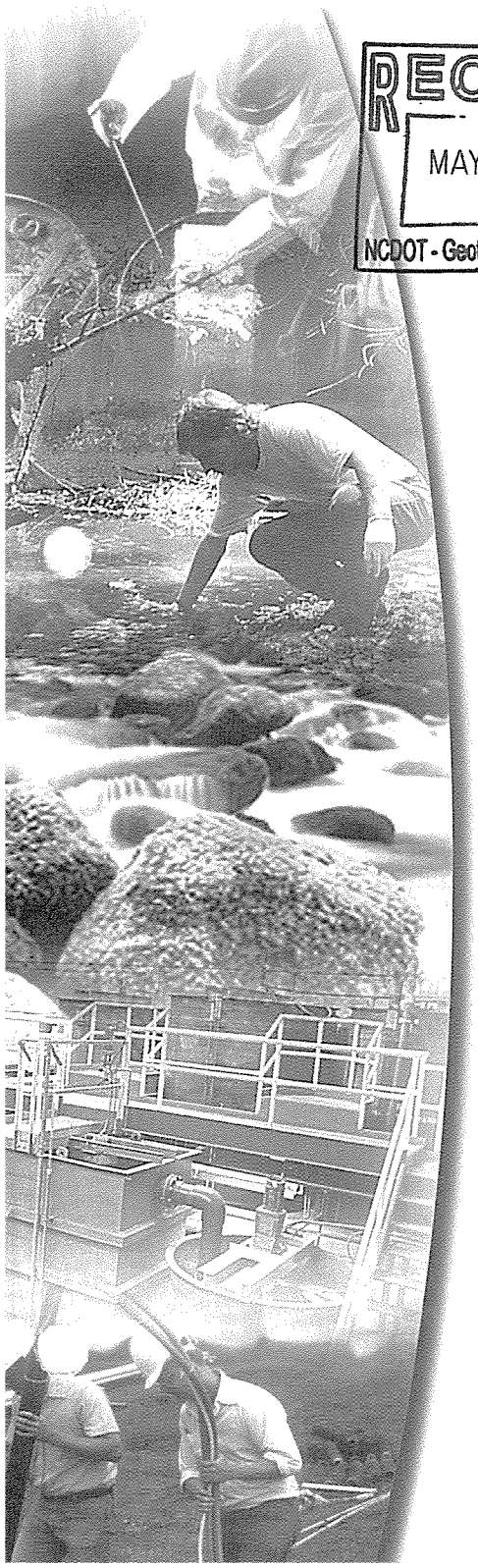



# LIMITED PRELIMINARY SITE ASSESSMENT

**Parcel 88**
**Bill Riddle Property (Riddle Fuel Oil Company)**
**335 US Highway 19E**
**Burnsville, NC 28714**

State Project No. R-2519A
WBS Element No. 35609.1.1
**EI Project No. ENMO060029.00**

Prepared For:

Gregory A. Smith
State of North Carolina
Department of Transportation
Geotechnical Unit
GeoEnvironmental Section
1589 Mail Service Center
Raleigh, NC 27699-1589

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May 2006

**LIMITED PRELIMINARY SITE ASSESSMENT (PSA)**

**Conducted on**

**Parcel 88**
**Bill Riddle Property**
**335 US Highway 19E**
**Burnsville, NC 28714**
**State Project No. R-2519A**
**WBS Element No. 35609.1.1**
**EI Project No. ENMO060029.00**

For

Mr. Gregory A. Smith
State of North Carolina
Department of Transportation
Geotechnical Engineering Unit
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1589 Mail Service Center
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Issue Date: May 12, 2006

Kevin D. Horton
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Signature

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David C. Brewster, P.G.
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NORTH CAROLINA LICENSED SEAL 1212 5-12-06 GEOLOGIST DAVID CHASE BREWSTER

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# 1.0 INTRODUCTION

Environmental Investigations, Inc. (EI) conducted a *Limited Preliminary Site Assessment* (PSA) within the existing and/or proposed North Carolina Department of Transportation (NCDOT) *right-of-way* (ROW) adjacent to a parcel (identified by the NCDOT as Parcel 88) located at 335 US Highway 19E, Burnsville, North Carolina 28714. A fuel oil company is currently located on the adjacent parcel. The report presented herein documents the findings of the PSA that was conducted within the described ROW. For purposes of this report, the terms subject site and/or site include the existing NCDOT ROW and the proposed ROW, and/or the abutting property/parcel.

## 1.1 Report Organization

Field activities were conducted by Mr. Kevin D. Horton, an Environmental Geologists with EI, on March 29, 2006. The report presented herein summarizes the scope of work conducted, discusses sampling procedures, and presents our findings, conclusions and recommendations. A table entitled "Summary of Soil Analytical Results" is presented in **Table 1,** and a table entitled "Summary of Groundwater Analytical Results", is presented in **Table 2**. A "Site Location Map", a "Site Map" and "Impacted Soils Map" are presented in **Figures 1**, **2**, and **3,** respectively. A compilation of "Site Photographs" are presented in **Appendix A**, the "Standard Field Operating Procedures (SOP)" are presented in **Appendix B**, "Soil Boring Logs" are included in **Appendix C**, Analytical Laboratory Reports are presented in **Appendix D,** and a Geophysical Report conducted by Schnabel Engineering South is presented in **Appendix E**.

## 1.2 Background

Mr. Eugene Tarascio, GeoEnvironmental Project Manager with the NCDOT GeoTechnical Engineering Unit submitted to EI a "*Request for Supplemental Technical and Cost Proposal*" (RFP), dated February 24, 2006. The RFP solicited a technical and cost proposal to perform Limited PSAs on a total of 18 Parcels located within a NCDOT Highway Project, identified as WBS Element #35609.1.1, State Project #R-2519A, located in Burnsville, NC. The RFP outlined site information on each of the 18 parcels, some site photographs and NCDOT Figures (Plan Sheets) were attached to the RFP. Mr. Gregory A. Smith, LG, PE, GeoEnvironmental Supervisor with the NCDOT, GeoTechnical Engineering Unit, GeoEnvironmental Section authorized EI to perform the PSAs, as documented in a "Notice to Proceed" (NTP) dated March 13, 2006.

## 1.3 Objectives

The objective of performing the PSA was to determine if existing onsite USTs have impacted the subsurface of the existing and/or proposed ROW. The study (PSA) on the referenced parcel (Parcel 88 – Bill Riddle Property) included herein was performed with a reasonable effort to investigate

and quantify potentially petroleum-hydrocarbon impacted subsurface soils. However, findings documented in the report do not constitute a guarantee that all potential sources of (petroleum) environmental contamination have been assessed and subsequently analyzed.

This report is provided for the sole use of the NCDOT on the project for which it was prepared. All materials and information used for this project were obtained by EI, Inc. Use of this report by any third parties other than the NCDOT will be at such party's sole risk. EI Inc. disclaims liability for any use of or reliance on this report by third parties.

## 2.0 SCOPE OF WORK & ENVIRONMENTAL SERVICES

### 2.1 Requested Scope of Work

Documented in the RFP, dated February 24, 2006, the NCDOT requested the following scope of work:

- Determine if contaminated soils are present around any underground storage tanks (USTs) identified that are within the existing and/or proposed ROW;
- Collection of soil samples every 15.24 meters (50 feet) to a maximum depth of 2.44 meters (8 feet) along the proposed drainage. If there is no proposed drainage, collect samples at same interval along the edge of existing and/or proposed ROW within the "area of investigation";
- delineate and estimate the quantity of impacted soils and indicate the approximate area of soil contamination on a site map for each site;
- if groundwater is encountered and the project manager suspects the possibility of groundwater contamination, obtain a sample for analysis by converting one (1) of the borings to a temporary monitoring well;
- for each groundwater sample collected, also obtain a 24-hour groundwater depth;
- if a groundwater sampled is collected for proposed drainage, perform aquifer testing to determine the recharge rate and use this to provide an estimated quantity of contaminated water that will have to be disposed of when de-watering occurs to install the proposed drainage; prepare a report including field activities, findings, and recommendations for the site and submit in quadruplet to the NCDOT office.

### 2.2 Scope of Services

To accomplish the scope-of-services, a field reconnaissance was performed to identify general site conditions, and Direct Push Technology (DPT) was utilized to collect soil samples on the subject parcel.

To perform the requested Limited PSA, EI personnel supervised, oversaw and performed site reconnaissance activities and collected appropriate samples to complete the project objectives. To complete the study on the subject parcel, EI performed the following scope of services:

- Supervision, and oversight of the advancement of eight (8) soil test borings utilizing DPT methods to the respective depths of 3.05 – 6.1 meters (10 - 20 feet) below the land surface (bls) within the existing and/or the proposed NCDOT right-of-way.
- Collection and submittal of eight (8) soil samples for laboratory analytical testing.
- Groundwater was not encountered during the site reconnaissance activities.
- Photo documentation of pertinent site features.

Preparation of the *Limited PSA Report*, presented herein that presents our findings and conclusions along with our recommendations.

# 3.0 SITE CHARACTERIZATION

## 3.1 Site Location

A fuel oil company known as the Bill Riddle Property (Riddle Fuel Oil Company) is currently located at 335 US Highway 19E, in Burnsville, North Carolina 28714 (**Figure 1**). The subject property is currently located immediately adjacent to the existing ROW (**Photograph 1**) as identified in DOT's R-2519A Plan Sheet 18/19. Copies of digital site photographs are presented in **Appendix A**.

## 3.2 Physical Setting

The subject site parcel currently consists of a fuel oil company. The parcel consists of a one-story building and asphalt parking. See **Figure 2** for the location of the business.

### 3.2.1 Number and Capacities of USTs

Based on information provided by the NCDOT, one (1) 3,785-liter (1,000-gallon) kerosene UST and one (1) 3,785 liter (1,000-gallon) diesel UST is currently located on the eastern side of the onsite building approximately 28 meters (91 feet) north of the centerline of US 19E. The USTs were reportedly not in use at the time of the site visit appeared to be situated north well beyond the NCDOT proposed ROW.

## 3.3 Site Topography

Site observations and review of the Burnsville, NC United States Geological Survey (USGS) Topographic Quadrangle Map (1998) revealed that the subject site is located at an elevation of approximately 816 meters (2,680 feet) above mean sea level (msl) (**Figure 1**). Topographically, the site slopes gently to the northeast. Surface water runoff appears to flow directly north in the direction of Little Crabtree Creek located adjacent the site to the north.

## 3.4 Land Use & Surrounding Properties

The subject property is located inside the city limits of Burnsville, NC. Land use in the immediate vicinity of the site is characterized by commercial properties. The site is bounded on the north by undeveloped property, to the east by commercial properties, to the west by undeveloped properties and to the south by US 19E.

# 4.0 SUBURFACE INVESTIAGTION

## 4.1 Geophysical Survey

Schnabel Engineering South, locally based in Greensboro, North Carolina, was subcontracted to provide geophysical services on the subject site. The purpose of the geophysical survey was to locate potential UST systems within the existing and/or proposed ROW. The contractor conducted an electromagnetic (EM) induction survey utilizing a Geonics EM61-MK2 instrument. Ground penetrating radar (GPR) investigations of selected EM61 anomalies were conducted using a Geophysical Surveys System SIR-2000 system equipped with a 400 MHz antenna. The geophysical contractor surveyed an estimated 1,487.5 square meters (4,879 square feet) located on the subject site. Based on Geophysical report, anomalies were identified probably due to insignificant buried metal objects, known site features, linear anomalies caused by a buried utility, and by buried metal culverts.

## 4.2 Geophysical Survey Results

A detailed report documenting the geophysical survey activities and results of the study is included in **Appendix E.**

## 4.3 Subsurface Soils Investigation

Subsurface Environmental Investigations (SEI), based in Statesville, North Carolina, was selected and subcontracted to provide DPT services. On April 4, 2006, EI directed and supervised the advancement of six (6) soil test borings (GP-1 through GP-6), in the vicinity of the proposed drainage pipe and two (2) borings (GP-7 and GP-8) in the vicinity of the tank pit and former pump island location.

In general, the borings were advanced in order to evaluate the absence/presence of potential subsurface soil (vadose zone) impact and/or subsurface groundwater (petroleum smearing) impact associated with potential petroleum releases associated with either former and/or present UST system spills and/or releases into the subsurface. The soil borings were advanced to investigative depths ranging from 3.05 – 6.1 meters (10 - 20 feet) bls.

## 4.4 Soil Test Boring Methodology

A complete descriptive explanation of EI's *Standard Field Operating Procedures* that discusses specific sampling methodology is presented in **Appendix B.**

## 4.5 Soil Sample Collection Procedures

A total of eight (8) soil samples were collected for laboratory analysis. Soil samples retained for laboratory analysis were shipped to a representative of Paradigm Analytical Laboratory, for laboratory analytical testing. Dates and times of sample shipment may be referenced in the analytical Chain-of Custodies (COC) presented in **Appendix D**.

## 4.6 Backfill Activities

At the completion of the exploratory subsurface advancement activities, the test borings were backfilled to surface grade. A complete descriptive explanation of EI's *Standard Field Operating Procedures* that discusses backfill procedures is presented in **Appendix B**.

## 4.7 Subsurface Soil Lithology

During boring advancement activities, soil samples were classified in the field by an EI geologist utilizing the Unified Soil Classification System (USCS). Subsurface soils encountered in the area of study were fairly consistent. The on-site geology consists of grass or asphalt with surficial topsoil from the surface to approximately 0.15 meters (0.5-foot) below grade. Layers of soil consisting of tan to white sandy SILT (ML) were encountered to the investigated depth of approximately 6.1 meters (20.0 feet) below the land surface (bls).

Detailed descriptions are presented in Soil Boring Logs included in **Appendix C**. The boring logs include an interpretation of subsurface conditions based on field samples.

## 4.8 Groundwater Investigation

### 4.8.1 Temporary Monitoring Well Installation

During the field study groundwater was not encountered at this site.

### 4.8.2 Monitoring Well Sampling

Groundwater was not encountered during this site visit.

# 5.0 LABORATORY TESTING AND RESULTS

## 5.1 Subsurface Soil Analytical Methods

A total of eight (8) soil samples (GP1 – GP8) were submitted for TPH analyses by Method 8015B with preparation methods for the analysis of Diesel Range Organics (DRO) by GC-FID and Gasoline Range Organics (GRO) by GC-FID. The GRO method is utilized to extract volatile fuels such as gasoline, while the DRO method is utilized to extract less volatile petroleum products such as diesel fuel, No. 2 fuel oil, kerosene, and varsol. One (1) soil sample (GP-10) was submitted for risk-based analysis consisting of EPA methods 8260, 8270, MADEP EPH and VPH.

## 5.2 Soil Laboratory Analyses Results

Analysis of the soil samples collected showed that none of the eight (8) samples showed concentrations of GRO or DRO at concentrations above the method laboratory detection limits.

Risk-Based analysis of GP- 8 (in the vicinity of the subject USTs) did not show concentrations of VOCs, SVOCs aliphatics and aromatics at or above the method detection limits.

The specific results of the analytical testing of the soil samples are tabulated and presented in **Table 1**. The complete laboratory results and Chain-of-Custody Records are presented in **Appendix D**.

## 5.3 Groundwater Laboratory Analysis

Groundwater was not encountered during this site visit.

## 5.4 Groundwater Laboratory Analyses Results

Groundwater was not encountered during this site visit.

## 6.0 SUMMARY OF FINDINGS

EI has reviewed information gathered during the Limited PSA study including the site reconnaissance activities, review of NCDOT plan sheets, review of the site investigation including soil collection activities, and review of a laboratory analyses report. Compiled below is a summarized list of the significant findings.

- One (1) 3,785-liter (1,000-gallon) kerosene UST and one (1) 3,785-liter (1,000-gallon) diesel UST are currently located on the eastern side of the onsite building approximately 28 meters (91 feet) north of the centerline of US 19E. The USTs were reportedly not in use at the time of the site visit appeared to be situated north well beyond the NCDOT proposed ROW.

- Groundwater was not encountered at the site.

- Analysis of the soil samples collected did not show the presence of residual petroleum in the eight (8) samples analyzed for GRO or DRO.

- Risk-Based analysis of one (1) of the samples (collected in the vicinity of the subject USTs) did not show concentrations of VOCs, SVOCs aliphatics and aromatics at or above the method detection limits.

## 7.0 CONCLUSIONS AND RECOMMENDATIONS

EI personnel have reviewed information obtained during the *Limited PSA* at the site (Parcel 88) and present the following conclusions and recommendations.

Based upon the absence of petroleum hydrocarbon field indicators at shallow depths and at depths below the bottom of the USTs, it appears that there has not been an impact to the existing/proposed ROW.

At this time, no other recommendations are warranted.

Note: This report does not constitute a guarantee that all potential sources of environmental contamination have been assessed and subsequently analyzed.

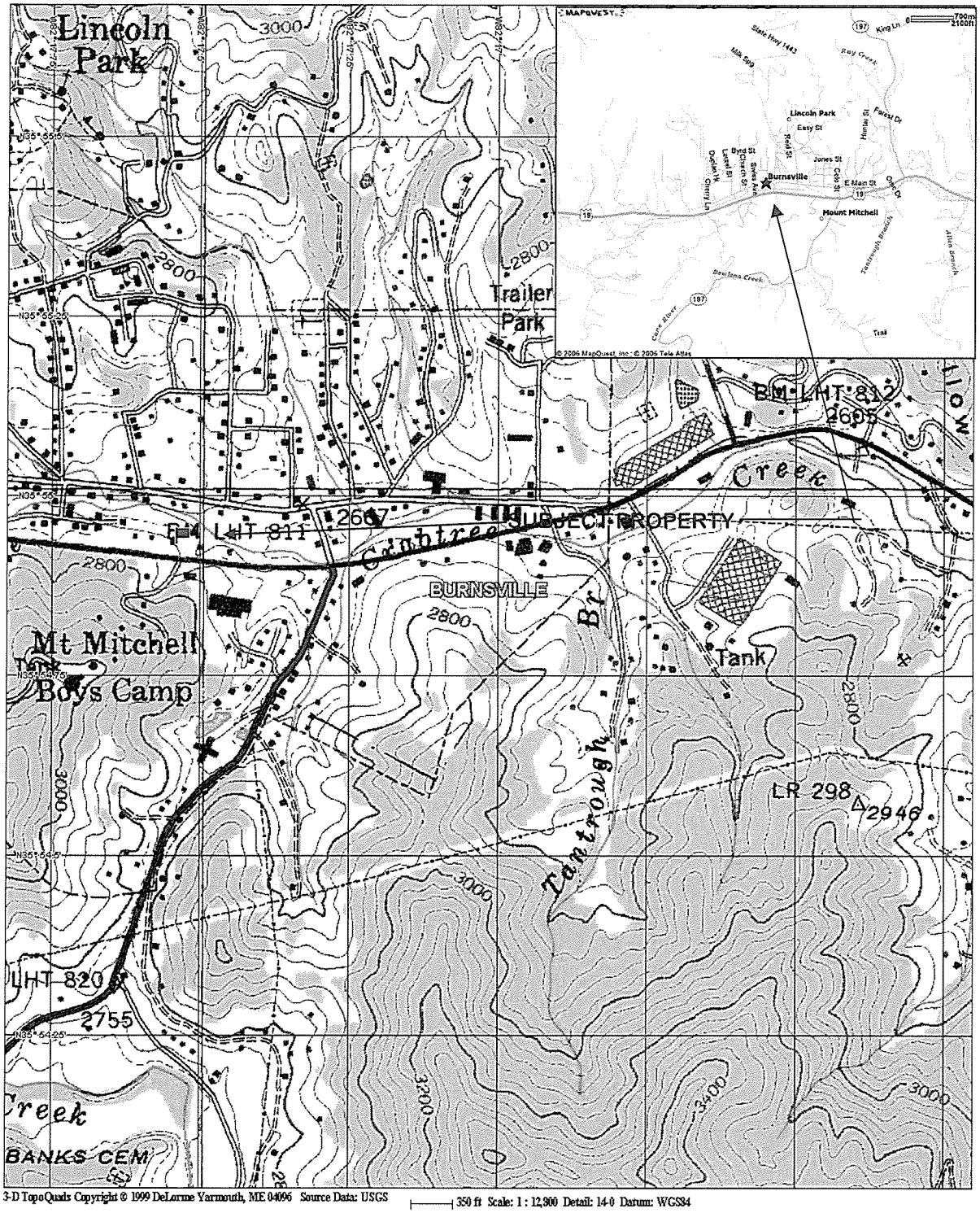
# TABLES

# TABLE 1
## SUMMARY OF SOIL ANALYTICAL RESULTS
### Parcel 88
**Bill Riddle Property**
**335 US Highway 19E, Burnsville, NC 28714**
**State Project No. R-2519A**

| Sample Identification | | | | GP-1 | GP-2 | GP-3 | GP-4 | GP-5 | GP-6 | GP-7 | GP-8 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample Depth Meters (Feet) | | | | 1.83-2.44 (6-8) | 1.83-2.44 (6-8) | 1.83-2.44 (6-8) | 1.83-2.44 (6-8) | 1.83-2.44 (6-8) | 1.83-2.44 (6-8) | 1.83-2.44 (6-8) | 1.83-2.44 (6-8) |
| Sample Date | | | | 4/4/2006 | | | | | | | |
| Field Screening Results-PID (ppm) | | | | 0.9 | 0.8 | 0.9 | 1.0 | 0.6 | 1.0 | 0.9 | 0.9 |
| **Laboratory Analysis** | Cleanup Standards (MSCC) Residential MSCC (mg/kg) | Industrial Commercial MSCC (mg/kg) | Soil-to-GW MSCC (mg/kg) | | | | | | | | Laboratory Results (mg/kg) |
| MADEP VPH | | | | | | | | | | | |
| C5-C8 Aliphatics | 939 | 24528 | 72 | | | | | | | | <10 |
| C9-C12 Aliphatics | 9386 | 245280 | 3255 | | | | | | | | <10 |
| C9-C10 Aromatics | 469 | 12264 | 34 | | | | | | | | <10 |
| MADEP EPH | Cleanup Standards (MSCC) | | | | | | | | | | Laboratory Results (mg/kg) |
| C9-C18 Aliphatics | 9386 | 245280 | 3255 | | | | | | | | <10 |
| C19-C36 Aliphatics | 469 | 12264 | 34 | | | | | | | | <10 |
| C11-C22 Aromatics | 93860 | * | Immobile | | | | | | | | <10 |
| Volatile Organic Compounds Method 8260B/5035 | Cleanup Standards (MSCC) | | | | | | | | | | Laboratory Results (mg/kg) |
| Benzene | 22 | 200 | 0.0056 | | | | | | | | BQL |
| Toluene | 3200 | 82000 | 7 | | | | | | | | BQL |
| Ethylbenzene | 1560 | 40000 | 0.24 | | | | | | | | BQL |
| Total Xylenes | 32000 | 200000 | 5 | | | | | | | | BQL |
| 2-Butanone (MEK) | 9385 | 245280 | 0.7 | | | | | | | | BQL |
| Acetone | 1564 | 40880 | 3 | | | | | | | | BQL |
| Isopropylbenzene (Cumene) | 1564 | 40880 | 2 | | | | | | | | BQL |
| n-Propylbenzene | 156 | 4088 | 2 | | | | | | | | BQL |
| 1,2,4-Trimethylbenzene | 782 | 20440 | 8 | | | | | | | | BQL |
| 1,3,5-Trimethylbenzene | 782 | 20440 | 7 | | | | | | | | BQL |
| sec-Butylbenzene | 156 | 4088 | 3 | | | | | | | | BQL |
| n-Butylbenzene | 156 | 4088 | 4 | | | | | | | | BQL |
| Naphthalene | 63 | 1635 | 0.58 | | | | | | | | BQL |
| Diisopropylether (DIPE) | 156 | 4088 | 0.37 | | | | | | | | BQL |
| Methyl Tert-butyl Ether (MTBE) | 156 | 4088 | 0.92 | | | | | | | | BQL |
| Methylene chloride | 85 | 763 | 0.02 | | | | | | | | BQL |
| p-Isopropyltoluene | NS | NS | NS | | | | | | | | BQL |
| All Remaining Analytes | NA | NA | NA | | | | | | | | BQL |
| Semivolatile Organic Compounds SW846-8270C | Cleanup Standards (MSCC) | | | | | | | | | | Laboratory Results (mg/kg) |
| Naphthalene | 63 | 1635 | 0.58 | | | | | | | | BQL |
| 2-methyl naphthalene | 63 | 1635 | 3 | | | | | | | | BQL |
| Phenanthrene | 469 | 12264 | 60 | | | | | | | | BQL |
| All Remaining Analytes | NA | NA | NA | | | | | | | | BQL |
| Laboratory Analysis (Total Petroleum Hydrocarbons by GC/FID 8015) | NCDENR[1] (Volume II) Reportable Concentration (mg/kg) | | | LABORATORY RESULTS (mg/kg) | | | | | | | |
| Gasoline Range Organics | 10 | | | BQL | BQL | BQL | BQL | BQL | BQL | BQL | BQL |
| Diesel Range Organics | | | | BQL | BQL | BQL | BQL | BQL | BQL | BQL | BQL |

NOTE:
mg/kg denotes parts per million
MSCC = Maximum Soil Contaminant Concentrations
***Bold & Italics Font*** = In Excess of MSCC Cleanup Standards
[1] NCDENR = North Carolina Department of Enviornment & Natural Resources

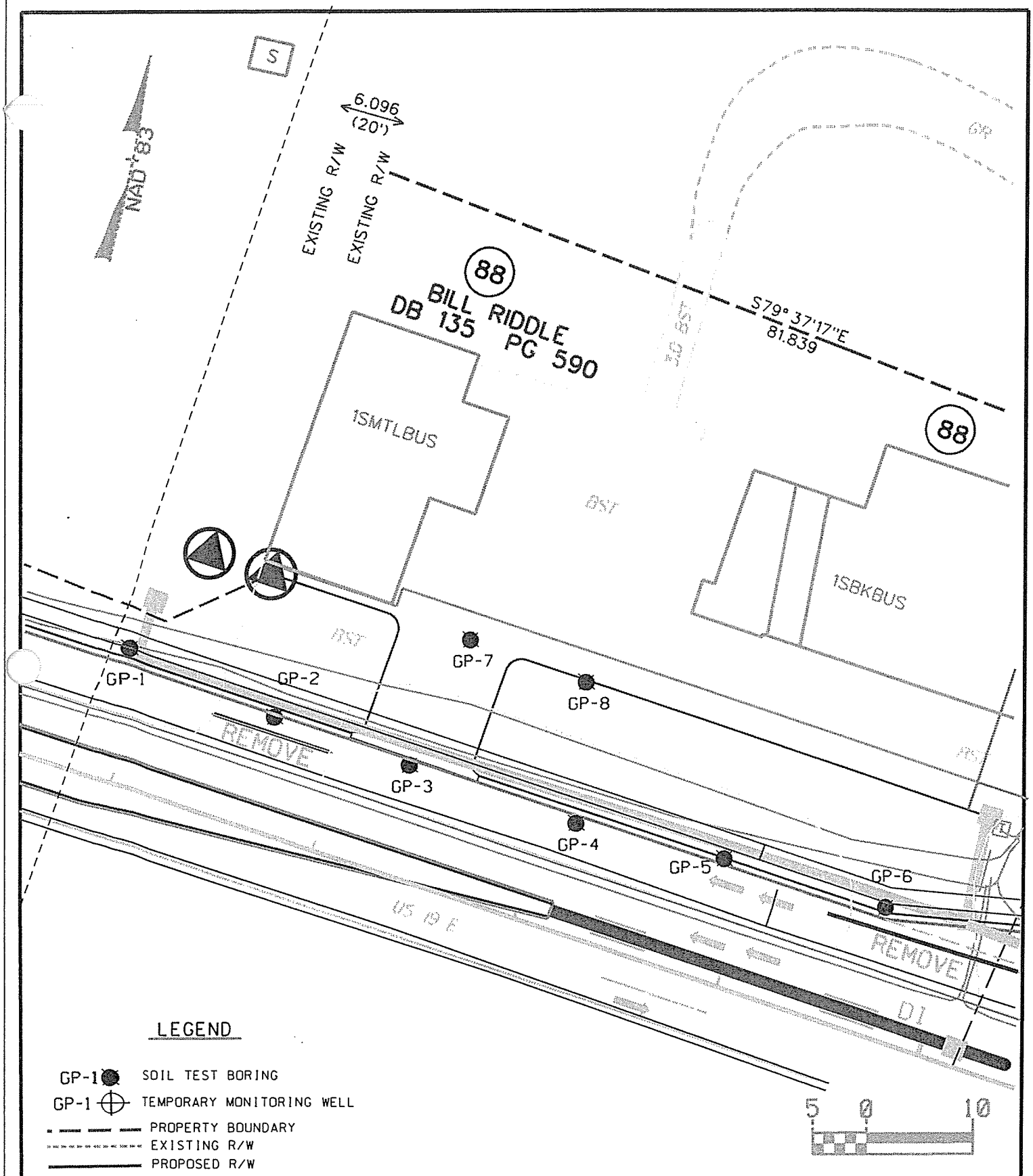
# FIGURES




| | |
|---|---|
| FIGURE NUMBER: | 1 |
| QUAD: | Burnsville |
| PROJECT NUMBER: | ENMO060029 |
| SCALE: | As Shown |

**SITE LOCATION MAP**
Bill Riddle Property
335 US Highway 19 E
Parcel 088
Burnsville, North Carolina

EI
ENVIRONMENTAL INVESTIGATIONS, INC

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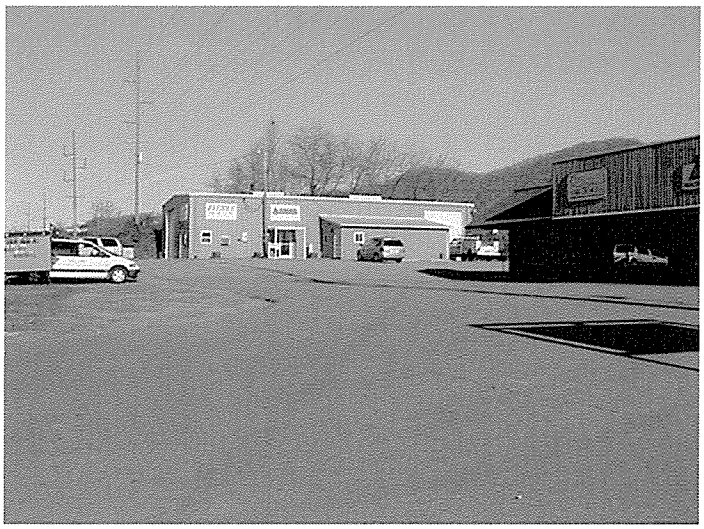
|---|---|
| FIGURE: | 2 |
| DRAWN BY: | NCDOT/RMS |
| DATE: | APR 2006 |
| PROJ NO: | ENM0060029.00 |
| SCALE: | 1 cm = 5m |

SITE MAP
PARCEL 88
BILL RIDDLE PROPERTY
335 US HWY 19E
Burnsville, NC 28714
WBS Element: 35609.1.1

# APPENDIX A

# SITE PHOTOGRAPHS



**Subject Property**

**Borings GP3, GP4 and location of fiber optic cable**

**Borings GP5 and GP6 facing west**

**Borings GP7 and GP8 facing west**

**Eastern adjoining property**

**Highway 19E and southern adjacent property**

# APPENDIX B

# STANDARD OPERATING PROCEDURES

**STANDARD OPERATING PROCEDURES**
**Subsurface Assessment Methodology And Sampling Protocol**

**Parcel 88**
**Bill Riddle Property**
**335 US Highway 19E**
**Burnsville, NC 28714**

WBS Element # 33359.1.1
State Project # R-2519A
**EI Project No. ENMO060029.00**

Prepared For:

Gregory A. Smith
State of North Carolina
Department of Transportation
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May 2006

## *STANDARD OPERATING PROCEDURES*
## (Subsurface Assessment Methodology And Sampling Protocol

## *INTRODUCTION*

Environmental Investigations, Inc. (EI) has prepared this STANDARD OPERATING PROCEDURES - Subsurface Assessment Methodology and Sampling Protocol Plan (SPP) for a residential property owned by Bill Riddle Property located at 335 US Highway 19E, Burnsville, Yancey County, North Carolina.

The document presented herein describes the methodology and protocol that was utilized during the *Limited Preliminary Site Assessment* conducted at the above referenced project "site".

## *SAMPLING DESIGN*

Prior to conducting a subsurface assessment, a sampling strategy was developed by EI based on the objectives of the investigation. After designing our soil sampling strategy, the appropriate equipment and techniques were selected to conduct the investigation. Our sampling strategy was based upon the premise of accomplishing the following performance objectives:

- collect soil samples that are representative of conditions as they exist at the study site;
- selecting the appropriate sampling device(s);
- taking measures to avoid introducing contamination as a result of poor sampling and/or poor handling techniques;
- reducing the potential of cross contamination between samples;
- defining sampling site selections and collection procedures for the appropriate individual media;
- defining the quality control assurance procedures;
- analytical requirements and limitations; and
- Data interpretation and assessment.

The sampling plan for this study was developed using the non-probabilistic (directed sampling designs) in nature. The location and frequency was based on this approach, to allow for the flexibility of the field coordinator (Geologist) to determine the number of samples collected for analysis. This approach allowed for the study objectives, properties of the matrix, resource constraints and access to sampling points to be adequately performed. Provision for access, use of sampling equipment, was also pre-determined.

The following section of the SPP discusses the sampling equipment available and collection methods which have been utilized to be technically appropriate.

## *SITE ORIENTATION*

Prior to conducting any soil sampling procedures, the EI Project Geologist/Manager reviewed and presented the Site and Safety Health Plan to all participants involved with the project which was developed based on the EI Safety and Health program. All monitoring, protective equipment (latex gloves, Tyvek® suits, etc.), potential hazards associated with the site and general health and safety standards were discussed.

### Site Survey

Prior to conducting specific sampling activities, EI personnel will conduct a limited site survey of the target and surrounding areas. Information discovered during the survey will be utilized to better perform the sampling activities and will provide more insight into establishment of the conclusions of this study. The site survey will consist of the following:

- General site layout (UST system layouts, overhead canopies, dispensers, etc.);
- Site access;
- Soil types and depths;
- Surface water drainage pathways;
- Existing site conditions;
- Visible staining of surface soil;
- Vegetation stress, and
- Possible offsite or non-site related sources.

## *FIELD INVESTIGATIVE PROCEDURES*

### Sampling Objectives

The general objective of sampling for this project was to collect a sample representative of subsurface and/or groundwater to reduce the potential bias caused by the sampling equipment used to obtain the sample.

The chosen sample locations were evaluated as discrete samples. A discrete sample is defined as "a discrete aliquot representative of a specific location at a given point in time."

### Areas of Environmental Concern

The objectives of choosing the proper sampling methods to collect appropriate samples that are representative of the conditions as they exist at the site were as follows:

- Selecting the appropriate sampling device.
- Taking measures to avoid introducing contamination as a result of poor sampling and/or handling techniques.
- Reducing the potential of cross contamination between samples.

The areas of environmental concern consisted of an existing heating oil UST.

## *SOIL SAMPLING ACTIVITIES*

Manual techniques and equipment, such as hand augers, are usually used for surface or shallow, subsurface soil sampling. Power operated equipment is usually associated with collecting deep samples, but this equipment can also be used for collecting shallow samples when the auger hole begins to collapse, or when the soil is so tight that manual auguring is not practical. Based on the request of the property owner, EI mainly used hand augers and to a lesser extent we utilized Direct Push Technology (DPT). The following section discusses the DPT methods employed during the site study.

### Soil Sampling Collection Methods

Soil samples were collected utilizing Direct Push Technology (DPT) methods.

### Direct Push Technology Methodology

DPT refers to tools and sensors that are inserted into the subsurface without the use of drilling to remove soil and make a path for the tool. To perform the DPT activities, the contractor utilized a GeoProbe® 6600 machine. The GeoProbe® 6600 is a hydraulically-powered probing machine designed, which uses static force and a percussion hammer to advance small diameter sampling tools into the subsurface to collect soil cores, groundwater samples, and or soil gas samples. A GeoProbe relies on a relatively small amount of static (vehicle) weight combined with percussion as the energy for advancement of a tool string.

The advantages of utilizing DPT drilling methods are described as follows:

- avoids the use of drilling fluids and lubricants during drilling;
- the equipment is highly mobile;
- disturbance of geochemical conditions during installation is minimized; and
- The drilling process does not produce drill cuttings.

**DPT Soil Sample Collection Methods**

Soil samples utilizing DPT methods were collected from the advanced DPT soil borings continuously in 5.0-foot increments using acetate liners contained in a nickel plated macro sampling tubes. Each soil-filled liner was split for field screening and soil sample collection purposes. Soil samples were collected from the liners with disposable vinyl gloves and utilized for soil vapor screening testing and/or laboratory retention. This sampling method allows for continuous soil sampling from the ground surface to the desired depth. Soil samples selected for analyses are referenced in the text section.

**Soil Sample Collection Protocol**

The following soil sampling collection procedures were utilized during this study:

- Ensured that all equipment, samplers and tools that will come in contact with the sample media was thoroughly decontaminated.
- Informed driller of sample interval (s) for borehole and oversaw the sampling process.
- Prepared and labeled all sample containers. Samples collected for the analytes of volatiles (if applicable) were sampled first.
- Labeled the containers including the location, depth, analyte, date and time of sampling.
- Delegated the driller to prepare the sample liner by cutting the liner in half.
- Placed liners on a clean sheet of plastic.
- Cut the soil core with a clean decontaminated knife to allow of visual soil classification.
- Sniffed the soil core with a PID/FID and recorded instrument readings volatile organics (VOCs) in a logbook (discussed further below).
- Logged the soil core in a logbook, including borehole identification (ID), sample number, date, time and any pertinent data.

- Logged soil classification including: recording percent recovery, color, description of major constituent, soil texture/structure, grading/sorting/plasticity, relative density or hardness consistency, clay, sand, silt, gravel content, grain size, moisture content, odor, staining and the Unified Soil Classification System (USCS) identifier and symbol;
- Physically collected the selected soil samples and placed these samples into laboratory prepared containers.
- Ensured the soil sample did not contain twigs, stones, and other debris from the soil.
- Packed soil samples for shipment, prepared chain-of-custody records and shipping documentation

**Soil Vapor Screening**

An important tool in performing this study is performing the soil vapor screening or sniffing activities. Field screening is generally performed for a variety of reasons. The technique conducted during this study was used to screen soil samples for measurable levels of volatile organics. The results obtained from this procedure are not quantitative; however the results from several soil samples are relative and allowed the Field Geologist/Project Manager to select samples that are the most contaminated with the contaminated media. Generally, the presence of little or no organic vapor is possibly indicative of non-contaminated soils. Soil samples collected for purposes of soil headspace screening were tested by the following procedures:

- the field instrument was calibrated, prior to use;
- soil samples were collected directly from the DPT soil liners and placed into sealable plastic bags;
- soil samples within the bags were allowed to equilibrate for approximately five minutes;
- the headspace of each bagged sample was screened with the instrument probe for the presence of volatile organic compound (VOCs) with a Mini-RAE Photo-ionization Detector (PID);
- recording the instrument readings (VOCs) in a field logbook; and
- Verified that the FID/PID was reading background levels prior to exposing the probe into another sample.

## Collection of Grab Soil Samples

Soil samples may provide two (2) types of soil contamination representation including grab and composite. Samples may be generally collected in random locations from a grid pattern or selected areas believed to be contaminated as evidenced by field indicators (staining, odors and/or measurable volatile organic readings).

For this study, grab samples selected from areas showing field indicators or confirmation soil samples chosen to confirm the absence of volatile organic readings were chosen. The technical definition for a grab sample is as follows: A grab sample is a discrete aliquot representative of a specific location at a given point in time. The sample is collected at one time and at one particular sampling point and depth. Refer to the text or Chain-of-Custody in this study for soil sample selection, date, time and depths of each sample chosen for laboratory analyses.

## Sample Handling Procedures

The sample handling procedures were conducted as follows:

1) Disposable surgical latex gloves were used to avoid cross contamination of samples. Gloves were discarded in a designated "waste bag after each sample was collected.

2) Each confirmation sample upon collection was immediately stored in a cooler containing ice. During the sample collection process, care was taken to insure the samples were not collected in direct sunlight. In addition, during the collection process, no parts of the body without gloves touched any part of the sample.

3) Once placed into the cooler, each sample was protected with bubble wrap® and foam was inserted in the base, sides and top of the cooler.

## Soil Boring Abandonment Procedures

Due to the fact that holes in the subsurface may act as a conduit for contamination migration, proper sealing of holes is essential for ensuring that a site assessment does not contribute to the spread of contaminants. The objective of hole-sealing is to prevent preferential migration of contaminants through the bore hole. To seal the boreholes advanced during this study, the contractor utilized a method known as surface pouring. Surface pouring entails sealing the boreholes with dry products (e.g., bentonite granules, chips and/or pellets). Once the DPT drive rods have been withdrawn, dry products are physically poured into the bottom of the

borehole and filled vertically up the column to at least two (2) feet from the base of the borehole. Once the dry products have seated into the borehole, the product is hydrated to expand the clay material. After the hydration process has been performed, the remaining portions of the boreholes are backfilled with the soil cores. Due to the nature of DPT, no soil cuttings were generated during soil boring exploration assessment work.

## *GROUNDWATER INVESTIGATION*

The purpose of a monitoring well is to provide an access point for measuring groundwater levels and to collect groundwater samples representing actual in-situ groundwater conditions at that point of access. For the purpose of this investigation, based on the scope of work, EI chose to install temporary groundwater monitoring wells (Type I).

## WELL DEVELOPMENT AND GROUNDWATER SAMPLE COLLECTION

### Water Development

The groundwater monitor well was purged with a Peristaltic™ pump. Well development allows fresh water from the formation to enter the well and the groundwater samples will more accurately represent actual groundwater conditions. The well was purged of approximately three (3) to five (5) well volumes of water or until dry prior to sampling.

### Groundwater Sampling Procedures

After well development activities were performed, groundwater samples were collected from the well(s) with the referenced pump. During the collection process, samples were poured directly from the bailer into the laboratory supplied containers which were placed into an ice chest filled with ice. Under no circumstances were any intermediate sample containers used, i.e. jar, beaker, etc., and then transferred to the sample container. In addition, water samples were not field filtered.

Prior to collecting the water sample, the containers were labeled accordingly. This procedure was performed prior to sampling because sample containers have a tendency to "sweat" when filled with groundwater; this makes it difficult to affix a label to the container after sampling. The sample label also was covered with a clear piece of tape, which was wrapped around the sample container. This procedure prevented the label from detaching from the container during sample storage and shipment.

Each sample container was labeled indicating the sample location (i.e. GP-1, or MW-1, etc.), date and time of collection, sample location, collector, project site, and analysis identification. Other pertinent information was recorded in the field book.

After the groundwater sample(s) was collected, the containers were immediately placed in a sample cooler containing ice. Upon completion, the samples were transported to Paradigm Analytical Laboratories, located in Wilmington, NC using chain-of-custody documentation.

### Soil Boring Abandonment Procedures

Due to the fact that holes in the subsurface may act as a conduit for contamination migration, proper sealing of holes is essential for ensuring that a site assessment does not contribute to the spread of contaminants. The objective of hole-sealing is to prevent preferential migration of contaminants through the bore hole. To seal the boreholes advanced during this study, the contractor utilized a method known as surface pouring. Surface pouring entails sealing the boreholes with dry products (e.g., bentonite granules, chips and/or pellets). Once the DPT drive rods have been withdrawn, dry products are physically poured into the bottom of the borehole and filled vertically up the column to at least two (2) feet from the base of the borehole. Once the dry products have seated into the borehole, the product is hydrated to expand the clay material. After the hydration process has been performed, the remaining portions of the boreholes are backfilled with the soil cores. Due to the nature of DPT, no soil cuttings were generated during soil boring exploration assessment work.

## *LABORATORY ANALYTICAL METHODS*

### Soil Analytical Methods

Based upon verbal information provided by NCDOT personnel (Eugene Tarascio), EI selected to analyze the chosen soil samples for total petroleum hydrocarbons (TPH) analyses by Method 8015B with preparation methods for the analysis of Diesel Range Organics (DRO) by GC-FID and Gasoline Range Organics (GRO) by GC-FID. The GRO method is utilized to extract volatile fuels such as gasoline, while the DRO method is utilized to extract less volatile petroleum products such as diesel fuel, fuel oil #2, kerosene, and varsol.

One (1) soil sample from the site was analyzed for volatile organics by SW-846 Method 8260 (5035 Prep), for semi-volatiles (SVOCs) by SW-846 Method 8270, and for aliphatics and aromatics by Massachusetts Department of Environmental Protection's (MADEP) method for volatile petroleum hydrocarbons (VPH) and MADEP's method for extractable

petroleum hydrocarbons (EPH), respectively.
These laboratory analytical methods were utilized as required in the *Guidelines* in order to compare results to the DWM's maximum soil contaminant concentration (MSCC) cleanup standards. The MSCC concentrations are also published in the *Guidelines*.

## *SAMPLE PACKAGING AND SHIPPING*

This section discusses the sample packaging and shipping protocol that shall be used to transport collected samples to the laboratories for analytical testing. Samples collected, prepared, preserved and stored must then be readied for packaging and shipping. It is important that the presented protocol be followed to ensure that the samples reach their destination in sound condition. In addition, the samples must be under strict COC from the time they are sampled until the analysis is complete.

Samples collected for this project were classified as environmental materials samples and were not considered hazardous. In addition, the samples collected for this study were not classified as "dangerous goods".

Environmental samples collected for this field study were packed prior to shipment using the following procedures:

1. Secure drain plug on cooler with tape.
2. Place cushioned layer on bottom of cooler (vermiculite or "bubble-wrap" plastic).
3. Line cooler with large heavy duty plastic bag.
4. Place all sample containers in large plastic bag within the cooler. Be sure the lids on all bottles are tight (will not leak).
5. Cushion containers to prevent breakage.
6 Put ice that has been "double bagged" in heavy duty polyethylene bags and placed on top of and/or between the samples within the large plastic bag. Fill all remaining space between the containers with cushion materials.
7 Securely fasten the top of the large plastic bag with tape or tie.
8. Place the Chain-of-Custody Record into a plastic bag, and tape the bag to the inner side of the cooler lid.
9. Close the cooler and securely tape (preferably with fiber tape) the top of the cooler shut. 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.
10. Shipping containers (ice cooler) 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 containers exterior. 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.

*Shipping Note*:
"When samples are to be shipped by common carrier or sent through the United States mail, it must comply with the Department of Transportation Hazardous Materials Regulations (49 CFR 172). The person offering such material for transportation is responsible or ensuring such compliance. For the preservation requirements of 40 CFR, Part 136, Table II, the Office of Hazardous Materials, Materials Transportation Bureau, Department of Transportation has determined that the Hazardous Materials Regulations do not apply to the following materials: Hydrochloric Acid (HCL) in water solutions at concentrations of 0.04% by weight or less (pH about 1.96 or greater); Nitric acid (HN03) in water solutions at concentrations of O.-15% by weight or less (pH about 1. 62 or greater); Sulfuric acid (H2SO4) in water solutions at concentrations of 0.35% by weight or less (pH about 1. 15 or greater); and Sodium Hydroxide (Na OH) in water solutions at concentrations of 0.08% by weight or less (pH about 12.30 or less). This footnote is wholly reproduced from 40 CFR 136.3, which is definitive".

**Sample Transportation**

The cooler(s) containing the collected soil samples was shipped overnight via Federal Express, with COC documentation, to Prism Laboratories, Inc. in Charlotte, NC. The following protocol was used for sample handling and transportation:

1) The lids on all bottles were tightened to reduce the potential for leakage.
2) The sample identification label on each individual laboratory container was covered with a clear piece of plastic tape. Each container was then placed within an appropriately sized polyethylene bag and sealed.
3) The containers were placed into a bubble-wrap® lined rectangular ice chest (cooler).
4) Ice was placed on top and surrounding bubble-wrap® sample containers. Some of the remaining spaces between the containers were filled with bubble-wrap® and/or ice.
5) The cooler drain plug was secured with clear tape.
6) The COC's was double plastic bagged and was taped to the inner side of the cooler lid.
7) The cooler was closed and securely taped.
8) A label with adhesive tape containing the name and address of the shipper and the address of the laboratory was placed on top of the cooler.

## *DECONTAMINATION PROCEDURES*

Decontamination is the process of washing, rinsing and removing contaminants from exposed surfaces of equipment. Decontamination helps prevent the spread of contamination off-site, and avoids cross-contamination to other samples. The decontamination procedures were performed as follows:

1) Disposable surgical latex gloves were used in lieu of decontamination procedures to collect soil samples.

The soil samples retained for laboratory analyses were placed in the appropriate clean laboratory prepared containers, labeled and subsequently delivered with chain-of-custody documentation (COC) for analysis. Dates and times of sampling may be referenced on the COC's. Specific laboratory analysis methods are referenced in the text of this Study.

## *QUALITY ASSURANCE PROTOCOL*

### Field and Laboratory Control Samples

The purpose of this section is to describe the standard control sampling program that supported the data quality objectives for this site. These control samples will included field control Quality Assurance (QA) samples used to assess sources of error. To minimize or consider the impact these errors have on the resulting data, a combination of unique field QA/QC protocols and control samples were developed to meet the QA overall objectives.

### Field Control Samples

The elements of the sampling and field QA/QC strategy included the following:

(1) El developed a well thought out sampling strategy for the site. The plan adequately and sufficiently outlined the different types of environmental media and protocol to sample the media.
(2) Sampling methodologies to obtain true representative samples.
(3) Used decontamination procedures in order to reduce cross-contamination potential between sampling points.
(4) Used the proper sample containers, and preservation requirements.
(5) Used the proper storage, and shipping of samples protocol.

Techniques to verify the inclusion of the QA/QC program included scheduled field control samples consisting of field blanks (trip and temperature). The field control samples were

handled similarly as the environmental samples.

### Quality Control Samples

A trip and temperature blank were collected during this study.

### Laboratory QA/QC Procedures

Laboratory QA/QC procedures are implemented in order to prevent, detects, and corrects potential errors during the analytical process. The reliability and credibility of analytical laboratories are corroborated by the development and performance of their respective QA/QC programs. For this project, the NCDOT contracted laboratory provided and performed their program as they see fit. Standard practices used by the selected laboratory included the following quality control sample information in their generated reports:

(a) laboratory method blanks;
(b) temperature blanks.

## *INVESTIGATION DERIVED WASTE MANAGEMENT PROTOCOL*

The investigation derived waste (IDW) generated during the sampling activities were placed on site. These wastes include any derivative investigative soils leftover from the sampling and backfilling protocol, decontamination water (cleaning of field equipment), bailers, bailer haul-line and PPE equipment, if applicable. The management of IDW for this project complies with applicable or relevant and appropriate requirements (ARAs). The site specific ARAs were followed in consensus with the EPA Standard Operating Procedures (SOP) and Quality Assurance Manual, Region 4 and the *Guidelines For Assessment And Corrective Action*, drafted by the North Carolina Underground Storage Tank Section, effective July 1, 2001.

# APPENDIX C

# SOIL BORING LOGS

ENVIRONMENTAL INVESTIGATIONS, INC.

2101 Gateway Centre Boulevard, Suite 200
Morrisville, North Carolina
919-544-7500

# SOIL BORING LOG

Boring No. **GP-1**
Date Drilled: **04/04/06**

| | | | |
|---|---|---|---|
| Client: | NCDOT | Logged By: | KDH |
| Project Name: | Parcel #88 | Drilling Company: | SEI |
| Project/Site Location: | 335 US Highway 19E, Burnsville, NC 28714 | Drill Device: | GeoProbe 6600 |
| Project Number: | ENMO060029.00 | Drill Method: | DPT |

Total Boring Depth: 3.05m
Boring Diameter: 4.0"
Weather Conditions: Cool
Boring Location: Drainage boring
Surface Elevation:

| Depth (Feet) | Depth (meters) | Time | Sample Analyzed | Recovery | Soil Profile | Lithological Description | Sample PID (ppm) |
|---|---|---|---|---|---|---|---|
| | | | | | ML | Tan to white sandy SILT (ML), dry. | NA |
| 2.00 | 0.61 | | | 100% | | | NA |
| 4.00 | 1.22 | | | | | | 0.9 |
| 6.00 | 1.83 | 9:15 | x | 100% | | | NA |
| 8.00 | 2.44 | | | | | | 0.9 |
| 10.00 | 3.05 | | | | | Boring terminated at 3.05m (10.0') bls.<br>x denotes soil sample at 1.83m - 2.44m (6-8') bls interval collected for laboratory retention. | |

ENVIRONMENTAL INVESTIGATIONS, INC.
2101 Gateway Centre Boulevard, Suite 200
Morrisville, North Carolina
919-544-7500

# SOIL BORING LOG

Boring No. GP-2
Date Drilled: 04/04/06

| | | | |
|---|---|---|---|
| Client: | NCDOT | Logged By: | KDH |
| Project Name: | Parcel #88 | Drilling Company: | SEI |
| Project/Site Location: | 335 US Highway 19E, Burnsville, NC 28714 | Drill Device: | GeoProbe 6600 |
| Project Number: | ENMO060029.00 | Drill Method: | DPT |

Total Boring Depth: 3.05m
Boring Diameter: 4.0"
Weather Conditions: Cool
Boring Location: Drainage boring
Surface Elevation:

| Depth (Feet) | Depth (meters) | Time | Sample Analyzed | Recovery | Soil Profile | Lithological Description | Sample PID (ppm) |
|---|---|---|---|---|---|---|---|
| | | | | | ML | Tan to white sandy SILT (ML), dry. | |
| 2.00 | 0.61 | | | 100% | | | NA |
| 4.00 | 1.22 | | | | | | NA |
| 6.00 | 1.83 | | | | | | 0.8 |
| | | 9:20 | x | | | | NA |
| 8.00 | 2.44 | | | 100% | | | |
| | | | | | | | 1.1 |
| 10.00 | 3.05 | | | | | | |
| | | | | | | Boring terminated at 3.05m (10.0') bls.<br>x denotes soil sample at 1.83m - 2.44m (6-8') bls interval collected for laboratory retention. | |

ENVIRONMENTAL INVESTIGATIONS, INC.

2101 Gateway Centre Boulevard, Suite 200
Morrisville, North Carolina
919-544-7500

# SOIL BORING LOG

Boring No. **GP-3**
Date Drilled: **04/04/06**

| | | | |
|---|---|---|---|
| Client: | NCDOT | Logged By: | KDH |
| Project Name: | Parcel #88 | Drilling Company: | SEI |
| Project/Site Location: | 335 US Highway 19E, Burnsville, NC 28714 | Drill Device: | GeoProbe 6600 |
| Project Number: | ENMO060029.00 | Drill Method: | DPT |

Total Boring Depth: 3.05m
Boring Diameter: 4.0"
Weather Conditions: Cool
Boring Location: Drainage boring
Surface Elevation:

| Depth (Feet) | Depth (meters) | Time | Sample Analyzed | Recovery | Soil Profile | Lithological Description | Sample PID (ppm) |
|---|---|---|---|---|---|---|---|
| | | | | | ML | Tan to white sandy SILT (ML), dry. | |
| 2.00 | 0.61 | | | 100% | | | NA |
| 4.00 | 1.22 | | | | | | NA |
| 6.00 | 1.83 | | | | | | 0.9 |
| | | 9:25 | x | 100% | | | NA |
| 8.00 | 2.44 | | | | | | 0.9 |
| 10.00 | 3.05 | | | | | | |
| | | | | | | Boring terminated at 3.05m (10.0') bls.<br>x denotes soil sample at 1.83m - 2.44m (6-8') bls interval collected for laboratory retention. | |

ENVIRONMENTAL INVESTIGATIONS, INC.

2101 Gateway Centre Boulevard, Suite 200
Morrisville, North Carolina
919-544-7500

# SOIL BORING LOG

Boring No. GP-4
Date Drilled: 04/04/06

| | | | |
|---|---|---|---|
| Client: | NCDOT | Logged By: | KDH |
| Project Name: | Parcel #88 | Drilling Company: | SEI |
| Project/Site Location: | 335 US Highway 19E, Burnsville, NC 28714 | Drill Device: | GeoProbe 6600 |
| Project Number: | ENMO060029.00 | Drill Method: | DPT |

Total Boring Depth: 3.05m
Boring Diameter: 4.0"
Weather Conditions: Cool
Boring Location: Drainage boring
Surface Elevation:

| Depth (Feet) | Depth (meters) | Time | Sample Analyzed | Recovery | Soil Profile | Lithological Description | Sample PID (ppm) |
|---|---|---|---|---|---|---|---|
| | | | | | ML | Tan to white sandy SILT (ML), dry. | NA |
| 2.00 | 0.61 | | | 100% | | | NA |
| 4.00 | 1.22 | | | | | | 1.0 |
| 6.00 | 1.83 | 9:30 | x | 100% | | | NA |
| 8.00 | 2.44 | | | | | | 1.0 |
| 10.00 | 3.05 | | | | | | |
| | | | | | | Boring terminated at 3.05m (10.0') bls.<br>x denotes soil sample at 1.83m - 2.44m (6-8') bls interval collected for laboratory retention. | |

ENVIRONMENTAL INVESTIGATIONS, INC.

2101 Gateway Centre Boulevard, Suite 200
Morrisville, North Carolina
919-544-7500

# SOIL BORING LOG

Boring No. **GP-5**
Date Drilled: **04/04/06**

| | | | |
|---|---|---|---|
| Client: | NCDOT | Logged By: | KDH |
| Project Name: | Parcel #88 | Drilling Company: | SEI |
| Project/Site Location: | 335 US Highway 19E, Burnsville, NC 28714 | Drill Device: | GeoProbe 6600 |
| Project Number: | ENMO060029.00 | Drill Method: | DPT |

Total Boring Depth: 3.05m
Boring Diameter: 4.0"
Weather Conditions: Cool
Boring Location: Drainage boring
Surface Elevation:

| Depth (Feet) | Depth (meters) | Time | Sample Analyzed | Recovery | Soil Profile | Lithological Description | Sample PID (ppm) |
|---|---|---|---|---|---|---|---|
| | | | | | | Tan to white sandy SILT (ML), dry. | NA |
| 2.00 | 0.61 | | | 100% | | | NA |
| 4.00 | 1.22 | | | | ML | | 0.6 |
| 6.00 | 1.83 | 9:35 | x | 100% | | | NA |
| 8.00 | 2.44 | | | | | | 0.9 |
| 10.00 | 3.05 | | | | | | |
| | | | | | | Boring terminated at 3.05m (10.0') bls.<br>x denotes soil sample at 1.83m - 2.44m (6-8') bls interval collected for laboratory retention. | |

ENVIRONMENTAL INVESTIGATIONS, INC.

2101 Gateway Centre Boulevard, Suite 200
Morrisville, North Carolina
919-544-7500

# SOIL BORING LOG

Boring No. **GP-6**
Date Drilled: **04/04/06**

| | | | |
|---|---|---|---|
| Client: | NCDOT | Logged By: | KDH |
| Project Name: | Parcel #88 | Drilling Company: | SEI |
| Project/Site Location: | 335 US Highway 19E, Burnsville, NC 28714 | Drill Device: | GeoProbe 6600 |
| Project Number: | ENMO060029.00 | Drill Method: | DPT |

Total Boring Depth: 3.05m | Weather Conditions: Cool | Surface Elevation:
Boring Diameter: 4.0" | Boring Location: Drainage boring

| Depth (Feet) | Depth (meters) | Time | Sample Analyzed | Recovery | Soil Profile | Lithological Description | Sample PID (ppm) |
|---|---|---|---|---|---|---|---|
| 2.00 | 0.61 | | | 100% | ML | Tan to white sandy SILT (ML), dry. | NA |
| 4.00 | 1.22 | | | | | | NA |
| 6.00 | 1.83 | | | | | | 1.0 |
| 8.00 | 2.44 | 9:40 | x | 100% | | | NA |
| 10.00 | 3.05 | | | | | | 1.0 |
| | | | | | | Boring terminated at 3.05m (10.0') bls.<br>x denotes soil sample at 1.83m - 2.44m (6-8') bls interval collected for laboratory retention. | |

ENVIRONMENTAL INVESTIGATIONS, INC.

2101 Gateway Centre Boulevard, Suite 200
Morrisville, North Carolina
919-544-7500

# SOIL BORING LOG

Boring No. **GP-7**
Date Drilled: **04/04/06**

| | | | |
|---|---|---|---|
| Client: | NCDOT | Logged By: | KDH |
| Project Name: | Parcel #88 | Drilling Company: | SEI |
| Project/Site Location: | 335 US Highway 19E, Burnsville, NC 28714 | Drill Device: | GeoProbe 6600 |
| Project Number: | ENMO060029.00 | Drill Method: | DPT |

Total Boring Depth: 6.1m
Boring Diameter: 4.0"
Weather Conditions: Cool
Boring Location: Delineation boring
Surface Elevation:

| Depth (Feet) | Depth (meters) | Time | Sample Analyzed | Recovery | Soil Profile | Lithological Description | Sample PID (ppm) |
|---|---|---|---|---|---|---|---|
| | | | | | | Tan to white sandy SILT (ML), dry. | |
| 2.00 | 0.61 | | | 100% | | | NA |
| 4.00 | 1.22 | | | | | | NA |
| 6.00 | 1.83 | | | | | | 0.9 |
| 8.00 | 2.44 | 9:45 | x | 100% | | | NA |
| 10.00 | 3.05 | | | | ML | | 1.0 |
| 12.00 | 3.66 | | | 100% | | | NA |
| 14.00 | 4.27 | | | | | | NA |
| 16.00 | 4.88 | | | | | | 1.0 |
| 18.00 | 5.49 | | | 100% | | | NA |
| 20.00 | 6.1 | | | | | | 1.1 |
| | | | | | | Boring terminated at 6.1m (20.0') bls. | |
| | | | | | | x denotes soil sample at 1.83m - 2.44m (6-8') bls interval collected for laboratory retention. | |

ENVIRONMENTAL INVESTIGATIONS, INC.

2101 Gateway Centre Boulevard, Suite 200
Morrisville, North Carolina
919-544-7500

# SOIL BORING LOG

Boring No. **GP-8**
Date Drilled: **04/04/06**

| | | | |
|---|---|---|---|
| Client: | NCDOT | Logged By: | KDH |
| Project Name: | Parcel #88 | Drilling Company: | SEI |
| Project/Site Location: | 335 US Highway 19E, Burnsville, NC 28714 | Drill Device: | GeoProbe 6600 |
| Project Number: | ENMO060029.00 | Drill Method: | DPT |

Total Boring Depth: 6.1m | Weather Conditions: Cool | Surface Elevation:
Boring Diameter: 4.0" | Boring Location: Delineation boring

| Depth (Feet) | Depth (meters) | Time | Sample Analyzed | Recovery | Soil Profile | Lithological Description | Sample PID (ppm) |
|---|---|---|---|---|---|---|---|
| | | | | | | Tan to white sandy SILT (ML), dry. | |
| 2.00 | 0.61 | | | 100% | | | NA |
| 4.00 | 1.22 | | | | | | NA |
| 6.00 | 1.83 | | | | | | 0.9 |
| 8.00 | 2.44 | 10:00 | x | 100% | ML | | NA |
| 10.00 | 3.05 | | | | | | 1.0 |
| 12.00 | 3.66 | | | 100% | | | NA |
| 14.00 | 4.27 | | | | | | NA |
| 15.00 | 4.57 | | | | | | 1.0 |
| | | | | | | Boring terminated at 6.1m (20.0') bls. | |
| | | | | | | x denotes soil sample at 1.83m - 2.44m (6-8') bls interval collected for laboratory retention. | |

# APPENDIX D

# LABORATORY RESULTS

SGS

Mr. Bob Shaut
Environmental Investigations
2101 Gateway Centre Boulevard
Suite 200
Morrisville NC 27560
Report Number: G106-590

Client Project: NCDOT

Dear Mr. Shaut:

Enclosed are the results of the analytical services performed under the referenced project. The samples are certified to meet the requirements of the National Environmental Laboratory Accreditation Conference Standards. Copies of this report and supporting data will be retained in our files for a period of five years in the event they are required for future reference. Any samples submitted to our laboratory will will be retained for a maximum of thirty (30) days from the date of this report unless other arrangements are requested.

If there are any questions about the report or the services performed during this project, please call SGS/Paradigm at (910) 350-1903. We will be happy to answer any questions or concerns which you may have.

Thank you for using SGS/Paradigm Analytical Labs for your analytical services. We look forward to working with you again on any additional analytical needs which you may have.

Sincerely,
SGS/Paradigm Analytical Laboratories, Inc.

4/24/2006
Laboratory Director Date
J. Patrick Weaver



Paradigm Analytical Laboratories, Inc. | 5500 Business Dr., Wilmington, NC 28405 t (910) 350-1903 f (910) 350-1557 www.sgs.com

## Results for Total Petroleum Hydrocarbons
by GC/FID 8015

Client Sample ID: GP1
Client Project ID: NCDOT
Lab Sample ID: G106-590-1
Lab Project ID: G106-590
Report Basis: Dry Weight

Analyzed By: MJC
Date Collected: 4/4/2006 9:15
Date Received: 4/6/2006
Matrix: Soil
Solids 73.33

| Analyte | Result MG/KG | RL MG/KG | Prep Method | Dilution Factor | Date Analyzed |
|---|---|---|---|---|---|
| Gasoline Range Organics | BQL | 8.22 | 5035 | 1 | 04/11/06 |
| Diesel Range Organics | BQL | 8.12 | 3541 | 1 | 04/17/06 |

Reviewed By: _____
TPH_LIMS_v3.0

## Results for Total Petroleum Hydrocarbons
by **GC/FID 8015**

Client Sample ID: GP2
Client Project ID: NCDOT
Lab Sample ID: G106-590-2
Lab Project ID: G106-590
Report Basis: Dry Weight

Analyzed By: MJC
Date Collected: 4/4/2006 9:25
Date Received: 4/6/2006
Matrix: Soil
Solids 79.73

| Analyte | Result MG/KG | RL MG/KG | Prep Method | Dilution Factor | Date Analyzed |
|---|---|---|---|---|---|
| Gasoline Range Organics | BQL | 7.65 | 5035 | 1 | 04/11/06 |
| Diesel Range Organics | BQL | 7.46 | 3541 | 1 | 04/17/06 |

Reviewed By: _____
TPH_LIMS_v2.0

## Results for Total Petroleum Hydrocarbons
by GC/FID 8015

Client Sample ID: GP3
Client Project ID: NCDOT
Lab Sample ID: G106-590-3
Lab Project ID: G106-590
Report Basis: Dry Weight

Analyzed By: MJC
Date Collected: 4/4/2006 9:30
Date Received: 4/6/2006
Matrix: Soil
Solids 76.21

| Analyte | Result MG/KG | RL MG/KG | Prep Method | Dilution Factor | Date Analyzed |
|---|---|---|---|---|---|
| Gasoline Range Organics | BQL | 7.61 | 5035 | 1 | 04/11/06 |
| Diesel Range Organics | BQL | 6.52 | 3541 | 1 | 04/17/06 |

Reviewed By: _____
TPH_LIMS_v2.0

## Results for Total Petroleum Hydrocarbons
by GC/FID 8015

Client Sample ID: GP4
Client Project ID: NCDOT
Lab Sample ID: G106-590-4
Lab Project ID: G106-590
Report Basis: Dry Weight

Analyzed By: MJC
Date Collected: 4/4/2006 9:35
Date Received: 4/6/2006
Matrix: Soil
Solids 87.79

| Analyte | Result MG/KG | RL MG/KG | Prep Method | Dilution Factor | Date Analyzed |
|---|---|---|---|---|---|
| Gasoline Range Organics | BQL | 7.56 | 5035 | 1 | 04/11/06 |
| Diesel Range Organics | BQL | 6.77 | 3541 | 1 | 04/17/06 |

Reviewed By: _____
TPH_LIMS_v2.0

## Results for Total Petroleum Hydrocarbons
by **GC/FID 8015**

Client Sample ID: GP5
Client Project ID: NCDOT
Lab Sample ID: G106-590-5
Lab Project ID: G106-590
Report Basis: Dry Weight

Analyzed By: MJC
Date Collected: 4/4/2006 9:45
Date Received: 4/6/2006
Matrix: Soil
Solids 73.51

| Analyte | Result MG/KG | RL MG/KG | Prep Method | Dilution Factor | Date Analyzed |
|---|---|---|---|---|---|
| Gasoline Range Organics | BQL | 8.16 | 5035 | 1 | 04/11/06 |
| Diesel Range Organics | BQL | 8.26 | 3541 | 1 | 04/17/06 |

Reviewed By: _____

SGS

## Results for Total Petroleum Hydrocarbons
by GC/FID 8015

Client Sample ID: GP6
Client Project ID: NCDOT
Lab Sample ID: G106-590-6
Lab Project ID: G106-590
Report Basis: Dry Weight

Analyzed By: MJC
Date Collected: 4/4/2006 9:50
Date Received: 4/6/2006
Matrix: Soil
Solids 80.95

| Analyte | Result MG/KG | RL MG/KG | Prep Method | Dilution Factor | Date Analyzed |
|---|---|---|---|---|---|
| Gasoline Range Organics | BQL | 7.61 | 5035 | 1 | 04/11/06 |
| Diesel Range Organics | BQL | 7.39 | 3541 | 1 | 04/17/06 |

Reviewed By: _____
TPH_LIMS_v2.0

## Results for Total Petroleum Hydrocarbons
by **GC/FID 8015**

Client Sample ID: GP7
Client Project ID: NCDOT
Lab Sample ID: G106-590-7
Lab Project ID: G106-590
Report Basis: Dry Weight

Analyzed By: MJC
Date Collected: 4/4/2006 10:00
Date Received: 4/6/2006
Matrix: Soil
Solids 78.76

| Analyte | Result MG/KG | RL MG/KG | Prep Method | Dilution Factor | Date Analyzed |
|---|---|---|---|---|---|
| Gasoline Range Organics | BQL | 8.00 | 5035 | 1 | 04/11/06 |
| Diesel Range Organics | BQL | 6.98 | 3541 | 1 | 04/17/06 |

Reviewed By: _____

## Results for Total Petroleum Hydrocarbons
by **GC/FID 8015**

Client Sample ID: GP8
Client Project ID: NCDOT
Lab Sample ID: G106-590-8
Lab Project ID: G106-590
Report Basis: Dry Weight

Analyzed By: MJC
Date Collected: 4/4/2006 10:10
Date Received: 4/6/2006
Matrix: Soil
Solids 84.16

| Analyte | Result MG/KG | RL MG/KG | Prep Method | Dilution Factor | Date Analyzed |
|---|---|---|---|---|---|
| Gasoline Range Organics | BQL | 6.88 | 5035 | 1 | 04/11/06 |
| Diesel Range Organics | BQL | 5.97 | 3541 | 1 | 04/17/06 |

Reviewed By: _____
TPH_LIMS_v2.0

SGS

**Results for Volatiles**
**by GCMS 8260-5035**

Client Sample ID: GP8
Client Project ID: NCDOT
Lab Sample ID G106-590-8C
Lab Project ID: G106-590
Report Basis: Dry Weight

Analyzed By: JTF
Date Collected: 04-04-2006 10:10
Date Received: 4/6/2006
Matrix: Soil
%Solids: 84.2

| Report Name<br>Compound | Result<br>UG/KG | Quantitation<br>Limit UG/KG | Dilution<br>Factor | Date<br>Analyzed |
|---|---|---|---|---|
| Acetone | BQL | 54.7 | 1 | 4/12/2006 |
| Benzene | BQL | 5.47 | 1 | 4/12/2006 |
| Bromobenzene | BQL | 5.47 | 1 | 4/12/2006 |
| Bromochloromethane | BQL | 5.47 | 1 | 4/12/2006 |
| Bromodichloromethane | BQL | 5.47 | 1 | 4/12/2006 |
| Bromoform | BQL | 5.47 | 1 | 4/12/2006 |
| Bromomethane | BQL | 5.47 | 1 | 4/12/2006 |
| 2-Butanone | BQL | 27.4 | 1 | 4/12/2006 |
| n-Butylbenzene | BQL | 5.47 | 1 | 4/12/2006 |
| sec-Butylbenzene | BQL | 5.47 | 1 | 4/12/2006 |
| tert-Butylbenzene | BQL | 5.47 | 1 | 4/12/2006 |
| Carbon disulfide | BQL | 5.47 | 1 | 4/12/2006 |
| Carbon tetrachloride | BQL | 5.47 | 1 | 4/12/2006 |
| Chlorobenzene | BQL | 5.47 | 1 | 4/12/2006 |
| Chloroethane | BQL | 5.47 | 1 | 4/12/2006 |
| Chloroform | BQL | 5.47 | 1 | 4/12/2006 |
| Chloromethane | BQL | 5.47 | 1 | 4/12/2006 |
| 2-Chlorotoluene | BQL | 5.47 | 1 | 4/12/2006 |
| 4-Chlorotoluene | BQL | 5.47 | 1 | 4/12/2006 |
| Dibromochloromethane | BQL | 5.47 | 1 | 4/12/2006 |
| 1,2-Dibromo-3-chloropropane | BQL | 5.47 | 1 | 4/12/2006 |
| Dibromomethane | BQL | 5.47 | 1 | 4/12/2006 |
| 1,2-Dibromoethane (EDB) | BQL | 5.47 | 1 | 4/12/2006 |
| 1,2-Dichlorobenzene | BQL | 5.47 | 1 | 4/12/2006 |
| 1,3-Dichlorobenzene | BQL | 5.47 | 1 | 4/12/2006 |
| 1,4-Dichlorobenzene | BQL | 5.47 | 1 | 4/12/2006 |
| trans-1,4-Dichloro-2-butene | BQL | 5.47 | 1 | 4/12/2006 |
| 1,1-Dichloroethane | BQL | 5.47 | 1 | 4/12/2006 |
| 1,1-Dichloroethene | BQL | 5.47 | 1 | 4/12/2006 |
| 1,2-Dichloroethane | BQL | 5.47 | 1 | 4/12/2006 |
| cis-1,2-Dichloroethene | BQL | 5.47 | 1 | 4/12/2006 |
| trans-1,2-dichloroethene | BQL | 5.47 | 1 | 4/12/2006 |
| 1,2-Dichloropropane | BQL | 5.47 | 1 | 4/12/2006 |
| 1,3-Dichloropropane | BQL | 5.47 | 1 | 4/12/2006 |
| 2,2-Dichloropropane | BQL | 5.47 | 1 | 4/12/2006 |
| 1,1-Dichloropropene | BQL | 5.47 | 1 | 4/12/2006 |
| cis-1,3-Dichloropropene | BQL | 5.47 | 1 | 4/12/2006 |
| trans-1,3-Dichloropropene | BQL | 5.47 | 1 | 4/12/2006 |
| Dichlorodifluoromethane | BQL | 5.47 | 1 | 4/12/2006 |
| Diisopropyl ether (DIPE) | BQL | 5.47 | 1 | 4/12/2006 |
| Ethylbenzene | BQL | 5.47 | 1 | 4/12/2006 |
| Hexachlorobutadiene | BQL | 5.47 | 1 | 4/12/2006 |

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**Results for Volatiles**
**by GCMS 8260-5035**

Client Sample ID: GP8
Client Project ID: NCDOT
Lab Sample ID G106-590-8C
Lab Project ID: G106-590
Report Basis: Dry Weight

Analyzed By: JTF
Date Collected: 04-04-2006 10:10
Date Received: 4/6/2006
Matrix: Soil
%Solids: 84.2

| Report Name<br>Compound | Result<br>UG/KG | Quantitation<br>Limit UG/KG | Dilution<br>Factor | Date<br>Analyzed |
|---|---|---|---|---|
| 2-Hexanone | BQL | 5.47 | 1 | 4/12/2006 |
| Iodomethane | BQL | 5.47 | 1 | 4/12/2006 |
| Isopropylbenzene | BQL | 5.47 | 1 | 4/12/2006 |
| 4-Isopropyltoluene | BQL | 5.47 | 1 | 4/12/2006 |
| Methylene chloride | BQL | 21.9 | 1 | 4/12/2006 |
| 4-Methyl-2-pentanone | BQL | 5.47 | 1 | 4/12/2006 |
| Methyl-tert-butyl ether (MTBE) | BQL | 5.47 | 1 | 4/12/2006 |
| Naphthalene | BQL | 5.47 | 1 | 4/12/2006 |
| n-Propyl benzene | BQL | 5.47 | 1 | 4/12/2006 |
| Styrene | BQL | 5.47 | 1 | 4/12/2006 |
| 1,1,1,2-Tetrachloroethane | BQL | 5.47 | 1 | 4/12/2006 |
| 1,1,2,2-Tetrachloroethane | BQL | 5.47 | 1 | 4/12/2006 |
| Tetrachloroethene | BQL | 5.47 | 1 | 4/12/2006 |
| Toluene | BQL | 5.47 | 1 | 4/12/2006 |
| 1,2,3-Trichlorobenzene | BQL | 5.47 | 1 | 4/12/2006 |
| 1,2,4-Trichlorobenzene | BQL | 5.47 | 1 | 4/12/2006 |
| Trichloroethene | BQL | 5.47 | 1 | 4/12/2006 |
| 1,1,1-Trichloroethane | BQL | 5.47 | 1 | 4/12/2006 |
| 1,1,2-Trichloroethane | BQL | 5.47 | 1 | 4/12/2006 |
| Trichlorofluoromethane | BQL | 5.47 | 1 | 4/12/2006 |
| 1,2,3-Trichloropropane | BQL | 5.47 | 1 | 4/12/2006 |
| 1,2,4-Trimethylbenzene | BQL | 5.47 | 1 | 4/12/2006 |
| 1,3,5-Trimethylbenzene | BQL | 5.47 | 1 | 4/12/2006 |
| Vinyl chloride | BQL | 5.47 | 1 | 4/12/2006 |
| m-,p-Xylene | BQL | 10.9 | 1 | 4/12/2006 |
| o-Xylene | BQL | 5.47 | 1 | 4/12/2006 |

| | Spike Added | Spike Result | Percent Recovered |
|---|---|---|---|
| 4-Bromofluorobenzene | 50 | 49.7 | 99 |
| 1,2-Dichloroethane-d4 | 50 | 58.4 | 117 |
| Toluene-d8 | 50 | 50.4 | 101 |

**Comments:**

**Flags:**
BQL = Below Quantitation Limits.

Reviewed By: BJP

SGS

## Results for Semivolatiles by GCMS 8270

Client Sample ID: GP8
Client Project ID: NCDOT
Lab Sample ID: G106-590-8M
Lab Project ID: G106-590
Report Basis: Dry weight

Analyzed By: MRC
Date Collected: 4/4/2006 10:10
Date Received: 4/6/2006
Date Extracted: 4/10/2006
Matrix: Soil
% Solids: 84.16

| Compound | Result ug/Kg | RL ug/Kg | Dilution Factor | Date Analyzed |
|---|---|---|---|---|
| Acenaphthene | BQL | 363 | 1 | 4/14/2006 |
| Acenaphthylene | BQL | 363 | 1 | 4/14/2006 |
| Anthracene | BQL | 363 | 1 | 4/14/2006 |
| Benzo[a]anthracene | BQL | 363 | 1 | 4/14/2006 |
| Benzo[a]pyrene | BQL | 363 | 1 | 4/14/2006 |
| Benzo[b]fluoranthene | BQL | 363 | 1 | 4/14/2006 |
| Benzo[g,h,i]perylene | BQL | 363 | 1 | 4/14/2006 |
| Benzo[k]fluoranthene | BQL | 363 | 1 | 4/14/2006 |
| Benzoic Acid | BQL | 725 | 1 | 4/14/2006 |
| Bis(2-chloroethoxy)methane | BQL | 363 | 1 | 4/14/2006 |
| Bis(2-chloroethyl)ether | BQL | 363 | 1 | 4/14/2006 |
| Bis(2-chloroisopropyl)ether | BQL | 363 | 1 | 4/14/2006 |
| Bis(2-ethylhexyl)phthalate | BQL | 363 | 1 | 4/14/2006 |
| 4-bromophenyl phenyl ether | BQL | 363 | 1 | 4/14/2006 |
| Butylbenzylphthalate | BQL | 363 | 1 | 4/14/2006 |
| 2-Chloronaphthalene | BQL | 363 | 1 | 4/14/2006 |
| 2-Chlorophenol | BQL | 363 | 1 | 4/14/2006 |
| 4-Chloro-3-methylphenol | BQL | 363 | 1 | 4/14/2006 |
| 4-Chloroaniline | BQL | 1810 | 1 | 4/14/2006 |
| 4-Chlorophenyl phenyl ether | BQL | 363 | 1 | 4/14/2006 |
| Chrysene | BQL | 363 | 1 | 4/14/2006 |
| Dibenzo[a,h]anthracene | BQL | 363 | 1 | 4/14/2006 |
| Dibenzofuran | BQL | 363 | 1 | 4/14/2006 |
| Di-n-Butylphthalate | BQL | 363 | 1 | 4/14/2006 |
| 1,2-Dichlorobenzene | BQL | 363 | 1 | 4/14/2006 |
| 1,3-Dichlorobenzene | BQL | 363 | 1 | 4/14/2006 |
| 1,4-Dichlorobenzene | BQL | 363 | 1 | 4/14/2006 |
| 3,3'-Dichlorobenzidine | BQL | 725 | 1 | 4/14/2006 |
| 2,4-Dichlorophenol | BQL | 363 | 1 | 4/14/2006 |
| Diethylphthalate | BQL | 363 | 1 | 4/14/2006 |
| Dimethylphthalate | BQL | 363 | 1 | 4/14/2006 |
| 2,4-Dimethylphenol | BQL | 363 | 1 | 4/14/2006 |
| Di-n-octylphthalate | BQL | 363 | 1 | 4/14/2006 |
| 4,6-Dinitro-2-methylphenol | BQL | 1810 | 1 | 4/14/2006 |
| 2,4-Dinitrophenol | BQL | 1810 | 1 | 4/14/2006 |
| 2,4-Dinitrotoluene | BQL | 363 | 1 | 4/14/2006 |
| 2,6-Dinitrotoluene | BQL | 363 | 1 | 4/14/2006 |
| Diphenylamine * | BQL | 363 | 1 | 4/14/2006 |
| Fluoranthene | BQL | 363 | 1 | 4/14/2006 |
| Fluorene | BQL | 363 | 1 | 4/14/2006 |
| Hexachlorobenzene | BQL | 363 | 1 | 4/14/2006 |
| Hexachlorobutadiene | BQL | 363 | 1 | 4/14/2006 |
| Hexachlorocyclopentadiene | BQL | 725 | 1 | 4/14/2006 |
| Hexachloroethane | BQL | 363 | 1 | 4/14/2006 |

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**Results for Semivolatiles**
**by GCMS 8270**

Client Sample ID: GP8
Client Project ID: NCDOT
Lab Sample ID: G106-590-8M
Lab Project ID: G106-590
Report Basis: Dry weight

Analyzed By: MRC
Date Collected: 4/4/2006 10:10
Date Received: 4/6/2006
Date Extracted: 4/10/2006
Matrix: Soil
% Solids: 84.16

| Compound | Result ug/Kg | RL ug/Kg | Dilution Factor | Date Analyzed |
|---|---|---|---|---|
| Indeno(1,2,3-c,d)pyrene | BQL | 363 | 1 | 4/14/2006 |
| Isophorone | BQL | 363 | 1 | 4/14/2006 |
| 2-Methylnaphthalene | BQL | 363 | 1 | 4/14/2006 |
| 2-Methylphenol | BQL | 363 | 1 | 4/14/2006 |
| 3- & 4-Methylphenol | BQL | 363 | 1 | 4/14/2006 |
| Naphthalene | BQL | 363 | 1 | 4/14/2006 |
| 2-Nitroaniline | BQL | 363 | 1 | 4/14/2006 |
| 3-Nitroaniline | BQL | 1810 | 1 | 4/14/2006 |
| 4-Nitroaniline | BQL | 1810 | 1 | 4/14/2006 |
| Nitrobenzene | BQL | 363 | 1 | 4/14/2006 |
| 2-Nitrophenol | BQL | 363 | 1 | 4/14/2006 |
| 4-Nitrophenol | BQL | 1810 | 1 | 4/14/2006 |
| N-Nitrosodi-n-propylamine | BQL | 363 | 1 | 4/14/2006 |
| Pentachlorophenol | BQL | 1810 | 1 | 4/14/2006 |
| Phenanthrene | BQL | 363 | 1 | 4/14/2006 |
| Phenol | BQL | 363 | 1 | 4/14/2006 |
| Pyrene | BQL | 363 | 1 | 4/14/2006 |
| 1,2,4-Trichlorobenzene | BQL | 363 | 1 | 4/14/2006 |
| 2,4,5-Trichlorophenol | BQL | 363 | 1 | 4/14/2006 |
| 2,4,6-Trichlorophenol | BQL | 363 | 1 | 4/14/2006 |

| | Spike Added | Spike Result | Percent Recovered |
|---|---|---|---|
| 2-Fluorobiphenyl | 10 | 11.5 | 115 |
| 2-Fluorophenol | 10 | 12 | 120 |
| Nitrobenzene-d5 | 10 | 11.5 | 115 |
| Phenol-d6 | 10 | 11.8 | 118 |
| 2,4,6-Tribromophenol | 10 | 11.6 | 116 |
| 4-Terphenyl-d14 | 10 | 12.3 | 123 |

**Comments:**
* N-Nitrosodiphenylamine is reported as the breakdown product Diphenylamine.

**Flags:**
BQL = Below Quantitation Limits.

Reviewed By: _____

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## VPH (Aliphatics/Aromatics) Laboratory Reporting Form

Client Name: Environmental Investigations

Project Name: NCDOT

| Sample Information and Analytical Results | |
|---|---|
| Sample Identification | GP8 |
| Sample Matrix | Soil |
| Collection Option (for Soil)* | 2 |
| Date Collected | 04/04/06 |
| Date Received | 04/06/06 |
| Date Extracted | 04/04/06 |
| Date Analyzed | 04/11/06 |
| Dry Weight | 84 |
| Dilution Factor | 1 |
| $C_5$-$C_8$ Aliphatics** | < 10 (mg/Kg) |
| $C_9$-$C_{12}$ Aliphatics** | < 10 (mg/Kg) |
| $C_9$-$C_{10}$ Aromatics** | < 10 (mg/Kg) |
| Surrogate % Recovery - PID | 100 |
| Surrogate % Recovery - FID | 110 |

* = Option 1 = Established fill line on vial, Option 2 = Sampling Device/Brand, or Option 3 = Field weight of soil.

** = Excludes any surrogates or internal standards.

Lab Info: g106-590-8a

Reviewed By: RM

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Attachment 2

# VPH Laboratory Reporting Form

## Calibration and QA/QC Information

FID Initial Calibration Date: 02/11/06 PID Initial Calibration Date: 02/11/06

### Calibration Ranges and Limits

| Range | MDL (07/15/2004) (µg/L) | ML (µg/L) | RL (µg/L) | RL (mg/Kg) |
|---|---|---|---|---|
| $C_5$-$C_8$ Aliphatics | 4.4 | 14 | 100 | 10 |
| $C_9$-$C_{12}$ Aliphatics | 3.4 | 11 | 100 | 10 |
| $C_9$-$C_{10}$ Aromatics | 0.13 | 0.41 | 100 | 10 |

### Calibration Concentration Levels

| Range | Levels (µg/L) | %RSD or CCC | Method of Quantitation |
|---|---|---|---|
| $C_5$-$C_8$ Aliphatics | 40 | 10.8 | Calibration Factor |
| | 1000 | | |
| | 2000 | | |
| | 3000 | | |
| | 4000 | | |
| $C_9$-$C_{12}$ Aliphatics | 10 | 0.99 | Linear Regression |
| | 250 | | |
| | 500 | | |
| | 750 | | |
| | 1000 | | |
| $C_9$-$C_{10}$ Aromatics | 10 | 19.30 | Calibration Factor |
| | 250 | | |
| | 500 | | |
| | 750 | | |
| | 1000 | | |

Calibration Check Date: 04/11/06

### Calibration Check

| Range | Levels (µg/L) | Levels (mg/Kg) | RPD |
|---|---|---|---|
| $C_5$-$C_8$ Aliphatics | 2000 | 200 | 6.9 |
| $C_9$-$C_{12}$ Aliphatics | 500 | 50 | -5.4 |
| $C_9$-$C_{10}$ Aromatics | 500 | 50 | 6.7 |

MDL = Method Detection Limit
ML = Minimum Limit
RL = Reportable Limit
RPD = Relative Percent Difference
%RSD = Percent Relative Standard Deviation
CCC = Correlation Coefficient of Curve

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## EPH (Aliphatics/Aromatics) Results

*by MDEP-EPH*

Client Name: Environmental Investigations

Project Name: NCDOT

| Sample Information and Analytical Results | |
|---|---|
| Sample Identification | GP8 |
| Sample Matrix | Soil |
| Date Collected | 04/04/06 |
| Date Received | 04/06/06 |
| Date Extracted | 04/20/06 |
| Date Analyzed | 04/24/06 |
| Dry Weight | 84.2 |
| Dilution Factor | 1 |
| $C_9$-$C_{18}$ Aliphatics* | < 10 (mg/Kg) |
| $C_{19}$-$C_{36}$ Aliphatics* | < 10 (mg/Kg) |
| $C_{11}$-$C_{22}$ Aromatics* | < 10 (mg/Kg) |
| Aliphatic Surrogate % Recovery | 120 |
| Aromatic Surrogate % Recovery | 87 |

**Comments:**

* = Excludes any surrogates or internal standards.
Sample did not require fractionation.

Lab info: G106-590-8N

Reviewed By: BJP

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Attachment 3

# EPH Laboratory Reporting Form

## Calibration and QA/QC Information

Initial Calibration Date: 04/19/06

### Calibration Ranges and Limits

| Range | MDL (2/2004) (µg/L) | ML (µg/L) | RL (µg/L) | RL (mg/Kg) |
|---|---|---|---|---|
| $C_9$-$C_{18}$ Aliphatics | 3.84 | 12.2 | 100 | 10 |
| $C_{19}$-$C_{36}$ Aliphatics | 0.57 | 1.8 | 100 | 10 |
| $C_{11}$-$C_{22}$ Aromatics | 4.54 | 14.4 | 100 | 10 |

### Calibration Concentration Levels

| Range | Levels (µg/mL) | %RSD or CCC | Method of Quantitation |
|---|---|---|---|
| $C_9$-$C_{18}$ Aliphatics | 6 | 13.30 | Calibration Factor |
| | 30 | | |
| | 60 | | |
| | 120 | | |
| | 240 | | |
| $C_{19}$-$C_{36}$ Aliphatics | 8 | 10.1 | Calibration Factor |
| | 40 | | |
| | 80 | | |
| | 160 | | |
| | 320 | | |
| $C_{11}$-$C_{22}$ Aromatics | 17 | 4.5 | Calibration Factor |
| | 85 | | |
| | 170 | | |
| | 340 | | |
| | 680 | | |

Calibration Check Date: 04/24/06

### Calibration Check

| Range | Levels (µg/mL) | RPD |
|---|---|---|
| $C_9$-$C_{18}$ Aliphatics | 120 | 4.3 |
| $C_{19}$-$C_{36}$ Aliphatics | 160 | 0.7 |
| $C_{11}$-$C_{22}$ Aromatics | 340 | -5.6 |

MDL = Method Detection Limit
ML = Minimum Limit
RL = Reportable Limit

RPD = Relative Percent Difference
%RSD = Percent Relative Standard Deviation
CCC = Correlation Coefficient of Curve

B = Compound also detected in batch blank

BQL = Below Quantitation Limit (RL or MDL)

DF = Dilution Factor

Dup = Duplicate

D = Detected, but RPD is > 40% between results in dual column method.

E = Estimated concentration, exceeds calibration range.

J = Estimated concentration, below calibration range and above MDL

LCS(D) = Laboratory Control Spike (Duplicate)

MDL = Method Detection Limit

MS(D) = Matrix Spike (Duplicate)

PQL = Practical Quantitation Limit

RL = Reporting Limit

RPD = Relative Percent Difference

mg/kg = milligram per kilogram, ppm, parts per million

ug/kg = micrograms per kilogram, ppb, parts per billion

mg/L = milligram per liter, ppm, parts per million

ug/L = micrograms per liter, ppb, parts per billion

% Rec = Percent Recovery

% soilds = Percent Solids

Special Notes:

1) Metals and mercury samples are digested with a hot block, see the standard operating procedure document for details.

2) Uncertainty for all reported data is less than or equal to 30 percent.

# SGS

## CHAIN OF CUSTODY RECORD
## SGS Environmental Services Inc.

Locations Nationwide
- Alaska
- Louisiana
- New Jersey
- West Virginia
- Hawaii
- Maryland
- North Carolina

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056747

(1)

CLIENT: EI

CONTACT: Bob Shaw PHONE NO: 919 657 7500

PROJECT: NCDOT SITE/PWSID#: Parcel 88

REPORTS TO: EI FAX NO.: 919 657 7551

INVOICE TO: NCDOT QUOTE # WBS Element 35609.1.1

P.O. NUMBER Tip# R-2519A

SGS Reference: G106-590

PAGE 1 OF 1

(2)

| LAB NO. | SAMPLE IDENTIFICATION | DATE | TIME | MATRIX | No CONTAINERS | SAMPLE TYPE (C=COMP G=GRAB) | Preservatives Used | Analysis Required (3) GRO/DRO | 8260 | 8270 | EPH | VPH | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | GP1 | 4/4 | 915 | S | | | | X | | | | | |
| | GP2 | | 925 | | | | | | | | | | |
| | GP3 | | 930 | | | | | | | | | | |
| | GP4 | | 935 | | | | | | | | | | |
| | GP5 | | 945 | | | | | | | | | | |
| | GP6 | | 950 | | | | | | | | | | |
| | GP7 | | 1000 | | | | | | | | | | |
| | GP8 | | 1010 | | | | | ↓ | X | X | X | X | |
| | ~~GP9~~ | | | | | | | | | | | | |
| | ~~GP10~~ | ↓ | | ↓ | | | | | | | | | |

3/3

(5)

| Collected/Relinquished By:(1) | Date | Time | Received By: |
|---|---|---|---|
| Kevin Horton | 4/4 | 2100 | |
| Relinquished By: (2) | Date 4/4/06 | Time 1015 | Received By: Julie Johnson |
| Relinquished By: (3) | Date | Time | Received By: |
| Relinquished By: (4) | Date | Time | Received By: |

(4)

Shipping Carrier: fedex

Shipping Ticket No: 8567 7732 4476

Samples Received Cold? (Circle) YES NO

Temperature °C: 5.6°C

Special Deliverable Requirements:

Chain of Custody Seal: (Circle) INTACT BROKEN ABSENT

Requested Turnaround Time and Special Instructions:

Standard



White - Retained by Lab
Yellow - Returned with Report
Pink - Retain [illegible] ampler

# APPENDIX E

# GEOPHYSICAL REPORT

Schnabel Engineering South

11-A Oak Branch Drive
Greensboro, NC 27407

Phone (336) 274-9456
Fax (336) 274-9486
www.schnabel-eng.com

May 8, 2006

Mr. Robert M. Shaut
EI, Inc.
2101 Gateway Centre Boulevard, Suite 200
Morrisville, NC 27560

Via email (pdf)

RE: State Project: R-2519A, WBS Element 35609.1.1, Yancey County
US 19E from east of SR 1336 (Jacks Creek Road) to SR 1186 (Old US 19)

SUBJECT: Report on Geophysical Surveys for Locating Possible UST's on 14 Parcels
Schnabel Engineering Project No. 05211014.01-07

Dear Mr. Shaut:

This letter contains our report on the geophysical surveys we conducted on the subject properties. This letter report includes one 8.5x11 color figure and thirty-two 11x17 color figures.

## 1.0 INTRODUCTION

The work described in this report was conducted by Schnabel Engineering under our contract with the NCDOT. The work was conducted at the locations indicated by EI to support their environmental assessment of the subject parcels. The purpose of the geophysical surveys was to locate possible metal underground storage tanks (UST's) and associated metal product lines in the accessible areas of the sites.

Schnabel Engineering conducted geophysical surveys on March 13 through 17, 2006, in the accessible areas of the proposed right-of-way (ROW) sections of the parcels: 040, 042, 088, 099, 114, 115, 117, 134, 144, 167, 177, 194, 196 and 214. Photographs of these properties are included on Figures 1 through 4. Photographs of UST locations as marked in the field are included on Figure

5.

The geophysical investigation consisted of electromagnetic (EM) induction surveys using a Geonics EM61-MK2 instrument. The EM61 metal detector is used to locate metal objects buried up to about eight feet below ground surface. Ground-penetrating radar (GPR) investigations of selected EM61 anomalies were conducted using a Geophysical Survey Systems SIR-2000 system equipped with a 400 MHz antenna. A Fisher Gemini-3 was used in the conduction mode to trace exposed vent pipes and product lines. Photographs of these instruments are shown in Figure 6.

## 2.0 FIELD METHODOLOGY

### 2.1 Location Control

Locations of geophysical data points and site features were obtained using a sub-meter Trimble Pro-XRS DGPS system on Parcels 40, 42, 88, 99, 114, 115, 117, 134, 144, 167, 177, 194, and 214. An X-Y survey grid was set up on Parcel 196. References to direction and location in this report for Parcel 196 are based on this local site grid. References to direction and location in this report for Parcels 40, 42, 88, 99, 114, 115, 117, 134, 144, 167, 177, 194, and 214 are based on the US State Plane 1983 System, North Carolina 3200 Zone, using the NAD 83 datum, with units in meters. The locations of existing site features (building, curbs, signs, etc.) were recorded for later correlation with the geophysical data and for location references to the NCDOT drawings.

### 2.2 Data Collection

The EM61 data were collected in the accessible portions of the parcels along parallel survey lines spaced approximately one meter apart. The EM61 and DGPS data were recorded digitally using a field computer and later transferred to a desktop computer for data processing. The GPR data were collected along survey lines spaced one-half to one meter apart in orthogonal directions over areas of reinforced concrete and over anomalous EM readings not attributed to cultural features. The GPR

data were reviewed in the field to evaluate the possible presence of USTs. The GPR data also were recorded digitally and later transferred to a desktop computer for further review.

Preliminary results were sent to Bob Shaut of EI on March 20, 2006.

## 3.0 DISCUSSION OF RESULTS

The contoured EM61 data are shown on Figures 7 through 34. The EM61 early time gate results are plotted on Figures 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31, and 33. The early time gate data provide the most sensitive detection of metal object targets, regardless of size. Figures 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, and 32 show the difference between the response of the top and bottom coils of the EM61 instrument (differential response). The difference is taken to remove the effect of surface and very shallowly buried metallic objects. Typically, the differential response emphasizes anomalies from deeper and larger objects such as USTs.

### 3.1 Parcel 040 - Andrew E. Brown Property (Andy's, Inc.)

The parcel owned by Andrew E. Brown is located approximately 61 meters east of NCSR 1375 on the north side of US Highway 19E. The EM61 results are shown on Figure 7 (early time gate) and Figure 8 (differential). Two vehicles could not be moved at the time of our surveys. The early time gate results show anomalies probably due to reinforced concrete, several small anomalies probably caused by insignificant buried metal objects, several anomalies caused by known site features, and a large linear anomaly probably caused by a buried utility. The observed anomalies not attributed to known site features are removed in the differential data set. GPR surveys were conducted over three areas of reinforced concrete. The GPR data did not indicate the presence of USTs in the areas surveyed.

### 3.2 Parcel 042 - Danny Hensley Property (Burnsville Independent)

The parcel owned by Danny Hensley is located approximately 244 meters to the east of NCSR 1196

on the south side of US Highway 19E. The EM61 results are shown on Figure 9 (early time gate) and Figure 10 (differential). Several vehicles and trailers could not be moved at the time of our surveys. The early time gate results show several small anomalies probably caused by insignificant buried metal objects, and several anomalies caused by known site features. The observed anomalies not attributed to known site features are removed in the differential data set. GPR surveys were not conducted on the site.

### 3.3 Parcel 088 - Bill Riddle Property (Riddle Fuel Oil Company)

The parcel owned by Bill Riddle is located approximately 488 meters to the west of NC Highway 197 on the north side of US Highway 19E. The EM61 results are shown on Figure 11 (early time gate) and Figure 12 (differential). The early time gate results show several small anomalies probably caused by insignificant buried metal objects, linear anomalies probably caused by buried utilities, two linear anomalies probably caused by buried metal culverts, and several anomalies caused by known site features. The observed anomalies not attributed to known site features are removed in the differential data set. GPR surveys were not conducted on the site.

### 3.4 Parcel 099 - Charles Dellinger Property (Texaco)

The parcel owned by Charles Dellinger is located at the southwestern quadrant of the intersection of US Highway 19E and NC 197. The EM61 results are shown on Figure 13 (early time gate) and Figure 14 (differential). The early time gate results show several small anomalies probably caused by insignificant buried metal objects, linear anomalies probably caused by buried utilities, and several anomalies caused by known site features. The observed anomalies not attributed to known site features are removed in the differential data set. GPR surveys were not conducted on the site.

### 3.5 Parcel 114 - Arlene Ray, Inc. Property (Burnsville Gas, Inc.)

The parcel owned by Arlene Ray, Inc. is located at the southwest quadrant of US Highway 19E and NCSR 1140. The EM61 results are shown on Figure 15 (early time gate) and Figure 16

(differential). The early time gate results show several small anomalies probably caused by insignificant buried metal objects, three linear anomalies probably caused by buried metal culverts, an anomaly probably caused by reinforced concrete, and several anomalies caused by known site features. The observed anomalies not attributed to known site features are removed in the differential data set. GPR surveys were conducted to investigate the reinforced concrete. The GPR data did not indicate the presence of USTs in the areas surveyed.

### 3.6 Parcel 115 - Tom Morgan Property (Convenience King 22)

The parcel owned by Tom Morgan is located at the intersection of Main Street and US Highway 19E. The EM61 results are shown on Figure 17 (early time gate) and Figure 18 (differential). The early time gate results show several small anomalies probably caused by insignificant buried metal objects, several anomalies probably caused by buried metal culverts, and several anomalies caused by known site features. Some of the observed anomalies not attributed to known site features are removed in the differential data set. GPR surveys were conducted to investigate several EM61 differential anomalies on the site. The GPR data did not indicate the presence of USTs in the areas surveyed.

### 3.7 Parcel 117 - Samuel S. Styles Property (Former Sam's Oil Company)

The parcel owned by Samuel S. Styles is located on the north side of US 19 East Business (East Main Street) just west of SR 1436. The EM61 results are shown on Figure 19 (early time gate) and Figure 20 (differential). The early time gate results show several small anomalies probably caused by insignificant buried metal objects, an anomaly probably caused by a buried metal culvert, and several anomalies caused by known site features. The observed anomalies not attributed to known site features are removed in the differential data set. GPR surveys were conducted to investigate several EM61 differential anomalies on the site. GPR surveys were not conducted behind the building in the area of the observed fill port because of the presence of large metallic obstructions and debris, and because this area was not within the intended survey area indicated by EI. The GPR data did not indicate the presence of USTs in the areas surveyed. The Gemini-3 was used in the

conduction mode in an attempt to trace out the extent of the vent pipe on the east side of the building. A signal was not detected, which suggests the vent pipe either does not extend very far under the surface beyond the exposed section, or the vent pipe extends beneath the building. A signal would have been detected if the vent pipe connected directly to a UST next to the building.

### 3.8 Parcel 134 - Keith Presnell Property (Austin Automotive)

The parcel owned by Keith Presnell is located at the northeast quadrant of the intersection of US Highway 19E and NCSR 1329. The EM61 results are shown on Figure 21 (early time gate) and Figure 22 (differential). Several vehicles and trailers could not be moved at the time of our surveys. The early time gate results show several small anomalies probably caused by insignificant buried metal objects, linear anomalies probably caused by utilities, and several anomalies caused by known site features. The observed anomalies not attributed to known site features are removed in the differential data set. GPR surveys were not conducted on the site.

### 3.9 Parcel 144 - Peggy Jones Property (Prives & Perches)

The parcel owned by Peggy Jones is located approximately 305 meters west of NCSR 1141 on the south side of US Highway 19E. The EM61 results are shown on Figure 23 (early time gate) and Figure 25 (differential). The early time gate results show several small anomalies probably caused by insignificant buried metal objects, two linear anomalies probably caused by buried metal culverts, an anomaly probably caused by a partially buried metal conduit pipe, and several anomalies caused by known site features. The observed anomalies not attributed to known site features are removed in the differential data set. GPR surveys were not conducted on the site. The Gemini-3 was used in the conduction mode to trace out the extent of the metal conduit pipe that was visible in the area of the former pump island, which was then marked out on the ground surface. The conduit pipe was traced to the front of the building, and the owner of the property informed our representative that on the wall inside the building a switch existed that was used to turn the pump off and on. The owner also informed our representative that the USTs and product lines were removed at the same time as the pump island, but the conduit pipe for the electrical was left in place.

### 3.10 Parcel 167 - Edd Cassida Property (Edd's Independent Station)

The parcel owned by Edd Cassida is located at the southwest quadrant of the intersection of US Highway 19E and NCSR 1142. The EM61 results are shown on Figure 25 (early time gate) and Figure 26 (differential). The early time gate results show several small anomalies probably caused by insignificant buried metal objects, two linear anomalies probably caused by buried metal culverts, and several anomalies caused by known site features. The observed anomalies not attributed to known site features are removed in the differential data set. GPR surveys were not conducted on the site.

### 3.11 Parcel 177 - Johnnie Bennett Property (Former BP Gas Station)

The parcel owned by Johnnie Bennett is located at the southwest quadrant of the intersection of US Highway 19E and NCSR 1143. The EM61 results are shown on Figure 27 (early time gate) and Figure 28 (differential). The early time gate results show several small anomalies probably caused by insignificant buried metal objects, an anomaly probably caused by reinforced concrete, and several anomalies caused by known site features. The observed anomalies not attributed to known cultural features are removed in the differential data set. GPR surveys were conducted to investigate the reinforced concrete. The GPR data did not indicate the presence of USTs in the areas surveyed.

### 3.12 Parcel 194 - William Ira Young Property (Former Gas Station)

The parcel owned by William Ira Young is located at the northwest quadrant of the intersection of SR 1323 and US Highway 19E. The EM61 results are shown on Figure 29 (early time gate) and Figure 30 (differential). Three site visits were required in order to survey the areas of concern because the site owner could only move obstructing trailers around at specific times. The early time gate results show several small anomalies probably caused by insignificant buried metal objects, an anomaly probably caused by a buried metal culvert, a linear anomaly probably caused by a buried utility, vent pipe line, or product line, and several anomalies caused by known site features. Some of

the observed anomalies not attributed to known site features are removed in the differential data set. Information provided by EI indicated a vent pipe at the southwest corner of the building, and three fill ports located southwest of the building. These features could not be located at the time of our surveys. GPR surveys were conducted to investigate the linear anomaly extending from the southwest corner of the building, as well as the areas occupied by trailers to the southwest of the building. The GPR data indicated the presence of one probable UST as shown on Figures 29 and 30, which was marked out on the ground surface as shown on Figure 5. The GPR data indicate that the UST is approximately 1.0 meter in diameter and about 1.5 meters in length, with an approximate capacity of 1100-1200 liters. It appears to be buried 1.0 to 1.5 meters below the ground surface.

### 3.13 Parcel 196 - Ed Gouge Property (Heritage Tire)

The parcel owned by Ed Gouge is located on the south side of US Highway 19E approximately 60 meters east of SR 1144. A local X-Y site grid was laid out for positioning of the geophysical surveys at this parcel because the steep valley walls at this location did not allow enough satellite visuals to provide a reliable GPS signal to be used for positioning. The EM61 results are shown on Figure 31 (early time gate) and Figure 32 (differential). The early time gate results show several small anomalies probably caused by insignificant buried metal objects, an anomaly probably caused by a buried metal culvert, and several anomalies caused by known site features. Some of the observed anomalies not attributed to known cultural features are removed in the differential data set. GPR surveys were conducted to investigate three EM61 differential anomalies on the site. The GPR data did not indicate the presence of USTs in the areas surveyed.

### 3.14 Parcel 214 - Charles R. Dellinger

The parcel owned by Charles Dellinger is located at the southwest corner of the intersection of US Highway 19E and SR 1146 (Cane Bridge Road). The EM61 results are shown on Figure 33 (early time gate). A malfunction with the top coil of the EM61 caused it to record random erroneous data, which influenced the differential data set. The differential data set was not used and has not been included in this report. The early time gate results show several small anomalies probably caused by

insignificant buried metal objects, an anomaly probably caused by a reinforced concrete bridge, and several anomalies caused by known site features. GPR surveys were conducted to investigate two EM61 early time gate anomalies on the site. The GPR data did not indicate the presence of USTs in the areas surveyed.

## 4.0 CONCLUSIONS

Our evaluation of the geophysical data collected on 14 Parcels on State Project R-2519A in Yancey County, NC indicate the following:

- The geophysical data indicate the presence of one possible UST on parcel 194. The possible UST is about 1.0 meter in diameter and about 1.5 meters in length, with an approximate capacity of 1100 to 1200 liters.

- The geophysical data do not indicate the presence USTs in the areas surveyed on parcels 040, 042, 088, 099, 114, 115, 117, 134, 144, 167, 177, 196, and 214.

## 5.0 LIMITATIONS

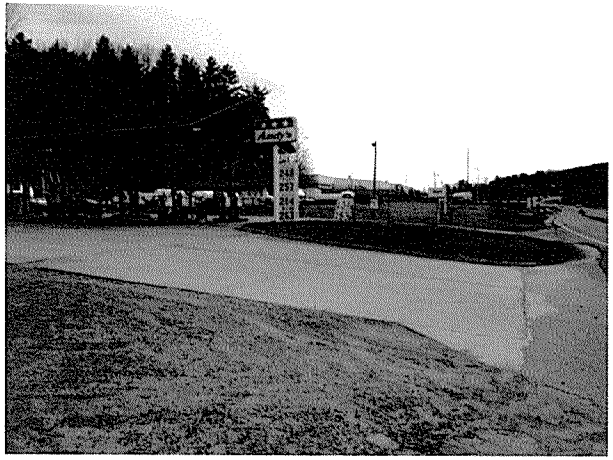
These services have been performed and this report prepared for the North Carolina Department of Transportation in accordance with generally accepted guidelines for conducting geophysical surveys. It is generally recognized that the results of geophysical surveys are non-unique and may not represent actual subsurface conditions.

Thank you for the opportunity to serve you on this project. Please call if you need additional information or have any questions.

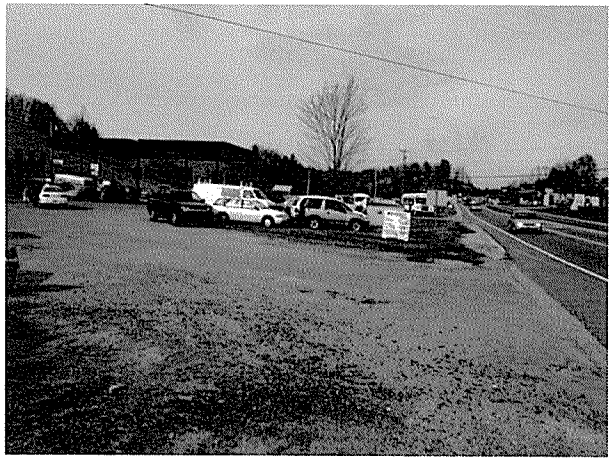
Sincerely,

Jeremy S. Strohmeyer, L.G.
Project Manager

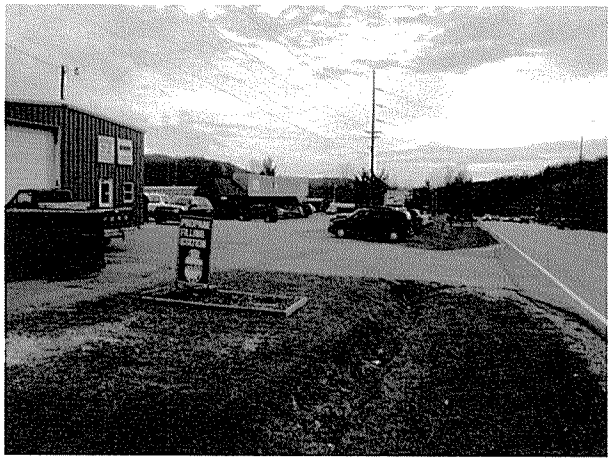
JS/RC
Attachment: Figures (1-33)



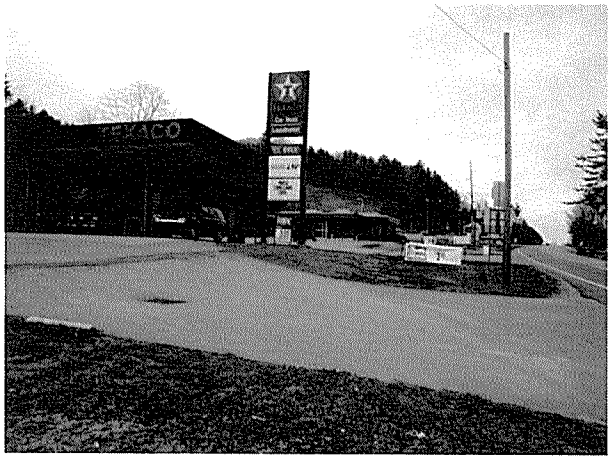
Parcel 040 - Andrew E. Brown Property, looking northeast



Parcel 042 - Danny Hensley Property, looking southwest

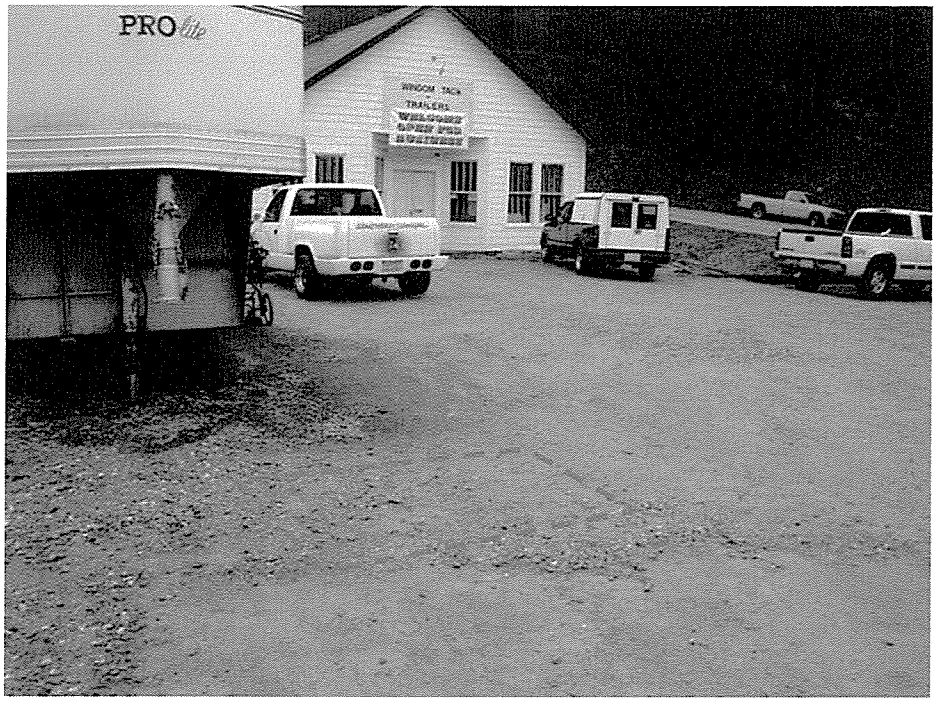


Parcel 088 - Bill Riddle Property, looking northeast

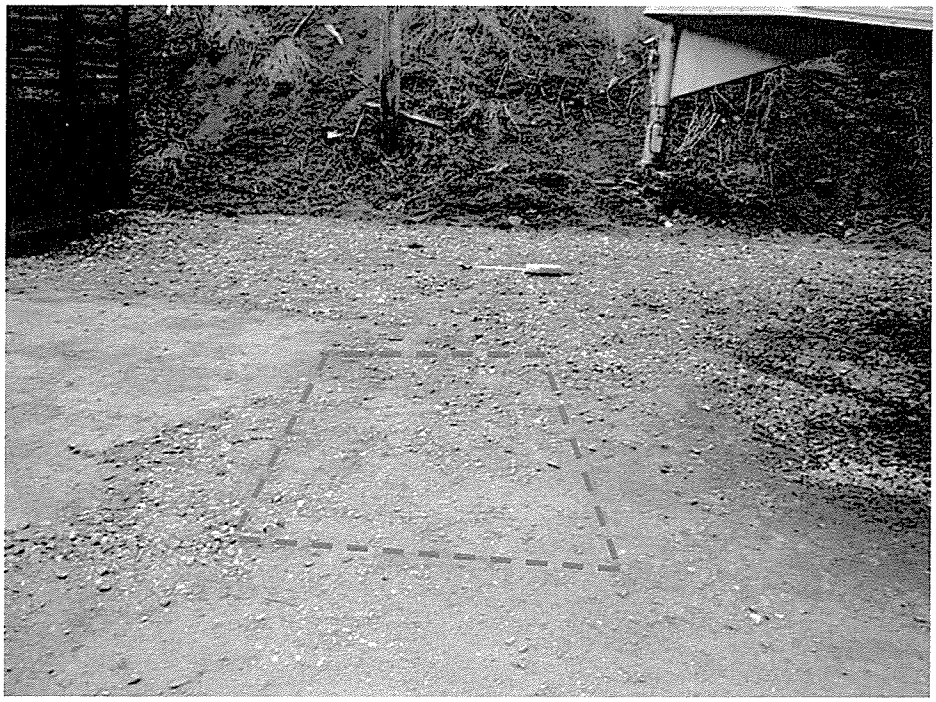


Parcel 099 - Charles Dellinger Property, looking southwest

| | | |
|---|---|---|
| Schnabel Engineering | NC Department of Transportation<br>Geotechnical Engineering Unit | SITE PHOTOS |
| | State Project No. R-2519A<br>Yancey County, North Carolina | FIGURE 1 |




Location of possible UST as marked on site, looking northeast

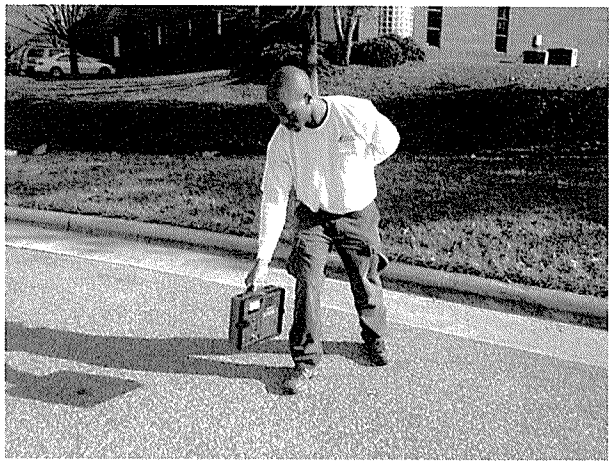


Location of possible UST as marked on site, looking west

| | | |
|---|---|---|
| Schnabel Engineering | NC Department of Transportation<br>Geotechnical Engineering Unit | **PHOTOS OF POSSIBLE UST LOCATION** |
| | State Project No. R-2519A<br>Yancey County, North Carolina | FIGURE 5 |

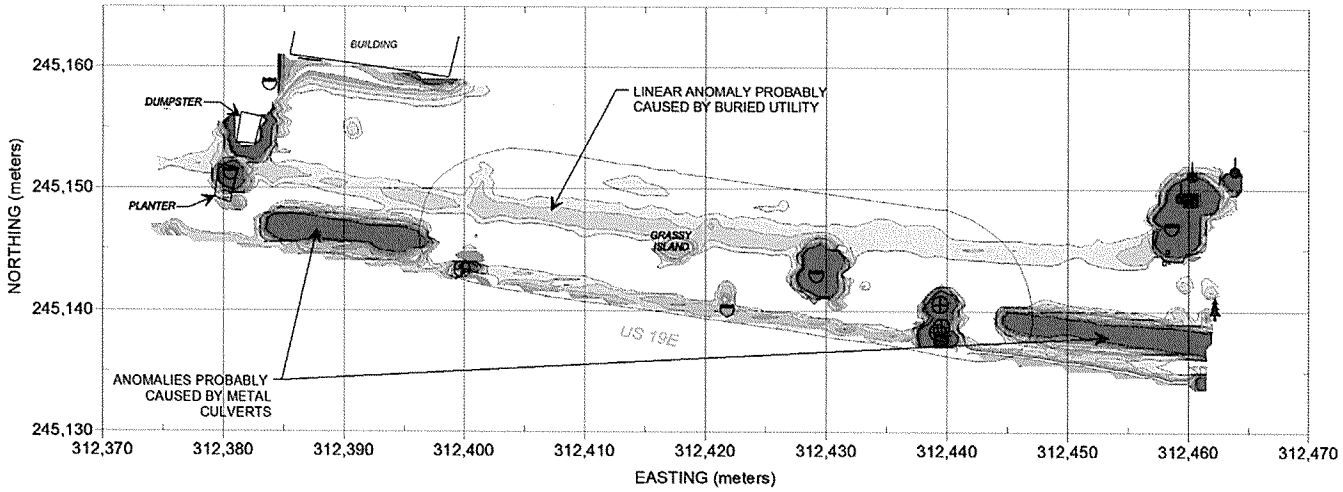
Geonics EM61-MK2

Geophysical Survey Systems SIR-2000 with 400 MHz antenna



Fisher Gemini-3 used in conduction mode

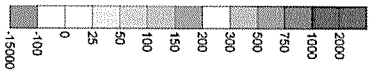
| | | |
|---|---|---|
| Schnabel Engineering | NC Department of Transportation<br>Geotechnical Engineering Unit<br>State Project No. R-2519A<br>Yancey County, North Carolina | **PHOTOS OF GEOPHYSICAL EQUIPMENT**<br>FIGURE 6 |




**EXPLANATION**

- EM61 SURVEY AREA - DATA ACQUIRED ALONG PARALLEL SURVEY LINES SPACED APPROXIMATELY 2.5 FEET APART
- STORM WATER INLET/OUTLET
- SIGN
- UTILITY
- METALLIC OBJECT
- RIGHT-OF-WAY MARKER
- UTILITY POLE
- GPR SURVEY AREA

EM61 Early Time Gate Response (mV)




Note: The contour plot shows the earliest and most sensitive time gate of the EM61 bottom coil/channel in millivolts (mV). The EM data were collected on March 14, 2006, using a Geonics EM61-MK2 instrument. Positioning for EM61 survey provided using a submeter Trimble ProXRS DGPS system. Coordinates are in the US State Plane 1983 System, North Carolina 3200 Zone, using the NAD 1983 datum.

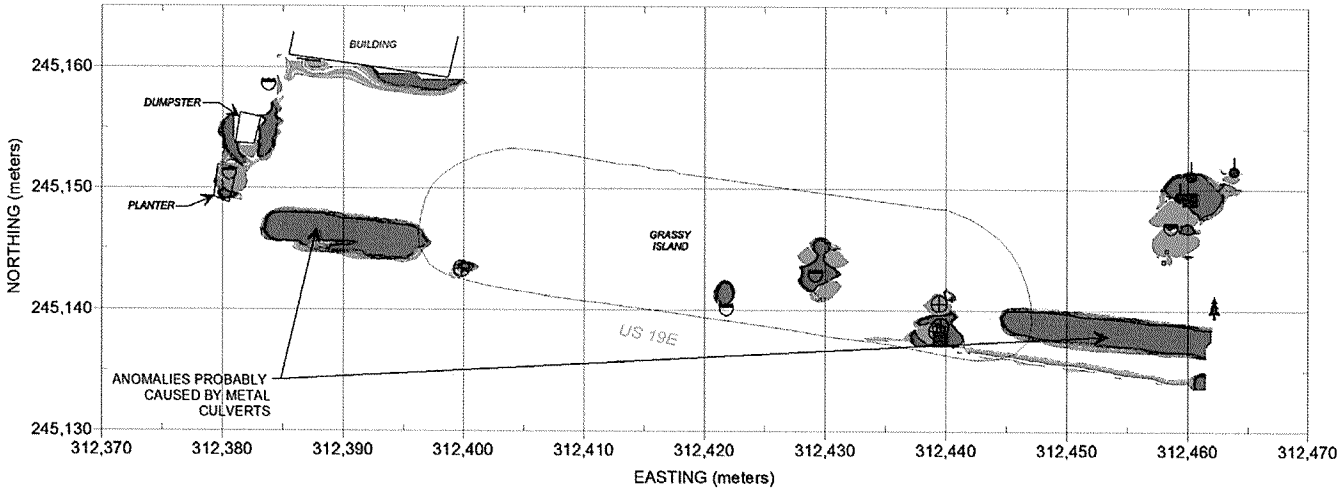
Schnabel Engineering

NC Department of Transportation
Geotechnical Engineering Unit

State Project No. R-2519A
Yancey County, North Carolina

**PARCEL 88**
**EM61 EARLY TIME GATE RESPONSE**

FIGURE 11




EXPLANATION

- EM61 SURVEY AREA - DATA ACQUIRED ALONG PARALLEL SURVEY LINES SPACED APPROXIMATELY 2.5 FEET APART
- STORM WATER INLET/OUTLET
- SIGN
- UTILITY
- METALLIC OBJECT
- RIGHT-OF-WAY MARKER
- UTILITY POLE
- GPR SURVEY AREA

EM61 Differential Response (mV)

-20000 -100 0 40 60 80 100 120 140 160 200

Note: The contour plot shows the difference, in millivolts (mV), between the readings from the top and bottom coils of the EM61. The difference is taken to reduce the effect of shallow metal objects and emphasize anomalies caused by deeper metallic objects, such as pipes and tanks. The EM data were collected on March 14 ,2006, using a Geonics EM61-MK2 instrument. Positioning for the EM61 survey provided using a submeter Trimble ProXRS DGPS system. Coordinates are in the US State Plane System, North Carolina 3200 Zone, using the NAD 1983 datum.

Schnabel Engineering

NC Department of Transportation
Geotechnical Engineering Unit

State Project No. R-2519A
Yancey County, North Carolina

**PARCEL 88**
**EM61 DIFFERENTIAL RESPONSE**

FIGURE 12