mg/L to 0.6 mg/L. **Table 4-3** presents a summary of the ferrous iron data.

#### ***SPLP Data from Old Ash Pond***

Synthetic precipitation leaching procedure (SPLP) tests were conducted on ash samples collected from the Old Ash Pond (OAP) in 2003 (BBL, 2004). Arsenic concentrations in SPLP leachate ranged from 14 to 130 µg/L. These concentrations were similar to the range of groundwater arsenic concentrations in vicinity of FADA. The OAP materials are primarily ash and are younger than the FADA materials which are predominately a mixture of ash and sand. Since the OAP ash material is are predominantly younger, the SPLP data from the OAP may represent a "worst case" estimate of arsenic concentrations in FADA groundwater. Therefore, these concentrations are not expected to worsen with time.

#### ***Aquifer Characteristics***

The aquifer consists primarily of sand to a depth of approximately 50 to 60 feet below ground surface. The presence of orange colored sand was noted in eight test pits and soil borings during the Phase I and Phase II RIs. These orange-colored sands were typically located near the top of water table and were primarily located down-gradient from the FADA footprint. Orange colored sands likely indicate the presence of iron oxides and hydroxides that potentially could sequester dissolved arsenic.

Average depth to groundwater in the FADA was 4.5 feet bgs based on the July 27, 2005 well gauging event. It should be noted that groundwater flow within the FADA may be significantly affected locally by the relative permeability differences between the ash unit and sandy soil within the FADA. This condition was observed in several test pits during the RI. The low permeability of the ash unit significantly retarded groundwater flow



relative to the much more permeable sand and ash mixture and/or sandy soil. These conditions may further limit arsenic transport in groundwater.

#### ***Hydrophobic Sorption and Arsenic Retardation***

Sorption refers to the chemical transport process whereby chemicals, including metals dissolved in groundwater, partition preferentially to solid phase aquifer materials. The quantity of chemicals that can partition to solid phase materials is directly proportional to the affinity of the dissolved chemical to sorb to the solid phase material. For metals, this affinity is described by the soil-water partition coefficient ( $K_d$ ). The result of this process is that some quantity of the chemical mass is removed from groundwater during transport, and the rate of constituent, in this case arsenic, migration in groundwater can be less than the average linear groundwater velocity. Sorption is, therefore, a natural physical groundwater attenuation process that results in the retardation of arsenic relative to the average linear groundwater velocity.

To evaluate the role that sorption plays in the rate of arsenic movement relative to the average linear groundwater velocity in the FADA, a site specific retardation factor for arsenic was estimated based on the following equation (Freeze and Cherry, 1979):

$$R_c = 1 + [\rho_b \times K_d / n]$$

where  $R_c$  is the retardation factor for a specific chemical ( $c$ ),  $\rho_b$  is the bulk density of the soil,  $K_d$  is the chemical-specific soil-water partition coefficient, and  $n$  is the effective soil porosity. The assumed aquifer bulk density is 1.65 gm/cm<sup>3</sup> and the assumed effective soil porosity is 0.30 (Freeze and Cherry, 1979). A  $K_d$  value of 29 mg/g for arsenic was obtained from the Risk Assessment Information System Toxicity and Chemical-Specific Factors Data Base ([http://risk.lsd.ornl.gov/cgi-bin/tox/TOX\\_select?select=csf](http://risk.lsd.ornl.gov/cgi-bin/tox/TOX_select?select=csf)). The following table presents the site-specific retardation factor for arsenic based on this equation:

| Site COC | $K_d$ (ml/g) | $R_c$ | $v_c$ (ft/yr) |
|----------|--------------|-------|---------------|
| Arsenic  | 29           | 160.5 | 1.5           |

As shown, site-specific the retardation factor for arsenic was calculated to be 160.5 indicating relatively high retardation. The velocity of arsenic transport in groundwater is related to the velocity of groundwater by the following equation:

$$v_c = v_{gw} / R_c$$

where  $v_c$  is COC velocity, in this case arsenic and  $v_{gw}$  is groundwater velocity. As shown, based on the maximum estimated groundwater velocity (242.6 ft/yr), arsenic velocity in groundwater is approximately 1.5ft/yr. This indicates that arsenic is significantly less mobile in groundwater relative to the overall groundwater velocity at the site.

It should be noted that  $K_d$  values for arsenic can vary several orders of magnitude depending upon local soil type and soil organic content. The value shown is "typical" and may not be fully representative of actual site conditions. Ideally, for solute transport modeling efforts, site-specific  $K_d$  information is developed for the range of aqueous and geological conditions of the system to be modeled. However, the retardation data provided above appear to be reflective of site conditions based on the limited distribution of arsenic observed in groundwater proximate to the FADA.

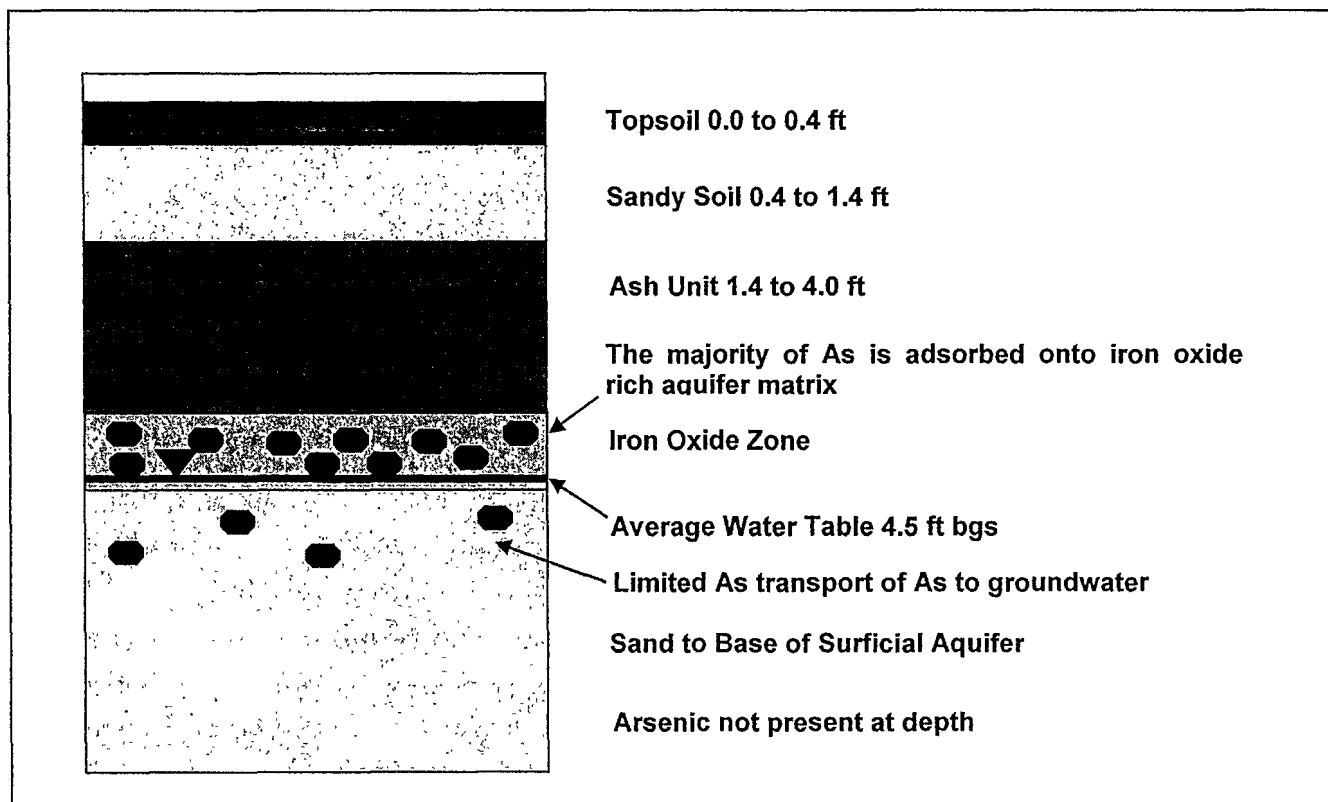
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#### 4.2.4 Site-Specific Characteristics – Support for MNA Remedy

Arsenic was not detected or was detected at concentrations below the 2L Standard in groundwater samples collected from monitoring wells located upgradient and directly downgradient from the FADA. Further, arsenic has not been detected above applicable criteria in surface water collected from Lake Sutton. Arsenic was detected above the 2L Standard in samples from only three shallow groundwater monitoring wells located within or relatively near the footprint of FADA. Deep groundwater was not impacted by arsenic based on the RI data. These results indicate that arsenic above the 2L Standard is generally limited in extent. It should be noted that arsenic may have migrated in groundwater from the FADA to monitoring well MW-15. This monitoring well is located approximately 300 feet downgradient from the edge of the FADA. Operation of the FADA began approximately 50 years ago, therefore, migration of arsenic appears to be limited to a transport velocity of about six feet per year. This transport velocity is similar in magnitude to the estimated arsenic transport velocity of 1.5 ft/yr referenced above, which is still very low relative to FADA groundwater velocity. These data indicate that sorption and retardation processes are playing a significant role in limiting arsenic distribution in FADA groundwater. The presence of orange sand and ferrous iron sampling results indicates the presence of iron oxides and hydroxides and the existence of arsenic assimilatory capacity within the aquifer matrix consistent with the findings of other arsenic MNA evaluations (Lin and Puls, 2003). A general conceptual site model (CSM) is presented in **Figure 4-2** below to illustrate the subsurface conditions within the FADA. It should be noted that seasonal changes in geochemistry may affect speciation and mobility of arsenic. Additional data may be required to better understand the potential affect of variations in groundwater geochemistry on arsenic mobility at the site.

In summary, MNA appears to be a viable remedial alternative to address groundwater in the FADA based on the RI data. A MNA monitoring plan is recommended to allow for evaluation of MNA as a remedial strategy over time to evaluate seasonal effects and time versus concentration trends. This plan is presented in Section 5.

**Figure 4-2**  
**CSM for Arsenic in FADA Groundwater**



#### **4.2.5 Implementation of ACs and LURs in the FADA**

The use of ACs and LURs is appropriate for the FADA for the following reasons:

**Use of ACs and LURs are protective of human health** – The FADA is located in a relatively isolated area of the Sutton Plant with a large property buffer surrounding it. The natural setting of the FADA greatly minimizes access to the area. Augmenting this setting with ACs provides an additional level of protection by further controlling contact with ash material.

**Projected Use of the FADA** – The Sutton Steam Plant is a vital source of electric power for the Wilmington area. Progress Energy intends to continue operations at the facility for the foreseeable future. The expected future use of the Sutton property, including the FADA, is expected to be industrial. Therefore, ACs and LURs that are maintained over time will provide an effective method of limiting potential contact with ash material by workers or trespassers within an industrial setting.

#### **4.3 Activities Necessary for Implementation .0306(l)(6)**

The following activities are necessary to implement the RAP:

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**Identification of Alternate RGs** – Progress Energy proposes to use RGs based on an industrial use scenario for the limited number of COCs in soil within the FADA. Details on the RGs proposed by Progress Energy are provided in Section 6.

**MNA Plan** – Section 5 presents a groundwater monitoring plan for the first year that will be used to further evaluate the applicability of MNA of arsenic in FADA groundwater. Sampling will be conducted on a quarterly basis for the parameters presented in Section 5 to evaluate the effects of seasonal changes on the groundwater geochemistry within the FADA, and the corresponding effect of these changes on NA of arsenic. After the first year of monitoring is completed, the data will be evaluated to determine a future monitoring program for the FADA. The FADA MNA monitoring program is expected to be long-term in nature (i.e., multiple years); however, additional data is needed to better project the frequency and time required for monitoring.

**AC Plan** – As part of RAP implementation, an AC implementation and maintenance plan will be prepared. An inventory of the existing ACs referenced in Section 3.1.2 will be conducted. Additional ACs that will further restrict access to the FADA will be developed in consultation with plant personnel. Additional ACs that may be proposed include adding fencing and/or additional signs that further restrict access to the FADA. An AC maintenance plan will also be prepared with input from Sutton Plant personnel for long-term management of the ACs. This plan will include provisions for an ongoing inspection and maintenance program for all ACs proposed for the FADA.

#### **4.4 Additional Site Characterization .0306 (I)(7)**

Additional groundwater data will be collected during the first year of MNA monitoring to further evaluate the applicability of MNA at the FADA as referenced above. The data collected will be evaluated after the first year. At that time, additional data collection may be proposed, if necessary, to further evaluate MNA of arsenic in FADA groundwater. Soil samples for selected geotechnical parameters may also be collected based on the results of the initial MNA sampling described in Section 5.1 below to support potential fate and transport modeling efforts, if warranted.

## **5. Procedures and Schedule for Remedial Action**

### **.0306(1)(8)**

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#### **5.1 MNA Plan for FADA Groundwater**

This section presents the procedures that will be followed to conduct the MNA evaluation for arsenic in FADA groundwater for the first year of the program. The procedures described in this section have been developed in general accordance with REC program requirements, including field and laboratory procedures, quality control/quality assurance (QA/QC) provisions, and health and safety requirements. The procedures described herein are also consistent with the procedures provided in the REC Guidance (August 2005) and the *Environmental Investigations Standard Operating Procedures and Quality Assurance Manual* (EISOPQAM) (United States Environmental Protection Agency [USEPA], 2001). EISOPQAM procedures are presented in Appendix A.

##### **5.1.1 Groundwater Monitoring Procedures**

Before beginning groundwater sampling activities, one synoptic round of depth to groundwater measurements will be collected from all FADA monitoring wells and piezometer PZ-10 during each groundwater monitoring event. The measurements will be made using an electronic water-level probe. Depth to groundwater measurements will be measured from the surveyed top of inner casing to the nearest 0.01 foot and recorded in the site logbook. Groundwater measurements will be converted to elevations and used to create a potentiometric surface contour map. These maps will be presented in the groundwater monitoring report for each event.

Monitoring wells will be sampled using the low-flow purging and sampling methods. This involves purging and sampling each monitoring well with a peristaltic pump and Teflon<sup>®</sup>-lined polyethylene tubing. The tubing will not be reused in other wells. The tubing will be positioned in the well such that the pump intake is situated at the middle of the well screen. The purge rate (maximum of 500 milliliters per minute) will be adjusted such that the water level within the well is not lowered by more than 0.3 foot. The water level within the well will be monitored throughout the duration of the purge. Additionally, field parameters (consisting of temperature, pH, specific conductivity, dissolved oxygen, ORP, and turbidity) will be monitored continuously using a Horiba U-22, or equivalent meter, with a flow-through-cell assembly. Color of the purge water, presence or absence of a sheen, odor, and turbidity will also be recorded by BBL personnel throughout the duration of the purge. Each monitoring well will be purged until three consecutive field measurements (taken at 5-minute intervals) of pH, conductivity, dissolved oxygen, and ORP stabilize to within one standard unit, 3%, 10%, and 10 millivolts, respectively. Additionally, purging will continue until turbidity stabilizes (three consecutive readings within 10%) or is below 10 NTU.

After the field parameter measurements stabilize, groundwater samples will be collected into laboratory sample containers from the Teflon<sup>®</sup>-lined polyethylene tubing. If turbidity measurements do not stabilize, or if measurements stabilize above 10 NTU, groundwater samples will be decanted prior to collection. If decanting is required, groundwater will be collected in laboratory sample containers, suspended solids will be allowed to settle out, and groundwater will be decanted into a second laboratory sample container.

After sampling is completed at a monitoring well, the equipment used for sample collection will be decontaminated, as necessary, following the decontamination procedures outlined in the EISOPQAM (see the applicable portion of EISOPQAM Appendix B included in Appendix A).

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Samples will be stored in coolers on ice and maintained under full chain-of-custody procedures. Samples will be transported via courier or shipped via overnight delivery to CompuChem Laboratory in Cary, NC (NC Certification No. 79) for analysis of the following analytical parameters, except arsenic speciation analysis:

***COCs***

- Arsenic by USEPA SW-846 Method 6010B (3030C preparation);
- Arsenic (III) by USEPA SW-846 Method 7063 (modified); and,
- Arsenic (V) by USEPA SW-846 Method 7063 (modified).

***Geochemical Parameters***

- Dissolved (filtered) iron by USEPA SW-846 Method 6010B (3030C preparation);
- Dissolved (filtered) organic carbon by USEPA SW-846 Method 415.1;
- Sulfate by USEPA SW-846 Method 375.4; and,
- Sulfide by USEPA SW-846 Method 376.1

Arsenic speciation analysis will be conducted at STL's North Canton, Ohio laboratory. Arsenic (III) and arsenic (V) speciation analysis will only be conducted on samples that have detectable concentrations of total arsenic. All dissolved samples will be collected using a dedicated 0.45-micron filter. A summary of the proposed sampling plan is provided in **Tables 5-1** and **5-2**.

**5.1.2 Quality Assurance Project Plan**

The site-specific Quality Assurance Project Plan (QAPP) used for the RI investigations will be used to implement the MNA program. Additional procedures will be added to the QAPP for any new analytical methods proposed in the MNA plan. This QAPP includes the QA manual for the main North Carolina-certified laboratory that will be used for the main portion of the sampling program, and will be modified to include any the laboratory selected for arsenic speciation analysis. Samples will be analyzed using a "Level III" data quality package as referenced in the REC Guidance.

Field sampling procedures and quality control requirements will be performed in general accordance with the applicable procedures provided in the EISOPQAM. These procedures will cover project activities such as monitoring well purging, collecting groundwater samples, decontaminating sampling equipment; packaging samples for chemical analysis; collecting QC samples (duplicates, MS/MSD samples, and rinsate blanks); and handling investigation-derived waste (IDW) (see selected EISOPQAM sections in Appendix A).

The following QA/QC samples will be submitted to CompuChem for analysis along with the samples collected in the field in accordance with the REC Guidance:

- A minimum of one (blind) field duplicate will be collected per day and analyzed for the constituents sampled on that day.
- One field (equipment) rinsate blank will be collected per week from each type of sampling equipment used and analyzed for the constituents sampled that week.
- A matrix spike/matrix spike duplicate (MS/MSD) will be collected at a frequency of 1 per 20 groundwater samples and analyzed for the constituents sampled on that day.

**Table 5-1** provides a summary of the QA/QC samples that will collected during monitoring activities.

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BBL personnel will conduct a data validation review of the analytical data generated for the groundwater monitoring program for the first year of monitoring. The data validation will be performed in accordance with national validation guidelines.

### **5.1.3 Decontamination Procedures .0306 (I)(11)**

Equipment decontamination procedures will follow EISOPQAM Standard Field Cleaning Procedures (see EISOPQAM Appendix B in Appendix A). Personnel decontamination procedures will follow EISOPQAM Site Operation procedures (see EISOPQAM Section 4.3.6 in Appendix A).

### **5.1.4 Investigation-Derived Waste**

IDW (purge water, etc.) will be contained in labeled 55-gallon drums pending the receipt of laboratory analysis. The material will then be managed in accordance with REC Guidance (Appendix A.6(g)). If laboratory data demonstrates that the IDW waste is below applicable REC RGs, then the material will be placed or discharged onto the ground in a manner similar to the NCDENR Division of Water Quality, Groundwater Section guidance (NCDENR, 2000). If the IDW has constituents present above the RGs, then the IDW will be properly managed at an appropriate waste management facility.

## **5.2 AC Implementation Plan**

An AC implementation plan will be prepared as part of RAP implementation. As indicated in Section 3.1.2, many ACs are already in place at the FADA. The plan will include provisions for a detailed inventory of the existing ACs. Based on this initial inventory, additional ACs that further restrict access to the FADA will likely be proposed. Upgrades to existing ACs may also be recommended. The plan will be developed in consultation with plant personnel so that potential for future use of the FADA is considered.

## **5.3 LUR Implementation Proposal**

The following LUR proposal is provided in accordance with Appendix F, Section F.1.2 of the REC Guidance. This LUR proposal is accompanied by a notification letter as required under Section F.1.1

### *F.1.2.a. – Restricted Site Activities*

An LUR consisting of a limitation on use of the FADA is proposed. Specifically, Progress Energy proposes to restrict all uses of the FADA other than industrial use. This restricted activity is provided as an example of possible precluded activity in the REC Guidance. This restriction is appropriate for the FADA given its location within the Sutton plant.

### *F.1.2.b. – Deed Book and Page Numbers where the LUR Will Apply*

The deed book containing the LUR will be located at the New Hanover County Register of Deeds and Recording Dept office located at:

**EMS Building  
216 N. Second Street  
Room 4  
Wilmington, NC 28401**

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The deed book is 501 and the page number is 407.

*F.1.2.c. – Plat Book and Page Numbers for any “Notice of an Inactive Hazardous Substance or Waste Disposal Site” Already Recorded for the Site*

There are no other existing “Notice of an Inactive Hazardous Substance or Waste Disposal Site” recorded for the Sutton site.

*F.1.2.d. – Proposed RGs for Restricted Land Use*

The proposed RGs are presented in Section 6.1 below and are summarized in Table 2-10.

*F.1.2.e. – Written Consent by Site Owners for Imposition of LURs*

The completed LUR consent form is included with the other certification forms provided at the front of this RAP.

*F.1.2.f. – Proposed Inspection Plan*

In accordance with F.1.2.f, Progress Energy will conduct an annual inspection of the LUR for the FADA. This inspection will be included as part of the AC implementation plan referenced in Section 5.2. A signed and notarized statement stating that the LURs are still in effect and that conditions at the site are not in violation of the LURs will be provided with each annual inspection.

## **5.4 Schedule of Implementation**

An implementation schedule for the RAP is provided as **Figure 5-1**.



## 6. Proposed Criteria for Remedial Action Completion .0306(I)(9)

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### 6.1 Remediation Goals for the FADA

#### *Proposed Soil/Ash RGs*

Only four COCs were detected in soil or ash above the unrestricted use RGs established in the REC program (the RG for the C9-C22 aromatic EPHs is based on the soil-to-groundwater MSCC established under the NCDENR underground storage tank (UST) program). Arsenic, benzo(a)pyrene, and thallium were detected within the ash material; the C9-C22 aromatic EPH compounds were detected in soil. These COCs are summarized in **Table 2-10**. Progress Energy proposes to use RGs for COCs in soil/ash based on direct contact exposure pathway for an industrial use scenario. This approach is consistent with the projected future use of the Sutton plant as a power generation facility and the isolated location of the FADA within the property. Therefore, proposed soil RGs for the Sutton site are USEPA Region 9 Preliminary Remediation Goals (PRGs) for industrial use (the NCDENR industrial soil-to-groundwater MSCC is proposed for C9 through C22 aromatic EPH), which are presented in Table 2-10. For arsenic, the industrial PRG is 1.6 mg/kg. This value is based on a cancer risk of one-in-one million [ $10^{-6}$ ] (USEPA, 2004). This value is below the regional soil arsenic background concentration for arsenic of approximately 3.6 mg/kg reported by Shacklette and Boerngen, (1984) and is conservative given the location and limited accessibility of the FADA. Therefore, it is proposed that the arsenic PRG be adjusted to 16 mg/kg based on an USEPA cancer risk range of  $10^{-5}$ . This approach is conservative for an industrial setting and is within USEPA's acceptable cancer risk range of  $10^{-6}$  to  $10^{-4}$ .

#### *Groundwater RGs*

For arsenic in groundwater, the North Carolina 2L Standard of 10 µg/L is proposed as the RG. Progress Energy also proposes the following additional criteria be considered for management of arsenic in groundwater given the industrial setting of the FADA:

- **Long-term Control of Arsenic in FADA Groundwater** – The criteria for demonstrating long-term control of arsenic in groundwater includes:
  - declining and/or stable concentrations of arsenic in groundwater over time; and,
  - evidence that arsenic is not migrating in FADA groundwater based on analytical data from the down-gradient shallow and deep groundwater monitoring well cluster (MW-20 and MW-20D), and deep monitoring wells MW-13D, MW-15D, and MW-16D.

### 6.2 AC and LUR Criteria

As discussed in Section 4, ACs and LURs are proposed as a component of the RAP to protect human health by further limiting access by unauthorized personnel, and restricting certain activities in the FADA. This approach will require ongoing maintenance of the ACs and LURs as a key component of the remedial action. As part of RAP implementation, an AC implementation plan to establish, maintain, and document the new and existing ACs will be prepared.

## **7. Community Health and Safety Plan .0306(I)(10)**

A site-specific health and safety plan (HASP) was prepared for the Sutton site for the RI investigations that included a Community HASP as required under the REC Guidance. This HASP is applicable for the scope of work proposed in this RAP and is included in **Appendix C**.

## ***8. RAP Certification .0306(b)(1-2) and Completion Statements .0306(b)(5)***

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Certification statements required by the Progress Energy (the Remediating Party) and the REC for the RAP are provided at the front of this document. Each of these statements has been properly notarized, as required under the REC program regulations.

## 9. References

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## ***Tables***

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Table 5-2  
Summary of Analytical Methods, Sample Containers, Preservation, and Hold Times  
Progress Energy L.V. Sutton Steam Electric Plant  
Remedial Action Plan - FADA  
Wilmington, North Carolina

| Analysis                                | Method  | Sample Container    | Volume     | Preservation   | Hold Time            |
|---|---|---------------------|------------|--|----------------------|
| <b>Groundwater Samples</b>              |   |                     |            |  |                      |
| Arsenic (total)                         | USEPA SW-846 6010B w/ 3030C Preparation Method <sup>1</sup> | Polyethylene Bottle | (1) 500 ml | HNO <sub>3</sub> (pH<2), cool to 4° with ice         | 180 days             |
| Arsenic (III) & (V) <sup>2</sup>        | Modified 7063 Method  | Polyethylene Bottle | (1) Liter  | HCL  | 28 days <sup>4</sup> |
| Iron (dissolved) <sup>3</sup>           | USEPA SW-846 6010B w/ 3030C Preparation Method <sup>3</sup> | Polyethylene Bottle | (1) 500 ml | HNO <sub>3</sub> (pH<2), cool to 4° with ice         | 180 days             |
| Sulfate                                 | USEPA SW-846 300  | Polyethylene Bottle | (1) 125 ml | cool to 4° with ice                                  | 28 days              |
| Sulfide                                 | USEPA SW-846 376,1  | Polyethylene Bottle | (1) Liter  | NaOH +Zn Acetate, cool to 4° with ice                | 7 days               |
| Organic Carbon (dissolved) <sup>3</sup> | USEPA SW-846 415.1  | vials               | (2) 40 mls | H <sub>2</sub> SO <sub>4</sub> , cool to 4° with ice | 28 days              |

**Notes:**

1. 3030C metals preparation must be completed within 72 hours of sample collection.
2. Samples to be sent to STL-North Canton, Ohio and placed on hold pending total arsenic sample analysis.
3. Dissolved samples will be collected using a 0.45-micron filter cartridge.
4. Arsenic speciation samples should be analyzed well within the 28 day hold time.

CompuChem Laboratory  
501 Madison Ave  
Cary, North Carolina 27511  
1-800-833-5097  
Fax: (919) 379-4050  
Attn: Marlene Swift  
[mswift@compuchemlabs.com](mailto:mswift@compuchemlabs.com)

STL-North Canton Laboratory  
4101 Shuffel Dr. NW  
North Canton, OH 44720  
(330) 497-9396  
Fax: (330) 497-0772  
Attn: Debbie Dunn  
[DDunn@stl-inc.com](mailto:DDunn@stl-inc.com)

**Table 2-1**  
**Summary of Analytes Detected in Sediment**  
**Remedial Action Plan - Former Ash Disposal Area**  
**Progress Energy L.V. Sutton Electric Steam Plant**  
**Wilmington, North Carolina**

| Sample ID:  |       |            | SD-1              | SD-2             |
|---|-------|------------|-------------------|------------------|
| Sample Location:  |       |            | Cape Fear River-  | Cape Fear River- |
| Date Collected:   | Units | RGs        | Upstream          | Downstream       |
|   |       |            | 07/02/04          | 06/23/04         |
| <b>Volatile Organic Compounds by USEPA Method 8260B</b>         |       |            |                   |                  |
| 1,2,4-Trichlorobenzene  | ug/kg | 130,000    | 13 JB [15 U]      | 8.6 U            |
| Methylene Chloride  | ug/kg | 8,900      | 5.4 J [15 U]      | 2.8 JB           |
| <b>Semi-Volatile Organic Compounds By USEPA Method 8270C</b>    |       |            |                   |                  |
| None Detected   | --    | --         | -- [--]           | --               |
| <b>HSL Metals By USEPA Methods 6010B / 7470A (Mercury only)</b> |       |            |                   |                  |
| Antimony  | mg/kg | 6.2        | 1.7 BN [1.6 BN]   | 0.58 BN          |
| Arsenic   | mg/kg | 4.4 (7.24) | <b>5.4 [5.1]</b>  | 0.7 B            |
| Beryllium   | mg/kg | 30         | 1 B [0.89 B]      | 0.45 B           |
| Cadmium   | mg/kg | 1          | 0.5 B [0.45 B]    | 0.09 B           |
| Chromium  | mg/kg | 52.3       | 30.2 [28.8]       | 11.7             |
| Copper  | mg/kg | 18.7       | 16.1 [15.4]       | 4.2              |
| Lead  | mg/kg | 30.2       | 18.6 [17.7]       | 5.6              |
| Mercury   | mg/kg | 0.13 {4.6} | <b>0.22 [0.2]</b> | 0.056 B          |
| Nickel  | mg/kg | 15.9       | 10.4 B [10.4 B]   | 3.2 B            |
| Zinc  | mg/kg | 124        | 62.3 [65.2]       | 14.6             |

**Notes:**

ug/kg: micrograms per kilogram.

mg/kg: milligrams per kilogram.

RGs shown are the more stringent of the health-based Soil RGs or sediment ESLs.

Shaded/Bolded values indicates that the constituent exceeded the RGs.

HSL: Hazardous Substance List.

[ ]: Bracketed values are duplicate sample results.

( ): Ecological Screening Levels (ESL) based on USEPA Region 4 Division of Waste Management Division.

{ }: Soil RG value based on Inactive Hazardous Sites Branch, updated August 2003.

**Organic Laboratory Qualifiers:**

U: This flag indicates the analyte was analyzed for but not detected.

J: This flag indicates an estimated value.

B: The analyte was found in the associated blank.

**Inorganic Laboratory Qualifiers:**

B: The analyte was less than the CRDL but greater than or equal to the IDL.

N: This flag indicates the sample spike recovery is outside of control limits.



**Table 2-2**  
**Summary of Analytes Detected in Surface Water**  
**Remedial Action Plan - Former Ash Disposal Area**  
**Progress Energy L.V. Sutton Electric Steam Plant**  
**Wilmington, North Carolina**

| <b>Sample ID:</b><br><b>Sample Location:</b><br><b>Date Collected:</b> | <b>SW-1</b><br><b>Cape Fear River -</b><br><b>Upstream</b><br><b>06/23/04</b> | <b>SW-2</b><br><b>Cape Fear River-</b><br><b>Downstream</b><br><b>06/23/04</b> |
|--|---|--|
| <b>Volatile Organic Compounds by USEPA Method 8260B</b>                |   |  |
| Chloroform   | 0.15 J [0.14 J]   | 0.16 J   |
| Chloromethane  | 0.15 [0.13J]  | 0.50 U   |
| Methyl-tert-butyl ether  | 0.20 J [0.18 J]   | 0.23 J   |
| Methylene Chloride   | 0.24 U [0.22 U]   | 0.37 JB  |
| <b>Semi-Volatile Organic Compounds by USEPA Method 8270C</b>           |   |  |
| None-Detected  | --  | --   |
| <b>HSL Metals by USEPA Method 6010B</b>                                |   |  |
| Antimony   | 8.7 B [2.6 B]   | 2.1 B  |
| Copper   | 3 B [2.8 B]   | 3.3 B  |
| Chromium   | 0.80 U [1.7 B]  | 0.80 U   |
| Lead   | 1.8 B [1.5 B]   | 1.3 U  |
| Nickel   | 2.6 B [0.96 B]  | 2.1 B  |
| Silver   | 0.40 U [0.40 U]   | 0.41 B   |
| Zinc   | 23.3 [17.8 B]   | 13.2 B   |

**Notes:**

All concentrations in micrograms per liter (ug/L).

HSL: Hazardous Substance List.

**Organic Laboratory Qualifiers:**

U: This flag indicates the analyte was analyzed for but not detected.

J: This flag indicates an estimated value.

B: The analyte was found in the associated method blank.

**Inorganic Laboratory Qualifiers:**

U: This flag indicates the analyte was analyzed for but not detected.

B: The analyte was less than the CRDL but greater than or equal to the IDL.

Table 2-3  
Test Pit and Soil Boring Descriptions  
Remedial Action Plan - Former Ash Disposal Area  
Progress Energy L.V. Sutton Steam Electric Plant  
Wilmington, North Carolina

| Location ID.        | Date      | Maximum Depth (ft bgs) | Depth Interval (ft bgs) | Lithologic Description   | USCS Classification <sup>1</sup> |  | Comments  |
|---------------------|-----------|------------------------|-------------------------|--|----------------------------------|--|---|
| <b>Test Pit ID.</b> |           |                        |                         |  |                                  |  |   |
| TP-1                | 5/24/2004 | 1.8                    | (0.0-0.8)               | Topsoil, brown Sand with Clay and organic matter, roots, moist.                        | Pt                               |  |   |
|                     |           |                        | (0.8-1.1)               | SAND, black, medium grained, trace organics, roots, moist, trace oil substance visible | SM                               |  | Petroleum staining observed.                          |
|                     |           |                        | (1.1-1.8)               | SAND, gray, medium grained, wet.   | SM                               |  |   |
| TP-2                | 5/24/2004 | 2.6                    | (0.0-0.2)               | Topsoil, brown Sand with Clay and organic matter, roots, moist.                        | Pt                               |  |   |
|                     |           |                        | (0.2-2.6)               | CLAYEY SAND, black to brown, trace organics, wet.                                      | SC                               |  |   |
| TP-3                | 5/24/2004 | 6.2                    | (0.0-0.4)               | Topsoil, brown Sand with Clay and organic matter, roots, moist.                        | Pt                               |  |   |
|                     |           |                        | (0.4-1.5)               | ASH, dark gray, silty, laminated.  |                                  |  |   |
|                     |           |                        | (1.5-1.55)              | SAND, light gray, fine grained.  | SM                               |  |   |
|                     |           |                        | (1.55-2.05)             | ASH, dark gray, silty, laminated.  |                                  |  |   |
|                     |           |                        | (2.05-2.6)              | SAND, dark gray, medium grained  | SM                               |  |   |
|                     |           |                        | (2.6-6.2)               | ASH and SAND, dark gray, silt to fine grained, laminated.                              |                                  |  | Sample collected for laboratory analysis at 4 ft bgs. |
| TP-4                | 5/25/2004 | 4                      | (0.0-0.9)               | Topsoil, brown Sand with Clay and organic matter, roots, moist.                        | Pt                               |  |   |
|                     |           |                        | (0.9-1.5)               | SAND with trace ASH, brown, silt to medium grained.                                    |                                  |  |   |
|                     |           |                        | (1.5-1.6)               | SAND, light gray, medium grained.  | SM                               |  |   |
|                     |           |                        | (1.6-1.9)               | ASH, dark gray, silty.   |                                  |  |   |
|                     |           |                        | (1.9-4)                 | SAND and ASH, dark gray, silt to fine grained.   |                                  |  |   |
| TP-5                | 5/25/2004 | 2.6                    | (0.0-0.3)               | Topsoil, brown Sand with Clay and organic matter, roots, moist.                        | Pt                               |  |   |
|                     |           |                        | (0.3-1)                 | SAND, brown to tan, medium grained, wet.   | SM                               |  |   |
|                     |           |                        | (1-1.8)                 | SAND, dark brown to black, fine to medium grained, wet.                                | SM                               |  |   |
|                     |           |                        | (1.8-2.6)               | SAND, black, fine to medium grained.   | SM                               |  |   |
| TP-6                | 5/25/2004 | 4.6                    | (0.0-0.2)               | Topsoil, brown Sand with Clay and organic matter, roots, moist.                        | Pt                               |  |   |
|                     |           |                        | (0.2-1.7)               | ASH, dark gray, silty, trace organics.   |                                  |  |   |
|                     |           |                        | (1.7-2.1)               | SAND, dark gray to brown to gray, medium grained, visible roots.                       | SM                               |  |   |
|                     |           |                        | (2.1-4.6)               | SAND and ASH, gray, silt to medium grained.  |                                  |  |   |
| TP-7                | 5/25/2004 | 7.0                    | (0.0-0.2)               | Topsoil, brown Sand with Clay and organic matter, roots, moist.                        | Pt                               |  |   |
|                     |           |                        | (0.2-1.2)               | SAND, dark gray, fine to medium grained.   | SM                               |  |   |
|                     |           |                        | (1.2-3.3)               | SAND, dark brown, medium grained.  | SM                               |  |   |
|                     |           |                        | (3.3-3.5)               | SAND, tan, medium grained, wet.  | SM                               |  |   |
|                     |           |                        | (3.5-4.8)               | SAND and ASH, fine to medium grained, laminated.                                       |                                  |  |   |
|                     |           |                        | (4.8-7.0)               | SAND, dark brown, medium grained, high organic content, roots.                         | SM                               |  | Perched groundwater at base of the SAND layer.        |
| TP-8                | 5/25/2004 | 4.0                    | (0.0-0.3)               | Topsoil, brown Sand with Clay and organic matter, roots, moist.                        | Pt                               |  |   |
|                     |           |                        | (0.3-0.9)               | SAND, dark gray, fine to medium grained.   | SM                               |  |   |
|                     |           |                        | (0.9-2.0)               | SAND, brown to dark gray, medium grained.  | SM                               |  |   |
|                     |           |                        | (2.0-4.0)               | SAND, light gray, medium to coarse grained.  | SM                               |  | Excavation unstable, undercaving.                     |

Table 2-3  
Test Pit and Soil Boring Descriptions  
Remedial Action Plan - Former Ash Disposal Area  
Progress Energy L.V. Sutton Steam Electric Plant  
Wilmington, North Carolina

| Location ID         | Date      | Maximum Depth (ft bgs) | Depth Interval (ft bgs) | Lithologic Description   | USCS Classification |  | Comments   |
|---------------------|-----------|------------------------|-------------------------|--|---------------------|--|--|
| <b>Test Pit ID.</b> |           |                        |                         |  |                     |  |  |
| TP-9                | 5/25/2004 | 4.0                    | (0.0-0.2)               | Topsoil, brown Sand with Clay and organic matter, roots, moist.  | Pt                  |  | Excavation unstable, undercaving of lower SAND units.  |
|                     |           |                        | (0.2-1.2)               | SAND, dark gray, medium grained, organics, roots.                | SM                  |  |  |
|                     |           |                        | (1.2-2.9)               | SAND, light brown to gray, medium grained, roots.                | SM                  |  |  |
|                     |           |                        | (2.9-4.0)               | SAND, light gray, medium to coarse grained.                      | SM                  |  |  |
| TP-10               | 5/25/2004 | 7.4                    | (0.0-0.4)               | Topsoil, brown Sand with Clay and organic matter, roots, moist.  | Pt                  |  | Groundwater observed at 6.9 ft bgs. Overlying ash layer appears to retard groundwater in this area.  |
|                     |           |                        | (0.4-2.6)               | SAND and ASH, gray, silt to medium grained.                      |                     |  |  |
|                     |           |                        | (2.6-3.4)               | SAND, brown, medium grained, moist.                              | SM                  |  |  |
|                     |           |                        | (3.4-6.9)               | SAND and ASH, silt to medium grained, laminated, moist.          |                     |  |  |
|                     |           |                        | (6.9-7.4)               | SAND, dark gray, medium to coarse grained, organics, roots, wet. | SM                  |  |  |
| TP-11               | 5/26/2004 | 6.2                    | (0.0-0.4)               | Topsoil, brown Sand with Clay and organic matter, roots, moist.  | SM                  |  | Groundwater observed at approximately 5 ft bgs<br>Sample collected for laboratory analysis at 5 ft bgs.  |
|                     |           |                        | (0.4-1.0)               | SAND, light brown to dark brown, fine to medium grained.         | SM                  |  |  |
|                     |           |                        | (1.0-2.6)               | SAND and ASH, dark brown to black, silt to medium grained.       |                     |  |  |
|                     |           |                        | (2.6-3.5)               | SAND and ASH, dark gray to black, silt to fine grained.          |                     |  |  |
|                     |           |                        | (3.5-6.2)               | SAND and ASH, silt to fine grained, laminated.                   |                     |  |  |
| TP-12               | 5/26/2004 | 8.6                    | (0.0-0.4)               | Topsoil, brown Sand with Clay and organic matter, roots, moist.  | Pt                  |  | Groundwater observed at approximately 8.4 ft bgs<br><br>Petroleum staining observed.<br>Sample collected for laboratory analysis at 5 ft bgs.  |
|                     |           |                        | (0.4-1.8)               | SAND and ASH, black, silt to fine grained.                       |                     |  |  |
|                     |           |                        | (1.8-3.9)               | SAND, light brown to black, medium grained.                      | SM                  |  |  |
|                     |           |                        | (3.9-4.6)               | SAND, black, medium grained, trace organics and roots, moist.    | SM                  |  |  |
|                     |           |                        | (4.6-8.6)               | SAND and ASH, black and gray, fine grained, laminated.           |                     |  |  |
| TP-13               | 5/26/2004 | 3.8                    | (0.0-0.4)               | Topsoil, brown Sand with Clay and organic matter, roots, moist.  | Pt                  |  | Excavation unstable, undercaving.  |
|                     |           |                        | (0.4-1.2)               | SAND, light to dark brown, medium grained.                       | SM                  |  |  |
|                     |           |                        | (1.2-1.6)               | SAND, gray to black, medium grained.                             | SM                  |  |  |
|                     |           |                        | (1.6-3.8)               | SAND, light brown to orange-brown, medium grained.               | SM                  |  |  |
| TP-14               | 5/26/2004 | 5.0                    | (0.0-1.1)               | Topsoil, brown Sand with Clay and organic matter, roots, moist.  | SM                  |  | Groundwater observed at approximately 4 ft bgs.  |
|                     |           |                        | (1.1-5.0)               | SAND, orange-brown, fine to medium grained.                      | SM                  |  |  |
| TP-15               | 5/26/2004 | 7.0                    | (0.0-0.9)               | SAND, gray, medium grained, organics, roots.                     | SM                  |  |  |
|                     |           |                        | (0.9-3.5)               | SAND, light to dark brown, medium grained.                       | SM                  |  |  |
|                     |           |                        | (3.5-7.0)               | ASH, gray, silty.  |                     |  |  |
| TP-16               | 5/26/2004 | 4.5                    | (0.0-1.5)               | SAND, gray, medium grained, organics, roots.                     | SM                  |  | Groundwater observed at approximately 4 ft bgs.<br><br>Ash beds truncate at the south end of test pit, returning to SAND, orange-brown, medium grain at 2.8 ft bgs.<br><br>Petroleum staining observed at 2.8 ft bgs. Sample collected for DRO and TN EPH laboratory analysis. |
|                     |           |                        | (1.5-2.8)               | SAND, dark brown, medium grained.                                | SM                  |  |  |
|                     |           |                        | (2.8-3.0)               | SAND, black, medium grained, moist.                              | SM                  |  |  |
|                     |           |                        | (3.0-4.5)               | SAND and ASH, gray to black, fine grained, laminated.            |                     |  |  |
| TP-17               | 5/26/2004 | 5.0                    | (0.0-0.1)               | Topsoil, brown Sand with Clay and organic matter, roots, moist.  | Pt                  |  |  |
|                     |           |                        | (0.1-5)                 | SAND, light brown to gray, medium grained.                       | SM                  |  |  |

Table 2-3  
Test Pit and Soil Boring Descriptions  
Remedial Action Plan - Former Ash Disposal Area  
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Wilmington, North Carolina

| Location ID.    | Date      | Maximum Depth (ft bgs) | Depth Interval (ft bgs)             | Lithologic Description  | USCS Classification <sup>1</sup> | Comments   |
|-----------------|-----------|------------------------|-------------------------------------|---|----------------------------------|--|
| Test Pit ID.    |           |                        |                                     |   |                                  |  |
| TP-18           | 5/26/2004 | 5.5                    | (0.0-0.4)                           | Topsoil, brown Sand with Clay and organic matter, roots, moist.             | Pt                               | SAND, grey, medium grained, truncates at western edge. ASH layers and petroleum stained SAND truncates on the western edge to SAND, light brown to orange-brown. |
|                 |           |                        | (0.4-1.9)                           | SAND, brown to gray, medium grained.  | SM                               |  |
|                 |           |                        | (1.9-3.8)                           | SAND, light brown to black, medium grained.                                 | SM                               |  |
|                 |           |                        | (3.8-4)                             | SAND, black, medium grained, moist.   | SM                               |  |
|                 |           |                        | (4-4.8)                             | SAND and ASH, gray and black, silt to fine grained, laminated.              |                                  |  |
|                 |           | (4.8-5.5)              | SAND, orange-brown, medium grained. | SM  |                                  |  |
| TP-19           | 5/26/2004 | 6.0                    | (0.0-0.6)                           | Topsoil, brown Sand with Clay and organic matter, roots, moist.             | Pt                               |  |
|                 |           |                        | (0.6-1.2)                           | SAND, brown, gray to black, medium grained, visible cross bedding.          | SM                               |  |
|                 |           |                        | (1.2-1.8)                           | SAND, light gray to white, medium grained.                                  | SM                               |  |
|                 |           |                        | (1.8-6)                             | SAND, orange-brown to gray to black, medium grained, visible cross bedding. | SM                               |  |
| TP-20           | 5/26/2004 | 5.0                    | (0.0-0.4)                           | Topsoil, brown Sand with Clay and organic matter, roots, moist.             | Pt                               | Groundwater observed at approximately 4.5 ft bgs   |
|                 |           |                        | (0.4-2.3)                           | SAND, dark brown to gray, medium grained.                                   | SM                               | Visible petroleum sheen observed in groundwater.   |
|                 |           |                        | (2.3-3.1)                           | SAND and ASH, black, silt to fine grained.                                  |                                  |  |
|                 |           |                        | (3.1-3.3)                           | SAND, black, medium grained, moist.   | SM                               | Petroleum staining observed.   |
|                 |           |                        | (3.3-5)                             | SAND and ASH, black and gray, laminated.                                    |                                  |  |
| Soil Boring ID. |           |                        |                                     |   |                                  |  |
| SB-1            | 5/27/2004 | 4.0                    | (0.0-0.6)                           | Topsoil, brown Sand with Clay and organic matter, roots, moist.             | Pt                               |  |
|                 |           |                        | (0.6-1.0)                           | SAND, gray, fine to medium grained.   | SM                               |  |
|                 |           |                        | (1.0-2.6)                           | SAND, light brown to orange-brown, medium grained.                          | SM                               |  |
|                 |           |                        | (2.6-3.0)                           | SAND, dark brown, medium grained.   | SM                               |  |
|                 |           |                        | (3.0-4.0)                           | SAND, black, medium grained.  | SM                               |  |
| SB-2            | 5/27/2004 | 6                      | (0.0-0.6)                           | Topsoil, brown Sand with Clay and organic matter, roots, moist.             | Pt                               |  |
|                 |           |                        | (0.6-1.0)                           | SAND, gray to black, medium fine grained.                                   | SM                               |  |
|                 |           |                        | (1.0-2.0)                           | SAND, black to brown, fine to medium grained.                               | SM                               |  |
|                 |           |                        | (2.0-4.0)                           | SAND and ASH, gray to brown, silt to fine grained, moist.                   |                                  |  |
|                 |           |                        | (4.0-4.25)                          | SAND and ASH, gray to white, medium grained.                                |                                  |  |
|                 |           |                        | (4.25-5.5)                          | SAND, gray to white, medium grained.  | SM                               |  |
|                 |           |                        | (5.5-6.0)                           | ASH, gray, silty, wet, no odor.   |                                  |  |
| SB-3            | 5/27/2004 | 3.2                    | (0.0-0.3)                           | Topsoil, brown Sand with Clay and organic matter, roots, moist.             | Pt                               |  |
|                 |           |                        | (0.3-2.0)                           | SAND, brown, medium grained.  | SM                               |  |
|                 |           |                        | (2.0-3.0)                           | SAND, light brown to gray, medium grained.                                  | SM                               |  |
|                 |           |                        | (3.0-3.2)                           | SAND, black, medium grained.  | SM                               |  |
| SB-4            | 5/27/2004 | 3                      | (0.0-0.6)                           | Topsoil, brown Sand with Clay and organic matter, roots, moist.             | Pt                               |  |
|                 |           |                        | (0.6-1.0)                           | SAND, brown, medium grained, trace organics.                                | SM                               |  |
|                 |           |                        | (1.0-2.5)                           | SAND, light brown to gray, medium grained, trace fine gravel.               | SM                               |  |
|                 |           |                        | (2.5-3.0)                           | SAND, orange-brown, medium grained.   | SM                               |  |
| SB-5            | 5/27/2004 | 3.9                    | (0.0-0.6)                           | Topsoil, brown Sand with Clay and organic matter, roots, moist.             | Pt                               |  |
|                 |           |                        | (0.6-3.0)                           | SAND, white to gray, medium grained.  | SM                               |  |
|                 |           |                        | (3.0-3.9)                           | SAND, dark brown to black, fine to medium grained, wet.                     | SM                               |  |



Table 2-3  
Test Pit and Soil Boring Descriptions  
Remedial Action Plan - Former Ash Disposal Area  
Progress Energy L.V. Sutton Steam Electric Plant  
Wilmington, North Carolina

| Location ID.        | Date      | Maximum Depth (ft bgs) | Depth Interval (ft bgs) | Lithologic Description  | USCS Classification <sup>1</sup> |  | Comments   |
|---------------------|-----------|------------------------|-------------------------|---|----------------------------------|--|--|
| <b>Test Pit ID.</b> |           |                        |                         |   |                                  |  |  |
| SB-6                | 5/27/2004 | 5                      | (0.0-0.6)               | Topsoil, brown Sand with Clay and organic matter, roots, moist. | Pt                               |  |  |
|                     |           |                        | (0.6-2.0)               | SAND, brown, medium grained.                                    | SM                               |  |  |
|                     |           |                        | (2.0-4.5)               | SAND, black, medium grained, moist                              | SM                               |  | Petroleum staining observed.                     |
|                     |           |                        | (4.5-5)                 | ASH, black, silty.  |                                  |  | Petroleum staining observed.                     |
| SB-7                | 5/27/2004 | 4.5                    | (0.0-0.5)               | Topsoil, brown Sand with Clay and organic matter, roots, moist. | Pt                               |  |  |
|                     |           |                        | (0.5-1.0)               | SAND and ASH, black, silt to fine grained.                      |                                  |  |  |
|                     |           |                        | (1.0-1.7)               | SAND and ASH, black and gray, silt to fine grained, laminated.  |                                  |  |  |
|                     |           |                        | (1.7-2.0)               | SAND, light gray to brown, medium grained.                      | SM                               |  |  |
|                     |           |                        | (2.0-4.5)               | SAND, light gray, medium grained.                               | SM                               |  |  |
| SB-8                | 5/27/2004 | 5.2                    | (0.0-0.4)               | Topsoil, brown Sand with Clay and organic matter, roots, moist. | Pt                               |  |  |
|                     |           |                        | (0.4-0.8)               | SAND and ASH, black, silt to fine grained.                      |                                  |  |  |
|                     |           |                        | (0.8-1.5)               | SAND and ASH, black and gray, fine grained, laminated.          |                                  |  |  |
|                     |           |                        | (1.5-2.5)               | ASH, gray, silty.   |                                  |  |  |
|                     |           |                        | (2.5-3.2)               | SAND and ASH, black and gray, silt to fine grained, laminated.  |                                  |  |  |
|                     |           |                        | (3.2-4.8)               | SAND and ASH, black, silt to fine grained.                      |                                  |  |  |
|                     |           |                        | (4.8-5.2)               | SAND, brown to orange-brown, medium grained.                    | SM                               |  |  |
| SB-9                | 5/27/2004 | 4.5                    | (0.0-0.6)               | Topsoil, brown Sand with Clay and organic matter, roots, moist. | Pt                               |  |  |
|                     |           |                        | (0.6-1.0)               | SAND, light brown, fine to medium grained.                      | SM                               |  |  |
|                     |           |                        | (1.0-1.5)               | SAND, light to dark brown, medium grained.                      | SM                               |  |  |
|                     |           |                        | (1.5-3.5)               | SAND and ASH, black and gray, silt to fine grained.             |                                  |  |  |
|                     |           |                        | (3.5-4.0)               | ASH, black, silty.  |                                  |  |  |
|                     |           |                        | (4.0-4.5)               | SAND, dark brown, medium grained.                               | SM                               |  |  |
| SB-10               | 6/9/2004  | 4.0                    | (0.0-0.4)               | Topsoil, brown Sand with Clay and organic matter, roots, moist. | Pt                               |  |  |
|                     |           |                        | (0.4-2.3)               | SAND, dark brown to gray, medium grained.                       | SM                               |  |  |
|                     |           |                        | (2.3-3.1)               | SAND and ASH, black, silt to fine grained.                      |                                  |  |  |
|                     |           |                        | (3.1-3.5)               | SAND, black, medium grained, moist.                             | SM                               |  | Visible petroleum sheen observed in groundwater. |
|                     |           |                        | (3.5-4.0)               | SAND, dark gray to black, silt to fine grained, wet.            | SM                               |  | Soil sample collected for laboratory analysis.   |
| SB-11               | 6/9/2004  | 4.5                    | (0.0-0.4)               | Topsoil, brown Sand with Clay and organic matter, roots, moist. | Pt                               |  |  |
|                     |           |                        | (0.4-1.8)               | SAND and ASH, black, silt to fine grained.                      |                                  |  |  |
|                     |           |                        | (1.8-3.9)               | SAND, light brown to black, medium grained.                     | SM                               |  | Visible petroleum sheen observed in groundwater. |
|                     |           |                        | (4.0-4.5)               | SAND, dark gray to black, fine grained, wet.                    | SM                               |  | Soil sample collected for laboratory analysis.   |
| SB-12               | 6/9/2004  | 4.0                    | (0.0-2.0)               | SAND, light brown to light gray, fine to medium grained.        | SM                               |  |  |
|                     |           |                        | (2.0-4.0)               | SAND and ASH, light gray, fine grained with trace silts, wet.   |                                  |  |  |
| SB-13               | 6/9/2004  | 4.0                    | (0.0-1.5)               | SAND, brown to light brown, fine grained                        | SM                               |  |  |
|                     |           |                        | (1.5-2.0)               | SAND and ASH, gray, silt to fine grained, damp.                 |                                  |  |  |
|                     |           |                        | (2.0-4.0)               | SAND, light brown to brown, fine to medium grained.             | SM                               |  |  |
| SB-14               | 6/9/2004  | 4.0                    | (0.0-1.0)               | SAND, dark gray, fine to medium grained with trace silts.       | SM                               |  |  |
|                     |           |                        | (1.0-4.0)               | SAND, light brown to tan, fine to medium grained, damp to wet.  | SM                               |  |  |
| SB-15               | 6/9/2004  | 4.2                    | (0.0-4.2)               | SAND, light brown, fine to medium grained, loose, damp to wet.  | SM                               |  |  |
| SB-16               | 6/9/2004  | 4.0                    | (0.0-3.5)               | SAND and ASH, light gray to gray, silt to fine grained, wet     |                                  |  |  |
|                     |           |                        | (3.5-4.0)               | SAND, brown, fine to medium grained, trace fine gravel, wet.    | SM                               |  |  |
| SB-17               | 6/9/2004  | 4.0                    | (0.0-4.2)               | SAND and ASH, gray, mottled brown, silt to fine grained.        |                                  |  |  |
| SB-18               | 6/9/2004  | 4.0                    | (0.0-1.5)               | SAND and ASH, gray, silt to fine grained.                       |                                  |  |  |
|                     |           |                        | (1.5-4.0)               | SAND, light gray, fine to medium grained, trace coarse grains.  | SM                               |  |  |

**Table 2-3**  
**Test Pit and Soil Boring Descriptions**  
**Remedial Action Plan - Former Ash Disposal Area**  
**Progress Energy L.V. Sutton Steam Electric Plant**  
**Wilmington, North Carolina**

| Location ID.     | Date      | Maximum Depth (ft bgs) | Depth Interval (ft bgs) | Lithologic Description   | USCS Classification <sup>1</sup> | Photograph | Comments   |
|------------------|-----------|------------------------|-------------------------|--|----------------------------------|------------|--|
| Test Pit ID.     |           |                        |                         |  |                                  |            |  |
| SB-19            | 1/25/2005 | 4.0                    | (0.0-0.2)               | Topsoil, brown organic leaf litter.                              | Pt                               |            |  |
|                  |           |                        | (0.2-2.0)               | ASH, light to dark gray, trace fine grained sand.                |                                  |            |  |
|                  |           |                        | (2.0-2.5)               | SAND and ASH, dark gray to black, fine to medium grained, wet.   |                                  |            |  |
|                  |           |                        | (2.5-3.0)               | SAND, dark brown, fine to medium grained, wet.                   | SM                               |            |  |
|                  |           |                        | (3.0-4.0)               | SAND, brown, fine to medium grained, wet.                        | SM                               |            |  |
| SB-20            | 1/25/2005 | 7.0                    | (0.0-0.2)               | Topsoil, brown organic leaf litter.                              | Pt                               |            |  |
|                  |           |                        | (0.2-1.0)               | SAND, gray, medium grained, trace ash.                           | SM                               |            |  |
|                  |           |                        | (1.0-2.0)               | SAND and ASH, dark gray to black, fine to medium grained, moist. |                                  |            |  |
|                  |           |                        | (2.0-3.0)               | ASH, light to dark gray, trace fine grained sand.                |                                  |            |  |
|                  |           |                        | (3.0-4.0)               | ASH, light to dark gray, trace fine grained sand, wet.           |                                  |            |  |
|                  |           |                        | (4.0-4.5)               | SAND and ASH, gray, fine grained, wet.                           |                                  |            |  |
|                  |           |                        | (4.5-5.0)               | SAND and ASH, gray, medium to coarse grained, wet.               |                                  |            |  |
|                  |           |                        | (5.0-5.5)               | SAND and ASH, gray, fine grained, wet.                           |                                  |            |  |
|                  |           |                        | (5.5-6.0)               | ASH, light gray, trace fine grained sand, wet.                   |                                  |            |  |
|                  |           |                        | (6.0-6.5)               | SAND and ASH, gray, medium grained, wet.                         |                                  |            |  |
|                  |           |                        | (6.5-7.0)               | SAND, brown, medium grained, wet.                                | SM                               |            |  |
| Surface Soil ID. |           |                        |                         |  |                                  |            |  |
| SF-1             | 6/9/2004  | 1.2                    | (0.0-1.2)               | SAND, dark brown to black, fine to medium grained, damp to wet.  | SM                               |            | Surface soil sample collected at 0.8'-1.2', Petroleum staining observed. |
| SF-2             | 1/25/2005 | 1.0                    | (0.5-1.0)               | SAND, brown to orange-brown, fine to medium grained.             | SM                               |            | Background surface soil sample collected at 0.5'-1.0'.                   |
| SF-3             | 1/25/2005 | 1.0                    | (0.5-1.0)               | SAND, gray to light gray, fine to medium grained, loose.         | SM                               |            | Background surface soil sample collected at 0.5'-1.0'.                   |
| SF-4             | 1/25/2005 | 1.0                    | (0.5-1.0)               | SAND, gray, fine to medium grained, loose.                       | SM                               |            | Background surface soil sample collected at 0.5'-1.0'.                   |
| SF-5             | 1/25/2005 | 1.0                    | (0.5-1.0)               | SAND, brown to light brown, fine to medium grained.              | SM                               |            | Background surface soil sample collected at 0.5'-1.0'.                   |
| SF-6             | 1/25/2005 | 1.0                    | (0.5-1.0)               | SAND, brown to orange-brown, fine to medium grained.             | SM                               |            | Background surface soil sample collected at 0.5'-1.0'.                   |
| SF-7             | 1/26/2005 | 1.0                    | (0.5-1.0)               | SAND, brown, fine to medium grained, wet.                        | SM                               |            | Surface soil sample collected at 0.5'-1.0'.                              |
| SF-8             | 1/26/2005 | 1.0                    | (0.5-1.0)               | SAND, brown, fine to medium grained, wet.                        | SM                               |            | Surface soil sample collected at 0.5'-1.0'.                              |
| SF-9             | 1/26/2005 | 1.0                    | (0.5-1.0)               | SAND, brown, fine to medium grained, wet.                        | SM                               |            | Surface soil sample collected at 0.5'-1.0'.                              |
| SF-10            | 1/26/2005 | 1.0                    | (0.5-1.0)               | SAND, brown, fine to medium grained, wet.                        | SM                               |            | Surface soil sample collected at 0.5'-1.0'.                              |

**Notes:**

 - Indicates ash was observed during test pitting or hand augering.  
 - Indicates a sand and ash mix was observed during test pitting or hand augering.  
 TP: "Test Pits" performed with a backhoe.  
 SB: "Soil borings" advanced with a 2-inch stainless steel hand auger.  
 SF: Surface soil sample.  
 USCS: Unified Soil Classification System.  
 1. Based on field observation.

**Table 2-4**  
**Summary of Analytes Detected in Soil**  
**Remedial Action Plan - Former Ash Disposal Area**  
**Progress Energy - L.V. Sutton Steam Electric Plant**  
**Wilmington, North Carolina**

| Sample ID:<br>Sample Depth(Feet):<br>Date Collected:         | RGs                             | Units                                   | SB-10<br>3.5 - 4.0:<br>06/09/04 | SB-11<br>4.0 - 4.5<br>06/09/04           | SF-1<br>0.8 - 1.2<br>06/09/04            | TP-16<br>2.8 - 3.0<br>05/26/04           |
|--|---------------------------------|---|---------------------------------|--|--|--|
| <b>Volatile Organic Compounds by USEPA Method 8260B</b>      |                                 |   |                                 |  |  |  |
| 1,1,1-Trichloroethane  | 400000                          | ug/kg                                   | 1.8 J                           | 4.6 U [4.5 U]                            | 5 U                                      | NA                                       |
| 2-Butanone   | 1460000                         | ug/kg                                   | 17 U                            | 11 U [11 U]                              | 26 J                                     | NA                                       |
| Acetone  | 320000                          | ug/kg                                   | 25                              | 11 U [35]                                | 210 J                                    | NA                                       |
| Isopropylbenzene   | --                              | ug/kg                                   | 4.8 J                           | 4.6 U [2.5 J]                            | 6.6 J                                    | NA                                       |
| Methylcyclohexane  | --                              | ug/kg                                   | 6.6 U                           | 4.6 U [4.5 U]                            | 12 J                                     | NA                                       |
| Toluene  | 3200000                         | ug/kg                                   | 6.6 U                           | 4.6 U [0.62 J]                           | 2 J                                      | NA                                       |
| Xylene (total)   | 54000                           | ug/kg                                   | 5.9 J                           | 14 U [3.3 J]                             | 11 J                                     | NA                                       |
| <b>Semi-Volatile Organic Compounds by USEPA Method 8270C</b> |                                 |   |                                 |  |  |  |
| 2-Methylnaphthalene  | 11200                           | ug/kg                                   | 520 U                           | 49 J [83 J]                              | 5,800 U                                  | NA                                       |
| Atrazine   | --                              | ug/kg                                   | 520 U                           | 83 J [1,000 U]                           | 5,800 U                                  | NA                                       |
| Benzo(a)anthracene   | 620                             | ug/kg                                   | 520 U                           | 610 U [120 J]                            | 5,800 U                                  | NA                                       |
| Benzo(a)pyrene   | 62                              | ug/kg                                   | 520 U                           | 91 J [1,000 U]                           | 5,800 U                                  | NA                                       |
| Caprolactam  | --                              | ug/kg                                   | 520 U                           | 610 U [1,000 U]                          | 2,600 J                                  | NA                                       |
| Chrysene   | 62000                           | ug/kg                                   | 520 U                           | 230 J [330 J]                            | 1,500 J                                  | NA                                       |
| Di-n-octyl phthalate   | 480000                          | ug/kg                                   | 120 J                           | 610 U [1,000 U]                          | 5,800 U                                  | NA                                       |
| Fluoranthene   | 460000                          | ug/kg                                   | 520 U                           | 48 J [100 J]                             | 5,800 U                                  | NA                                       |
| Fluorene   | 520000                          | ug/kg                                   | 520 U                           | 290 J [500 J]                            | 5,800 U                                  | NA                                       |
| N-Nitrosodiphenylamine                                       | 99000                           | ug/kg                                   | 520 U                           | 610 U [970 J]                            | 1,200 J                                  | NA                                       |
| Phenanthrene   | --                              | ug/kg                                   | 520 U                           | 1,100 [1,900]                            | 5,800 U                                  | NA                                       |
| Pyrene   | 460000                          | ug/kg                                   | 520 U                           | 240 J [310 J]                            | 840 J                                    | NA                                       |
| <b>HSL Metals by USEPA Method 6010B / 7470A (Hg only)</b>    |                                 |   |                                 |  |  |  |
| Arsenic  | 4.4                             | mg/kg                                   | 13.3                            | 1.9 [2]                                  | 1.6                                      | NA                                       |
| Beryllium  | 30                              | mg/kg                                   | 2.7                             | 0.22 B [0.2 B]                           | 0.13 B                                   | NA                                       |
| Cadmium  | 7.4                             | mg/kg                                   | 0.22 B                          | 0.05 U [0.05 U]                          | 0.05 U                                   | NA                                       |
| Chromium III   | 24000                           | mg/kg                                   | 16.7                            | 2.9 [3]                                  | 2.3                                      | NA                                       |
| Copper   | 580                             | mg/kg                                   | 38.1                            | 2.7 [2.6]                                | 2.7                                      | NA                                       |
| Lead   | 400                             | mg/kg                                   | 11.4                            | 1.6 [1.6]                                | 4.8                                      | NA                                       |
| Mercury  | 4.6                             | mg/kg                                   | 0.13                            | 0.018 U [0.02 U]                         | 0.02 U                                   | NA                                       |
| Nickel   | 320                             | mg/kg                                   | 21.3                            | 2.5 B [2.3 B]                            | 5  | NA                                       |
| Selenium   | 78                              | mg/kg                                   | 2.6                             | 0.29 B [0.43 B]                          | 0.28 U                                   | NA                                       |
| Silver   | 78                              | mg/kg                                   | 0.18 B                          | 0.05 U [0.09 B]                          | 0.06 B                                   | NA                                       |
| Thallium   | 1.04                            | mg/kg                                   | 2                               | 0.38 U [0.38 U]                          | 0.38 U                                   | NA                                       |
| Zinc   | 4600                            | mg/kg                                   | 32.1                            | 2.8 U [2.9 U]                            | 4.2                                      | NA                                       |
| <b>Additional Parameters by USEPA Method 8015B</b>           |                                 |   |                                 |  |  |  |
| DRO  | --                              | mg/kg                                   | NA                              | NA                                       | NA                                       | 7,300                                    |
| TN-EPH   | --                              | mg/kg                                   | NA                              | NA                                       | NA                                       | 31,000 B                                 |
| Sample ID:<br>Sample Depth(ft bgs):<br>Date Collected:       | MSCC<br>Residential<br>Criteria | MSCC<br>Soil-to Groundwater<br>Criteria | Units                           | SB-22 (4.0-4.5)<br>4.0 - 4.5<br>01/26/05 | SB-24 (4.0-4.5)<br>4.0 - 4.5<br>01/26/05 | SB-26 (4.5-5.0)<br>4.5 - 5.0<br>01/26/05 |
| <b>MADEP - EPH/VPH<sup>a</sup></b>                           |                                 |   |                                 |  |  |  |
| C5 - C8 Aliphatics (VPH)                                     | 939                             | 72                                      | mg/kg                           | 10 U                                     | 9.6 U                                    | 9.2 U                                    |
| C9 - C18 Aliphatics (VPH + EPH)                              | 9386                            | 3255                                    | mg/kg                           | BDL                                      | BDL                                      | BDL                                      |
| C19 - C36 Aliphatics (EPH)                                   | 93860                           | considered immobile                     | mg/kg                           | 28                                       | 59                                       | 12                                       |
| C9 - C22 Aromatics (VPH + EPH)                               | 469                             | 34                                      | mg/kg                           | 9.2                                      | 5.9 J                                    | 8.7 J                                    |
| Sample ID:<br>Sample Depth(ft bgs):<br>Date Collected:       | MSCC<br>Residential<br>Criteria | MSCC<br>Soil-to Groundwater<br>Criteria | Units                           | SB-28 (4.0-4.5)<br>4.0 - 4.5<br>01/26/05 | SB-29 (3.5-4.0)<br>3.5 - 4.0<br>01/27/05 | SB-30 (2.5-3.0)<br>2.5 - 3.0<br>01/27/05 |
| <b>MADEP - EPH/VPH<sup>a</sup></b>                           |                                 |   |                                 |  |  |  |
| C5 - C8 Aliphatics (VPH)                                     | 939                             | 72                                      | mg/kg                           | 9.1 U                                    | 8.7 U [9.2 U]                            | 9.6 U                                    |
| C9 - C18 Aliphatics (VPH + EPH)                              | 9386                            | 3255                                    | mg/kg                           | 22                                       | BDL [BDL]                                | BDL                                      |
| C19 - C36 Aliphatics (EPH)                                   | 93860                           | considered immobile                     | mg/kg                           | 99                                       | 20 [17]                                  | 6.4                                      |
| C9 - C22 Aromatics (VPH + EPH)                               | 469                             | 34                                      | mg/kg                           | 28.3 J                                   | 23.1 J [3.3 J]                           | 3.5 J                                    |
| Sample ID:<br>Sample Depth(ft bgs):<br>Date Collected:       | MSCC<br>Residential<br>Criteria | MSCC<br>Soil-to Groundwater<br>Criteria | Units                           | SB-31 (2.5-3.0)<br>2.5 - 3.0<br>01/27/05 | SB-32 (3.5-4.0)<br>3.5 - 4.0<br>01/27/05 | SF-7 (0.5-1.0)<br>0.5 - 1.0<br>01/26/05  |
| <b>MADEP - EPH/VPH<sup>a</sup></b>                           |                                 |   |                                 |  |  |  |
| C5 - C8 Aliphatics (VPH)                                     | 939                             | 72                                      | mg/kg                           | 8.2 U                                    | 9.9 U                                    | 9.9 U                                    |
| C9 - C18 Aliphatics (VPH + EPH)                              | 9386                            | 3255                                    | mg/kg                           | BDL                                      | BDL                                      | 51 J                                     |
| C19 - C36 Aliphatics (EPH)                                   | 93860                           | considered immobile                     | mg/kg                           | 3.5 U                                    | 4.6 U                                    | 280 J                                    |
| C9 - C22 Aromatics (VPH + EPH)                               | 469                             | 34                                      | mg/kg                           | 1.9 J                                    | 2.8 J                                    | 126.9 J                                  |

Table 2-4  
Summary of Analytes Detected in Soil  
Remedial Action Plan - Former Ash Disposal Area  
Progress Energy - L.V. Sutton Steam Electric Plant  
Wilmington, North Carolina

| Sample ID:<br>Sample Depth(ft bgs):<br>Date Collected: | MSCC<br>Residential<br>Criteria | MSCC<br>Soil-to Groundwater<br>Criteria | Units | SF-8 (0.5-1.0)<br>0.5 - 1.0<br>01/26/05 | SF-9 (0.5-1.0)<br>0.5 - 1.0<br>01/26/05 | SF-10 (0.5-1.0)<br>0.5 - 1.0<br>01/26/05 |
|--|---------------------------------|---|-------|---|---|--|
| <b>MADEP - EPH/VPH<sup>a</sup></b>                     |                                 |   |       |   |   |  |
| C5 - C8 Aliphatics (VPH)                               | 939                             | 72                                      | mg/kg | 4.5 U                                   | 8.5 U [10 U]                            | 8.9 U                                    |
| C9 - C18 Aliphatics (VPH + EPH)                        | 9386                            | 3255                                    | mg/kg | BDL                                     | 9 J [14.8 J]                            | 18 J                                     |
| C19 - C36 Aliphatics (EPH)                             | 93860                           | considered immobile                     | mg/kg | 49                                      | 82 J [98]                               | 120 J                                    |
| C9 - C22 Aromatics (VPH + EPH)                         | 469                             | 34                                      | mg/kg | 24 J                                    | <b>35.2 J [49.6 J]</b>                  | 24.3 J                                   |

**Notes:**

<sup>a</sup> VPH samples were collected as an unmixed grab sample.

RGs: Soil Remediation Goals, Inactive Hazardous Sites Branch, updated January 2005.

DRO: Diesel Range Organics.

TN-EPH: Tennessee Extractable Petroleum Hydrocarbons.

MADEP-EPH: Massachusetts Department of Environmental Protection Extractable Petroleum Hydrocarbon Method.

MADEP-VPH: Massachusetts Department of Environmental Protection Volatile Petroleum Hydrocarbon Method.

MSCC: Maximum Soil Contaminant Concentration, NCDENR 2001.

**Bolded and shaded** values indicate that the constituent exceeded the applicable regulatory criteria.

mg/kg: milligrams per kilogram.

ug/kg: micrograms per kilogram.

ft bgs: feet below ground surface.

SB: Soil Boring Sample.

SF: Surface Soil Sample.

TP: Test pit.

NA: Not analyzed.

[ ]: Bracketed values are duplicate sample results.

BDL: Result was below detection limits for both VPH and EPH fractions.

**Organic Laboratory Qualifiers:**

U: This flag indicates the analyte was analyzed for but not detected.

J: This flag indicates an estimated value.

**Inorganic Laboratory Qualifiers:**

U: This flag indicates the analyte was analyzed for but not detected.

B: The analyte was less than the CRDL but greater than or equal to the IDL.

N: This flag indicates the sample spike recovery is outside of control limits.

\*: This flag is used for duplicate analysis when the sample and the sample duplicate results are not within the control limits.



**Table 2-5**  
**Summary of Analytes Detected in Background Soil**  
**Remedial Action Plan - Former Ash Disposal Area**  
**Progress Energy - L.V. Sutton Steam Electric Plant**  
**Wilmington, North Carolina**

| Sample ID:<br>Sample Depth (ft bgs):<br>Date Collected:  | Units | RGs   | SF-2 (0.5-1.0)<br>0.5 - 1.0<br>01/25/05 | SF-3 (0.5-1.0)<br>0.5 - 1.0<br>01/25/05 | SF-4 (0.5-1.0)<br>0.5 - 1.0<br>01/25/05 | SF-5 (0.5-1.0)<br>0.5 - 1.0<br>01/25/05 | SF-6 (0.5-1.0)<br>0.5 - 1.0<br>01/25/05 |
|--|-------|-------|---|---|---|---|---|
| <b>HSL Metals by USEPA Method 6010-/ 7470A (Hg only)</b> |       |       |   |   |   |   |   |
| Antimony   | mg/kg | 6.2   | 0.2 U                                   | 0.21 U [0.2 U]                          | 0.21 U                                  | 0.2 U                                   | 0.22 U                                  |
| Arsenic  | mg/kg | 4.4   | 0.26 B                                  | 0.21 U [0.2 U]                          | 0.21 U                                  | 0.38 B                                  | 0.43 B                                  |
| Beryllium  | mg/kg | 30    | 0.02 B                                  | 0.01 U [0.01 U]                         | 0.01 B                                  | 0.01 U                                  | 0.02 B                                  |
| Cadmium  | mg/kg | 7.4   | 0.03 U                                  | 0.03 U [0.03 U]                         | 0.03 U                                  | 0.03 U                                  | 0.03 U                                  |
| Chromium   | mg/kg | 24000 | 1.8                                     | 0.06 U [0.06 U]                         | 0.07 B                                  | 0.78 B                                  | 0.93 B                                  |
| Copper   | mg/kg | 620   | 0.44 B                                  | 0.25 B [0.14 B]                         | 0.19 B                                  | 0.27 B                                  | 0.31 B                                  |
| Lead   | mg/kg | 400   | 2.4                                     | 0.42 [0.42]                             | 0.84                                    | 2.3                                     | 1.7                                     |
| Manganese  | mg/kg | 360   | 2.2                                     | 0.39 B [0.37B]                          | 0.66 B                                  | 1.3                                     | 1.5                                     |
| Mercury  | mg/kg | 4.6   | 0.016 U                                 | 0.015 U [0.015 U]                       | 0.017 U                                 | 0.016 U                                 | 0.018 U                                 |
| Nickel   | mg/kg | 320   | 0.36 B                                  | 0.08 U [0.08 U]                         | 0.24 B                                  | 0.08 U                                  | 0.17 B                                  |
| Selenium   | mg/kg | 78    | 0.26 U                                  | 0.27 U [0.26 U]                         | 0.27 U                                  | 0.26 U                                  | 0.29 U                                  |
| Silver   | mg/kg | 78    | 0.08 U                                  | 0.08 U [0.08 U]                         | 0.08 U                                  | 0.08 U                                  | 0.09 U                                  |
| Thallium   | mg/kg | 1.04  | 0.29 U                                  | 0.3 U [0.29U]                           | 0.3 U                                   | 0.29 U                                  | 0.32 U                                  |
| Zinc   | mg/kg | 4600  | 2.5                                     | 0.85 U [1.1 U]                          | 0.87 U                                  | 1.5 B                                   | 1.4 B                                   |

**Notes:**

mg/kg: milligrams per kilogram.

RGs: Soil Remediation Goals, Inactive Hazardous Sites Branch, updated January 2005.

HSL: Hazardous Substance List.

[ ]: Bracketed values are duplicate sample results.

SF: Surface soil sample.

ft bgs: feet below ground surface.

**Laboratory Qualifiers:**

U: This flag indicates the analyte was analyzed for but not detected.

B: The analyte was less than the contract required detection limit, but greater than or equal to the instrument detection limit.

**Table 2-6**  
**Well and Piezometer Construction Details and Water Elevation Data**  
**Remedial Action Plan - Former Ash Disposal Area**  
**Progress Energy - L.V. Sutton Steam Electric Plant**  
**Wilmington, North Carolina**

| Well Designation                         | Completion Date | Well Diameter (inches) | Screen Interval (ft bgs) | Total Boring Depth (ft bgs) | TOC/Meas. Pt. Elevation <sup>a</sup> (ft msl) | Depth to Water <sup>b</sup> (ft btoc) | Water Level Elevation (ft msl) | Groundwater Unit Depth |
|--|-----------------|------------------------|--------------------------|-----------------------------|---|---------------------------------------|--------------------------------|------------------------|
| <b>Permanent Monitoring Wells</b>        |                 |                        |                          |                             |   |                                       |                                |                        |
| MW-13                                    | 5/25/04         | 2                      | 3 - 13                   | 13.0                        | 18.21   | 8.04                                  | 10.17                          | Shallow                |
| MW-13D                                   | 1/28/05         | 2                      | 33 - 38                  | 38.0                        | 18.16   | 7.97                                  | 10.19                          | Deep                   |
| MW-14                                    | 5/25/04         | 2                      | 1 - 11                   | 11.0                        | 14.15   | 4.53                                  | 9.62                           | Shallow                |
| MW-15                                    | 5/25/04         | 2                      | 1 - 11                   | 11.0                        | 11.47   | 3.49                                  | 7.98                           | Shallow                |
| MW-15D                                   | 1/31/05         | 2                      | 40 - 45                  | 45.0                        | 11.21   | 3.28                                  | 7.93                           | Deep                   |
| MW-16                                    | 6/7/04          | 2                      | 2 - 12                   | 12.0                        | 16.91   | 6.97                                  | 9.94                           | Shallow                |
| MW-16D                                   | 1/27/05         | 2                      | 42 - 47                  | 47.0                        | 16.43   | 6.62                                  | 9.81                           | Deep                   |
| MW-20                                    | 2/2/05          | 2                      | 4 - 14                   | 14.0                        | 13.70   | 8.08                                  | 5.62                           | Shallow                |
| MW-20D                                   | 2/2/05          | 2                      | 43 - 48                  | 48.0                        | 13.66   | 8.09                                  | 5.57                           | Deep                   |
| <b>Permanent Piezometer</b>              |                 |                        |                          |                             |   |                                       |                                |                        |
| PZ-10                                    | 5/25/04         | 2                      | 1 - 11                   | 11.0                        | 12.82   | 3.70                                  | 9.12                           | Shallow                |
| <b>Temporary Piezometers (Abandoned)</b> |                 |                        |                          |                             |   |                                       |                                |                        |
| PZ-11                                    | 1/25/05         | 1                      | 1-6                      | 6.0                         | 18.31   | NA                                    | NA                             | Shallow                |
| PZ-12                                    | 1/25/05         | 1                      | 1-6                      | 6.0                         | 15.90   | NA                                    | NA                             | Shallow                |
| PZ-13                                    | 1/25/05         | 1                      | 1-6                      | 6.0                         | 16.72   | NA                                    | NA                             | Shallow                |
| PZ-14                                    | 1/25/05         | 1                      | 1-6                      | 6.0                         | 15.80   | NA                                    | NA                             | Shallow                |
| PZ-15                                    | 1/25/05         | 1                      | 1-6                      | 6.0                         | 15.30   | NA                                    | NA                             | Shallow                |
| PZ-16                                    | 1/25/05         | 1                      | 1-6                      | 6.0                         | 9.97  | NA                                    | NA                             | Shallow                |

**Notes:**

<sup>a</sup>Surveyed elevations based on TWT surveys conducted June 2004 and February 2005.

<sup>b</sup>Water level measurements taken on July 27, 2005.

ft bgs = feet below ground surface.

ft msl = feet above mean sea level.

ft btoc = Feet below top of casing.

TOC = Top of casing.

**Table 2-7**  
**Site Survey Data**  
**Remedial Action Plan - Former Ash Disposal Area**  
**Progress Energy - L.V. Sutton Steam Electric Plant**  
**Wilmington, North Carolina**

| <b>Well Designation</b>                            | <b>Northing</b> | <b>Easting</b> | <b>Ground<sup>a</sup> Elevation (ft msl)</b> | <b>Top of Casing Elevation (ft msl)</b> |
|--|-----------------|----------------|--|---|
| <b>Permanent Monitoring Wells</b>                  |                 |                |  |   |
| MW-13  | 197948.14       | 2305008.16     | 15.09  | 18.21                                   |
| MW-13D   | 197965.38       | 2305017.45     | 15.53  | 18.16                                   |
| MW-14  | 197252.17       | 2306178.43     | 10.96  | 14.15                                   |
| MW-15  | 196475.65       | 2306044.01     | 8.53   | 11.47                                   |
| MW-15D   | 196476.98       | 2306061.06     | 8.61   | 11.21                                   |
| MW-16  | 196975.93       | 2306753.16     | 14.11  | 16.91                                   |
| MW-16D   | 196962.70       | 2306758.11     | 14.00  | 16.43                                   |
| MW-20  | 196257.98       | 2305318.10     | 10.78  | 13.70                                   |
| MW-20D   | 196256.89       | 2305326.09     | 10.73  | 13.66                                   |
| <b>Permanent Piezometer</b>                        |                 |                |  |   |
| PZ-10  | 196897.50       | 2306271.49     | 10.15  | 12.82                                   |
| <b>Temporary Piezometers</b>                       |                 |                |  |   |
| PZ-11  | 197824.56       | 2305109.88     | 15.76  | 18.31                                   |
| PZ-12  | 197004.43       | 2305068.36     | 11.17  | 15.90                                   |
| PZ-13  | 197188.14       | 2305495.92     | 11.21  | 16.72                                   |
| PZ-14  | 196911.31       | 2305327.01     | 10.58  | 15.80                                   |
| PZ-15  | 196508.86       | 2305223.83     | 10.05  | 15.30                                   |
| PZ-16  | 196384.40       | 2305681.97     | 8.01   | 9.97                                    |
| <b>Surface Water and Sediment Sample Locations</b> |                 |                |  |   |
| SW-1/SD-1  | 196378.52       | 2302994.45     | -1.00  | NA                                      |
| SW-2/SD-2  | 193800.36       | 2304984.17     | -1.00  | NA                                      |

**Notes:**

Surveyed elevations based on TWT survey conducted in June 2004 and February 2005.

ft msl = feet above mean sea level.

NA = Not applicable.

<sup>a</sup>SW-1/SW-2 elevation is feet below mean sea level.

**Table 2-8**  
**Historical Groundwater Elevation Data**  
**Remedial Action Plan - Former Ash Disposal Area**  
**Progress Energy - L.V. Sutton Steam Electric Plant**  
**Wilmington, North Carolina**

| Well Designation                  | Date | Top of Casing Elevation (ft amsl) | Depth to Water (ft btoc) | Groundwater Elevation (ft msl) |
|-----------------------------------|------|-----------------------------------|--------------------------|--------------------------------|
| <b>Permanent Monitoring Wells</b> |      |                                   |                          |                                |
| MW-13                             | 6/04 | 18.21                             | 8.96                     | 9.25                           |
|                                   | 2/05 | 18.21                             | 7.89                     | 10.32                          |
|                                   | 7/05 | 18.21                             | 8.04                     | 10.17                          |
| MW-13D                            | 2/05 | 18.16                             | 7.81                     | 10.35                          |
|                                   | 7/05 | 18.16                             | 7.97                     | 10.19                          |
| MW-14                             | 6/04 | 14.15                             | 5.16                     | 8.99                           |
|                                   | 2/05 | 14.15                             | 4.23                     | 9.92                           |
|                                   | 7/05 | 14.15                             | 4.53                     | 9.62                           |
| MW-15                             | 6/04 | 11.47                             | 2.94                     | 8.53                           |
|                                   | 2/05 | 11.47                             | 3.35                     | 8.12                           |
|                                   | 7/05 | 11.47                             | 3.49                     | 7.98                           |
| MW-15D                            | 2/05 | 11.21                             | 3.13                     | 8.08                           |
|                                   | 7/05 | 11.21                             | 3.28                     | 7.93                           |
| MW-16                             | 6/04 | 16.91                             | 7.60                     | 9.31                           |
|                                   | 2/05 | 16.91                             | 6.75                     | 10.16                          |
|                                   | 7/05 | 16.91                             | 6.97                     | 9.94                           |
| MW-16D                            | 2/05 | 16.43                             | 6.38                     | 10.05                          |
|                                   | 7/05 | 16.43                             | 6.62                     | 9.81                           |
| MW-20                             | 2/05 | 13.70                             | 7.92                     | 5.78                           |
|                                   | 7/05 | 13.70                             | 8.08                     | 5.62                           |
| MW-20D                            | 2/05 | 13.66                             | 7.90                     | 5.76                           |
|                                   | 7/05 | 13.66                             | 8.09                     | 5.57                           |
| <b>Permanent Piezometer</b>       |      |                                   |                          |                                |
| PZ-10                             | 6/04 | 12.82                             | 4.31                     | 8.51                           |
|                                   | 2/05 | 12.82                             | 3.43                     | 9.39                           |
|                                   | 7/05 | 12.82                             | 3.70                     | 9.12                           |

**Notes:**

ft amsl = feet above mean sea level.

ft msl = feet mean sea level.

ft btoc = feet below top of casing.

D denotes deep groundwater monitoring well.

**Table 2-9**  
**Summary of Historical Analytes Detected in Groundwater**  
**Remedial Action Plan - Former Ash Disposal Area**  
**Progress Energy- L.V. Sutton Steam Electric Plant**  
**Wilmington, North Carolina**

| Sample ID:<br>Date Collected:                               | RGs  | MW-13<br>06/21/04 | MW-13<br>02/02/05 | MW-13D<br>02/02/05 | MW-14<br>06/21/04 | MW-14<br>02/02/05 | MW-15<br>06/21/04 | MW-15<br>02/02/05 | MW-15D<br>02/02/05 | MW-16<br>06/21/04 | MW-16D<br>02/02/05 | MW-20<br>02/02/05 | MW-20D<br>02/02/05 |
|---|------|-------------------|-------------------|--------------------|-------------------|-------------------|-------------------|-------------------|--------------------|-------------------|--------------------|-------------------|--------------------|
| <b>Volatile Organic Compounds by USEPA Method 8260</b>      |      |                   |                   |                    |                   |                   |                   |                   |                    |                   |                    |                   |                    |
| 2-Hexanone  | --   | 2.5 U             | NS                | NS                 | 0.5 J             | NS                | 2.5 U [0.53 J]    | NS                | NS                 | 2.5 U             | NS                 | NS                | NS                 |
| Acetone   | 700  | 3.3               | NS                | NS                 | 6.6               | NS                | 5.5 [6.2]         | NS                | NS                 | 2.5 U             | NS                 | NS                | NS                 |
| Methylene Chloride  | 5    | 0.26 J            | NS                | NS                 | 0.25 J            | NS                | 0.24 J [0.13 J]   | NS                | NS                 | 0.19 J            | NS                 | NS                | NS                 |
| Toluene   | 1000 | 0.39 J            | NS                | NS                 | 0.38 J            | NS                | 0.56 [0.56]       | NS                | NS                 | 0.26 J            | NS                 | NS                | NS                 |
| <b>Semi-Volatile Organic Compounds by USEPA Method 8270</b> |      |                   |                   |                    |                   |                   |                   |                   |                    |                   |                    |                   |                    |
| None Detected   | --   | --                | NS                | NS                 | --                | NS                | --                | NS                | NS                 | --                | NS                 | NS                | NS                 |
| <b>HSL Metals by USEPA Method 6010</b>                      |      |                   |                   |                    |                   |                   |                   |                   |                    |                   |                    |                   |                    |
| Antimony  | --   | 1.9 U*            | NS                | NS                 | 1.9 U*            | NS                | 1.9 U* [2.1 B*]   | NS                | NS                 | 2.8 B*            | NS                 | NS                | NS                 |
| Arsenic   | 10   | 70.6 *            | 99.1 [103]        | 3.6 U              | 10.9 *            | 9.6 B             | 41.3* [44.1*]     | 44                | 3.6 U              | 3.5 B*            | 4.3 B              | 3.6 U [3.6 U]     | 3.6 U              |
| Chromium  | 50   | 0.8 U*            | 0.9 UJ [0.9 UJ]   | 0.9 UJ             | 1.1 B*            | 0.9 UJ            | 0.8 U* [2.4 B*]   | 0.9 UJ            | 0.9 UJ             | 0.8 U*            | 0.9 UJ             | 0.9 UJ [0.9 UJ]   | 0.9 UJ             |
| Copper  | 1000 | 1.3 U*            | 0.55 B [0.5 U]    | 0.5 U              | 1.3 U*            | 0.59 B            | 1.4 B* [1.3 U*]   | 0.5 U             | 0.5 U              | 1.4 B*            | 0.5 U              | 0.59 B [0.91 B]   | 1.1 B              |
| Nickel  | 100  | 0.7 U*            | NS                | NS                 | 0.72 B*           | NS                | 0.7 U* [0.70 U]   | NS                | NS                 | 0.93 B*           | NS                 | NS                | NS                 |
| Thallium  | --   | 3.2 UN*           | 10 UJ [6.2 UJ]    | 10 UJ              | 3.2 UN*           | 6.2 UJ            | 3.2 UN* [3.2 U]   | 10 UJ             | 6.2 UJ             | 4.7 BN*           | 8 UJ               | 6.2 UJ [6.2 UJ]   | 6.2 UJ             |
| Zinc  | 2100 | 10.2 B*           | 20 U [20 U]       | 20 U               | 11.2 B*           | 20 U              | 11.7 B* [11.7 B*] | 20 U              | 20 U               | 11.6 B*           | 35.3 U             | 24.3 U [26.2 U]   | 21.9 U             |

**Notes:**

All concentrations in micrograms per liter (ug/L).

RGs: Remediation Goals based on NCAC 2L Groundwater Standards.

HSL: Hazardous Substance List.

NS: Not analyzed for constituent.

Bold values indicates that the constituent was detected.

Shaded values indicates that the constituent exceeded the RGs.

**Organic Laboratory Qualifiers:**

U: This flag indicates the analyte was analyzed for but not detected.

J: This flag indicates an estimated value.

**Inorganic Laboratory Qualifiers:**

UJ: This flag indicates that the analyte was not detected and the detection limit is an estimated value.

U: This flag indicates the analyte was analyzed for but not detected.

B: The analyte was less than the contract required detection limit, but greater than or equal to the instrument detection limit

N: This flag indicates the sample spike recovery is outside of control limits.

\*: This flag is used for duplicate analysis when the sample and the sample duplicate results are not within the control limits.

**Table 2-10**  
**Summary of COCs Detected Above Unrestricted Use RGs and Proposed RGs**  
**Remedial Action Plan - Former Ash Disposal Area**  
**Progress Energy- L.V. Sutton Steam Electric Plant**  
**Wilmington, North Carolina**

| COC                                | NC 2L Standard       |                    |                                  | MW-13<br>06/21/04                      | MW-13<br>02/02/05                      | MW-14<br>06/21/04                       | MW-15<br>06/21/04                       | MW-15<br>02/02/05 | Comments  |
|------------------------------------|----------------------|--------------------|----------------------------------|--|--|---|---|-------------------|---|
| <b>Groundwater (ug/L)</b>          |                      |                    |                                  |  |  |   |   |                   |   |
| Arsenic                            | 10                   |                    |                                  | 70.6 *                                 | 99.1 [103]                             | 10.9 *                                  | 41.3 * [44.1*]                          | 44.0              | No As groundwater exceedances in MW-13D, MW-15D, MW-16, MW-16D, MW-20, and MW-20D. All Other constituents were below 2L Stds. |
| <b>Soil (mg/kg)</b>                |                      |                    |                                  |  |  |   |   |                   |   |
| COC                                | Unrestricted Use RGs | Industrial MSCCs   | USEPA Region 9 PRGs (Industrial) | SB-10 (3.5-4.0)<br>3:5-4.0<br>06/09/04 | SB-11 (4.0-4.5)<br>4.0-4.5<br>06/09/04 | SF-7 (0.5-1.0)<br>0.5 - 1.0<br>01/26/05 | SF-9 (0.5-1.0)<br>0.5 - 1.0<br>01/26/05 |                   | Comments  |
| Benzo(a)pyrene                     | 0.062                | 0.78               | 0.21                             | --                                     | 0.091 J [1 U]                          | --                                      | --                                      |                   | All other soil samples were below unrestricted use RGs or applicable criteria.  |
| Arsenic                            | 4.4                  | NA                 | 16 <sup>c</sup>                  | 13.3                                   | --                                     | --                                      | --                                      |                   |   |
| Thallium                           | 1.04                 | NA                 | 670                              | 2.0                                    | --                                     | --                                      | --                                      |                   |   |
| C9-C22 Aromatic Hydrocarbons (EPH) | 34 <sup>a</sup>      | 12264 <sup>a</sup> | NA                               | --                                     | --                                     | 120 J                                   | 33 J [44 J]                             |                   |   |

**Notes:**

<sup>a</sup> Remediation Goal based on most restrictive MSCC (soil-to-groundwater) established by the NCDENR UST Section (April 2001).

<sup>b</sup> No analytes were detected above the applicable criteria in surface-water samples (SW-1 & SW-2).

<sup>c</sup> = Industrial PRG for arsenic adjusted to 10<sup>-6</sup> cancer risk based on the rationale presented in Section 6.1.

<sup>d</sup> = Represents average concentration of COC detected in soil.

COC: Constituent of Concern.

ug/L: micrograms per liter.

mg/kg: milligrams per kilogram.

RGs: Remediation Goals for unrestricted use established by the NCDENR, Division of Waste Management, Inactive Hazardous Sites Branch (January 2005).

NC 2L Standard: Class GA groundwater standards published in 15A NCAC 2L .0202.

MSCC: Maximum Soil Contaminant Concentration established by the NCDENR UST Section (April 2001).

Region 9 PRGs: Preliminary Remediation Goals for industrial use established by USEPA Region 9 (October 2004).

NA = Not applicable.

EPH: Extractable Petroleum Hydrocarbon by Massachusetts Department of Environmental Protection Method.

Bold values indicates that the constituent exceeded the applicable RG.

D: Designates a deep monitoring well.

[ ]: Bracketed values are duplicate sample results.

( ): Ecological Screening Levels (ESL) base on USEPA Region 4 Division of Waste Management.

< >: Soil RG value.

**Organic Laboratory Qualifiers:**

U: This flag indicates the analyte was analyzed for but not detected.

J: This flag indicates an estimated value.

**Inorganic Laboratory Qualifiers:**

\*: This flag is used for duplicate analysis when the sample and the sample duplicate results are not within the control limits.

**Table 3-1**  
**Summary of Remedial Alternatives Comparative Analysis**  
**Remedial Action Plan - Former Ash Disposal Area**  
**Progress Energy - L.V. Sutton Steam Electric Plant**  
**Wilmington, North Carolina**

| REC Program Criteria Provided in Section .0306 (I)(A-H) |   | Alternative 1<br>MNA/ACs/LUR | Alternative 2<br>Capping | Alternative 3<br>Soil Excavation |
|---|---|------------------------------|--------------------------|----------------------------------|
| A   | Protective of Human Health & Environment            | +                            | +                        | +                                |
| B   | Compliance with Federal, State, & Local Regulations | +                            | +                        | +                                |
| C   | Long-term Effectiveness & Permanence                | +                            | +                        | +                                |
| D   | Reduction of toxicity, mobility, & volume           | +                            | ---                      | +                                |
| E   | Short-term effectiveness                            | +                            | 0                        | 0                                |
| F   | Implementability                                    | +                            | ---                      | ---                              |
| G   | Cost  | +                            | ---                      | ---                              |
| H   | Community Acceptance                                | +                            | +                        | 0                                |

**Notes:**

MNA = Monitored Natural Attenuation

ACs = Access Controls

LURs = Land Use Restrictions

+

-- = Does not meet the criterion.

0 = Questionable based on the definition of criteria provided in .0306 (I)(3).

\* = Primarily protective of human health.

\*\* = Effective provided cap is maintained over time.

\*\*\* = Mobility of COCs may be reduced.

Alternatives are ranked in order of preference.

**Table 3-2**  
**Remedial Alternatives Cost Analysis**  
**Remedial Action Plan - Former Ash Disposal Area**  
**Progress Energy - L.V. Sutton Steam Electric Plant**  
**Wilmington, North Carolina**

| <b>Remedial Alternative No. 1 - MNA/ACs/LURs</b> | <b>Estimated Cost</b> |
|--|-----------------------|
| 1.) AC Implementation Plan preparation           | \$ 10,000             |
| 2.) AC implementation                            | \$ 25,000             |
| 3.) LUR implementation                           | \$ 5,000              |
| 4.) MNA program - Year 1                         |                       |
| - Analytical (4 Qtrs.)                           | \$ 24,000             |
| - Labor (4 Qtrs.)                                | \$ 17,000             |
| - Data analysis & Reporting                      | \$ 35,000             |
| 5.) MNA program Years 2 - 6* (\$15,000 X 5 yrs.) | \$ 75,000             |
| 6.) Annual Inspection (\$2,400 x 6 years)        | \$ 12,000             |
| <b>Total</b>                                     | <b>\$ 203,000</b>     |
| <b>Remedial Alternative No. 2 - Capping</b>      |                       |
| 1.) Pre-implementation planning                  | \$ 30,000             |
| 2.) Clearing                                     | \$ 50,000             |
| 3.) Cap placement                                | \$ 6,000,000          |
| 4.) Transportation of cap materials              | \$ 6,000,000          |
| 5.) Field oversight                              | \$ 75,000             |
| 6.) Site restoration                             | \$ 75,000             |
| 7.) MNA program - Year 1                         |                       |
| - Analytical (4 Qtrs.)                           | \$ 24,000             |
| - Labor (4 Qtrs.)                                | \$ 17,000             |
| - Data analysis & Reporting                      | \$ 35,000             |
| 8.) MNA program Years 2 - 6* (\$15,000 X 5 yrs.) | \$ 75,000             |
| 9.) Reporting                                    | \$ 50,000             |
| <b>Total</b>                                     | <b>\$ 12,431,000</b>  |
| <b>Remedial Alternative No. 3 - Excavation</b>   |                       |
| 1.) Pre-implementation planning                  | \$ 40,000             |
| 2.) Clearing                                     | \$ 50,000             |
| 3.) Excavation and transportation                | \$ 12,100,000         |
| 4.) Post-excavation sampling                     | \$ 10,000             |
| 5.) Backfilling                                  | \$ 6,000,000          |
| 6.) Site restoration                             | \$ 75,000             |
| 7.) Field oversight                              | \$ 100,000            |
| 8.) MNA program - Year 1                         |                       |
| - Analytical (4 Qtrs.)                           | \$ 24,000             |
| - Labor (4 Qtrs.)                                | \$ 17,000             |
| - Data analysis & Reporting                      | \$ 35,000             |
| 9.) MNA program Years 2 - 6* (\$15,000 X 5 yrs.) | \$ 75,000             |
| 10.) Reporting                                   | \$ 50,000             |
| <b>Total</b>                                     | <b>\$ 18,576,000</b>  |

**Notes:**

\* = Assumes annual monitoring.

Costs are for general estimating purposes only.



**Table 4-1**  
**Historical Stabilized Field Parameter Measurements**  
**Remedial Action Plan - Former Ash Disposal Area**  
**Progress Energy - L.V. Sutton Steam Electric Plant**  
**Wilmington, North Carolina**

| Sample Designation | Date Collected | pH (Std. Units) | Specific Conductivity (μS/cm) | Temperature (°C) | Dissolved Oxygen (mg/L) | ORP (mV) | Turbidity (NTUs) |
|--------------------|----------------|-----------------|-------------------------------|------------------|-------------------------|----------|------------------|
| MW-13              | June-04        | 6.73            | 552                           | 22.60            | 0.32                    | -197     | 1.2              |
|                    | Feb-05         | 9.18            | 585                           | 16.11            | 0.40                    | 94       | 5.0              |
| MW-13D             | Feb-05         | 8.30            | 898                           | 18.88            | 0.32                    | 158      | 7.0              |
| MW-14              | Jun-04         | 6.48            | 582                           | 26.39            | 0.22                    | -181     | 5.0              |
|                    | Feb-05         | 9.65            | 360                           | 11.11            | 0.40                    | 110      | 9.0              |
| MW-15              | Jun-04         | 6.82            | 281                           | 24.20            | 2.09                    | -100     | 1.5              |
|                    | Feb-05         | 9.13            | 296                           | 13.88            | 0.31                    | 143      | 9.0              |
| MW-15D             | Feb-05         | 8.66            | 498                           | 18.33            | 0.29                    | 175      | 1.0              |
| MW-16              | Jun-04         | 6.44            | 195                           | 23.60            | 0.28                    | -125     | 3.4              |
|                    | Feb-05         | 8.45            | 180                           | 15.55            | 0.51                    | 107      | 9.0              |
| MW-16D             | Feb-05         | 6.68            | 528                           | 20.00            | 0.31                    | 252      | 0.0              |
| MW-20              | Feb-05         | 7.85            | 326                           | 17.27            | 0.28                    | 45       | 4.0              |
| MW-20D             | Feb-05         | 7.80            | 561                           | 17.05            | 0.55                    | 127      | 5.0              |

**Notes:**

Field parameter measurement collected utilizing an Horiba U-22 water quality meter.

ORP = Oxidation-reduction potential.

uS = Microsiemens.

°C = Degrees Celcius.

mg/L = Milligrams per liter.

mV = Millivolts.

NTU = Nephelometric turbidity units.

**Table 4-2**  
**Microbiological Community Data**  
**Remedial Action Plan - Former Ash Disposal Area**  
**Progress Energy - L.V. Sutton Steam Electric Plant**  
**Wilmington, North Carolina**

| Sample Designation  | Sample Date | Present or Absent | Dominant Bacteria       |
|---|-------------|-------------------|-------------------------|
| <b>Heterotrophic Aerobic Bacteria (HAB) Results<sup>a</sup></b> |             |                   |                         |
| MW-13D  | 2/2/05      | Present           | Aerobic                 |
| MW-15D  | 2/2/05      | Present           | Aerobic                 |
| MW-16D  | 2/2/05      | Present           | Aerobic                 |
| MW-20   | 2/4/05      | Present           | Aerobic                 |
| MW-20D  | 2/4/05      | Present           | Aerobic                 |
| <b>Iron Related Bacteria (IRB) Results<sup>a</sup></b>          |             |                   |                         |
| MW-13D  | 2/2/05      | Present           | Pseudomonads & Enterics |
| MW-15D  | 2/2/05      | Present           | Pseudomonads & Enterics |
| MW-16D  | 2/2/05      | Present           | IRB                     |
| MW-20   | 2/4/05      | Present           | Pseudomonads & Enterics |
| MW-20D  | 2/4/05      | Present           | IRB                     |

Notes:

Aerobic: Characterized by the presence of free oxygen.

IRB: Iron Related Bacteria.

<sup>a</sup> All samples collected per manufacturer specifications.

**Table 4-3**  
**Summary of Ferrous Iron Data - July 2005**  
**Remedial Investigation - Former Ash Disposal Area**  
**Progress Energy L.V. Sutton Electric Steam Plant**  
**Wilmington, North Carolina**

| Sample Designation | Ferrous Iron (mg/l) |
|--------------------|---------------------|
| MW-13              | 3.6                 |
| MW-13D             | 0.5                 |
| MW-14              | 4.6                 |
| MW-15              | 2.8                 |
| MW-15D             | 0.2                 |
| MW-16              | 0.6                 |
| MW-16D             | 0.2                 |
| MW-20              | 3.4                 |
| MW-20D             | 0.2                 |

**Notes:**

Data collected utilizing a field HACH kit for ferrous iron.

mg/L = Milligrams per liter.

D = designates a deep well

Table 5-1  
Summary of Proposed Sampling Program for the Remedial Action  
Progress Energy Carolinas, Inc.  
L.V. Sutton Steam Electric Plant  
Remedial Action Plan - Former Ash Disposal Area  
Wilmington, North Carolina

| Sample ID                     | Arsenic (total) | Arsenic (III)* | Arsenic (V)* | Iron (Dissolved) <sup>a</sup> | Organic Carbon (Dissolved) <sup>a</sup> | Sulfate | Sulfide | pH <sup>b</sup> | DO <sup>b</sup> | ORP <sup>b</sup> | Specific Conductivity <sup>b</sup> | Temperature <sup>b</sup> | Sample Method               | Laboratory Detection Limits  | Notes  |
|-------------------------------|-----------------|----------------|--------------|-------------------------------|---|---------|---------|-----------------|-----------------|------------------|------------------------------------|--------------------------|-----------------------------|--|--|
| Groundwater Samples           |                 |                |              |                               |   |         |         |                 |                 |                  |                                    |                          |                             |  |  |
| MW-13                         | 1               | 1              | 1            | 1                             | 1                                       | 1       | 1       | X               | X               | X                | X                                  | X                        | Low Flow - peristaltic pump | Must achieve sample quantitation limits less than or equal to the Subchapter 2L groundwater standards or the lowest that can be achieved using U.S. EPA method detection limits, per REC Guidance. | Quarterly Monitoring of Natural Attenuation Parameters |
| MW-14                         | 1               | 1              | 1            | 1                             | 1                                       | 1       | 1       | X               | X               | X                | X                                  | X                        | Low Flow - peristaltic pump |  | Quarterly Monitoring of Natural Attenuation Parameters |
| MW-15                         | 1               | 1              | 1            | 1                             | 1                                       | 1       | 1       | X               | X               | X                | X                                  | X                        | Low Flow - peristaltic pump |  | Quarterly Monitoring of Natural Attenuation Parameters |
| MW-16                         | 1               | 1              | 1            | 1                             | 1                                       | 1       | 1       | X               | X               | X                | X                                  | X                        | Low Flow - peristaltic pump |  | Quarterly Monitoring of Natural Attenuation Parameters |
| MW-20                         | 1               | 1              | 1            | 1                             | 1                                       | 1       | 1       | X               | X               | X                | X                                  | X                        | Low Flow - peristaltic pump |  | Quarterly Monitoring of Natural Attenuation Parameters |
| MW-13D                        | 1               | 1              | 1            | 1                             | 1                                       | 1       | 1       | X               | X               | X                | X                                  | X                        | Low Flow - peristaltic pump |  | Quarterly Monitoring of Natural Attenuation Parameters |
| MW-15D                        | 1               | 1              | 1            | 1                             | 1                                       | 1       | 1       | X               | X               | X                | X                                  | X                        | Low Flow - peristaltic pump |  | Quarterly Monitoring of Natural Attenuation Parameters |
| MW-16D                        | 1               | 1              | 1            | 1                             | 1                                       | 1       | 1       | X               | X               | X                | X                                  | X                        | Low Flow - peristaltic pump |  | Quarterly Monitoring of Natural Attenuation Parameters |
| MW-20D                        | 1               | 1              | 1            | 1                             | 1                                       | 1       | 1       | X               | X               | X                | X                                  | X                        | Low Flow - peristaltic pump |  | Quarterly Monitoring of Natural Attenuation Parameters |
| Groundwater QA/QC Samples     |                 |                |              |                               |   |         |         |                 |                 |                  |                                    |                          |                             |  |  |
| Blind Field Duplicate         | 2               | 2              | 2            | 2                             | 2                                       | 2       | 2       |                 |                 |                  |                                    |                          | Low Flow - peristaltic pump | Must achieve sample quantitation limits less than or equal to the Subchapter 2L groundwater standards or the lowest that can be achieved using U.S. EPA method detection limits, per REC Guidance. | Per REC Guidance                                       |
| Field Equipment Rinsate Blank | 1               | 1              | 1            | 1                             | 1                                       | 1       | 1       |                 |                 |                  |                                    |                          | Low Flow - peristaltic pump |  | Per EISOPQAM (e.g., peristaltic pump)                  |
| MS                            | 1               | 1              | 1            | 1                             | 1                                       | 1       | 1       |                 |                 |                  |                                    |                          | Low Flow - peristaltic pump |  | Laboratory QA/QC                                       |
| MSD                           | 1               | 1              | 1            | 1                             | 1                                       | 1       | 1       |                 |                 |                  |                                    |                          | Low Flow - peristaltic pump |  | Laboratory QA/QC                                       |
| Total Groundwater Samples     | 14              | 14             | 14           | 14                            | 14                                      | 14      | 14      |                 |                 |                  |                                    |                          |                             |  |  |

Notes:

<sup>a</sup> Dissolved samples will be collected with a 0.45 micron filter.

<sup>b</sup> Field parameters will be collected with an Horiba U-22 (or equivalent) with a flow-through-cell assembly.

\* Arsenic(III) and Arsenic(V) analysis will be contingent based on the total arsenic analytical results.

EISOPQAM: U.S. Environmental Protection Agency Environmental Investigations Standard Operating Procedures and Quality Assurance Manual (USEPA, 2001).

REC: Registered Environmental Consultant Implementation Guidance, dated August 2004.

RG: Remediation Goals (see REC Guidance, dated August 2004).

QA/QC: quality assurance/quality control.

MS/MSD: matrix spike/matrix spike duplicate.

DO: Dissolved oxygen.

ORP: Oxidation-Reduction Potential.

Table 5-2  
Summary of Analytical Methods, Sample Containers, Preservation, and Hold Times  
Progress Energy L.V. Sutton Steam Electric Plant  
Remedial Action Plan - FADA  
Wilmington, North Carolina

| Analysis                                | Method  | Sample Container    | Volume     | Preservation   | Hold Time            |
|---|---|---------------------|------------|--|----------------------|
| <b>Groundwater Samples</b>              |   |                     |            |  |                      |
| Arsenic (total)                         | USEPA SW-846 6010B w/ 3030C Preparation Method <sup>1</sup> | Polyethylene Bottle | (1) 500 ml | HNO <sub>3</sub> (pH<2), cool to 4° with ice         | 180 days             |
| Arsenic (III) & (V) <sup>2</sup>        | Modified 7063 Method  | Polyethylene Bottle | (1) Liter  | HCL  | 28 days <sup>4</sup> |
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| Sulfate                                 | USEPA SW-846 300  | Polyethylene Bottle | (1) 125 ml | cool to 4° with ice                                  | 28 days              |
| Sulfide                                 | USEPA SW-846 376.1  | Polyethylene Bottle | (1) Liter  | NaOH +Zn Acetate, cool to 4° with ice                | 7 days               |
| Organic Carbon (dissolved) <sup>3</sup> | USEPA SW-846 415.1  | vials               | (2) 40 mls | H <sub>2</sub> SO <sub>4</sub> , cool to 4° with ice | 28 days              |

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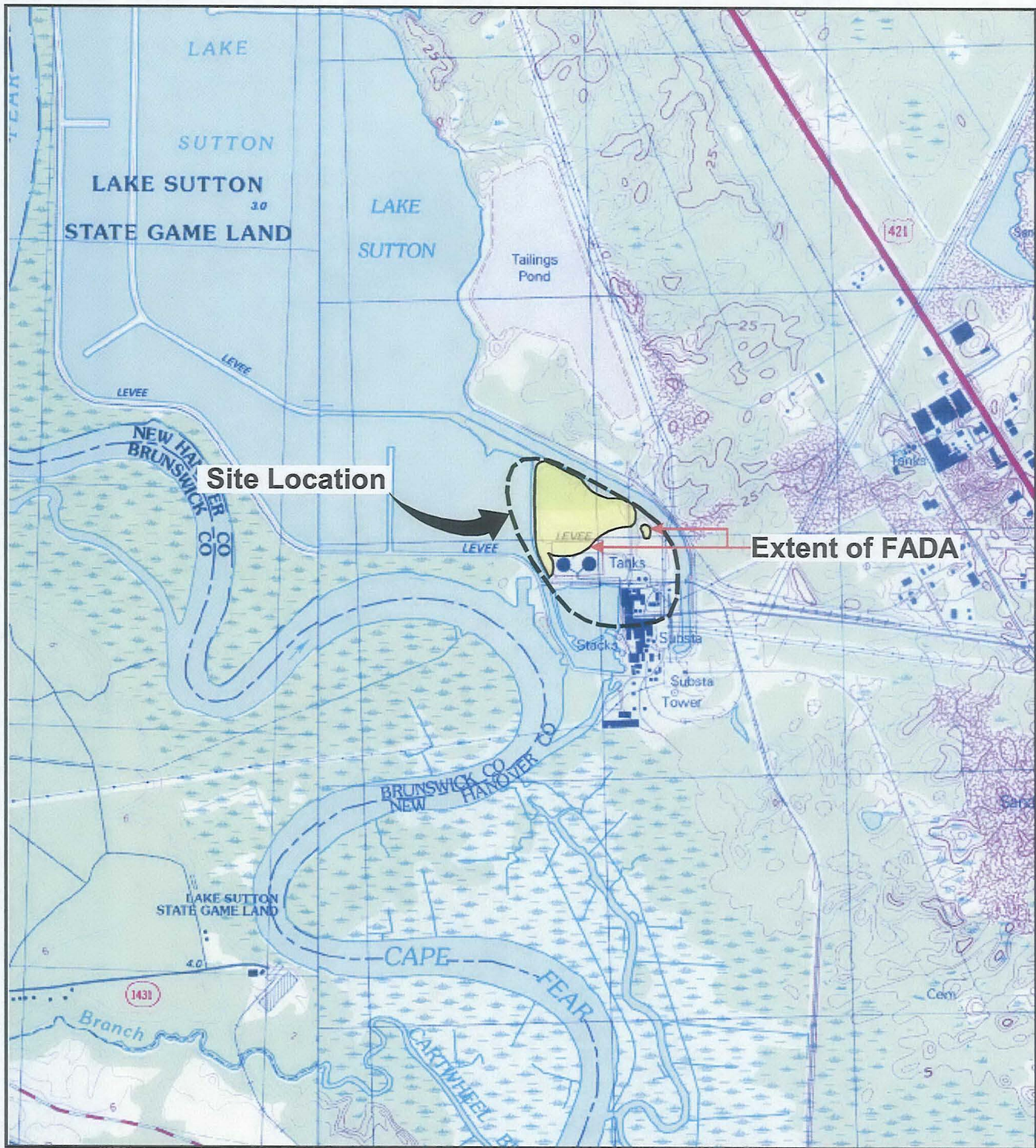
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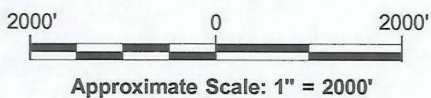
## *Figures*

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REFERENCE: BASE MAP USGS 7.5 MIN. QUADS., CASTLE HAYNE, NC, 1997, AND LELAND, NC, 1997.



Area Location

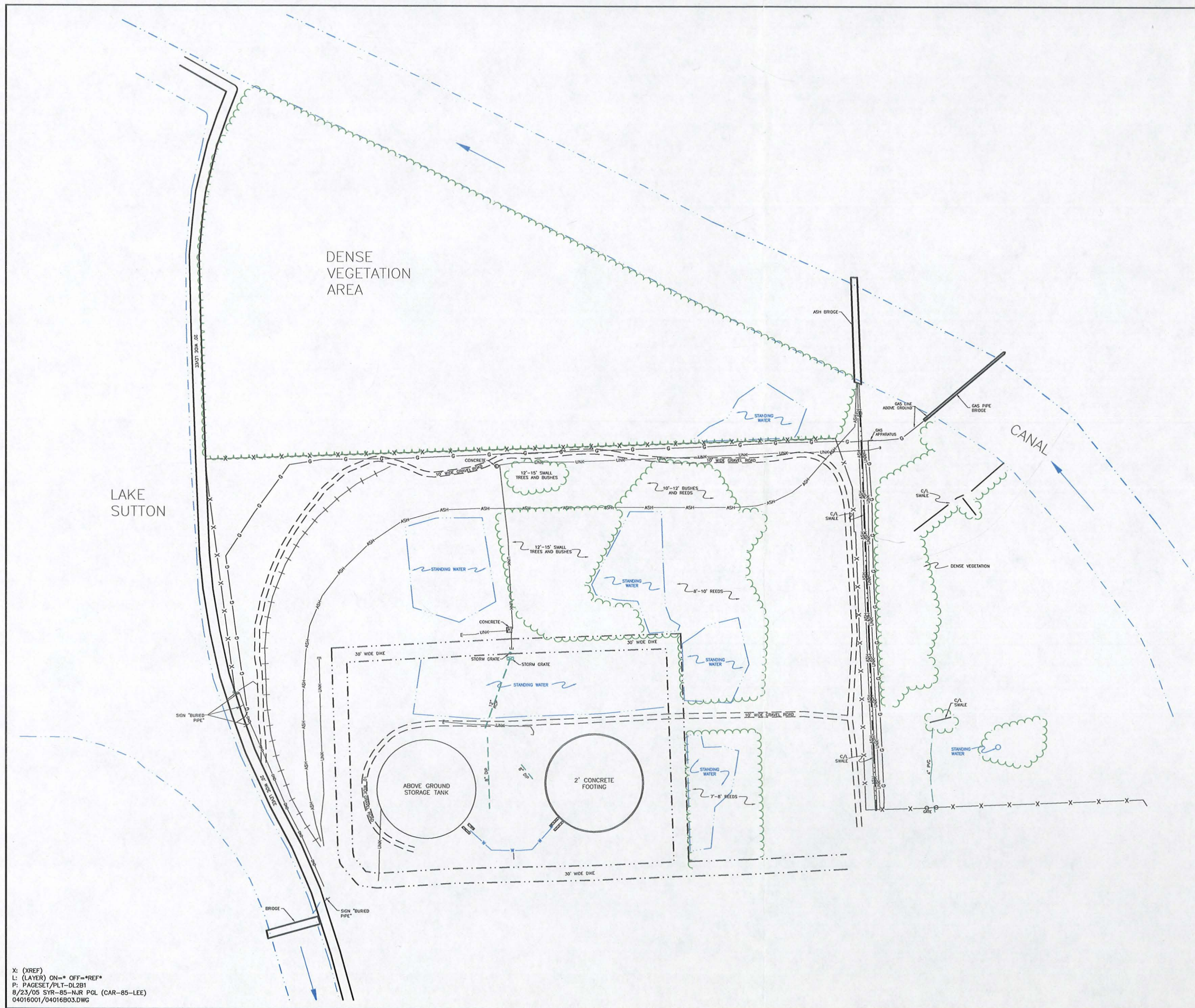
PROGRESS ENERGY  
L. V. SUTTON STEAM ELECTRIC PLANT, WILMINGTON, N.C.  
REMEDIAL ACTION PLAN -  
FORMER ASH DISPOSAL AREA

## SITE LOCATION MAP

**BBL**  
BLASLAND, BOUCK & LEE, INC.  
engineers, scientists, economists

FIGURE  
1-1



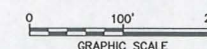


# LINE LEGEND

|                           |                      |
|---------------------------|----------------------|
| — X — X — X — X —         | FENCE LINE           |
| — G — G — G — G —         | GAS LINE             |
| — ASH — ASH — ASH — ASH — | ASH LINE             |
| — GND — GND — GND — GND — | GROUND WIRE LINE     |
| — UND — UND — UND — UND — | UNDERGROUND ELECTRIC |
| — W — W — W — W —         | WATER LINE           |
| — D — D — D — D —         | DIKE LINE            |
| — S — S — S — S —         | STANDING WATER       |
| — ST — ST — ST — ST —     | STORM PIPE           |
| — R — R — R — R —         | RAILROAD TRACK (C/L) |
| — T — T — T — T —         | TREE/VEGETATION LINE |
| — U — U — U — U —         | UNKNOWN LINE         |
| — GR — GR — GR — GR —     | GRAVEL ROAD          |

## NOTE:

1. SOURCE: SURVEY PROVIDED BY 'TAYLOR, WISEMAN & TAYLOR', 3500 Regency Parkway, Suite H, Cary N.C., 919-297-0085, (PROJECT NO. 70488.0005) DATED JUNE 23, 2004. REVISIONS MADE ON JULY 7, 2004 AND FEB. 23, 2005.



PROGRESS ENERGY  
L.V. SUTTON STEAM ELECTRIC PLANT, WILMINGTON, N.C.  
REMEDIAL ACTION PLAN

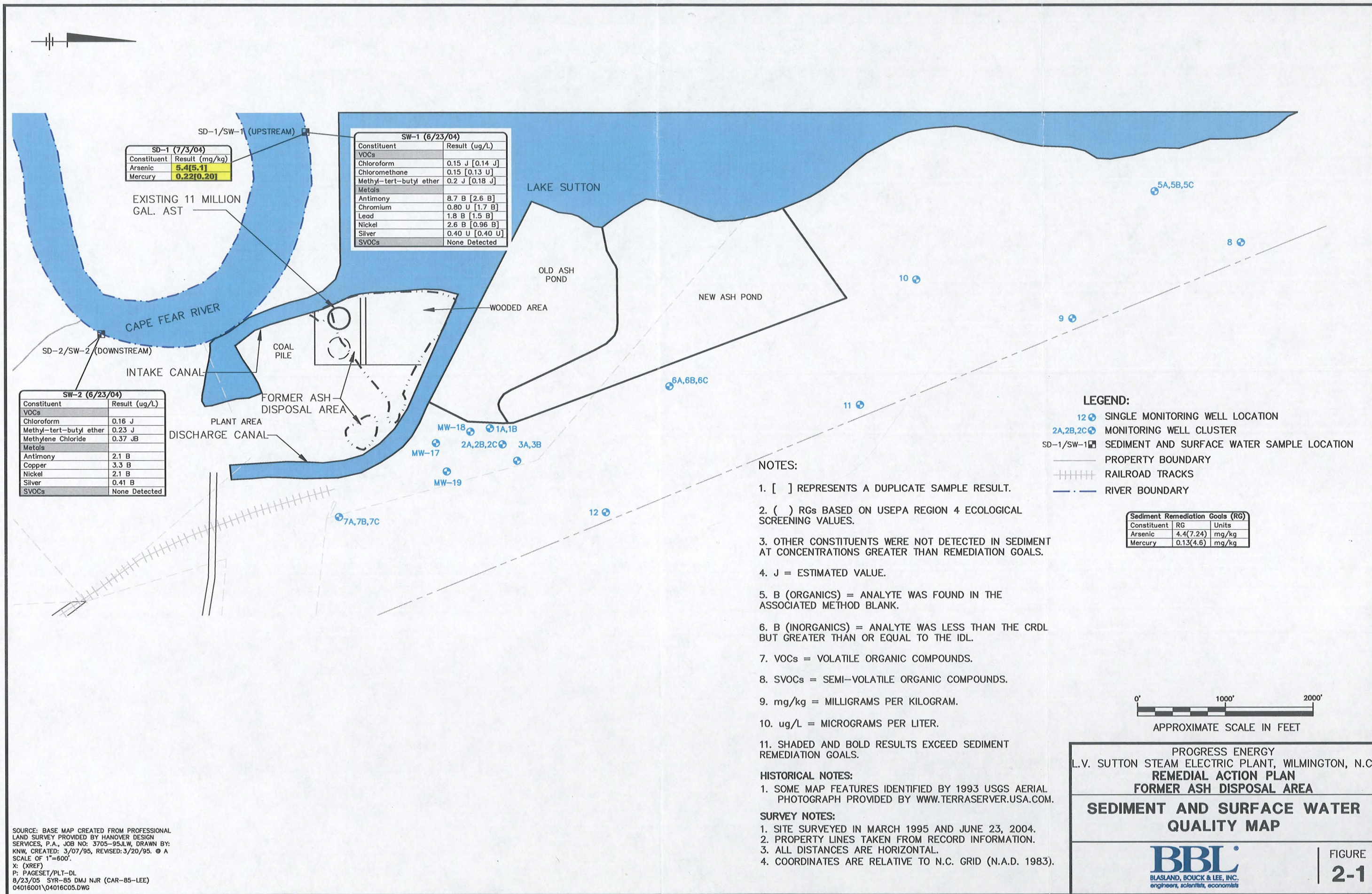
## SITE PLAN

**BBL**  
BLASLAND, BOUCK & LEE, INC.  
engineers, scientists, economists

FIGURE  
**1-2**

X: (XREF)  
L: (LAYER) ON=\* OFF=\*REF\*  
P: PAGESET/PLT-DL2B1  
8/23/05 SYR-85-NUR PGL (CAR-85-LEE)  
04016001/04016B03.DWG





| SD-1 (7/3/04) |                |
|---------------|----------------|
| Constituent   | Result (mg/kg) |
| Arsenic       | 5.4(5.1)       |
| Mercury       | 0.22(0.20)     |

| SW-1 (6/23/04)          |                 |
|-------------------------|-----------------|
| Constituent             | Result (ug/L)   |
| VOCs                    |                 |
| Chloroform              | 0.15 J [0.14 J] |
| Chloromethane           | 0.15 [0.13 U]   |
| Methyl-tert-butyl ether | 0.2 J [0.18 J]  |
| Metals                  |                 |
| Antimony                | 8.7 B [2.6 B]   |
| Chromium                | 0.80 U [1.7 B]  |
| Lead                    | 1.8 B [1.5 B]   |
| Nickel                  | 2.6 B [0.96 B]  |
| Silver                  | 0.40 U [0.40 U] |
| SVOCs                   | None Detected   |

| SW-2 (6/23/04)          |               |
|-------------------------|---------------|
| Constituent             | Result (ug/L) |
| VOCs                    |               |
| Chloroform              | 0.16 J        |
| Methyl-tert-butyl ether | 0.23 J        |
| Methylene Chloride      | 0.37 JB       |
| Metals                  |               |
| Antimony                | 2.1 B         |
| Copper                  | 3.3 B         |
| Nickel                  | 2.1 B         |
| Silver                  | 0.41 B        |
| SVOCs                   | None Detected |

- LEGEND:**
- 12 SINGLE MONITORING WELL LOCATION
  - 2A,2B,2C MONITORING WELL CLUSTER
  - SD-1/SW-1 SEDIMENT AND SURFACE WATER SAMPLE LOCATION
  - PROPERTY BOUNDARY
  - RAILROAD TRACKS
  - RIVER BOUNDARY

| Sediment Remediation Goals (RG) |           |       |
|---------------------------------|-----------|-------|
| Constituent                     | RG        | Units |
| Arsenic                         | 4.4(7.24) | mg/kg |
| Mercury                         | 0.13(4.6) | mg/kg |

- NOTES:**
- [ ] REPRESENTS A DUPLICATE SAMPLE RESULT.
  - ( ) RGs BASED ON USEPA REGION 4 ECOLOGICAL SCREENING VALUES.
  - OTHER CONSTITUENTS WERE NOT DETECTED IN SEDIMENT AT CONCENTRATIONS GREATER THAN REMEDIATION GOALS.
  - J = ESTIMATED VALUE.
  - B (ORGANICS) = ANALYTE WAS FOUND IN THE ASSOCIATED METHOD BLANK.
  - B (INORGANICS) = ANALYTE WAS LESS THAN THE CRDL BUT GREATER THAN OR EQUAL TO THE IDL.
  - VOCs = VOLATILE ORGANIC COMPOUNDS.
  - SVOCs = SEMI-VOLATILE ORGANIC COMPOUNDS.
  - mg/kg = MILLIGRAMS PER KILOGRAM.
  - ug/L = MICROGRAMS PER LITER.
  - SHADED AND BOLD RESULTS EXCEED SEDIMENT REMEDIATION GOALS.

- HISTORICAL NOTES:**
- SOME MAP FEATURES IDENTIFIED BY 1993 USGS AERIAL PHOTOGRAPH PROVIDED BY WWW.TERRASERVER.USA.COM.
- SURVEY NOTES:**
- SITE SURVEYED IN MARCH 1995 AND JUNE 23, 2004.
  - PROPERTY LINES TAKEN FROM RECORD INFORMATION.
  - ALL DISTANCES ARE HORIZONTAL.
  - COORDINATES ARE RELATIVE TO N.C. GRID (N.A.D. 1983).

SOURCE: BASE MAP CREATED FROM PROFESSIONAL LAND SURVEY PROVIDED BY HANOVER DESIGN SERVICES, P.A., JOB NO: 3705-95JLW, DRAWN BY: KNW, CREATED: 3/07/95, REVISED: 3/20/95. © A SCALE OF 1"=600'.  
X: (XREF)  
P: PAGESET/PLT-DL  
8/23/05 SYR-85 DMJ NJR (CAR-85-LEE)  
04016001\04016005.DWG

PROGRESS ENERGY  
L.V. SUTTON STEAM ELECTRIC PLANT, WILMINGTON, N.C.  
**REMEDIAL ACTION PLAN**  
**FORMER ASH DISPOSAL AREA**

**SEDIMENT AND SURFACE WATER QUALITY MAP**

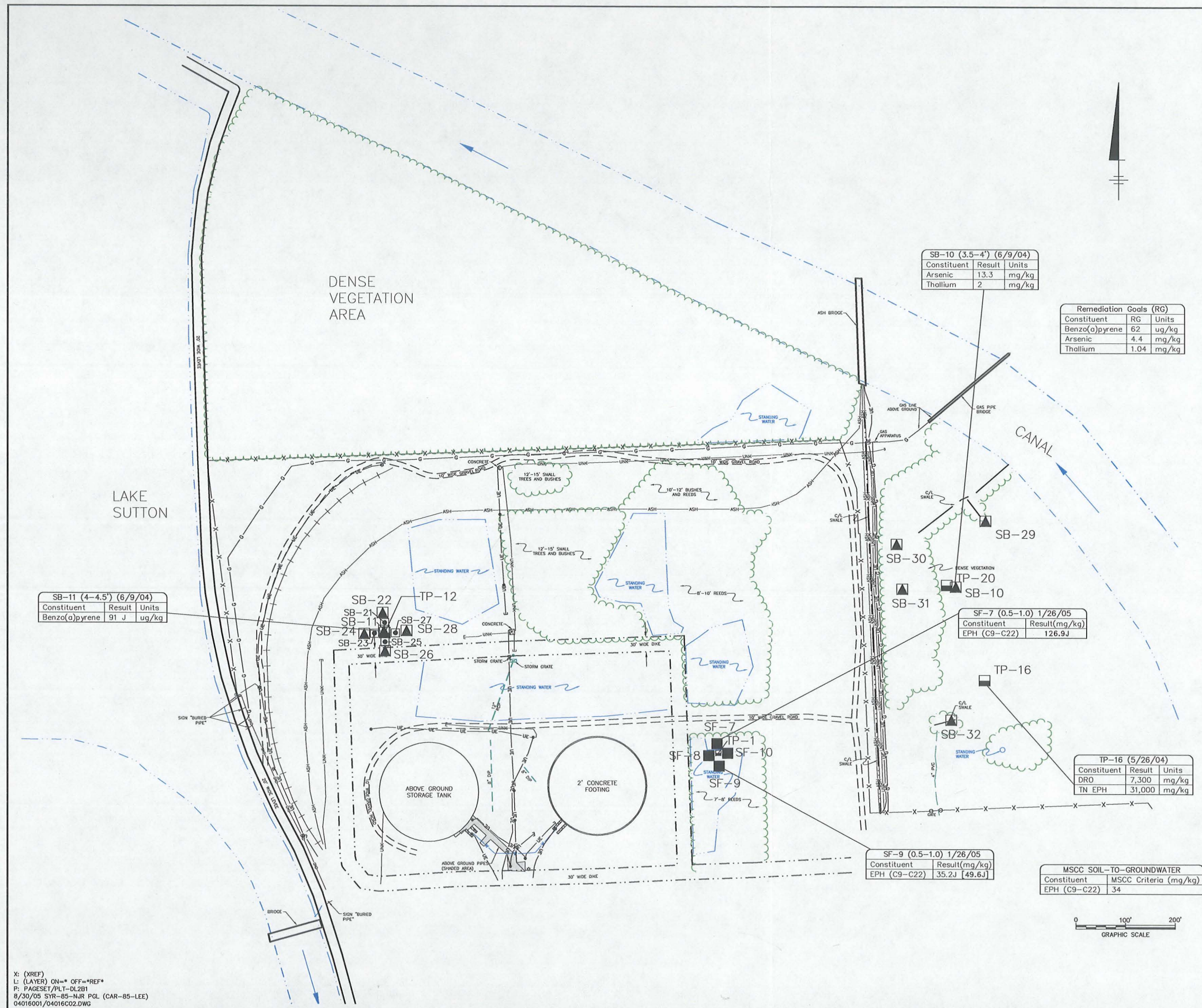
**BBL**  
BLASLAND, BOUCK & LEE, INC.  
engineers, scientists, economists

FIGURE  
**2-1**









# SYMBOL LEGEND

- PHASE I RI TEST PIT LOCATION WHERE PETROLEUM HYDROCARBONS WERE OBSERVED
- PHASE II RI SOIL BORING LOCATION
- PHASE II RI BORING LOCATION WITH SOIL SAMPLE
- PHASE II RI SURFACE SOIL SAMPLE LOCATION
- UTILITY RISER
- LIGHT POLE

## LINE LEGEND

- FENCE LINE
- GAS LINE
- ASH LINE
- GROUND WIRE LINE
- UNDERGROUND ELECTRIC
- WATER LINE
- DIKE LINE
- STANDING WATER
- STORM PIPE
- RAILROAD TRACK (C/L)
- TREE/VEGETATION LINE
- UNKNOWN LINE
- GRAVEL ROAD

## NOTES:

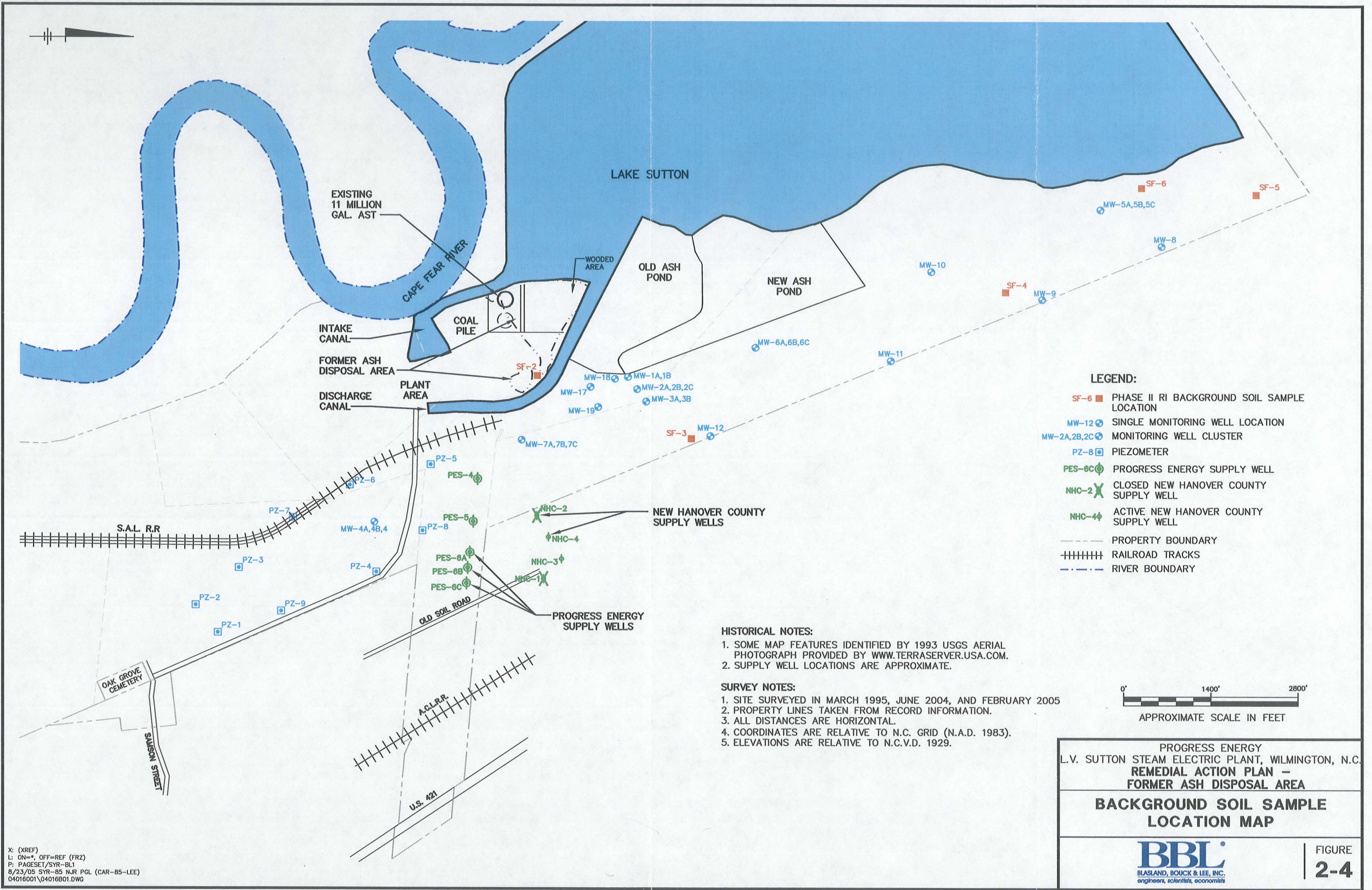
- SOURCE: SURVEY PROVIDED BY 'TAYLOR, WISEMAN & TAYLOR', 3500 Regency Parkway, Suite H, Cary N.C., 919-297-0085, (PROJECT NO. 70488.0005) DATED JUNE 23, 2004. REVISIONS MADE ON JULY 7, 2004 AND FEB. 23, 2005.
- J = ESTIMATED VALUE.
- OTHER CONSTITUENTS WERE NOT IDENTIFIED IN SOIL AT CONCENTRATIONS GREATER THAN MSCCs.
- [ ] = BRACKETED VALUE IS A DUPLICATE RESULT.
- EPH = EXTRACTABLE PETROLEUM HYDROCARBON BY MADEP METHOD.
- MADEP = MASSACHUSETTS DEPARTMENT OF ENVIRONMENTAL PROTECTION.
- MSCC = MAXIMUM SOIL CONTAMINANT CONCENTRATION, NCDENR 2001.
- mg/kg = MILLIGRAM PER KILOGRAM.
- BOLDED VALUES INDICATE THAT THE CONSTITUENT EXCEEDED THE MSCC SOIL-TO-GROUNDWATER CRITERIA.

## PROGRESS ENERGY L.V. SUTTON STEAM ELECTRIC PLANT, WILMINGTON, N.C. REMEDIAL ACTION PLAN

## PHASE I AND II REMEDIAL INVESTIGATION SOIL SAMPLING RESULTS - FORMER ASH DISPOSAL AREA





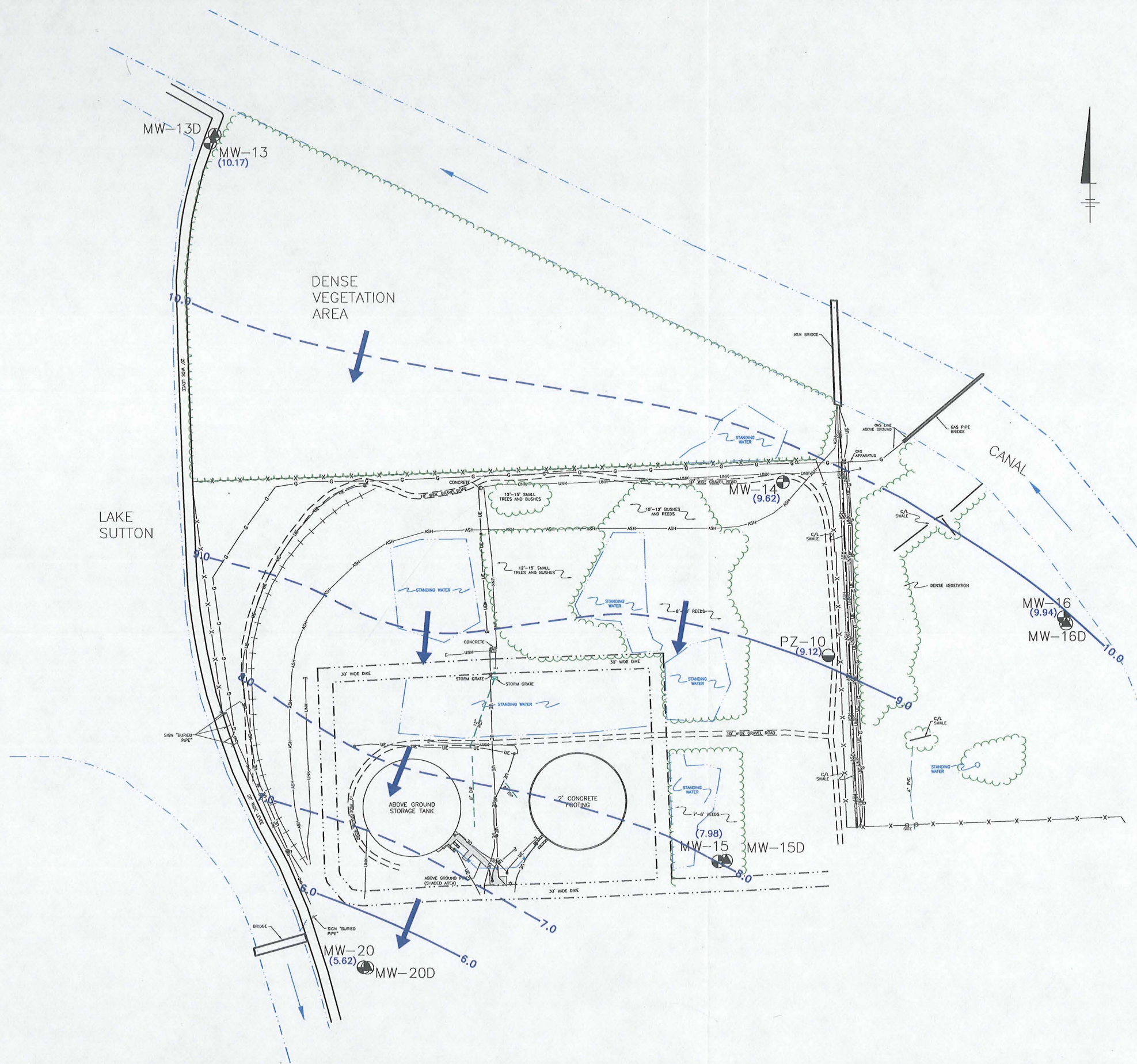


X: (XREF)  
L: ON=\*, OFF=REF (FRZ)  
P: PAGESET/SYR-BL1  
8/23/05 SYR-85 NJR PGL (CAR-85-LEE)  
04016001\04016B01.DWG









### SYMBOL LEGEND

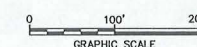
- ⊙ EXISTING DEEP MONITORING WELL
- ⊕ EXISTING SHALLOW MONITORING WELL
- PERMANENT PIEZOMETER
- UTILITY RISER
- ☆ LIGHT POLE
- (10.17) GROUNDWATER ELEVATION
- 9.0 — GROUNDWATER ELEVATION CONTOUR LINE (DASHED WHERE INFERRED). CONTOUR INTERVAL = 1.0 FT.
- ← DIRECTION OF GROUNDWATER FLOW

### LINE LEGEND

- X—X—X—X— FENCE LINE
- G—G—G—G— GAS LINE
- ASH—ASH—ASH—ASH— ASH LINE
- GND—GND—GND—GND— GROUND WIRE LINE
- UE—UE—UE—UE— UNDERGROUND ELECTRIC
- W—W—W—W— WATER LINE
- — — — — DIKE LINE
- — — — — STANDING WATER
- — — — — STORM PIPE
- +++++ RAILROAD TRACK (C/L)
- — — — — TREE/VEGETATION LINE
- UNK—UNK—UNK—UNK— UNKNOWN LINE
- — — — — GRAVEL ROAD

### NOTE:

1. SOURCE: SURVEY PROVIDED BY 'TAYLOR, WISEMAN & TAYLOR', 3500 Regency Parkway, Suite H, Cary N.C., 919-297-0085, (PROJECT NO. 70488.0005) DATED JUNE 23, 2004. REVISIONS MADE ON JULY 7, 2004 AND FEB. 23, 2005.



X: NONE  
L: ON= OFF=REF\* (FRZ)  
P: PAGESET/PLT-DL2B1  
8/23/05 (CAR-B5-LEE)  
04016001/04016W04.DWG

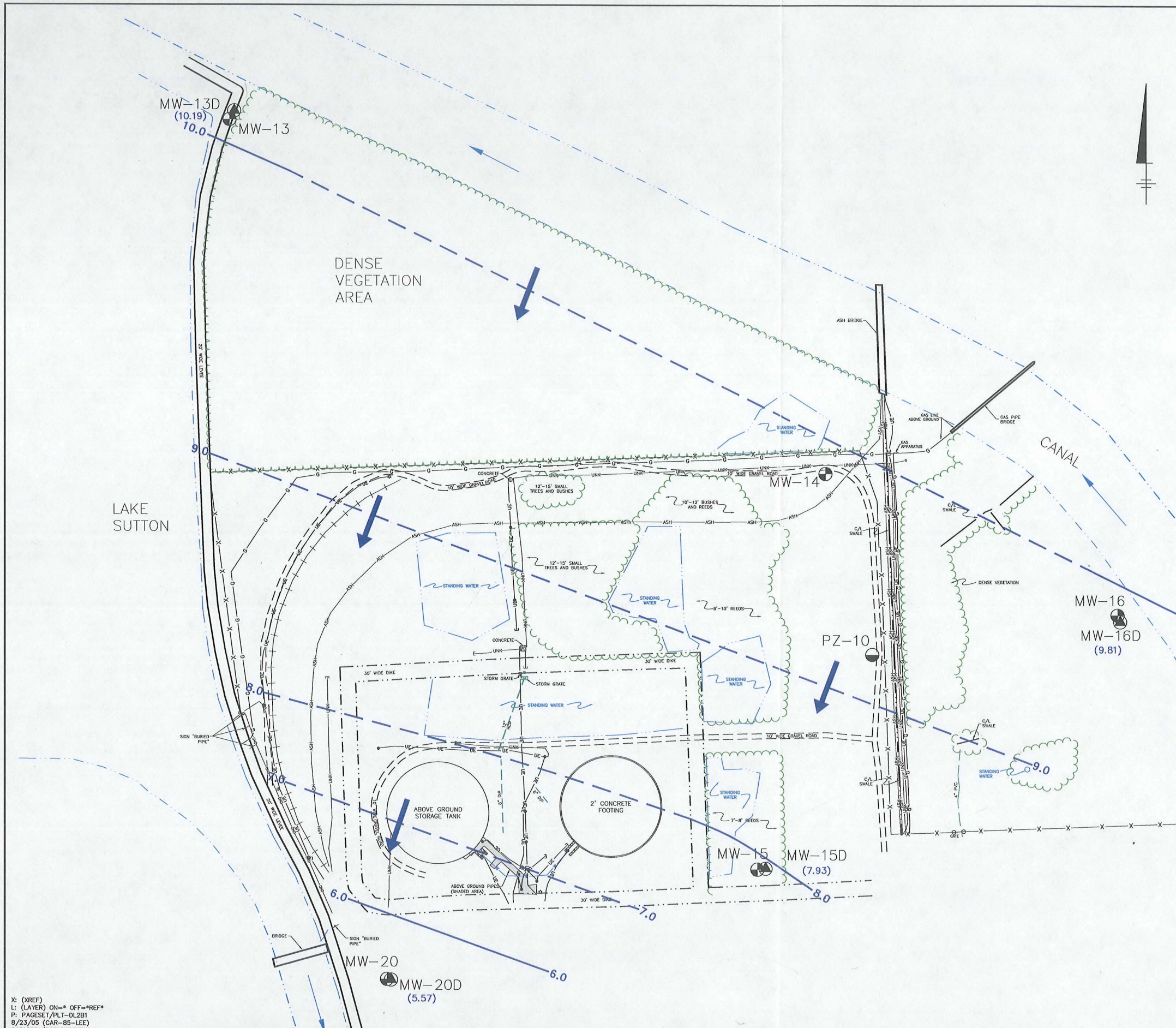
PROGRESS ENERGY  
L.V. SUTTON STEAM ELECTRIC PLANT, WILMINGTON, N.C.  
REMEDIAL ACTION PLAN

SHALLOW GROUNDWATER  
POTENTIOMETRIC SURFACE MAP -  
FORMER ASH DISPOSAL AREA -  
JULY 27, 2005

**BBL**  
BLASLAND, BOUCK & LEE, INC.  
engineers, scientists, economists

FIGURE  
**2-6**





### SYMBOL LEGEND

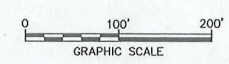
- ⊙ EXISTING DEEP MONITORING WELL
- ⊕ EXISTING SHALLOW MONITORING WELL
- PERMANENT PIEZOMETER
- UTILITY RISER
- ☆ LIGHT POLE
- (10.19) GROUNDWATER ELEVATION
- 9.0 — GROUNDWATER ELEVATION CONTOUR LINE (DASHED WHERE INFERRED). CONTOUR INTERVAL = 1.0 FT.
- ← DIRECTION OF GROUNDWATER FLOW

### LINE LEGEND

- X-X-X-X- FENCE LINE
- G-G- GAS LINE
- ASH-ASH- ASH LINE
- GND-GND- GROUND WIRE LINE
- UE-UE- UNDERGROUND ELECTRIC
- W-W- WATER LINE
- - - DIKE LINE
- - - - - STANDING WATER
- - - - - STORM PIPE
- +++++ RAILROAD TRACK (C/L)
- - - - - TREE/VEGETATION LINE
- UNK-UNK- UNKNOWN LINE
- - - - - GRAVEL ROAD

### NOTE:

1. SOURCE: SURVEY PROVIDED BY 'TAYLOR, WISEMAN & TAYLOR', 3500 Regency Parkway, Suite H, Cary N.C., 919-297-0085, (PROJECT NO. 70488.0005) DATED JUNE 23, 2004. REVISIONS MADE ON JULY 7, 2004 AND FEB. 23, 2005.



X: (KREF)  
L: (LAYER) ON= OFF=REF\*  
P: PAGESET/PLT-DL201  
8/23/05 (CAR-B5-LEE)  
04016001/04016W03.DWG

**PROGRESS ENERGY**  
L.V. SUTTON STEAM ELECTRIC PLANT, WILMINGTON, N.C.  
**REMEDIAL ACTION PLAN**

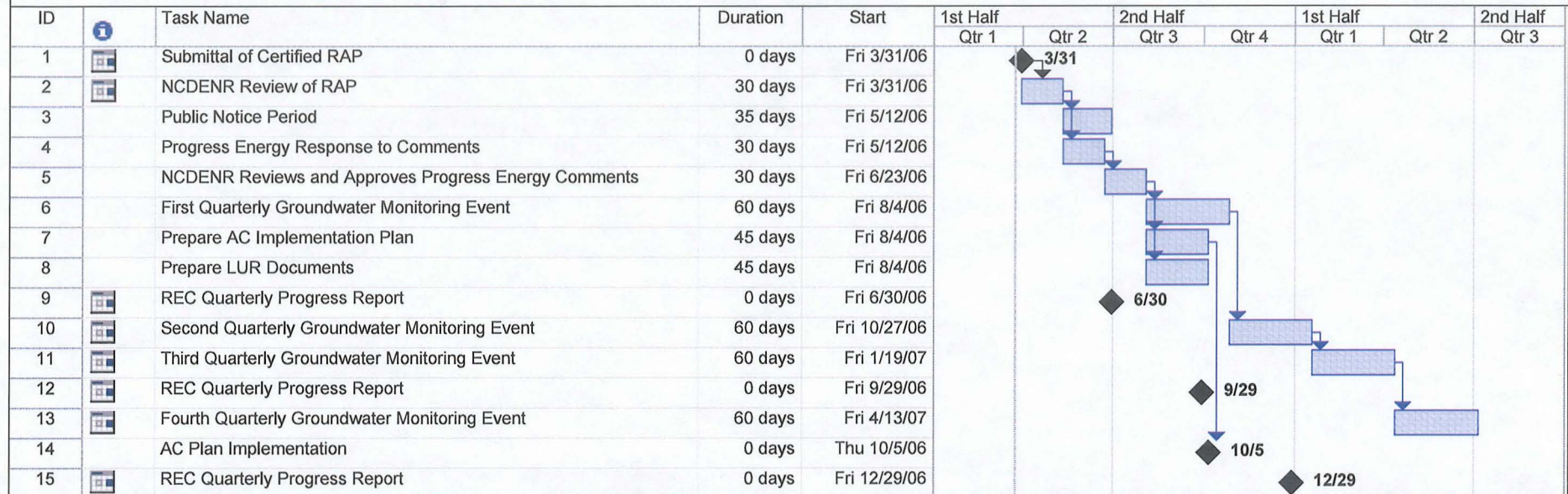
**DEEP GROUNDWATER**  
**POTENTIOMETRIC SURFACE MAP -**  
**FORMER ASH DISPOSAL AREA -**  
**JULY 27, 2005**

FIGURE

2-7



**Figure 5-1**  
**RAP Implementation Schedule**  
**Progress Energy Carolinas, Inc.**  
**L.V. Sutton Electric Steam Plant**  
**Wilmington, NC**



|          |  |                 |  |                    |  |
|----------|--|-----------------|--|--------------------|--|
| Task     |  | Milestone       |  | External Tasks     |  |
| Split    |  | Summary         |  | External Milestone |  |
| Progress |  | Project Summary |  | Deadline           |  |

Project schedule is dependent on approval of RAP by NCDENR. March 2006 Progress Report is not required due to submittal of this RAP.

## ***Appendices***

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## *Appendix A*

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# **EISOPQAM Procedures**



## APPENDIX B STANDARD FIELD CLEANING PROCEDURES

### PERFORMANCE OBJECTIVE:

- To remove contaminants of concern from sampling, drilling and other field equipment to concentrations that do not impact study objectives using a standard cleaning procedure.

### B.1 Introduction

Cleaning procedures in this appendix are intended for use by field personnel for cleaning sampling and other equipment in the field. Emergency field sample container cleaning procedures are also included; however, they should not be used unless absolutely necessary. Cleaning procedures for use at the Field Equipment Center (FEC) are in Appendix C.

Sampling and field equipment cleaned in accordance with these procedures must meet the minimum requirements for Data Quality Objectives (DQO) definitive data collection. Deviations from these procedures should be documented in the approved study plan, field records, and investigative reports.

These are the materials, methods, and procedures to be used when cleaning sampling and other equipment in the field.

#### B.1.1 Specifications for Cleaning Materials

Specifications for standard cleaning materials referred to in this appendix are as follows:

- Soap shall be a standard brand of phosphate-free laboratory detergent such as Liquinox®. Use of other detergent must be justified and documented in the field logbooks and inspection or investigative reports.
- Solvent shall be pesticide-grade isopropanol. Use of a solvent other than pesticide-grade isopropanol for equipment cleaning purposes must be justified in the study plan. Otherwise its use must be documented in field logbooks and inspection or investigation reports.
- Tap water may be used from any municipal water treatment system. Use of an untreated potable water supply is not an acceptable substitute for tap water.
- Analyte free water (deionized water) is tap water that has been treated by passing through a standard deionizing resin column. At a minimum, the finished water should contain no detectable heavy metals or other inorganic compounds (i.e., at or above analytical detection limits) as defined by a standard inductively coupled Argon Plasma Spectrophotometer (ICP) (or equivalent) scan. Analyte free water obtained by other methods is acceptable, as long as it meets the above analytical criteria.

- Organic/analyte free water is defined as tap water that has been treated with activated carbon and deionizing units. A portable system to produce organic/analyte free water under field conditions is available. At a minimum, the finished water must meet the analytical criteria of analyte free water and should contain no detectable pesticides, herbicides, or extractable organic compounds, and no volatile organic compounds above minimum detectable levels as determined by the Region 4 laboratory for a given set of analyses. Organic/analyte free water obtained by other methods is acceptable, as long as it meets the above analytical criteria.
- Other solvents may be substituted for a particular purpose if required. For example, removal of concentrated waste materials may require the use of either pesticide-grade hexane or petroleum ether. After the waste material is removed, the equipment must be subjected to the standard cleaning procedure. Because these solvents are not miscible with water, the equipment must be completely dry prior to use.

Solvents, laboratory detergent, and rinse waters used to clean equipment shall not be reused during field decontamination.

#### B.1.2 Handling and Containers for Cleaning Solutions

Improperly handled cleaning solutions may easily become contaminated. Storage and application containers must be constructed of the proper materials to ensure their integrity. Following are acceptable materials used for containing the specified cleaning solutions:

- Soap must be kept in clean plastic, metal, or glass containers until used. It should be poured directly from the container during use.
- Solvent must be stored in the unopened original containers until used. They may be applied using the low pressure nitrogen system fitted with a Teflon® nozzle, or using Teflon® squeeze bottles.
- Tap water may be kept in clean tanks, hand pressure sprayers, squeeze bottles, or applied directly from a hose.
- Analyte free water must be stored in clean glass, stainless steel, or plastic containers that can be closed prior to use. It can be applied from plastic squeeze bottles.
- Organic/analyte free water must be stored in clean glass, Teflon®, or stainless steel containers prior to use. It may be applied using Teflon® squeeze bottles, or with the portable system.

Note: Hand pump sprayers generally are not acceptable storage or application containers for the above materials (with the exception of tap water). This also applies to stainless steel sprayers. All hand sprayers have internal oil coated gaskets and black rubber seals that may contaminate the solutions.

#### B.1.3 Disposal of Solvent Cleaning Solutions

Procedures for the safe handling and disposition of investigation derived waste (IDW), including used wash water, rinse water, and spent solvents are in Section 5.15.

#### B.1.4 Equipment Contaminated with Concentrated Wastes

Equipment used to collect samples of hazardous materials or toxic wastes or materials from hazardous waste sites, RCRA facilities, or in-process waste streams should be field cleaned before returning from the study. At a minimum, this should consist of washing with soap and rinsing with tap water. More stringent procedures may be required at the discretion of the field investigators.

### **B.1.5 Safety Procedures for Field Cleaning Operations**

Some of the materials used to implement the cleaning procedures outlined in this appendix can be harmful if used improperly. Caution should be exercised by all field investigators and all applicable safety procedures should be followed. At a minimum, the following precautions should be taken in the field during these cleaning operations:

- Safety glasses with splash shields or goggles, and latex gloves will be worn during all cleaning operations.
- Solvent rinsing operations will be conducted in the open (never in a closed room).
- No eating, smoking, drinking, chewing, or any hand to mouth contact should be permitted during cleaning operations.

### **B.1.6 Handling of Cleaned Equipment**

After field cleaning, equipment should be handled only by personnel wearing clean gloves to prevent re-contamination. In addition, the equipment should be moved away (preferably upwind) from the cleaning area to prevent recontamination. If the equipment is not to be immediately re-used it should be covered with plastic sheeting or wrapped in aluminum foil to prevent re-contamination. The area where the equipment is kept prior to re-use must be free of contaminants.

## **B.2 Field Equipment Cleaning Procedures**

Sufficient clean equipment should be transported to the field so that an entire study can be conducted without the need for field cleaning. However, this is not possible for some specialized items such as portable power augers (Little Beaver®), well drilling rigs, soil coring rigs, and other large pieces of field equipment. In addition, particularly during large scale studies, it is not practical or possible to transport all of the precleaned field equipment required into the field. In these instances, sufficient pre-cleaned equipment should be transported to the field to perform at least one days work. The following procedures are to be utilized when equipment must be cleaned in the field.

### **B.2.1 Specifications for Decontamination Pads**

Decontamination pads constructed for field cleaning of sampling and drilling equipment should meet the following minimum specifications:

- The pad should be constructed in an area known or believed to be free of surface contamination.
- The pad should not leak excessively.
- If possible, the pad should be constructed on a level, paved surface and should facilitate the removal of wastewater. This may be accomplished by either constructing the pad with one corner lower than the rest, or by creating a sump or pit in one corner or along one side. Any sump or pit should also be lined.
- Sawhorses or racks constructed to hold equipment while being cleaned should be high enough above ground to prevent equipment from being splashed.
- Water should be removed from the decontamination pad frequently.

- A temporary pad should be lined with a water impermeable material with no seams within the pad. This material should be either easily replaced (disposable) or repairable.

At the completion of site activities, the decontamination pad should be deactivated. The pit or sump should be backfilled with the appropriate material designated by the site project leader, but only after all waste/rinse water has been pumped into containers for disposal. No solvent rinsates will be placed in the pit. Solvent rinsates should be collected in separate containers for proper disposal. See Section 5.15 of this SOP for proper handling and disposal of these materials. If the decontamination pad has leaked excessively, soil sampling may be required.

#### B.2.2 "Classic Parameter" Sampling Equipment

"Classic Parameters" are analyses such as oxygen demand, nutrients, certain inorganics, sulfide, flow measurements, etc. For routine operations involving classic parameter analyses, water quality sampling equipment such as Kemmerers, buckets, dissolved oxygen dunkers, dredges, etc., may be cleaned with the sample or analyte-free water between sampling locations. A brush may be used to remove deposits of material or sediment, if necessary. If analyte-free water is unavailable the samplers should be flushed at the next sampling location with the substance (water) to be sampled, before the sample is collected.

Flow measuring equipment such as weirs, staff gages, velocity meters, and other stream gaging equipment may be cleaned with tap water between measuring locations, if necessary.

**The previously described procedures are not to be used for cleaning field equipment to be used for the collection of samples undergoing trace organic or inorganic constituent analyses.**

#### B.2.3 Sampling Equipment used for the Collection of Trace Organic and Inorganic Compounds

The following procedures are to be used for all sampling equipment used to collect routine samples undergoing trace organic or inorganic constituent analyses:

1. Clean with tap water and soap using a brush if necessary to remove particulate matter and surface films. Equipment may be steam cleaned (soap and high pressure hot water) as an alternative to brushing. Sampling equipment that is steam cleaned should be placed on racks or saw horses at least two feet above the floor of the decontamination pad. PVC or plastic items should not be steam cleaned.
2. Rinse thoroughly with tap water.
3. Rinse thoroughly with analyte free water.
4. Rinse thoroughly with solvent. Do not solvent rinse PVC or plastic items.
5. Rinse thoroughly with organic/analyte free water. If organic/analyte free water is not available, equipment should be allowed to completely dry. Do not apply a final rinse with analyte water. Organic/analyte free water can be generated on-site utilizing the portable system.
6. Remove the equipment from the decontamination area and cover with plastic. Equipment stored overnight should be wrapped in aluminum foil and covered with clean, unused plastic.

#### B.2.4 Well Sounders or Tapes

1. Wash with soap and tap water.
2. Rinse with tap water.
3. Rinse with analyte free water.

#### B.2.5 Goulds® Pump Cleaning Procedure

**CAUTION - During cleaning always disconnect the pump from the generator.**

The Goulds® pump should be cleaned prior to use and between each monitoring well. The following procedure is required:

1. Using a brush, scrub the exterior of the contaminated hose and pump with soap and tap water.
2. Rinse the soap from the outside of the pump and hose with tap water.
3. Rinse the tap water residue from the outside of pump and hose with analyte-free water.
4. Place the pump and hose in a clean plastic bag.

#### B.2.6 Redi-Flo2® Pump

The Redi-Flo2® pump should be cleaned prior to use and between each monitoring well. The following procedure is required:

**CAUTION - Make sure the pump is not plugged in.**

1. Using a brush, scrub the exterior of the pump, electrical cord and garden hose with soap and tap water. Do not wet the electrical plug.
2. Rinse with tap water.
3. Rinse with analyte free water.
4. Place the equipment in a clean plastic bag.

To clean the Redi-Flo2® ball check valve:

1. Completely dismantle ball check valve. Check for wear and/or corrosion, and replace as needed.
2. Using a brush, scrub all components with soap and tap water.
3. Rinse with analyte free water.
4. Reassemble and re-attach the ball check valve to the Redi-Flo2® pump head.

### B.2.7 Automatic Sampler Tubing

The Silastic® and Tygon® tubing previously used in the automatic samplers may be field cleaned as follows:

1. Flush tubing with tap water and soap.
2. Rinse tubing thoroughly with tap water.
3. Rinse tubing with analyte free water.

### B.3 Downhole Drilling Equipment

These procedures are to be used for drilling activities involving the collection of soil samples for trace organic and inorganic constituent analyses, and for the construction of monitoring wells to be used for the collection of groundwater samples for trace organic and inorganic constituent analyses.

#### B.3.1 Introduction

Cleaning and decontamination of all equipment should occur at a designated area (decontamination pad) on the site. The decontamination pad should meet the specifications of Section B.2.1.

Tap water (potable) brought on the site for drilling and cleaning purposes should be contained in a pre-cleaned tank.

A steam cleaner and/or high pressure hot water washer capable of generating a pressure of at least 2500 PSI and producing hot water and/or steam (200°F plus), with a soap compartment, should be obtained.

#### B.3.2 Preliminary Cleaning and Inspection

The drill rig should be clean of any contaminants that may have been transported from another hazardous waste site, to minimize the potential for cross-contamination. Further, the drill rig itself should not serve as a source of contaminants. In addition, associated drilling and decontamination equipment, well construction materials, and equipment handling procedures should meet these minimum specified criteria:

- All downhole augering, drilling, and sampling equipment should be sandblasted before use if painted, and/or there is a buildup of rust, hard or caked matter, etc., that cannot be removed by steam cleaning (soap and high pressure hot water), or wire brushing. Sandblasting should be performed prior to arrival on site, or well away from the decontamination pad and areas to be sampled.
- Any portion of the drill rig, backhoe, etc., that is over the borehole (kelly bar or mast, backhoe buckets, drilling platform, hoist or chain pulldowns, spindles, cathead, etc.) should be steam cleaned (soap and high pressure hot water) and wire brushed (as needed) to remove all rust, soil, and other material which may have come from other hazardous waste sites before being brought on site.
- Printing and/or writing on well casing, tremie tubing, etc., should be removed before use. Emery cloth or sand paper can be used to remove the printing and/or writing. Most well material suppliers can supply materials without the printing and/or writing if specified when ordered.

- The drill rig and other equipment associated with the drilling and sampling activities should be inspected to insure that all oils, greases, hydraulic fluids, etc., have been removed, and all seals and gaskets are intact with no fluid leaks.
- PVC or plastic materials such as tremie tubes should be inspected. Items that cannot be cleaned are not acceptable and should be discarded.

### B.3.3 Drill Rig Field Cleaning Procedure

Any portion of the drill rig, backhoe, etc., that is over the borehole (kelly bar or mast, backhoe buckets, drilling platform, hoist or chain pulldowns, spindles, cathead, etc.) should be steam cleaned (soap and high pressure hot water) between boreholes.

### B.3.4 Field Cleaning Procedure for Drilling Equipment

The following is the standard procedure for field cleaning augers, drill stems, rods, tools, and associated equipment. This procedure does not apply to well casings, well screens, or split-spoon samplers used to obtain samples for chemical analyses, which should be cleaned as outlined in Section B.2.3.

1. Clean with tap water and soap, using a brush if necessary, to remove particulate matter and surface films. Steam cleaning (high pressure hot water with soap) may be necessary to remove matter that is difficult to remove with the brush. Drilling equipment that is steam cleaned should be placed on racks or saw horses at least two feet above the floor of the decontamination pad. Hollow-stem augers, drill rods, etc., that are hollow or have holes that transmit water or drilling fluids, should be cleaned on the inside with vigorous brushing.
2. Rinse thoroughly with tap water.
3. Remove from the decontamination pad and cover with clean, unused plastic. If stored overnight, the plastic should be secured to ensure that it stays in place.

When there is concern for low level contaminants it may be necessary to clean this equipment between borehole drilling and/or monitoring well installation using the procedure outlined in Section B.2.3.

### B.4 Emergency Disposable Sample Container Cleaning

New one-pint or one-quart mason jars may be used to collect samples for analyses of organic compounds and metals in waste and soil samples during an emergency. These containers would also be acceptable on an emergency basis for the collection of water samples for extractable organic compounds, pesticides, and metals analyses. These jars cannot be used for the collection of water samples for volatile organic compound analyses.

The rubber sealing ring should not be in contact with the jar and aluminum foil should be used, if possible, between the jar and the sealing ring. If possible, the jar and aluminum foil should be rinsed with pesticide-grade isopropanol and allowed to air dry before use. Several empty bottles and lids should be submitted to the laboratory as blanks for quality control purposes.



## APPENDIX D SAMPLE SHIPPING PROCEDURES

### D.1 Introduction

Samples collected during field investigations or in response to a hazardous materials incident must be classified prior to shipment, as either environmental or hazardous materials samples. In general, environmental samples include drinking water, most groundwater and ambient surface water, soil, sediment, treated municipal and industrial wastewater effluent, biological specimens, or any samples not expected to be contaminated with high levels of hazardous materials.

Samples collected from process wastewater streams, drums, bulk storage tanks, soil, sediment, or water samples from areas suspected of being highly contaminated may require shipment as dangerous goods. Regulations for packing, marking, labeling, and shipping of dangerous goods by air transport are promulgated by the International Air Transport Authority (IATA), which is equivalent to United Nations International Civil Aviation Organization (UN/ICAO) (1). Transportation of hazardous materials (dangerous goods) by EPA personnel is covered by EPA Order 1000.18 (2).

### D.2 Shipment of Dangerous Goods

The project leader is responsible for determining if samples collected during a specific field investigation meet the definitions for dangerous goods. If a sample is collected of a material that is listed in the Dangerous Goods List, Section 4.2, IATA, then that sample must be identified, packaged, marked, labeled, and shipped according to the instructions given for that material. If the composition of the collected sample(s) is unknown, and the project leader knows or suspects that it is a regulated material (dangerous goods), the sample may not be offered for air transport. If the composition and properties of the waste sample or highly contaminated soil, sediment, or water sample are unknown, or only partially known, the sample may not be offered for air transport.

In addition, the shipment of pre-preserved sample containers or bottles of preservatives (e.g., NaOH pellets, HCL, etc.) which are designated as dangerous goods by IATA is regulated. Shipment of nitric acid is forbidden on all aircraft. Dangerous goods must not be offered for air transport without contacting the Division dangerous goods shipment designee.

### D.3 Shipment of Environmental Laboratory Samples

Guidance for the shipment of environmental laboratory samples by personnel is provided in a memorandum dated March 6, 1981, subject "Final National Guidance Package for Compliance with Department of Transportation Regulations in the Shipment of Laboratory Samples" (3). By this memorandum, the shipment of the following unpreserved samples is not regulated:

- Drinking water
- Treated effluent
- Biological specimens
- Sediment
- Water treatment plant sludge
- POTW sludge

In addition, the shipment of the following preserved samples is not regulated, provided the amount of preservative used does not exceed the amounts found in 40 CFR 136.3 (4) (see Appendix A). It is the shippers' (individual signing the airway bill) responsibility to ensure that proper amounts of preservative are used:

- Drinking water
- Ambient water
- Treated effluent
- Biological specimens
- Sediment
- Wastewater treatment plant sludge
- Water treatment plant sludge

Samples determined by the project leader to be in these categories are to be shipped using the following protocol, developed jointly between US-EPA, OSHA, and DOT. This procedure is documented in the "Final National Guidance Package for Compliance with Department of Transportation Regulations in the Shipment of Environmental Laboratory Samples" (3).

Untreated wastewater and sludge from POTW's are considered to be "diagnostic specimens" (not environmental laboratory samples). However, because they are not considered to be etiologic agents (infectious) they are not restricted and may be shipped using the procedures outlined below.

Environmental samples should be packed prior to shipment by air using the following procedures:

1. Allow sufficient headspace (ullage) in all bottles (except VOC containers with a septum seal) to compensate for any pressure and temperature changes (approximately 10 percent of the volume of the container).
2. Be sure the lids on all bottles are tight (will not leak).
3. Place bottles in separate and appropriately sized polyethylene bags and seal the bags with tape (preferably plastic electrical tape). Up to three VOC bottles may be packed in one Whirl-Pak container.
4. Optionally, place three to six VOC vials in a quart metal can and then fill the can with vermiculite.
5. Select a sturdy cooler in good repair. Secure and tape the drain plug with fiber or duct tape. Line the cooler with a large heavy duty plastic bag.
6. Place two to four inches of vermiculite in the bottom of the cooler and then place the bottles and cans in the cooler with sufficient space to allow for the addition of vermiculite between the bottles and cans.
7. Put "blue ice" (or ice that has been "double bagged" in heavy duty polyethylene bags and properly sealed) on top of and/or between the samples. Fill all remaining space between the bottles or cans with vermiculite.

8. Securely fasten the top of the large garbage bag with tape (preferably plastic electrical tape).
9. Place the Chain-of-Custody Record and the CLP Traffic Report Form (if applicable) into a plastic bag, and tape the bag to the inner side of the cooler lid.
10. Close the cooler and securely tape (preferably with fiber tape) the top of the cooler shut. Chain-of-custody seals should be affixed to the top and sides of the cooler within the securing tape so that the cooler cannot be opened without breaking the seal.
11. Shipping containers must be marked "THIS END UP", and arrow labels which indicate the proper upward position of the container should be affixed to the container. A label containing the name and address of the shipper should be placed on the outside of the container. Labels used in the shipment of hazardous materials (e.g., Cargo Only Air Craft, Flammable Solids, etc.) are not permitted to be on the outside of containers used to transport environmental samples.

#### **D.4 References**

1. Dangerous Goods Regulations, International Air Transport Authority (IATA). Current Edition. which changes annually.
2. EPA Order 1000.18, February 16, 1979.
3. "Final Regulation Package for Compliance with DOT Regulations in the Shipment of Environmental Laboratory Samples," Memo from David Weitzman, Work Group Chairman, Office of Occupational Health and Safety (PM-273), US-EPA, April 13, 1981.
4. 40 CFR 136.3. July 1, 2001. See Table 11, Footnote 3.

## SECTION 7 GROUND WATER SAMPLING

### PERFORMANCE OBJECTIVES:

- To collect a sample representative of ground water residing in the formation of interest.
- To reduce the potential bias caused by the sampling equipment used to obtain the sample.

### 7.1 Introduction

Ground water sampling may be required for a variety of reasons, such as examining potable or industrial water supplies, checking for and/or tracking contaminant plume movement in the vicinity of a land disposal or spill site, Resource Conservation Recovery Act (RCRA) compliance monitoring, or examining a site where historical information is minimal or non-existent but where it is thought that ground water contamination may have occurred.

Ground water samples are usually obtained from either temporarily or permanently installed ground water monitoring wells. They can also be obtained, however, anywhere ground water is present, such as in a pit or a dug or drilled hole.

Occasionally, the ground water source may not be in the ideal location to meet a particular objective (e.g., to track a contaminant plume). In that case, either a temporary or permanent monitoring well should be installed. An experienced and knowledgeable person will need to locate the well and supervise its installation so that samples will be representative of the ground water.

Additional guidance is given in RCRA Ground-Water Monitoring: Technical Guidance (1) and Chapter 11 of SW-846 (2). The ground water sampling procedures described in this SOP will meet or exceed the requirements of these documents.

Ground water sampling procedures can be sub-divided into two areas, purging and sampling, each of which has different goals and objectives. Within the topic of purging, it is necessary, because of the inherently different characteristics of the two types of wells, to address permanent and temporary wells separately. The procedures and techniques which follow in this section reflect these differences.

### 7.2 Purging

#### 7.2.1 Purging and Purge Adequacy

Purging is the process of removing stagnant water from a monitoring well, immediately prior to sampling, causing its replacement by ground water from the adjacent formation, which is representative of actual aquifer conditions. In order to determine when a well has been adequately purged, field investigators should: 1) monitor the pH, specific conductance, temperature, and turbidity of the ground water removed during purging; and 2) observe and record the volume of water removed.

Prior to initiating the purge, the amount of water standing in the water column (water inside the well riser and screen) should be determined. To do this, the diameter of the well should be determined and the water level and total depth of the well are measured and recorded. Specific methodology for obtaining these measurements is found in Section 15.5 of this SOP. Once this information is obtained, the volume of water to be purged can be determined using one of several methods. One is the equation:

$$V = 0.041 d^2 h$$

Where: h = depth of water in feet  
d = diameter of well in inches  
V = volume of water in gallons

Alternatively, the volume may be determined using a casing volume per foot factor for the appropriate diameter well, similar to that in Table 7.2.1. The water level is subtracted from the total depth, providing the length of the water column. This length is multiplied by the factor in the Table 7.2.1 which corresponds to the appropriate well diameter, providing the amount of water, in gallons, contained in the well. Other acceptable methods include the use of nomographs or other equations or formulae.

With respect to volume, an adequate purge is normally achieved when three to five times the volume of standing water in the well has been removed. The field notes should reflect the single well volume calculations or determinations, according to one of the above methods, and a reference to the appropriate multiplication of that volume, i.e., a minimum three well volumes, clearly identified as a purge volume goal.

With respect to the ground water chemistry, an adequate purge is achieved when the pH, specific conductance, and temperature of the ground water have stabilized and the turbidity has either stabilized or is below 10 Nephelometric Turbidity Units (NTUs) (twice the Primary Drinking Water Standard of 5 NTUs). Although ten NTUs is normally considered the minimum goal for most ground water sampling objectives, 1 NTU has been shown to be easily achievable and reasonable attempts should be made to reach this level. Stabilization occurs when pH measurements remain constant within 0.1 Standard Unit (SU), specific conductance varies no more than 10 percent, and the temperature is constant for at least three consecutive readings. There are no criteria establishing how many sets of measurements are adequate for the determination of stability. If the calculated purge volume is small, the measurements should be taken frequently to provide a sufficient number of measurements to evaluate stability. If the purge volume is large, measurements taken every 15 minutes may be sufficient.

If, after three well volumes have been removed, the chemical parameters have not stabilized according to the above criteria, additional well volumes (up to five well volumes), should be removed. If the parameters have not stabilized within five volumes, it is at the discretion of the project leader whether or not to collect a sample or to continue purging. If after five well volumes, pH and conductivity have been stabilized and the turbidity is still decreasing and approaching an acceptable level, additional purging should be considered to obtain the best sample possible. The conditions of sampling should be noted in the field log.

TABLE 7.2.1  
WELL CASING DIAMETER vs. VOLUME

| WELL CASING DIAMETER 9 (INCHES) vs. VOLUME (GALS.)/FEET of WATER |            |
|--|------------|
| CASING   | GALLONS/FT |
| 1  | 0.041      |
| 2  | 0.163      |
| 3  | 0.367      |
| 4  | 0.653      |
| 5  | 1.02       |
| 6  | 1.469      |
| 7  | 1.999      |
| 8  | 2.611      |
| 9  | 3.305      |
| 10   | 4.08       |
| 11   | 4.934      |
| 12   | 5.875      |

In some situations, even with slow purge rates, a well may be pumped or bailed dry (evacuated). In these situations, this generally constitutes an adequate purge and the well can be sampled following sufficient recovery (enough volume to allow filling of all sample containers). It is not necessary that the well be evacuated three times before it is sampled. The pH, specific conductance, temperature, and turbidity should be measured, during collection of the sample from the recovered volume, as the measurements of record for the sampling event.

Attempts should be made to avoid purging wells to dryness. This can be accomplished, for example, by slowing the purge rate. If a well is pumped dry, it may result in the sample being comprised partially of water contained in the sand pack, which may be reflective, at least in part, of initial, stagnant conditions. In addition, as water re-enters a well that is in an evacuated condition, it may cascade down the sand pack or the well screen, stripping volatile organic constituents that may be present and/or introducing soil fines into the water column.

It is particularly important that wells be sampled as soon as possible after purging. If adequate volume is available, the well must be sampled immediately. If not, sampling should occur as soon as adequate volume has recovered.

#### Equipment Available

Monitoring well purging is accomplished by using in-place plumbing and dedicated pumps or, by using portable pumps/equipment when dedicated systems are not present. The equipment may consist of a variety of pumps, including peristaltic, large and small diameter turbine (electric submersible), bladder, centrifugal, gear-driven positive displacement, or other appropriate pumps. The use of any of these pumps is usually a function of the depth of the well being sampled and the amount of water that is to be removed during purging. Whenever the head difference between the sampling location and the water level is less than the limit of suction and the volume to be removed is reasonably small, a peristaltic pump should be used for purging. Appendix E of this SOP contains the operating instructions for all pumps commonly used during Branch ground water investigations.



Bailers may also be used for purging in appropriate situations, however, their use is discouraged. Bailers tend to disturb any sediment that may be present in the well, creating or increasing sample turbidity. If a bailer is used, it should be a closed-top Teflon® bailer.

#### 7.2.2 Purging Techniques (Wells Without Plumbing or In-Place Pumps)

For permanently installed wells, the depth of water and depth of the well should be determined (if possible) before purging. Electrical water level indicators/well sounders can be used for this purpose. It is standard practice to mark the top of casing, providing a point of reference from which these measurements will be consistently made. Field investigators should look for these markings when taking these measurements. Extreme caution should be exercised during this procedure to prevent cross-contamination of the wells. This is a critical concern when samples for trace organic compounds or metals analyses are collected. At a minimum, the well sounding device should be cleaned by washing in a laboratory detergent solution, followed by rinses with tap water and analyte-free water. After cleaning, it should be placed in a clean plastic bag or wrapped in foil.

##### Purging with Pumps

When peristaltic pumps or centrifugal pumps are used, only the intake line is placed into the water column. The line placed into the water should be either standard-cleaned (see Appendix B) Teflon® tubing, for peristaltic pumps, or standard-cleaned stainless steel pipe attached to a hose for centrifugal pumps.

When submersible pumps (bladder, turbine, displacement, etc.) are used, the pump itself is lowered into the water column. The pump must be cleaned as specified in Appendix B.

##### Purging with Bailers

Standard-cleaned (Appendix B) closed-top Teflon® bailers with Teflon® leaders and new nylon rope are lowered into top of the water column, allowed to fill, and removed. It is critical that bailers be slowly and gently immersed into the top of the water column, particularly during final stages of purging, to minimize turbidity and disturbance of volatile organic constituents. The use of bailers for purging and sampling is discouraged because the correct technique is highly operator dependent.

##### Field Care of Purging Equipment

Regardless of which method is used for purging, new plastic sheeting should be placed on the ground surface around the well casing to prevent contamination of the pumps, hoses, ropes, etc., in the event they need to be placed on the ground during the purging or they accidentally come into contact with the ground surface. It is preferable that hoses used in purging that come into contact with the ground water be kept on a spool or contained in a plastic-lined tub, both during transporting and during field use, to further minimize contamination from the transporting vehicle or ground surface.

##### Purging Entire Water Column

The pump/hose assembly or bailer used in purging should be lowered into the top of the standing water column and not deep into the column. This is done so that the purging will "pull" water from the formation into the screened area of the well and up through the casing so that the entire static volume can be removed. If the pump is placed deep into the water column, the water above the pump may not be removed, and the subsequent samples, particularly if collected with a bailer, may not be representative of the ground water.

It is recommended that no more than three to five feet of hose be lowered into the water column. If the recovery rate of the well is faster than the pump rate and no observable draw down occurs, the pump should be raised until the intake is within one foot of the top of the water column for the duration of purging. If the pump rate exceeds the recovery rate of the well, the pump will have to be lowered, as needed, to accommodate the draw down. After the pump is removed from the well, all wetted portions of the hose and the pump should be cleaned as outlined in Appendix B of this SOP.

Careful consideration shall be given to using pumps to purge wells which are excessively contaminated with oily compounds, because it may be difficult to adequately decontaminate severely contaminated pumps under field conditions. When wells of this type are encountered, alternative purging methods, such as bailers, should be considered.

#### General Low Flow/Low Stress Method Preference

The device with the lowest pump or water removal rate and the least tendency to stress the well during purging should be selected for use. For example, if a bailer and a peristaltic pump both work in a given situation, the pump should be selected because it will greatly minimize turbidity, providing a higher quality sample (Section 7.2.4 contains a description of low flow purging and sampling with a peristaltic pump used in a temporary well). If a Fultz® pump or a Grundfos Redi-Flo2® could both be used, the Redi-Flo2® may be given preference because the speed can be controlled to provide a lower pump rate, thereby minimizing turbidity.

#### Low Flow/Low Volume Purging Techniques/Procedures

Alternatives to the low flow purging procedures exist and may be acceptable. The low flow/low volume purging is a procedure used to minimize purge water volumes. The pump intake is placed within the screened interval at the zone of sampling, preferably, the zone with the highest flow rate. Low flow rate purging is conducted after hydraulic conditions within the well have re-stabilized, usually within 24 to 48 hours. Flow rates should not exceed the recharge rate of the aquifer. This is monitored by measuring the top of the water column with a water level recorder or similar device while pumping. These techniques, however, are only acceptable under certain hydraulic conditions and are not considered standard procedures.

##### 7.2.3 Purging Techniques - Wells with In-Place Plumbing

Wells with in-place plumbing are commonly found at municipal water treatment plants, industrial water supplies, private residences, etc. Many permanent monitoring wells at active facilities are also equipped with dedicated, in-place pumps. The objective of purging wells with in-place pumps is the same as with monitoring wells without in-place pumps, i.e., to ultimately collect a sample representative of the ground water. Among the types of wells identified in this section, two different approaches are necessary. The permanent monitoring wells with in-place pumps should, in all respects, be treated like the monitoring well without pumps. They generally are sampled only occasionally and require purging as described for wells without in-place pumps, i.e., 3 to 5 well volumes and stable parameters.

In the case of the other types of wells, however, not enough is generally known about the construction aspects of the wells to apply the same criteria as used for monitoring wells, i.e., 3 to 5 well volumes. The volume to be purged in these situations, therefore, depends on several factors: whether the pumps are running continuously or intermittently and whether or not any storage/pressure tanks are located between the sampling point and the pump. The following considerations and procedures should be followed when purging wells with in-place plumbing under the conditions described.

### Continuously Running Pumps

If the pump runs more or less continuously, no purge (other than opening a valve and allowing it to flush for a few minutes) is necessary. If a storage tank is present, a spigot, valve or other sampling point should be located between the pump and the storage tank. If not, locate the valve closest to the tank. Measurements of pH, specific conductance, temperature, and turbidity are recorded at the time of sampling.

### Intermittently Running Pumps

If the pump runs intermittently, it is necessary to determine, if possible, the volume to be purged, including storage/pressure tanks that are located prior to the sampling location. The pump should then be run continuously until the required volume has been purged. If construction characteristics are not known, best judgement should be used in establishing how long to run the pump prior to collecting the sample. Generally, under these conditions, 30 minutes will be adequate. Measurements of pH, specific conductance, temperature and turbidity should be made and recorded at intervals during the purge and the final measurements made at the time of sampling.

#### 7.2.4 Purging Techniques - Temporary Monitoring Wells

Temporary ground water monitoring wells differ from permanent wells because temporary wells are installed in the ground water for immediate sample acquisition. Wells of this type may include standard well screen and riser placed in boreholes created by hand augering, power augering, or by drilling. They may also consist of a rigid rod and screen that is pushed, driven, or hammered into place to the desired sampling interval, such as the Direct Push Wellpoint®, the Geoprobe® and the Hydropunch®. As such, the efforts to remove several volumes of water to replace stagnant water do not necessarily apply in these situations, because generally, stagnant water is non-existent. It is important to note, however, that the longer a temporary well is in place and not sampled, the more appropriate it may be to apply, to the extent possible, standard permanent monitoring well purging criteria to it.

In cases where the temporary well is to be sampled immediately after installation, purging is conducted primarily to mitigate the impacts of installation. In most cases, temporary well installation procedures disturb the existing aquifer conditions, resulting primarily in increased turbidity. Therefore, the goal of purging is to reduce the turbidity and remove the volume of water in the area directly impacted by the installation procedure. Low turbidity samples in these types of wells are typically and routinely achieved by the use of low-flow purging and sampling techniques.

The following low-flow purging technique using peristaltic pumps has been used routinely to achieve acceptably low NTU values in a variety of temporary monitoring well applications.

In purging situations where the elevation of the top of the water column is no greater than approximately 25 feet below the pump head elevation, a peristaltic pump may be used to purge temporary wells. Enough tubing is deployed to reach the bottom of the temporary well screen. At the onset of purging, the tubing is slowly lowered to the bottom of the screen and is used to remove any formation material which may have entered the well screen during installation. This is critical to ensuring rapid achievement of low turbidity conditions. After the formation material is removed from the bottom of the screen, the tubing is slowly raised through the water column to near the top of the column. The tubing can be held at this level to determine if the pump is lowering the water level in the well. If not, secure the tubing at the surface to maintain this pumping level.

If the water column is lowered, and the pump is not variable speed, continue to lower the tubing as the water column is lowered. If a variable speed peristaltic pump is being used and draw down is observed on initiation of pumping, reduce the pump speed and attempt to match the draw down of the well. Sustained pumping at these slow rates will usually result in a relatively clear, low turbidity sample. If the draw down stabilizes, maintain that level, however, if it continues to lower, "chase" the water column until the well is evacuated. In this case, the recovered water column may be relatively free of turbidity and can be sampled. It may take several episodes of recovery to provide enough volume for a complete sample.

With many of the direct push sampling techniques, purging is not practical or possible, therefore, no purging is conducted. The sampling device is simply pushed to the desired depth and opened and the sample is collected and retrieved.

#### 7.2.5 Investigation Derived Waste

Purging generates quantities of purge water or investigation derived waste (IDW), the disposition of which must be considered. What is appropriate for the disposition of the water is, in part, dependent on the nature of the investigation. If the IDW is generated at a RCRA facility, it will generally be contained and disposed on site in an on-site treatment facility. IDW generated during Superfund or other investigations may, at the discretion of the field project leader or the program manager (remedial project manager), be discharged to the ground, away from the well, or be containerized for later disposal or other appropriate action.

### 7.3 Sampling

Sampling is the process of obtaining, containerizing, and preserving the ground water sample after the purging process is complete. Non-dedicated pumps for sample collection generally should not be used. Many pumps are made of materials, such as brass, plastic, rubber, or other elastomer products which may cause chemical interferences with the sample. Their principle of operation may also render them unacceptable as a sample collection device. The pump may be turbine driven, which may release volatile organic constituents. It is recognized that there are situations, such as industrial or municipal supply wells or private residential wells, where a well may be equipped with a dedicated pump from which a sample would not normally be collected. Discretion should always be used in obtaining a sample.

#### 7.3.1 Equipment Available

Because of the problems with most pumps described in the preceding paragraph, only three devices should be used to collect ground water samples from most wells. These are the peristaltic pump/vacuum jug assembly, a stainless steel and Teflon® bladder pump, and a closed-top, Teflon® bailer.

Other monitoring equipment used during sampling includes water level indicators, pH meters, thermometers, conductivity bridges, and nephelometers (turbidity meters).

#### 7.3.2 Sampling Techniques - Wells With In-Place Plumbing

Samples should be collected following purging from a valve or cold water tap as near to the well as possible, preferably prior to any storage/pressure tanks that might be present. Remove any hose that may be present before sample collection and reduce the flow to a low level to minimize sample disturbance, particularly with respect to volatile organic constituents. Samples should be collected directly into the appropriate containers (see Standard Sample Containers, Appendix A). It may be necessary to use a secondary container, such as a clean 8 oz. sample jar or a stainless steel scoop, to obtain and transfer samples from spigots with low ground clearance. Also, refer to the Potable Water Supply discussion in Section 2.2. All measurements for pH, specific conductance, temperature, and turbidity should be recorded at the time of measurement.

### 7.3.3 Sampling Techniques - Wells without Plumbing

Following purging, samples should be collected using a peristaltic pump/vacuum jug assembly, a Teflon®/stainless steel bladder pump, or a closed-top Teflon® bailer. These techniques are described below.

#### Peristaltic pump/vacuum jug

The peristaltic pump/vacuum jug can be used for sample collection because it allows for sample collection without the sample coming in contact with the pump tubing. This is accomplished by placing a Teflon® transfer cap assembly onto the neck of a standard cleaned 4-liter (1-gallon) glass container. Teflon® tubing (¼-inch O.D.) connects the container to both the pump and the sample source. The pump creates a vacuum in the container, thereby drawing the sample into the container without it coming into contact with the pump tubing.

Samples for volatile organic compound analysis should be collected using a bailer or by filling the Teflon® tube, by one of two methods, and allowing it to drain into the sample vials. The tubing can be momentarily attached to the pump to fill the tube with water. After the initial water is discharged through the pump head, the tubing is quickly removed from the pump and a gloved thumb placed on the tubing to stop the water from draining out. The tubing is then removed from the well and the water allowed to either gravity drain or be reversed, by the pump, into the sample vials. (Note: When reversing the pump, make sure the discharge tubing is not submerged in purge water. This will prevent introducing potentially cross-contaminated purge water into the sample.) Alternatively, the tubing can be lowered into the well the desired depth and a gloved thumb placed over the end of the tubing. This method will capture the water contained in the tubing. It can then be removed from the well and the water collected by draining the contents of the tubing into the sample vials. Under no circumstances should the sample for volatile organic compound analysis be collected from the content of any other previously filled container. All equipment should be cleaned using the procedures described in Appendix B. Also, refer to the Potable Water Supply discussion, Section 2.2, for additional information.

When sampling for metals only, it is also permissible to collect the sample directly from the pump discharge tubing after an adequate purge has been demonstrated. When collecting samples in this manner there are several considerations to be aware of. The pump head tubing (silastic, etc.) must be changed after each well and a rinsate blank must be collected of a representative piece of the pump head tubing (only one blank per investigation). Also, precautions must be taken to ensure that the end of the discharge tubing is not allowed to touch the ground or other surface to ensure the integrity of the sample collected in this manner.

#### Bladder Pumps

After purging has been accomplished with a bladder pump, the sample is obtained directly from the pump discharge. If the discharge rate of the pump, during purging, is too great, so as to make sample collection difficult, care should be taken to reduce the discharge rate at the onset of actual sample collection. This is necessary to minimize sample disturbance, particularly with respect to samples collected for volatile organic compounds analysis.

#### Bailers

When bailing, new plastic sheeting should be placed on the ground around each well to provide a clean working area. New nylon rope should be attached to the bailer via a Teflon® coated stainless steel wire. This coated wire is semi-permanently attached to the bailer and is decontaminated for reuse as the bailer is cleaned. The bailer should be gently immersed in the top of the water column until just filled. At this point, the bailer should be carefully removed and the contents emptied into the appropriate sample containers.

#### 7.3.4 Sample Preservation

Immediately after collection, all samples requiring preservation must be preserved with the appropriate preservative. Consult Appendix A for the correct preservative for the particular analytes of interest. All samples preserved using a pH adjustment (except VOCs) must be checked, using pH strips, to ensure that they were adequately preserved. This is done by pouring a small volume of sample over the strip. Do not place the strip in the sample.

#### 7.3.5 Special Sample Collection Procedures

##### Trace Organic Compounds and Metals

Special sample handling procedures should be instituted when trace contaminant samples are being collected. All sampling equipment, including pumps, bailers, water level measurement equipment, etc., which comes into contact with the water in the well must be cleaned in accordance with the cleaning procedures described in Appendix B. Pumps should not be used for sampling, unless the interior and exterior portions of the pump and the discharge hoses are thoroughly cleaned. Blank samples should be collected to determine the adequacy of cleaning prior to collection of any sample using a pump.

##### Order of Sampling with Respect to Analytes

In many situations when sampling permanent or temporary monitoring wells, an adequate purge, with respect to turbidity, is often difficult to achieve. Removal and insertion of equipment after the purge and prior to actual sampling may negate the low turbidities achieved during purging and elevate turbidity back to unacceptable levels. For this reason, it is important that special efforts be used to minimize any disturbance of the water column after purging and to collect the aliquot for metals first.

##### Filtering

As a standard practice, ground water samples will not be filtered for routine analysis. Filtering will usually only be performed to determine the fraction of major ions and trace metals passing the filter and used for flow system analysis and for the purpose of geochemical speciation modeling. Filtration is not allowed to correct for improperly designed or constructed monitoring wells, inappropriate sampling methods, or poor sampling technique.

When samples are collected for routine analyses and are filtered, such as under conditions of excessive turbidity, both filtered and non-filtered samples will be submitted for analyses. Samples for organic compounds analysis should not be filtered. Prior to filtration of the ground water sample for any reason other than geochemical speciation modeling, the following criteria must be demonstrated to justify the use of filtered samples for inorganic analysis:

1. The monitoring wells, whether temporary or permanent, have been constructed and developed in accordance with Section 6.
2. The ground water samples were collected using sampling techniques in accordance with this section, and the ground water samples were analyzed in accordance with US-EPA approved methods.
3. Efforts have been undertaken to minimize any persistent sample turbidity problems. These efforts may consist of the following:
  - Redevelopment or re-installation of permanent ground water monitoring wells.
  - Implementation of low flow/low stress purging and sampling techniques.

4. Turbidity measurements should be taken during purging and sampling to demonstrate stabilization or lack thereof. These measurements should be documented in the field notes.

If the ground water sample appears to have either a chemically-induced elevated turbidity, such as would occur with precipitate formation, or a naturally elevated colloid or fine, particulate-related turbidity, filtration will not be allowed.

If filtration is necessary for purposes of geochemical modeling or other **pre-approved** cases, the following procedures are suggested:

1. Accomplish in-line filtration through the use of disposable, high capacity filter cartridges (barrel-type) or membrane filters in an in-line filter apparatus. The high capacity, barrel-type filter is preferred due to the higher surface area associated with this configuration. If a membrane filter is utilized, a minimum diameter of 142 mm is suggested.
2. Use a 5  $\mu\text{m}$  pore-size filter for the purpose of determining the colloidal constituent concentrations. A 0.1  $\mu\text{m}$  pore-size filter should be used to remove most non-dissolved particles.
3. Rinse the cartridge or barrel-type filter with 500 milliliters of the solute (ground water to be sampled) prior to collection of sample. If a membrane filter is used, rinse with 100 milliliters of solute prior to sample collection.

Potential differences could result from variations in filtration procedures used to process water samples for the determination of trace element concentrations. A number of factors associated with filtration can substantially alter "dissolved" trace element concentrations; these include filter pore size, filter type, filter diameter, filtration method, volume of sample processed, suspended sediment concentration, suspended sediment grain-size distribution, concentration of colloids and colloidally-associated trace elements; and concentration of organic matter. Therefore, consistency is critical in the comparison of short-term and long-term results. Further guidance on filtration may be obtained from the following: 1) Metals in Ground Water: Sampling Artifacts and Reproducibility (3); 2) Filtration of Ground Water Samples for Metals Analysis (4); and 3) Ground Water Sampling - A Workshop Summary (5).

#### Bacterial Sampling

Whenever wells (normally potable wells) are sampled for bacteriological parameters, care must be taken to ensure the sterility of all sampling equipment and all other equipment entering the well. Further information regarding bacteriological sampling is available in the following: 1) Sampling for Organic Chemicals and Microorganisms in the Subsurface (6); 2) Handbook for Evaluating Water Bacteriological Laboratories (7); and 3) Microbiological Methods for Monitoring the Environment, Water and Wastes (8).

#### 7.3.6 Specific Sampling Equipment Quality Assurance Techniques

All equipment used to collect ground water samples shall be cleaned as outlined in Appendix B and repaired, if necessary, before being stored at the conclusion of field studies. Cleaning procedures utilized in the field (Appendix B), or field repairs shall be thoroughly documented in field records.

#### 7.3.7 Auxiliary Data Collection

During ground water sample collection, it is important to record a variety of ground water related data. Included in the category of auxiliary data are water level measurements, well volume determinations, pumping rates during purging, and occasionally, drillers or boring logs. This information should be documented in the field records. Well volume determinations are described in Section 7.2.1.



### Water Level Measurements

Water table measurements from the top of the well casings (referenced to National Geodetic Vertical Datum) in permanent wells, and ground surface elevations in temporary wells should be made to assist in determining the general direction of ground water flow and gradient. The methodology to be used to determine well water levels are given in Section 15.5. Tracer dyes and radioactive and thermal detection methods can be used to determine direction and velocities of flow (9). Also, a study of the general topography and drainage patterns will generally indicate direction of ground water flow.

The ground surface elevation and top of casing elevation at the wells should be determined by standard engineering survey practices as outlined in Section 15.

### Well Pumping Rate - Bucket/Stop Watch Method

The pumping rate for a pump can be determined by collecting the discharge from the pump in a bucket of known volume and timing how long it takes to fill the bucket. The pumping rate should be in gallons per minute. This method shall be used primarily with pumps with a constant pump rate, such as gasoline-powered or electric submersible pumps. Care should be taken when using this method with some battery-powered pumps. As the batteries' charge decreases, the pump rate also decreases so that pumping rate calculations using initial, high pump rates may be erroneously high. If this method is used with battery-powered pumps, the rate should be re-checked frequently to ensure accuracy of the pumping rate calculations.

#### 7.4 References

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8. Microbiological Methods for Monitoring the Environment, Water and Wastes, US EPA, ORD, Environmental Monitoring and Support Laboratory, Cincinnati, Ohio, 1978.
9. "Groundwater", Section 18, USDA-SCS National Engineering Handbook, United States Department of Agriculture, Soil Conservation Service, 1978.

The DQO process has both qualitative and quantitative components. The qualitative steps encourage logical and practical planning for environmental data collection activities while the quantitative steps use statistical methods to design a data collection operation that will efficiently control the probability of making an incorrect decision. Although the quantitative steps of the DQO process are important, investigators and decision makers may choose not to apply statistics to every environmental field investigation. In some cases, the planning team may only utilize the qualitative steps of the DQO process during the investigation planning phases to generate authoritative data which may be used to confirm site characteristics.

### **5.13 Specific Sample Collection Quality Control Procedures**

#### **5.13.1 Introduction**

This subsection provides guidelines for establishing quality control procedures for sampling activities. Strict adherence to all of the standard operating procedures outlined in this subsection form the basis for an acceptable sampling quality assurance program.

#### **5.13.2 Experience Requirements**

There is no substitute for field experience. Therefore, all professional and paraprofessional investigators shall have the equivalent of six months field experience before they are permitted to select sampling sites on their own initiative. This field experience shall be gained by on-the-job training using the "buddy" system. Each new investigator should accompany an experienced employee on as many different types of field studies as possible. During this training period, the new employee will be permitted to perform all facets of field investigations, including sampling, under the direction and supervision of senior investigators.

#### **5.13.3 Traceability Requirements**

All sample collection activities shall be traceable through field records to the person collecting the sample and to the specific piece of sampling equipment (where appropriate) used to collect that sample. All maintenance and calibration records for sampling equipment (where appropriate) shall be kept so that they are similarly traceable. See Sections 3.1 through 3.6 for specific procedures to be utilized that insure traceability.

#### **5.13.4 Chain-of-Custody**

Specific chain-of-custody procedures are included in Sections 3.1 through 3.6 of this SOP. These procedures will insure that evidence collected during an investigation will withstand scrutiny during litigation. To assure that procedures are being followed, it is recommended that field investigators or their designees audit chain-of-custody entries, tags, field notes, and any other recorded information for accuracy.

#### **5.13.5 Sampling Equipment Construction Material**

Sampling equipment construction materials can affect sample analytical results. Materials used must not contaminate the sample being collected and must be easily decontaminated so that samples are not cross-contaminated.

### 5.13.6 Sample Preservation

Samples for some analyses must be preserved in order to maintain their integrity. Preservatives required for routine analyses of samples collected are given in Appendix A of this SOP. All chemical preservatives used will be supplied by the Region 4 laboratory. All samples requiring preservation should be preserved immediately upon collection in the field. Samples that **should not** be preserved in the field are:

- Those collected within a hazardous waste site that are known or thought to be highly contaminated with toxic materials which may be highly reactive. Barrel, drum, closed container, spillage, or other source samples from hazardous waste sites are not to be preserved with any chemical. These samples may be preserved by placing the sample container on ice, if necessary.
- Those that have extremely low or high pH or samples that may generate potentially dangerous gases if they were preserved using the procedures given in Appendix A.
- Those for metals analyses which are shipped by air shall not be preserved with nitric acid in excess of the amount specified in Appendix A.

All samples preserved with chemicals shall be clearly identified by indication on the sample tag that the sample is preserved. If samples normally requiring preservation were not preserved, field records should clearly specify the reason.

### 5.13.7 Special Precautions for Trace Contaminant Sampling

Some contaminants can be detected in the parts per billion and/or parts per trillion range. Extreme care must be taken to prevent cross-contamination of these samples. The following precautions shall be taken when trace contaminants are of concern:

- A clean pair of new, non-powdered, disposable latex gloves will be worn each time a different location is sampled and the gloves should be donned immediately prior to sampling. The gloves should not come into contact with the media being sampled.
- Sample containers for source samples or samples suspected of containing high concentrations of contaminants shall be placed in separate plastic bags immediately after collecting, tagging, etc.
- If possible, ambient samples and source samples should be collected by different field teams. If different field teams cannot be used, all ambient samples shall be collected first and placed in separate ice chests or shipping containers. Samples of waste or highly contaminated samples shall never be placed in the same ice chest as environmental samples. Ice chests or shipping containers for source samples or samples suspected to contain high concentrations of contaminants shall be lined with new, clean, plastic bags.
- If possible, one member of the field sampling team should take all the notes, fill out tags, etc., while the other members collect the samples.
- When sampling surface waters, the water sample should always be collected before the sediment sample is collected.
- Sample collection activities should proceed progressively from the least suspected contaminated area to the most suspected contaminated area.

- Investigators should use equipment constructed of Teflon®, stainless steel, or glass that has been properly pre-cleaned (Appendix B) for collection of samples for trace metals or organic compounds analyses. Teflon® or glass is preferred for collecting samples where trace metals are of concern. Equipment constructed of plastic or PVC shall not be used to collect samples for trace organic compounds analyses.

#### 5.13.8 Sample Handling and Mixing

After collection, all sample handling should be minimized. Investigators should use extreme care to ensure that samples are not contaminated. If samples are placed in an ice chest, investigators should ensure that melted ice cannot cause the sample containers to become submerged, as this may result in sample cross-contamination. Plastic bags, such as Zip-Lock® bags or similar plastic bags sealed with tape, should be used when small sample containers (e.g., VOC vials or bacterial samples) are placed in ice chests to prevent cross-contamination.

Once a sample has been collected, it may have to be transferred into separate containers for different analyses. The best way to transfer liquid samples is to continually stir the sample contents with a clean pipette or pre-cleaned Teflon® rod and allow the contents to be alternately siphoned into respective sample containers using Teflon® or PVC (Tygon® type) tubing (and a siphon bulb to start the flow). Teflon® must be used when analyses for organic compounds or trace metals are to be conducted. Any device used for stirring, or tubing used for siphoning, must be cleaned in the same manner as other equipment (Appendix B). However, samples collected for volatile organic compound, oil and grease, bacteria, sulfides, and phenols analyses may not be transferred using this procedure.

It is extremely important that waste (when appropriate), soil and sediment samples be mixed thoroughly to ensure that the sample is as representative as possible of the sample media. The most common method of mixing is referred to as quartering. The quartering procedure should be performed as follows:

1. The material in the sample pan should be divided into quarters and each quarter should be mixed individually.
2. Two quarters should then be mixed to form halves.
3. The two halves should be mixed to form a homogenous matrix.

This procedure should be repeated several times until the sample is adequately mixed. If round bowls are used for sample mixing, adequate mixing is achieved by stirring the material in a circular fashion, reversing direction, and occasionally turning the material over.

#### 5.13.9 Special Handling of Samples for Volatile Organic Compounds (VOCs) Analysis

Water samples to be analyzed for volatile organic compounds should be stored in 40-ml septum vials with screw cap and Teflon®-silicone disk in the cap to prevent contamination of the sample by the cap. The disks should be placed in the caps (Teflon® side to be in contact with the sample) in the laboratory prior to the beginning of the sampling program.

The vials should be completely filled to prevent volatilization, and extreme caution should be exercised when filling a vial to avoid any turbulence which could also produce volatilization. The sample should be carefully poured down the side of the vial to minimize turbulence. As a rule, it is best to gently pour the last few drops into the vial so that surface tension holds the water in a convex meniscus. The cap is then applied and some overflow is lost, but the air space in the bottle is eliminated. After capping, turn the bottle over and tap it to check for bubbles. If any bubbles are present, repeat the procedure with another clean 40-ml vial. Since the VOC vials are pre-preserved, caution should be exercised when the vials are used as the collection device for surface water samples in order to prevent the loss of the preservative. When collecting water samples for VOCs. Three 40-ml vials containing preservative should be filled the with sample.

Soil samples for VOC analyses should be collected and handled as specified in section 12.4. Soil and sediment samples collected for VOC analyses should not be mixed.

#### 5.13.10 Estimating Variability

##### Spacial Variability

The following spacial duplicate sampling procedures should be used during the collection of samples as a measure of variability within the area represented by the sample. When appropriate, spacial duplicate grab and/or composite samples should be collected during major investigations and studies conducted by the Branch. A "major study" would include all investigations where more than twenty (20) samples were collected, or those studies where the study objectives dictate that additional quality control samples be collected. No more than ten percent of all samples should be collected as spacial duplicates. These samples should be collected at the same time, using the same procedures, the same type of equipment, and in the same types of containers as the original samples, but collected from a different location within the area represented by the original. They should also be preserved in the same manner and submitted for the same analyses as the required samples. The collection of spacial duplicate composite samples requires that the sample aliquots be arrayed in a manner different from the original sample and spaced within the same area of representativeness. Data from spacial duplicates will be examined by the lead investigator to determine if the samples represent the areas intended in the project work plan.

##### Temporal Variability

When required, temporal variability at a given sampling location will be measured by collecting temporal duplicate samples. These samples will be collected from the same sampling location, using the same techniques and the same type of equipment, but at a time different from the original sample. The time selected for the temporal duplicate sample will be within the same span of time for which the original sample is designed to be representative in the project work plan. Data from temporal duplicates will be examined by the project leader to determine if samples represent the time span intended in the project work plan.

##### Sample Handling Variability

The effectiveness of sample handling techniques will be measured by collecting split and blank samples.

##### Split Samples

Split samples will be collected by initially collecting twice as much material as is normally collected for a sample. After mixing, the material will be apportioned into two sets of containers. Both sets of containers will be submitted for analyses with one set designated as an "original sample", the other designated as a "split sample". Data from split samples will be examined by the Quality Assurance Officer to determine sample handling variability. On large studies (more than 20 samples), no more than 10 percent of all samples will be collected as split samples.

### Blank Samples

The following blank samples will be prepared by the laboratory and obtained by the project leader prior to traveling to a sample site.

1. **Water Sample VOC Trip Blank** -- A water sample VOC trip blank is required for every study where water samples are collected for VOC analysis. Two sealed preserved (or unpreserved if appropriate) 40-ml VOC vials will be transported to the field. For routine studies these samples will be prepared by lab personnel. Investigators shall request that these samples be provided at least one week in advance of scheduled field investigations and inspections and never (except in emergency situations) less than two days in advance of scheduled field investigations and inspections. These samples should not be picked up earlier than the morning of departure for the scheduled inspection/investigation. These field blanks will be handled and treated in the same manner as the water samples collected for volatile organic compounds analysis on that particular study. These samples will be clearly identified on sample tags and Chain-of-Custody Records as trip blanks.
2. **Soil Sample VOC Trip Blank** -- A soil sample VOC trip blank is required for every study where soil samples are collected for VOC analysis. The required containers are specified in section 12.4. The preparation and pick up of this sample will be the same as for the water sample VOC trip blank. Encore® containers (two for SESD laboratory or 3 for CLP) will be transported to the field. These field blanks will be handled and treated by Branch personnel in the same manner as the soil samples collected for volatile organic compounds analysis on that particular study. These samples will be clearly identified on sample tags and Chain-Of-Custody Records as trip blanks.

The following blanks are prepared in the field:

1. **Inorganic Sample Preservative Blanks** -- Metals and general inorganic sample containers filled with analyte-free water will be transported to the field and preserved and submitted for the same analyses as the other inorganic samples collected. These samples will be clearly identified as preservatives blanks on sample tags and the Chain-Of-Custody Record(s). At least one preservative blank for each type of preserved sample should be collected at the end of routine field investigations. A minimum of one preservative blank should be prepared in the field at the beginning and end of all major field investigations that last more than one week.
2. **Equipment Field Blanks** -- When field cleaning equipment is required during a sampling investigation, a piece of the field-cleaned equipment will be selected for collection of a rinse blank. At least one rinse blank will be collected during each week of sampling operations. After the piece of equipment has been field cleaned and prior to its being used for sample operations, it will be rinsed with organic/analyte free water. The rinse water will be collected and submitted for analyses of all constituents for which normal samples collected with that piece of equipment are being analyzed.
3. **Organic/Analyte Free Water System Blanks** -- When using a portable organic-free water generating system in the field, a sample of the raw source water and water generated will be collected at least once during each week of operations. The collected water sample will be submitted for analyses of all constituents for which normal samples are being analyzed.
4. **Material Blanks** -- When construction materials are being used on a site in such a way as to have a potential impact on constituent concentrations in the sample, a sample of the materials will be submitted for analyses. An example of a situation where construction blanks are required is monitoring well construction. In this situation all materials used in well construction should be submitted for analyses (e.g., grout, sand, tap water, etc.).



5. Automatic Sampler Blanks – In general, cleaning procedures outlined in Appendix B of this SOP should be adequate to insure sample integrity. However, it is the standard practice of the Branch to submit automatic sampler blanks for analyses when automatic samplers are used to collect samples for organic compounds and metals analyses. Automatic sampler blanks for other standard analyses may be submitted in the event of a special investigation (ie, criminal or civil).

The Quality Assurance Officer will inform the project leaders and management when blank samples are found to be unacceptably contaminated. The Quality Assurance Officer will immediately initiate an investigation to determine the cause of the problem. The results of this investigation will be promptly reported to appropriate personnel so that corrective action and/or qualifications to the data can be initiated.

#### 5.13.11 Special Quality Control Procedures for Water Samples for Extractable Organic Compounds, Pesticides, or Herbicides Analyses (Matrix Duplicate)

Duplicate water samples shall be submitted to the laboratory for extractable organic compounds, pesticides, and/or herbicides analyses from at least one sampling location per project and laboratory used. These samples should be collected from a location expected to be relatively free from contamination, since the samples will be used for laboratory quality control purposes. The duplicate samples should be clearly identified as "Duplicate Sample for Matrix Spike" on the sample tag, Chain-Of-Custody Record, in the field logbook, and on the Contract Laboratory Program (CLP) Traffic Report Form (if appropriate). This procedure shall be followed for all projects where water samples are collected for the indicated analyses.

#### 5.13.12 Special Quality Control Procedures for EPA Contract Laboratories

On a case-by-case basis, field investigators may be required to collect split samples (or duplicate samples if appropriate) for analyses by both the Region 4 laboratory and contract laboratories. The split samples are to be submitted to the Region 4 laboratory using established procedures. The contract laboratory involved shall not be notified that samples were split, i.e., there should be no indication on Chain-Of-Custody Records or CLP Traffic Report Forms submitted to the contract laboratories that these samples were split with the Region 4 laboratory.

#### 5.13.13 Special Quality Control Procedures for Dioxins and Furans

All samples collected for dioxins and furans analyses are analyzed by other EPA laboratories or through contract laboratories. The Region 4 laboratory does not conduct in-house analyses for dioxins and furans. The Region 4 laboratory should be consulted for the current quality control procedures for dioxin and furan samples prior to the sampling event.

### 5.14 Internal Quality Control Procedures

#### 5.14.1 Introduction

The focus of this subsection is on Field Equipment Center (FEC) operations involving preparation of sampling and support equipment for field operations as well as for field data generated under the Specific Sample Collection Quality Control Procedures discussed in Section 5.13. Quality control checks of these operations insure that field sampling teams are provided with equipment that is suitable for sampling use, and that field sampling is conducted using proper procedures.

#### 5.14.2 Traceability Requirements

Records, in the form of bound notebooks, will be kept by FEC personnel documenting the dates of operations and the person performing operations for the following:

- Organic/Analyte Free Water System Maintenance (Field and FEC Systems) – Maintenance on field systems will be performed immediately following every major study, or at least once per calendar quarter. FEC system maintenance will be performed at least once per calendar quarter.
- Air Monitoring Instrumentation Checkouts – Pre-loadout checks on air monitoring instrumentation will be recorded each time they are performed. Discrepancies will be immediately reported to the Branch Safety Officer.
- Self Contained Breathing Apparatus (SCBA) Checkouts – Pre-loadout checks on SCBAs will be recorded when they are performed. SCBA checkouts will be performed at least once per calendar quarter in the absence of loadout requests. Any discrepancies will be reported immediately to the Branch Safety Officer.
- Other Equipment Maintenance – Maintenance performed on equipment other than that listed above will be recorded in a logbook for miscellaneous field equipment. All required repairs will be reported to the FEC coordinator.
- Sampling Containers and Latex Gloves – A record will be kept of shipments received of sampling containers and latex gloves. Containers and gloves will be recorded by lot numbers. Upon receipt, the Quality Assurance (QA) Officer will be notified. Containers and gloves within a received lot will not be used until they have been checked by the QA Officer.

All equipment cleaned and wrapped for field use will be marked with the date on which preparation was completed. Equipment will be stored in the FEC in specified areas to minimize the risk of contamination while awaiting use.

#### 5.14.3 Specific Quality Control Checks

At least once per calendar quarter, the QA Officer will conduct the following checks and issue a written report on the results.

1. Collect and submit for analyses samples of each lot of containers received during that quarter. Bottles from each lot will be tagged and sealed, then submitted for the following analyses:

One-Gallon Amber – metals, cyanide, extractable organics, and pesticides.

8-oz. Glass – metals, cyanide, extractable organics, and pesticides.

1-Liter Polyethylene – metals and cyanide.

Latex glove samples will be collected as rinse blanks using organic/analyte free water. The rinsate will be submitted for analyses of VOCs, metals, cyanide, extractable organics, and pesticides. A new glove will be rinsed for each parameter (e.g., one glove for VOC sample, another glove for metals, etc.) to avoid dilution of potential contaminants on the gloves.

2. Collect and submit for analyses a sample of water from the FEC organic/analyte free water system. The sample will be submitted for analyses of VOCs, metals, cyanide, extractable organics, and pesticides.
3. Collect and submit for analyses a rinsate blank of at least one piece of sampling or sample related equipment stored at the FEC. The sample will be submitted for analyses of VOCs, metals, cyanide, extractable organics, and pesticides.
4. Collect the results of field quality control samples from the project leaders for the quarter. Normally, field quality control samples consist of the following:
  - Field split samples (not to include inter-lab splits);
  - Water VOC trip blank samples;
  - Soil VOC trip blank samples;
  - Inorganic sample preservative blanks;
  - Equipment field rinse blanks;
  - Field organic/analyte free water system blanks; and
  - Material blanks.

The QA Officer will evaluate all data received and immediately attempt to resolve any problems found. A written report will be issued on the quality control checks during each calendar quarter. The report will be submitted to appropriate personnel.

#### **5.15 Investigation Derived Waste (IDW)**

##### **5.15.1 Types of IDW**

Materials which may become IDW are:

- Personnel protective equipment (PPE) – This includes disposable coveralls, gloves, booties, respirator canisters, splash suits, etc.
- Disposable equipment – This includes plastic ground and equipment covers, aluminum foil, conduit pipe, composite liquid waste samplers (COLIWASAs), Teflon® tubing, broken or unused sample containers, sample container boxes, tape, etc.
- Soil cuttings from drilling or hand augering.
- Drilling mud or water used for water rotary drilling.
- Ground water obtained through well development or well purging.
- Cleaning fluids such as spent solvents and washwater.
- Packing and shipping materials.

Table 5.15.1 lists the types of IDW commonly generated during investigations, and current disposal practices.

##### **5.15.2 Management of Non-Hazardous IDW**

Disposal of non-hazardous IDW from hazardous waste sites should be addressed in the study plan. To reduce the volume for transportation back to the FEC, it may be necessary to compact the waste into a reusable container, such as a 55-gallon drum.

If the waste is from an active facility, permission should be sought from the operator of the facility to place the non-hazardous PPE, disposable equipment, and/or paper/cardboard wastes into the facilities' dumpsters. If necessary, these materials may be placed into municipal dumpsters, with the permission of the owner. These materials may also be taken to a nearby permitted landfill. On larger studies, waste hauling services may be obtained and a dumpster located at the study site. Non-hazardous IDW may also be buried on site near the contamination source, with the burial location noted in the field logbook.

Disposal of non-hazardous IDW such as drill cuttings, purge or development water, decontamination washwater, drilling muds, etc., should be specified in the approved study plan. It is recommended that these materials be placed into a unit with an environmental permit such as a landfill or sanitary sewer. These materials must not be placed into dumpsters. If the facility at which the study is being conducted is active, permission should be sought to place these types of IDW into the facilities treatment system. It may be feasible to spread drill cuttings around the borehole, or if the well is temporary, to place the cuttings back into the borehole. Cuttings, purge water, or development water may also be placed in a pit in or near the source area. Monitoring well purge or development water may also be poured onto the ground downgradient of the monitoring well. Purge water from private potable wells which are in service may be discharged directly onto the ground surface.

The minimum requirements of this subsection are:

- Liquid and soil/sediment IDW must be containerized and analyzed before disposal.
- The collection, handling, and proposed disposal method must be specified in the approved study plan.

#### 5.15.3 Management of Hazardous IDW

Disposal of hazardous or suspected hazardous IDW must be specified in the approved study plan. Hazardous IDW must be disposed as specified in US-EPA regulations. If appropriate, these wastes may be placed back in an active facility waste treatment system. These wastes may also be disposed of in the source area from which they originated, if doing so does not endanger human health and the environment.

If on-site disposal is not feasible, and if the wastes are suspected to be hazardous, appropriate tests must be conducted to make that determination. If they are determined to be hazardous wastes, they must be properly contained and labeled. They may be stored on the site for a maximum of 90 days before they must be manifested and shipped to a permitted treatment or disposal facility. Generation of hazardous IDW must be anticipated, if possible, to permit arrangements for proper containerization, labeling, transportation, and disposal/treatment in accordance with US-EPA regulations.

The generation of hazardous IDW should be minimized to conserve Branch resources. Most routine studies should not produce any hazardous IDW, with the exception of spent solvents and possibly purged ground water. Care should be taken to keep non-hazardous materials segregated from hazardous waste contaminated materials. The volume of spent solvents produced during equipment decontamination should be controlled by applying only the minimum amount of solvent necessary, and capturing it separately from the washwater.

At a minimum the requirements of the management of hazardous IDW are as follows:

- Spent solvents must be returned to the FEC for proper disposal or recycling.
- All hazardous IDW must be containerized. Proper handling and disposal should be arranged prior to commencement of field activities.

**TABLE 5.15.1  
DISPOSAL of IDW**

| TYPE                  | HAZARDOUS  | NON-HAZARDOUS  |
|-----------------------|--|--|
| PPE-Disposable        | Containerize in plastic 5-gallon bucket with tight-fitting lid. Identify and leave on-site with permission of site operator, otherwise return to FEC for proper disposal.  | Place waste in trash bag. Place in dumpster with permission of site operator, otherwise return to FEC for disposal in dumpster.  |
| PPE-Reusable          | Decontaminate as per Appendix B, if possible. If the equipment cannot be decontaminated, containerize in plastic 5-gallon bucket with tight-fitting lid. Identify and leave on-site with permission of site operator, otherwise return to FEC for proper disposal. | Decontaminate as per Appendix B.   |
| Spent Solvents        | Containerize in original containers. Clearly identify contents. Leave on-site with permission of site operator, otherwise return to FEC for proper disposal.   | N/A  |
| Soil Cuttings         | Containerize in 55-gallon drum with tight-fitting lid. Identify and leave on-site with permission of site operator, otherwise arrange with WMD site manager for testing and disposal.  | Containerize in 55-gallon drum with tight-fitting lid. Identify and leave on-site with permission of site operator, otherwise arrange with site manager for testing and disposal.                            |
| Groundwater           | Containerize in 55-gallon drum with tight-fitting lid. Identify and leave on-site with permission of site operator, otherwise arrange with WMD site manager for testing and disposal.  | Containerize in 55-gallon drum with tight-fitting lid. Identify and leave on-site with permission of site operator, otherwise arrange with site manager for testing and disposal.                            |
| Decontamination Water | Containerize in 55-gallon drum with tight-fitting lid. Identify and leave on-site with permission of site operator, otherwise arrange with WMD site manager for testing and disposal.  | Containerize in 55-gallon drum with tight-fitting lid. Identify and leave on-site with permission of site operator, otherwise arrange with site manager for testing and disposal.                            |
| Disposable Equipment  | Containerize in 55-gallon drum or 5-gallon plastic bucket with tight-fitting lid. Identify and leave on-site with permission of site operator, otherwise arrange with WMD site manager for testing and disposal.   | Containerize in 55-gallon drum or 5-gallon plastic bucket with tight-fitting lid. Identify and leave on-site with permission of site operator, otherwise arrange with site manager for testing and disposal. |
| Trash                 | N/A  | Place waste in trash bag. Place in dumpster with permission of site operator, otherwise return to FEC for disposal in dumpster.  |

## 5.16 References

1. US-EPA, Guidance for the Data Quality Objectives Process (EPA QA/G-4, EPA/600/R-96/055, August 2000)
2. US-EPA, Data Quality Objectives Process for Hazardous Waste Sites (EPA QA/G-4HW, EPA/600/R-00/007, January 2000)
3. ASTM, Standard Practice for Generation of Environmental Data Related to Waste Management Activities: Development of Data Quality Objectives (D5792-95).
4. ASTM, Standard Guide for the Generation of Environmental Data Related to Waste Management Activities: Quality Assurance and Quality Control Planning and Implementation, (D5283-92 (1997).
5. Gilbert, Richard O., Statistical Methods for Environmental Pollution Monitoring, Van Nostrand Reinhold Co., New York, NY, 1987.
6. ASTM, Standard Guide for General Planning of Waste Sampling.
7. US-EPA, Characterization of Hazardous Waste Sites - A Methods Manual, Volume 1 - Site Investigations (EPA 600/4-84/075).
8. US-EPA, Guidance of Choosing a Sampling Design for Environmental Data Collection, (EPA QA/G5-5S, Peer Review Draft, August 2000)
9. Kittrell, F.W., A Practical Guide to Water Quality Studies.
10. US-EPA Order 5360.1, Policy and Program Requirements for the Mandatory Agency-wide Quality System, May 5, 2000.

enter after conducting appropriate air monitoring include, building interiors (if possible the field investigator(s) should attempt to ventilate the enclosed area by opening doors and windows), trenches (less than 3 feet deep), low lying areas in tank farms, tractor trailers, sumps, and behind barriers such as tall buildings or tanks. At a minimum, field investigators should use direct reading instruments such as the combustible gas indicator (CGI), oxygen meter, and an organic vapor analyzer (OVA) to monitor the atmosphere in areas that may unexpectedly trap harmful vapors or have a depleted oxygen supply.

#### 4.3.5 Training Status Tracking System

A computer system is used for tracking the status of required safety training for all personnel involved in hazardous waste field operations within the Division. The system tracks the following safety training:

- Medical monitoring physical (annual renewal);
- 40-hour hazardous waste training (no required renewal);
- 8-hour refresher training (annual renewal);
- Cardio-pulmonary resuscitation (CPR) certification (annual renewal);
- First aid certification (tri-annual renewal);
- Fire extinguisher operation (annual renewal);
- International Air Transport Association (bi-annual renewal); and
- Hazard Communication (no required renewal).

It is the responsibility of the Branch safety officer or their designee to notify field investigators or their supervisor when renewals of required training are due. Notification will be no more than 90 days after the actual renewal date. Scheduling training will be the responsibility of each individual unless otherwise stipulated in the notification. Upon scheduling of the training, the individual will notify the Branch safety officer of the date. Upon successful completion of training, a copy of the certificate received will be sent by the individual to the Branch safety officer for inclusion in the safety training file.

In the event that a field investigator's OSHA required training has lapsed by more than 90 days, the individual will not be allowed to enter onto a hazardous waste site. When lapses in training required by EPA policy occur, the individual will be allowed to enter hazardous waste sites at the discretion of the Occupational Health and Safety Designee (OHSD). The individual and their supervisor will be notified of the change in status. Upon successful completion of the required training, the individual and their supervisor will be notified of their return to prior status.

#### 4.3.6 Site Operations

Upon initial entry at a hazardous waste site, a site survey will be conducted. In a facility that has active working employees, the site survey may be conducted in Level D accompanied by air monitoring. At sites that do not have active working employees, the SSO must use discretion when choosing the level of protection that will be used while conducting an initial site survey. All initial site surveys should be conducted using appropriate air monitoring instruments that detect explosive vapors (CGI), oxygen content, and organic vapors (OVA). The purpose of an initial site survey is to accomplish one or both of the following objectives:

- Determine the hazards that may exist which could affect site personnel.
- Verify existing information or obtain new information about the site.



To accomplish the first objective, an assessment of real or potential dangers from fire, explosion, airborne contaminants, radiation, and oxygen deficient atmospheres must be made. This assessment will be made as follows:

- Combustible Gases -- The atmosphere in any location capable of containing or generating a combustible concentration of gases will be monitored with a combustible gas meter. Response of the meter in excess of 25% of the lower explosive limit (LEL) will cause an immediate evacuation of the site.
- Oxygen Deficiency -- A location capable of containing or generating an oxygen deficiency either by depletion or displacement will be monitored with an oxygen meter. Any reading less than 19.5% oxygen will result in the use of self contained breathing apparatus (SCBA).
- Organic Vapors and Gases -- The atmosphere will be monitored with both a photoionization detector (PID) and a flame ionization detector (FID). When appropriate, cyanide gas and halogenated vapors will also be monitored. Any response above background concentrations will cause an upgrade to Level C respiratory protection. Any response above 5 ppm when contaminants are not known, will cause an upgrade to Level B respiratory protection. A response above 200 ppm when contaminants are not known will cause an upgrade to Level A protection.
- Inorganic Vapors and Gases -- There are only a few direct reading instruments with the capability to detect and quantify non-specific inorganic vapors and gases. PIDs have a very limited capability in this area. If specific inorganics are known or suspected of being present, an attempt should be made to provide appropriate monitoring if possible. In the absence of a monitoring capability always assume a worse case scenario and upgrade the level of protection (see below) to a level that gives respiratory and skin protection that is appropriate to a worse case assumption.
- Radiation -- A radiation survey will be conducted of the site. The primary survey instrument will be a Geiger-Mueller detector for beta/gamma radiation. Any response above background will result in evacuation of the area.

Following the initial survey, monitoring will be repeated when new areas of the site are entered, or when operations likely to cause a release are being conducted.

#### Levels of Personal Protection

Personal protective equipment is divided into four categories based on the degree of protection afforded. The following table compares the relative protection for each level.

|             | Level A | Level B | LEVEL C  | LEVEL D |
|-------------|---------|---------|----------|---------|
| Respiratory | Maximum | Maximum | Moderate | Minimum |
| Skin        | Maximum | High    | Moderate | Minimum |
| Eye         | Maximum | High    | Moderate | Minimum |

The relationship between air monitoring results and levels of protection (LOP) is shown in the following table.

| Instrument | Response                                | LOP |
|------------|---|-----|
| PID/FID    | Background                              | D   |
| PID/FID    | Less than 5 PPM above background        | C   |
| PID/FID    | 5 PPM to 200 PPM                        | B   |
| PID/FID    | Greater than 200 PPM                    | A   |
| Oxygen     | Less than 19.5%                         | B   |
| CN         | Greater than 0 PPM and less than 10 PPM | B   |
| CN         | 10 PPM or greater                       | A   |

**NOTE:** Measurements from direct-reading air monitors are only one consideration for LOP decisions. If contaminants are known, protection can be achieved at a lesser LOP.

The four levels of protection (ranked from least protective Level D to most protective Level A) and a description of the situations for which each is appropriate is as follows:

| LEVEL D                  |   |
|--------------------------|---|
| REQUIRED                 | Shirt, long pants or coveralls  |
|                          | Boots with steel toes and shank   |
| OPTIONAL                 | Gloves  |
|                          | Rubber boots with steel toe and shank   |
|                          | Boot covers (disposable)  |
|                          | Safety glasses, goggles, or face shield (not for chemical splash protection)  |
|                          | Hard hat  |
|                          | Emergency Life Support Apparatus (ELSA)   |
|                          | Thermal/weather protection (coat, overalls, sweater, hat, rain gear, cool vests, and heat stress monitors)  |
| LEVEL D<br>is used when: | The atmosphere contains no known or anticipated hazard.   |
|                          | Work conditions <b>preclude</b> splashes, immersion, or the potential for unexpected inhalation of or contact with hazardous levels of any chemicals. |

| LEVEL C               |   |
|-----------------------|---|
| REQUIRED              | LEVEL D (modified to require chemical resistant boots with steel toe & shank)   |
|                       | Full-face Air Purifying Respirator (APR) (NIOSH approved)   |
|                       | Disposable chemical-resistant overalls  |
|                       | Chemical resistant gloves (inner and outer)   |
|                       | Emergency Life Support Apparatus (ELSA) (for enclosed area initial entry)   |
| OPTIONAL              | Boot covers (disposable)  |
|                       | Hard hat  |
|                       | Face shield   |
|                       | ELSA (for other than initial operations)  |
|                       | Thermal/weather protection (coat, overalls, sweater, hat, rain gear, cool vests and heat stress monitors)   |
| LEVEL C is used when: | The atmospheric contaminants, liquid splashes, or other direct contact will not adversely affect or be absorbed through any exposed skin.                   |
|                       | The types of air contaminants have been identified, concentrations measured, and an air-purifying respirator is available that can remove the contaminants. |
|                       | All criteria for the use of air-purifying respirators are met.  |

NOTE: Level C operations require decontamination of personnel and equipment. Also, zones of protection are required.

Level C is not considered hazardous duty because adequate safety precautions have been taken to reduce the degree of risk.

| MODIFIED LEVEL C               |  |
|--------------------------------|--|
| REQUIRED                       | LEVEL C (modified to include chemically resistant splash suit and triple glove system)             |
|                                | Cool vests and heat stress monitors (if ambient temperature exceeds 80°F) - see below              |
|                                | Splash shield  |
|                                | ELSA (for enclosed area initial entry)   |
| OPTIONAL                       | Boot covers (disposable)   |
|                                | Hard hat   |
|                                | ELSA (for other than initial operations)   |
|                                | Cool vests and heat stress monitors are optional if ambient temperature is 80°F or less)           |
| Modified Level C is used when: | All requirements for atmospheric contaminants and APR use related to normal Level C have been met. |
|                                | Materials being handled require a high degree of splash or contact protection.                     |

**NOTE 1:** Modified Level C operations require decontamination of personnel and equipment. Also, zones of protection are required.

Modified Level C is not normally considered hazardous because adequate safety precautions have been taken to reduce the degree of risk to a negligible level. Modified Level C could be considered hazardous in a situation where atmospheric contamination was not the determining factor

**NOTE 2:** When wearing a chemically resistant splash suit (Level B):

- Cool vests are required when wearing a chemically resistant suit for more than 30 minutes and the temperature is 80°F to 90°F.
- Cool vests are required when wearing an chemically resistant suit for more than 15 minutes and the temperature is above 90°F.
- At the discretion of the SSO, a lack of shade may result in the need for cool vests regardless of the temperature.
- Heat stress monitors are optional unless mandated by the SSO.

| LEVEL B               |  |
|-----------------------|--|
| REQUIRED              | MODIFIED LEVEL C (without the requirement for splash shield, ELSA, and APR)  |
|                       | Positive pressure, full-face piece self-contained breathing apparatus (SCBA)/airline system  |
| OPTIONAL              | Boot covers (disposable)   |
|                       | Hard hat   |
|                       | ELSA   |
|                       | Cool vests and heat stress monitors (if ambient temperature is 80°F or less)   |
|                       | Splash shield  |
| Level B is used when: | The type and concentration of atmospheric contaminants have been identified and require the maximum level of respiratory protection, but only a high level of skin protection.   |
|                       | The atmosphere contains less than 19.5 percent oxygen.   |
|                       | The presence of incompletely identified vapors or gases is indicated by direct-reading detecting equipment, but the concentrations of contaminants are not suspected of posing a hazard through skin contact.  |
|                       | The work involves opening containers suspected of containing concentrated wastes where a likelihood of an air release is possible. In this situation, Level B is the initial protection and can be upgraded or downgraded as more information on the nature of the wastes is gathered. |

**NOTE 1:** Level B operations require decontamination of personnel and equipment. Also, zones of protection are required.

Level B operations normally qualify as hazardous duty because the risk of fire/explosion cannot be mitigated.

**NOTE 2:** When wearing a chemically resistant suit (Level B):

- Cool vests are required when wearing an chemically resistant suit for more than 30 minutes and the temperature is 80°F to 90°F.
- Cool vests are required when wearing an chemically resistant suit for more than 15 minutes and the temperature is above 90°F.
- At the discretion of the SSO, a lack of shade may result in the need for cool vests regardless of the temperature.
- Heat stress monitors are optional unless mandated by the SSO.

| LEVEL A               |  |
|-----------------------|--|
| REQUIRED              | LEVEL D (with chemical resistant rubber boots with steel toe and shank)  |
|                       | Totally-encapsulating chemical-protective suit   |
|                       | Positive pressure, full face-piece self-contained breathing apparatus (SCBA)/airline system  |
| OPTIONAL              | Boot covers (disposable)   |
|                       | Hard hat   |
|                       | Cool vests and heat stress monitors (if ambient temperature is 80°F or less)   |
| LEVEL A is used when: | The hazardous substance has been identified and requires the highest level of protection for skin, eyes, and the respiratory system.   |
|                       | Measurements by direct-reading detecting equipment show concentrations high enough to pose a hazard through skin contact.  |
|                       | Operations are being conducted in confined, poorly ventilated areas not normally intended for human occupation, and conditions requiring a lower level of protection have not been determined (i.e., Levels B, C, or D). |

**NOTE 1:** Level A operations require decontamination of personnel and equipment. Also, zones of protection are required.

Confined space operations require special training and compliance with OSHA permit-required confined space entry procedures.

Level A operations are hazardous duty due to the nature of the equipment worn, and the inability to mitigate the risk of fire/explosion.

**NOTE 2:** When wearing a totally-encapsulated, chemical-protective suit (Level A):

- Cool vests are required when wearing a totally-encapsulated, chemical-protective suit for more than 30 minutes and the temperature is 80°F to 90°F.
- Cool vests are required when wearing a totally-encapsulated, chemical-protective suit for more than 15 minutes and the temperature is above 90°F.
- At the discretion of the SSO, a lack of shade may result in the need for cool vests regardless of the temperature.
- Heat stress monitors are optional unless mandated by the SSO.

## Stress

Field personnel on hazardous waste sites are exposed to both psychological and physiological stress. Psychological stress is countered with adequate training and job proficiency. Physiological stress is primarily due to exposure of the worker to extremes of heat and cold.

### Heat Stress

Heat stress can be the result of working during hot weather or wearing protective clothing that inhibits natural ventilation. It can occur even under moderate temperature conditions. Whenever possible, work should be scheduled during cooler parts of the day or night. The following protocols are to be used to counter heat stress:

- Allow workers to replace lost body fluids, water will be available at the site. Liquids for electrolyte replenishment will be available at the discretion of the SSO.
- Cool vests will be made available. Their use will be designated during modified Level C or higher protective level operations when ambient temperatures exceed 80°F or at the discretion of the SSO (see preceding policy).
- At the discretion of the SSO, workers' vital signs will be monitored (i.e., body temperature, blood pressure and heart rate). If deemed necessary by the site safety officer, workers will be fitted with heat stress monitors. Monitoring of vital signs will be mandatory during modified Level C or higher level operations when ambient temperatures exceed 80°F.
- Adequate shade will be provided to shelter workers from direct exposure to the sun during rest periods.
- Work teams will be rotated so that an individuals time on stressful jobs is minimized.
- Field personnel are encouraged to maintain their physical fitness.
- Intake of diuretics (coffee or alcohol) should be minimized prior to field work.

### Cold Stress

Exposure to extreme cold can result in hypothermia. Field work during periods of low temperatures and high winds should be conducted to minimize the possibility of hypothermia. The following protocols are to be followed:

- Workers will dress as warmly as possible using the principle of layering their clothing to maximize protection.
- Gloves should be worn when handling metal equipment.
- At the discretion of the SSO, work tours will be limited to minimize exposure to the cold.
- Warm shelter will be made available for workers during breaks. Use of vehicles for warm shelter is discouraged due to the possibility of carbon monoxide exposure.

The SSO will carefully observe workers for signs of hypothermia/frostbite.



### Site Control

Site control serves to minimize exposure to contaminants and is accomplished by: 1) providing site security to exclude unnecessary personnel; 2) limiting the number of workers and equipment on-site to the minimum required for effective operations; 3) conducting operations to reduce personal exposure and minimize the potential for airborne dispersion; and 4) implementing decontamination procedures.

### Work Zones

To control access of personnel and equipment to possible contaminants, the site will be divided into work zones. Three categories of zones and one command post are utilized. For all operations except Level D, work zones will be designated as follows:

1. Support Zone -- Along with the command post, this is the outermost boundary of the site. Contamination of personnel and equipment in this area is unlikely.
2. Contamination Reduction Zone -- This area serves as a corridor between the exclusion zone and the support zone. All personnel and equipment passing through this corridor from the exclusion zone to the support zone must undergo appropriate decontamination.
3. Exclusion Zone -- This is an area within the support zone, where actual operations are being conducted. Access to this area is limited to personnel and equipment being utilized at that particular time. The risk of contamination in this area is high.

### Decontamination

Prior to exiting a hazardous waste site, all personnel and equipment (as needed) must undergo a thorough decontamination. The purpose of this decontamination is twofold. First, it minimizes the transportation of hazardous wastes from a site. Second, it protects workers from exposure which may occur while they are removing their protective equipment.

Decontamination must be conducted in an organized, stepwise manner. If certain pieces of the protective equipment are removed prior to the elimination of potential problems by decontamination, the worker may suffer damage due to inhalation or skin contact with contaminants. It is therefore important that persons doing the decontamination work know the proper procedures and the order in which to perform them to insure that such potential personal injuries do not occur. It is also important that site workers avoid contaminating themselves until after they have been cleared to exit the contamination reduction zone.

Decontamination procedures will generate a quantity of hazardous waste (e.g., contaminated solvents, disposable equipment, etc.) called investigation derived waste - IDW. This material must be handled and disposed of in accordance with Section 5.15.

### Level A Decontamination Procedures

Level A operations pose a possibility of hazardous exposure to decontamination workers. Due to the nature of Level A work, personnel in the exclusion zone are likely to have contacted high concentrations of hazardous materials which remain on their protective equipment. Therefore, decontamination workers are required to perform their duties in Level B protection. Following are the Level A decontamination procedures:

1. Immediately upon leaving the exclusion zone, site workers will place all sampling equipment at a designated area provided at the first station. The area will be covered with disposable plastic. Site workers will then proceed to the first decontamination wash tub where their suit, boots, and outer gloves will be thoroughly scrubbed with the appropriate cleaning solution (usually alkaline soap and water). Long handle brushes will be provided for use by the decontamination workers. Decontamination workers should avoid touching the site workers until after they have cleared the rinse station.
2. Site workers' boots and outer gloves will usually be the most contaminated items. Therefore, this step of the decontamination procedure will be accomplished by using soap and water from the washtub/bucket and a brush which is stored in the tub/bucket. In this step, only the boots and gloves of the site worker will be scrubbed. The site workers' suits will be scrubbed using a cleaning solution from a pump sprayer and a brush which is not allowed to contact the more contaminated contents of the washtub/bucket.
3. After clearance from the decontamination personnel, the site worker will proceed to the rinse water washtub/bucket. At this location, the decontamination personnel will scrub the site workers' boots and outer gloves with water from the washtub/bucket using a long handle brush. The site workers' suits will be rinsed with water from a pump sprayer, scrubbed with a brush which has not been allowed to contact the contaminated water in the washtub/bucket, and finally rinsed a second time with water from a pump sprayer.
4. Once cleared by the decontamination personnel, the site worker will exit the rinse tub/bucket area and proceed to a location where the outer gloves and boot covers (if used) will be removed and discarded. Having been decontaminated, the site worker will exit the contamination reduction corridor and enter the support zone. The support zone will be located a distance of at least 25 feet upwind of the last station in the contamination reduction corridor.
5. Once in the support zone, the site workers may receive a fresh cylinder of air, new outer gloves, and new boot covers and return through the contamination reduction corridor to the exclusion zone. If there is to be no immediate return to the exclusion zone, site workers will proceed to the last station. At this location, site workers will remove their boots first, and then remove the suit. Following this, SCBAs and cool vests (if used) will be removed. Each site worker will then clean their SCBA masks with a soap and water rinse, followed by cleaning the inside of the mask with an alcohol wipe. Finally, the site workers will remove their inner glove systems which will be discarded.
6. Decontamination personnel for Level A operations will themselves require decontamination prior to entering the support zone. Decontamination personnel will perform decontamination on each other. A decontamination line separate from the Level A decontamination line will be set up for this purpose. Procedures used on this decontamination line will be those given for Level B decontamination. Under no circumstances will decontamination personnel attempt to perform personal decontamination in the Level A decontamination line.

## Level B Decontamination Procedures

Level B operations pose a limited risk of exposure to decontamination personnel. Level B site workers often exit the exclusion zone with moderate levels of contamination on their outer gloves and boots. To a lesser extent, contamination may be present on their splash suits. To protect against exposure to this contamination, decontamination workers will perform their functions in Level C protection.

1. Upon exiting the exclusion zone, site workers will place all equipment in a designated area provided at the first station. The area will be covered with disposable plastic. Following the equipment drop, site workers will proceed to the first decontamination washtub/bucket area where their boots and outer gloves will be thoroughly scrubbed with the appropriate cleaning solution (usually alkaline soap and water). Long handle brushes will be provided for use by the decontamination workers. While at the first decontamination washtub/bucket area, decontamination workers will not attempt to scrub the site workers' suits above chest height. This procedure is to prevent the cleaning solution carrying contaminants from splashing into the open facial area of the impermeable suit. When scrubbing the impermeable suit and SCBA equipment below chest level, decontamination workers will apply water from a pump sprayer and use long handle brushes which have not come into contact with the water in the washtub/bucket. Following this step, decontamination workers will clean areas of the impermeable suit and SCBA above chest level as necessary with paper towels wetted with the cleaning solution from the pump sprayers. Immediately following this step, the decontamination workers will discard their outer gloves and don clean ones. Areas above chest level of the site workers will then be rinsed with clean water from a pump sprayer.
2. Once cleared from the first decontamination washtub/bucket area, site workers will then step into the rinse water washtub/bucket. At this location, decontamination workers will thoroughly scrub the site workers' boots and gloves with water from the washtub/bucket using a long handle brush. The site worker will then be rinsed with water from a pump sprayer. Following this, the decontamination workers will thoroughly scrub site workers (below chest level only) with a long handle brush which is not allowed to contact the contaminated water in the washtub/bucket. Site workers will be rinsed a second time with water from a pump sprayer.
3. Once cleared by decontamination personnel, site workers will exit the rinse tub/bucket and proceed to a location where the outer gloves and boot covers (if used) will be removed and discarded. Having been decontaminated, site workers will exit the contamination reduction corridor and enter the support zone. The support zone will be located a distance of at least 25 feet upwind of the last station in the contamination reduction corridor.
4. Once in the support zone, site workers may receive a fresh cylinder of air, new outer gloves and boot covers then return through the contamination reduction corridor to the exclusion zone. If there is to be no immediate return to the exclusion zone, the site workers will proceed to the last station. At this location, site workers will remove their boots first, then remove their SCBA. Following this, the impermeable suit and cool vest (if worn) will be removed. Each site worker will then clean their SCBA mask with a soap solution and water rinse, followed by cleaning the inside of the mask with an alcohol wipe. Finally, the site workers will remove their inner gloves and discard them.
5. Decontamination personnel for Level B operations will require a minimal amount of decontamination before exiting the contamination reduction zone. This decontamination will consist of a boot rinse in the rinse water washtub/bucket (not the decontamination cleaning solution washtub/bucket), followed by removing the outer gloves and discarding them. If boot covers are worn by decontamination personnel, the boot rinse can be eliminated and the covers can simply be removed and discarded. Decontamination workers can then enter the support zone where new

respirator cartridges, outer gloves, and boot covers can be obtained for return to the contamination reduction corridor. If no immediate return to the corridor is anticipated, decontamination workers can remove their respirators and clean them in a soap wash and water rinse, followed by cleaning the inside of the mask with an alcohol wipe. Their inner gloves will then be removed and discarded.

#### Level C Decontamination Procedures

Level C operations do not pose a significant risk of exposure to decontamination workers. Therefore, Level D protection is all that is required to be worn when performing decontamination functions.

1. Upon exiting the exclusion zone, site workers will place their equipment in a designated area provided at the first decontamination station. The area will be covered with disposable plastic. Following this, they will proceed to a decontamination cleaning solution washtub/bucket area where decontamination personnel will scrub their boots with a long handle brush. Once cleared from the cleaning solution washtub/bucket area, the site worker will step into a water rinse washtub/bucket. Upon leaving the water rinse tub/bucket, site workers will remove their outer gloves and boot covers (if used) and discard them.
2. Site workers are then clear to enter the support zone where they may obtain new respirator cartridges, outer gloves, and boot covers for return to the exclusion zone. If an immediate return is not anticipated, site workers may remove their respirators. Respirators will be washed in soap solution and rinsed in water. Following this, the inside of the respirators will be cleaned with an alcohol wipe. Finally, site workers will remove and discard their inner gloves.
3. Decontamination personnel may exit the contamination reduction corridor without having to conduct any decontamination upon themselves other than to remove and discard their gloves.

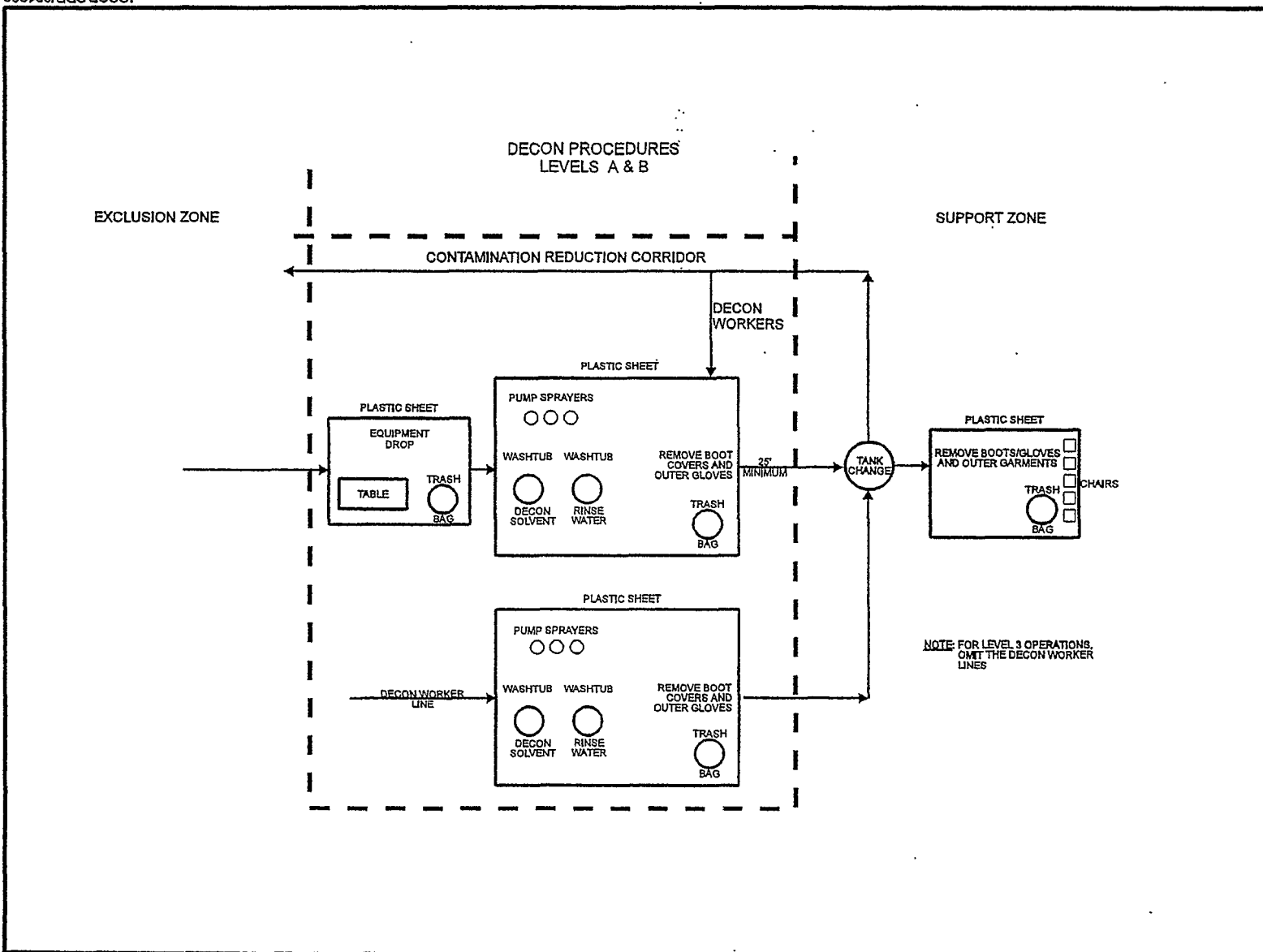
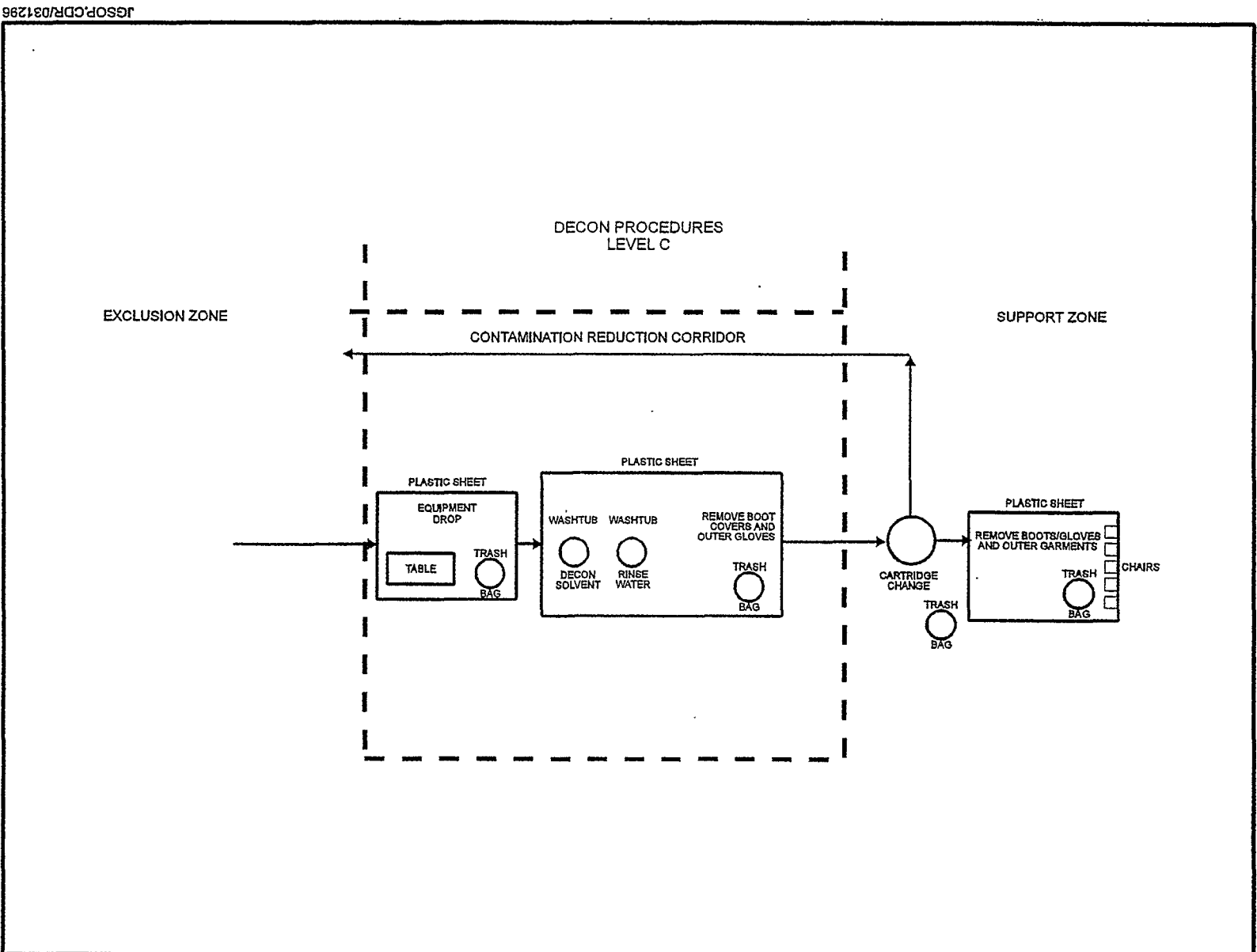


FIGURE 4-1  
DECONTAMINATION ZONE FOR LEVELS A AND B

FIGURE 4-2  
DECONTAMINATION ZONE FOR LEVEL C



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