wood.

North Carolina Department of Transportation

Preliminary Site Assessment
State Project: R-2307B
WBS Element: 37944.1.FR5
Parcel 123
Iredell County

Frances L. Nantz
842 NC 150 (River Highway)
Mooresville, North Carolina
January 30, 2019

Wood Environment and Infrastructure Solutions, Inc.
Project: 188322307

John Maas, LG
Senior Geologist

Helen Corley, LG, BCES
Senior Assoc. Hydrogeologist

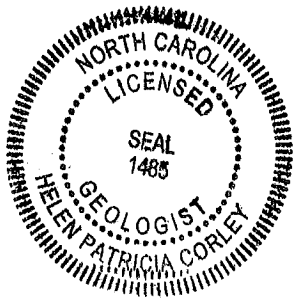


TABLE OF CONTENTS

TABLES

FIGURES

APPENDICES

1.0 INTRODUCTION

In response to the North Carolina Department of Transportation (NCDOT) Request for Proposal, dated September 17, 2018, Wood Environment and Infrastructure Solutions, Inc. (Wood) has performed a Preliminary Site Assessment (PSA) for Parcel 123. The investigation was conducted in accordance with Wood's Technical and Cost proposal dated September 27, 2018. NCDOT contracted Wood to perform a PSA at the parcel, within the area to be affected by future road construction activities, in order to identify potential impacts from the former use of the property.

The parcel is located on the north side of River Highway and east of Water Oak Drive, approximately 1.7 miles west of I-77, as shown in the Vicinity Map, **Figure 1**. The parcel which is located at 842 NC 150 (River Highway), is occupied by a garden center, Garden Shed and More, operating from a one-story multi-unit building. It is identified as Parcel 123 and Frances L. Nantz (Site), within the NCDOT R-2307B design file. The parcel is in Mooresville of Iredell County, North Carolina. The area of investigation within the parcel is shown as **Figure 2**.

The following report summarizes a geophysical survey and describes our subsurface field investigation at the Site. The report also presents soil analyses to evaluate potential soil contamination within Parcel 123, the Frances L. Nantz property.

1.1 Site History

Mr. Robert Nantz became the owner after he inherited the property when the former owner (Sid Cook) and operator was killed onsite in the 1970's. After the death of Sid Cook the operations as a gas station ended at the Site. The property had been a gas station from the late 1950's up until the 1970's.

This parcel appears on the North Carolina Department Environment and Quality (NCDEQ) Underground Storage Tank (UST) Facility Database with one closed incident # 21301. The UST Closure Report for the Nantz Estate Property, dated February 1, 2000, by Ground Technological Services Inc. (GTSI) documented removal of four gasoline USTs. Three of the USTS were located in the tank bed west of the building while one UST was located in an eastern tank bed (see Figure 2) . Contracted by Mr. Nantz, F.J. Ervin Grading Inc. initiated and implemented closure procedures. Upon GTSI's arrival, GTSI noted one UST

had been removed, with work on an additional UST excavation underway. Site work was halted until the local Fire Marshall and NCDEQ Mooresville Regional Office was contacted. GTSI performed excavation and sampling work from January 4 to6, 2000. Each tank was excavated utilizing a large track hoe and no stained soils or odors indicative of a release were noted within the excavations. No field screening with organic vapor analyzer instruments was utilized. One 5,000-gallon (tank #3), one 8,000-gallon (tank #1), and two 10,000-gallon (tank #2 and #4) gasoline USTs were removed from the Site. No holes were noted in any of the tanks or piping, and no loose fittings were noted. The condition of the systems was free from corrosion.

Three closure soil samples were obtained below tanks #1, #2 and #4 and two closure soil samples were collected below tank #3. GTSI noted the former dispenser island was converted to a raised garden bed, containing timbered walls and soil fill. GTSI removed the raised bed with a backhoe and found a concrete platform below the soil fill. The excavator found three dispenser pipes and it was confirmed by the owner that the previous gas station had three dispensers. Samples were taken below the former dispensers and no impacted soils were identified. No groundwater was encountered during excavation. Results from twenty-one of the twenty-two soil samples indicated “not detected.” Results from soil sample (D-1), collected below a former dispenser, reported concentrations of chloroform, naphthalene and 1,2,4-trimethylbenzene, which were below state maximum soil contaminant concentrations (MSCCs).

NCDEQ received the UST closure report on February 15, 2000 and issued a Notice of No Further Action February 16, 2000, closing the incident. UST Closure Report excerpts and associated documents are included in **Appendix A**.

1.2 Site Description

The Site is occupied by a garden center, Garden Shed and More, operating from a one-story multi-unit building reportedly constructed in 1959. Wood interviewed an employee of Garden Shed and More in person on September 21, 2018 and retrieved the contact information for the business owner, Amanda Meadows, and property owner, Mr. Robert Nantz. A septic system was found north of the building, but the mentioned private water supply well was not located during the reconnaissance.

The Site, located in a mixed-use commercial and residential area of Mooresville in Iredell County, and covers approximately 3.8 acres. The majority of the Site ground cover is asphalt and concrete near the building with the remainder of the Site covered with grassy areas. The general topography of the Site area is sloping toward the east. Photographs taken of the Site are included in **Appendix B**.

2.0 GEOLOGY

2.1 Regional Geology

The Site is located within the Charlotte Terrane of the Piedmont Physiographic Province of North Carolina. According to the 1985 State Geologic Map of North Carolina, the area is underlain by strongly foliated fine-grained biotite gneiss of Cambrian/Late Proterozoic age, with layers of amphibolite and muscovite schist.

2.2 Site Geology

Site geology was observed through the drilling of 15 shallow soil borings (P123-B1 to P123-B15). Figure 2 presents the boring locations and Site layout. The borings did not exceed a total depth of 10 feet bgs. Soils encountered in the borings consisted mostly of red and brown silty clay underlain by red silty clay. Staining was not observed in the borings. Groundwater was not encountered in the borings. Based on observations of topography of the Site vicinity, the groundwater flow direction is inferred to be generally toward the east. Boring logs are presented in **Appendix C**.

3.0 FIELD ACTIVITIES

3.1 Preliminary Activities

Prior to commencing field sampling activities at the Site, several tasks were accomplished in preparation for the subsurface investigation. A Health and Safety Plan (HASP) was created including the site-specific health and safety information necessary for the field activities. North Carolina One Call was contacted on January 14, 2019 to report the

proposed drilling activities and subsequently notify affected utilities for the parcel. GEL Solutions (GEL) was procured by Wood to perform utility locating and perform a geophysical survey at the Site. Innovation Environmental Technologies, Inc. (IET) of Concord, North Carolina was retained by Wood to perform the direct push sampling for soil borings. Sampling containers and tool were acquired from RED Lab.

Wood understands that acquisition of the expanded right-of-way is necessary for the widening of NC 150. Boring locations were strategically placed within the parcel to maximize the opportunity to encounter potential contaminated soil.

3.2 Site Reconnaissance

Wood personnel performed a site reconnaissance on September 21, 2018. During the site reconnaissance, the area was visually examined for the presence of any areas/obstructions that could potentially affect the subsurface investigation. Potted plants, stone birdbaths and a large above ground plastic fountain were identified that would limit access of a drill rig. No other obstructions were observed during the reconnaissance. The Garden Shed and More business owner requested that field implementation of the PSA occur after the fall and Christmas seasons for her business.

A septic system was found north of the building, but the private water supply well was not found during reconnaissance.

3.3 Geophysics Survey Results and Utility Locating

The geophysical survey of the Site occurred January 15, 2019. GEL performed an electromagnetic (EM) survey of the Site with a ground penetrating radar (GPR) survey conducted across select EM anomalies. Time domain electromagnetic methodology (TDEM) was also utilized to measure electrical conductivity of subsurface materials. GEL's complete geophysical report is presented as **Appendix D**. GEL did not identify subsurface anomalies indicative of potential USTs within the limits of the investigation. Anomalies identified by GEL were indicative of known metallic surface features and/or cultural interference.

In advance of drilling activities, GEL also performed utility locating services at the Site on January 15, 2019. GEL identified an underground electric line beneath the asphalt extending to the building from the central portion of the parcel. Telecommunication lines were identified extending northwest to southeast along River Highway on the southern portion of the parcel. Overhead powerlines were located on the southern portion of the parcel extending along River Highway.

3.4 Soil Sampling

Wood conducted drilling activities at the Site on January 24, 2019. Wood's drilling subcontractor, IET, advanced 15 direct push borings across the area of investigation to an approximate depth of 10 feet bgs. Figure 2 presents the Site Map with boring locations and identifications. Boring locations targeted subsurface design features and potential environmental sources in the area of investigation dependent on utility clearance.

The purpose of soil sampling was to determine if a past petroleum release had impacted the Site and if so, to estimate the volume of impacted soil that might require special handling during construction activities. Soil sampling was performed utilizing direct push methods accompanied by field screening for volatile organic compounds (VOCs) using a photoionization detector (PID). The soil borings were screened with the PID at approximately two-foot intervals. The soil interval exhibiting the highest PID reading was retained for analysis of total hydrocarbons (TPH), diesel range organics (DRO), gasoline range organics (GRO), benzene, toluene, ethylbenzene, and xylene (BTEX), total aromatics, and polycyclic aromatic hydrocarbons (PAH) soil via ultraviolet fluorescence (UVF). If no reading greater than ten parts per million (ppm) was identified, then the two to four-foot interval was sampled. Eleven total samples were collected from the Site from the borings for UVF analysis.

4.0 SOIL SAMPLING RESULTS

Based on the PID field screening and UVF hydrocarbon analyses, evidence of petroleum hydrocarbon impacts was not identified within the area of investigation.

Only one elevated PID reading, above 10 ppm, was detected in the soil borings. P123-B14 0-2' had a PID reading of 17.0 ppm. The PID field screening results are summarized in **Table 1** and provided on the boring logs in Appendix C.

Results from the UVF petroleum soil analyses are presented in **Table 2**, with instrument generated tables in **Appendix E**. Several categories of analyses were measured including DRO, GRO, TPH, PAHs, and total aromatics. **Figure 3** presents the GRO and DRO results at each boring.

Elevated TPH values above the NCDEQ Action Limits of 50 milligrams per kilogram (mg/kg) for GRO or 100 mg/kg for DRO were not detected in the 11 samples from the 15 borings advanced at the Site. Specifically GRO was measurable in just one sample, B12-2-4 at 1.7 mg/kg, while DRO was measurable in six samples at values from 0.07 to 22.9 mg/kg. The hydrocarbon results from the QED QROS Hydrocarbon Analyzer are provided in Appendix E.

5.0 CONCLUSIONS

Based on Site observations and UVF analysis, petroleum-impacted soil contamination was not identified above the NCDEQ Action level of 100 mg/kg for DRO and 50 mg/kg for GRO.

The following bulleted summary is based upon Wood's evaluation of field observations, and quantitative analyses of samples collected from the Site on January 24, 2019.

- This parcel in the area of proposed highway widening activities is occupied by a garden center operating from a one-story multi-unit building. The majority of the Site ground cover is asphalt and concrete covered near the building with outlying grassy areas.

- Results of the geophysical survey did not identify subsurface anomalies indicative of probable or possible USTs or subsurface magnetic anomalies at the Site.

- During a review of the NCDEQ storage tank databases, a closure report indicated that four gasoline USTs were removed in January 2000. Evidence of contamination

was not encountered during UST closure activities. UST closure samples indicated TPH levels were below state action levels. The incident was closed February 2000.

- Fifteen soil borings were advanced to an approximate depth of 10 feet bgs. Groundwater was not encountered in the borings. Samples from each boring were screened at two-foot intervals in the field by a PID. Only one PID reading was above 10 ppm (P123-B14 0-2') with a reading of 17.0 ppm. A total of 11 samples were analyzed by the UVF. Soils encountered in the borings consisted mostly of red and brown silty clay underlain by red silty clay.

- Elevated TPH values above the NCDEQ Action Limit of 50 mg/kg for GRO were not detected in the samples from 15 borings advanced at the Site.

- Elevated TPH values above the NCDEQ Action Limit of 100 mg/kg for DRO were not detected in the samples from 15 borings advanced at the Site.

6.0 RECOMMENDATIONS

Based on these PSA results, Wood does not recommend further assessment or soil sampling in the area of investigation.

TABLES

Table 1
PID Field Screening Results
R-2307B, Parcel 123, Frances L. Nantz-Iredell County
Mooresville, North Carolina

SAMPLE ID	Sample Date	Sample Depth (feet bgs)	PID Screening (ppm)
P123 B1-2-4	1/24/2019	2-4	0.0
P123 B2-2-4	1/24/2019	2-4	0.0
P123 B4-2-4	1/24/2019	2-4	0.0
P123 B6-2-4	1/24/2019	2-4	0.1
P123 B8-2-4	1/24/2019	2-4	0.0
P123 B10-2-4	1/24/2019	2-4	0.0
P123 B11-2-4	1/24/2019	2-4	0.0
P123 B12-2-4	1/24/2019	2-4	0.4
P123 B14-0-2	1/24/2019	0-2	17.0
P123 B14-4-6	1/24/2019	4-6	1.7
P123 B15-2-4	1/24/2019	2-4	1.9
		Prepared By/Date	DRH 1/29/2019
		Checked By/Date	JRM 1/30/2019

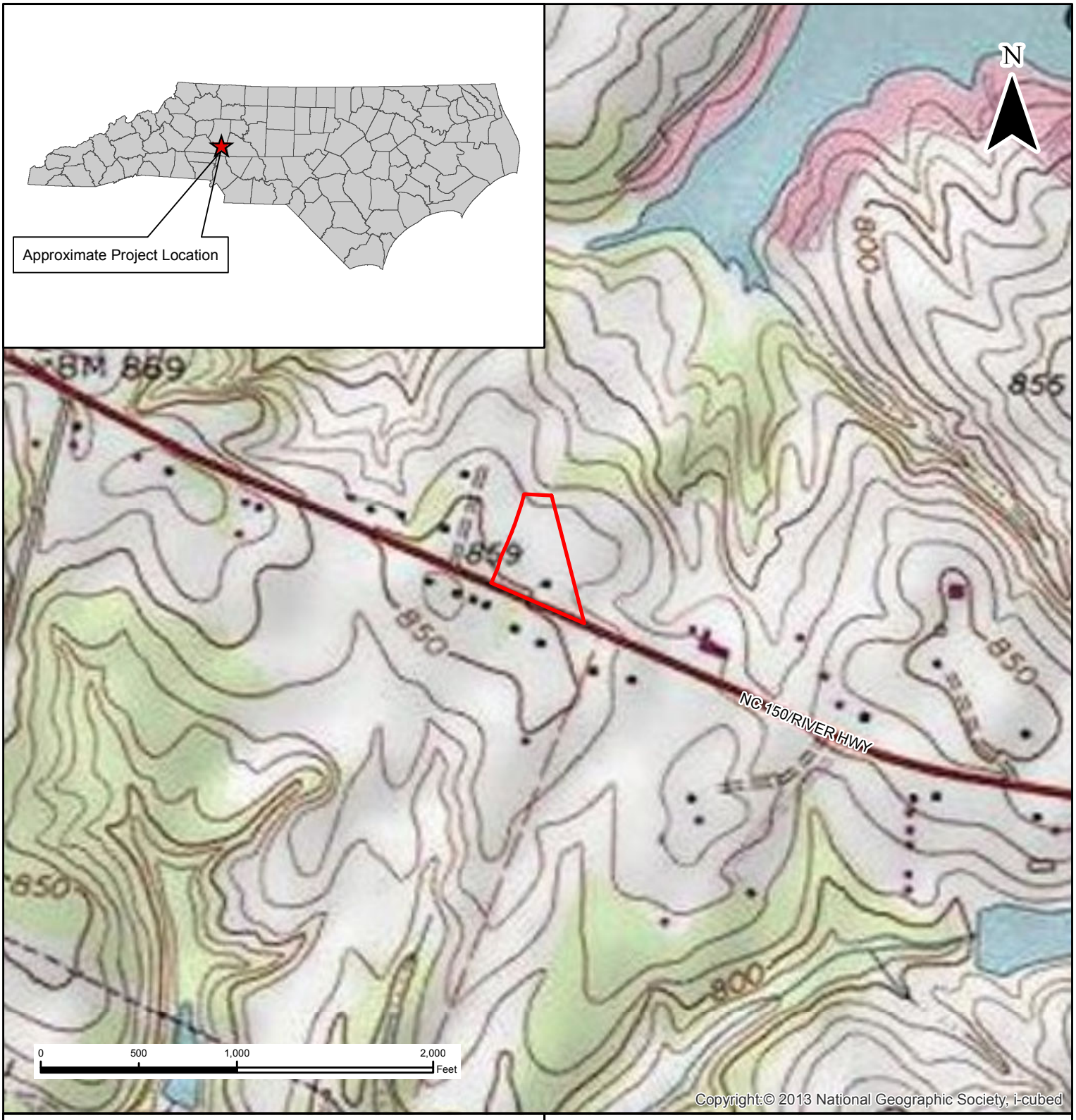
Notes: PPM = Parts Per Million
ft bgs = feet below ground surface

Table 2
UVF Petroleum Soil Results, 1/24/2019
R-2307B, Parcel 123, Frances L. Nantz-Iredell County
Mooresville, North Carolina

Sample ID Number	Sample Depth (ft bgs)	BTEX (mg/kg)	GRO (mg/kg)	DRO (mg/kg)	PAHs (mg/kg)
NC State Action Level	**NA**	**NA**	**50**	**100**	**NA**
P123 B1-2-4	2-4	<0.57	<0.57	0.07	0.007
P123 B2-2-4	2-4	<0.51	<0.51	0.35	0.009
P123 B4-2-4	2-4	<0.5	<0.5	<0.2	<0.01
P123 B6-2-4	2-4	<0.55	<0.55	22.9	0.5
P123 B8-2-4	2-4	<0.55	<0.55	<0.22	<0.01
P123 B10-2-4	2-4	<0.54	<0.54	<0.21	<0.01
P123 B11-2-4	2-4	<0.54	<0.54	0.1	0.01
P123 B12-2-4	2-4	<0.58	1.7	1.6	0.04
P123 B14-0-2	0-2	<0.5	<0.5	1.7	0.05
P123 B14-4-6	4-6	<0.54	<0.54	<0.22	<0.01
P123 B15-2-4	2-4	<0.55	<0.55	<0.22	<0.01

NOTES: Prepared By/Date DRH 1/30/19
(mg/kg) = Millograms per kilogram Checked By/Date JRM 1/30/19
GRO = Gasoline Range Organics
DRO = Diesel Range Organics
BTEX = Benzene, Toluene, Ethylbenzene and Xylenes
PAHs = Polycyclic Aromatic Hydrocarbon
ft bgs = feet below ground surface
NA= Not applicable

FIGURES



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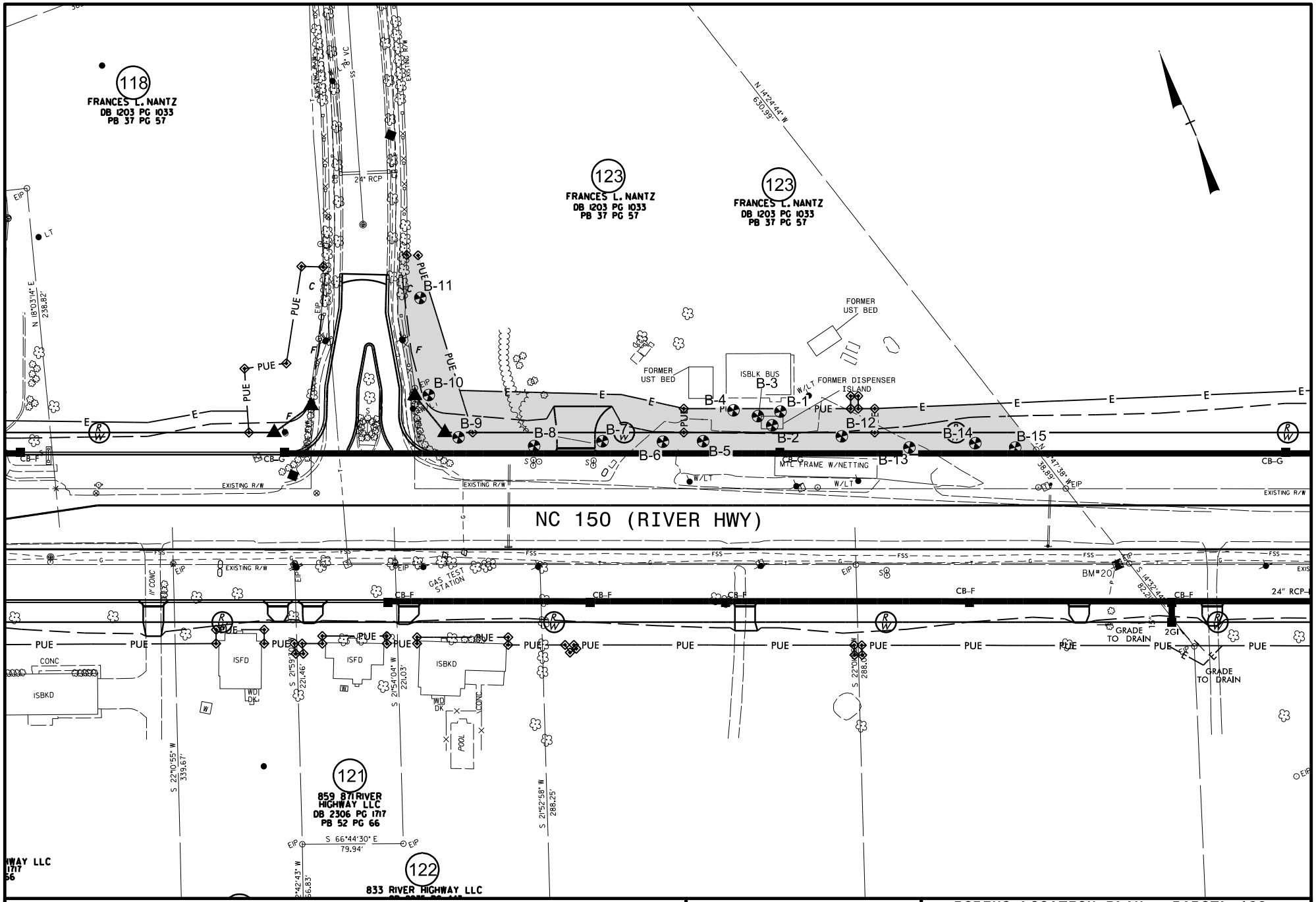
VICINITY MAP

Parcel 123
Francis L. Nantz
842 NC 150 (River Hwy) Mooresville, North Carolina

Site Boundary

Prepared By: LMM Date: 9/20/2018	Checked By: AJF Date: 9/20/2018	Project No.: 188322307	Figure No.: 1



BORING LOCATION

50′ 0′ 50′ 100′
25′
(ENGLISH)

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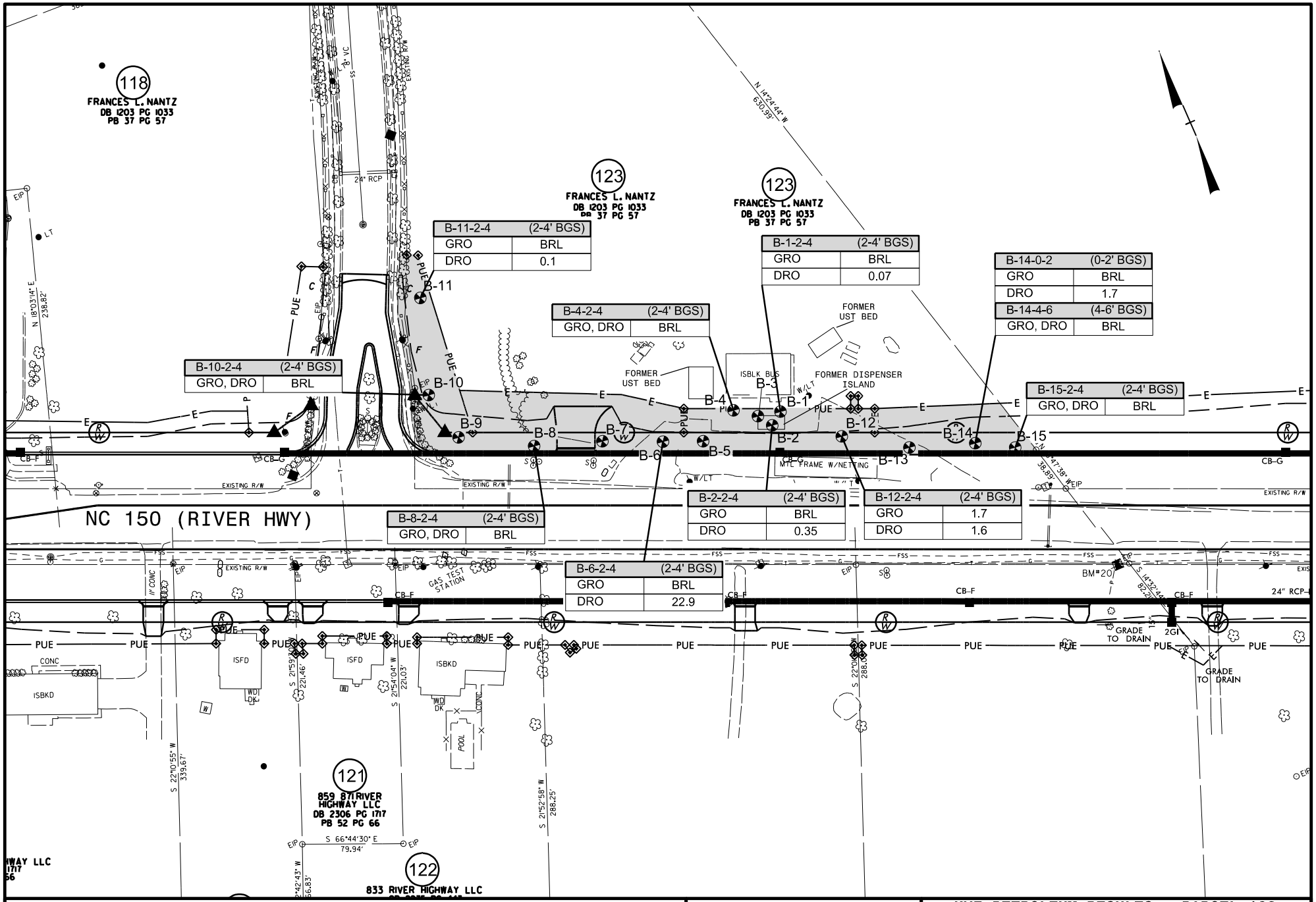
BORING LOCATION PLAN - PARCEL 123
FRANCES L. NANTZ - R-2307B
842 NC 150 (RIVER HWY)
MOORESVILLE, NC 28117

PREPARED BY:	DATE:	CHECKED BY:	DATE:	JOB NUMBER	FIGURE
LMM	1/29/19	HPC	1/29/19	188322307	2



BORING LOCATION
GRO=GASOLINE RANGE ORGANICS
DRO=DIESEL RANGE ORGANICS
BRL=BELOW REPORTING LIMITS

50' 0' 50' 100'
25'
(ENGLISH)

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UVF PETROLEUM RESULTS - PARCEL 123
FRANCES L. NANTZ - R-2307B
842 NC 150 (RIVER HWY)
MOORESVILLE, NC 28117

PREPARED BY:	DATE:	CHECKED BY:	DATE:	JOB NUMBER	FIGURE
LMM	1/30/19	HPC	1/30/19	188322307	3

APPENDIX A
HISTORIC REPORTS AND DOCUMENTS

UST CLOSURE REPORT
NANTZ ESTATE PROPERTY
842 RIVER ROAD-HWY 150 WEST
IREDELL COUNTY
GTSI-00101

Prepared For
Estate of Francis L. Nantz
c/o Robert D. Nantz, co-executor
Mooresville, N.C.

Prepared By

GTSI
18637 Northline Drive
Cornelius, North Carolina 28031
January, 2000

GTSI
GROUND
TECHNOLOGICAL
SERVICES
INC.

February 1, 2000

Mr. Landon Davidson (UST Division: Iredell County)
State of North Carolina
DENR-Division of Environment & Natural Resources
919 North Main Street
Mooresville, NC 28115

RE: UST Closure Report - 4 UST's
Nantz Estate
842 River Road- Highway 150 West
Iredell County, North Carolina
GTI-00101

Dear Mr. Davidson,

GTSI has recently completed a site investigation with UST closure procedures at the referenced site. The tanks were removed, with standard DENR closure sampling procedures performed below all UST's, piping and former dispenser locations. GTSI has submitted soil samples for lab analysis. The analytical laboratory results have been included as Appendix F.

The report follows the UST-12 format required by DENR. If you should have any questions, please call us at your convenience.

Sincerely,
Ground Technological Services, Inc.

Geoff Underwood
Staff Geologist

Gary L. Gechter P.G.

Karen E. Heater P.E.
c.c. Bob Randall, F. J. Ervin, Robert Nantz, Fire Marshall

P.O. Box 2246 ▪ Huntersville, NC 28070 ▪ Phone 704-987-8378 ▪ Fax 704-987-8175

TABLE OF CONTENTS

GTSI GROUND TECHNOLOGICAL SERVICES INC.

I. GENERAL INFORMATION

A. Ownership:

"Estate of Francis L. Nantz"
c/o Robert Nantz, co-executor
951 Mt. Ulla Highway
Mooresville, N.C. 28115
(W) (704)-663-5829
(H) (704)-663-1005

B. Operator:

Sid Cook, the former owner of the property, was killed on-site in the 1970's, ending operations of the site as a gas station under his ownership. We understand the ownership was transferred by will through the Lineberger family and subsequently to the extended Nantz family by marriage. The property is currently leased to Jerry's Marine Construction.

C. Facility Information:

No information is available. As indicated above, the property has not been operated as a gas station since the 1970's, and the former operator/owner is deceased.

D. Contacts:

Primary Contact: Robert Nantz, co-executor, 951 Mt. Ulla Highway Mooresville, N.C. 28115 (W) (704)-663-5829 (H) (704)-663-1005

Closure contractor: F. J. Ervin Grading Co., 380 Mackwood, Mooresville, NC 28115 (704) 633-1136.

Primary Consultant: GTSI, 18637 Northline Drive, Cornelius, NC 28031 (704) 987-8378

Laboratory: Prism Inc., 449 Springbrook Road, Charlotte, NC (704)-529-6364. (Certificate #402).

E. UST information:

TABLE 1:

Tank No.	Installa-tion Date	Size In Gallons	Tank Size (ft)	Last Contents	Previous Contents
1	"late 1950s"	8,000	8 X 21	Gasoline	None
2	"	10,000	8 X 27	"	"
3	"	5,000	8 X 13.5	"	"
4	"	10,000	8 X 27	"	"

F. Site Characteristics:

1. Past Releases:

None were indicated.

2. Active/Inactive?

The site is currently inactive, having closed in the late 1970's.

3. Description of surrounding property:

Residential property is located to the west and south of the site, along Highway 150. Commercial establishments are located further to the east and west.

4. Geology/Hydrogeology:

The referenced site is situated in the geologic Charlotte Belt within the Piedmont Physiographic Province of North Carolina. The property lies within an area mapped by the N.C. Geological Survey (1985) as fine grained biotite gneiss. Although no bedrock or rock exposures were encountered during any of our investigations, clayey, sandy saprolitic material was encountered at the base of the Tank #1 and #3 excavations. Saprolite generally retains some of the original structural features of the parent rock. No subsurface features such as veins or fractures were observed. The near surface residual soils exhibit a higher level of weathering and normally do not retain the structural features of the parent rock. Soil encountered above the saprolite included an orange-red clayey silt.

CLOSURE PROCEDURES

A. Preparations:
The closure procedures were initiated and implemented by the closure contractor, F. J. Ervin Grading Inc., contracted by the owner, a representative of the Estate of Francis Nantz. Upon our arrival on the site, GTSI noted one UST had been removed, with work on an additional UST excavation underway. Site work was halted until the following day, when the DENR MRO (N. C. State Division of Environment and Natural Resources, Mooresville Regional Office) and the local Fire Marshall were contacted. Following the closure activities, a UST-3 form was submitted to the DENR-MRO. The site was visited by Kim Weisenberger of the Iredell County Fire Marshall's office, with a "Tank Inspection Report" submitted. Copies of the permits are included in the appendix. The Mooresville City Fire Department was also notified, with no site visit performed.

B. and C. Residual Product:
The site contained four (4) UST's as indicated in Table 1 and our location diagram. The contents of each gasoline UST were pumped out and sold in the 1970's.

D. and E. Excavation:
Each tank was excavated utilizing a large trackhoe, with no stained soils or odors indicative of a release noted within the excavation sidewalls, at the base of the excavation, near the fill pipes, or under the (former) dispenser area. No groundwater, bedrock, vein structures or fracture patterns were observed within the excavated areas. Following sampling procedures, the clean excavated soils were used as backfill, with the remaining backfill soils obtained on-site from the rear of the property, as referenced from Highway 150. Backfill soils were consistently noted as an orange-red clayey silt.

No holes were noted in any of the tanks or piping, and no loose fittings were noted. The condition of the systems as a whole were free from corrosion. Soil excavation sizes and volumes are included below (minus tank volumes):

Table #2: Soil Volume

UST NUMBER	DEPTH TO UST	EXCAVATION SIZE	VOLUME OF SOILS
T-1	2.5 FEET	18' X 28' X 11'	166 CUBIC YARDS
T-2	2.0 '	15' X 38' X 11'	161 " "
T-3	3.0 '	26' X 16' X 11'	102 " "
T-4	3.0 '	18' X 38' X 11'	229 " "

III. Site Investigation:

A. and B. Sampling/Screening

UST's

As indicated above, no impacted soils were observed through visual or olfactory inspection. No field screening with OVA instruments were utilized.

Sampling procedures followed standard DENR guidelines, with each sample obtained from 1.0 to 2.0 feet below the centerline of each tank in native, or residual soils. Three sampling points were obtained below Tanks #1, #2 and #4 (greater than 20' long) and two sampling points below Tank #3 (less than 20' long). Samples were labeled T-1 to T-4 (Tank 1 to 4) and S-1 to S-3 (Sample location 1 to 3).

PRODUCT LINES:

Each product line located was sampled every 20 feet per DENR guidelines. The samples were obtained 1.0 to 2.0 feet below the nearest coupling in residual soils, one per twenty linear feet. Each pipe section was removed and inspected for loose couplings and corrosion. Samples were designated from P-1 to P-8 (Pipe sample locations). It should be noted, only about 15 linear feet of the Tank #4 product line was present, with one sample (P-1) obtained.

DISPENSERS:

The dispensers were removed many years ago following the discontinuation of the service station facility. GTSI noted the former dispenser island was converted to a raised garden bed, containing timbered walls and soil fill. GTSI utilized a backhoe to remove the raised bed, with a raised concrete platform noted below the soil fill. Based on information gathered from the owner, and the presence of three dispenser pipes, the site apparently contained three dispensers. The 25' long concrete island and dispenser pipes were removed, with sampling points located 1.0 to 2.0 feet below each dispenser in residual soils. No impacted soils were indicated around the dispenser island or below the former dispenser locations. Samples were indicated as D-1, D-2 and D-3.

C. Groundwater data:

As mentioned above, no groundwater was encountered during the closure procedures.

D. Quality Control Measures:

Each UST sample was obtained from plugs of residual soil excavated from two on-site backhoes. Samples obtained below product lines and dispensers were obtained directly from undisturbed residual soils at the bottom of the excavated trenches.

Clean, disposable latex gloves were used for the sampling procedures and changed between samples. The soil samples were placed immediately in sterilized glass jars or vials provided by the laboratory. The jars were completely filled with soil leaving no head space, tightly sealed, and placed in an iced, insulated cooler for transportation under chain-of-custody to PRISM Laboratories in Charlotte, NC. Sample VPH vials provided by the lab included preweighed and measured soil displacement lines, with soil added carefully to predetermined levels. Duplicate MADEP VPH vials included a methanol preservative in each vial. Samples were left as undisturbed as possible.

Excavation and sampling work, slowed by site clearing of doc, dredge and boat materials and inclement weather, was performed from January 4-6, 2000. GTSI submitted grab samples to Prism Labs on January 6, 2000 from a total of twenty-two (22) soil sampling locations. Samples were refrigerated overnight to maintain constant temperatures. The samples were analyzed by the EPA Method 8260 (with additional testing for IPE and MTBE constituents) and the MADEP VPH Method for low boiling point feul (gasoline). Following the standard state DENR sampling guidelines, only one MADEP VPH sample was collected below each tank, product line and dispenser island. One VPH trip blank was submitted for quality control purposes.

E. LAB/INVESTIGATION RESULTS:

Twenty-one (21) of the (22) **soil samples indicated "Not detected" (Below Detectable Levels) of contamination. No free product** was observed inside the excavations. In addition **no groundwater was encountered.** The lab analytical record is included as Appendix F.

The sample # D-1 below one former dispenser location contained 6 ug/kg Chloroform, 6 ug/kg Naphtalene, and 9 ug/kg 1,2,4-Trimethylbenzene. In general, the units ug/kg, or micrograms per kilogram, are interchangable with parts per billion. It should noted the above levels are well below the State DENR mandated Maximum (allowable) Soil Contaminant concentrations, expressed in mg/kg, or **parts per million** (Table 4, Groundwater section Guidelines for the Investigation and Remediation of Soil and Groundwater, Volume II). At the time of our sampling, loose asphalt debris was noted near the former dispenser area, and may account for the elevated levels.

A table of the laboratory results of soil samples were as follows:

TABLE 3: Lab results

SAMPLE NUMBER	MADEP VPH (mg/kg)	EPA 8260 (ug/kg)
T-1,S-1	NOT APPLICABLE = NA	ND
T-1,S-2	NOT DETECTED = ND	ND
T-1,S-3	NA	ND
T-2,S-1	NA	ND
T-2,S-2	ND	ND
T-2,S-3	NA	ND
T-3,S-1	NA	ND
T-3,S-2	ND	ND
T-4,S-1	NA	ND
T-4,S-2	ND	ND
T-4,S-3	NA	ND
P-1	ND	ND
P-2	NA	ND
P-3	ND	ND
P-4	NA	ND
P-5	ND	ND
P-6	NA	ND
P-7	ND	ND
P-8	NA	ND
D-1	NA	CHLOROFORM.....6 NAPHTHALENE.....6 1,2,4- TRIMETHYLBENZENE.. 9
D-2	ND	ND
D-3	NA	ND

A copy of the results from PRISM laboratories are included in the appendix.

Each UST was transported off-site and properly disposed at Goose Creek Farm Tank Disposal in Indian Trail, N.C. Copies of the disposal manifests are included in the appendices.

IV. CONCLUSIONS AND RECOMMENDATIONS

The analytical data and field observations indicate that no elevated levels of petroleum hydrocarbons beyond Maximum Allowable Concentrations were present. Slightly elevated 8260 levels were present in one dispenser sample only, either at or near minimum detectable levels. As noted above, subsurface conditions were apparently not conducive to corrosion of metal parts within the UST system. No stained soils or odors indicative of petroleum releases were noted during the closure assessment around or below any of the UST's, piping or former dispenser locations. No free product or groundwater was observed during any of the field work. The UST systems have been removed from the site and properly disposed of under manifest.

Based on field observations and analytical data, GTSI recommends no further action.

V. P.G./P.E. Stamp(s)

VI. Enclosures:

A. Figures
1. Site Vicinity Map
2. USGS topographic map
3. UST excavation map

B. Tables
1. UST Information
2. Soil Volume
3. Lab Results

C. Appendices
Appendix A. Notice of Intent: DENR GW/UST-3 permit form
Appendix B. Site Investigation Closure Report: GW/UST-2 form
Appendix C. Four (4) UST disposal manifests
Appendix D. Chain-of-custody records
Appendix E. Laboratory Analytical Record.

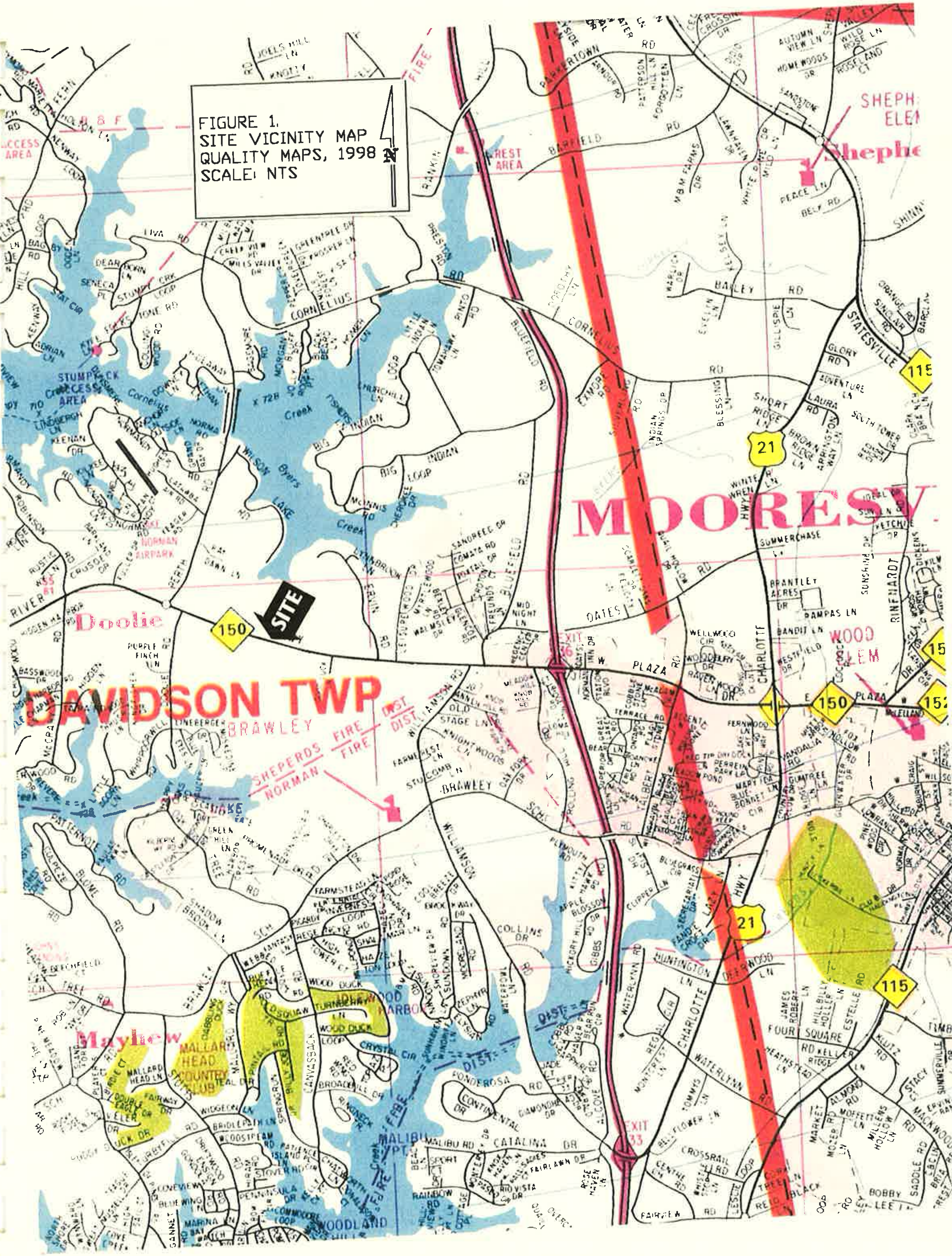


FIGURE 1.
SITE VICINITY MAP
QUALITY MAPS, 1998
SCALE: NTS

LAKE NORMAN NORTH QUADRANGLE
NORTH CAROLINA
7.5 MINUTE SERIES (TOPOGRAPHIC)

4855 III NE (SHEPHERDS)

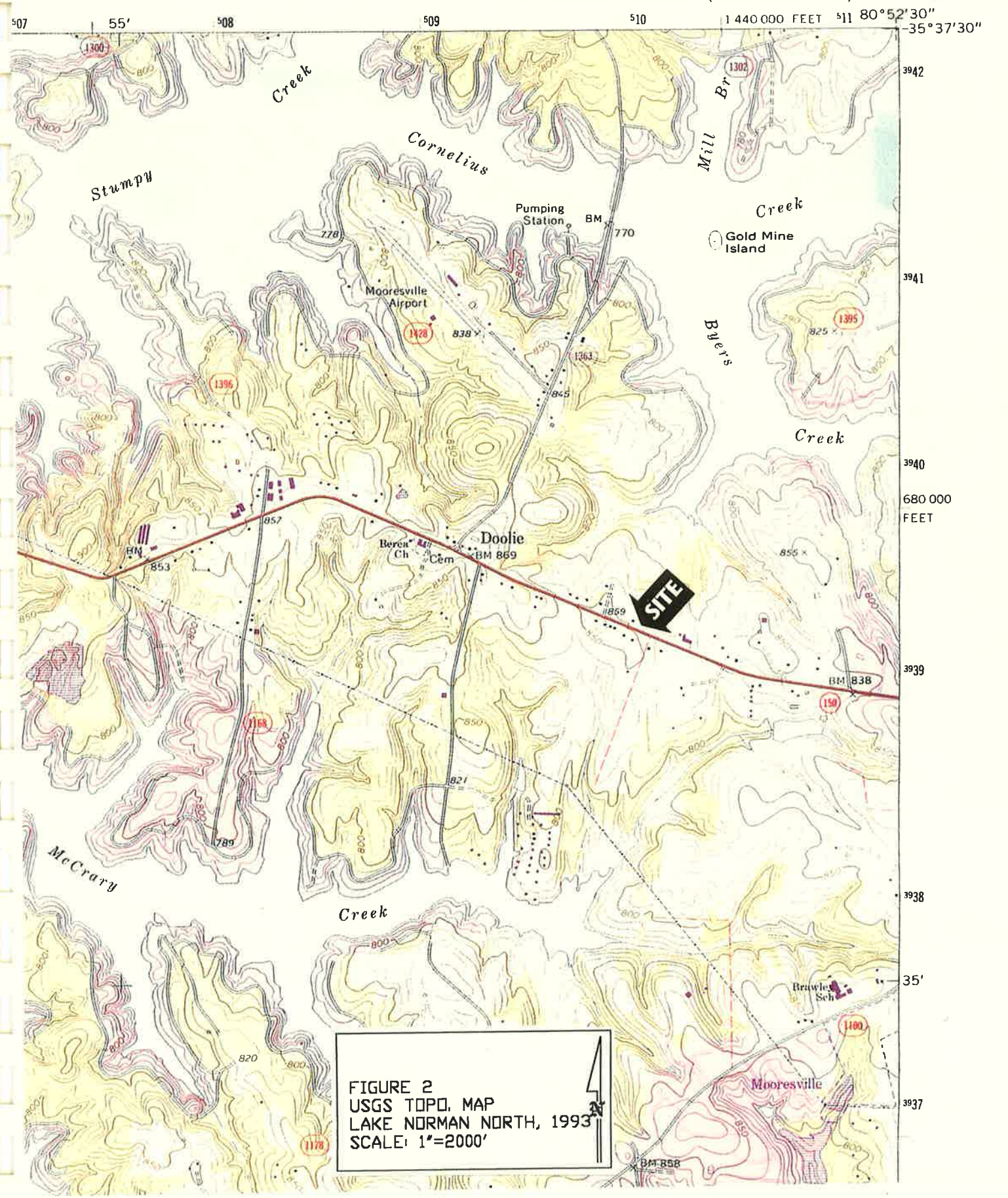
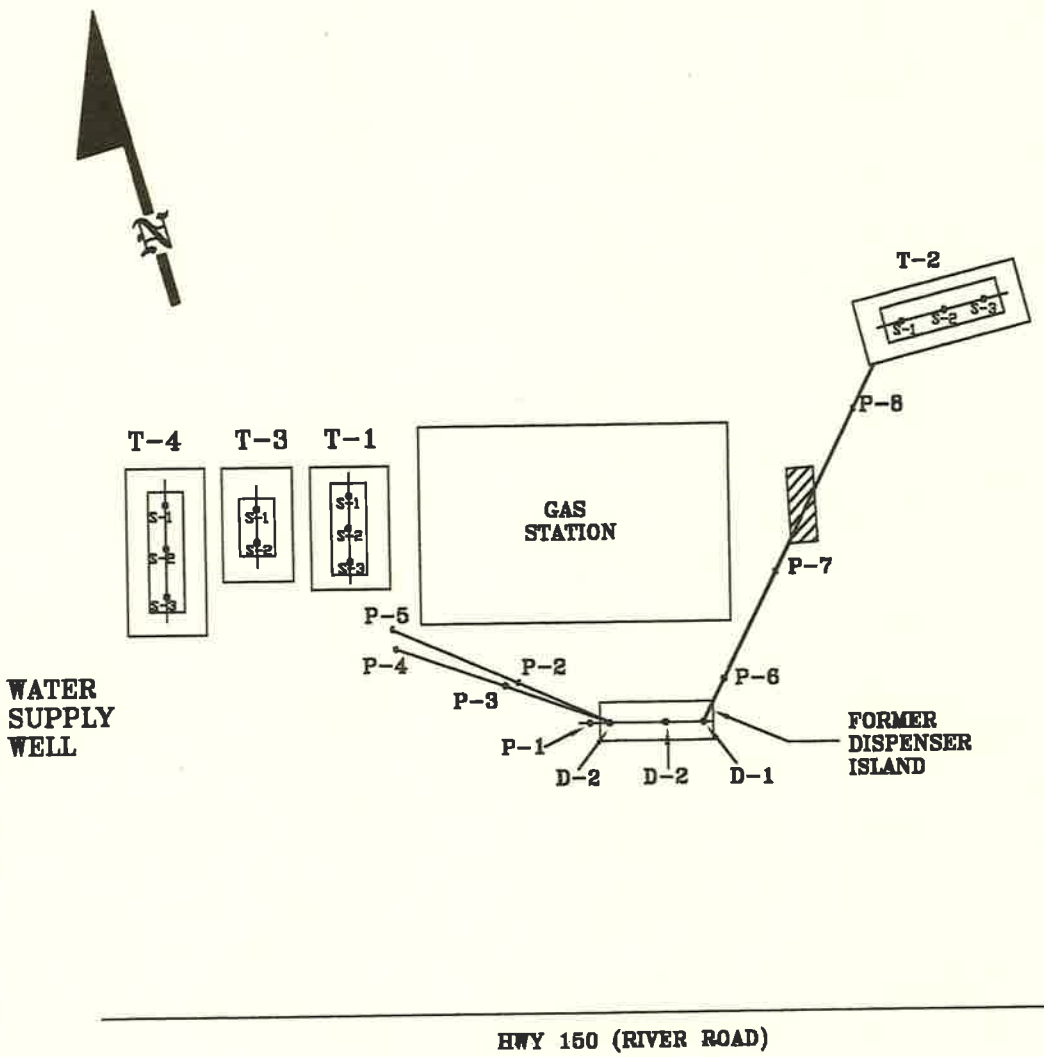


FIGURE 2
USGS TOPO. MAP
LAKE NORMAN NORTH, 1993
SCALE: 1"=2000'



LAB RESULTS:

SAMPLE #	MADEP VPH (mg/kg)	EPA 8260 (ug/kg)
T-1,S-1	NOT APPLICABLE=NA	ND
T-1,S-2	NOT DETECTED=ND	ND
T-1,S-3	NA	ND
T-2,S-1	NA	ND
T-2,S-2	ND	ND
T-2,S-3	NA	ND
T-3,S-1	NA	ND
T-3,S-2	ND	ND
T-4,S-1	NA	ND
T-4,S-2	ND	ND
T-4,S-3	NA	ND
P-1	ND	ND
P-2	NA	ND
P-3	ND	ND
P-4	NA	ND
P-5	ND	ND
P-6	NA	ND
P-7	ND	ND
P-8	NA	ND
D-1	NA	CHLOROFORM .....6 NAPHTHALENE .....6 1,2,4-TRIMETHYLBENZENE ..9
D-2	ND	ND
D-3	NA	ND

FIGURE 1.

NANTZ PROPERTY
MOORESVILLE, NORTH CAROLINA
SITE LOCATION MAP WITH
SOIL ANALYTICAL RESULTS

SCALE: NTS DWG: RM

FOR: F.J. ERVIN GRADING

BY: GTSI GROUND TECHNOLOGICAL SERVICES INC.

PRO: 00101 DATE: 1/7/00

UST-3 FOR TANKS IN NC

Notice of Intent: UST Permanent Closure or Change-in-Service

Return completed form to:
The DWM Regional Office in the area the facility is located. SEE MAP ON THE BACK OF THIS FORM FOR REGIONAL OFFICE ADDRESSES.

ENVIRONMENT, HEALTH, & NATURAL RESOURCES
JAN 06 2000

STATE USE ONLY:
I.D. Number: _____
Date Received: _____

INSTRUCTIONS

Complete and return at least five (5) working days prior to closure or change-in-service if a Professional Engineer (P.E.) or a Licensed Geologist (L.G.) provides supervision for closure or change-in-service site assessment activities and signs and seals all closure reports. Otherwise, thirty (30) days notice is required.

I. OWNERSHIP OF TANKS

Owner Name: ESTATE OF FRANCIS L. NANTZ (co- executor Robert D. Nantz)
Corporation, Individual, Public Agency, or Other Entity
Street Address: 951 Mt. Ulla Hwy (Robert Nantz)
City: Mooresville County: Iredell
State: NC Zip Code: 28115
Telephone Number: (704) 663-5829 (WORK)
Area Code

II. LOCATION

Facility Name: NANTZ PROPERTY
Or Company
Facility I.D. # (If known): —
Street Address or State Road: 842 RIVER ROAD (HWY 150 WEST)
City: Mooresville County: Iredell Zip Code: 28115
Telephone Number: ( ) —
Area Code

III. CONTACT PERSONNEL

Name: GEOFF UNDERWOOD (GTSI) Job Title: GEOLOGIST Tel. No.: (704) 987-8378

IV. TANK REMOVAL, CLOSURE IN PLACE, CHANGE-IN-SERVICE

1. Contact local Fire Marshall.
2. Plan the entire closure event.
3. Conduct Site Soil Assessment.
4. If removing tanks or closing in place, refer to API Publication 2015 *Cleaning Petroleum Storage Tanks* and 1604 *Removal and Disposal of Used Underground Petroleum Storage Tanks*.
5. Provide a sketch locating piping, tanks and soil sampling locations.
6. Submit a closure report in the format of UST-12 and include the form UST-2 within 30 days following the site investigation.
7. If a release from the tank(s) has occurred, the site assessment portion of the tank closure must be conducted under the supervision of a P.E. or L.G.. with all closure site assesement reports bearing signature and seal of the P.E. or L.G. If a release has not occurred, the supervision, signature, or seal of a P.E. or L.G. is not required.
8. Keep closure records for 3 years.

V. WORK TO BE PERFORMED BY

Contractor Name: F. J. ERVIN
Address: 380 MACKWOOD RD, Mooresville State: NC Zip Code: 28115
Contact Person: F. J. ERVIN Tel. No.: 664-5418 (704)
Primary Consultant: GTSI: GEOFF UNDERWOOD Tel. No.: 987-8378

VI. TANK(S) SCHEDULED FOR CLOSURE OR CHANGE-IN-SERVICE

Tank ID#	Tank Capacity	Last Contents	Proposed Activity: Closure – Removal	Closure – Abandonment In Place	Change-in-service – New Contents Stored
T-1	8,000 gall.	GASOLINE	☑	☐	
T-2	10,000 gall.	GASOLINE	☑	☐	
T-3	5,000 gall	GASOLINE	☑	☐	
T-4	10,000 gall	GASOLINE	☑	☐	
			☐	☐	
			☐	☐	

VII. OWNER OR OWNER'S AUTHORIZED REPRESENTATIVE

I understand that I can be held responsible for environmental damage resulting from the improper disposal of my USTs. Read note on the back of this form before signing.

Print name and official title: Robert D. Nantz Co-Administrator

Signature	Date Signed	SCHEDULED REMOVAL DATE	Notify your DWM Regional Office 48 hours before this date if scheduled removal date changes.
Robert D. Nantz Co-Admin	1/6/00	1/5/00 - 1/6/00	

UST-3 rev. 3/99 White Copy-Regional Office Yellow Copy- Central Office Pink copy-Owner

UST-2 Site Investigation Report for Permanent Closure or Change-in Service of UST

FOR TANKS IN NC

Return completed form to:
The DWM Regional Office in the area the facility is located. SEE MAP ON THE BACK OF THIS FORM FOR REGIONAL OFFICE ADDRESSES. Return the yellow copy to the Central Office in Raleigh so that the status of the tank may be changed to "PERMANENTLY CLOSED".

STATE USE ONLY:
I.D. Number: _____
Date Received: _____

I. Ownership of Tanks

Owner Name: ESTATE OF FRANCIS NANTZ
Corporation, Individual, Public Agency, or Other Entity
Street Address: 951 Mt Ulla Hwy
City: Mooresville County: IREDELL
State: NC Zip Code: 28115
Telephone Number: (704) 663-5829
Area Code

II. Location of Tanks

Facility Name: _____
Or Company
Facility I.D. # (if known): 842 RIVER RD,
Street Address: Mooresville, NC
City: NC County: Iredell Zip Code: 28115
Telephone Number: ( ) 663-5829
Area Code

III. Contact Personnel

Name: Robert Nantz (Co-executor of will for estate of Francis NANTZ) Job Title: _____ Tel. No. 663-5829
Closure Contractor: F.J. ERVIN Grading Address: 380 Mackwood, Mooresville Tel. No. 664-5418
Primary Consultant: GTSI Address: 18637 Northline, Cornelius Tel. No. 987-8378
Lab: PRISM LABS Address: 449 Springbrook, Charlotte Tel. No. 529-6364

IV. UST Information

Tank No.	Size in Gallons	Tank Dimensions	Last Contents
1	8,000	8' X 21'	GASOLINE
2	10,000	8' X 27'	GASOLINE
3	5,000	8' X 13.5'	GASOLINE
4	10,000	8' X 27'	GASOLINE

V. Excavation Condition

Tank No.	Water in Excavation Yes	Water in Excavation No	Free Product Yes	Free Product No	Notable Odor or Visible Soil Contamination Yes	Notable Odor or Visible Soil Contamination No
1		✓		✓		✓
2		✓		✓		✓
3		✓		✓		✓
4		✓		✓		✓

VI. Additional Information Required

See reverse side of pink copy (owner's copy) for additional information required by NC DWM in the written report and sketch.

NOTE: If a release from the tank(s) has occurred, the site assessment portion of the tank closure must be conducted under the supervision of a P.E. or L.G., with all closure site assessment reports bearing the signature and seal of the P.E. or L.G.

VII. Check List (Check the Activities Completed)

PERMANANENT CLOSURE
(For removing or Abandoning-in-place)

- ☑ Contact local fire marshal.
- ☑ Notify DWM Regional Office before abandonment.
- ☑ Drain & flush piping into tank.
- ☑ Remove all product and residuals form tank.
- ☑ Excavate down to tank.
- ☑ Clean and inspect tank.
- ☑ Remove drop tube, fill pipe, gauge pipe, vapor recovery tank connections, submersible pumps and other tank fixtures.
- ☐ Cap or plug all lines except the vent and fill lines.
- ☐ Purge tank of all product & flammable vapors.
- ☐ Cut one or more large holes in the tanks.
- ☑ Backfill the area.

Date Tank(s) Permanently closed: 1/5/00 - 1/6/00
Date of Change-in-Service: N/A

ABANDONMENT IN PLACE

- ☐ Fill tank until material overflows tank opening.
- ☐ Plug or cap all openings.
- ☐ Disconnect and cap or remove vent line.
- ☐ Solid inert material used–specify: _____

REMOVAL

- ☐ Create vent hole. - 2 pipe holes open
- ☑ Label tank.
- ☑ Dispose of tank in approved manner. Final tank destination:

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this and all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate and complete.

Print name and official title of owner or owner's authorized representative	Signature	Date Signed
Robert N Nantz Co-Admin	Robert N Nantz Co-Admin	1/6/00

GOOSE CREEK FARM TANK DISPOSAL

2018 LAWYERS ROAD WEST, INDIAN TRAIL, NC 28079

Certificate of Disposal

Tank # 7075 Size 10,000 GAL STEEL

Job Address FRANCES L. NANTZE ESTATE, 842 RIVER Rd. MOORESVILLE, NC

For SJ ERVIN GRADING

This is to certify that the above tank has been disposed of by GooseCreek Farm Tank Disposal in accordance with EPA regulations on Petroleum Tank Dsposal .

On 1-6-2000

Certified

by [signature] Date 1-10-2001

GOOSE CREEK FARM TANK DISPOSAL

2018 LAWYERS ROAD WEST, INDIAN TRAIL, NC 28079

Certificate of Disposal

Tank # 7076 Size 8000 GAL STEEL

Job Address FRANCES L. NANTZE ESTATE, 824 RIVER Rd. MOORESVILLE NC.

For SJ ERWIN GRADING

This is to certify that the above tank has been disposed of by Goose Creek Farm Tank Disposal in accordance with EPA regulations on Petroleum Tank Disposal .

On 1-6-2000.

Certified

by [signature] Date 1-10-2000

GOOSE CREEK FARM TANK DISPOSAL

2018 LAWYERS ROAD WEST, INDIAN TRAIL, NC 28079

Certificate of Disposal

Tank # 7077 Size 10,000 GAL STEEL

Job Address FRANCES L. HINTZE ESTATE, 824 RIDER RD. MOORESVILLE NC

For S J ERVIN GRADING

This is to certify that the above tank has been disposed of by Goose Creek Farm Tank Disposal in accordance with EPA regulations on Petroleum Tank Disposal .

On 1-6-2000

Certified

by [signature] Date 1-10-2000

GOOSE CREEK FARM TANK DISPOSAL

2018 LAWYERS ROAD WEST, INDIAN TRAIL, NC 28079

Certificate of Disposal

Tank # 7078 Size 5,000 GAL. STEEL

Job Address FRANCES L. NANTZ ESTATE, 824 RIVER RD. MOORESVILLE NC

For SJ ERVIN GRADING

This is to certify that the above tank has been disposed of by Goose Creek Farm Tank Disposal in accordance with EPA regulations on Petroleum Tank Disposal.

On 1-6-2000.

Certified

by [signature] Date 1-10-2000

IREDELL COUNTY
FIRE MARSHAL'S OFFICE
P.O. Box 788
Statesville, NC 28687
(704) 878-3035

TANK INSPECTION REPORT

Inspection No: ____________ Date of Inspection: 1-5-00
Business Status: [illegible] Time of Inspection: 1040

Permit No: ____________ Approved: Yes ______ No ______

Aboveground ✓ Underground ✓ Installation ______ Removal ✓

Occupancy Class: ______ Fire District Shepherds

Business Name: Robert Wentz Business No. ____________
Address of Business: Hwy 150 City: Mooresville
State: NC Zip Code: ____________ Phone: 663-5829

843 River Hwy
Tank Owner: Robert Wentz
Address of Tank Owner: ____________ City: ____________
State: ____________ Zip Code: ____________ Phone: ____________

Contractor: CTSI - Jeff
Address of Contractor: 18637 Northline Dr. City: Cornelius
State: NC Zip Code: 28031 Phone: 987-8378

Remarks:

2 -

Need copy of tank removal report
to include soil test results

Inspected By: [illegible signature]

POLLUTION INCIDENT/U.S.T. LEAK REPORTING FORM

Department of Environment, Health, Natural Resources
Division of Environmental Management
GROUNDWATER SECTION

Confirm. GW Contamination (Y/N) ____
Major Soil Contamination (Y/N) ____
Minor Soil Contaminatin (Y/N) Y

Incident # 21301

Date Incident Occurred or Leak Detected [illegible]

INCIDENT DESCRIPTION

Incident Location/Name [illegible] Estate Property

Address [illegible]

City/Town [illegible] | County [illegible] | Region [illegible]

Briefly Describe Incident [illegible]

DIRF & SITE CLOSURE [illegible]

POTENTIAL SOURCE OWNER-OPERATOR

Potential Source Owner-Operator [illegible] | Telephone [illegible]

Company [illegible] | Street Address [illegible]

City [illegible] | County [illegible] | State NC | Zip Code [illegible]

OWNERSHIP
0. N/A 1. Municipal 2. Military 3. Unknown 4. Private 5. Federal 6. County 7. State

OPERATION TYPE
0. N/A 1. Public Service 2. Agricultural 3. Residential 4. Educational/Relig. 5. Industrial 6. Commercial 7. Mining

POLLUTANTS INVOLVED

MATERIALS INVOLVED	AMOUNT LOST	AMOUNT RECOVERED
Gasoline	Unknown	Unknown

SOURCE OF POLLUTION

PRIMARY SOURCE OF POLLUTION (Select one)
1. Intentional dump
2. Pit, pond, lagoon
3. Leak-underground (circled)
4. Spray irrigation
5. Land application
6. Animal feedlot
7. Source unknown
8. Septic tank
9. Sewer line
10. Stockpile
11. Landfill
12. Spill-surface
13. Well
14. Dredge spoil
15. Nonpoint source

PRIMARY POLLUTANT TYPE (Select one)
1. Pesticide/herbicide
2. Radioactive waste
3. Gasoline/diesel (circled)
4. Heating oil
5. Other petroleum prod.
6. Sewage/septage
7. Fertilizers
8. Sludge
9. Solid waste leachate
10. Metals
11. Other inorganics
12. Other organics

LOCATION
1. Facility
2. Railroad
3. Waterway
4. Pipeline
5. Dumpsite
6. Highway
7. Residence (circled)
8. Other

SETTING
1. Residential (circled)
2. Industrial
3. Urban
4. Rural

Site Priority Ranking ____

D.E.M. Regional Contact [illegible] | Signature [signature] | Date [illegible]

GW-61 Revised 3/92

IMPACT ON DRINKING WATER SUPPLIES

WELLS AFFECTED 1. YES 2. NO

NUMBER OF WELLS AFFECTED _____

Well(s) Contaminated: (Users Name)

1.

2.

3.

4.

5.

Circle Appropriate Responses

Lab Samples Taken By: 1. DEM 2. DHS (3.) Responsible Party 4. Other 5. None

Samples Taken Include: 1. Groundwater (2.) Soil

LOCATION OF INCIDENT

7 1/2 Min. Quad Name: Lake Norman North

Lat. : Deg : Min : Sec : 35° 35' 56"

5 Min. Quad Number: M66V

Long. : Deg : Min : Sec : 80° 53' 19"

Draw Sketch of Area or Attach Additional Maps

See attached map

Closed 2/16/00

UST-3 FOR TANKS IN NC

Notice of Intent: UST Permanent Closure or Change-in-Service

Return completed form to:
The DWM Regional Office in the area the facility is located. SEE MAP ON THE BACK OF THIS FORM FOR REGIONAL OFFICE ADDRESSES.

NC DEPT OF ENVIRONMENT, HEALTH & NATURAL RESOURCES
JAN 06 2000

STATE USE ONLY:
I.D. Number: _____
Date Received: _____

INSTRUCTIONS

Complete and return at least five (5) working days prior to closure or change-in-service. If a Professional Engineer (P.E.) or a Licensed Geologist (L.G.) provides supervision for closure or change-in-service site assessment activities and signs and seals all closure reports. Otherwise, thirty (30) days notice is required.

I. OWNERSHIP OF TANKS

Owner Name: ESTATE OF FRANCIS L. NANTZ — co-executor Robert D. Nantz
Corporation, Individual, Public Agency, or Other Entity
Street Address: 951 Mt. Ulla HWY (Robert Nantz)
City: Mooresville County: Iredell
State: NC Zip Code: 28115
Telephone Number: (704) 663-5829 (WORK)
Area Code

II. LOCATION

Facility Name: NANTZ PROPERTY
Or Company
Facility I.D. # (if known): —
Street Address or State Road: 842 (HWY 150 WEST) RIVER ROAD
City: Mooresville County: Iredell Zip Code: 28115
Telephone Number: ( ) —
Area Code

III. CONTACT PERSONNEL

Name: GEOFF UNDERWOOD (GTSI) Job Title: GEOLOGIST Tel. No.: (704) 987-8378

IV. TANK REMOVAL, CLOSURE IN PLACE, CHANGE-IN-SERVICE

1. Contact local Fire Marshall.
2. Plan the entire closure event.
3. Conduct Site Soil Assessment.
4. If removing tanks or closing in place, refer to API Publication 2015 *Cleaning Petroleum Storage Tanks* and 1604 *Removal and Disposal of Used Underground Petroleum Storage Tanks.*
5. Provide a sketch locating piping, tanks and soil sampling locations.
6. Submit a closure report in the format of UST-12 and include the form UST-2 within 30 days following the site investigation.
7. If a release from the tank(s) has occurred, the site assessment portion of the tank closure must be conducted under the supervision of a P.E. or L.G., with all closure site assessment reports bearing signature and seal of the P.E. or L.G. If a release has not occurred, the supervision, signature, or seal of a P.E. or L.G. is not required.
8. Keep closure records for 3 years.

V. WORK TO BE PERFORMED BY

Contractor Name: F. J. ERVIN
Address: 380 MACKWOOD RD, Mooresville State: NC Zip Code: 28115
Contact Person: F. J. ERVIN Tel. No.: 664-5418 (704)
Primary Consultant: GTSI: GEOFF UNDERWOOD Tel. No.: 987-8378

VI. TANK(S) SCHEDULED FOR CLOSURE OR CHANGE-IN-SERVICE

Tank ID#	Tank Capacity	Last Contents	Proposed Activity: Closure – Removal	Closure – Abandonment in Place	Change-in-service – New Contents Stored
T-1	8,000 gall.	GASOLINE	☑	☐	
T-2	10,000 gall.	GASOLINE	☑	☐	
T-3	5,000 gall	GASOLINE	☑	☐	
T-4	10,000 gall	GASOLINE	☑	☐	
			☐	☐	
			☐	☐	

VII. OWNER OR OWNER'S AUTHORIZED REPRESENTATIVE

I understand that I can be held responsible for environmental damage resulting from the improper disposal of my USTs. Read note on the back of this form before signing.

Print name and official title: Robert D. Nantz Co-Administrator

Signature	Date Signed	SCHEDULED REMOVAL DATE	Notify your DWM Regional Office 48 hours before this date if scheduled removal date changes.
Robert D. Nantz Co-Admin	1/6/00	1/5/00 - 1/6/00	

UST-3 rev. 3/99 White Copy-Regional Office Yellow Copy- Central Office Pink copy-Owner

NCDENR

JAMES B. HUNT JR.
GOVERNOR

BILL HOLMAN
SECRETARY

WILLIAM L. MEYER
DIRECTOR

COPY

NORTH CAROLINA DEPARTMENT OF
ENVIRONMENT AND NATURAL RESOURCES

DIVISION OF WASTE MANAGEMENT

February 16, 2000

Estate of Francis L. Nantz
c/o Robert Nantz, co-executor
951 Mt. Ulla Highway
Mooresville, North Carolina 28115

RE: Soil Sample Results from
Underground Storage Tank Closure

Nantz Estate Property
842 River Road / Highway 150 West
Iredell County, N.C.
Incident No. Pending

Dear Mr. Nantz:

The UST Section of the Division of Waste Management at the Mooresville Regional Office has received the laboratory analyses from twenty-two (22) soil samples collected during the closure of four (4) gasoline underground storage tank systems at the subject site. The report arrived on February 15, 2000. Based on the reported results, no further action is required at this time.

Should you have any questions, please do not hesitate to call me at 704.663.1699, ext. 248.

Sincerely,

Bradley D. Murphy
Hydrogeologic Technician II

cc: Karen Heater, P.E. - GTSI, PO Box 2246, Huntersville, North Carolina 28070

UST SECTION
919 NORTH MAIN STREET, MOORESVILLE, NORTH CAROLINA 28115
PHONE 704-663-1699 FAX 704-663-6040

APPENDIX B
PHOTOGRAPH LOG

PHOTO 1:

View northeast onsite looking at the nursery.

Photo taken 1/24/19.

PHOTO 2:

View southeast of River Highway. Distribution powerlines extending down River Highway.

Photo taken 1/24/19.

PHOTO 3:

View south onsite, potted plants are spread throughout the site near the building.

Photo taken 1/24/19.

PHOTO 4:

View of IET drilling soil boring B-3, facing northeast.

Photo taken 1/24/19.

PHOTO 5:

View of IET drilling soil boring B-3, approximate location of former dispenser island, facing northeast.

Photo taken 1/24/19.

APPENDIX C
BORING LOGS

SOIL BORING FIELD WORKSHEET

BORING #	**B-1**	BORING DEPTH (ft)	**10**	NUMBER OF PAGES	**1**
PROJECT #	**188322307**			PROJECT NAME	**NCDOT Mooresville-Parcel 123.**
DATE DRILLED	**1/24/2019**			WEATHER CONDITIONS	**Cloudy w/Rain, 55˚F**
DRILLING SUB-CONTRACTOR	**IET**			DRILL RIG	**AMS PowerProbe**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
2	0.0	Asphalt Red Brown Silty CLAY	
4	0.0	Red Silty CLAY	Sample taken 2-4'
6	0.0		
8	0.0		
10	0.0	Red Orange Silty CLAY	
		*Boring terminated at 10'.	

Log Completed By: **DRH**

SOIL BORING FIELD WORKSHEET

BORING #	**B-2**	BORING DEPTH (ft)	**10**	NUMBER OF PAGES	**1**
PROJECT #	**188322307**			PROJECT NAME	**NCDOT Mooresville-Parcel 123.**
DATE DRILLED	**1/24/2019**			WEATHER CONDITIONS	**Cloudy w/Rain, 55˚F**
DRILLING SUB-CONTRACTOR	**IET**			DRILL RIG	**AMS PowerProbe**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
2	0.0	Asphalt Brown Silty CLAY	
4	0.0	Red Silty CLAY	Sample taken 2-4'
6	0.0		
8	0.0		
10	0.0	Red Orange Fine-Grained Sandy CLAY	
		*Boring terminated at 10'. Three foot of recovery for the first five foot core.	

Log Completed By: **DRH**

SOIL BORING FIELD WORKSHEET

BORING #	**B-3**	BORING DEPTH (ft)	**10**	NUMBER OF PAGES	**1**
PROJECT #	**188322307**			PROJECT NAME	**NCDOT Mooresville-Parcel 123.**
DATE DRILLED	**1/24/2019**			WEATHER CONDITIONS	**Cloudy w/Rain, 55˚F**
DRILLING SUB-CONTRACTOR	**IET**			DRILL RIG	**AMS PowerProbe**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
2	0.0	Asphalt Brown Silty CLAY	
4	0.0	Red Silty CLAY	
6	0.0		
8	0.0	Red, Orange and Brown Fine-Grained Sandy CLAY, Mica	
10	0.0		
		*Boring terminated at 10'. No sample taken.	

Log Completed By: **DRH**

SOIL BORING FIELD WORKSHEET

BORING #	**B-4**	BORING DEPTH (ft)	**10**	NUMBER OF PAGES	**1**
PROJECT #	**188322307**			PROJECT NAME	**NCDOT Mooresville-Parcel 123.**
DATE DRILLED	**1/24/2019**			WEATHER CONDITIONS	**Cloudy w/Rain, 55˚F**
DRILLING SUB-CONTRACTOR	**IET**			DRILL RIG	**AMS PowerProbe**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
2	0.0	Asphalt	
4	0.0	Brown Silty CLAY	Sample taken 2-4'
6	0.0	Red Sily CLAY	
8	0.0	Tan Orange Silty CLAY	
10	0.0		
		*Boring terminated at 10'.	

Log Completed By: **DRH**

Page: **1**

SOIL BORING FIELD WORKSHEET

BORING #	**B-5**	BORING DEPTH (ft)	**10**	NUMBER OF PAGES	**1**
PROJECT #	**188322307**			PROJECT NAME	**NCDOT Mooresville-Parcel 123.**
DATE DRILLED	**1/24/2019**			WEATHER CONDITIONS	**Cloudy w/Rain, 55˚F**
DRILLING SUB-CONTRACTOR	**IET**			DRILL RIG	**AMS PowerProbe**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
2	0.0	Asphalt Brown Silty CLAY	
4	0.0	Red Silty CLAY	
6	0.0		
8	0.0	Red Orange Silty CLAY	
10	0.0		
		*Boring terminated at 10'. No sample taken.	

Log Completed By: **DRH**

SOIL BORING FIELD WORKSHEET

BORING #	**B-6**	BORING DEPTH (ft)	**10**	NUMBER OF PAGES	**1**
PROJECT #	**188322307**			PROJECT NAME	**NCDOT Mooresville-Parcel 123.**
DATE DRILLED	**1/24/2019**			WEATHER CONDITIONS	**Cloudy w/Rain, 55˚F**
DRILLING SUB-CONTRACTOR	**IET**			DRILL RIG	**AMS PowerProbe**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
2	0.0	Asphalt Brown Silty CLAY	
4	0.1	Red Silty CLAY	Sample taken 2-4'
6	0.0		
8	0.0	Red Orange Silty CLAY	
10	0.0		
		*Boring terminated at 10'.	

Log Completed By: **DRH**

SOIL BORING FIELD WORKSHEET

BORING #	**B-7**	BORING DEPTH (ft)	**10**	NUMBER OF PAGES	**1**
PROJECT #	**188322307**			PROJECT NAME	**NCDOT Mooresville-Parcel 123.**
DATE DRILLED	**1/24/2019**			WEATHER CONDITIONS	**Cloudy w/Rain, 55˚F**
DRILLING SUB-CONTRACTOR	**IET**			DRILL RIG	**AMS PowerProbe**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
2	0.0	Red Silty CLAY	
4	0.0		
6	0.0		
8	0.0		
10	0.0		
		*Boring terminated at 10'. No sample taken.	

Log Completed By: **DRH**

Page: **1**

SOIL BORING FIELD WORKSHEET

BORING #	**B-8**	BORING DEPTH (ft)	**10**	NUMBER OF PAGES	**1**
PROJECT #	**188322307**			PROJECT NAME	**NCDOT Mooresville-Parcel 123.**
DATE DRILLED	**1/24/2019**			WEATHER CONDITIONS	**Cloudy w/Rain, 55˚F**
DRILLING SUB-CONTRACTOR	**IET**			DRILL RIG	**AMS PowerProbe**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
2	0.0	Red Silty CLAY	
4	0.0		Sample taken 2-4'
6	0.0		
8	0.0		
10	0.0		
		*Boring terminated at 10'.	
		Moist from 5-10'.	

Log Completed By: **DRH**

SOIL BORING FIELD WORKSHEET

BORING #	**B-9**	BORING DEPTH (ft)	**10**	NUMBER OF PAGES	**1**
PROJECT #	**188322307**			PROJECT NAME	**NCDOT Mooresville-Parcel 123.**
DATE DRILLED	**1/24/2019**			WEATHER CONDITIONS	**Cloudy w/Rain, 55˚F**
DRILLING SUB-CONTRACTOR	**IET**			DRILL RIG	**AMS PowerProbe**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
2	0.0	Red Silty CLAY	
4	0.0		
6	0.0		
8	0.0	Red Orange Fine-Grained Sandy CLAY	
10	0.0		
		*Boring terminated at 10'.	
		Moist from 5-10'.	
		No sample taken.	

Log Completed By: **DRH**

SOIL BORING FIELD WORKSHEET

BORING #	**B-10**	BORING DEPTH (ft)	**10**	NUMBER OF PAGES	**1**
PROJECT #	**188322307**			PROJECT NAME	**NCDOT Mooresville-Parcel 123.**
DATE DRILLED	**1/24/2019**			WEATHER CONDITIONS	**Cloudy w/Rain, 55˚F**
DRILLING SUB-CONTRACTOR	**IET**			DRILL RIG	**AMS PowerProbe**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
2	0.0	Red Brown Silty CLAY	
4	0.0	Red Silty CLAY	Sample taken 2-4'
6	0.0		
8	0.0		
10	0.0		
		*Boring terminated at 10'.	

Log Completed By: **DRH**

Page: **1**

SOIL BORING FIELD WORKSHEET

BORING #	**B-11**	BORING DEPTH (ft)	**10**	NUMBER OF PAGES	**1**
PROJECT #	**188322307**			PROJECT NAME	**NCDOT Mooresville-Parcel 123.**
DATE DRILLED	**1/24/2019**			WEATHER CONDITIONS	**Cloudy w/Rain, 55˚F**
DRILLING SUB-CONTRACTOR	**IET**			DRILL RIG	**AMS PowerProbe**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
2	0.0	Red Brown Silty CLAY	
4	0.0		Sample taken 2-4'
6	0.0		
8	0.0	Red Silty CLAY	
10	0.0		
		*Boring terminated at 10'.	

Log Completed By: **DRH**

Page: **1**

SOIL BORING FIELD WORKSHEET

BORING #	**B-12**	BORING DEPTH (ft)	**10**	NUMBER OF PAGES	**1**
PROJECT #	**188322307**			PROJECT NAME	**NCDOT Mooresville-Parcel 123.**
DATE DRILLED	**1/24/2019**			WEATHER CONDITIONS	**Cloudy w/Rain, 55˚F**
DRILLING SUB-CONTRACTOR	**IET**			DRILL RIG	**AMS PowerProbe**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
2	0.7	Asphalt	
4	0.4	Red Silty CLAY	Sample taken 2-4'
6	0.0		
8	1.2		
10	0.0	Red Orange Fine-Grained Sandy CLAY	
		*Boring terminated at 10'.	

Log Completed By: **DRH**

SOIL BORING FIELD WORKSHEET

BORING #	**B-13**	BORING DEPTH (ft)	**10**	NUMBER OF PAGES	**1**
PROJECT #	**188322307**			PROJECT NAME	**NCDOT Mooresville-Parcel 123.**
DATE DRILLED	**1/24/2019**			WEATHER CONDITIONS	**Cloudy w/Rain, 55˚F**
DRILLING SUB-CONTRACTOR	**IET**			DRILL RIG	**AMS PowerProbe**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
2	2.5	Red Silty CLAY	
4	1.2		
6	1.3		
8	0.5	Red Orange Fine-Grained Sandy CLAY	
10	0.4	Tan and White Medium to Fine-Grained Silty SAND	
		*Boring terminated at 10'. No sample taken.	

Log Completed By: **DRH**

SOIL BORING FIELD WORKSHEET

BORING #	**B-14**	BORING DEPTH (ft)	**10**	NUMBER OF PAGES	**1**
PROJECT #	**188322307**			PROJECT NAME	**NCDOT Mooresville-Parcel 123.**
DATE DRILLED	**1/24/2019**			WEATHER CONDITIONS	**Cloudy w/Rain, 55˚F**
DRILLING SUB-CONTRACTOR	**IET**			DRILL RIG	**AMS PowerProbe**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
2	17.0	Brown Silty CLAY (moist)	Sample taken 0-2
4	2.0	Red Orange Silty CLAY	
6	1.7		Sample taken 4-6
8	2.4		
10	1.6		
		*Boring terminated at 10'.	

Log Completed By: **DRH**

Page: **1**

SOIL BORING FIELD WORKSHEET

BORING #	**B-15**	BORING DEPTH (ft)	**10**	NUMBER OF PAGES	**1**
PROJECT #	**188322307**			PROJECT NAME	**NCDOT Mooresville-Parcel 123.**
DATE DRILLED	**1/24/2019**			WEATHER CONDITIONS	**Cloudy w/Rain, 55˚F**
DRILLING SUB-CONTRACTOR	**IET**			DRILL RIG	**AMS PowerProbe**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
2	1.6	Red Silty CLAY	
4	1.9		Sample taken 2-4
6	1.6		
8	1.1	Red Orange Silty CLAY	
10	1.8		
		*Boring terminated at 10'.	

Log Completed By: **DRH**

APPENDIX D
GEOPHYSICAL REPORT

GEL Solutions

55 Shiloh Road, Suite 6
Asheville, NC 28803
P 828.782.3523

www.gel-solutions.com

January 17, 2019

Mr. John Maas, PG
Wood, PLC
2801 Yorkmont Road, Suite 100
Charlotte, NC 28208

Re: Report for Geophysical Survey to Identify Underground Storage Tanks
And Underground Utilities
Parcel #123
842 NC 150 (River Highway)
Mooresville, North Carolina 28117

Dear Mr. Maas,

GEL Solutions appreciates the opportunity to provide Wood with this report of our geophysical investigation for the referenced project. This investigation was designed to determine the potential presence of underground storage tanks (USTs) at the site and underground utilities that would obstruct drilling activities at the site. The geophysical field investigation was successfully performed on January 15, 2019.

1.0 Summary of Results

No subsurface anomalies were identified in the geophysical data that indicated the presence of USTs. The anomalies represented in Figure 1 are consistent with known metallic surface objects, utilities, and/or cultural interference. Although geophysical methods provide a high level of assurance for the location of subsurface objects, the possibility exists that not all features can or will be identified. Therefore, due caution should be used when performing any subsurface excavation, and GEL Solutions, LLC will not be liable for any damages that may occur. Descriptions of the technologies employed during this geophysical investigation are provided below.

2.0 Overview of Geophysical Investigation

The geophysical evaluation included the deployment of radio-frequency electromagnetic (EM), ground penetrating radar (GPR) and time-domain electromagnetic (TDEM) technologies to the site. These technologies were used in concert with one another in order to identify the presence of potential underground utilities and USTs at the site. A brief description of each technology is presented in the following paragraphs.

Radio-Frequency Electromagnetic

Radio-Frequency Electromagnetic (EM) utility locating equipment consists of a transmitter and a dual-function receiver. The receiver can be operated in a “passive” mode or in an “active” mode. The two modes of operation provide various levels of detection capabilities depending on the specific target or application.

The EM system is operated in the “active” mode by either inducting or conducting a signal into the underground utility to be traced. A transmitter is placed over and in line with a suspected buried utility. The transmitter induces a signal, which propagates along the buried utility. As the receiver is moved back and forth across the suspected path of the utility, the trace signal induces a signal into the receiver’s coil sensor. A visual and audio response indicates when the receiver is directly over the buried utility.

Another means of detecting in the "active" mode utilizes a method to "conduct" a signal within the buried utility. To accomplish this, a cable from the transmitter is clamped onto an exposed section of the buried utility and a signal propagates along the buried line. This technique minimizes any interference caused by parasitic emissions from adjacent cables in congested areas. When the system is utilized in the "passive" mode, the receiver is responding to a 60 Hertz cycle current energized by underground utilities.

Interference can and may occur when buried utilities intersect or are adjacent to each other. This effect referred to as "bleed-off" may provide a false response to the identification of the tracked utility. "Bleed-off" is caused by utilities that may be energized in the "active" or "passive" mode.

Ground Penetrating Radar Methodology

A RAMAC digital radar control system configured with a 450-Megahertz (MHz) antenna array was used in this investigation. GPR is an electromagnetic geophysical method that detects interfaces between subsurface materials with differing dielectric constants. The GPR system consists of an antenna which houses the transmitter and receiver, a digital control unit which both generates and digitally records the GPR data, and a color video monitor to view data as it is collected in the field.

The transmitter radiates repetitive short-duration electromagnetic waves (at radar frequencies) into the earth from an antenna moving across the ground surface. These radar waves are reflected back to the receiver from the interface of materials with different dielectric constants. The intensity of the reflected signal is a function of the contrast in the dielectric constant between the materials, the conductivity of the material through which the wave is traveling, and the frequency of the signal.

Subsurface features that commonly cause such reflections are: 1) natural geologic conditions, such as changes in sediment composition, bedding, and cementation horizons and voids; or 2) unnatural changes to the subsurface such as disturbed soils, soil backfill, buried debris, tanks, pipelines, and utilities. The digital control unit processes the signal from the receiver and produces a continuous cross-section of the subsurface interface reflection events.

GPR data profiles were collected along transects covering the entire rights of ways. Depth of investigation of the GPR signal is highly site-specific and is limited by signal attenuation (absorption) in the subsurface materials. Signal attenuation is dependent upon the electrical conductivity of the subsurface materials. Signal attenuation is greatest in materials with relatively high electrical conductivities such as clays, brackish groundwater, or groundwater with a high dissolved solid content from natural or manmade sources. Signal attenuation is lowest in relatively low conductivity materials such as dry sand or rock. Depth of investigation is also dependent on the antenna's transmitting frequency. Depth of investigation generally increases as transmitting frequency decreases; however, the ability to resolve smaller subsurface features is diminished as frequency is decreased. The average depth of penetration at this site was approximately 2-5 feet below the surface.

The GPR antenna used at this site is internally shielded from aboveground interference sources. Accordingly, the GPR response is not affected by overhead power lines, metallic buildings, or nearby objects.

Time Domain Electromagnetic Methodology

TDEM methods measure the electrical conductivity of subsurface materials. The conductivity is determined by inducing (from a transmitter) a time or frequency-varying magnetic field and measuring (with a receiver) the

amplitude and phase shift of an induced secondary magnetic field. The secondary magnetic field is created by subsurface conductive materials behaving as an inductor as the primary magnetic field is passed through them.

The Geonics EM-61 system used in this investigation operates within these principles. However, the EM-61 TDEM system can discriminate between moderately conductive earth materials and very conductive metallic targets. The EM-61 consists of a portable coincident loop time domain transmitter and receiver with a 1.0-meter by 0.5-meter coil system. The EM-61 generates 150 pulses per second and measures the response from the ground after transmission or between pulses. The secondary EM responses from metallic targets are of longer duration than those created by conductive earth materials. By recording the later time EM arrivals, only the response from metallic targets is measured, rather than the field generated by the earth material.

3.0 Field Procedures and Results

The geophysical field investigation was successfully performed on January 15, 2019 at DOT parcel #123 located in the immediate vicinity of Highway 150 in Mooresville, NC. Interpretation of the GPR data was conducted in the field and any potential anomalies were marked in the field. GPR data processing typically included band pass filtering, background removal, horizontal smoothing, and gain adjustments. TDEM was also used to scan the project site. Any electromagnetic anomalies detected during field activities that were indicative of buried metallic objects were also marked in the field.

There were no subsurface geophysical anomalies detected within the limits of Parcel #123 during this investigation that indicated the presence of USTs. The anomalies represented in the data shown on Figure 1 are indicative of known metallic surface features and/or cultural interference.

The locations of underground utilities were designated using EM and GPR equipment, and their locations were marked with paint on the land surface, and additionally shown in Figure 1. Positioning data was obtained using a Trimble R10 GPS antenna.

4.0 Closing

GEL Solutions appreciates the opportunity to assist Wood with this project. If you have any questions or need further information regarding the project, please do not hesitate to call me at (828) 782-3523.

Yours very truly,

William R. Adgate
Senior Project Manager

Enclosures
fc: 123.AMEC01118.Report.pdf

Site Photos

Photo 1: Looking northwest showing surface metal and power pole

Photo 2: Looking southeast showing movable obstructions

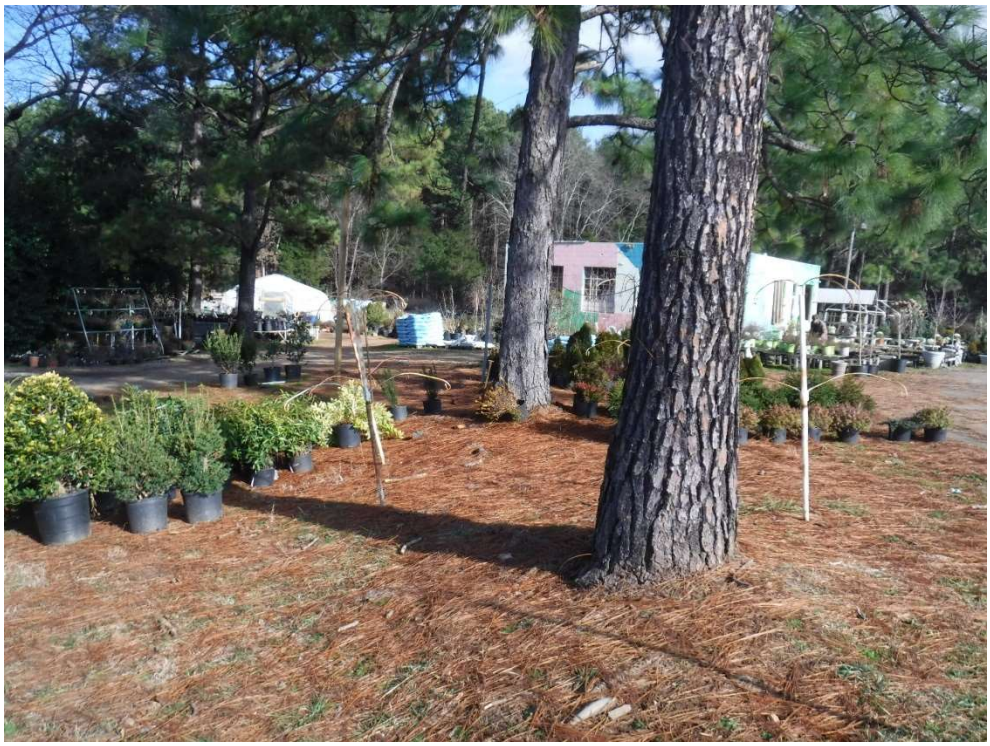


Photo 3: Looking northeast showing surface metal

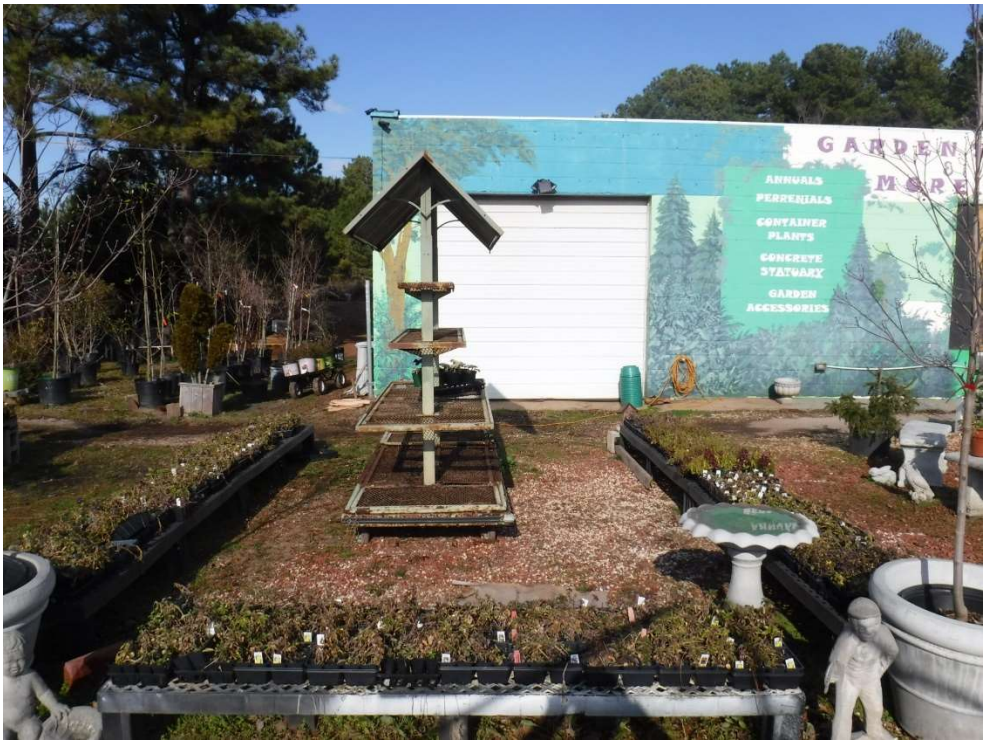


Photo 4: Looking north showing metallic obstruction

Photo 5: Looking north showing profile paths through movable obstructions

Photo 6: Looking north showing profile paths through movable obstructions

Photo 7: Looking southeast showing “Metal frame with netting”

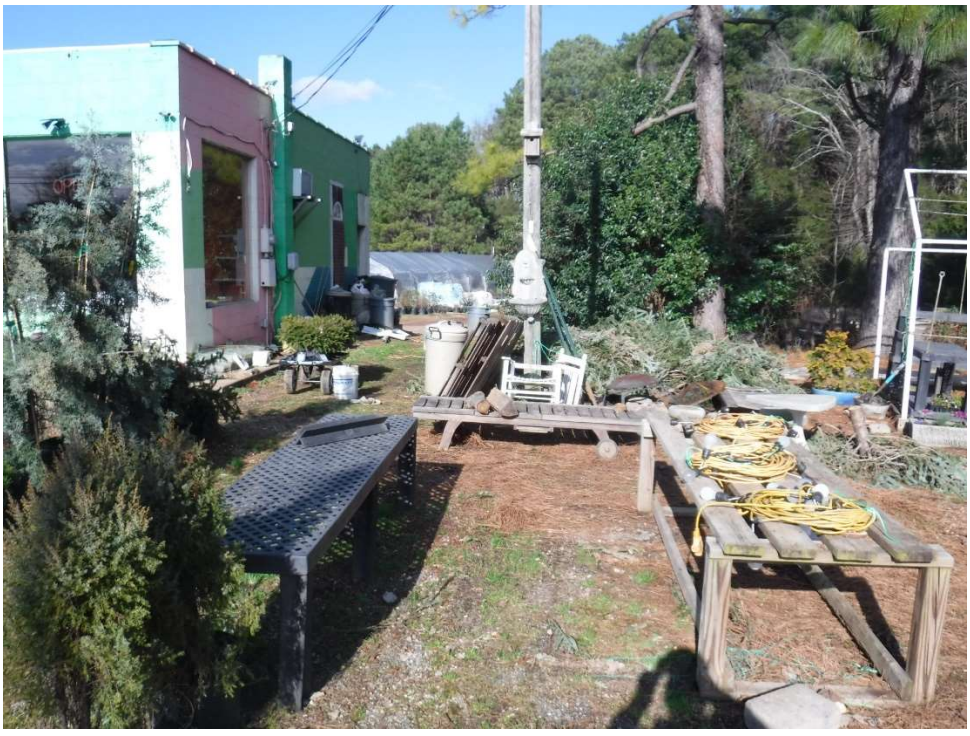


Photo 8: Looking north showing profile paths through movable obstructions

Photo 9: Looking north showing obstructions and surface metal

Photo 10: Looking east to site limits

APPENDIX E
RESULTS FROM UVF SOIL ANALYSES

QED REDLAB RAPID ENVIRONMENTAL DIAGNOSTICS QROS

Hydrocarbon Analysis Results

Client: WOOD
Address: 2801 YORKMONT RD
CHARLOTTE NC 28208

Contact: DERICK HAYDIN

Project: NCDOT MOORESVILLE

Samples taken Thursday, January 24, 2019
Samples extracted Thursday, January 24, 2019
Samples analysed Monday, January 28, 2019

Operator NICK HENDRIX

F03640

Matrix	Sample ID	Dilution used	BTEX (C6 - C9)	GRO (C5 - C10)	DRO (C10 - C35)	TPH (C5 - C35)	Total Aromatics (C10-C35)	16 EPA PAHs	BaP	Ratios			HC Fingerprint Match
										% light	% mid	% heavy	
Soil	P123 B1-2-4	22.8	<0.57	<0.57	0.07	0.07	0.07	0.007	<0.007	0	57.7	42.3	Residual HC
Soil	P123 B2-2-4	20.3	<0.51	<0.51	0.35	0.35	0.5	0.009	<0.006	0	81.5	18.5	V.Deg.PHC 90.7%,(FCM)
Soil	P123 B4-2-4	20.2	<0.5	<0.5	<0.2	<0.5	<0.01	<0.01	<0.006	0	0	0	PHC ND,(FCM)
Soil	P123 B6-2-4	21.8	<0.55	<0.55	22.9	22.9	10.2	0.5	0.009	0	83.5	16.5	V.Deg.PHC 90.8%,(FCM)
Soil	P123 B8-2-4	22.0	<0.55	<0.55	<0.22	<0.55	<0.01	<0.01	<0.007	0	0	0	PHC ND,(FCM)
Soil	P123 B10-2-4	21.5	<0.54	<0.54	<0.21	<0.54	<0.01	<0.01	<0.006	0	0	0	PHC ND,(FCM)
Soil	P123 B11-2-4	21.5	<0.54	<0.54	0.1	0.1	0.1	0.01	<0.006	0	62.1	37.9	Residual HC
Soil	P123 B12-2-4	23.0	<0.58	1.7	1.6	3.3	0.79	0.04	0.001	72.3	21.9	5.8	V.Deg.PHC 88.6%,(FCM)
Soil	P123 B14-0-2	20.0	<0.5	<0.5	1.7	1.7	0.9	0.05	0.001	0	89.8	10.2	V.Deg.PHC 92.8%,(FCM)
Soil	P123 B14-4-6	21.7	<0.54	<0.54	<0.22	<0.54	<0.01	<0.01	<0.007	0	0	0	PHC ND,(FCM)

Initial Calibrator QC check OK Final FCM QC Check OK 105.0%

Results generated by a QED HC-1 analyser. Concentration values in mg/kg for soil samples and mg/L for water samples. Soil values are not corrected for moisture or stone content

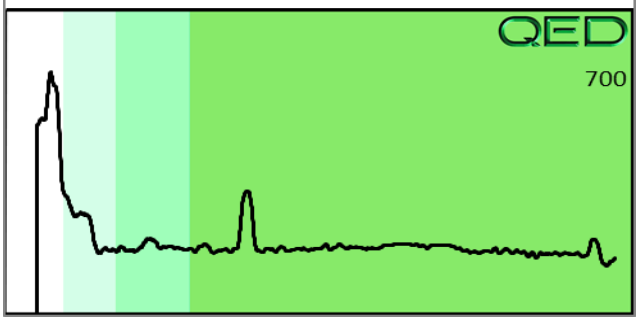
Fingerprints provide a tentative hydrocarbon identification. The abbreviations are:- FCM = Results calculated using Fundamental Calibration Mode : % = confidence for sample fingerprint match to library

(SBS) or (LBS) = Site Specific or Library Background Subtraction applied to result : (PFM) = Poor Fingerprint Match : (T) = Turbid : (P) = Particulate present

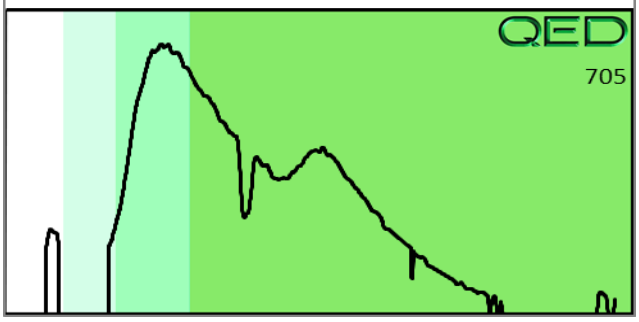
QED Hydrocarbon Fingerprints

Project: 188322307 / NCDOT MOORESVILLE ##################

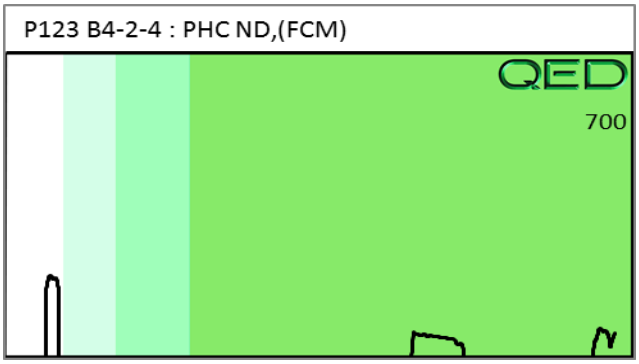
P123 B1-2-4 : Residual HC



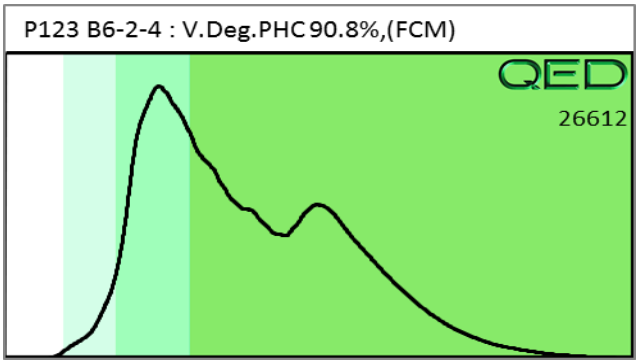
P123 B2-2-4 : V.Deg.PHC 90.7%,(FCM)



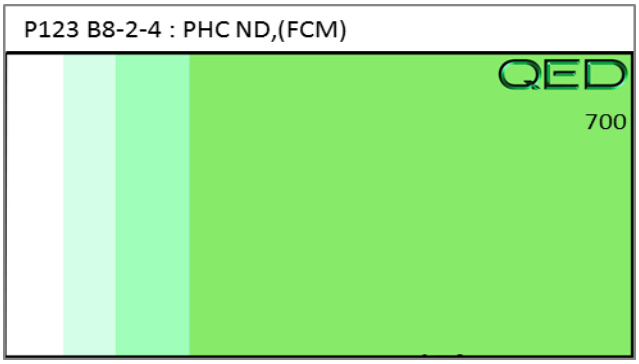
P123 B4-2-4 : PHC ND,(FCM)



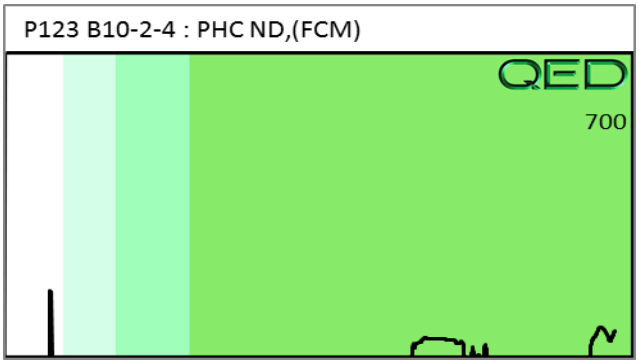
P123 B6-2-4 : V.Deg.PHC 90.8%,(FCM)



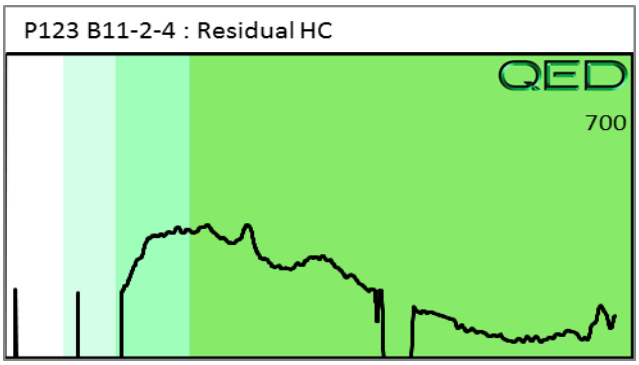
P123 B8-2-4 : PHC ND,(FCM)



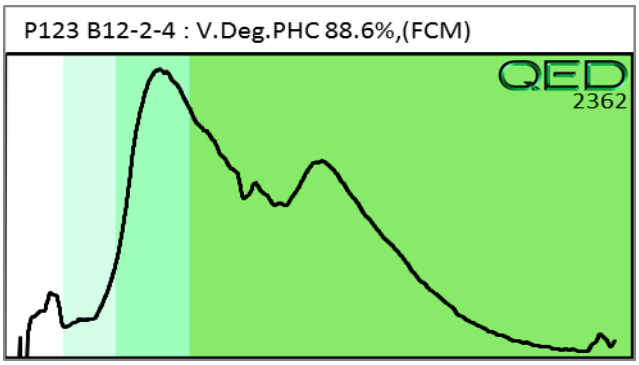
P123 B10-2-4 : PHC ND,(FCM)



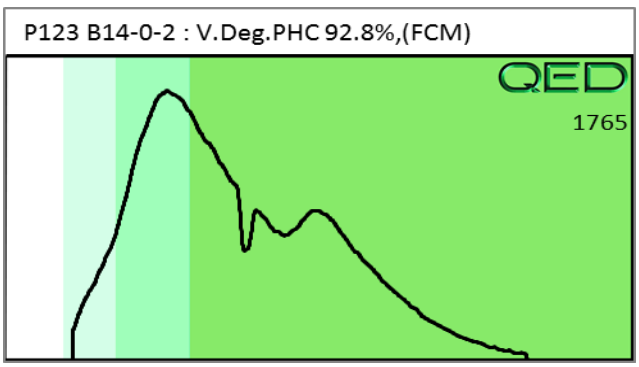
P123 B11-2-4 : Residual HC



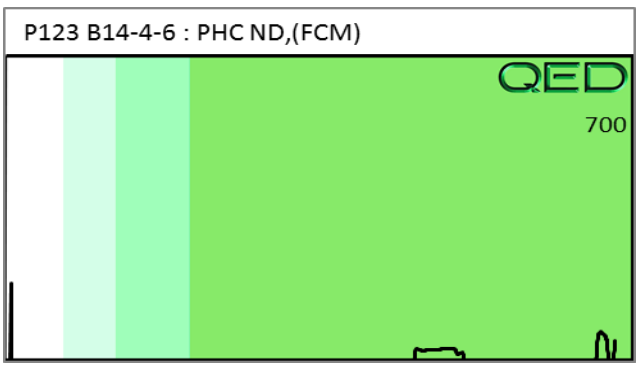
P123 B12-2-4 : V.Deg.PHC 88.6%,(FCM)



P123 B14-0-2 : V.Deg.PHC 92.8%,(FCM)



P123 B14-4-6 : PHC ND,(FCM)



QED

REDLAB
RAPID ENVIRONMENTAL DIAGNOSTICS

QROS

Hydrocarbon Analysis Results

Client: WOOD
Address: 2801 YORKMONT RD
CHARLOTTE NC 28208

Contact: DERICK HAYDIN

Project: NCDOT MOORESVILLE

Samples taken Thursday, January 24, 2019
Samples extracted Thursday, January 24, 2019
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Operator NICK HENDRIX

F03640

Matrix	Sample ID	Dilution used	BTEX (C6 - C9)	GRO (C5 - C10)	DRO (C10 - C35)	TPH (C5 - C35)	Total Aromatics (C10-C35)	16 EPA PAHs	BaP	Ratios			HC Fingerprint Match
										% light	% mid	% heavy	
Soil	P123 B15-2-4	22.0	<0.55	<0.55	<0.22	<0.55	<0.01	<0.01	<0.007	0	0	0	PHC ND,(FCM)

Initial Calibrator QC check OK

Final FCM QC Check OK 102.1%

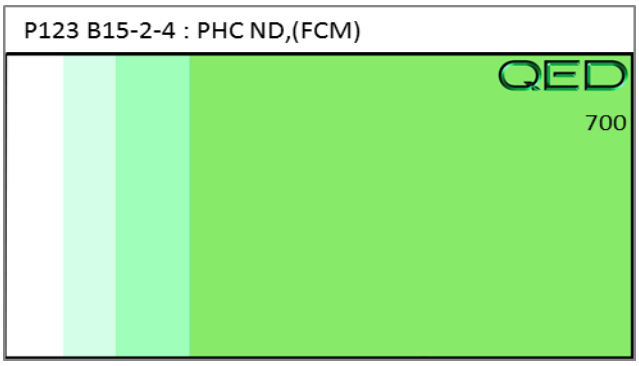
Results generated by a QED HC-1 analyser. Concentration values in mg/kg for soil samples and mg/L for water samples. Soil values are not corrected for moisture or stone content

Fingerprints provide a tentative hydrocarbon identification. The abbreviations are:- FCM = Results calculated using Fundamental Calibration Mode : % = confidence for sample fingerprint match to library

(SBS) or (LBS) = Site Specific or Library Background Subtraction applied to result : (PFM) = Poor Fingerprint Match : (T) = Turbid : (P) = Particulate present

QED Hydrocarbon Fingerprints

Project: 188322307 / NCDOT MOORESVILLE ##################



wood.

North Carolina Department of Transportation
Preliminary Site Assessment
State Project: R-2307B
WBS Element: 37944.1.FR5
Parcel 126
Iredell County

HGST Group, LLC
800 NC 150 (River Highway)
Mooresville, North Carolina
January 8, 2019

Wood Environment and Infrastructure Solutions, Inc.
Project: 188322307

John Maas, LG
Senior Geologist

Helen Corley, LG, BCES
Senior Assoc. Hydrogeologist

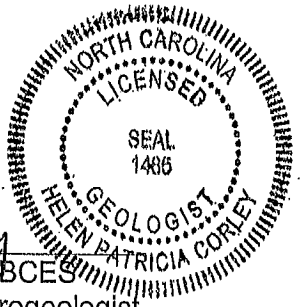


TABLE OF CONTENTS

TABLES

FIGURES

APPENDICES

1.0 INTRODUCTION

In response to the North Carolina Department of Transportation (NCDOT) Request for Proposal, dated September 17, 2018, Wood Environment and Infrastructure Solutions, Inc. (Wood) has performed a Preliminary Site Assessment (PSA) for Parcel 126. The investigation was conducted in accordance with Wood's Technical and Cost proposal dated September 27, 2018. NCDOT contracted Wood to perform a PSA at the parcel, within the area to be affected by future road construction activities, to identify potential impacts from the former use of the property.

The parcel is located on the north side of River Highway, east of the Water Oak Dr. intersection, and approximately one and a half miles west of I-77, as shown in the Vicinity Map, **Figure 1**. The parcel with an address of 800 NC 150 (River Highway), is currently occupied by an abandoned one-story building. It is identified as Parcel 126, HGST Group, LLC within the NCDOT R-2307B design file. The parcel is in Mooresville of Iredell County, North Carolina. The area of investigation within Parcel 126 (the Site) to be affected by widening of NC 150 is shown on **Figure 2**.

The following report summarizes a geophysical survey and describes our subsurface field investigation at the Site. The report also presents onsite soil analyses to evaluate potential soil contamination within Parcel 126, the HGST Group, LLC property.

1.1 Site History

The Site is occupied by an abandoned one-story multi-unit building constructed in 1971 along River Highway. At the time of reconnaissance there were no personnel on Site to interview on September 21, 2018.

This parcel appears on the Underground Storage Tank (UST) Section Registry with one closed incident # 19218. UST closure by removal occurred on August 31, 1998 by Royster Oil Company, Inc. with Norman's House Demolishing Inc. listed as the owner and operator of the tanks. There were two 1,000-gallon, one 2,000-gallon, two 8,000-gallon gasoline USTs and one 4,000-gallon diesel empty USTs closed by removal. A pump island and the piping between island and the UST bed were also removed. A UST Closure Report was submitted to NCDEQ on November 6. Closure Report excerpts and associated documents are included in **Appendix A**. Seventeen soil samples were taken ranging in depth from 4'

to 13’ below ground surface (bgs) from the UST, piping or fuel island excavation floors. Soil samples were analyzed for gasoline or diesel Total Petroleum Hydrocarbons (TPH) by EPA Modified 8015 depending on the fuel stored at that location. Results from two samples reported detectable TPH as 7.2 and 11 mg/kg. The removed steel USTs were described as having been in good condition with only minor corrosion.

On November 16, 1998 NCDEQ responded to the submitted UST Closure Report with a Notice of No Further Action for the Site, closing the incident.

1.2 Site Description

The Site is located in a mixed-use commercial and residential area of Mooresville in Iredell County and covers approximately 23.02 acres. At the time of the PSA field implementation, the parcel was occupied by an abandoned one-story multi-unit building. The Site ground cover is asphalt and concrete near the abandoned building, and the rest of the Site is cleared or wooded land. The parcel slopes gently to the north. Photos of the Site are presented in **Appendix B**.

2.0 GEOLOGY

2.1 Regional Geology

The Site is located within the Charlotte Terrane of the Piedmont Physiographic Province of North Carolina. According to the 1985 State Geologic Map of North Carolina, the area is underlain by strongly foliated fine-grained biotite gneiss of Cambrian/Late Proterozoic age, with layers of amphibolite and muscovite schist.

2.2 Site Geology

Site geology was observed through the drilling or hand augering of twenty-two shallow soil borings (P126B1 to P126B22). Figure 2 presents the boring locations and Site layout. Borings did not exceed a total depth of 10 feet bgs. Soils encountered in the borings consisted mostly of red and orange silty clay. Staining was not observed in the borings. Groundwater was not encountered in the borings. Based on observations of topography of

the Site vicinity, the groundwater flow direction is inferred to be generally to the north. Boring logs are presented in **Appendix C**.

3.0 FIELD ACTIVITIES

3.1 Preliminary Activities

Prior to commencing field sampling activities at the Site, several tasks were accomplished in preparation for the subsurface investigation. A Health and Safety Plan (HASP) was created including the site-specific health and safety information necessary for the field activities. North Carolina One Call was contacted on November 5th to report the proposed drilling activities and subsequently notify all affected utilities for the parcel. GEL Solutions (GEL) was procured by Wood to perform utility locating and perform a geophysical survey at the Site. Innovation Environmental Technologies, Inc. (IET) of Concord, North Carolina was retained by Wood to perform the direct push sampling for soil borings.

Wood understands that acquisition of the expanded right-of-way is necessary for the widening of NC 150. Boring locations were strategically placed within the parcel to maximize the opportunity to encounter potential contaminated soil. Boring depths were extended to approximately 10 feet bgs.

3.2 Site Reconnaissance

Wood personnel performed a site reconnaissance on September 21, 2018. During the site reconnaissance, the area was visually examined for the presence of any areas/obstructions that could potentially affect the subsurface investigation. Thick vegetation was observed in the northeast and western portions of the parcel that would limit the access of a drill rig. It was determined that hand auguring would be utilized to acquire samples in the dense vegetated areas. No other obstructions were observed during the reconnaissance.

A reinforced concrete fuel dispenser pad was observed in front of the building within the area of investigation. North of the abandoned building, a small well house and above ground storage tank (AST) of undetermined size was found. A septic system was not

found; however, it is assumed the building is on a private septic system as the neighboring property to the west is on private well and septic.

3.3 Geophysics Survey Results and Utility Locating

The geophysical survey of the Site occurred from October 15 to 25, 2018. GEL performed an electromagnetic (EM) survey of the Site with a ground penetrating radar (GPR) survey conducted across select EM anomalies. Time domain electromagnetic methodology (TDEM) was also utilized to measure electrical conductivity of subsurface materials. Their complete geophysical report is presented as **Appendix D**. GEL reported that two subsurface geophysical anomalies were detected within the limits of investigation. Both anomalies were denoted as “No Confidence”, which is the lowest possibility of being a UST. One “No Confidence” anomaly was detected approximately 160 feet west of the abandoned building, the second “No Confidence” anomaly was detected approximately 50 feet east of the building. The other anomalies represented in the data are indicative of known metallic surface features and/or cultural interference.

In advance of drilling activities, GEL identified underground electric and telecommunication utilities on the parcel. Underground electric was identified beneath the asphalt running to the building. Telecommunication utilities were found on the western side of the abandoned building running to River Highway and then along River Highway. Overhead distribution powerlines were located along the southern portion of the Site along River Highway.

3.4 Soil Sampling

Wood conducted drilling activities at the Site on November 13 and November 14, 2018. The purpose of soil sampling was to determine if a past petroleum release had impacted the Site and if so, to estimate the volume of impacted soil that might require special handling during construction activities. Wood’s drilling subcontractor, IET, advanced 22 total soil borings across the area of investigation to a maximum approximate depth of 10 feet bgs. Wood conducted field screening of the soil borings with a PID that was used to screen recovered soil at approximate two-foot intervals. The interval of the soil boring exhibiting the greatest PID reading was selected for analysis of total petroleum hydrocarbons (TPH), diesel range organics (DRO), gasoline range organics (GRO),

benzene, toluene, ethylbenzene, and xylene (BTEX), total aromatics, and polycyclic aromatic hydrocarbons (PAH) soil via onsite ultraviolet fluorescence (UVF). Twenty-seven total samples were collected from the Site from the borings for UVF onsite analysis.

Of the 22 soil borings, 13 were installed with direct push and 9 by hand auger. Boring locations were selected to address geophysical anomalies, potential environmental source areas, subsurface design features, and cut areas. All hand auger soil borings were advanced to five feet bgs. The two subsurface geophysical anomalies were outlined by paint by GEL. Three hand augered exploratory borings were advanced on top of the western painted outline, and all three were restricted to less than one foot total depth due to buried bricks. A direct push soil boring (P126B12) was advanced to 10 feet approximately three feet from the edge of the painted line. One hand augered exploratory boring was advanced at the eastern anomaly in the middle of the potential tank. The boring was restricted to less than one foot total depth due to buried rock fragments. A direct push soil boring (P126B17) was advanced to 10 feet deep approximately three feet from the edge of the paint. The hand augered exploratory boring findings indicate that the two subsurface geophysical anomalies are associated with localized buried brick and rock fragments, and not USTs. Figure 2 presents the Site Map with boring locations and identifications.

4.0 SOIL SAMPLING RESULTS

Based on PID field screening and UVF hydrocarbon analysis, evidence of petroleum hydrocarbon impacts was not identified within the area of investigation.

There were no elevated PID readings, above 10 ppm, detected in the soil borings. The PID field screening results are summarized in **Table 1** and provided on the boring logs in Appendix C.

Results from the onsite UVF petroleum soil analyses are presented in **Table 2**, with instrument generated tables in **Appendix E**. Several categories of analyses were measured including DRO, GRO, TPH, PAHs, and total aromatics. **Figure 3** presents the GRO and DRO results at each boring.

Elevated TPH values above the NCDEQ Action Limits of 50 milligrams per kilogram (mg/kg) for GRO and 100 mg/kg for DRO were not detected in the 27 samples from the 22 borings advanced at the Site. The hydrocarbon analysis results from the QED QROS Hydrocarbon Analyzer are provided in Appendix E.

5.0 CONCLUSIONS

Based on Site observations and UVF onsite analysis, petroleum-impacted soil contamination was not identified above the NCDEQ Action level of 100 mg/kg for DRO, or 50 mg/kg for GRO during the field activities.

The following bulleted summary is based upon Wood's evaluation of field observations, and onsite and offsite quantitative analyses of samples collected from the Site on November 13 and November 14, 2018.

- This parcel in the area of proposed highway widening activities is a property occupied by an abandoned one-story building. The Site ground cover is asphalt and concrete with cleared and wooded land surrounding the building.

- Results of the geophysical survey identified two subsurface geophysical anomalies denoted as "No Confidence." Hand auger exploratory soil borings were done in the middle of both anomalies, which were found to be piles of rock and brick. No USTs were found onsite.

- An AST of undetermined volume and a well house were found north of the existing building, outside of the area of investigation.

- During a review of the NCDEQ storage tank databases, a closure report indicated that six USTs were removed (gasoline and diesel) in 1998. Evidence of contamination was not encountered during UST closure activities. UST closure samples indicated TPH levels were below state action levels. The incident was closed November 1998.

- A reinforced concrete fuel dispenser pad was observed in front of the building within the area of investigation. Fuel dispenser supply piping has been removed based on the 1998 UST Closure Report.

- A total of 22 soil borings were advanced to a maximum approximate depth of 10 feet bgs. Hand auger soil borings were advanced to an approximate depth of 5 feet bgs. Groundwater was not encountered in the borings. Samples from each boring were screened at two-foot intervals in the field by a PID. A total of 27 samples were analyzed by the UVF.

- Elevated TPH values above the NCDEQ Action Limit of 50 mg/kg for GRO were not detected in the samples from 22 borings advanced at the Site.

- Elevated TPH values above the NCDEQ Action Limit of 100 mg/kg for DRO were not detected in the samples from 22 borings advanced at the Site.

6.0 RECOMMENDATIONS

Based on these PSA results, Wood does not recommend further assessment or soil sampling in the area of investigation.

TABLES

Table 1
PID Field Screening Results
Parcel 126, HGST Group, LLC-Iredell County
Mooresville, North Carolina

SAMPLE ID	Sample Date	Sample Depth (feet bgs)	PID Screening (ppm)
P126B1-0-2	11/13/2018	0-2	0.7
P126B1-6-8	11/13/2018	6-8	1.1
P126B2-2-4	11/13/2018	2-4	0.5
P126B2-8-10	11/13/2018	8-10	1.0
P126B3-2-4	11/13/2018	2-4	0.9
P126B3-8-10	11/13/2018	8-10	1.4
P126B4-2-4	11/13/2018	2-4	0.8
P126B4-8-10	11/13/2018	8-10	1.8
P126B5-2-4	11/13/2018	2-4	0.7
P126B5-8-10	11/13/2018	8-10	0.8
P126B6-2-4	11/13/2018	2-4	0.5
P126B7-0-2	11/13/2018	0-2	0.3
P126B8-0-2	11/13/2018	0-2	0.1
P126B9-2-4	11/13/2018	2-4	0
P126B10-2-4	11/13/2018	2-4	0
P126B11-2-4	11/13/2018	2-4	0
P126B12-2-4	11/14/2018	2-4	0
P126B13-2-4	11/14/2018	2-4	0.5
P126B14-0-2	11/14/2018	0-2	6.5
P126B15-0-2	11/14/2018	0-2	5.2
P126B16-0-2	11/14/2018	0-2	2.1
P126B17-0-2	11/14/2018	0-2	0
P126B18-2-4	11/14/2018	2-4	0
P126B19-0-2	11/14/2018	0-2	0.1
P126B20-2-4	11/14/2018	2-4	5.8
P126B21-2-4	11/14/2018	2-4	0
P126B22-2-4	11/14/2018	2-4	0
		Prepared By/Date	DRH 12/10/2018
		Checked By/Date	RFS 12/12/2018

Notes: PPM = Parts Per Million
ft bgs = feet below ground surface

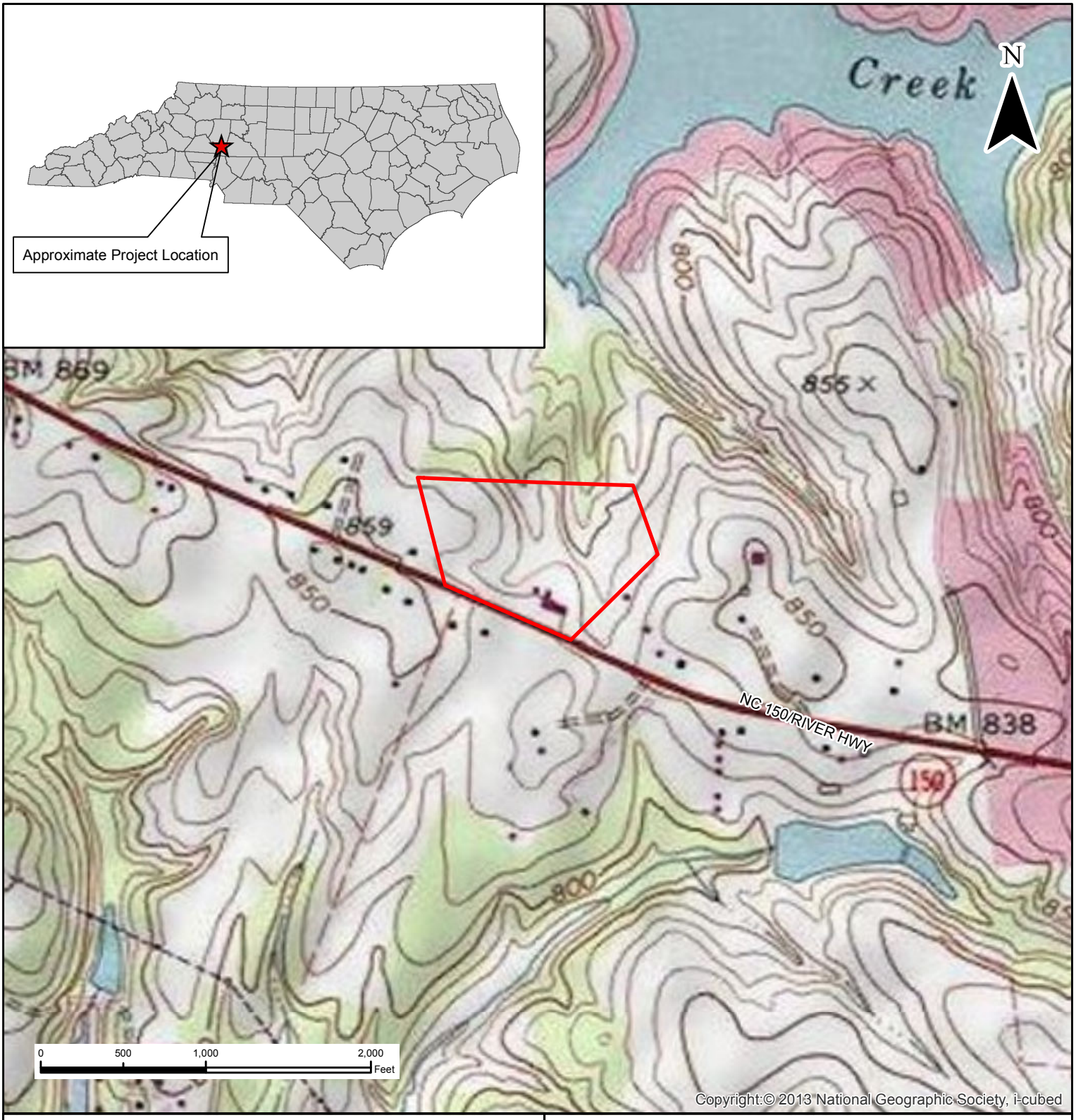
Table 2
UVF Petroleum Soil Results, 11/13/2018-11/14/2018
Parcel 126, HGST Group, LLC-Iredell County
Mooresville, North Carolina

Sample ID Number	Sample Depth (ft bgs)	BTEX (mg/kg)	GRO (mg/kg)	DRO (mg/kg)	PAHs (mg/kg)
NC State Action Level	**NA**	**NA**	**50**	**100**	**NA**
P126B1-0-2	0-2	<0.33	1.0	4.9	0.23
P126B1-6-8	6-8	<0.28	<0.28	1.4	<0.09
P126B2-2-4	2-4	<0.23	<0.23	4.5	0.22
P126B2-8-10	8-10	<0.21	<0.21	8.2	0.32
P126B3-2-4	2-4	<0.26	<0.26	0.26	<0.08
P126B3-8-10	8-10	<0.21	<0.21	0.41	<0.07
P126B4-2-4	2-4	<0.22	<0.22	0.76	<0.07
P126B4-8-10	8-10	<0.43	<0.43	59.4	1.7
P126B5-2-4	2-4	<0.32	<0.32	0.57	<0.1
P126B5-8-10	8-10	<0.24	<0.24	5.0	0.18
P126B6-2-4	2-4	<0.29	<0.29	6.9	0.18
P126B7-0-2	0-2	<0.25	<0.25	1.3	<0.08
P126B8-0-2	0-2	<0.3	<0.3	<0.3	<0.09
P126B9-2-4	2-4	<0.27	<0.27	<0.27	<0.09
P126B10-2-4	2-4	<0.27	<0.27	<0.27	<0.09
P126B11-2-4	2-4	<0.27	<0.27	<0.27	<0.09
P126B12-2-4	2-4	<0.26	<0.26	<0.26	<0.08
P126B13-2-4	2-4	<0.26	<0.26	<0.26	<0.08
P126B14-0-2	0-2	<0.22	<0.22	4.5	<0.07
P126B15-0-2	0-2	<0.28	<0.28	<0.28	<0.09
P126B16-0-2	0-2	<0.27	<0.27	<0.27	<0.09
P126B17-0-2	0-2	<0.43	<0.21	6.2	0.14
P126B18-2-4	2-4	<0.29	<0.29	<0.29	<0.09
P126B19-0-2	0-2	<0.27	<0.27	<0.27	<0.09
P126B20-2-4	2-4	<0.25	0.49	1.6	<0.08
P126B21-2-4	2-4	<0.21	<0.21	<0.21	<0.07
P126B22-2-4	2-4	<0.24	<0.24	<0.24	<0.08

NOTES:
(mg/kg) = Millograms per kilogram
GRO = Gasoline Range Organics
DRO = Diesel Range Organics
BTEX = Benzene, Toluene, Ethylbenzene and Xylenes
PAHs = Polycyclic Aromatic Hydrocarbon
ft bgs = feet below ground surface
NA= Not applicable

Prepared By/Date DRH 12/10/18
Checked By/Date RFS 12/12/18

FIGURES



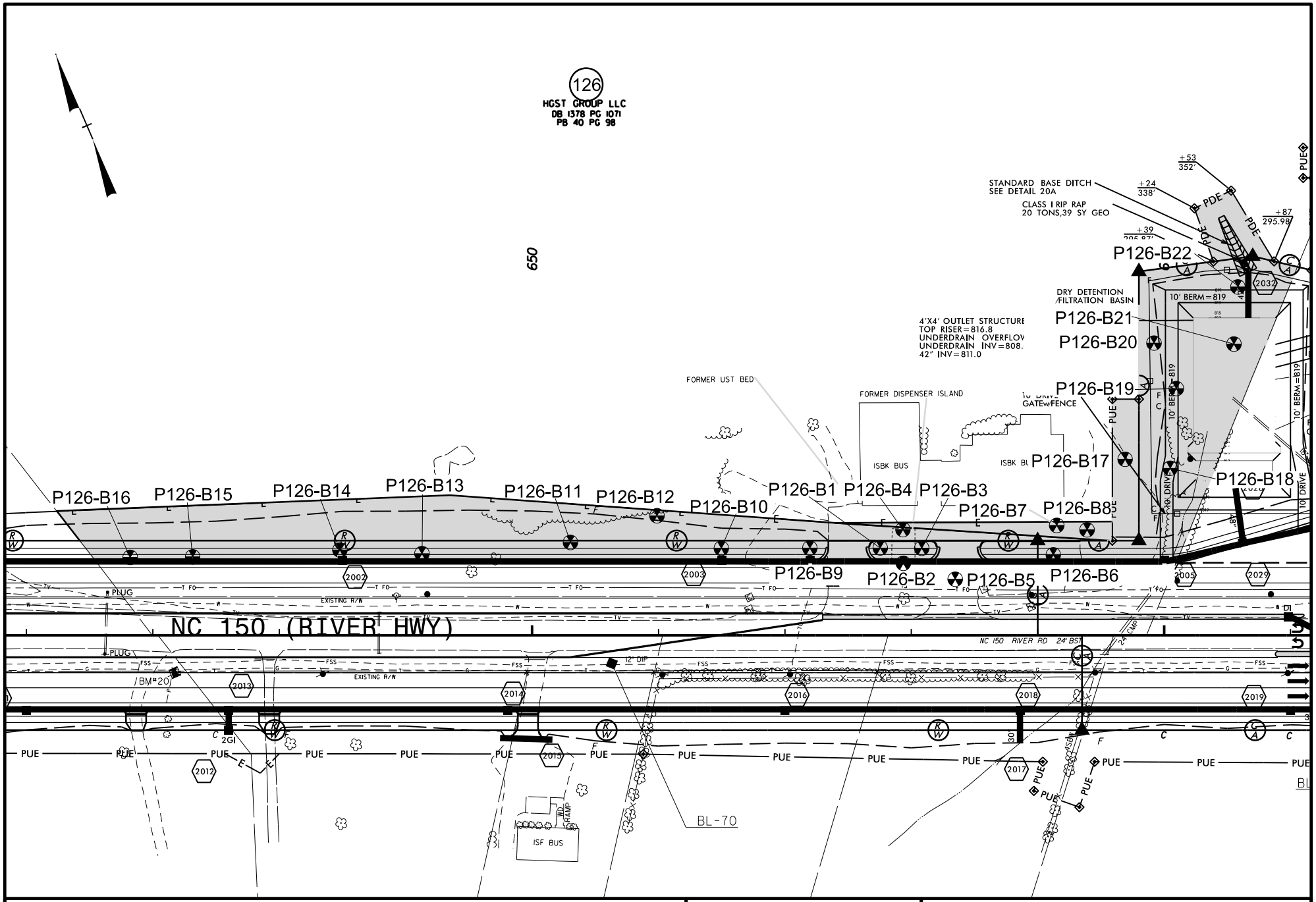
wood.

VICINITY MAP

Parcel 126
HGST Group LLC
800 NC 150 (River Hwy) Mooresville, North Carolina

Site Boundary

Prepared By: LMM Date: 9/20/2018	Checked By: AJF Date: 9/20/2018	Project No.: 188322307	Figure No.: 1



AREA OF INVESTIGATION

BORING LOCATION

50′ 0′ 50′ 100′

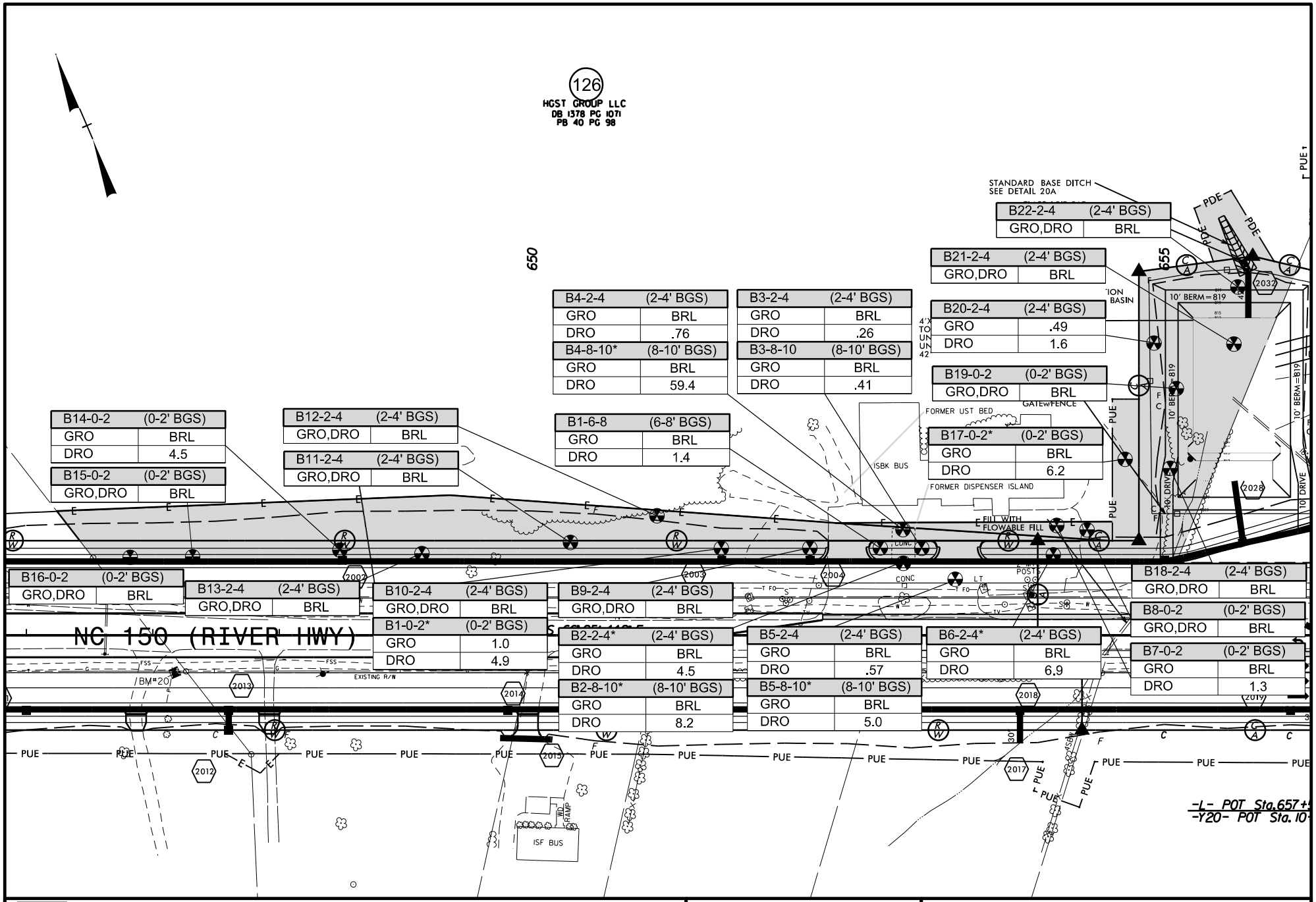
25′

(ENGLISH)

wood.

AREA OF INVESTIGATION - PARCEL 126
HGST GROUP LLC R-2307B
800 NC 150 (RIVER HWY)
MOORESVILLE, NC 28117

PREPARED BY:	DATE:	CHECKED BY:	DATE:	JOB NUMBER	FIGURE
LPL	1/3/19	HPC	1/3/2019	188322307	2



AREA OF INVESTIGATION
BORING LOCATION
GRO = GASOLINE RANGE ORGANICS
DRO = DIESEL RANGE ORGANICS
BRL = BELOW REPORTABLE LIMITS
* PAH EXCEEDS LIMITS. SEE TABLE 2 FOR ADDITIONAL INFORMATION

50′ 0′ 50′ 100′
25′
(ENGLISH)

wood.

UVF PETROLEUM RESULTS - PARCEL 126
HGST GROUP LLC R-2307B
800 NC 150 (RIVER HWY)
MOORESVILLE, NC 28117

PREPARED BY:	DATE:	CHECKED BY:	DATE:	JOB NUMBER	FIGURE
LPL	1/3/19	HPC	1/3/2019	188322307	3

APPENDIX A
HISTORIC REPORTS AND DOCUMENTS

Royster Oil Company, Inc.

WHOLESALE DISTRIBUTORS OF BP AND CHEVRON PRODUCTS

Shelby/487-6344 Forest City/245-4267 Gastonia/824-4330

HOME OFFICE:
P.O. Box 1467
720 S. Lafayette St.
Shelby, N.C. 28150

11-1-98

UNDERGROUND STORAGE TANK CLOSURE REPORT (GW/UST-12)

I. GENERAL INFORMATION

A. Ownership of tanks

Norman's House Demolishing, Inc.
3726 Aster Drive
Charlotte, NC 28227
(704) 545-1060

B. Operator of tanks (facility information)

Norman's House Demolishing, Inc.
800 River Road - Hwy 150 W.
Mooresville, NC 28115
(704) 545-1060
Iredell County
Facility # 0-034993

C. Contacts

Primary-Jack D. Norman, Jr. President
address as above

Closure-Royster Oil Company, Inc.
P.O. Box 1467
Shelby, NC 28151-1467
(704) 487-6344
Michael R. Royster
Primary consultant-Royster

Laboratory-Pace Analytical Services
9800 Kincey Ave., Suite 100
Huntersville, NC 28078
(704) 875-9092
Lab Cert. # 275

D. UST Information

Tank #	Installation dates	Size in gallons	Tank dimensions	Last contents	Previous Contents (if any)
1	unknown	6000	8' x 16'	empty	gasoline
2	unknown	6000	8' x 16'	empty	gasoline
3	unknown	4000	64" x 24'	empty	diesel
4	unknown	1000	4' x 10'-8"	empty	gasoline
5	unknown	1000	4' x 10'-8"	empty	gasoline
6	unknown	2000	64" x 12'	empty	gasoline

E. Site characteristics

There is no history of any past releases at this site. This facility was a former convenience store which has been out of business in excess of ten years. At the time the facility went inactive the tanks were pumped out and left empty.

BP
Chevron

Royster Oil Company, Inc.

WHOLESALE DISTRIBUTORS OF BP AND CHEVRON PRODUCTS

Shelby/487-6344 Forest City/245-4267 Gastonia/824-4330

HOME OFFICE:
P.O. Box 1467
720 S. Lafayette St.
Shelby, N.C. 28150

The State registration form declares the tanks were all installed in 1964 which is incorrect. The owner states tanks D,E & F were installed around 1972 and tanks A,B & C were added later in the early 1980's. Based on the evidence found during the removals I would agree with the owner's statement.

The surrounding property is rural farmland with scattered housing. The site geology/hydrogeology can be described as red clay soils and the water table is in excess of twenty feet deep, which is typical for this region. During the excavation and removal of the tanks the water table was not encountered.

II. CLOSURE PROCEDURES

Preparation to remove the tanks began with the notification of local and State authorities and the completion of the GW/UST-3 form for NCDENR. No local permitting was required. A pre-excavation visit was performed to locate the tanks and determine if any residual material was remaining. These tanks had been pumped out prior to being taken out of service and less than one inch of product remained in any tank. ULOCO services were notified to mark any possible underground utilities.

Excavation began at 7:20am under clear skies and sunny conditions. The tanks were located in a grassy area on the west side of the building. There was a concrete apron around the fill boxes for tanks D,E & F. Depth of burial to the top of the tanks is as follows:

A = 36"	D = 42"
B = 36"	E = 42"
C = 36"	F = 42"

Soil conditions were good as we found clean red clay. The tanks had been properly installed and backfilled with sand. There was no evidence of petroleum contamination by sight or smell and soil samples were taken according to NCDENR guidelines. Since we encountered no obvious contamination no excess soils were removed or stockpiled and the excavation pit was kept to a minimum. Clean backfill was delivered on site by Lake Norman Sand & Gravel, a local supplier. The unprotected steel tanks were in good condition with only minor surface corrosion. Upon removal of the tanks they were shipped to Nationwide Tank Service for certified EPA disposal.

III. Upon excavation and removal of the tanks soil samples were taken by hand from the floor of the excavation pits. The total depth of the samples are as follows:

1 = 10'	7 = 10'	13 = $9\frac{1}{2}$'
2 = 13'	8 = $10\frac{1}{2}$'	14 = 2'
3 = 13'	9 = $10\frac{1}{2}$'	15 = 2'
4 = 13'	10 = $9\frac{1}{2}$'	16 = 4'
5 = 13'	11 = $9\frac{1}{2}$'	17 = 4'
6 = 10'	12 = $9\frac{1}{2}$'	

Royster Oil Company, Inc.

WHOLESALE DISTRIBUTORS OF BP AND CHEVRON PRODUCTS

Shelby/487-6344 Forest City/245-4267 Gastonia/824-4330

HOME OFFICE:
P.O. Box 1467
720 S. Lafayette St.
Shelby, N.C. 28150

The soil samples were placed in clean laboratory jars, packed on ice and picked up on site by a Pace Labs courier for analysis.

An SSE (Site Sensitivity Evaluation) was not performed at this site because:

A. The water table was not encountered during the removal process.
B. No obvious contamination was encountered by sight or smell.
C. None of the sample analyses yielded results warranting further action.

EPA methods 5030 & 3550 were used to test the soil samples for petroleum contamination. The sample results and guidelines are as follows:

SAMPLE ID	METHOD	REPORTABLE CONCENTRATION	YOUR RESULTS
1	5030 & 3550	10ppm	11ppm
2	5030	10ppm	ND
3	5030	10ppm	ND
4	5030	10ppm	ND
5	5030	10ppm	ND
6	5030 & 3550	10ppm	7.2ppm
7	5030 & 3550	10ppm	ND
8	5030	10ppm	ND
9	5030	10ppm	ND
10	5030	10ppm	ND
11	5030	10ppm	ND
12	5030	10ppm	ND
13	5030	10ppm	ND
14	5030	10ppm	ND
15	5030	10ppm	ND
16	5030	10ppm	ND
17	5030	10ppm	ND

(ppm = parts per million ND = Not Detected)

Sampl # 1 testing for diesel contamination barely exceeds the reportable concentration limit. All of the above results were reported to NCDENR's representative Dan Graham for comment and possible action. Since the other sample results were ND or below limits, it was decided that we would revisit the site and take another soil sample at the same location as #1. On 10/09/98 we returned to the site with a hand auger and performed another sample. The depth of sample was fourteen feet. The sample was placed in a clean laboratory jar, packed on ice and shipped to Pace Labs for analysis. The results are attached under separate cover as "Norman's Project # 922204 and there were no detectable concentrations reported.

IV. CONCLUSIONS & RECOMMENDATIONS

At no time did we encounter obvious contamination in the tank pits. All tanks were in good condition with only minor surface corrosion. There was

Royster Oil Company, Inc.

WHOLESALE DISTRIBUTORS OF BP AND CHEVRON PRODUCTS

Shelby/487-6344 Forest City/245-4267 Gastonia/824-4330

HOME OFFICE:
P.O. Box 1467
720 S. Lafayette St.
Shelby, N.C. 28150

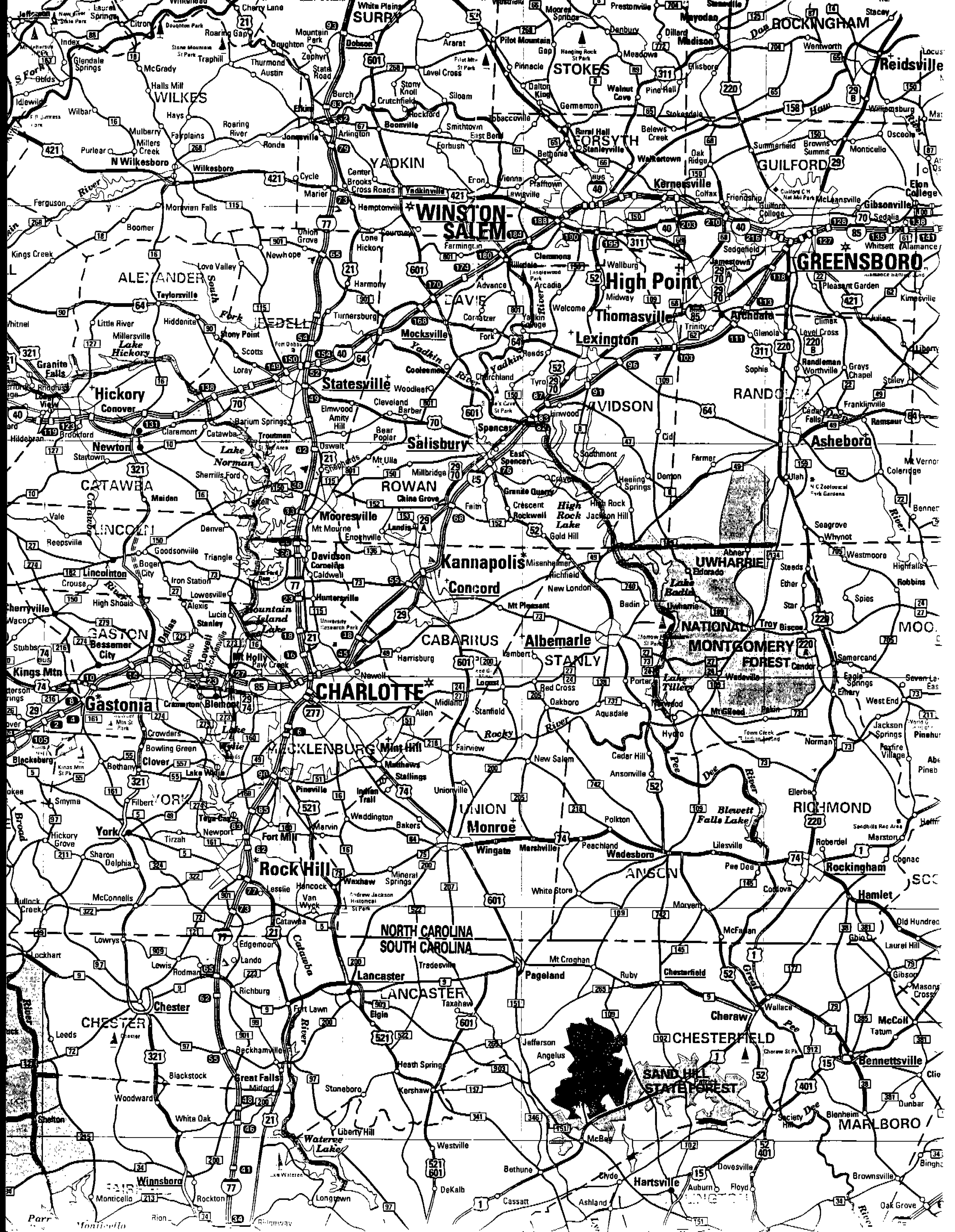
no evidence of soil staining around the tanks nor did we observe wet spots on the tanks where possible leaks from pinholes can occur. The galvanized piping was in very good condition and was remarkably free of corrosion. There was no evidence of pipe leaks at joints or under the pumps. All soil samples were below minimum reportable concentrations. We observed no noticible odors and the soil in the pits and line trenches gave the appearance of only clean red clay.

Based on the sample analysis, soil conditions and site investigation, it is my recommendation that no further action be required at this site.

Royster Oil Company, Inc.
by Michael R. Royster
dated 10-27-98

J. Michael Floyd, L.G.
by
dated 11/1/98

NORTH CAROLINA LICENSED SEAL 1215 GEOLOGIST JERRY MICHAEL FLOYD



SURRY
ROCKINGHAM
Reidsville
Mayodan
Madison
Stoneville
Wentworth
Pilot Mountain
STOKES
Danbury
Dobson
Elkin
Jonesville
Boonville
YADKIN
Yadkinville
WILKES
N Wilkesboro
Wilkesboro
FORSYTH
Rural Hall
Kernersville
GUILFORD
WINSTON-SALEM
GREENSBORO
High Point
Thomasville
Lexington
Clemmons
DAVIE
Mocksville
ALEXANDER
Taylorsville
IREDELL
Statesville
Hickory
Conover
Newton
CATAWBA
Maiden
LINCOLN
Lincolnton
Salisbury
ROWAN
China Grove
Mooresville
Davidson
Cornelius
Kannapolis
Concord
CABARRUS
Albemarle
STANLY
Asheboro
RANDOLPH
Archdale
Troy
MONTGOMERY
UWHARRIE
NATIONAL FOREST
Kings Mtn
Gastonia
GASTON
Bessemer City
Cherryville
Mt Holly
Belmont
CHARLOTTE
MECKLENBURG
Mint Hill
Matthews
Pineville
Monroe
UNION
Wingate
Marshville
Wadesboro
ANSON
Rockingham
RICHMOND
Hamlet
Clover
YORK
York
Rock Hill
Fort Mill
NORTH CAROLINA
SOUTH CAROLINA
Lancaster
LANCASTER
Chester
CHESTER
Pageland
Chesterfield
CHESTERFIELD
Cheraw
Bennettsville
MARLBORO
McColl
SAND HILL
STATE FOREST
Great Falls
Winnsboro
Hartsville
Lake Norman
Mountain Island Lake
Lake Wylie
Lake Tillery
High Rock Lake
Blewett Falls Lake
Wateree Lake
Catawba
Yadkin River
Rocky River
Pee Dee River

Royster Oil Company, Inc.

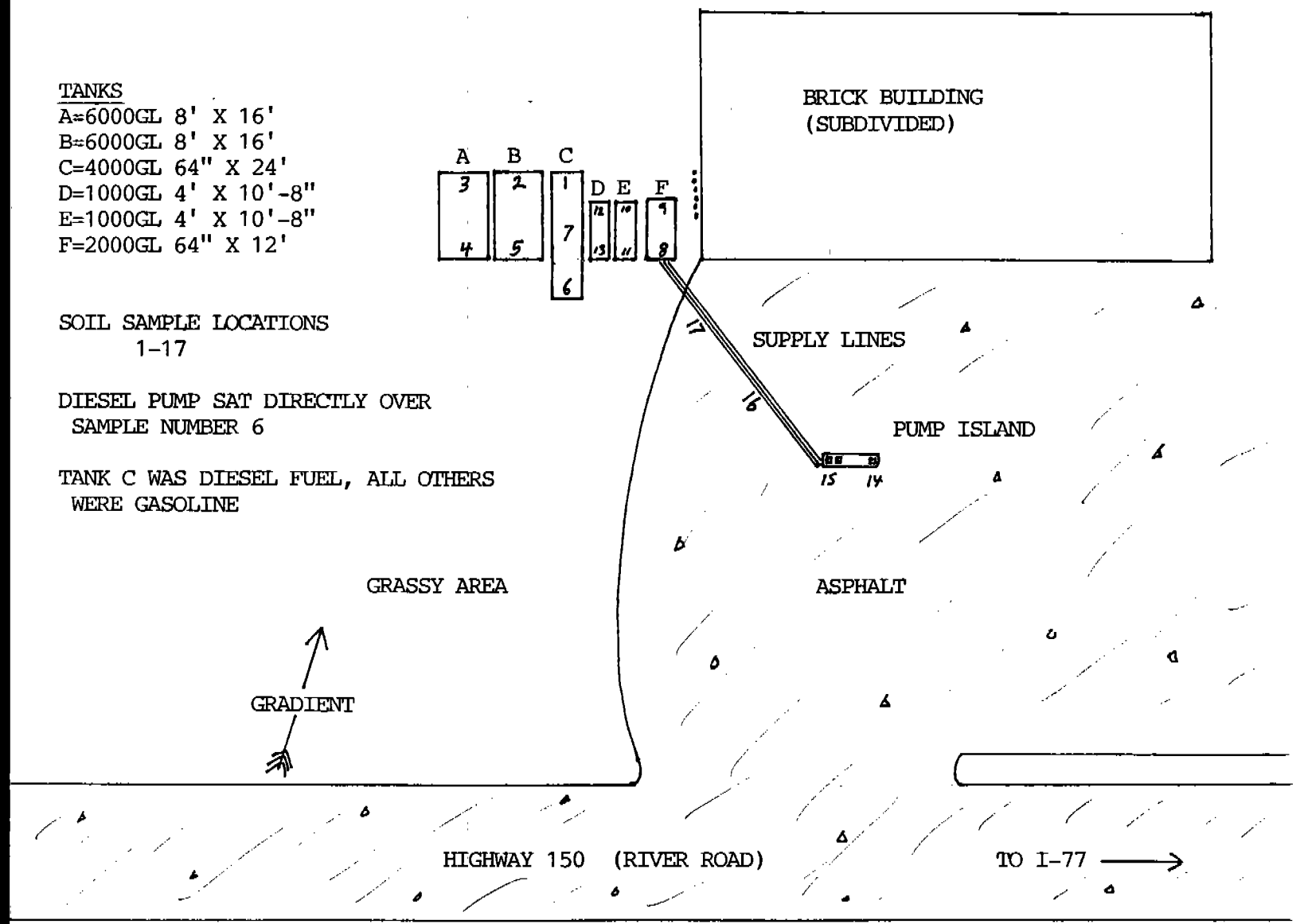
WHOLESALE DISTRIBUTORS OF GULF AND BP PRODUCTS

Shelby/487-6344 Forest City/245-4267 Gastonia/824-4330

HOME OFFICE:
P.O. Box 1467
720 S. Lafayette St.
Shelby, N.C. 28150

NORMAN'S HOUSE DEMOLISHING, INC.
800 RIVER ROAD - HWY. 150 W.
MOORESVILLE, NC 28115
REMOVAL OF UNDERGROUND STORAGE TANKS
AUGUST 31, 1998

SCALE 1" = 30'



NATIONWIDE TANK DISPOSAL SERVICES
P.O. Box 23536
Mint Hill, NC 28227-0272
704-545-3139

Certificate of Disposal

Tank # 10357 Size 6,000 gallon

This is to certify that the above tank has been disposed of by Nationwide Tank Disposal in accordance with and exceeding EPA regulations on Petroleum Tank Disposal.
On 9/1/98

1	6,000	gallon	Royester Oil - Shelby NC	Hwy 150	Lake Norman	NC

Certified by Don W Sm Date 9/1/98

NATIONWIDE TANK DISPOSAL SERVICES

P.O. Box 23536
Mint Hill, NC 28227-0272
704-545-3139

Certificate of Disposal

Tank # 10358 Size 4,000 gallon

This is to certify that the above tank has been disposed of by Nationwide Tank Disposal in accordance with and exceeding EPA regulations on Petroleum Tank Disposal.
On 9/1/98

1	4,000	gallon	Royester Oil Co. Shelby NC	Hwy 150	Lake Norman	NC

Certified by [signature] Date 9/1/98

NATIONWIDE TANK DISPOSAL SERVICES
P.O. Box 23536
Mint Hill, NC 28227-0272
704-545-3139

Certificate of Disposal

Tank # 10359 Size 2,000 gallon

This is to certify that the above tank has been disposed of by Nationwide Tank Disposal in accordance with and exceeding EPA regulations on Petroleum Tank Disposal.
On 9/1/98

1	2,000	gallon	Royester Oil Co. - Shelby NC	Hwy 150	LAKE NORMAN	NC

Certified by [signature] Date 9/1/98

NATIONWIDE TANK DISPOSAL SERVICES
P.O. Box 23536
Mint Hill, NC 28227-0272
704-545-3139

Certificate of Disposal

Tank # 10360 Size 1,000 gallon

This is to certify that the above tank has been disposed of by Nationwide Tank Disposal in accordance with and exceeding EPA regulations on Petroleum Tank Disposal.
On 9/1/98

1	1,000	gallon	Royesten 0.1 Co. Shelby NC	Hwy 150	Lake Norman	NC

Certified by Jon W. Sm Date 9/1/98

NATIONWIDE TANK DISPOSAL SERVICES
P.O. Box 23536
Mint Hill, NC 28227-0272
704-545-3139

Certificate of Disposal

Tank # 10361 Size 1,000 gallon

This is to certify that the above tank has been disposed of by Nationwide Tank Disposal in accordance with and exceeding EPA regulations on Petroleum Tank Disposal.
On 9-1-98

1	1,000	gallon	Royester Oil Co. Shelby NC	Hwy 150	Lake Norman	NC

Certified by Don W. Lee Date 9/1/98

ATTACHMENT I

GW/UST-3 Notice of Intent: UST Permanent Closure or Change-In-Service

FOR TANKS IN **NC**

Return Completed Form To:
The appropriate DEM Regional Office according to the county of the facility's location. [SEE REVERSE SIDE OF OWNER'S COPY (PINK) FOR REGIONAL OFFICE ADDRESS].

State Use Only
I. D. Number
Date Received

INSTRUCTIONS
Complete and return five (5) working days prior to closure or change-in-service.

I. OWNERSHIP OF TANK(S)

Tank Owner Name: Norman's House Demolishing, Inc.
(Corporation, Individual, Public Agency, or Other Entity)
Street Address: 3726 Aster Dr.
County: Mecklenberg
City: Charlotte State: NC Zip Code: 28227
Tele. No. (Area Code): 704 545-1060

II. LOCATION OF TANK(S)

Facility Name or Company: Norman's House Dem., Inc.
Facility ID # (if available): 0-034993
Street Address or State Road: 800 River Rd-Hwy 150 W.
County: Iredell City: Mooresville Zip Code: 28115
Tele. No. (Area Code): 704 545-1060

III. CONTACT PERSON

Name: Jack D. Norman, Jr. Job Title: President Telephone Number: (704) 545-1060

IV. TANK REMOVAL, CLOSURE IN PLACE, CHANGE-IN-SERVICE

1. Contact Local Fire Marshall.
2. Plan the entire closure event.
3. Conduct Site Soil Assessments.
4. If Removing Tanks or Closing in Place refer to API Publications 2015 "Cleaning Petroleum Storage Tanks" & 1604 "Removal & Disposal of Used Underground Petroleum Storage Tanks".
5. Provide a sketch locating piping, tanks and soil sampling locations.
6. Fill out form GW/UST-2 "Site Investigation Report for Permanent Closure" and return within 30 days following the site investigation.
7. The **site assessment** portion of the tank closure must be conducted under the supervision of a Professional Engineer or Licensed Geologist. After January 1, 1994, **all closure site assessment reports must be signed and sealed by a P.E. or L.G.**
8. Keep closure records for 3 years.

V. WORK TO BE PERFORMED BY:

(Contractor) Name: Royster Oil Company, Inc.
Address: P.O. Box 1467 Shelby State: NC Zip Code: 28151
Contact: Mike Royster Phone: 704 487-6344
Primary Consultant: same Phone:

VI. TANK(S) SCHEDULED FOR CLOSURE OR CHANGE-IN-SERVICE

TANK ID#	TANK CAPACITY	LAST CONTENTS	PROPOSED ACTIVITY: CLOSURE – Removal	CLOSURE – Abandonment In Place	CHANGE-IN-SERVICE – New Contents Stored
1	6000	gasoline	XX		
2	6000	gasoline	XX		
3	4000	diesel	XX		
4	1000	gasoline	XX		
5	1000	gasoline	XX		
6	2000	gasoline	XX		

VII. OWNER OR OWNER'S AUTHORIZED REPRESENTATIVE

Print name and official title
Michael R. Royster V-P

Signature: Michael R. Royster

*Scheduled Removal Date: 8/31/98

Date Submitted: 7/20/98

*If scheduled work date changes, notify your appropriate DEM Regional Office 48 hours prior to originally scheduled date.

GW/UST-3 (Rev. 05/94) White Copy - Regional Office Yellow Copy - Central Office Pink Copy - Owner

ATTACHMENT II

GW/UST-2 Site Investigation Report For Permanent Closure or Change-in-Service of U.S.T.

FOR TANKS IN **NC**

Return Completed Form To:
The appropriate DEM Regional Office according to the county of the facility's location. [SEE MAP ON REVERSE SIDE OF OWNER'S COPY (PINK) FOR REGIONAL OFFICE ADDRESS].

State Use Only
I.D. Number _____
Date Received _____

INSTRUCTIONS

Complete and return within (30) days following completion of site investigation.

I. Ownership of Tank(s)

Owner Name: Norman's House Demolishing, Inc.
(Corporation, Individual, Public Agency, or Other Entity)
Street Address: 3726 Aster Dr.
County: Mecklenburg
City: Charlotte State: NC Zip Code: 28227
Telephone Number: (704) 545-1060
(Area Code)

II. Location of Tank(s)

Facility Name: Norman's House Demolishing, Inc.
(or Company)
Facility ID # (if available): 0-034993
Street Address 800 River Rd.-Hwy 150 W.
(or State Road)
County: Iredell City: Mooresville Zip Code: 28115
Telephone Number: (704) 545-1060
(Area Code)

III. Contact Person

Name: Jack D. Norman, Jr. Job Title: President Tel. No. 704 545-1060
Closure Contractor: Royster Oil Co., Inc Address: POBox 1467 Shelby, NC 28151 Tel. No. 704 487-6344
Primary Consultant: same Address: Tel. No. :
Lab: Pace Analytical Services Address: 9800 Kincey Ave., Tel. No. 704 875-9092

IV. U.S.T. Information / V. Excavation Condition

Tank No.	Size in Gallons	Tank Dimensions	Last Contents	Water in Excavation		Free Product		Notable Odor or Visible Soil Contamination	
				Yes	No	Yes	No	Yes	No
1	6000	8' x 16'	gasoline		X		X		X
2	6000	8' x 16'	gasoline		X		X		X
3	4000	64" x 24'	diesel		X		X		X
4	1000	48" x10'-8"	gasoline		X		X		X
5	1000	48" x10'-8"	gasoline		X		X		X
6	2000	64" x 12'	gasoline		X		X		X

VI. Additional Information Required:

See reverse side of pink copy (owner's copy) for additional information required by N.C. - DEM in the written report and sketch.

NOTE: The site assessment portion of the tank closure must be conducted under the supervision of a Professional Engineer or Licensed Geologist. After Jan.1, 1994, all closure site assessment reports must be signed and sealed by a P.E. or L.G.

VII. Check List (Check the activities completed)

PERMANENT CLOSURE (For Removing or Abandoning-in-place)

- [x] Contact local fire marshal.
- [x] Notify DEM Regional Office before abandonment.
- [x] Drain & flush piping into tank.
- [x] Remove all product and residuals from tank.
- [x] Excavate down to tank.
- [x] Clean and inspect tank.
- [x] Remove drop tube, fill pipe, gauge pipe, vapor recovery tank connections, submersible pumps and other tank fixtures.
- [x] Cap or plug all lines except the vent and fill lines.
- [x] Purge tank of all product & flammable vapors.
- [x] Cut one or more large holes in the tanks.
- [x] Backfill the area.

Date Tank(s) Permanently closed: 8/31/98
Date of Change-in-Service: _____

ABANDONMENT IN PLACE

- [ ] Fill tank until material overflows tank opening.
- [ ] Plug or cap all openings.
- [ ] Disconnect and cap or remove vent line.
- [ ] Solid inert material used - specify: _____

REMOVAL

- [x] Create vent hole.
- [x] Label tank.
- [x] Dispose of tank in approved manner.

Final tank destination: Nationwide Tank Service Charlotte, NC

VIII. Certification (Read and Sign)

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this and all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete.

Print name and official title of owner or owner's authorized representative	Signature	Date Signed
Michael R. Royster V-P	Michael R. Royster	10/27/98

* 5 days prior to closing. By Fri. or call Beth

GW/UST-3 Notice of Intent: UST Permanent Closure or Change-In-Service

FOR TANKS IN NC

Return Completed Form To:
The appropriate DEM Regional Office according to the county of the facility's location. [SEE REVERSE SIDE OF OWNER'S COPY (PINK) FOR REGIONAL OFFICE ADDRESS].

State Use Only N.C. DEPT. OF ENVIRONMENT, HEALTH, & NATURAL RESOURCES
I. D. Number
Date Received SEP 15 1995

INSTRUCTIONS
Complete and return five (5) working days prior to closure or change-in-service.

DIVISION OF ENVIRONMENTAL ... MOORESVILLE REGIONAL OFFICE

I. OWNERSHIP OF TANK(S)

Tank Owner Name: Norman's House Demolishing Co.
(Corporation, Individual, Public Agency, or Other Entity)
Street Address: [illegible] Aster Dr.
County: Mecklenburg
City: Charlotte State: NC Zip Code: 28227
Tele. No. (Area Code): 704 545-1060

II. LOCATION OF TANK(S)

Facility Name or Company: Norman's House Demolishing Co.
Facility ID # (if available):
Street Address or State Road: Hwy 150 West
County: Iredell City: Mooresville Zip Code: 28115
Tele. No. (Area Code):

III. CONTACT PERSON

Name: Dale Norman Job Title: President Telephone Number: (704) 545-1060 work 803 328-1888

IV. TANK REMOVAL, CLOSURE IN PLACE, CHANGE-IN-SERVICE

1. Contact Local Fire Marshall.
2. Plan the entire closure event.
3. Conduct Site Soil Assessments.
4. If Removing Tanks or Closing in Place refer to API Publications 2015 "Cleaning Petroleum Storage Tanks" & 1604 "Removal & Disposal of Used Underground Petroleum Storage Tanks".
5. Provide a sketch locating piping, tanks and soil sampling locations.
6. Fill out form GW/UST-2 "Site Investigation Report for Permanent Closure" and return within 30 days following the site investigation.
7. The **site assessment** portion of the tank closure must be conducted under the supervision of a Professional Engineer or Licensed Geologist. After January 1, 1994, **all closure site assessment reports must be signed and sealed by a P.E. or L.G.**
8. Keep closure records for 3 years.

V. WORK TO BE PERFORMED BY:

(Contractor) Name: Petroleum Equipment Co.
Address: 3810 Statesville Ave State: N.C. Zip Code: 28206
Contact: Randy Davis Phone: 335-8801
Primary Consultant: Jimmy Kelly Phone: 335-8801

VI. TANK(S) SCHEDULED FOR CLOSURE OR CHANGE-IN-SERVICE

TANK ID#	TANK CAPACITY	LAST CONTENTS	PROPOSED ACTIVITY: CLOSURE – Removal	CLOSURE – Abandonment In Place	CHANGE-IN-SERVICE – New Contents Stored
1	Unknown	Gas	X		
2	"	Gas	X		
3	"	Gas	X		
4	"	Diesel	X		
5	"	Gas	X		
6	"	Gas	X		

VII. OWNER OR OWNER'S AUTHORIZED REPRESENTATIVE

Print name and official title: JACK DALE NORMAN JR. PRESIDENT
*Scheduled Removal Date: OCT 15TH
Signature: Jack Dale Norman Jr
Date Submitted: 9-14-95

*If scheduled work date changes, notify your appropriate DEM Regional Office 48 hours prior to originally scheduled date.

GW/UST-3 (Rev. 05/94) White Copy - Regional Office Yellow Copy - Central Office Pink Copy - Owner

NORTH CAROLINA DEPARTMENT OF
ENVIRONMENT AND NATURAL RESOURCES
MOORESVILLE REGIONAL OFFICE

NCDENR

JAMES B. HUNT JR.
GOVERNOR

WAYNE MCDEVITT
SECRETARY

DIVISION OF WASTE MANAGEMENT
November 16, 1998

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Norman's House Demolishing, Inc.
3726 Aster Drive
Charlotte, North Carolina 28227
Attention: Jack Norman

RE: Notice of No Further Action
15A NCAC 2L .0115(h)
RISK-BASED ASSESSMENT
AND CORRECTIVE ACTION
FOR PETROLEUM
UNDERGROUND STORAGE
TANKS

Norman's House Demolishing,
Inc.
800 River Road, Mooresville
Iredell County, NC
UST Incident #pending 19218
Risk: Low

Dear Mr. Norman:

On November 6, 1998, the Division of Waste Management (DWM) of the Mooresville Regional Office received a Closure Report for the above-referenced site. A review of the report shows that soil contamination does not exceed the residential or soil-to-groundwater maximum soil contaminant concentrations established in 15A NCAC 2L .0115(m), whichever are lower. Based on information provided to date, the DWM classifies the risk posed by the discharge or release as low risk and determines that no further action is required for this incident. This determination shall apply unless the DWM later determines that the discharge or release poses an unacceptable risk or a potentially unacceptable risk to human health or the environment.

Pursuant to 15A NCAC 2L .0115(e), you have a continuing obligation to notify the DWM of any changes that you know of or should know of, that might affect

919 NORTH MAIN STREET, MOORESVILLE, NORTH CAROLINA 28115
PHONE 704-663-1699 FAX 704-663-6040

the level of risk assigned to the discharge or release.

Should you have any questions, please contact Dan Graham at (704)663-1699, ext. 268.

Sincerely,

Dan Graham

Dan Graham
Hydrogeological Technician II

cc: Faye Sweat-UST Section

Z 560 750 476

US Postal Service
Receipt for Certified Mail
No Insurance Coverage Provided.
Do not use for International Mail *(See reverse)*

Sent to Normans House Demolishing Inc	
Street & Number 3726 Aster Drive	
Post Office, State, & ZIP Code Charlotte, NC 28227	
Postage Attn: Jack Norman	$
Certified Fee	
Special Delivery Fee	
Restricted Delivery Fee	
Return Receipt Showing to Whom & Date Delivered	
Return Receipt Showing to Whom, Date, & Addressee's Address	
TOTAL Postage & Fees	$
Postmark or Date	

PS Form 3800, April 1995

Mailed on 9/8/98 REVISED From 9-14-95

GW/UST-3 **Notice of Intent to Conduct Closure or Change-In-Service**

FOR TANKS IN **NC**

Return Completed Form To: The appropriate DWQ Regional Office according to the county of the facility's location. [SEE REVERSE SIDE OF OWNER'S COPY FOR REGIONAL OFFICE ADDRESS].

State Use Only
I. D. Number
Date Received

Complete and return at least five (5) working days prior to closure or change-in-service if a Professional Engineer (P.E.) or a Licensed Geologist (L.G.) provides supervision for closure or change-in-service site assessment activities and signs and seals all closure reports. Otherwise, thirty (30) days notice is required.

I. OWNERSHIP OF TANK(S)

Tank Owner Name: NORMANS HOUSE DEMOLISHING CO.
(Corporation, Individual, Public Agency, or Other Entity)
Street Address: 3726 Aster Dr
County: MECKLENBURG
City: CHARLOTTE State: NC Zip Code: 28227
Tele. No. (Area Code): 704-545-1060

II. LOCATION OF TANK(S)

Facility Name or Company: NORMAN'S HOUSE DEM. CO
Facility ID # (if available): 0-034993
Street Address or State Road: 800 RIVER ROAD Hwy 150
County: IREDELL City: MOORESVILLE Zip Code: 28115
Tele. No. (Area Code):

Name: DALE NORMAN Job Title: PRESIDENT Telephone Number: WORK 704-329-0200 (704) 545-1062

IV. TANK REMOVAL OR IN-PLACE CLOSURE / CHANGE-IN-SERVICE

1. Contact Local Fire Marshall.
2. Plan the entire closure event.
3. Conduct Site Soil Assessments.
4. If Removing Tanks or Closing in Place refer to API Publications 2015 "Cleaning Petroleum Storage Tanks" & 1604 "Removal & Disposal of Used Underground Petroleum Storage Tanks".
5. Provide a sketch showing piping, tanks and soil sampling locations.
6. Submit a closure report in the format of GW/UST-12 and include the form GW/UST-2 within 60 days following the site investigation.
7. If a release from the tank(s) has occurred, the site assessment portion of the report closure must be conducted under the supervision of a P.E. or L.G., with all closure site assessment reports bearing signature and seal of the P.E. or L.G. If a release has not occurred, the supervision, signature, or seal of a P.E. or L.G. is not required.
8. Keep closure records for 3 years.

V. WORK TO BE PERFORMED BY:

(Contractor) Name: Royster Oil Co. INC.
Address: 720 S. LAFAYETTE St City: S. SHELBY NC Zip Code: 28150
Contact: MIKE ROYSTER Phone: 704-487-6344
Primary Consultant: " Phone: "

VI. TANK(S) SCHEDULED FOR CLOSURE OR CHANGE-IN-SERVICE

TANK ID#	TANK CAPACITY	LAST CONTENTS	PROPOSED ACTIVITY: CLOSURE – Removal	CLOSURE – Abandonment In Place	CHANGE-IN-SERVICE – New Contents Stored
1	2000	GAS	✓		
2	1000	GAS	✓		
3	1000	GAS	✓		
4	4000	DIESEL	✓		
5	8000	GAS			
6	8000	GAS			

VII. OWNER OR OWNER'S AUTHORIZED REPRESENTATIVE

Print name and official title: JACK DALE NORMAN JR. PRESIDENT
*Scheduled Removal Date: 9-1-98
Signature: Jack Dale Norman Jr. Date Submitted: 8-19-98

*If scheduled work date changes, notify your appropriate DWQ Regional Office 48 hours prior to originally scheduled date.

GW/UST-3 (Rev. 10/96) White Copy - Regional Office Yellow Copy - Central Office Pink Copy - Owner

POLLUTION INCIDENT/U.S.T. LEAK REPORTING FORM

Department of Environment, Health, Natural Resources
Division of Environmental Management
GROUNDWATER SECTION
ATTN: FAYE SWEAT

Confirm. GW Contamination (Y/N) _____
Major Soil Contamination (Y/N) _____
Minor Soil Contaminatin (Y/N) X

Incident # _____

Date Incident Occurred or Leak Detected 10/12/96

INCIDENT DESCRIPTION

Incident Location/Name: NORMAN'S HOUSE DEMOLISHING, INC.
Address: 800 RIVER Rd
City/Town: MOORESVILLE | County: IREDELL | Region: MRO
Briefly Describe Incident:
DURING TANK CLOSURE, PETROLEUM CONTAMINATED SOIL WAS DOCUMENTED
SITE CLOSED

POTENTIAL SOURCE OWNER-OPERATOR

Potential Source Owner-Operator: JACK NORMAN | Telephone: 704-545-1060
Company: NORMAN'S HOUSE DEM., INC | Street Address: 3726 ASTER DR
City: CHARLOTTE | County: MECKLENBURG | State: NC | Zip Code: 28227

OWNERSHIP
0. N/A 1. Municipal 2. Military 3. Unknown (4.Private) 5.Federal 6. County 7. State

OPERATION TYPE
0. N/A 1. Public Service 2. Agricultrural 3. Residential 4. Educational/Relig. 5. Industrial (6. Commercial) 7. Mining

POLLUTANTS INVOLVED

MATERIALS INVOLVED	AMOUNT LOST	AMOUNT RECOVERED
GAS, DIESEL	UNK	—

SOURCE OF POLLUTION

PRIMARY SOURCE OF POLLUTION (Select one)
1. Intentional dump
2. Pit, pond, lagoon
3. Leak-underground
4. Spray irrigation
5. Land application
6. Animal feedlot
7. Source unknown
8. Septic tank
9. Sewer line
10. Stockpile
11. Landfill
12. Spill-surface
13. Well
14. Above-ground Storage Tank
15. Nonpoint source

PRIMARY POLLUTANT TYPE (Select one)
1. Pesticide/herbicide
2. Radioactive waste
3. Gasoline/diesel
4. Heating oil
5. Other petroleum prod.
6. Sewage/septage
7. Fertilizers
8. Sludge
9. Solid waste leachate
10. Metals
11. Other inorganics
12. Other organics

LOCATION
1. Facility
2. Railroad
3. Waterway
4. Pipeline
5. Dumpsite
6. Highway
7. Residence
8. Other

SETTING
1. Residential
2. Industrial
3. Urban
4. Rural

Site Priority Ranking: L

D.E.M. Regional Contact: DAN GRAHAM | Signature: Dan Graham | Date: 11/16/98

GW-61 Revised 2/95

IMPACT ON DRINKING WATER SUPPLIES

WELLS AFFECTED 1. YES 2. NO

NUMBER OF WELLS AFFECTED _____

Well(s) Contaminated: (Users Name)

1.

2.

3.

4.

5.

Circle Appropriate Responses

Lab Samples Taken By: 1. DEM 2. DHS 3. Responsible Party 4. Other 5. None

Samples Taken Include: 1. Groundwater 2. Soil

LOCATION OF INCIDENT

7 1/2 Min. Quad Name

Lat. : Deg : Min : Sec :

5 Min. Quad Number

Long. : Deg : Min : Sec :

Draw Sketch of Area or Attach Additional Maps

unable to get above info from closure report.

APPENDIX B
PHOTOGRAPH LOG

PHOTO 1:

View of parking lot, facing southwest. Overhead power running along River Highway. Broken concrete where former dispenser islands were.

Photo taken 9/21/18.

PHOTO 2:

View of parking lot in front of the abandoned building, facing east.

Photo taken 9/21/18.

PHOTO 3:

View of the corner of the abandoned building and the dense vegetation of the northeast quadrant of the investigation area, facing northeast.

Photo taken 9/21/18

APPENDIX C
BORING LOGS

wood.

SOIL BORING FIELD WORKSHEET

BORING #	**B-1**	BORING DEPTH (ft)	**10**	NUMBER OF PAGES	**1**
PROJECT #	**188322307**			PROJECT NAME	**NCDOT Mooresville-Parcel 126**
DATE DRILLED	**11/13/2018**			WEATHER CONDITIONS	**Cloudy, 47˚F**
DRILLING SUB-CONTRACTOR	**IET**			DRILL RIG	**AMS PowerProbe**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
2	0.7	Red Silty Clay	Sample taken at 0-2'
4	0.6		
6	0.8		
8	1.1	Red Orange Silty Clay	Sample taken at 6-8'
10	0.8		
		*Boring terminated at 10'	

Log Completed By: **DRH**

Page: **1**

SOIL BORING FIELD WORKSHEET

BORING #	**B-2**	BORING DEPTH (ft)	**10**	NUMBER OF PAGES	**1**
PROJECT #	**188322307**			PROJECT NAME	**NCDOT Mooresville-Parcel 126**
DATE DRILLED	**11/13/2018**			WEATHER CONDITIONS	**Cloudy, 47˚F**
DRILLING SUB-CONTRACTOR	**IET**			DRILL RIG	**AMS PowerProbe**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
2	0.0	Red Silty Clay	
4	0.5		Sample taken at 2-4'
6	0.6		
8	0.9	Red Orange Silty Clay	
10	1.0		Sample taken at 8-10'
		*Boring terminated at 10'	

Log Completed By: **DRH**

Page: **1**

wood.

SOIL BORING FIELD WORKSHEET

BORING #	**B-3**	BORING DEPTH (ft)	**10**	NUMBER OF PAGES	**1**
PROJECT #	**188322307**			PROJECT NAME	**NCDOT Mooresville-Parcel 126**
DATE DRILLED	**11/13/2018**			WEATHER CONDITIONS	**Cloudy, 47˚F**
DRILLING SUB-CONTRACTOR	**IET**			DRILL RIG	**AMS PowerProbe**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
2	0.7	Red Silty Clay	
4	0.9		Sample taken at 2-4'
6	1.2		
8	1.3	Red Orange Silty Clay	
10	1.4		Sample taken at 8-10'
		*Boring terminated at 10'	

Log Completed By: **DRH**

Page: **1**

SOIL BORING FIELD WORKSHEET

BORING #	**B-4**	BORING DEPTH (ft)	**10**	NUMBER OF PAGES	**1**
PROJECT #	**188322307**			PROJECT NAME	**NCDOT Mooresville-Parcel 126**
DATE DRILLED	**11/13/2018**			WEATHER CONDITIONS	**Cloudy, 47˚F**
DRILLING SUB-CONTRACTOR	**IET**			DRILL RIG	**AMS PowerProbe**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
2	0.6	Red Silty CLAY	
4	0.8		Sample taken at 2-4'
6	1.1		
8	1.5		
10	1.8		Sample taken at 8-10'
		*Boring terminated at 10'	

Log Completed By: **DRH**

Page: **1**

SOIL BORING FIELD WORKSHEET

BORING #	**B-5**	BORING DEPTH (ft)	**10**	NUMBER OF PAGES	**1**
PROJECT #	**188322307**			PROJECT NAME	**NCDOT Mooresville-Parcel 126**
DATE DRILLED	**11/13/2018**			WEATHER CONDITIONS	**Cloudy, 47˚F**
DRILLING SUB-CONTRACTOR	**IET**			DRILL RIG	**AMS PowerProbe**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
2	0.4	Red Silty CLAY	
4	0.7		Sample taken at 2-4'
6	0.5		
8	0.8		
10	0.8		Sample taken at 8-10'
		*Boring terminated at 10'	

Log Completed By: **DRH**

SOIL BORING FIELD WORKSHEET

BORING #	**B-6**	BORING DEPTH (ft)	**10**	NUMBER OF PAGES	**1**
PROJECT #	**188322307**			PROJECT NAME	**NCDOT Mooresville-Parcel 126**
DATE DRILLED	**11/13/2018**			WEATHER CONDITIONS	**Cloudy, 47˚F**
DRILLING SUB-CONTRACTOR	**IET**			DRILL RIG	**AMS PowerProbe**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
2	0.4	Red Silty CLAY	
4	0.5		Sample taken at 2-4'
6	0.0		
8	0.3		
10	0.0		
		*Boring terminated at 10'	

Log Completed By: **DRH**

Page: **1**

SOIL BORING FIELD WORKSHEET

BORING #	**B-7**	BORING DEPTH (ft)	**10**	NUMBER OF PAGES	**1**
PROJECT #	**188322307**			PROJECT NAME	**NCDOT Mooresville-Parcel 126**
DATE DRILLED	**11/13/2018**			WEATHER CONDITIONS	**Cloudy, 47˚F**
DRILLING SUB-CONTRACTOR	**IET**			DRILL RIG	**AMS PowerProbe**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
2	0.3	Red Silty CLAY	Sample taken at 0-2'
4	0.1		
6	0.2		
8	0.4	Tan Orange Sandy SILT	
10	0.4		
		*Boring terminated at 10'	

Log Completed By: **DRH**

Page: **1**

SOIL BORING FIELD WORKSHEET

BORING #	**B-8**	BORING DEPTH (ft)	**10**	NUMBER OF PAGES	**1**
PROJECT #	**188322307**			PROJECT NAME	**NCDOT Mooresville-Parcel 126**
DATE DRILLED	**11/13/2018**			WEATHER CONDITIONS	**Cloudy, 47˚F**
DRILLING SUB-CONTRACTOR	**IET**			DRILL RIG	**AMS PowerProbe**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
2	0.1	Red Silty CLAY	Sample taken at 0-2'
4	0.0		
6	0.1		
8	0.3	Tan Orange Sandy SILT	
10	0.0		
		*Boring terminated at 10'	

Log Completed By: **DRH**

SOIL BORING FIELD WORKSHEET

BORING #	**B-9**	BORING DEPTH (ft)	**10**	NUMBER OF PAGES	**1**
PROJECT #	**188322307**			PROJECT NAME	**NCDOT Mooresville-Parcel 126**
DATE DRILLED	**11/13/2018**			WEATHER CONDITIONS	**Cloudy, 47˚F**
DRILLING SUB-CONTRACTOR	**IET**			DRILL RIG	**AMS PowerProbe**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
2	0.0	Red Silty CLAY	
4	0.0		Sample taken at 2-4'
6	0.0		
8	0.0	Tan Orange Sandy SILT	
10	0.0		
		*Boring terminated at 10'	

Log Completed By: **DRH**

Page: **1**

wood.

SOIL BORING FIELD WORKSHEET

BORING #	**B-10**	BORING DEPTH (ft)	**10**	NUMBER OF PAGES	**1**
PROJECT #	**188322307**			PROJECT NAME	**NCDOT Mooresville-Parcel 126**
DATE DRILLED	**11/13/2018**			WEATHER CONDITIONS	**Cloudy, 47˚F**
DRILLING SUB-CONTRACTOR	**IET**			DRILL RIG	**AMS PowerProbe**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
2	0.0	Red Silty CLAY	
4	0.0		Sample taken at 2-4'
6	0.0		
8	0.0	Tan Orange Sandy SILT	
10	0.0		
		*Boring terminated at 10'	

Log Completed By: **DRH**

SOIL BORING FIELD WORKSHEET

BORING #	**B-11**	BORING DEPTH (ft)	**9**	NUMBER OF PAGES	**1**
PROJECT #	**188322307**			PROJECT NAME	**NCDOT Mooresville-Parcel 126**
DATE DRILLED	**11/13/2018**			WEATHER CONDITIONS	**Cloudy, 47˚F**
DRILLING SUB-CONTRACTOR	**IET**			DRILL RIG	**AMS PowerProbe**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
2	0.0	Red Silty CLAY	
4	0.0		Sample taken at 2-4'
6	0.0		
8	0.0		
10	0.0	*Boring terminated at 9'	
		Hand Auger 0-4', Geoprobe 4-9'	

Log Completed By: **DRH**

SOIL BORING FIELD WORKSHEET

BORING #	**B-12**	BORING DEPTH (ft)	**10**	NUMBER OF PAGES	**1**
PROJECT #	**188322307**			PROJECT NAME	**NCDOT Mooresville-Parcel 126**
DATE DRILLED	**11/14/2018**			WEATHER CONDITIONS	**Cloudy, 47°F**
DRILLING SUB-CONTRACTOR	**IET**			DRILL RIG	**AMS PowerProbe**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
2	0.0	Red Silty CLAY	
4	0.0		Sample at 2-4'
6	0.0		
8	0.0		
10	0.0		
		*Boring terminated at 10'	

Log Completed By: **DRH**

Page: **1**

wood.

SOIL BORING FIELD WORKSHEET

BORING #	**B-13**	BORING DEPTH (ft)	**5**	NUMBER OF PAGES	**1**
PROJECT #	**188322307**			PROJECT NAME	**NCDOT Mooresville-Parcel 126**
DATE DRILLED	**11/14/2018**			WEATHER CONDITIONS	**Cloudy, 47°F**
DRILLING SUB-CONTRACTOR	**IET**			DRILL RIG	**Hand Auger**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
2	1.1	Red Sandy CLAY	
4	0.5		Sample taken at 2-4'
6	0.3	*Boring terminated at 5'	

Log Completed By: **DRH**

Page: **1**

SOIL BORING FIELD WORKSHEET

BORING #	**B-14**	BORING DEPTH (ft)	**5**	NUMBER OF PAGES	**1**
PROJECT #	**188322307**			PROJECT NAME	**NCDOT Mooresville-Parcel 126**
DATE DRILLED	**11/14/2018**			WEATHER CONDITIONS	**Cloudy, 47°F**
DRILLING SUB-CONTRACTOR	**IET**			DRILL RIG	**Hand Auger**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
2	6.5	Red Sandy CLAY	Sample taken at 0-2'
4	2.3		
6	0.7	*Boring terminated at 5'	

Log Completed By: **DRH**

Page: **1**

SOIL BORING FIELD WORKSHEET

BORING #	**B-15**	BORING DEPTH (ft)	**5**	NUMBER OF PAGES	**1**
PROJECT #	**188322307**			PROJECT NAME	**NCDOT Mooresville-Parcel 126**
DATE DRILLED	**11/14/2018**			WEATHER CONDITIONS	**Cloudy, 47°F**
DRILLING SUB-CONTRACTOR	**IET**			DRILL RIG	**Hand Auger**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
2	5.2	Red Sandy SILT w/Clay	Sample taken at 0-2'
4	0.6		
6	0.5	*Boring terminated at 5'	

Log Completed By: **DRH**

Page: **1**

SOIL BORING FIELD WORKSHEET

BORING #	**B-16**	BORING DEPTH (ft)	**5**	NUMBER OF PAGES	**1**
PROJECT #	**188322307**			PROJECT NAME	**NCDOT Mooresville-Parcel 126**
DATE DRILLED	**11/14/2018**			WEATHER CONDITIONS	**Cloudy, 47°F**
DRILLING SUB-CONTRACTOR	**IET**			DRILL RIG	**Hand Auger**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
2	2.1	Red Sandy SILT w/Clay	Sample taken at 0-2'
4	0.5		
6	0.8	*Boring terminated at 5'	

Log Completed By: **DRH**

Page: **1**

SOIL BORING FIELD WORKSHEET

BORING #	**B-17**	BORING DEPTH (ft)	**10**	NUMBER OF PAGES	**1**
PROJECT #	**188322307**			PROJECT NAME	**NCDOT Mooresville-Parcel 126**
DATE DRILLED	**11/14/2018**			WEATHER CONDITIONS	**Cloudy, 47°F**
DRILLING SUB-CONTRACTOR	**IET**			DRILL RIG	**AMS PowerProbe**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
2	0.0	Red Silty CLAY	Sample taken at 0-2'
4	0.0		
6	0.0		
8	0.0	Red Orange Silty CLAY	
10	0.0		
		*Boring terminated at 10'	

Log Completed By: **DRH**

Page: **1**

SOIL BORING FIELD WORKSHEET

BORING #	**B-18**	BORING DEPTH (ft)	**5**	NUMBER OF PAGES	**1**
PROJECT #	**188322307**			PROJECT NAME	**NCDOT Mooresville-Parcel 126**
DATE DRILLED	**11/14/2018**			WEATHER CONDITIONS	**Cloudy, 47°F**
DRILLING SUB-CONTRACTOR	**IET**			DRILL RIG	**Hand Auger**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
2	0.0	Brown Silty Clay	
4	0.0		Sample taken at 2-4'
6	0.0	*Boring terminated at 5'	

Log Completed By: **DRH**

Page: **1**

SOIL BORING FIELD WORKSHEET

BORING #	**B-19**	BORING DEPTH (ft)	**5**	NUMBER OF PAGES	**1**
PROJECT #	**188322307**			PROJECT NAME	**NCDOT Mooresville-Parcel 126**
DATE DRILLED	**11/14/2018**			WEATHER CONDITIONS	**Cloudy, 47°F**
DRILLING SUB-CONTRACTOR	**IET**			DRILL RIG	**Hand Auger**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
2	0.1	Brown Silty Clay	Sample taken at 0-2'
4	0.0		
6	0.0	*Boring terminated at 5'	

Log Completed By: **DRH**

Page: **1**

SOIL BORING FIELD WORKSHEET

BORING #	**B-20**	BORING DEPTH (ft)	**5**	NUMBER OF PAGES	**1**
PROJECT #	**188322307**			PROJECT NAME	**NCDOT Mooresville-Parcel 126**
DATE DRILLED	**11/14/2018**			WEATHER CONDITIONS	**Cloudy, 47°F**
DRILLING SUB-CONTRACTOR	**IET**			DRILL RIG	**Hand Auger**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
2	0.7	Brown Silty Clay	
4	5.8		Sample taken at 2-4'
6	1.1	*Boring terminated at 5'	

Log Completed By: **DRH**

Page: **1**

SOIL BORING FIELD WORKSHEET

BORING #	**B-21**	BORING DEPTH (ft)	**5**	NUMBER OF PAGES	**1**
PROJECT #	**188322307**			PROJECT NAME	**NCDOT Mooresville-Parcel 126**
DATE DRILLED	**11/14/2018**			WEATHER CONDITIONS	**Cloudy, 47°F**
DRILLING SUB-CONTRACTOR	**IET**			DRILL RIG	**Hand Auger**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
2	0.0	Brown Silty Clay	
4	0.0		Sample taken at 2-4'
6	0.0	*Boring terminated at 5'	

Log Completed By: **DRH**

Page: **1**

SOIL BORING FIELD WORKSHEET

BORING #	**B-22**	BORING DEPTH (ft)	**5**	NUMBER OF PAGES	**1**
PROJECT #	**188322307**			PROJECT NAME	**NCDOT Mooresville-Parcel 126**
DATE DRILLED	**11/14/2018**			WEATHER CONDITIONS	**Cloudy, 47°F**
DRILLING SUB-CONTRACTOR	**IET**			DRILL RIG	**Hand Auger**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
2	0.0	Brown Silty Clay	
4	0.0		Sample taken at 2-4'
6	0.0	*Boring terminated at 5'	

Log Completed By: **DRH**

Page: **1**

APPENDIX D
GEOPHYSICAL REPORT

GEL Solutions

55 Shiloh Road, Suite 6
Asheville, NC 28803
P 828.782.3523

www.gel-solutions.com

November 2, 2018

Mr. John Maas, PG
Wood, PLC
2801 Yorkmont Road, Suite 100
Charlotte, NC 28208

Re: Report for Geophysical Survey to Identify Underground Storage Tanks
And Underground Utilities
Parcel #126
800 NC 150 (River Highway)
Mooresville, North Carolina 28117

Dear Mr. Maas,

GEL Solutions appreciates the opportunity to provide Wood with this report of our geophysical investigation for the referenced project. This investigation was designed to determine the potential presence of underground storage tanks (USTs) at the site and underground utilities that would obstruct drilling activities at the site. The geophysical field investigation was successfully performed on October 15, 2018 through October 25, 2018.

1.0 Summary of Results

Two subsurface anomalies were identified in the geophysical data. Figure 1 depicts the approximate location and size of the anomalies as well as the known metallic surface objects present at the time of the investigation. The anomalies were both denoted as "No Confidence" with respect to the UST level of confidence rating. Any anomalies not denoted with the UST level of confidence rating in post processed data (Figure 1) are consistent with known metallic surface objects, utilities, and/or cultural interference. A significant portion of Parcel #126 could not be investigated with geophysical methods due to vegetation. Although geophysical methods provide a high level of assurance for the location of subsurface objects, the possibility exists that not all features can or will be identified. Therefore, due caution should be used when performing any subsurface excavation, and GEL Solutions, LLC will not be liable for any damages that may occur. Descriptions of the technologies employed during this geophysical investigation are provided below.

2.0 Overview of Geophysical Investigation

The geophysical evaluation included the deployment of radio-frequency electromagnetic (EM), ground penetrating radar (GPR) and time-domain electromagnetic (TDEM) technologies to the site. These technologies were used in concert with one another in order to identify the presence of potential underground utilities and USTs at the site. A brief description of each technology is presented in the following paragraphs.

Radio-Frequency Electromagnetic

Radio-Frequency Electromagnetic (EM) utility locating equipment consists of a transmitter and a dual-function receiver. The receiver can be operated in a "passive" mode or in an "active" mode. The two modes of operation provide various levels of detection capabilities depending on the specific target or application.

The EM system is operated in the "active" mode by either inducting or conducting a signal into the underground utility to be traced. A transmitter is placed over and in line with a suspected buried utility. The transmitter induces a signal, which propagates along the buried utility. As the receiver is moved back and forth across the suspected path of the utility, the trace signal induces a signal into the receiver's coil sensor. A visual and audio response indicates when the receiver is directly over the buried utility.

Another means of detecting in the "active" mode utilizes a method to "conduct" a signal within the buried utility. To accomplish this, a cable from the transmitter is clamped onto an exposed section of the buried utility and a signal propagates along the buried line. This technique minimizes any interference caused by parasitic emissions from adjacent cables in congested areas. When the system is utilized in the "passive" mode, the receiver is responding to a 60 Hertz cycle current energized by underground utilities.

Interference can and may occur when buried utilities intersect or are adjacent to each other. This effect referred to as "bleed-off" may provide a false response to the identification of the tracked utility. "Bleed-off" is caused by utilities that may be energized in the "active" or "passive" mode.

Ground Penetrating Radar Methodology

A RAMAC digital radar control system configured with a 450-Megahertz (MHz) antenna array was used in this investigation. GPR is an electromagnetic geophysical method that detects interfaces between subsurface materials with differing dielectric constants. The GPR system consists of an antenna which houses the transmitter and receiver, a digital control unit which both generates and digitally records the GPR data, and a color video monitor to view data as it is collected in the field.

The transmitter radiates repetitive short-duration electromagnetic waves (at radar frequencies) into the earth from an antenna moving across the ground surface. These radar waves are reflected back to the receiver from the interface of materials with different dielectric constants. The intensity of the reflected signal is a function of the contrast in the dielectric constant between the materials, the conductivity of the material through which the wave is traveling, and the frequency of the signal.

Subsurface features that commonly cause such reflections are: 1) natural geologic conditions, such as changes in sediment composition, bedding, and cementation horizons and voids; or 2) unnatural changes to the subsurface such as disturbed soils, soil backfill, buried debris, tanks, pipelines, and utilities. The digital control unit processes the signal from the receiver and produces a continuous cross-section of the subsurface interface reflection events.

GPR data profiles were collected along transects covering the entire rights of ways. Depth of investigation of the GPR signal is highly site-specific and is limited by signal attenuation (absorption) in the subsurface materials. Signal attenuation is dependent upon the electrical conductivity of the subsurface materials. Signal attenuation is greatest in materials with relatively high electrical conductivities such as clays, brackish groundwater, or groundwater with a high dissolved solid content from natural or manmade sources. Signal attenuation is lowest in relatively low conductivity materials such as dry sand or rock. Depth of investigation is also dependent on the antenna's transmitting frequency. Depth of investigation generally increases as transmitting frequency decreases; however, the ability to resolve smaller subsurface features is diminished as frequency is decreased. The average depth of penetration at this site was approximately 2-5 feet below the surface.

The GPR antenna used at this site is internally shielded from aboveground interference sources. Accordingly, the GPR response is not affected by overhead power lines, metallic buildings, or nearby objects.

Time Domain Electromagnetic Methodology

TDEM methods measure the electrical conductivity of subsurface materials. The conductivity is determined by inducing (from a transmitter) a time or frequency-varying magnetic field and measuring (with a receiver) the amplitude and phase shift of an induced secondary magnetic field. The secondary magnetic field is created by subsurface conductive materials behaving as an inductor as the primary magnetic field is passed through them.

The Geonics EM-61 system used in this investigation operates within these principles. However, the EM-61 TDEM system can discriminate between moderately conductive earth materials and very conductive metallic targets. The EM-61 consists of a portable coincident loop time domain transmitter and receiver with a 1.0-meter by 0.5-meter coil system. The EM-61 generates 150 pulses per second and measures the response from the ground after transmission or between pulses. The secondary EM responses from metallic targets are of longer duration than those created by conductive earth materials. By recording the later time EM arrivals, only the response from metallic targets is measured, rather than the field generated by the earth material.

3.0 Field Procedures and Results

The geophysical field investigation was successfully performed on October 15 through October 25, 2018 at the 11 DOT parcels located in the immediate vicinity of Highway 150 in Mooresville, NC. Interpretation of the GPR data was conducted in the field and any potential anomalies were marked in the field. GPR data processing typically included band pass filtering, background removal, horizontal smoothing, and gain adjustments. TDEM was also used to scan the project site. Any electromagnetic anomalies detected during field activities that were indicative of buried metallic objects were also marked in the field.

Two subsurface geophysical anomalies were detected during the investigation of Parcel #126 as depicted in Figure 1. Both anomalies were indicative of "No Confidence" with respect to the UST level of confidence rating system based on TDEM and GPR investigation. Figure 1 depicts the approximate location and size of the anomalies as well as the known metallic surface objects present at the time of the investigation. Known metallic surface objects in Figure 1 are noted with a brief identifiable description. A significant portion of Parcel #126 could not be investigated with geophysical methods due to vegetation.

The UST level of confidence rating system was developed by NCDOT in May 2009 ("Known UST," "Probable UST," "Possible UST," or "No Confidence") and was used in the interpretation and presentation of this report.

Additional TDEM responses were present in the data but correlated to surface metallic debris and/or above ground metal structures and are not considered to be representative of "Potential USTs."

The locations of underground utilities were designated using EM and GPR equipment, and their locations were marked with paint on the land surface, and additionally shown in Figure 1. Positioning data was obtained using a Trimble R10 GPS antenna.

4.0 Closing

GEL Solutions appreciates the opportunity to assist Wood with this project. If you have any questions or need further information regarding the project, please do not hesitate to call me at (828) 782-3523.

Yours very truly,

William R. Adgate
Senior Project Manager

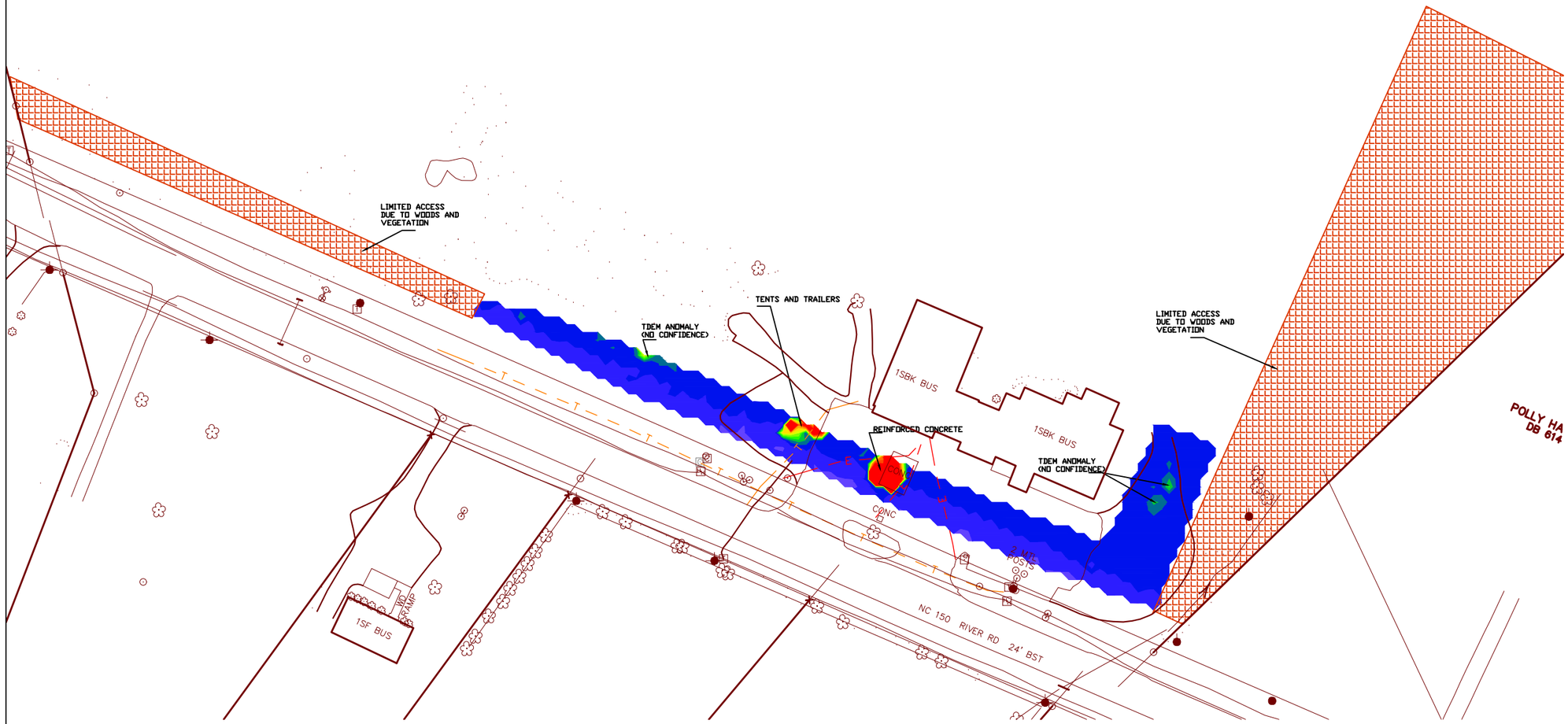
Enclosures
fc: 126.AMEC01118.Report.pdf

Site Photos

Photo 1: Middle of parcel looking west showing obstructions, surface metal, and vegetation on west side of site

Photo 2: Middle of parcel looking east

Photo 3: East side of parcel looking north showing limited access due to vegetation



LEGEND

- UK — APPROXIMATE LOCATION OF SUSPECTED UNDERGROUND UNKNOWN UTILITY LINE
- W — APPROXIMATE LOCATION OF SUSPECTED UNDERGROUND WATER LINE
- E — APPROXIMATE LOCATION OF SUSPECTED UNDERGROUND ELECTRICAL POWER LINE
- G — APPROXIMATE LOCATION OF SUSPECTED UNDERGROUND GAS LINE
- T — APPROXIMATE LOCATION OF SUSPECTED UNDERGROUND COMMUNICATIONS LINE
- LIMITED ACCESSIBILITY

GRAPHIC SCALE

0 20 40 80 160 320

(IN FEET)
1 inch = 80 ft.

NOTES

1) UNDERGROUND FEATURES WERE LOCATED USING VISUAL EVIDENCE, GROUND PENETRATING RADAR (GPR), AND TIME DOMAIN ELECTROMAGNETIC (TDEM) METHODS. OTHER BURIED UTILITIES AND STRUCTURES MAY EXIST BUT WERE NOT DETECTED DUE TO LIMITATIONS OF THE GEOPHYSICAL METHODS, SITE ACCESS, AUTHORIZED SCOPE-OF-WORK, AND/OR HIGH TARGET CONGESTION. THEREFORE, DUE CAUTION SHOULD BE USED WHEN PERFORMING SUBSURFACE EXCAVATION ACTIVITIES WHERE POTENTIAL CONFLICTS EXIST. GEL SOLUTIONS IS NOT RESPONSIBLE FOR DAMAGES THAT MAY OCCUR. IDENTIFYING THE LOCATION OF SOME UTILITIES AND STRUCTURES MAY ONLY BE POSSIBLE WITH VACUUM OR OTHER EXCAVATION METHODS.
2) FIELD SURVEY CONDUCTED ON 10.15.2018 - 10.24.2018.
3) GEOPHYISICAL DATA GENERATED USING MALA GEOSCIENCE GPR SYSTEM CONFIGURED WITH A 450MHZ ANTENNA AND A GEONICS EM-61 TDEM SYSTEM. APPROXIMATE POSITIONING WAS PROVIDED USING TRIMBLE RTK/GPS.
4) GEL SOLUTIONS IS NOT LIABLE FOR ACCURACY OF BASE MAP PROVIDED BY WOOD.

GEL SOLUTIONS
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ASHEVILLE, NC 28803
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PROJECT: AMEC01118

GEOPHYSICAL INVESTIGATION FOR USTs
PARCEL #126
800 NC 150 (RIVER HIGHWAY)
MOORESVILLE, NORTH CAROLINA

RESULTS OF GEOPHYSICAL INVESTIGATION

FIGURE 1

DATE: 10/30/18

DRAWN BY: JAT APPRV. BY: WRA

APPENDIX E
RESULTS FROM ONSITE UVF SOIL ANALYSES

QED

AQROS

Hydrocarbon Analysis Results

Client: Wood
Address: 2801 Yorkmont Rd
Charlotte, NC 28208

Samples taken Tuesday, November 13, 2018
Samples extracted Tuesday, November 13, 2018
Samples analysed Wednesday, November 14, 2018

Contact: Helen Corley

Operator Ian Ros

Project: NCDOT Mooresville - Parcel 126

U00904

Matrix	Sample ID	Dilution used	BTEX (C6 - C9)	GRO (C5 - C10)	DRO (C10 - C35)	TPH (C5 - C35)	Total Aromatics (C10-C35)	16 EPA PAHs	BaP	% Ratios			HC Fingerprint Match
										C5 - C10	C10 - C18	C18	
s	P126B1-0-2	13.1	<0.33	1	4.9	5.9	4	0.23	<0.013	27	62.7	10.3	Deg Fuel 74.9%,(FCM),(BO)
s	P126B1-6-8	11.4	<0.28	<0.28	1.4	1.4	0.98	<0.09	<0.011	0	85.5	14.5	Deg Fuel 76.4%,(FCM)
s	P126B2-2-4	9.2	<0.23	<0.23	4.5	4.5	3.8	0.22	<0.009	0	85.8	14.2	Deg Fuel 73.1%,(FCM),(BO)
s	P126B2-8-10	8.4	<0.21	<0.21	8.2	8.2	5.8	0.32	<0.008	0	87.4	12.6	Deg.Fuel 70.8%,(FCM),(BO)
s	P126B3-2-4	10.2	<0.26	<0.26	0.26	0.26	0.18	<0.08	<0.01	0	85	15	Deg Fuel 74.2%,(FCM)
s	P126B3-8-10	8.4	<0.21	<0.21	0.41	0.41	0.28	<0.07	<0.008	0	85.8	14.2	Deg Fuel 75.6%,(FCM)
s	P126B4-2-4	8.7	<0.22	<0.22	0.76	0.76	0.53	<0.07	<0.009	0	83.6	16.4	Deg Fuel 72.3%,(FCM)
s	P126B4-8-10	17.1	<0.43	<0.43	59.4	59.4	30.2	1.7	<0.017	0	86.4	13.6	Deg Fuel 74.1%,(FCM),(BO)
s	P126B5-2-4	12.7	<0.32	<0.32	0.57	0.57	0.3	<0.1	<0.013	0	85	15	V.Deg.PHC 76.2%,(FCM)
s	P126B5-8-10	9.8	<0.24	<0.24	5	5	3.2	0.18	<0.01	0	84.6	15.4	Deg.Fuel 72%,(FCM),(BO)

Initial Calibrator QC check OK Final FCM QC Check OK 104.3 %

Concentration values in mg/kg for soil samples and mg/L for water samples. Soil values uncorrected for moisture or stone content. Fingerprints provide a tentative hydrocarbon identification.

Abbreviations :- FCM = Results calculated using Fundamental Calibration Mode : % = confidence of hydrocarbon identification : (PFM) = Poor Fingerprint Match : (T) = Turbid : (P) = Particulate detected

B = Blank Drift : (SBS)/(LBS) = Site Specific or Library Background Subtraction applied to result : (BO) = Background Organics detected : (OCR) = Outside cal range : (M) = Modifed Result.

% Ratios estimated aromatic carbon number proportions : HC = Hydrocarbon : PHC = Petroleum HC : FP = Fingerprint only. **Data generated by HC-1 Analyser**

QED Hydrocarbon Fingerprints

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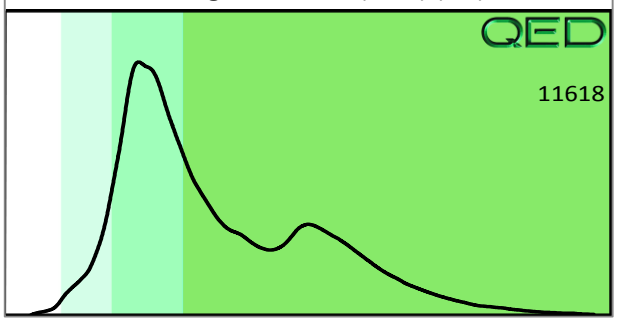
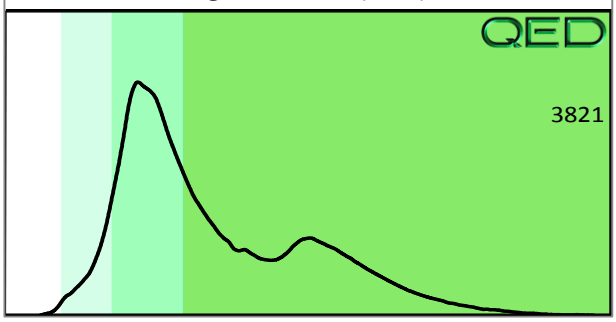
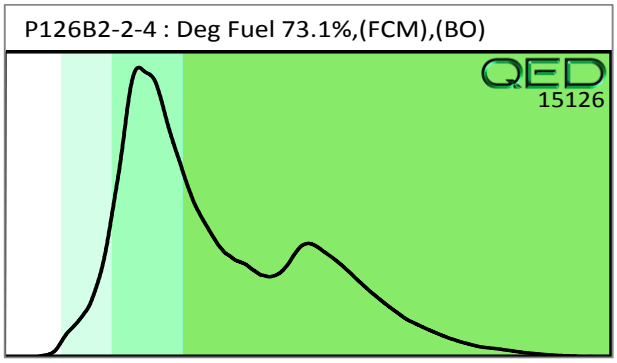
P126B1-0-2 : Deg Fuel 74.9%,(FCM),(BO)



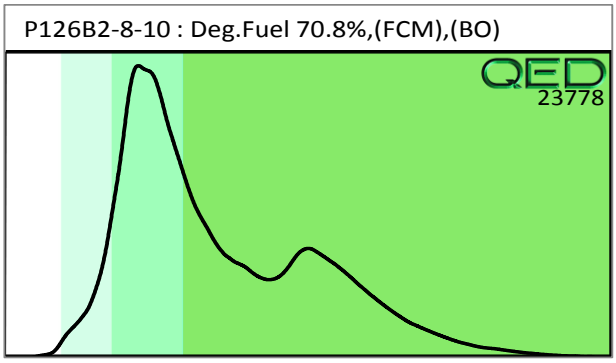
P126B1-6-8 : Deg Fuel 76.4%,(FCM)



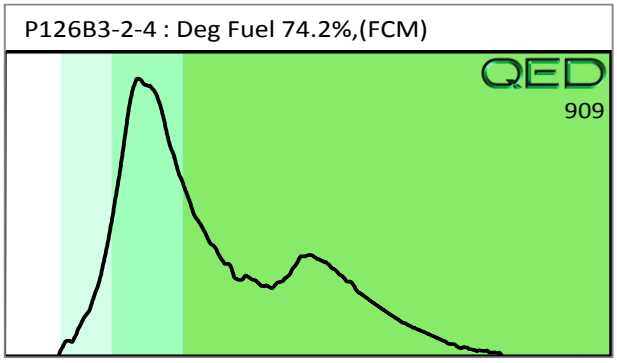
P126B2-2-4 : Deg Fuel 73.1%,(FCM),(BO)



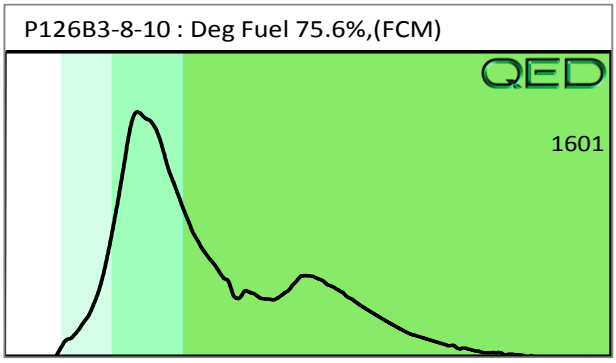
P126B2-8-10 : Deg.Fuel 70.8%,(FCM),(BO)



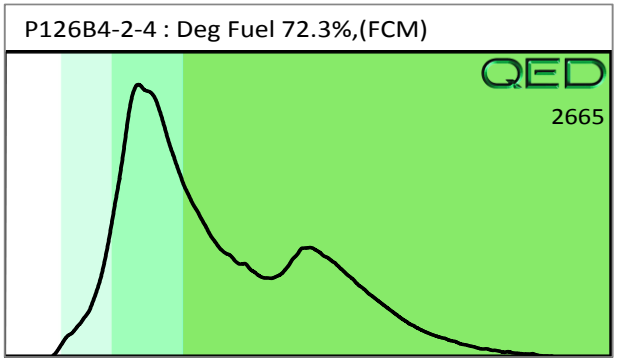
P126B3-2-4 : Deg Fuel 74.2%,(FCM)



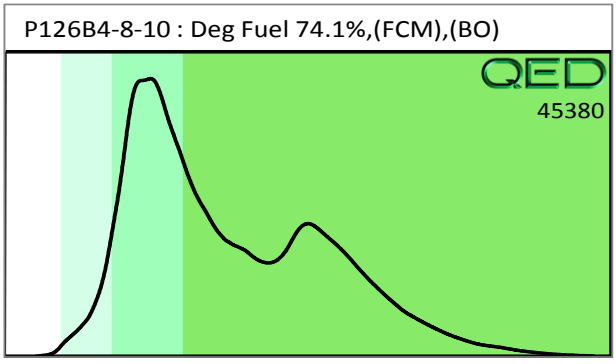
P126B3-8-10 : Deg Fuel 75.6%,(FCM)



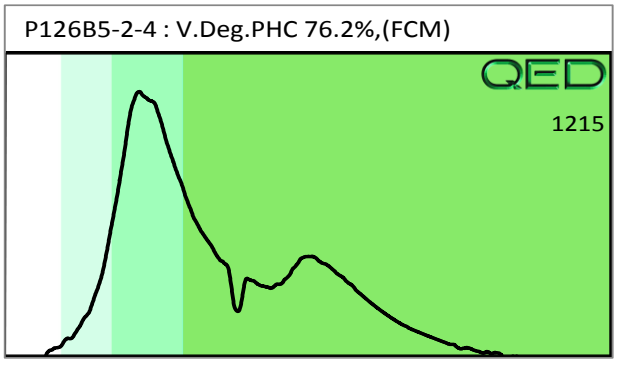
P126B4-2-4 : Deg Fuel 72.3%,(FCM)



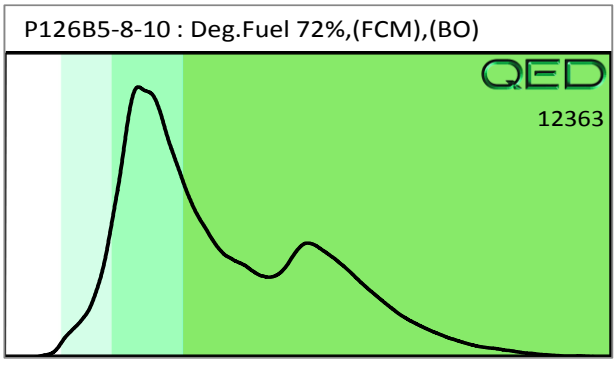
P126B4-8-10 : Deg Fuel 74.1%,(FCM),(BO)



P126B5-2-4 : V.Deg.PHC 76.2%,(FCM)



P126B5-8-10 : Deg.Fuel 72%,(FCM),(BO)



QED

QROS

Hydrocarbon Analysis Results

Client: Wood
Address: 2801 Yorkmont Rd
Charlotte, NC 28208

Samples taken Wednesday, November 14, 2018
Samples extracted Wednesday, November 14, 2018
Samples analysed Wednesday, November 14, 2018

Contact: Helen Corley

Operator Ian Ros

Project: NCDOT Mooresville - Parcel 126

U00904

Matrix	Sample ID	Dilution used	BTEX (C6 - C9)	GRO (C5 - C10)	DRO (C10 - C35)	TPH (C5 - C35)	Total Aromatics (C10-C35)	16 EPA PAHs	BaP	% Ratios			HC Fingerprint Match
										C5 - C10	C10 - C18	C18	
s	P126B6-2-4	11.5	<0.29	<0.29	6.9	6.9	3.6	0.18	<0.011	0	79.5	20.5	Deg.PHC 71.3%,(FCM),(BO)
s	P126B7-0-2	10.1	<0.25	<0.25	1.3	1.3	0.66	<0.08	<0.01	0	80.7	19.3	Road Tar 76.8%,(FCM),(BO)
s	P126B8-0-2	11.9	<0.3	<0.3	<0.3	<0.3	<0.06	<0.09	<0.012	0	100	0	Residual HC
s	P126B9-2-4	10.9	<0.27	<0.27	<0.27	<0.27	<0.05	<0.09	<0.011	0	0	0	Road Tar,(FCM)
s	P126B10-2-4	10.9	<0.27	<0.27	<0.27	<0.27	<0.05	<0.09	<0.011	0	0	0	,(FCM)
s	P126B11-2-4	10.8	<0.27	<0.27	<0.27	<0.27	<0.05	<0.09	<0.011	0	0	0	,(FCM)
s	P126B12-2-4	10.4	<0.26	<0.26	<0.26	<0.26	<0.05	<0.08	<0.01	0	0	0	,(FCM)
s	P126B13-2-4	10.3	<0.26	<0.26	<0.26	<0.26	<0.05	<0.08	<0.01	0	0	0	,(FCM)
s	P126B14-0-2	9.0	<0.22	<0.22	4.5	4.5	0.43	<0.07	<0.009	0	100	0	Deg.Hydr.Oil 80.1%,(FCM),(BO)
s	P126B15-0-2	11.3	<0.28	<0.28	<0.28	<0.28	<0.06	<0.09	<0.011	100	0	0	Residual HC

Initial Calibrator QC check OK Final FCM QC Check OK 91.9 %

Concentration values in mg/kg for soil samples and mg/L for water samples. Soil values uncorrected for moisture or stone content. Fingerprints provide a tentative hydrocarbon identification.

Abbreviations :- FCM = Results calculated using Fundamental Calibration Mode : % = confidence of hydrocarbon identification : (PFM) = Poor Fingerprint Match : (T) = Turbid : (P) = Particulate detected

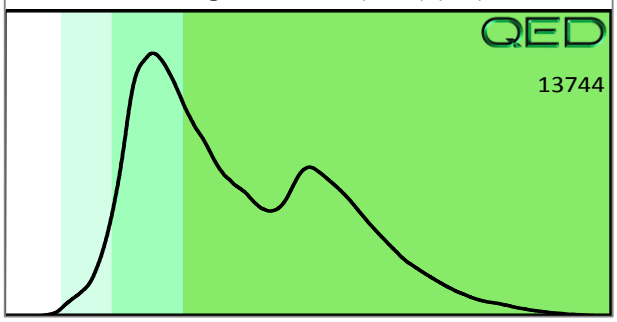
B = Blank Drift : (SBS)/(LBS) = Site Specific or Library Background Subtraction applied to result : (BO) = Background Organics detected : (OCR) = Outside cal range : (M) = Modifed Result.

% Ratios estimated aromatic carbon number proportions : HC = Hydrocarbon : PHC = Petroleum HC : FP = Fingerprint only. **Data generated by HC-1 Analyser**

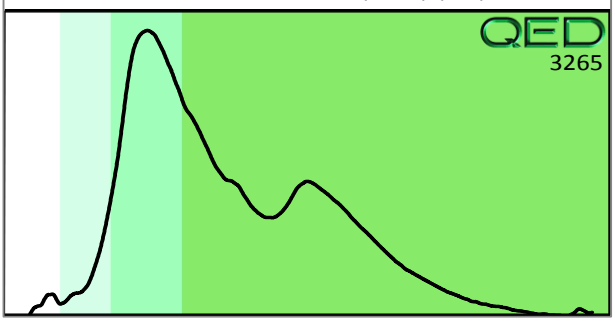
QED Hydrocarbon Fingerprints

Project: NCDOT Mooresville - Parcel 126 ##################

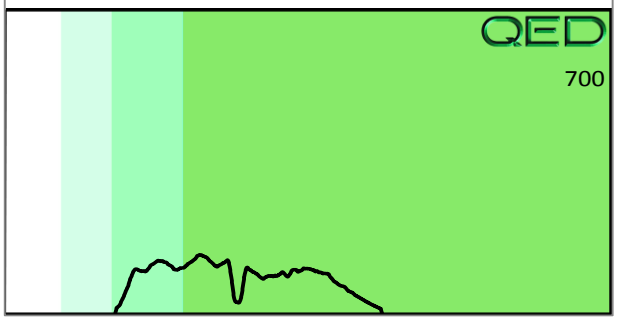
P126B6-2-4 : Deg.PHC 71.3%,(FCM),(BO)



P126B7-0-2 : Road Tar 76.8%,(FCM),(BO)



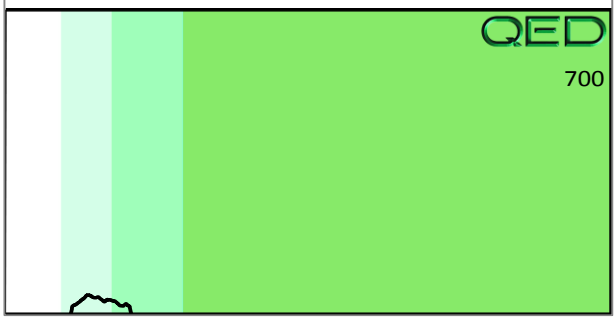
P126B8-0-2 : Residual HC



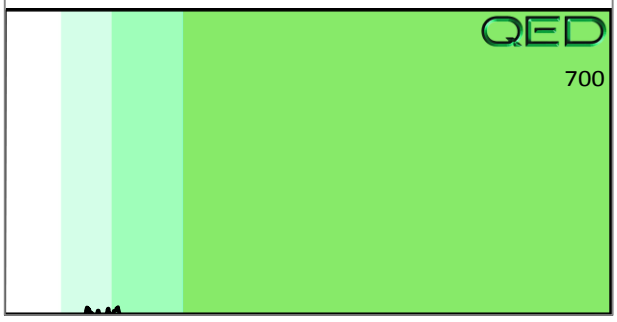
P126B9-2-4 : Road Tar,(FCM)

P126B10-2-4 : ,(FCM)

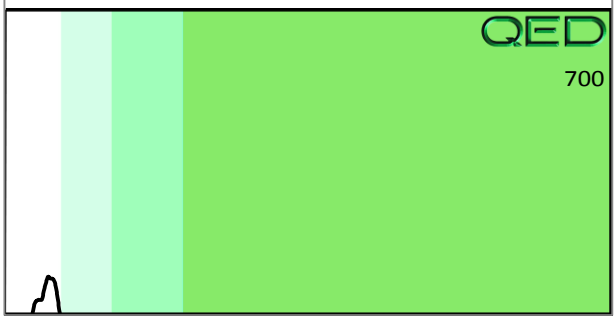
P126B11-2-4 : ,(FCM)



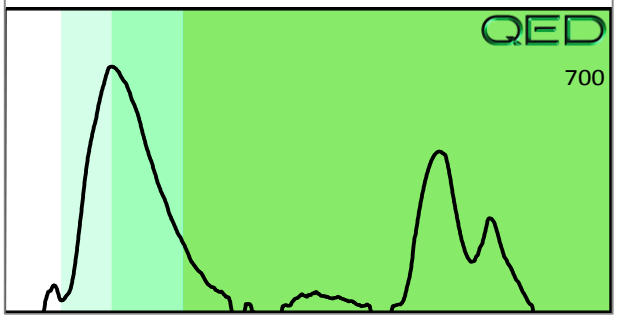
P126B12-2-4 : ,(FCM)



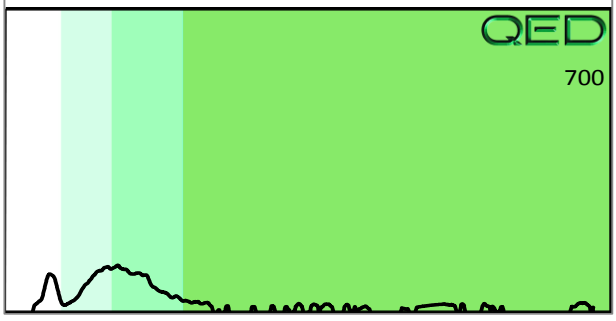
P126B13-2-4 : ,(FCM)



P126B14-0-2 : Deg.Hydr.Oil 80.1%,(FCM),(BO)



P126B15-0-2 : Residual HC



QED

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Hydrocarbon Analysis Results

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Samples analysed Wednesday, November 14, 2018

Contact: Helen Corley

Operator Ian Ros

Project: NCDOT Mooresville - Parcel 126

U00904

Matrix	Sample ID	Dilution used	BTEX (C6 - C9)	GRO (C5 - C10)	DRO (C10 - C35)	TPH (C5 - C35)	Total Aromatics (C10-C35)	16 EPA PAHs	BaP	% Ratios			HC Fingerprint Match
										C5 - C10	C10 - C18	C18	
s	P126B16-0-2	10.8	<0.27	<0.27	<0.27	<0.27	<0.05	<0.09	<0.011	0	100	0	Residual HC,(P)
s	P126B17-0-2	8.6	<0.43	<0.21	6.2	6.2	2.7	0.14	<0.009	8.4	76.5	15.2	Deg.PHC 82.4%,(FCM)
s	P126B18-2-4	11.6	<0.29	<0.29	<0.29	<0.29	<0.06	<0.09	<0.012	0	0	0	,(FCM)
s	P126B19-0-2	10.8	<0.27	<0.27	<0.27	<0.27	<0.05	<0.09	<0.011	0	44.2	55.8	Residual HC,(BO),(P)
s	P126B20-2-4	9.9	<0.25	0.49	1.6	2.1	0.69	<0.08	<0.01	89.7	9.9	0.4	Deg.Tr Oil 72.2%,(FCM)
s	P126B21-2-4	8.2	<0.21	<0.21	<0.21	<0.21	<0.04	<0.07	<0.008	0	37.4	62.6	No Match found
s	P126B22-2-4	9.8	<0.24	<0.24	<0.24	<0.24	<0.05	<0.08	<0.01	0	40.5	59.5	No Match found

Initial Calibrator QC check OK

Final FCM QC Check OK 99.5 %

Concentration values in mg/kg for soil samples and mg/L for water samples. Soil values uncorrected for moisture or stone content. Fingerprints provide a tentative hydrocarbon identification.

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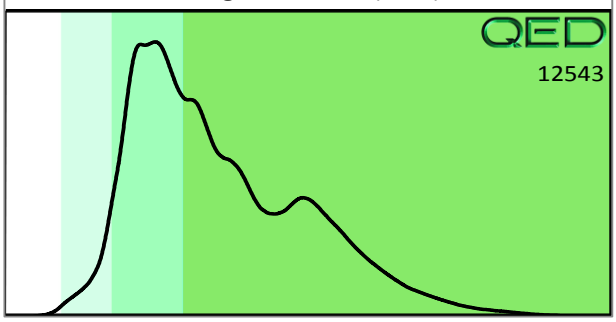
% Ratios estimated aromatic carbon number proportions : HC = Hydrocarbon : PHC = Petroleum HC : FP = Fingerprint only. **Data generated by HC-1 Analyser**

QED Hydrocarbon Fingerprints

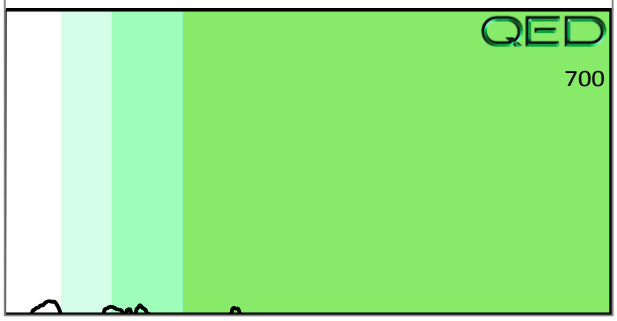
Project: NCDOT Mooresville - Parcel 126 ##################

P126B16-0-2 : Residual HC,(P)

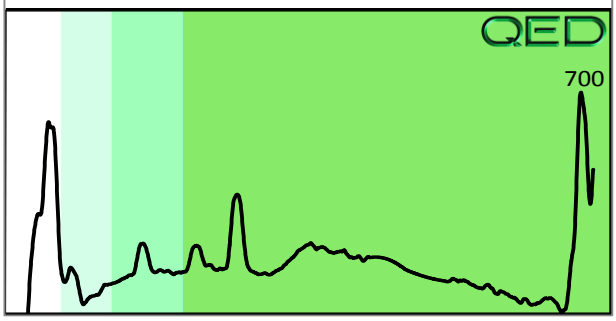
P126B17-0-2 : Deg.PHC 82.4%,(FCM)



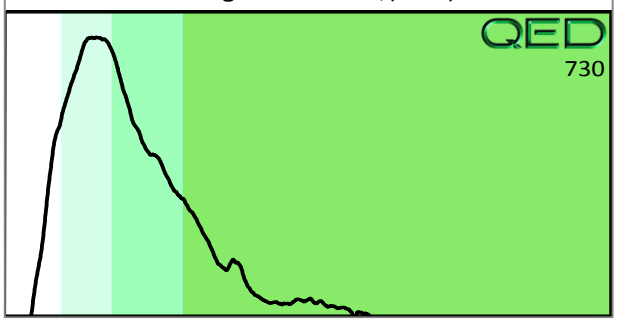
P126B18-2-4 : ,(FCM)



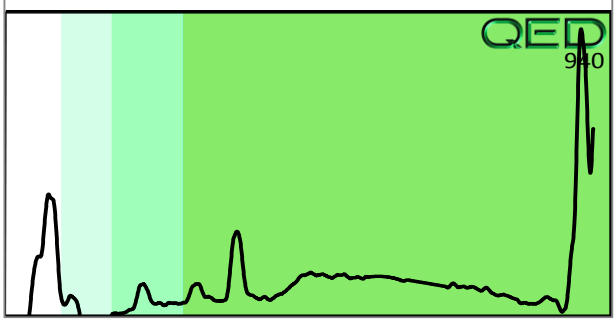
P126B19-0-2 : Residual HC,(BO),(P)



P126B20-2-4 : Deg.Tr Oil 72.2%,(FCM)



P126B21-2-4 : No Match found



P126B22-2-4 : No Match found