Solutions-IES
Industrial & Environmental Services
a division of Draper Aden Associates

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March 30, 2017

Mr. Craig Haden
North Carolina Department of Transportation
Geotechnical Engineering Unit
1589 Mail Service Center
Raleigh, North Carolina 27699-1589

Reference: **Preliminary Site Assessment**
Richard and Paul Joyce Property (Parcel #48)
1025 N Main Street
Kernersville, Forsyth County, North Carolina
State Project: U-4734
WBS Element 36600.1.2
SIES Project No. 2017.0015.NDOT

Dear Mr. Haden:

Solutions-IES, Inc., (SIES), a Division of Draper Aden Associates, has completed the Preliminary Site Assessment conducted at the above-referenced property. The work was performed in accordance with the Technical and Cost proposal dated February 8, 2017, and the North Carolina Department of Transportation's (NCDOT's) Notice to Proceed dated February 22, 2017. Activities associated with the assessment consisted of conducting a geophysical investigation and collecting soil samples for analysis. The purpose of this report is to document the field activities, present the laboratory analyses, and provide recommendations regarding the property.

Location and Description

The Richard and Paul Joyce Property (Parcel #48) is located at 1025 N. Main Street in Kernersville, Forsyth County, North Carolina. The property is situated on the northwest side of N. Main Street at the intersection of N Main Street and County Line Road (**Figure 1**). The property consists of an active gas station and convenience store (K&L's Grab-N-Go). Based on a review of on-line UST registry information, three gasoline underground storage tanks (USTs) were reportedly installed on the property in 1989.

An asphalt parking area adjoins the building on east-southeast sides and extends almost to the southern property boundary. A detached canopy with three dispensers is located in front of the building, and the three USTs are located on the south side of the building (noted as U/G Tank on **Figure 2**). An approximate 1,000-gallon above ground storage tank (AST) is situated on the south side of the building between the building and the USTs. The proposed easement had not been marked at the time of the assessment, but the NCDOT plan sheet shows the easement as potentially impacting the canopy.

On the basis of the presence of the gas station and the proximity of the USTs to the proposed easement, the NCDOT requested a Preliminary Site Assessment for the right-of-way and proposed easement. The scope of work as defined in the Request for Technical and Cost Proposal was to evaluate the site with respect to the presence of known and unknown USTs, and to assess where contamination exists on the right-of-way/proposed easement. An estimate of the quantity of impacted soil is to be provided, should impacted soils be encountered.

SIES reviewed the on-line NCDEQ Incident Management database and no incident number has been assigned to the site. SIES also examined the UST registration database to obtain UST ownership information. According to the database, the USTs on the property were operated under Facility Number 00-0-0000031423 and include three 6,000-gallon gasoline tanks. The owner and operator of the tanks are listed as follows:

Owner	Operator
Clinard Oil Company	K&L's Grab-N-Go
PO Box 1007	1025 N. Main Street
Thomasville, NC 27361	Kernersville, NC 27284

Geophysical Survey

Prior to SIES' mobilization to the site, Pyramid Environmental & Engineering of Greensboro, NC (Pyramid) conducted a geophysical survey to confirm the presence of the known and determine if additional USTs were present in the right-of-way/proposed easement. The geophysical survey consisted of an electromagnetic survey using a Geonics EM61 time-domain electromagnetic induction meter to locate buried metallic objects, and ground penetrating radar using a Geophysical Survey Systems Inc. Utility Scan DF with a dual frequency 300/800 MHz antenna. The instruments were used specifically to locate USTs.

A survey grid was laid out along the right-of-way/proposed easement with the X-axis oriented approximately parallel to N. Main Street and the Y-axis oriented approximately perpendicular to N.Main Street. The grid was positioned to cover the entire right-of-way/proposed easement and the known UST area, as shown on **Figure 2** of the geophysical survey report in **Attachment A**.

The survey lines were spaced five feet apart and magnetic data were collected continuously along each survey line with a data logger. After collection, the data were reviewed in the field with graphical computer software. Following the electromagnetic survey, a ground penetrating radar (GPR) survey was conducted to further evaluate any significant metallic anomalies.

Access was available to all areas of the study area, and several anomalies were detected with the geophysical survey. The anomalies were generally attributed to vehicles, metallic debris, underground utilities, signage, or USTs. One anomaly was detected in the UST area that Pyramid interpreted as known USTs, based on the NCDOT criteria. Pyramid's detailed report of findings and interpretations is presented in **Attachment A**.

Site Assessment Activities

On March 20, 2017, SIES mobilized to the site to conduct a Geoprobe® direct-push investigation to evaluate subsurface soil conditions on the property. As directed by the NCDOT, the Geoprobe® borings were terminated at 10 feet below ground surface (ft bgs) unless the location was in the vicinity of a known or suspected UST, which resulted in a boring terminated at 12 ft bgs. Eight direct-push holes (SB-1 through SB-8) were advanced around the existing UST area and throughout the right-of-way/proposed easement (**Figure 2).** Although the existing USTs are outside the proposed easement, the NCDOT requested information from the area to determine if the USTs were affecting the subsurface soils in the proposed easement. The soil boring logs are included as **Attachment B**. Borings SB-1 through SB-3 were located to evaluate the subsurface conditions near the existing USTs, borings SB-5 through SB-7 were located to evaluate the conditions near the dispensers, and borings SB-4 and SB-8 were situated to evaluate the remainder of the right-of-way/proposed easement along N. Main Street (see photos in **Attachment C**). Borings SB-1 through SB-3 were advanced to 12 ft bgs and the remaining borings were advanced to a depth of 10 ft bgs.

Continuous sampling using a Geoprobe® resulted in good recovery of soil samples from the direct-push holes. Soil samples were collected and contained in four-foot long acetate sleeves inside the direct-push Macro-Core® sampler. Each of the sleeves was divided into two-foot long sections for soil sample screening. Soil from each two-foot interval was placed in a resealable plastic bag and the bag was set aside for volatilization of organic compounds from the soil to the bag headspace. A photoionization detector (PID) probe was inserted into the bag and the reading was recorded (**Table 1**).

Two soil samples were collected from each boring. The soil sample with the highest field screening in the boring and the soil sample from the bottom of the boring were selected for analysis. The PID results are summarized in **Table 1**. The selected soil samples were submitted to REDLab in Wilmington, North Carolina, for analysis of total petroleum hydrocarbons (TPH) diesel range organics (DRO) and gasoline range organics (GRO) using ultraviolet fluorescence (UVF) methodology. Following sampling, each boring was backfilled with bentonite and drill cuttings to the ground surface.

The lithology encountered by the direct-push samples was generally consistent throughout the site. The ground surface was covered with about 0.5 feet of gravel, asphalt, or topsoil. Below this surface cover was a yellowish brown to reddish brown silt to fine-grained sand. No groundwater or bedrock was observed in any of the borings.

According to the 1985 Geologic Map of North Carolina, the site is within the Piedmont Physiographic Province in North Carolina. The strata indicated for this area is a megacrystalline to equigranular granite common to the area. The soils observed at the site are consistent with granite as the parent material.

Analytical Results

The laboratory data are summarized in **Table 1** and the complete report is presented in **Attachment D** (Note: The laboratory reports and chain-of-custody contain information from a second site and only those samples labeled as SB-1 through SB-8 should be considered applicable to this report). Sixteen soil samples were submitted for analysis. Of these samples, all contained detectable DRO compounds and five contained detectable GRO compounds. Detectable GRO concentrations ranged from 0.48 to 5.6 milligrams per kilogram (mg/kg). Detected DRO concentrations ranged from 0.24 to 15.6 mg/kg. The action levels are 50 mg/kg for GRO and 100 mg/kg for DRO[1]. None of the soil samples analyzed for this site contained DRO or GRO concentrations above their respective action levels.

Conclusions and Recommendations

A Preliminary Site Assessment was conducted to evaluate the Richard and Paul Joyce Property (Parcel #48) located at 1025 N. Main Street in Kernersville, Forsyth County, North Carolina. A geophysical survey conducted at the site located the known USTs on the south side of the property. The proposed right-of-way/easement was not marked in the field, but according to the plan sheets that NCDOT provided, the existing USTs are not within the proposed right-of-way/easement. No other probable/possible UST's were identified. Eight soil borings were advanced to evaluate the subsurface soil conditions near the existing USTs and the right-of-way/proposed easement.

The UVF analytical results (**Table 1)** of the soil samples collected on March 20, 2017, indicate that none of the soil samples contained DRO or GRO concentrations above the action level. Therefore, no estimate of the volume of soil requiring possible remediation was made.

SIES appreciates the opportunity to work with the NCDOT on this project. Because compounds were detected above the method detection limit in the soil samples, SIES recommends that a copy of this report be submitted to the Division of Waste Management, UST Section, in the Winston-Salem Regional Office. If you have any questions, please contact us at (919) 873-1060.

Sincerely,
Solutions-IES

DocuSigned by:
Michael Branson
942B7ACDE09841E...

Michael W. Branson, P.G.
Project Manager

DocuSigned by:
John E. Palmer
B33F2A9DD9BD4C4...

John Palmer, P.G.
Senior Hydrogeologist

Attachments

NORTH CAROLINA LICENSED SEAL 467 GEOLOGIST MICHAEL W. BRANSON

[1] NCDEQ, *Guidelines for North Carolina Action Limits for Total Petroleum Hydrocarbons (TPH)*,July 26, 2016,

TABLE 1
SOIL FIELD SCREENING AND ANALYTICAL RESULTS
JOYCE PROPERTY (PARCEL #48)
KERNERSVILLE, FORSYTH COUNTY, NORTH CAROLINA
STATE PROJECT: U-4734
WBS ELEMENT 36600.1.2
SIES PROJECT NO. 2017.0015.NDOT

SAMPLE ID	DEPTH (ft)	PID READING (ppm)	SAMPLE ID	ANALYTICAL RESULTS (mg/kg)	
				UVF GRO	UVF DRO
	Action Level (mg/kg)			50	100
SB-1	0 - 2	0.0			
	2 - 4	0.0			
	4 - 6	0.1			
	6 - 8	1.0			
	8 - 10	1.8	SB-1-10	**0.48**	**0.26**
	10 - 12	3.8	SB-1-12	**0.65**	**1.1**
SB-2	0 - 2	1.5			
	2 - 4	0.7			
	4 - 6	3.5			
	6 - 8	19.0			
	8 - 10	21.8	SB-2-10	<0.69	**5.2**
	10 - 12	102	SB-2-12	<0.72	**5.4**
SB-3	0 - 2	1.7			
	2 - 4	7.3			
	4 - 6	7.0			
	6 - 8	25			
	8 - 10	107	SB-3-10	<0.25	**13.5**
	10 - 12	186	SB-3-12	**2.1**	**5.4**
SB-4	0 - 2	12.7			
	2 - 4	3.6			
	4 - 6	4.0	SB-4-6	**5.6**	**8.2**
	6 - 8	2.2			
	8 - 10	5.9	SB-4-10	<0.26	**15.6**
SB-5	0 - 2	6.7			
	2 - 4	22.7			
	4 - 6	104			
	6 - 8	121	SB-5-8	**0.85**	**0.24**
	8 - 10	283	SB-5-10	<0.27	**0.27**
SB-6	0 - 2	1.3			
	2 - 4	2.5	SB-6-4	<0.78	**9.5**
	4 - 6	1.2			
	6 - 8	1.9			
	8 - 10	3.4	SB-6-10	<0.75	**1.1**
SB-7	0 - 2	1.7	SB-7-2	<0.68	**7.8**
	2 - 4	1.3			
	4 - 6	0.8			
	6 - 8	0.8			
	8 - 10	1.8	SB-7-10	<0.76	**14.5**
SB-8	0 - 2	0.8			
	2 - 4	1.7			
	4 - 6	1.8	SB-8-6	<1.1	**3.7**
	6 - 8	1.0			
	8 - 10	1.2	SB-8-10	<0.71	**4.0**

1) ft - feet

2) ppm - parts per million.

3) PID - photoionization ionization detector

4) mg/kg - milligrams per kilogram.

5) UVF DRO - Diesel range organics by UVF.

6) UVF GRO - Gasoline range organics by UVF.

7) Action level based upon NCDEQ memo *Guidelines for North Carolina Action Limits for Total Petroleum Hydrocarbons* - July 29, 2016.

8) Soil samples were collected on March 20, 2017.

9) **Bold** values are above the detection level.

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FIGURES

SCALE 1:24,000

1 ½ 0 1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 .5 0 1 KILOMETER

SOURCE: U.S. GEOLOGICAL SURVEY 7.5 MIN QUADRANGLE: BELEWS CREEK, NC (2016)

FILE NCDOT KERNERSVILLE PSA

DATE MARCH 2017

PROJECT MANAGER MWB

CHECKED BY JEP

PROJECT NUMBER 2017.0015.NDOT

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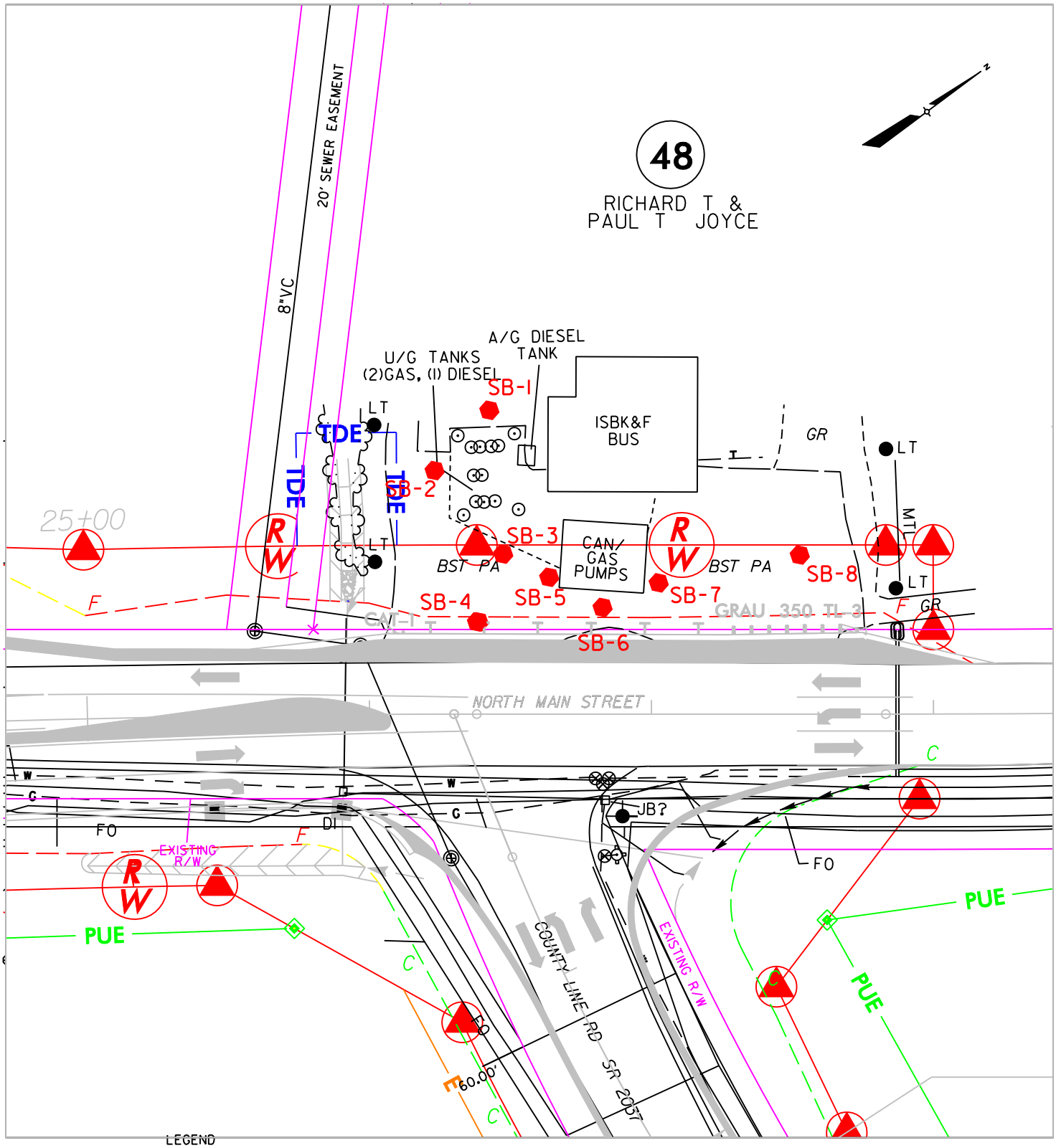
VICINITY MAP

RICHARD AND PAUL JOYCE PROPERTY (PARCEL #48)
KERNERSVILLE, FORSYTH COUNTY NORTH CAROLINA

FIGURE
1

...\CAD\fig 1 48.dgn 3/27/2017 1:34:13 PM

PROJECT NUMBER 2017.0015.NDOT
DRAFTER MWB
CHECKED BY JEP
PROJECT MANAGER MWB
DATE MARCH 2017
FILE NCDOT KERNERSVILLE PSA



LEGEND

SB-1

SOIL SAMPLE LOCATION AND IDENTIFICATION

0 25 50
GRAPHIC SCALE (FEET)

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SITE MAP

RICHARD AND PAUL JOYCE PROPERTY (PARCEL #48)

KERNERSVILLE, FORSYTH COUNTY, NORTH CAROLINA

FIGURE

2

ATTACHMENT A

PYRAMID GEOPHYSICAL SERVICES
(PROJECT 2017-060)

GEOPHYSICAL SURVEY

METALLIC UST INVESTIGATION:
PARCEL 048
NCDOT PROJECT U-4734

1025 N. MAIN STREET, KERNERSVILLE, NC

MARCH 21, 2017

Report prepared for: **Mike Branson**
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Reviewed by: _____
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GEOPHYSICAL INVESTIGATION REPORT
Parcel 048 – 1025 N. Main Street
Kernersville, North Carolina

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Figures

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LIST OF ACRONYMS

CADD	Computer Assisted Drafting and Design
DF	Dual Frequency
EM	Electromagnetic
GPR	Ground Penetrating Radar
GPS	Global Positioning System
NCDOT	North Carolina Department of Transportation
ROW	Right-of-Way
SVE	Soil Vapor Extraction
UST	Underground Storage Tank

EXECUTIVE SUMMARY

Project Description: Pyramid Environmental conducted a geophysical investigation for Solutions, IES (Solutions) at Parcel 048, located at 1025 N. Main Street, Kernersville, NC. The survey was part of a North Carolina Department of Transportation (NCDOT) Right-of-Way (ROW) investigation (NCDOT Project U-4734). Solutions directed Pyramid as to the geophysical survey boundaries at the project site, which were designed to extend from the existing edge of pavement to the proposed ROW lines and/or easement lines within the property, whichever distance was greater. Conducted from March 9-11, 2017, the geophysical investigation was performed to determine if unknown, metallic underground storage tanks (USTs) were present beneath the survey area.

Geophysical Results: Three known USTs were observed at the property. The majority of the EM anomalies were directly attributed to known metallic features including the known USTs and other cultural structures. GPR scans were performed across the known USTs to verify their size and orientation, and across areas suspected to contain metal reinforcement. The GPR verified the locations of the three known USTs, and verified the presence of metal-reinforced concrete. No evidence of larger structures was recorded. Collectively, the geophysical data did not show any evidence of unknown metallic USTs at Parcel 048. The locations of three known USTs were verified by the geophysical survey.

INTRODUCTION

Pyramid Environmental conducted a geophysical investigation for Solutions, IES (Solutions) at Parcel 048, located at 1025 N. Main Street, Kernersville, NC. The survey was part of a North Carolina Department of Transportation (NCDOT) Right-of-Way (ROW) investigation (NCDOT Project U-4734). Solutions directed Pyramid as to the geophysical survey boundaries at the project site, which were designed to extend from the existing edge of pavement to the proposed ROW lines and/or easement lines within the property, whichever distance was greater. Conducted from March 9-11, 2017, the geophysical investigation was performed to determine if unknown, metallic underground storage tanks (USTs) were present beneath the survey area.

The site included an active service station surrounded by asphalt parking areas and grass medians. Three known USTs were evidenced on the south side of the service station building by fill ports and a reinforced concrete area. Aerial photographs showing the survey area boundaries and ground-level photographs are shown in **Figure 1**.

FIELD METHODOLOGY

The geophysical investigation consisted of electromagnetic (EM) induction-metal detection and ground penetrating radar (GPR) surveys. Pyramid collected the EM data using a Geonics EM61 metal detector integrated with a Trimble AG-114 GPS antenna. The integrated GPS system allows the location of the instrument to be recorded in real-time during data collection, resulting in an EM data set that is geo-referenced and can be overlain on aerial photographs and CADD drawings. A boundary grid was established around the perimeter of the site with marks every 10 feet to maintain orientation of the instrument throughout the survey and assure complete coverage of the area.

According to the instrument specifications, the EM61 can detect a metal drum down to a maximum depth of approximately 8 feet. Smaller objects (1-foot or less in size) can be detected to a maximum depth of 4 to 5 feet. The EM61 data were digitally collected at

approximately 0.8 foot intervals along north-south trending or east-west trending, generally parallel survey lines spaced five feet apart. The data were downloaded to a computer and reviewed in the field and office using the Geonics NAV61 and Surfer for Windows Version 11.0 software programs.

GPR data were acquired across select EM anomalies on March 11, 2017, using a Geophysical Survey Systems, Inc. (GSSI) UtilityScan DF unit equipped with a dual frequency 300/800 MHz antenna. Data were collected both in reconnaissance fashion as well as along formal transect lines across EM features. The GPR data were viewed in real-time using a vertical scan of 512 samples, at a rate of 48 scans per second. GPR data were viewed down to a maximum depth of approximately 4 feet, based on dielectric constants calculated by the DF unit in the field during the reconnaissance scans. GPR transects across specific anomalies were saved to the hard drive of the DF unit for post-processing and figure generation.

Pyramid's classifications of USTs for the purposes of this report are based directly on the geophysical UST ratings provided by the NCDOT. These ratings are as follows:

Geophysical Surveys for Underground Storage Tanks
on NCDOT Projects

High Confidence	Intermediate Confidence	Low Confidence	No Confidence
Known UST Active tank - spatial location, orientation, and approximate depth determined by geophysics.	**Probable UST** Sufficient geophysical data from both magnetic and radar surveys that is characteristic of a tank. Interpretation may be supported by physical evidence such as fill/vent pipe, metal cover plate, asphalt/concrete patch, etc.	**Possible UST** Sufficient geophysical data from either magnetic or radar surveys that is characteristic of a tank. Additional data is not sufficient enough to confirm or deny the presence of a UST.	Anomaly noted but not characteristic of a UST. Should be noted in the text and may be called out in the figures at the geophysicist's discretion.

DISCUSSION OF RESULTS

Discussion of EM Results

A contour plot of the EM61 results obtained across the survey area at the property is presented in **Figure 2**. Each EM anomaly is numbered for reference in the figure. The following table presents the list of EM anomalies and the cause of the metallic response, if known:

LIST OF METALLIC ANOMALIES IDENTIFIED BY EM SURVEY

Metallic Anomaly #	Cause of Anomaly	Investigated with GPR
1	3 Known USTs	☑
2	Reinforced concrete	☑
3	Vehicles	
4	Guardrail	

The majority of the EM anomalies observed were directly attributed to known metallic features including the three known USTs, suspected metallic reinforcement, vehicles and a metal guardrail. GPR scans were performed across the three known USTs to verify their sizes and orientations, as well as across areas suspected to contain metal-reinforced concrete.

Discussion of GPR Results

Figure 3 presents the locations of the formal GPR transects performed at the property, as well as select transect images. A total of 8 GPR transects were performed at the site. A GPR transect was performed across the width of the three known USTs, and GPR Transects 2-4 were performed across the length of each tank. GPR Transects 5-7 were performed across areas adjacent to the tanks and the pump island suspected to contain reinforced concrete. These GPR scans verified the presence of reinforcement in the concrete. GPR Transect 8 was performed near the service station building to further examine the area

where vehicles resulted in EM interference. No evidence of large subsurface structures such as USTs was recorded.

Collectively, the geophysical data did not show any evidence of unknown metallic USTs at Parcel 048. The locations of three known USTs were verified by the geophysical survey.

SUMMARY & CONCLUSIONS

Pyramid's evaluation of the EM61 and GPR data collected at Parcel 048 in Kernersville, North Carolina, provides the following summary and conclusions:

- The EM61 and GPR surveys provided reliable results for the detection of metallic USTs within the accessible portions of the geophysical survey area.
- Three known USTs were observed at the property.
- The majority of the EM anomalies were directly attributed to known metallic features including the known USTs and other cultural structures.
- GPR scans were performed across the known USTs to verify their size and orientation, and across areas suspected to contain metal reinforcement.
- GPR verified the locations of the three known USTs, and verified the presence of metal-reinforced concrete. No evidence of larger structures was recorded.
- Collectively, the geophysical data did not show any evidence of unknown metallic USTs at Parcel 048. The locations of three known USTs were verified by the geophysical survey.

LIMITATIONS

Geophysical surveys have been performed and this report was prepared for Solutions, IES in accordance with generally accepted guidelines for EM61 and GPR surveys. It is generally recognized that the results of the EM61 and GPR surveys are non-unique and

may not represent actual subsurface conditions. The EM61 and GPR results obtained for this project have not conclusively determined the definitive presence or absence of metallic USTs, but the evidence collected is sufficient to result in the conclusions made in this report. Additionally, it should be understood that areas containing extensive vegetation, reinforced concrete, or other restrictions to the accessibility of the geophysical instruments could not be fully investigated.

N

APPROXIMATE BOUNDARIES OF GEOPHYSICAL SURVEY AREA

View of Survey Area
(Facing Approximately North)

View of Known UST Area
(Facing Approximately North)

TITLE	PARCEL 048 - GEOPHYSICAL SURVEY BOUNDARIES AND SITE PHOTOGRAPHS
PROJECT	1025 N. MAIN STREET KERNERSVILLE, NORTH CAROLINA NCDOT PROJECT U-4734
Pyramid Geophysics	503 INDUSTRIAL AVENUE GREENSBORO, NC 27460 (336) 335-3174 (p) (336) 691-0648 (f) License # C1251 Eng. / License # C257 Geology
DATE 3/20/2017	CLIENT SOLUTIONS, IES
PYRAMID PROJECT #: 2017-060	**FIGURE 1**

N

EM61 METAL DETECTION RESULTS

NUMBERS IN BLUE (x) CORRESPOND TO ANOMALY TABLE INCLUDED IN THE REPORT

3 KNOWN USTs OBSERVED; NO EVIDENCE OF UNKNOWN METALLIC USTs OBSERVED

The contour plot shows the differential results of the EM61 instrument in millivolts (mV). The differential results focus on larger metallic objects such as USTs and drums. The EM61 data were collected on March 9, 2017, using a Geonics EM61 instrument. Verification GPR data were collected using a GSSI UtilityScan DF instrument on March 10, 2017.

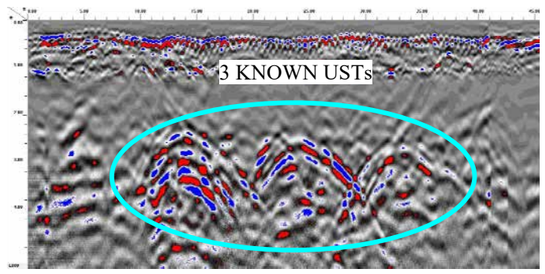
EM61 Metal Detection Response (millivolts)

TITLE	PARCEL 048 - EM61 RESULTS CONTOUR MAP
PROJECT	1025 N. MAIN STREET KERNERSVILLE, NORTH CAROLINA NCDOT PROJECT U-4734
Pyramid Geophysics	503 INDUSTRIAL AVENUE GREENSBORO, NC 27460 (336) 335-3174 (p) (336) 691-0648 (f) License # C1251 Eng. / License # C257 Geology
DATE	3/20/2017
CLIENT	SOLUTIONS, IES
PYRAMID PROJECT #:	2017-060
	FIGURE 2

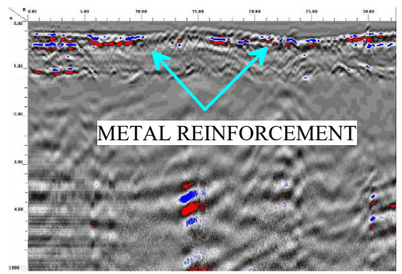
LOCATIONS OF GPR TRANSECTS

VIEW OF AREA CONTAINING
THREE KNOWN USTs

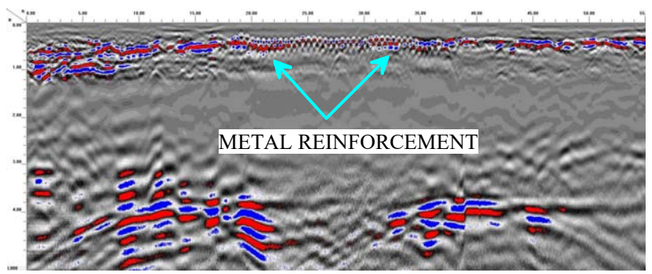
N



GPR TRANSECT 1 (T1)



GPR TRANSECT 5 (T5)



GPR TRANSECT 7 (T7)

TITLE
PARCEL 048 - GPR TRANSECT LOCATIONS AND SELECT IMAGES

PROJECT
1025 N. MAIN STREET
KERNERSVILLE, NORTH CAROLINA
NCDOT PROJECT U-4734

Pyramid Geophysics
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(336) 335-3174 (p) (336) 691-0648 (f)
License # C1251 Eng. / License # C257 Geology

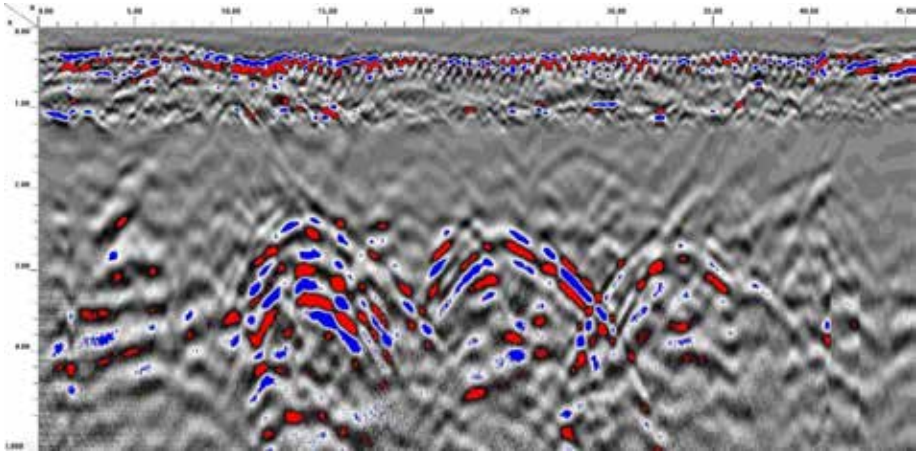
DATE 3/20/2017

CLIENT SOLUTIONS, IES

PYRAMID PROJECT #: 2017-060

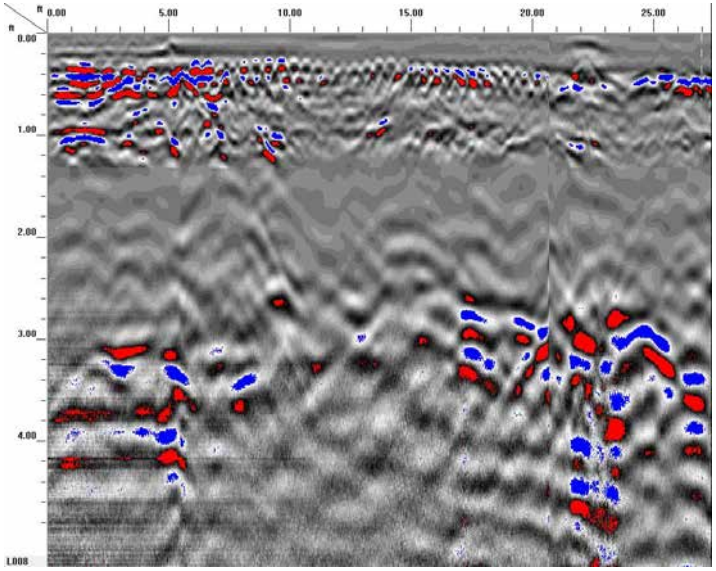
FIGURE 3

Appendix A – GPR Transect Images

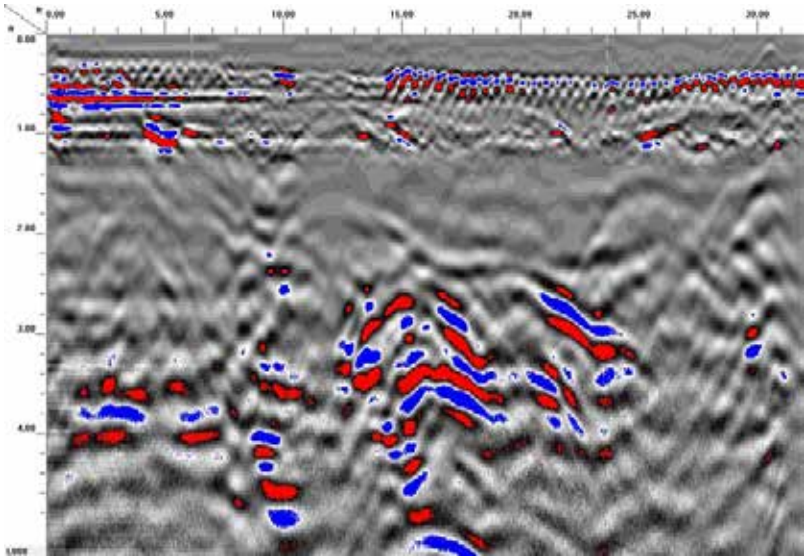


GPR TRANSECT 1

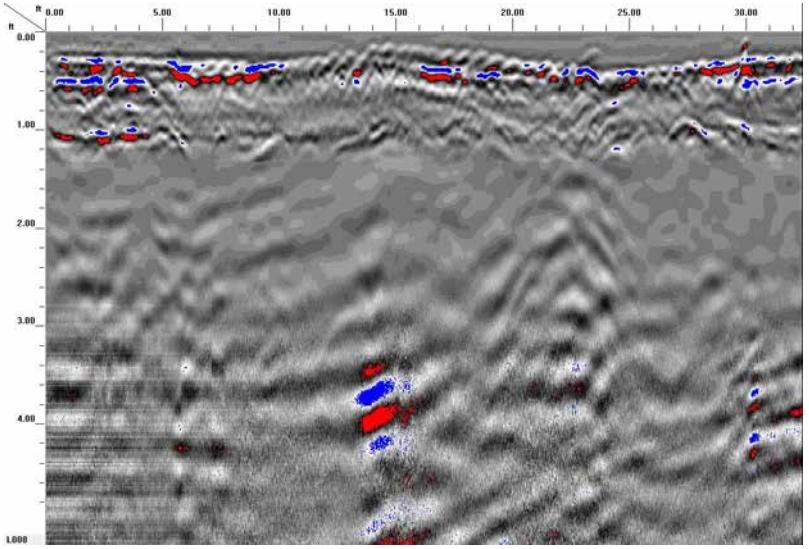
GPR TRANSECT 2 (DATA CORRUPTED)



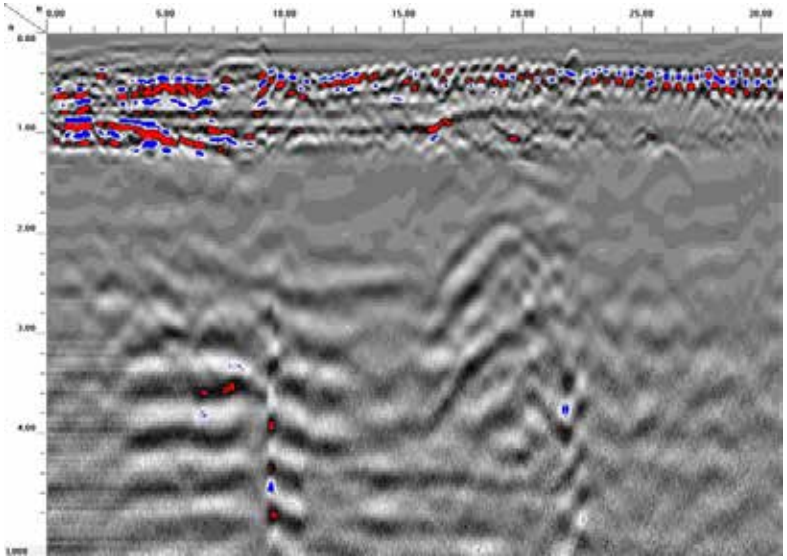
GPR TRANSECT 3



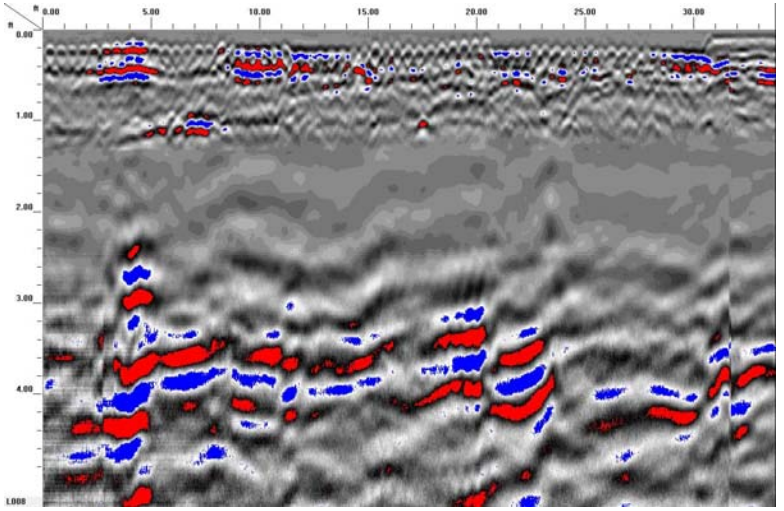
GPR TRANSECT 4



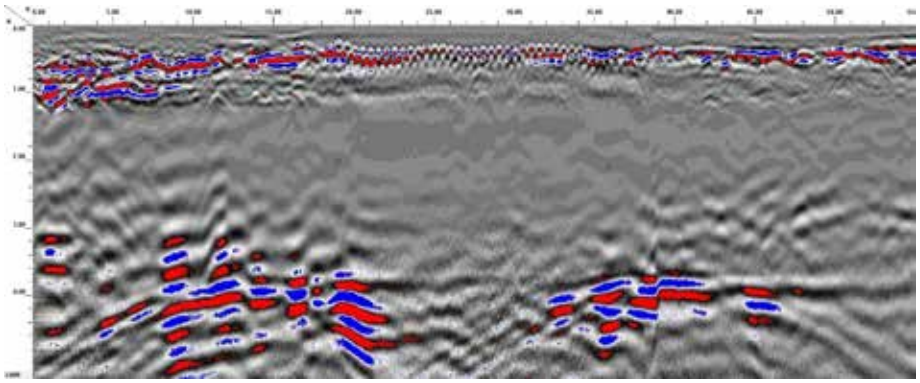
GPR TRANSECT 5



GPR TRANSECT 6



GPR TRANSECT 8



GPR TRANSECT 7

ATTACHMENT B

Log of Soil Boring:

Project: Richard and Paul Joyce Property PSA (Parcel #48)
Client: NCDOT (U-4734)
Drilling Method: Geoprobe
Sampler Type: MacroCore
Logged By: CE

Solutions-IES
Industrial & Environmental Services
a division of Draper Aden Associates

Boring Number: SB-1
Boring Date: 3/20/2017
Total Depth of Boring: 12'
Initial Water Level:
Stabilized Water Level:
Cave In Depth:
County: Forsyth

SUBSURFACE PROFILE			SAMPLE					
Depth ft. bgs	USCS Symbol	Description	Sample Interval	% Recovery	FID Field Screen ppm	PID Field Screen ppm	Lab Sample Depth	Well Data
		Ground Surface						
0	SM	Reddish brown silty sand, moist, hard, micaceous, trace fine gravel.				0.0		
						0.0		
5	ML/CL	Dark yellowish brown silty clay/clayey silt, moist, hard, micaceous.				0.1		
						1.0		
10	SM	Light reddish brown fine-grained silty sand, moist, firm. Becomes light yellowish brown downward.				1.8	SB-1-10	
						3.8	SB-1-12	
15		Boring terminated at 12 feet No groundwater encountered.						
20								

Log of Soil Boring:

Project: Richard and Paul Joyce Property PSA (Parcel #48)
Client: NCDOT (U-4734)
Drilling Method: Geoprobe
Sampler Type: MacroCore
Logged By: CE

Solutions-IES
Industrial & Environmental Services
a division of Draper Aden Associates

Boring Number: SB-2
Boring Date: 3/20/2017
Total Depth of Boring: 12'
Initial Water Level:
Stabilized Water Level:
Cave In Depth:
County: Forsyth

SUBSURFACE PROFILE			SAMPLE					
Depth ft. bgs	USCS Symbol	Description	Sample Interval	% Recovery	FID Field Screen ppm	PID Field Screen ppm	Lab Sample Depth	Well Data
		Ground Surface						
0	ML	Reddish brown silt, moist, hard.				1.5		
						0.7		
5	SM	Fine-grained sand lens.				3.5		
	ML	Dark yellowish brown silt. Color change to reddish brown at 7 feet.				19.0		
10	SM	Light reddish brown fine-grained silty sand, soft.				21.8	SB-2-10	
						102	SB-2-12	
15		Boring terminated at 12 feet No groundwater encountered.						
20								

Log of Soil Boring:

Project: Richard and Paul Joyce Property PSA (Parcel #48)
Client: NCDOT (U-4734)
Drilling Method: Geoprobe
Sampler Type: MacroCore
Logged By: CE

Solutions-IES
Industrial & Environmental Services
a division of Draper Aden Associates

Boring Number: SB-3
Boring Date: 3/20/2017
Total Depth of Boring: 12'
Initial Water Level:
Stabilized Water Level:
Cave In Depth:
County: Forsyth

SUBSURFACE PROFILE			SAMPLE					
Depth ft. bgs	USCS Symbol	Description	Sample Interval	% Recovery	FID Field Screen ppm	PID Field Screen ppm	Lab Sample Depth	Well Data
		Ground Surface						
0	ML	Dark yellowish brown silt with gray streaks, moist, hard, some woody debris.				1.7		
						7.3		
5	ML	Dark yellowish brown silt with red and brown mottling, very hard.				7.0		
						25.0		
10	SM	Yellowish brown fine-grained silty sand, moist, firm, white and orange mottling.				107	SB-3-10	
						186	SB-3-12	
15		Boring terminated at 12 feet No groundwater encountered.						
20								

Log of Soil Boring:

Project: Richard and Paul Joyce Property PSA (Parcel #48)
Client: NCDOT (U-4734)
Drilling Method: Geoprobe
Sampler Type: MacroCore
Logged By: CE

Solutions-IES
Industrial & Environmental Services
a division of Draper Aden Associates

Boring Number: SB-4
Boring Date: 3/20/2017
Total Depth of Boring: 10'
Initial Water Level:
Stabilized Water Level:
Cave In Depth:
County: Forsyth

SUBSURFACE PROFILE			SAMPLE					
Depth ft. bgs	USCS Symbol	Description	Sample Interval	% Recovery	FID Field Screen ppm	PID Field Screen ppm	Lab Sample Depth	Well Data
		Ground Surface						
0						12.7		
						3.6		
	ML	Orange-gray silt, moist, hard, woody debris in upper portion, becoming mottled red and brown downward, hard to very hard.				4.0	SB-4-6	
5						2.2		
						5.9	SB-4-10	
	ML	Mottled reddish brown silt, most, soft.						
10		Boring terminated at 10 feet No groundwater encountered.						
15								
20								

Log of Soil Boring:

Project: Richard and Paul Joyce Property PSA (Parcel #48)
Client: NCDOT (U-4734)
Drilling Method: Geoprobe
Sampler Type: MacroCore
Logged By: CE

Solutions-IES
Industrial & Environmental Services
a division of Draper Aden Associates

Boring Number: SB-5
Boring Date: 3/20/2017
Total Depth of Boring: 10'
Initial Water Level:
Stabilized Water Level:
Cave In Depth:
County: Forsyth

SUBSURFACE PROFILE			SAMPLE					
Depth ft. bgs	USCS Symbol	Description	Sample Interval	% Recovery	FID Field Screen ppm	PID Field Screen ppm	Lab Sample Depth	Well Data
		Ground Surface						
0						6.7		
	ML	Yellowish brown silt, moist, firm to hard.				22.7		
5						104		
	ML	Light reddish brown silt, moist, very hard.				121	SB-5-8	
	SM	Light reddish brown fine-grained silty sand, moist, firm,				283	SB-5-10	
10		Boring terminated at 10 feet No groundwater encountered.						
15								
20								

Log of Soil Boring:

Project: Richard and Paul Joyce Property PSA (Parcel #48)
Client: NCDOT (U-4734)
Drilling Method: Geoprobe
Sampler Type: MacroCore
Logged By: CE

Solutions-IES
Industrial & Environmental Services
a division of Draper Aden Associates

Boring Number: SB-6
Boring Date: 3/20/2017
Total Depth of Boring: 10'
Initial Water Level:
Stabilized Water Level:
Cave In Depth:
County: Forsyth

SUBSURFACE PROFILE			SAMPLE					
Depth ft. bgs	USCS Symbol	Description	Sample Interval	% Recovery	FID Field Screen ppm	PID Field Screen ppm	Lab Sample Depth	Well Data
		Ground Surface						
0	ML	Dark yellowish brown silt with orange mottling, very hard, becomes reddish brown downward.				1.3		
						2.5	SB-6-4	
5	SM	Light yellowish brown fine-grained silty sand, soft, loose, becomes light orange-brown at 9 feet.				1.2		
						1.9		
10						3.4	SB-6-10	
		Boring terminated at 10 feet No groundwater encountered.						
15								
20								

Log of Soil Boring:

Project: Richard and Paul Joyce Property PSA (Parcel #48)
Client: NCDOT (U-4734)
Drilling Method: Geoprobe
Sampler Type: MacroCore
Logged By: CE

Solutions-IES
Industrial & Environmental Services
a division of Draper Aden Associates

Boring Number: SB-7
Boring Date: 3/20/2017
Total Depth of Boring: 10'
Initial Water Level:
Stabilized Water Level:
Cave In Depth:
County: Forsyth

SUBSURFACE PROFILE			SAMPLE					
Depth ft. bgs	USCS Symbol	Description	Sample Interval	% Recovery	FID Field Screen ppm	PID Field Screen ppm	Lab Sample Depth	Well Data
		Ground Surface						
0	ML	Dark yellowish brown silt/clay, moist, very hard.				1.7	SB-7-2	
						1.3		
5	ML	Reddish brown silt, moist, firm to hard.				0.8		
						0.6		
	SM	Light reddish brown fine-grained silty sand, moist, soft.				1.8	SB-7-10	
10		Boring terminated at 10 feet No groundwater encountered.						
15								
20								

Log of Soil Boring:

Project: Richard and Paul Joyce Property PSA (Parcel #48)
Client: NCDOT (U-4734)
Drilling Method: Geoprobe
Sampler Type: MacroCore
Logged By: CE

Solutions-IES
Industrial & Environmental Services
a division of Draper Aden Associates

Boring Number: SB-8
Boring Date: 3/20/2017
Total Depth of Boring: 10'
Initial Water Level:
Stabilized Water Level:
Cave In Depth:
County: Forsyth

SUBSURFACE PROFILE			SAMPLE					
Depth ft. bgs	USCS Symbol	Description	Sample Interval	% Recovery	FID Field Screen ppm	PID Field Screen ppm	Lab Sample Depth	Well Data
		Ground Surface						
0						0.8		
	ML/CL	Reddish brown clayey silt, moist, very hard				1.7		
5						1.8	SB-8-6	
	SM	Dark yellowish brown fine-grained silty sand, moist, soft to firm.				1.0		
10						1.2	SB-8-10	
		Boring terminated at 10 feet No groundwater encountered.						
15								
20								

ATTACHMENT C

PHOTO 1- VIEW OF SOIL BORING LOOKING NORTHWEST

PHOTO 2 - VIEW OF SOIL BORINGS LOOKING WEST

PHOTO 3 - VIEW OF SOIL BORING LOOKING WEST

PHOTO 4 - VIEW OF SOIL BORING LOOKING EAST

PHOTO 5 - VIEW OF SOIL BORING LOOKING NORTHEAST

PHOTO 6 - VIEW OF SOIL BORING LOOKING NORTH

PHOTO 7 - VIEW OF SOIL BORING LOOKING NORTH

PHOTO 8 - VIEW OF SOIL BORING LOOKING NORTHEAST

ATTACHMENT D

QED

REDLAB RAPID ENVIRONMENTAL DIAGNOSTICS

QROS

Hydrocarbon Analysis Results

Client: SIES
Address: 1101 NOWELL RD
RALEIGH, NC 27607

Samples taken Monday, March 20, 2017
Samples extracted Monday, March 20, 2017
Samples analysed Wednesday, March 22, 2017

Contact: M BRANSON

Operator BRUZDZINSKI

Project: NCDOT 2017.0015

H09382

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	SB-1-10	10.3	<0.26	0.48	0.26	0.74	0.16	<0.08	<0.01	75.3	19.2	5.5	No Match found
s	SB-1-12	9.4	<0.24	0.65	1.1	1.8	0.76	<0.08	<0.009	72.3	22.2	5.6	V.Deg.Diesel 77.5%,(FCM),(BO),(P)
s	SB-2-10	27.7	<0.69	<0.69	5.2	5.2	4	<0.22	<0.028	17.8	70.1	12.1	Deg Fuel 94.8%,(FCM)
s	SB-2-12	28.9	<0.72	<0.72	5.4	5.4	4.2	<0.23	<0.029	0	86.2	13.8	Deg Fuel 95.3%,(FCM)
s	SB-3-10	9.9	<0.25	<0.25	13.5	13.5	13.5	0.76	<0.01	0	90	10	Deg Fuel 92.8%,(FCM),(BO)
s	SB-3-12	20.3	<0.51	2.1	5.4	7.5	4.1	0.23	<0.02	43.8	48.1	8.1	Deg Fuel 92.2%,(FCM)
s	SB-4-6	11.5	<0.29	5.6	8.2	13.8	6.5	0.36	<0.011	53.2	38.9	7.9	Deg.Fuel 83.7%,(FCM),(BO)
s	SB-4-10	10.2	<0.26	<0.26	15.6	15.6	15.4	0.85	0.014	0	88.7	11.3	Deg Fuel 89.2%,(FCM),(BO)
s	SB-5-8	9.4	<0.24	0.85	0.24	1.09	0.15	<0.08	<0.009	91.1	6.9	2	No Match found
s	SB-5-10	10.6	<0.27	<0.27	0.27	0.27	0.16	<0.09	<0.011	0	100	0	No Match found

Initial Calibrator QC check OK Final FCM QC Check OK 104.2 %

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

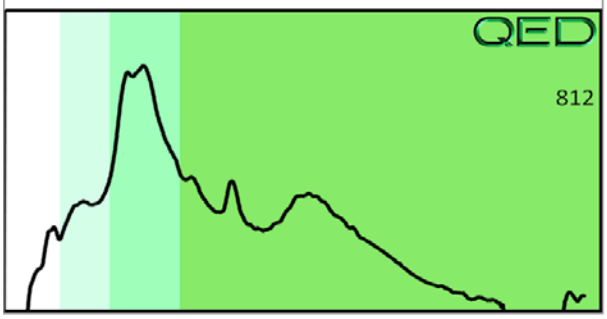
B = Blank Drift : (SBS)/(LBS) = Site Specific or Library Background Subtraction applied to result : (BO) = Background Organics detected : (OCR) = Outside cal range : (M) = Modifed Result.

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

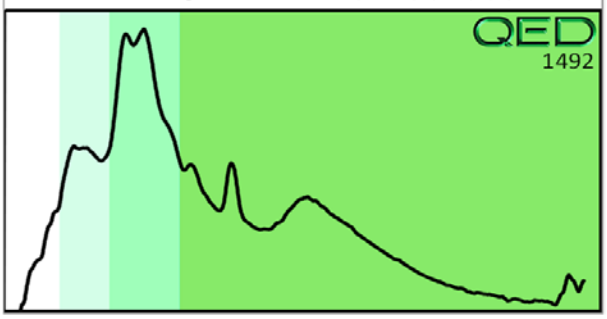
QED Hydrocarbon Fingerprints

Project: NCDOT 2017.0015 Wednesday, March 22, 2017

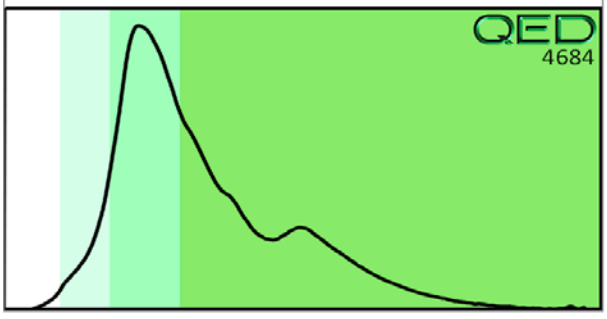
SB-1-10 : No Match found



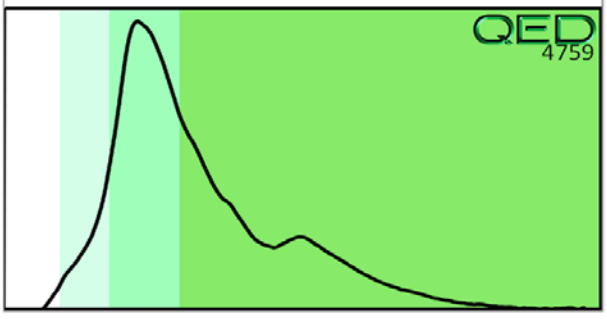
SB-1-12 : V.Deg.Diesel 77.5%,(FCM),(BO),(P)



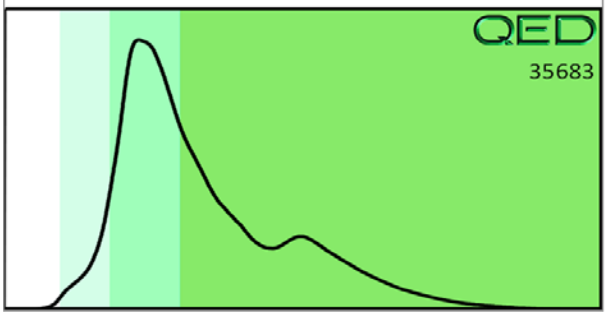
SB-2-10 : Deg Fuel 94.8%,(FCM)



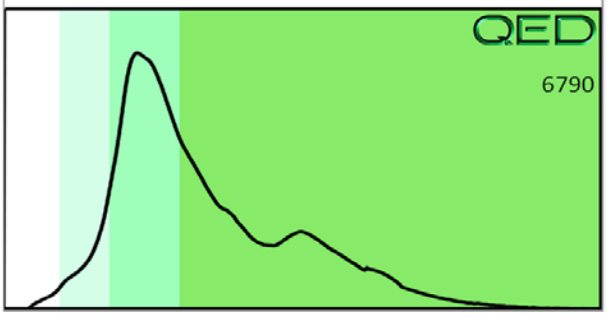
SB-2-12 : Deg Fuel 95.3%,(FCM)



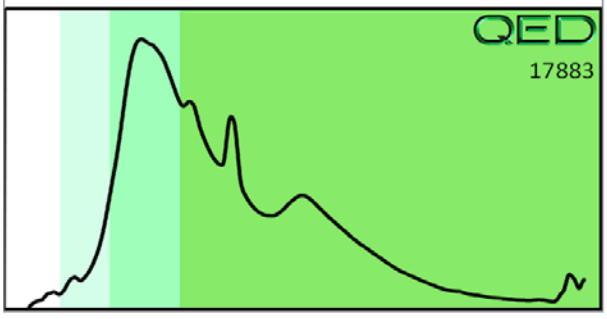
SB-3-10 : Deg Fuel 92.8%,(FCM),(BO)



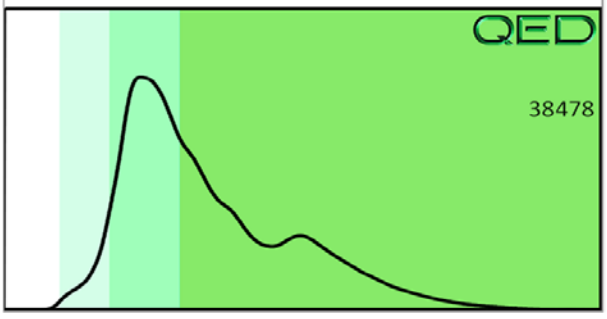
SB-3-12 : Deg Fuel 92.2%,(FCM)



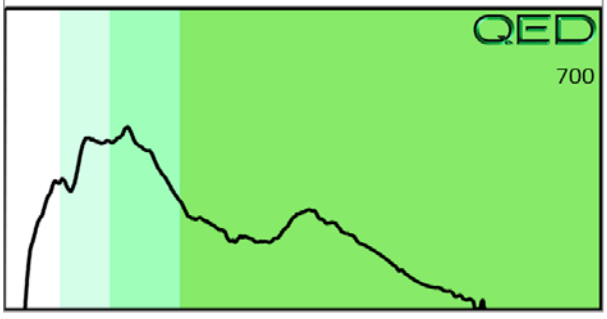
SB-4-6 : Deg.Fuel 83.7%,(FCM),(BO)



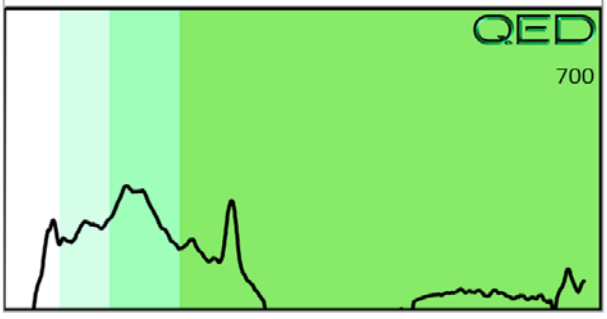
SB-4-10 : Deg Fuel 89.2%,(FCM),(BO)



SB-5-8 : No Match found



SB-5-10 : No Match found



QED

REDLAB RAPID ENVIRONMENTAL DIAGNOSTICS

QROS

Hydrocarbon Analysis Results

Client: SIES
Address: 1101 NOWELL ROAD
RALEIGH NC 27607

Samples taken Tuesday, March 21, 2017
Samples extracted Tuesday, March 21, 2017
Samples analysed Wednesday, March 22, 2017

Contact: M BRANSON
MBRANSON@DAA.COM 919-873-1060
Project: NCDOT 2017.0015

Operator NICK HENDRIX

U00902

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	SB-6-4	31.3	<0.78	<0.78	9.5	9.5	4.6	0.5	<0.031	0	80.4	19.6	Road Tar 66.8%,(FCM)
s	SB-6-10	29.9	<0.75	<0.75	1.1	1.1	0.56	<0.24	<0.03	59.5	30.5	10	V.Deg.PHC 71.5%,(FCM)
s	SB-7-2	27.4	<0.68	<0.68	7.8	7.8	3.5	<0.22	<0.027	0	77	23	Deg Fuel 73.2%,(FCM)
s	SB-7-10	30.2	<0.76	<0.76	14.5	14.5	7	0.79	<0.03	0	79.8	20.2	Road Tar 77.7%,(FCM)
s	SB-8-6	44.8	<1.1	<1.1	3.7	3.7	1.7	<0.36	<0.045	0	75.6	24.4	Deg Fuel 71.7%,(FCM)
s	SB-8-10	28.6	<0.71	<0.71	4	4	1.8	<0.23	<0.029	0	82.2	17.8	Deg.Fuel 74.2%,(FCM)
s	SB-9-6	24.3	<0.61	<0.61	0.61	0.61	0.31	<0.19	<0.024	0	94.1	5.9	Residual HC
s	SB-10-6	27.7	<0.69	<0.69	4	4	2	<0.22	<0.028	0	80.7	19.3	Deg Fuel 77.8%,(FCM)
s	SB-11-6	24.8	<0.62	<0.62	0.62	0.62	0.33	<0.2	<0.025	0	75.8	24.2	V.Deg.PHC 89.3%,(FCM)
s	SB-12-10	14.4	<0.36	<0.36	0.36	0.36	<0.07	<0.12	<0.014	0	100	0	Deg Fuel 74.2%,(FCM)

Initial Calibrator QC check OK Final FCM QC Check OK 96.6 %

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.

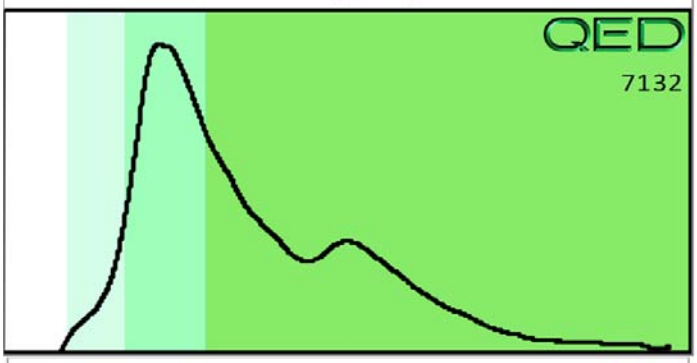
Abbreviations :- FCM = Results calculated using Fundamental Calibration Mode : % = confidence of hydrocarbon identification : (PFM) = Poor Fingerprint Match : (T) = Turbid : (P) = Particulate detected

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.

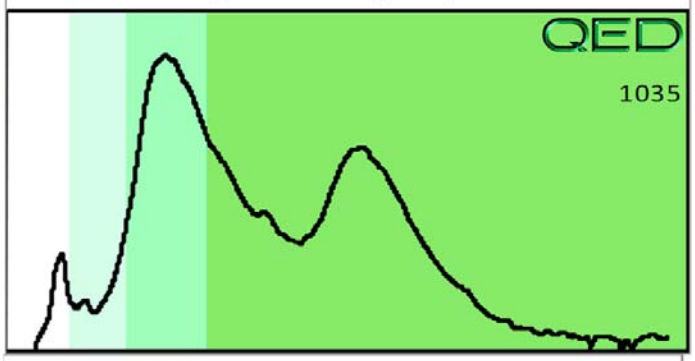
% Ratios estimated aromatic carbon number proportions : HC = Hydrocarbon : PHC = Petroleum HC : FP = Fingerprint only. **Data generated by HC-1 Analyser**

Project: NCDOT 2017.0015 Wednesday, March 22, 2017

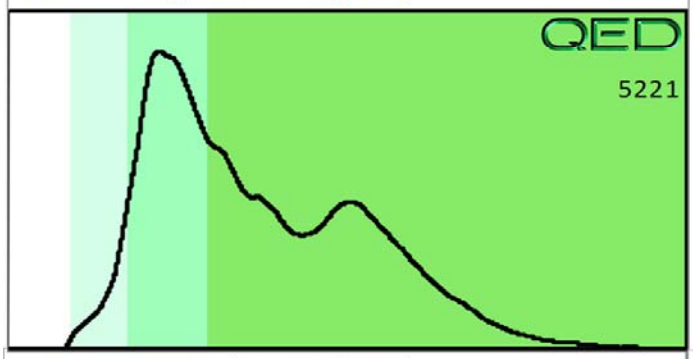
SB-6-4 : Road Tar 66.8%,(FCM)



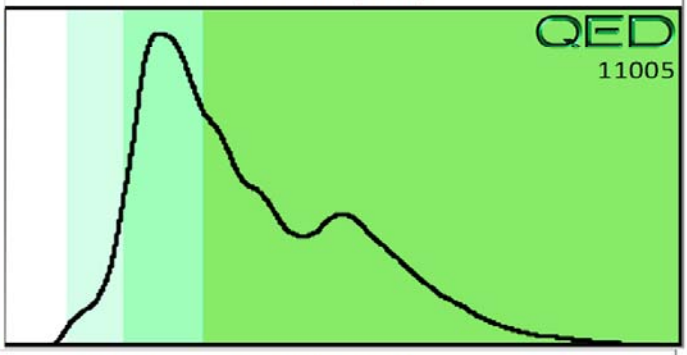
SB-6-10 : V.Deg.PHC 71.5%,(FCM)



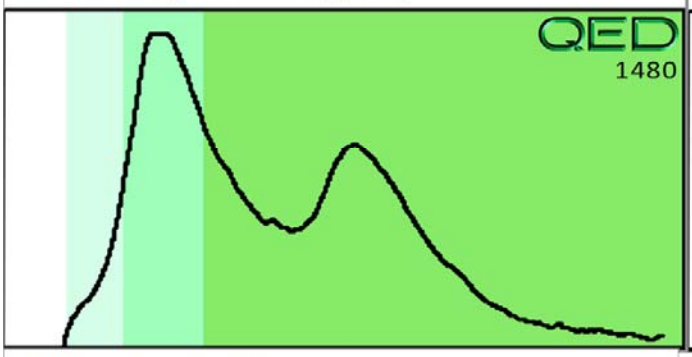
SB-7-2 : Deg Fuel 73.2%,(FCM)



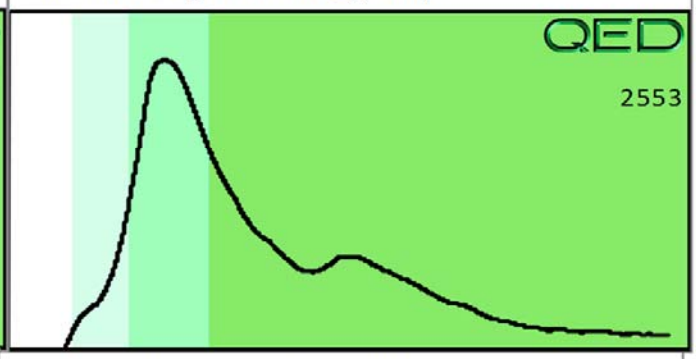
SB-7-10 : Road Tar 77.7%,(FCM)



SB-8-6 : Deg Fuel 71.7%,(FCM)

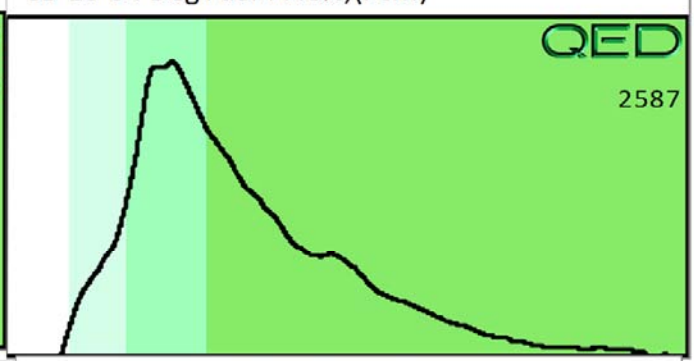


SB-8-10 : Deg.Fuel 74.2%,(FCM)

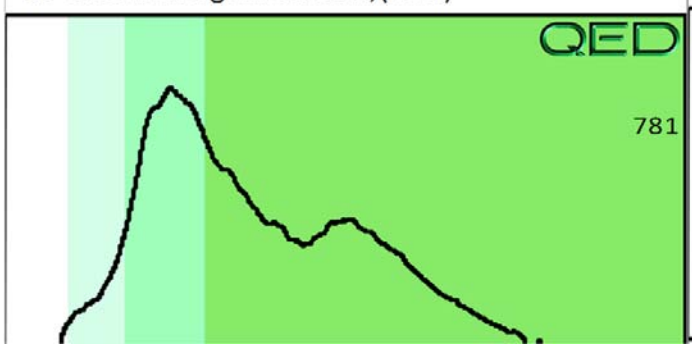


SB-9-6 : Residual HC

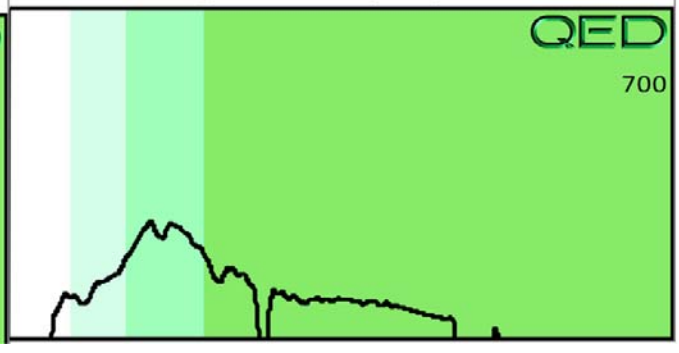
SB-10-6 : Deg Fuel 77.8%,(FCM)



SB-11-6 : V.Deg.PHC 89.3%,(FCM)



SB-12-10 : Deg Fuel 74.2%,(FCM)



Client Name:	SIES
Address:	1101 NOWELL RD RALIEGH, NC 27607
Contact:	MBRANSON
Project Ref.:	
Email:	mbranson@daa.com
Phone #:	919-873-1060
Collected by:	CANDY ELLIOTT

REDLAB™
RAPID ENVIRONMENTAL DIAGNOSTICS

CHAIN OF CUSTODY AND ANALYTICAL REQUEST FORM

RED Lab, LLC
5598 Marvin K Moss Lane
MARBIONC Bldg, Suite 2003
Wilmington, NC 28409

Each sample will be analyzed for BTEX, GRO, DRO, TPH, PAH total aromatics and BaP

Sample Collection Date/Time	TAT Requested 24 Hour	TAT Requested 48 Hour	Matrix (S/W)	Sample ID	UVF	GC BTEX	Total Wt.	Tare Wt.	Sample Wt.
3/20/17 1030			S	SB-1-10			54.9	45.2	9.7
1040				SB-1-12			55.7	45.1	10.6
1045				SB-2-10			54.5	45.1	9.4
1055				SB-2-12			53.3	44.3	9.0
1115				SB-3-10			55.6	45.5	10.1
1120				SB-3-12			54.7	44.9	12.8
1150				SB-4-6			53.8	45.1	8.7
1200				SB-4-10			55.0	45.2	9.8
1230				SB-5-8			56.1	45.5	10.6
1240				SB-5-10			54.8	45.4	9.4
1325				SB-6-4			534	45.1	8.3
1340				SB-6-10			53.9	45.2	8.7
1350				SB-7-2			54.9	45.4	9.5
1355				SB-7-10			53.3	44.7	8.6
1410				SB-8-6			51.1	45.3	5.8
1415				SB-8-10			53.6	44.5	9.1
3/21/17 0840				SB-9-6			55.6	44.9	10.7
0910				SB-10-6			54.2	44.8	9.4
0930				SB-11-6			55.5	45.0	10.5
1000				SB-12-10			55.0	45.3	9.7

Comments: STANDARD TAT

Relinquished by	Date/Time	Accepted by	Date/Time
	3/21/17		3.22.17 1355
Relinquished by	Date/Time	Accepted by	Date/Time

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