
**Preliminary Site Assessment Report
for Highway 221 Widening Project, Ashe County,
State Project: R-2915C
WBS Element: 34518.1.4**

at

**Parcel #032 Ashe County Board of Education Property
Fleetwood Community Center
8996 Highway 221 South
Fleetwood, NC 28626**

Prepared For:

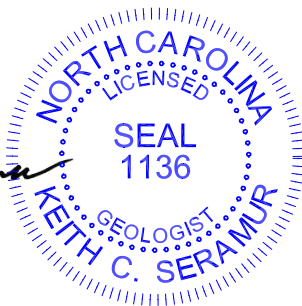
**Mr. Gordon Box
NC DOT, Geotechnical Engineering Unit
GeoEnvironmental Section
1589 Mail Service Center
Raleigh, NC27699-1589**

Prepared By:

**Seramur & Associates, PC
165 Knoll Drive
Boone, NC 28607**

May 18, 2015 (Rev. June 2, 2015)

Keith C. Seramur



Keith C. Seramur, P.G.

Signature and Seal

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1.0 Introduction

1.1 General Site Background Information

Seramur & Associates, PC was contracted to complete a Preliminary Site Assessment (PSA) at the Ashe County Board of Education Property in Fleetwood, North Carolina (Figure 1). The property is:

1. Parcel #032 Ashe County Board of Education Property
Fleetwood Community Center
8996 Highway 221 South, Fleetwood, NC 28626
(referred to in our report as “Fleetwood Community Center”)

The PSA scope of work included completing geophysical surveys at the property to investigate the potential for underground storage tanks followed by soil sampling to assess soil quality and estimate the volume of potentially contaminated soil at the site.

2.0 Scope of Work

2.1 Geophysical Surveys

The MF-1 Fluxgate magnetometer is designed to measure changes in the earth’s magnetic field associated with larger objects such as a steel pipe and buried drums and tanks. It is very sensitive to USTs. Seramur & Associates used the magnetometer to locate the ends of the two registered heating oil tanks. A magnetometer survey across the proposed right of way was completed with a MF-1 Fluxgate magnetometer. Vegetation and slope prevented using the GPR to survey around the USTs.

2.2 Soil Sampling and Analyses

On May 6, 2015, Geonetics Corporation, Dba: Techdrill mobilized to the site to drill soil test borings and collect soil samples. The soil borings were drilled with a track-mounted rotary drill rig using hollow stem augers. Drilling tools were decontaminated prior to advancing each soil boring. The drilling tools were cleaned with a hot-water pressure wash. Split spoons and the cutter head were decontaminated by washing with non-phosphate detergent, rinsed with de-ionized water, rinsed with isopropyl alcohol and a final rinse with de-ionized water.

Boring B-1 was advanced through the asphalt/concrete pavement to a depth of 12 feet. Soil samples were collected at 2 to 4 feet, 8 to 10 feet and 10 to 11.5 feet. A hang auger was used to drill down to a depth of 3.5 feet in boring B-2. This precaution was taken to avoid hitting the fuel line with hollow-stem augers. Boring B-2 was drilled to a depth of 12 feet with soil samples being collected at depths of 3.5 to 5 feet, 8 to 10 feet and 10 to 12 feet.

A new pair of Nitrile gloves was worn while collecting each soil sample from the split spoons. A representative portion of soil from each split spoon was placed in a zip lock bag and allowed

to sit for a period of time. A calibrated Photoionization detector was used to screen the headspace in each bag and the concentration of volatile petroleum vapors measured by the PID was recorded. The texture and type of soil material for each sample was recorded. Table 1 lists the soil boring number, depth, PID reading, soil texture and soil type for each sample.

Soil samples were observed for staining and odor as they were collected. Our protocol is to collect one shallow (2 to 4 feet) and one deep sample (~10 feet) from each boring. A 5-gram terra core soil sampler was used to place the soil samples in containers prepared and supplied by QROS Laboratory. The containers were labeled and immediately placed on ice in a cooler. Chain of Custody (COC) records were completed to document site information and sample collection data. COC records accompanied the samples from the time they were collected until they were delivered to QROS Laboratories in Wilmington, North Carolina. The samples were shipped overnight to the laboratory via FedEx.

QROS Laboratory analyzed the soil samples for petroleum constituents by Ultra-Violet Fluorescence using a QED HC-1 analyzer. The laboratory reports and chain of custody records are included in Appendix B.

3.0 Results of Investigation

3.1 Geophysical Surveys

The NCDENR UST database lists 2 USTs at the Fleetwood Community Center (Table 1). A local informant indicated that the “new oil tank” was located on the north side of the drive.

The magnetometer was used only to locate the ends of the two heating oil tanks. The magnetometer did not detect anomalies likely to be associated with buried USTs in other areas of the proposed right of way and drainage easement.

3.2 Soil Borings, Sampling and Laboratory Results

Two soil borings B-1 and B-2 were drilled at the Fleetwood Community Center (Figure 2). The borings were drilled around the fill pipe for the 7500 gallon heating oil UST (Figure 2). The purpose of these soil borings was to describe soils around the UST and document soil quality.

Three soil samples were collected from boring B-1 and two samples were collected from boring B-2. The soil samples from boring B-1 were collected from 2 to 4 feet, 8 to 10 feet and 10 to 11.5 feet (Table 2). The soil samples from boring B-2 were collected from 3.5 to 5 feet and 10 to 12 feet (Table 2).

Field screening with the PID did not detect petroleum vapors in the soil samples (Table 2). A grey stained soil with a petroleum odor was observed in the 2 to 4 foot sample of boring B-1. There were no petroleum odors or soil staining noted in any of the other soil samples collected at the Fleetwood Community Center.

Diesel range petroleum hydrocarbons (TPH- DRO) were detected at a concentration of 22 ppm in the 2 to 4 foot soil sample (S-51) from boring B-1 (Table B-3). The laboratory fingerprint for this detection indicated it was degraded fuel. The TPH-DRO detected in the 2 to 4 foot sample is attributed to overfill/spillage associated with filling the UST.

TPH-DRO were also detected (8.7 ppm) in the deeper 10 to 11.5 foot sample (S-53) in boring B-1. The laboratory fingerprint for the detection in S-53 is also degraded fuel and could be petroleum constituents that have translocated down the soil profile from overfill at the top of the tank. However, the origin of these lower concentrations of TPH-DRO in sample S-53 is uncertain because TPH-DRO was not detected in the 8 to 10 foot sample (S-52) collected between samples S-51 and S-53.

TPH-DRO was detected at a concentration of 1.2 ppm in the shallow soil sample (S-54) from boring B-2. The laboratory fingerprint for the detection in S-54 is very degraded petroleum hydrocarbons. Petroleum hydrocarbons were not detected above the minimum qualification limits in the 10 to 12 foot sample (S-55) from boring B-2.

The TPH-DRO concentrations in soil samples S-53 and S-54 were below the gasoline and diesel range organics Action Level of 10 ppm set by NCDENR (Figure 3 & Table B-3). Soil sample S-51 had a TPH-DRO concentration of 22 ppm which is above the NCDENR Action Level (Table B-3).

3.3 Volume and Extent of Contaminated Soil

Only sample S-51 had TPH-DRO concentration that exceeded the NCDENR Action Level of 10 ppm. This slightly elevated level of TPH-DRO is likely from overfill/spillage when filling the UST since this boring is near the fill pipe. It was fingerprinted as degraded fuel. Drilling around the UST was limited to two borings because of the slope at the site and the easement boundary.

A reasonable approximation of the volume of contaminated soil can be made using one half the volume of a sphere with a radius of 4 feet (Figure 5). A radius of 4 feet was chosen because soil sample S-51 was collected from a depth of 2 to 4 feet and boring B-1 is 5.25 feet from the fill pipe (Figure 5). This is a volume equal to 134 cubic feet or approximately 5 cubic yards. The volume of contaminated soil from the overfill/spillage is not more than 5 cubic yards.

3.4 Conclusions

The UST assessment at the Fleetwood Community Center detected petroleum constituents in one soil sample (S-51) at concentrations that exceeded the NCDENR Action Level for TPH DRO of 10 ppm (Table B-3). This is likely due to over filling of the heating oil tank and some minute residuals left from that.

The magnetometer delineated the ends of the two USTs on the property. The magnetometer and GPR system did not detect anomalies potentially associated with additional USTs within the right of way and easement. The north corner of the 7500 gallon heating oil UST extends below the permanent drainage easement (Figure 3).

A limited volume of contaminated soil was detected by the shallow sample (S-51) in boring B-1. The contaminated soil is attributed to overfill/spillage when filling the UST. We estimate the volume of the contaminated soil to be less than 5 cubic yards.

The 7500 gallon heating oil UST extends under the permanent drainage easement boundary (Figure 3). Approximately 5 cubic yards of contaminated soil are present around the top of the UST. TPH-DRO detected in soil sample S-53 (10 to 11.5 feet below ground surface) indicates that there could be additional contaminated soil directly below the UST.

Seramur & Associates has reviewed the plans provided for the expansion of US 221. It does not appear that construction of the standard V-ditch within the permanent drainage easement will require excavation of contaminated soil (Figure 3).

3.5 Recommendations

Contaminated soil was detected around the top of the UST. Seramur & Associates recommends that a Licensed geologist or engineer supervise the excavation and removal of this contaminated soil. Petroleum constituent concentrations were detected at the base of the UST at concentrations below the NCDENR Action Levels. It is possible that these petroleum constituents leaked from the UST. We further recommend that a Licensed geologist or engineer supervise the UST closure and collect the required soil samples below the UST and along the product lines.

Table 1. NCDENR UST Data - 8996 Highway 221 South

Facility Name	Address	City	State	Zip	Contact	Address	City	State	Zip
Fleetwood Elementary School	8996 US Hwy 221 South	Fleetwood	NC	28626	Ashe County Board of Education	PO Box 604	Jefferson	NC	28640
Fleetwood Elementary School	8996 US Hwy 221 South	Fleetwood	NC	28626	Ashe County Board of Education	PO Box 604	Jefferson	NC	28640

Tank Id	Installation Date	Capacity	Commercial	Regulated	Product Name
1	10/1/75	10000	Y	N	Heating Oil/Fuel
2	10/1/80	7500	Y	N	Heating Oil/Fuel

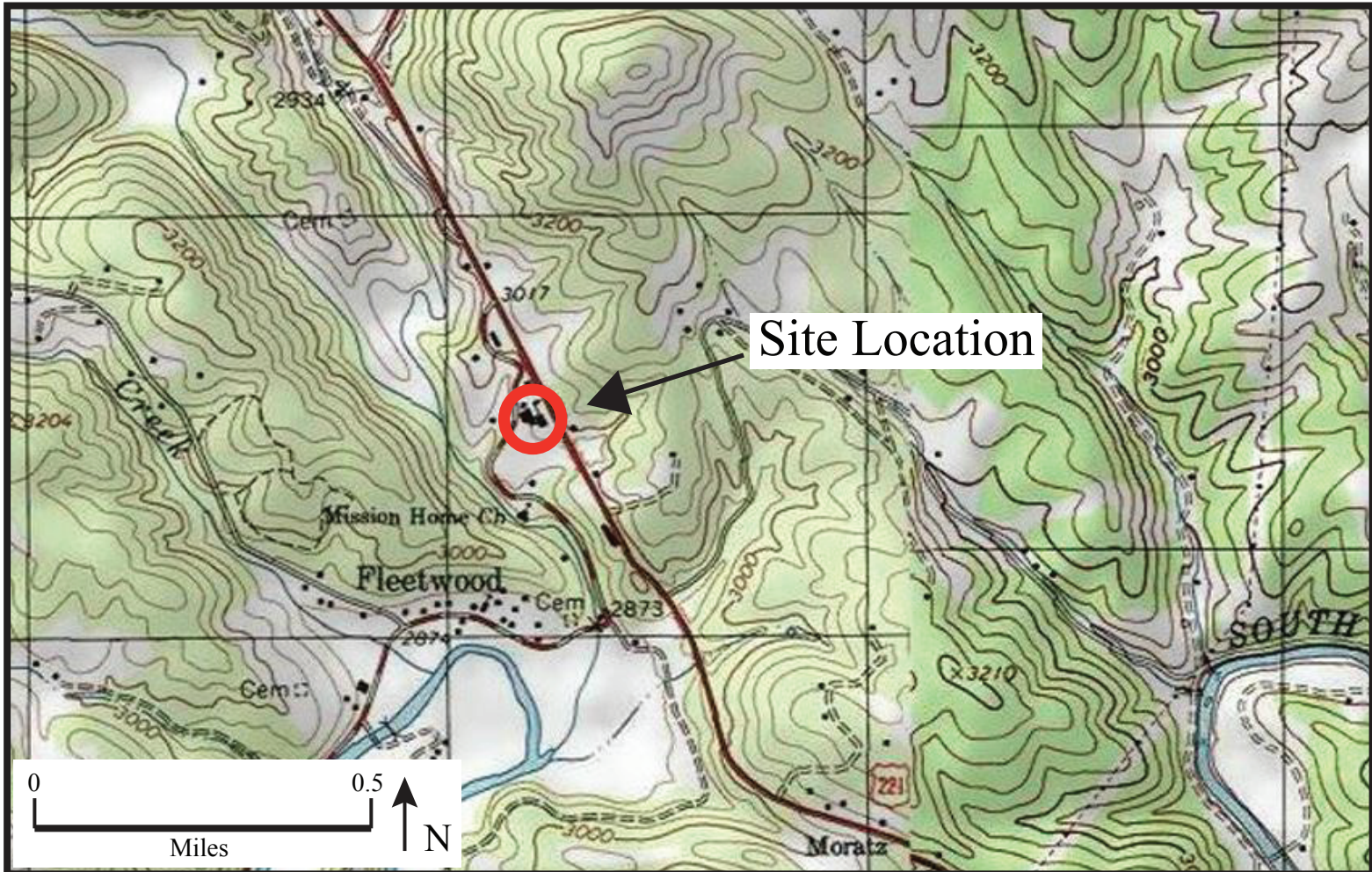
Table 2. Soil Boring Data -- 8996 Highway 221 South

Boring No.	Depth (ft)	Lithology	Soil type	Soil Sample	PID ppm	Comments
B-1	2 to 4	Sandy Silt	Fill	S-51	0	Petro odor
B-1	8 to10	Silty Sand	Saprolite	S-52	0	
B-1	10 to 11.5	Silty Sand	Saprolite	S-53	0	Auger Refusal @ 11.5 ft
B-2	3.5 to 5	Sandy silt	Fill	S-54	0	
B-2	8 to 10	NA	NA	NA	NA	No Recovery
B-2	10 to 12	Silty Sand	Residual	S-55	0	

Table B-3: Summary of Soil Sampling Results – 8996 Highway 221 South
 Revision Date: 5-11-2015 Name: Parcel #032 Fleetwood Community Center

Analytical Method (e.g., VOC by EPA 8260) →					8015C	8015C	
Contaminant of Concern →					TPH GRO (ppm)	TPH DRO (ppm)	Hydro- carbon Fingerprint
Sample ID	Date Collected (m/dd/yy)	Source Area (eg. Tank pit 1)	Sample Depth (ft BGS)	Incident Phase (Closure, 20Day, LSA, etc.)			
S-51	5/06/15	B-1	2.0-4.0 ft	PSA	<0.33	22	Deg. Fuel
S-52	5/06/15	B-1	8.0-10.0 ft	PSA	<0.33	<0.13	V. Deg. PHC
S-53	5/06/15	B-1	10.0-11.5 ft	PSA	<0.32	8.7	Deg. Fuel
S-54	5/06/15	B-2	3.5-5.0 ft	PSA	<0.35	1.2	Deg. PHC
S-55	5/06/15	B-2	10.0-12.0 ft	PSA	<0.36	<0.15	PHC- ND
NCDENR Action Level					10	10	

Note: PHC – Petroleum Hydrocarbons
 ND – Not Detected



8996 Highway 221
U.S. Geological Survey,
The National Map

Figure 1
Site Location Map

Seramur & Associates, PC
165 Knoll Drive
Boone, NC

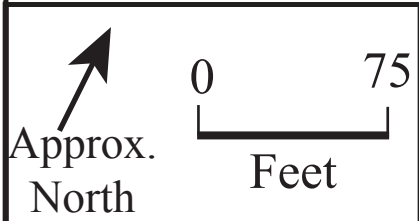
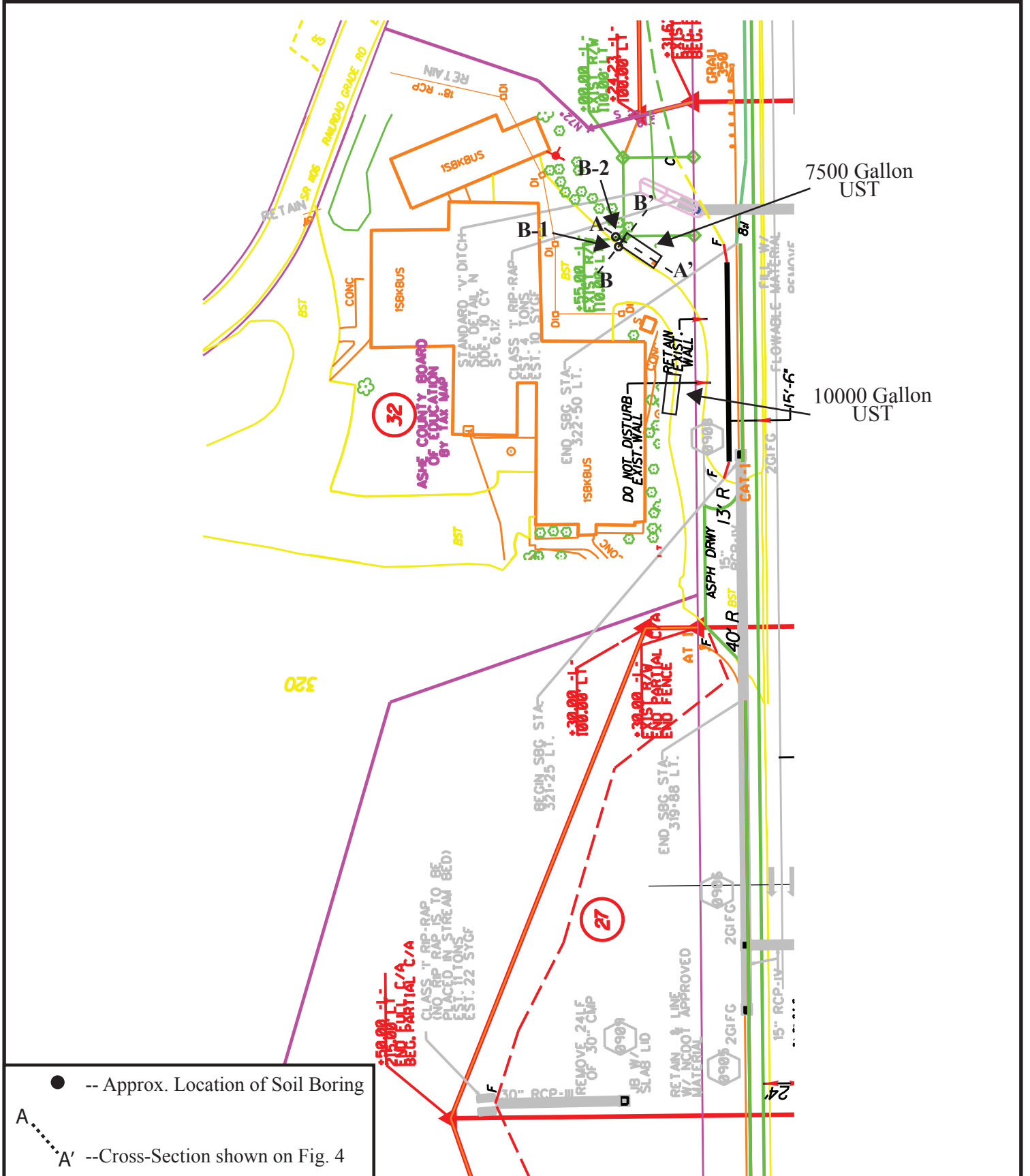


Figure 2
 Site Map with
 Soil Boring
 Locations

Fleetwood Community Center
 8996 Highway 221 South
 Fleetwood, NC

Seramur & Associates, PC
 165 Knoll Drive
 Boone, NC

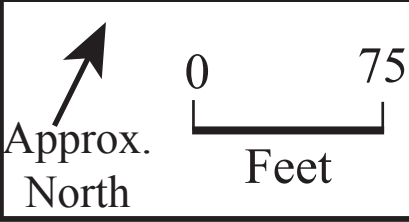
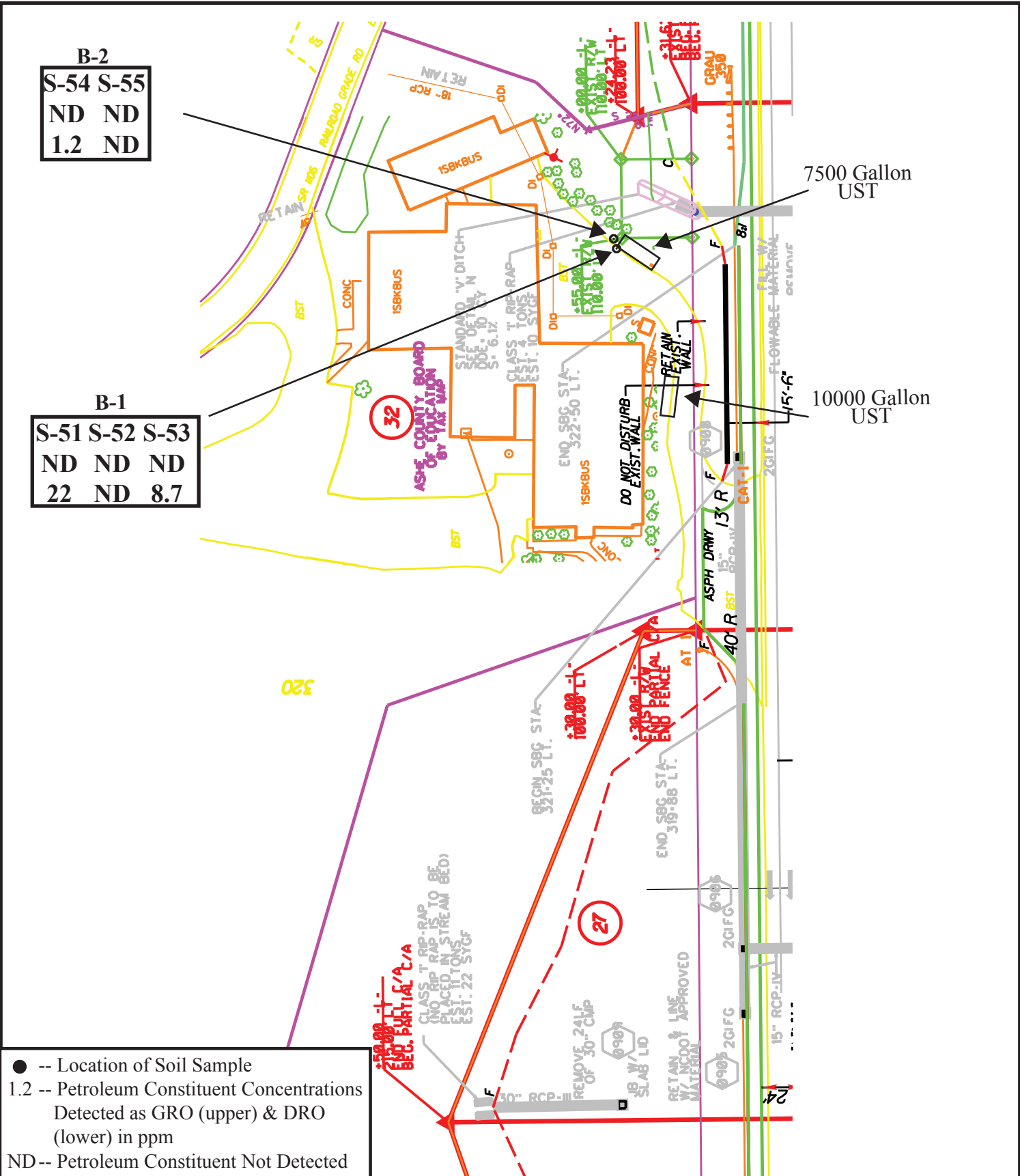
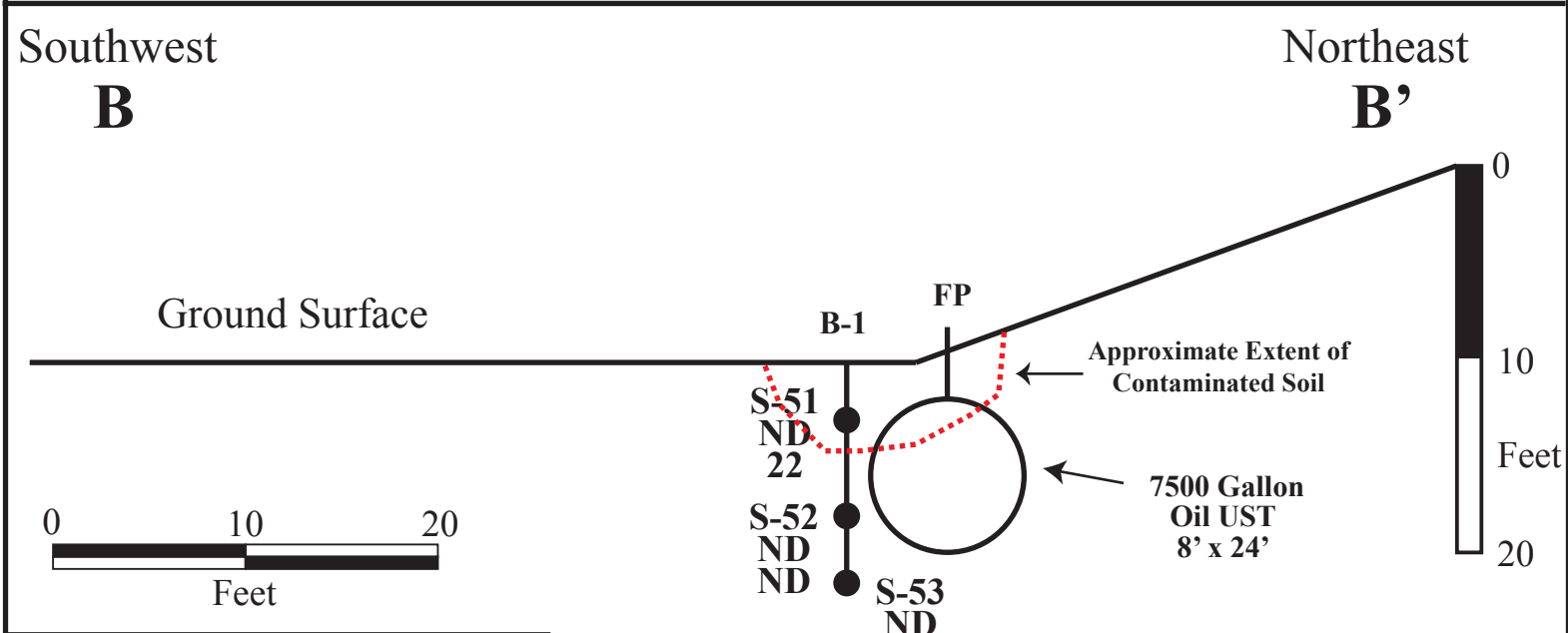
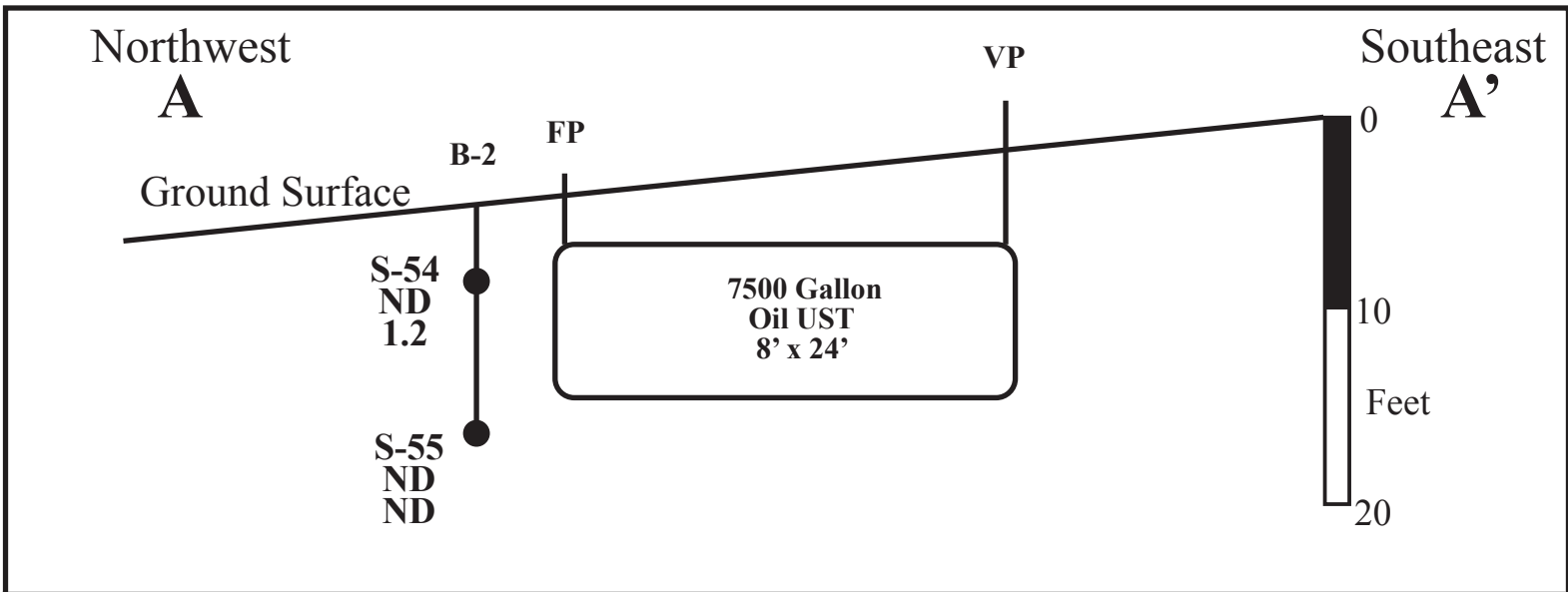


Figure 3
 Soil Sample Analytical Results

Fleetwood Community Center
 8996 Highway 221 South
 Fleetwood, NC

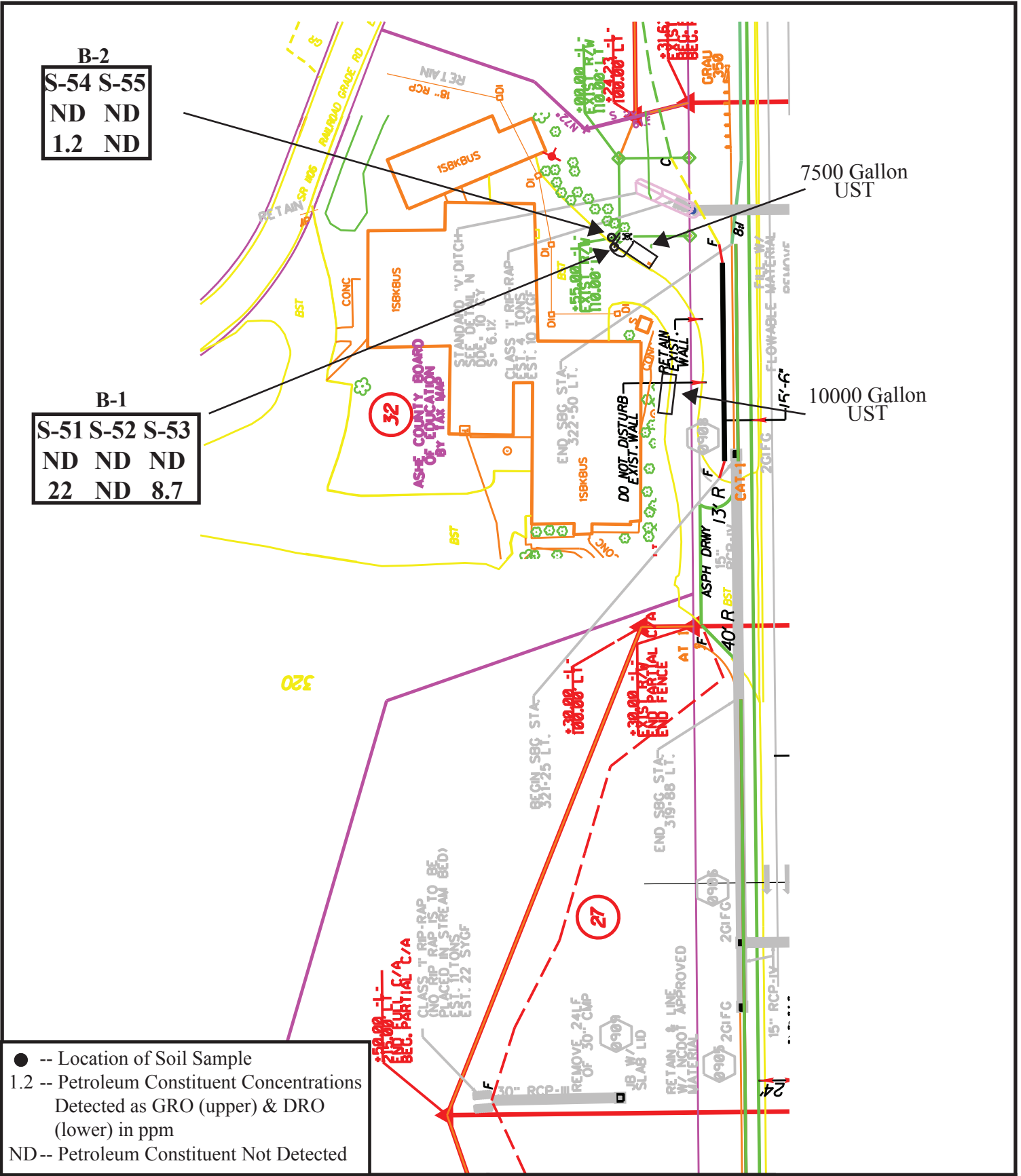
Seramur & Associates, PC
 165 Knoll Drive
 Boone, NC



● -- Location of Soil Sample
 FP -- Fill Pipe on UST
 VP -- Vent Pipe on UST
 1.2 -- Petroleum Constituent Concentrations
 Detected as GRO (upper) & DRO
 (lower) in ppm
 ND-- Petroleum Constituent Not Detected

Note: All locations are approximate

<p>Figure 4 Cross-Sections A-A' and B-B'</p>	<p>Fleetwood Community Center 8946 Highway 221 South Fleetwood, NC</p>	<p>Seramur & Associates, PC 165 Knoll Drive Boone, NC</p>
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B-2	
S-54	S-55
ND	ND
1.2	ND

B-1		
S-51	S-52	S-53
ND	ND	ND
22	ND	8.7

● -- Location of Soil Sample
 1.2 -- Petroleum Constituent Concentrations Detected as GRO (upper) & DRO (lower) in ppm
 ND-- Petroleum Constituent Not Detected

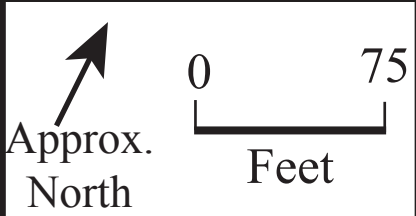


Figure 5
 Area of Soil Containing Petroleum Hydrocarbons

Fleetwood Community Center
 8996 Highway 221 South
 Fleetwood, NC

Seramur & Associates, PC
 165 Knoll Drive
 Boone, NC

Appendix B – Laboratory Reports



Hydrocarbon Analysis Results

Client: Seramur and Associates
Address: Boone, NC

Samples taken
Samples extracted
Samples analysed

Wednesday, May 06, 2015
 Wednesday, May 06, 2015
 Friday, May 08, 2015

Contact: Keith Seramur

Operator

F. Owen

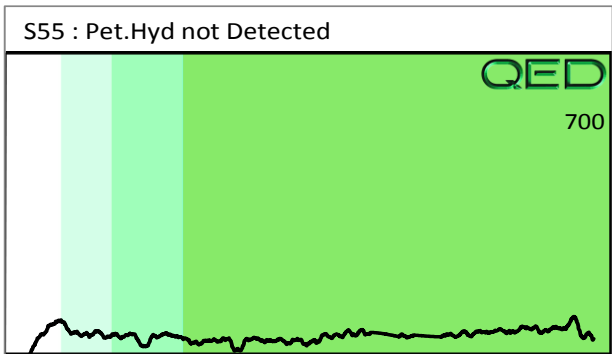
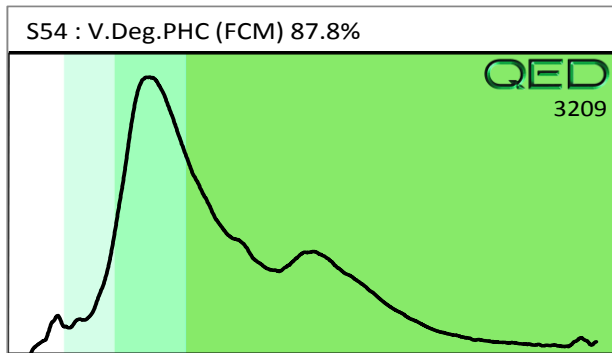
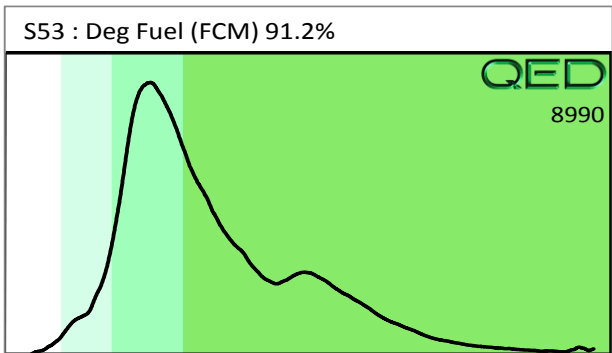
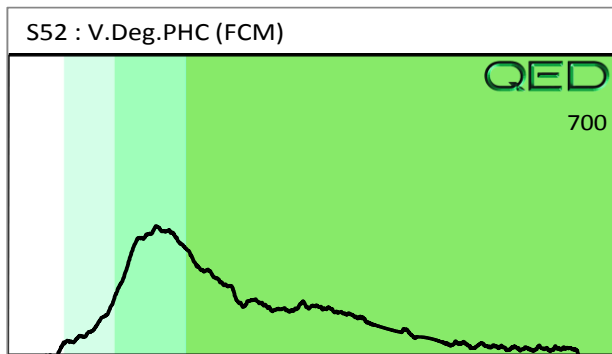
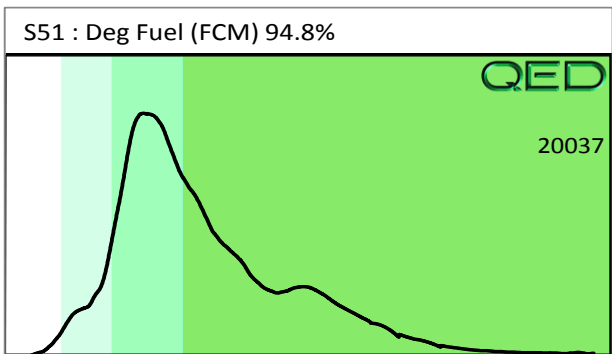
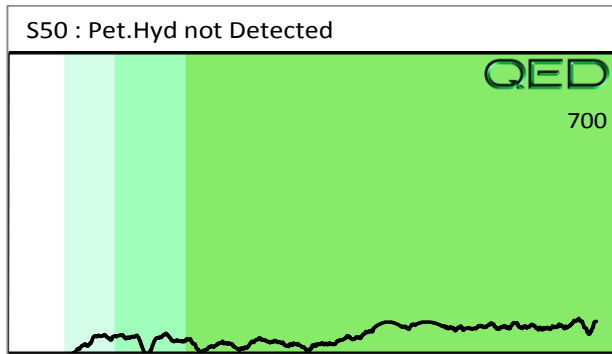
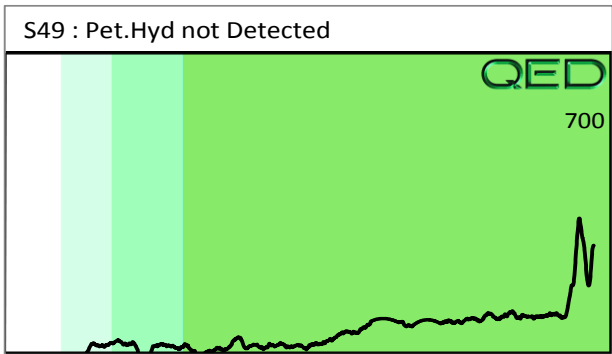
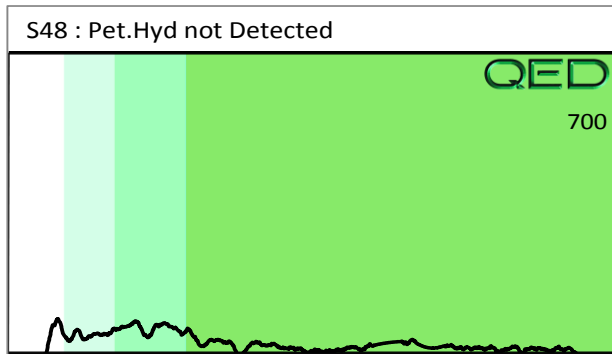
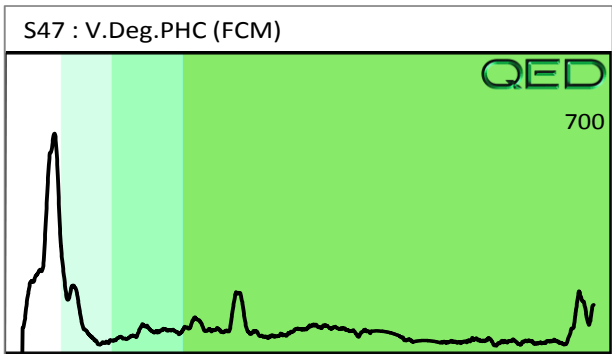
Project: NC DOT R-2915C

Fingerprints Only													
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	
s	S47	14.3	<0.71	<0.36	<0.14	<0.36	<0.07	<0.01	<0.007	0	100	0	V.Deg.PHC (FCM)
s	S48	14.9	<0.75	<0.37	<0.15	<0.37	<0.07	<0.01	<0.007	0	0	0	Pet.Hyd not Detected
s	S49	14.4	<0.36	<0.36	<0.14	<0.36	<0.07	<0.01	<0.007	0	0	0	Pet.Hyd not Detected
s	S50	13.8	<0.34	<0.34	<0.14	<0.34	<0.07	<0.01	<0.007	0	0	0	Pet.Hyd not Detected
s	S51	13.0	<0.65	<0.33	22	22	7.2	0.28	0.004	0	93.7	6.3	Deg Fuel (FCM) 94.8%
s	S52	13.0	<0.65	<0.33	<0.13	<0.33	<0.07	<0.01	<0.007	0	71	29	V.Deg.PHC (FCM)
s	S53	12.7	<0.63	<0.32	8.7	8.7	2.7	0.11	0.001	0	91.6	8.4	Deg Fuel (FCM) 91.2%
s	S54	14.1	<0.71	<0.35	1.2	1.2	1.1	0.06	<0.007	0	91.1	8.9	V.Deg.PHC (FCM) 87.8%
s	S55	14.5	<0.73	<0.36	<0.15	<0.36	<0.07	<0.01	<0.007	0	0	0	Pet.Hyd not Detected
Initial Calibrator QC check			OK			Final FCM QC Check			OK			103.0%	

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






Chain of Custody Record and Analytical Request Form

Sample ID QED UVF	Sample Collection		Initials	TAT Requested	
	Date	Time		24 Hour	48 Hour
S-1	5/4/15	10:19	KCS		X
S-2	5/4/15	10:22	KCS		X
S-3	5/4/15	10:35	KCS		X
S-4	5/4/15	10:49	KCS		X
S-5	5/4/15	11:06	KCS		X
S-6	5/4/15	11:15	KCS		X
S-7	5/4/15	11:38	KCS		X
S-8	5/4/15	11:41	KCS		X
S-9	5/4/15	11:44	KCS		X
S-10	5/4/15	12:20	KCS		X
S-11	5/4/15	12:50	KCS		X
S-12	5/4/15	13:01	KCS		X
S-13	5/4/15	13:32	KCS		X
S-14	5/4/15	13:50	KCS		X
S-15	5/4/15	14:27	KCS		X
S-16	5/4/15	14:38	KCS		X
S-17	5/4/15	14:42	KCS		X

Client: Sevamar & Associates
 Contact: Keith Sevamar
 Phone: 828 773 0499
 Email: sevamar@icloud.com
 Project Reference: NCDOT R-2915-C

Each Sample will be analyzed for total BTEX, GRO, DRO, TPH, and PAH
 Each Sample will generate a fingerprint representative of the petroleum product within the sample. Electronic Data will be submitted to the email above.

	5/6/15	Fed Ex	5/6/15 1500
Relinquished by	Date/time	Accepted by	Date/time
Relinquished by	Date/time	Accepted by	Date/time
Relinquished by	Date/time	Accepted by	Date/time

SHIP TO: QROS
 420 Raleigh Street Suite E
 Wilmington, NC 28412
 Contact: Leila Tabatabai
leilat@qrosllc.com
 910-508-1940

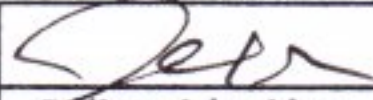


Chain of Custody Record and Analytical Request Form

Sample ID	Sample Collection		Initials	TAT Requested	
	Date	Time		24 Hour	48 Hour
S-18	5/4/15	15:25	KCS		X
S-19	5/4/15	15:46	KCS		X
S-20	5/4/15	16:08	KCS		X
S-21	5/4/15	16:15	KCS		X
S-22	5/4/15	16:10	KCS		X
S-23	5/4/15	16:30	KCS		X
S-24	5/4/15	16:45	KCS		X
S-25	5/4/15	17:11	KCS		X
S-26	5/4/15	17:35	KCS		X
S-27	5/4/15	19:11	KCS		X
S-28	5/4/15	19:45	KCS		X
S-28A	5/5/15	9:49	KCS		X
S-29	5/5/15	10:09	KCS		X
S-30	5/5/15	10:43	KCS		X
S-31	5/5/15	10:51	KCS		X
S-32	5/5/15	11:07	KCS		X
S-34	5/5/15	11:18	KCS		X

Client: Seaman & Associates
 Contact: Keith Seaman
 Phone: 828 723 0499
 Email: seaman@idaid.com
 Project Reference: NC DOT R-2915-C

Each Sample will be analyzed for total BTEX, GRO, DRO, TPH, and PAH
 Each Sample will generate a fingerprint representative of the petroleum product within the sample. Electronic Data will be submitted to the email above.

	5/6/15	PaEx	5/6/15 15:00
Relinquished by	Date/time	Accepted by	Date/time
Relinquished by	Date/time	Accepted by	Date/time
Relinquished by	Date/time	Accepted by	Date/time

SHIP TO: QROS
 420 Raleigh Street Suite E
 Wilmington, NC 28412
 Contact: Leila Tabatabai
leilat@qrosllc.com
 910-508-1940



Chain of Custody Record and Analytical Request Form

Sample ID	Sample Collection		Initials	TAT Requested	
	Date	Time		24 Hour	48 Hour
S-35	5/5/15	11:33	KCS		X
S-36	5/5/15	11:54	KCS		X
S-37	5/5/15	12:08	KCS		X
S-38	5/5/15	12:20	KCS		X
S-39	5/5/15	13:17	KCS		X
S-40	5/5/15	13:31	KCS		X
S-41	5/5/15	14:57	KCS		X
S-42	5/5/15	15:04	KCS		X
S-43	5/5/15	15:30	KCS		X
S-44	5/5/15	15:52	KCS		X
S-45	5/5/15	16:10	KCS		X
S-46	5/5/15	16:27	KCS		X
S-47	5/5/15	16:37	KCS		X
S-48	5/5/15	16:45	KCS		X
S-49	5/6/15	9:13	KCS		X
S-50	5/6/15	9:29	KCS		X
S-51	5/6/15	10:36	KCS		X

Client: ~~QROS~~ Serafin & Associates

Contact: Keith Serafin

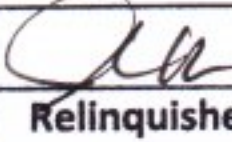
Phone: 828 773 0499

Email: serafin@icloud.com

Project Reference: NC DOT R-2915-C

Each Sample will be analyzed for total
BTEX, GRO, DRO, TPH, and PAH

Each Sample will generate a fingerprint
representative of the petroleum product
within the sample. Electronic Data will be
submitted to the email above.

	5/6/15	Fed Ex	5/6/15 1500
Relinquished by	Date/time	Accepted by	Date/time
Relinquished by	Date/time	Accepted by	Date/time
Relinquished by	Date/time	Accepted by	Date/time

SHIP TO: QROS
 420 Raleigh Street Suite E
 Wilmington, NC 28412
 Contact: Leila Tabatabai
leilat@qrosllc.com
 910-508-1940



Chain of Custody Record and Analytical Request Form

Sample ID	Sample Collection			TAT Requested	
	QED UVF	Date	Time	Initials	24 Hour
S-52	5/6/15	11:01	KCS		X
S-53	5/6/15	11:08	KCS		X
S-54	5/6/15	11:27	KCS		X
S-55	5/6/15	11:55	KCS		X

Client: <u>Sevann & Associates</u>
Contact: <u>Keith Sevannur</u>
Phone: <u>828 723 0499</u>
Email: <u>sevannur@icloud.com</u>
Project Reference: <u>NC DOT R-2915-C</u>

Each Sample will be analyzed for total BTEX, GRO, DRO, TPH, and PAH

Each Sample will generate a fingerprint representative of the petroleum product within the sample. Electronic Data will be submitted to the email above.

<u>[Signature]</u>	5/6/15	<u>Fed Ex</u>	5/6/15 1500
Relinquished by	Date/time	Accepted by	Date/time
Relinquished by	Date/time	Accepted by	Date/time
Relinquished by	Date/time	Accepted by	Date/time

SHIP TO: QROS

420 Raleigh Street Suite E
 Wilmington, NC 28412

Contact: Leila Tabatabai
leilat@qrosllc.com

910-508-1940