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

at

Parcel #034 Christopher Evan & Kyala Moore Property
Moore Residence
8946 Highway 221 South
Fleetwood, NC 28626

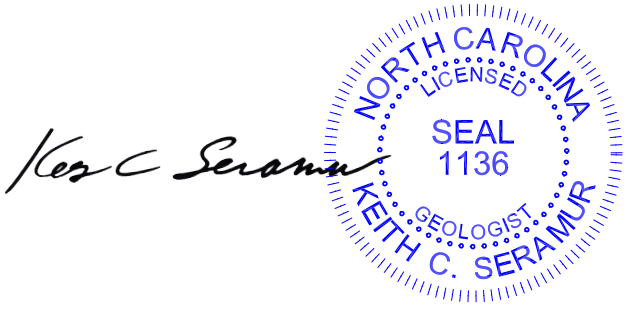
Prepared For:

Mr. Gordon Box
NC DOT, Geotechnical Engineering Unit
GeoEnvironmental Section
1589 Mail Service Center
Raleigh, NC 27699-1589

Prepared By:

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

May 18, 2015 (Revised 6-2-15)



Keith C. Seramur, P.G.

Signature and Seal

TABLE OF CONTENTS

SECTION **PAGE**

1.0 Introduction

1.1 General Site Background Information

Seramur & Associates, PC was contracted to complete a Preliminary Site Assessment (PSA) at the Moore Residence in Fleetwood, North Carolina (Figure 1). The property is:

1. Parcel #034 Moore, Christopher Evan and Kyala
   8946 Highway 221 South, Fleetwood, North Carolina 28626
   (Referred to in our report as "Moore Residence")

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

Seramur & Associates set up a 20' x 30' grid on the south side of the house. A magnetometer survey was completed with a MF-1 Fluxgate magnetometer. Magnetometer data was collected along transects with 2-foot spacing. Magnetometer data was compiled in an Excel spread sheet and a contour map of the data was drafted using Golden Software's Surfer® modeling program.

The magnetometer was also used to survey other areas around the residence where additional heating oil USTs might be located. Seramur & Associates did not find evidence of additional USTs.

A Ground Penetrating Radar survey (GPR) was completed for the grid using Geophysical Survey Systems, Inc. 400 MHz antenna and a SIR-3000 Single Channel Data Acquisition System with a calibrated survey wheel. The GPR data was downloaded and saved onto a computer. The GPR grid data has been processed and modeled using GSSI's Randan® software. The GPR data processing included adjusting time zero, completing a background removal and adjusting the time variable gain to enhance deep reflections.

2.2 Soil Sampling and Analyses

On May 4, 2015, Seramur & Associates mobilized to the site to drill soil test borings and collected soil samples (Figure 2). The soil borings were drilled using 3-inch stainless steel hand augers. Hand augers were decontaminated prior to advancing each soil boring with a hot-water wash using non-phosphate detergent, a de-ionized water rinse, an isopropyl alcohol rinse, and a final rinse with de-ionized water.

Each boring was advanced until a depth of 2 feet below the base of the UST or auger refusal.

A new pair of Nitrile gloves was worn while collecting each soil sample. A representative soil sample from each auger 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, sample depth, PID reading and soil texture and soil type for each sample.

Our project design called for one soil sample to be collected from the bottom of each boring. A 5-gram terra core soil sampler was used to collect soil samples and place them 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 MF-1 Fluxgate magnetometer is designed to measure changes in the earth's magnetic field associated with larger objects such a steel pipe and buried drums and tanks. It is very sensitive to USTs. The magnetometer data showed a large anomaly around the heating oil UST next to the Moore Residence (Figure 3).

The magnetometer did not detect any other ferrous objects around the Moore Residence. The GPR data also shows an anomaly associated with the heating oil UST (Figure 4). The GPR survey did not detect other anomalies that would indicate additional USTs.

The heating oil UST at the Moore Residence is buried 1.9 feet below the ground surface. Our investigation has determined that the UST is about 4 feet in diameter and 9 feet long. This tank has a volume of about 850 gallons.

3.2 Soil Borings, Sampling and Laboratory Results

Four hand augured borings (B-1 through B-4) were drilled at the Moore Residence (Figure 2). The borings were drilled on the two ends of the tank and on the down slope side of the tank. The purpose of these soil borings was to describe soils and document soil quality around the UST.

Soil sample S-27 and S-28 were collected from borings B-1 and B-4, at depths of 8 and 9 feet, respectively (Table 1). Soil at the site is colluvium over saprolite. Colluvial soils extend to about the base of the UST. Hand auger borings B-2 and B-3 encountered auger refusal on cobbles within the colluvial soils at depths of 5 feet and 4 feet, respectively. Field screening

with the PID indicated the presence of volatile petroleum vapors in samples S-27 and S-28 (Table 1). There were no petroleum odors or soil staining noted in these samples.

The UVF analysis detected low concentrations of petroleum constituents in soil samples S-27 (0.47 ppm DRO) and S-28 (0.47 ppm DRO) (Figure 5 & Table B-3). The UVF fingerprint indicated that these petroleum constituents were very degraded petroleum hydrocarbons (Appendix B). These petroleum constituent concentrations are below the NCDENR Action Levels of 10 ppm.

3.3 Conclusions

The geophysical surveys delineated the ends of the heating oil UST on the Property. These surveys did not detect any evidence of additional USTs at the Moore Residence. Soil sampling and analysis at the Moore Residence did not detect petroleum constituent concentrations that exceeded the NCDENR Action Level of 10 ppm for Gasoline or Diesel Range Organics (Table B-3). The soil borings were drilled around the perimeter of the UST. If the UST has leaked along the centerline of the tank, it is possible that contaminated soil is present directly below the tank.

Seramur & Associates has reviewed the plans provided for the widening of US 221. It does not appear that contaminated soil will be encountered during the construction at the 8946 Highway 221 parcel.

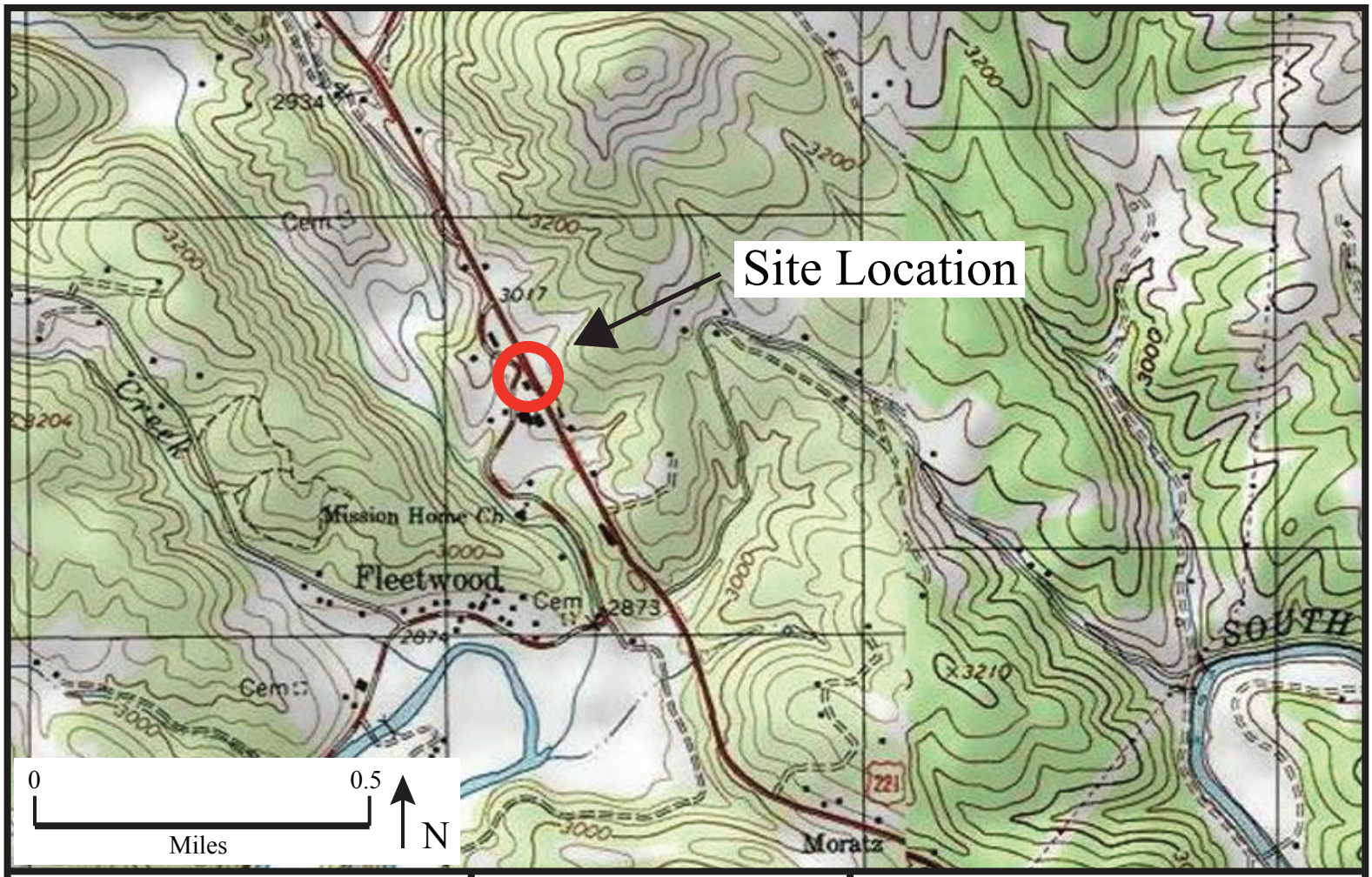
3.4 Recommendations

Seramur & Associates does not recommend any additional assessment at the Moore Property.

Table 1. Soil Boring Data – 8946 Highway 221 South						
Boring No.	**Depth (ft)**	**Lithology**	**Soil type**	**Soil Sample**	**PID ppm**	**Comments**
B-1	8.0	Sandy Silt w/ cobbles	Colluvium/ Saprolite	S-27	128	Saprolite
B-2	5.0	Sandy Silt w/ cobbles	Colluvium	--	NA	Auger Refusal @ 5 ft
B-3	4.0	Sandy Silt w/ cobbles	Colluvium	--	NA	Auger Refusal @ 4 ft
B-4	9.0	Sandy Silt w/ cobbles	Colluvium/ Saprolite	S-28	57	Saprolite

Table B-3: Summery of Soil Sampling Results – 8946 Highway 221 South
Revision Date: 5-11-2015 Name: Parcel #034 Moore Residence

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-27	5/04/15	B-1	8.0 ft	PSA	<0.64	0.47	V. Deg. PHC
S-28	5/04/15	B-4	9.0 ft	PSA	<0.66	0.5	V. Deg. PHC
NCDENR Action Level					10	10	



8946 Highway 221 U.S. Geological Survey, The National Map	Figure 1 Site Location Map	Seramur & Associates, PC 165 Knoll Dr. Boone, NC

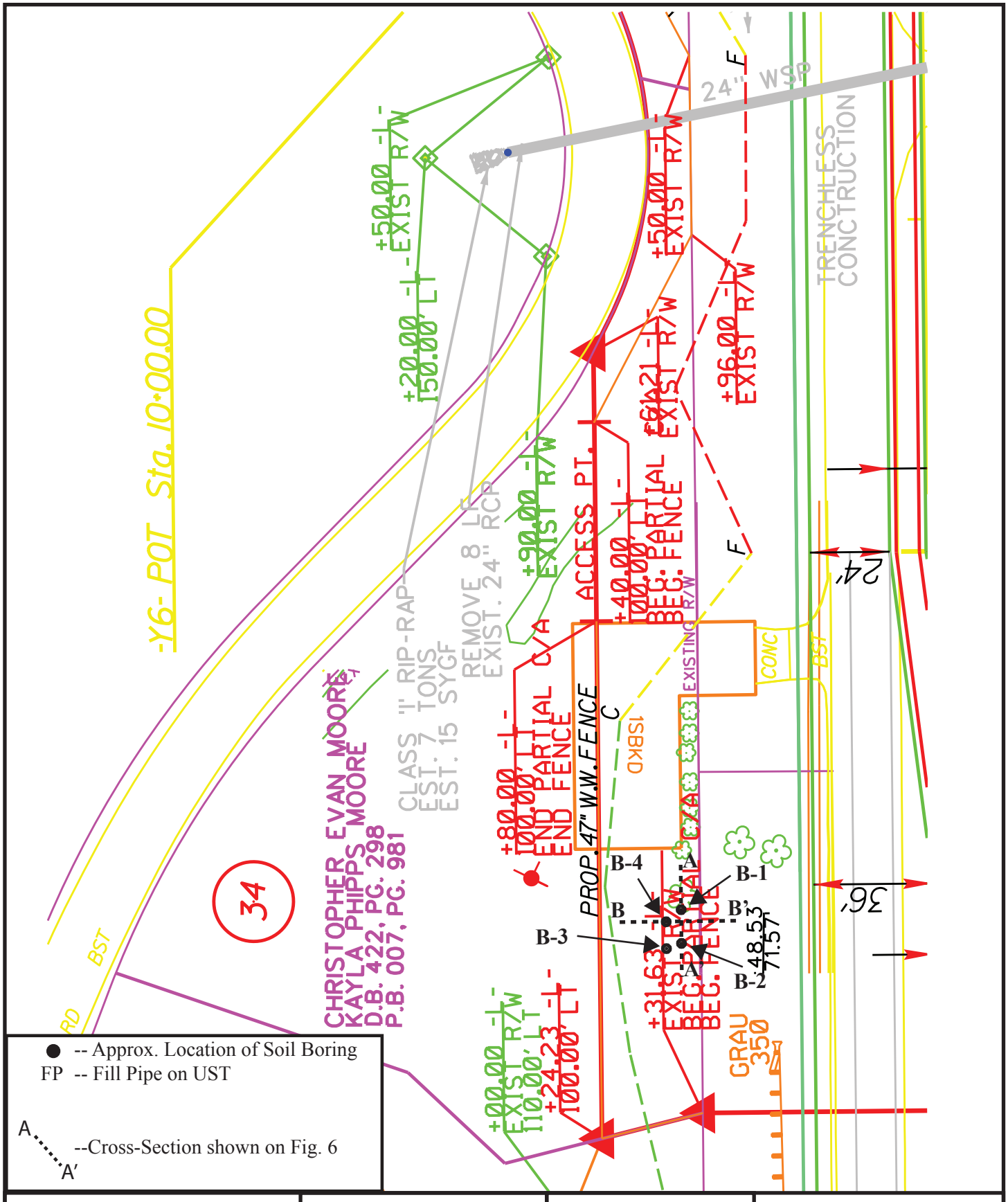
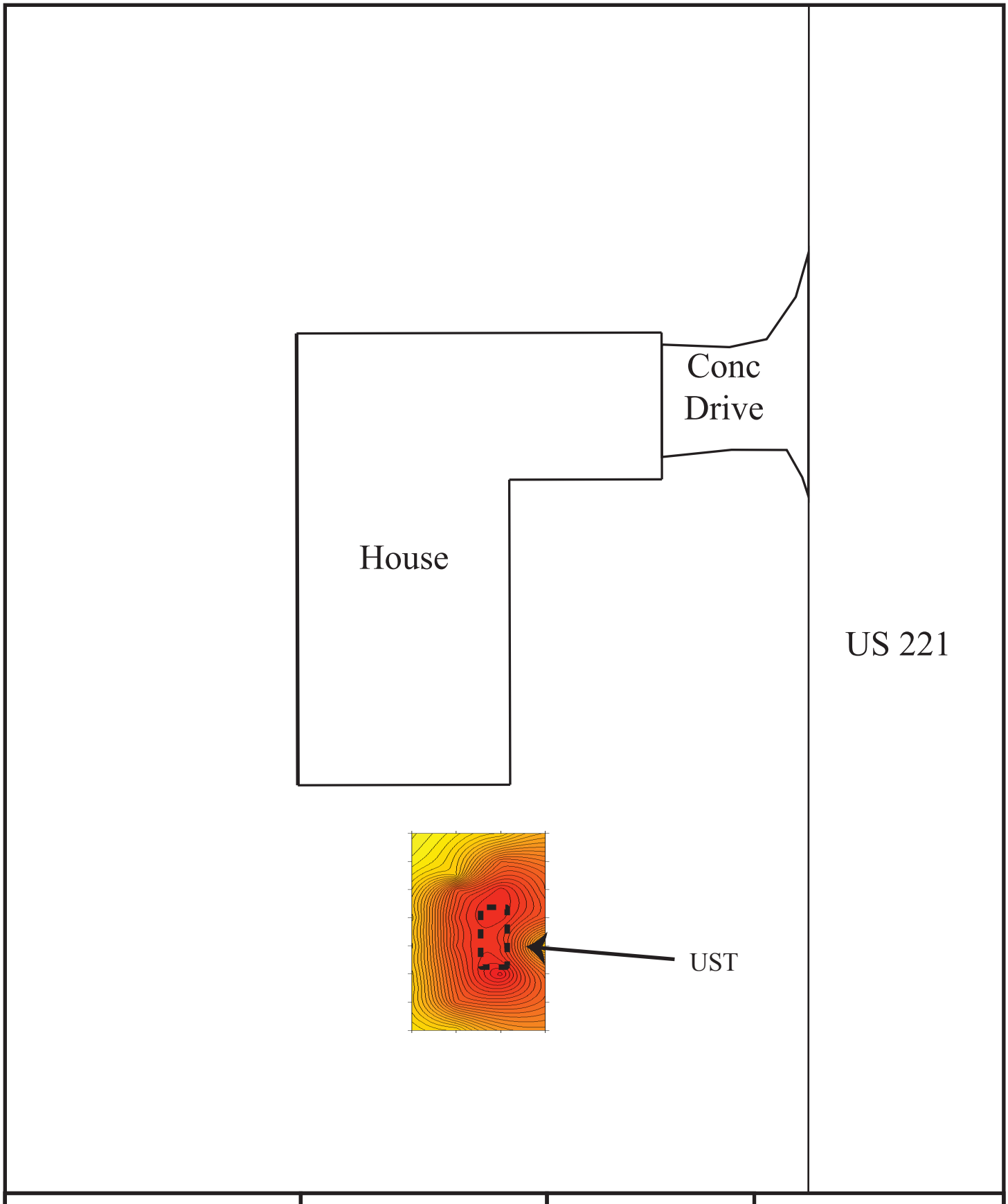


Figure 2
Site Plan with
Soil Boring Locations

Moore Residence
8946 Highway 221
Fleetwood, NC

Seramur & Associates, PC
165 Knoll Drive
Boone, NC



Approx. North

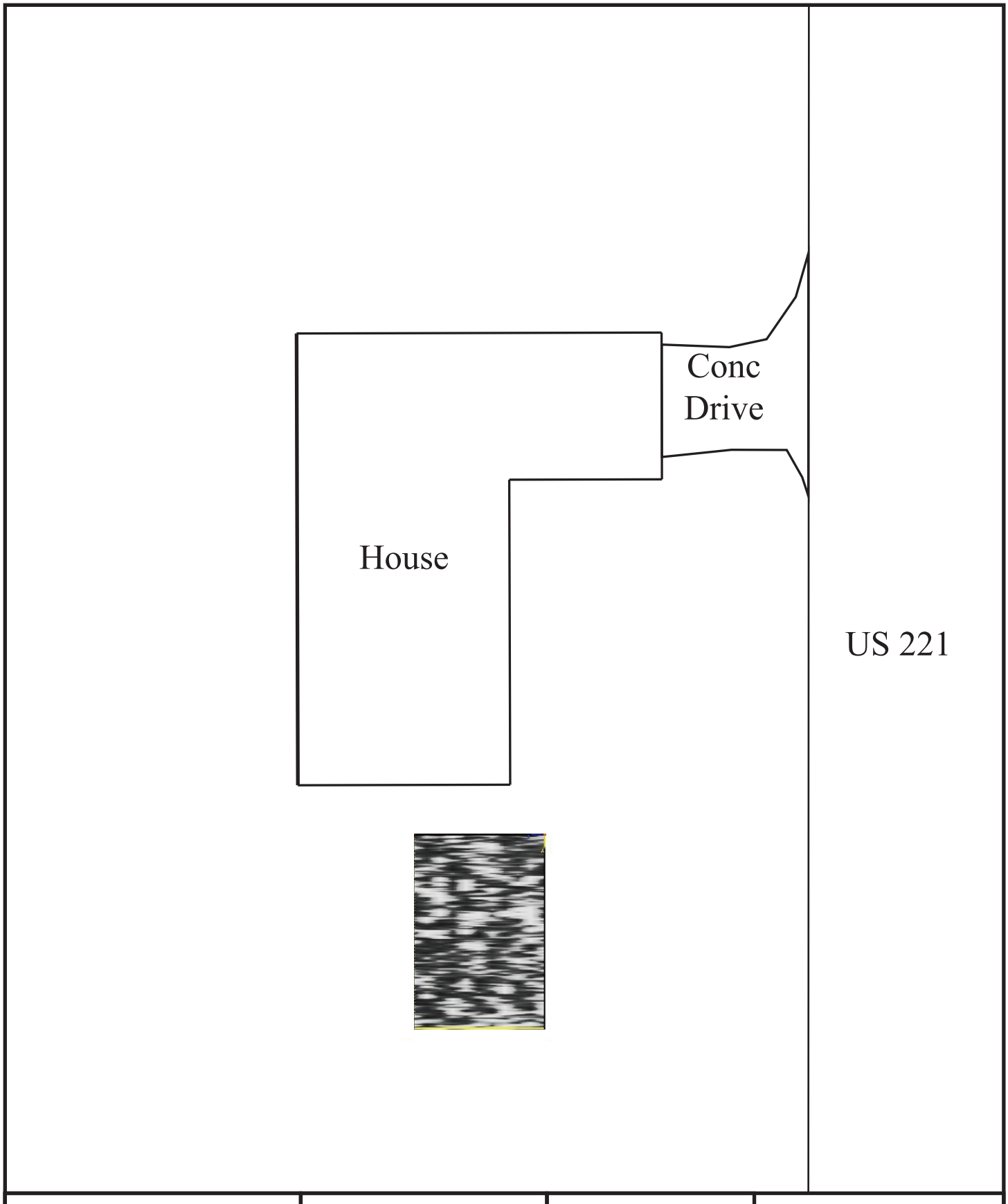
0 20

Feet

Figure 3
Magnetometer
Contour Map

Moore Residence
8946 Highway 221
Fleetwood, NC

Seramur & Associates, PC
165 Knoll Drive
Boone, NC



Approx. North

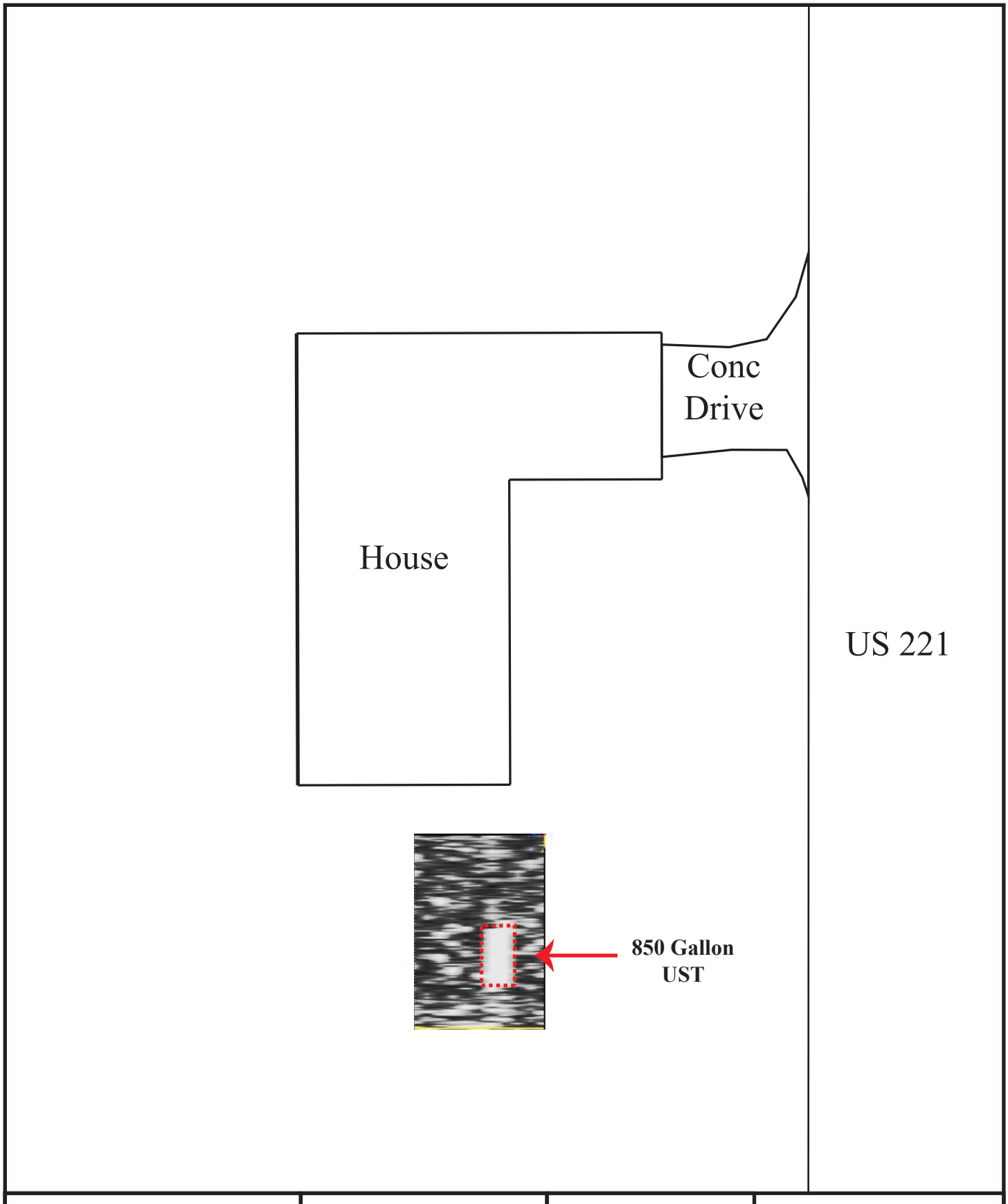
0 20

Feet

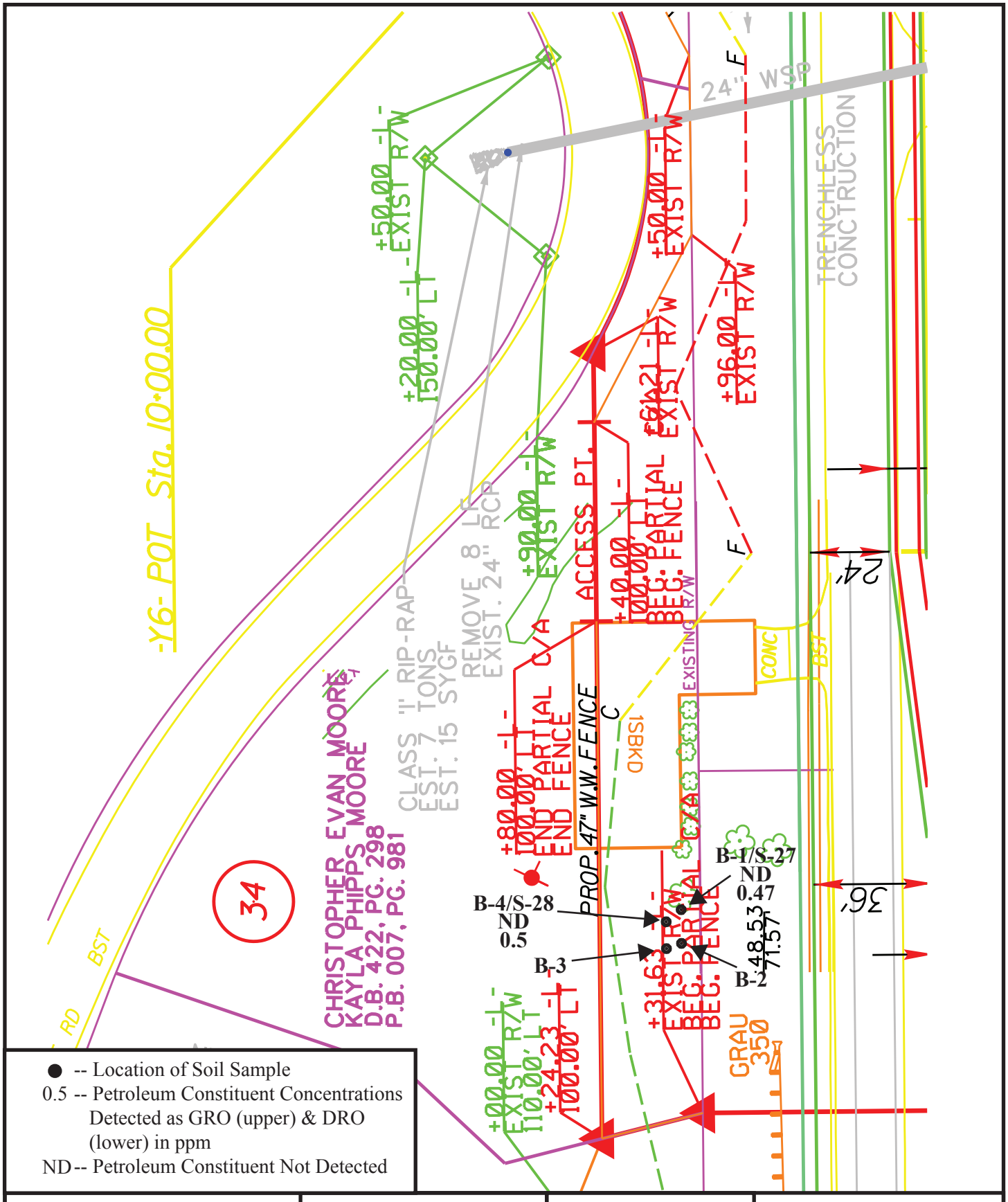
Figure 4-A
GPR Time Slice
2 Foot Depth

Moore Residence
8946 Highway 221
Fleetwood, NC

Seramur & Associates, PC
165 Knoll Drive
Boone, NC



Approx. North 0 20 Feet	**Figure 4-B** GPR Time Slice 3 Foot Depth	Moore Residence 8946 Highway 221 Fleetwood, NC	Seramur & Associates, PC 165 Knoll Drive Boone, NC



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

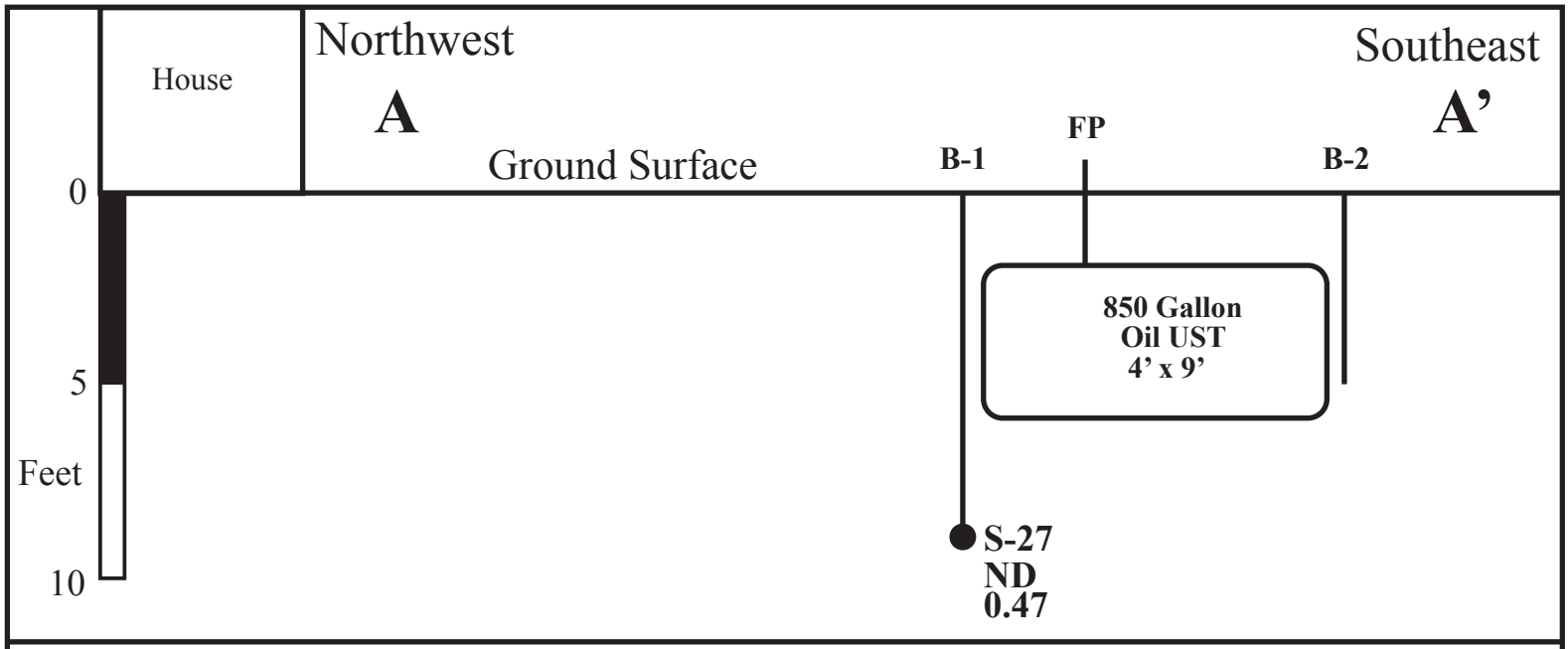
Approx. North

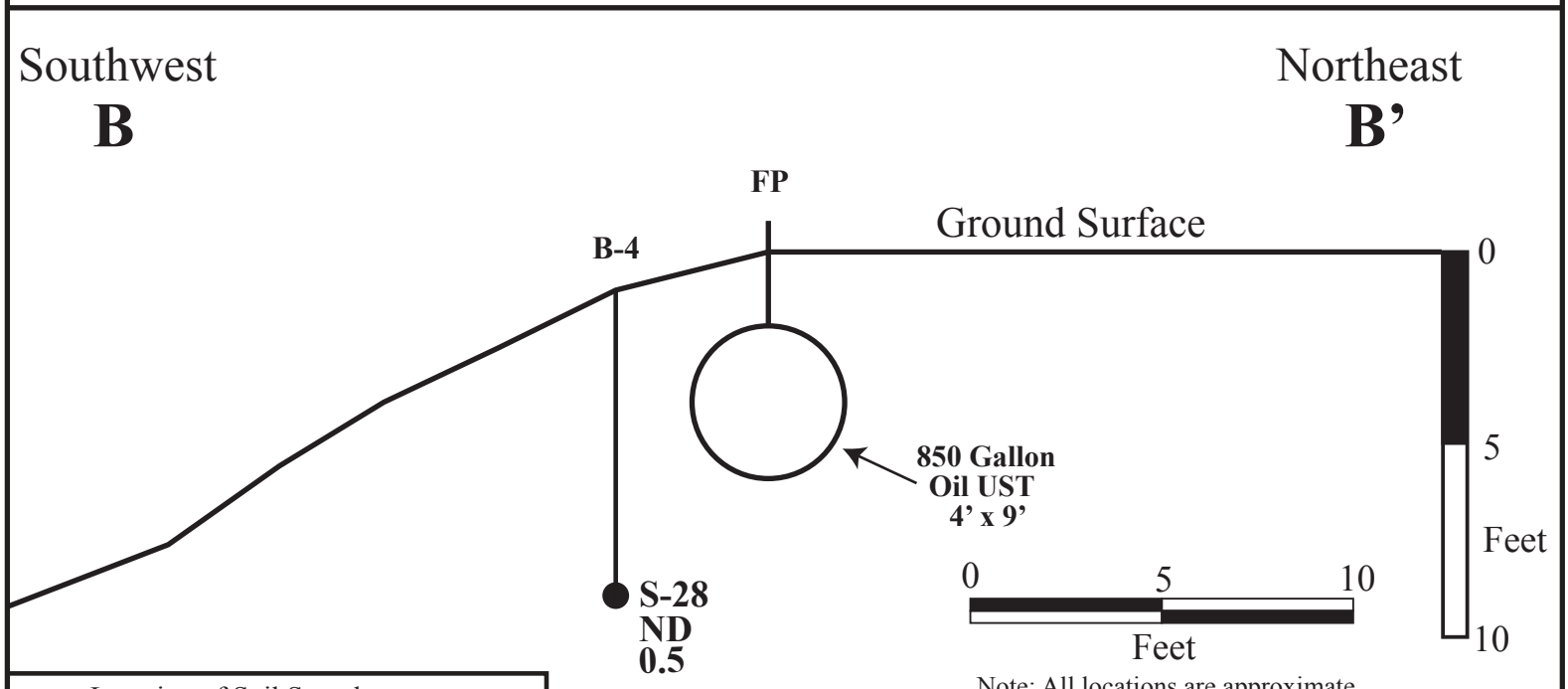
0 40
Feet

Figure 5
Soil Sample Analytical Results

Moore Residence
8946 Highway 221
Fleetwood, NC

Seramur & Associates, PC
165 Knoll Drive
Boone, NC





Note: All locations are approximate

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

Figure 6
Cross-Sections
A-A' and B-B'

Moore Property
8946 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 Wednesday, May 06, 2015
Samples extracted Wednesday, May 06, 2015
Samples analysed Thursday, May 07, 2015

Contact: Keith Seramur

Operator F. Owen

Project: NC DOT R-2915-C

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	S21	19.0	<0.95	<0.47	2.7	2.7	2	0.1	<0.009	0	83.6	16.4	V.Deg.PHC (FCM) 78.8%
s	S22	16.8	<0.42	<0.42	0.53	0.53	0.53	0.06	<0.008	0	96.5	3.5	V.Deg.PHC (FCM)
s	S23	19.8	<0.99	<0.5	43.2	43.2	12.5	0.52	0.006	0	97.5	2.5	Deg Fuel (FCM) 84.3%
s	S24	20.8	<0.52	<0.52	0.48	0.48	0.48	0.05	<0.01	0	100	0	V.Deg.PHC (FCM)
s	S25	279.3	<14	<7	470.6	470.6	14.6	0.72	<0.14	0	100	0	Degraded Oil (PFM) (FCM) 67.3%
s	S26	19.3	<0.96	<0.48	4.4	4.4	3.4	0.16	<0.01	0	81.2	18.8	V.Deg.PHC (FCM) 88.3%
s	S27	25.7	<1.3	<0.64	0.47	0.47	0.47	<0.03	<0.013	0	100	0	V.Deg.PHC (FCM)
s	S28	26.3	<1.3	<0.66	0.5	0.5	0.5	0.06	<0.013	0	100	0	V.Deg.PHC (FCM)
s	S28A	19.3	<0.48	<0.48	1.4	1.4	0.84	0.04	<0.01	0	93.8	6.2	Road Tar (PFM) (FCM) 93.2%
s	S29	20.2	<1	<0.5	14.3	14.3	10.6	0.51	0.016	0	91.9	8.1	V.Deg.PHC (FCM) 89.4%
	Initial Calibrator QC check			OK					Final FCM QC Check		OK		98,3%

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

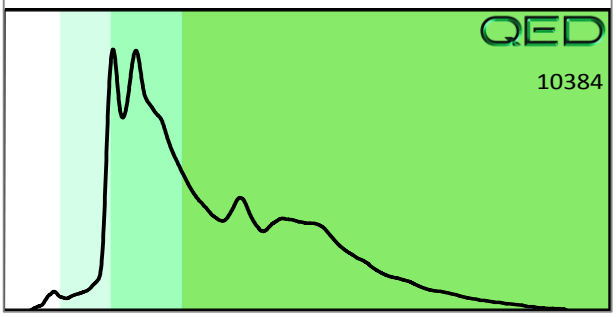
Fingerprints provide a tentative hydrocarbon identification. The abbreviations are:- FCM = Results calculated using Fundamental Calibration Mode : % = confidence for sample fingerprint match to library

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

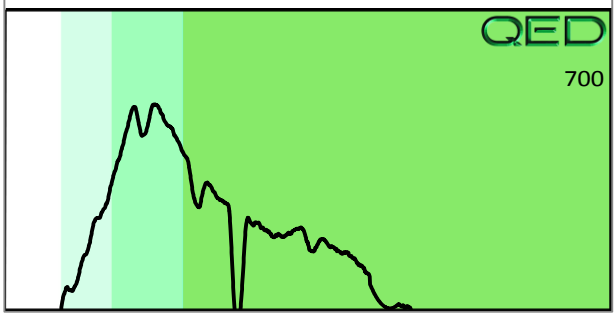
QED Hydrocarbon Fingerprints

Project: NC DOT R-2915-C ##################

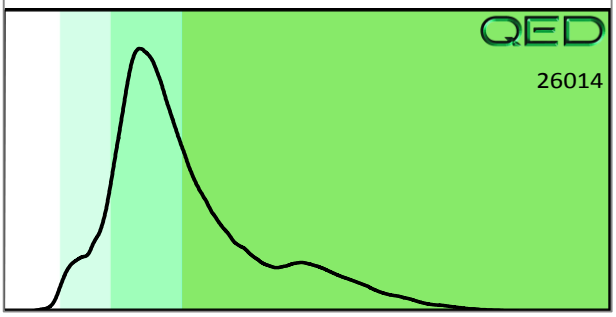
S21 : V.Deg.PHC (FCM) 78.8%



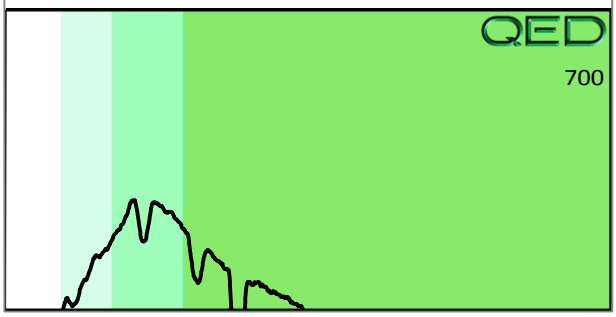
S22 : V.Deg.PHC (FCM)



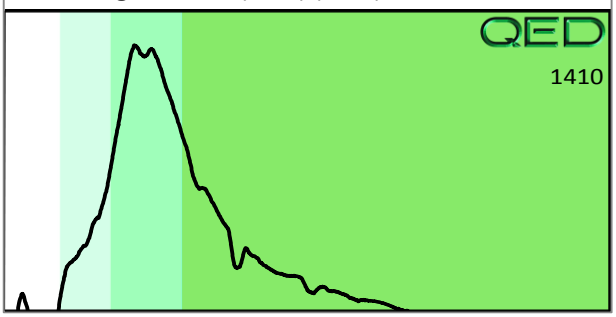
S23 : Deg Fuel (FCM) 84.3%



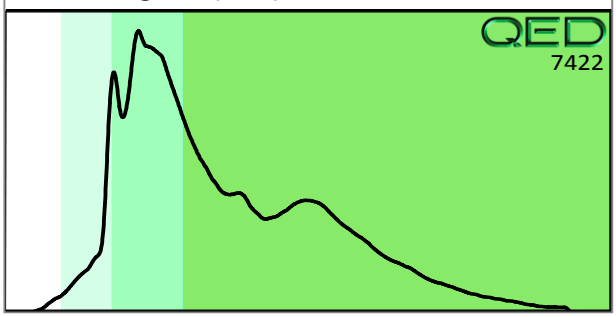
S24 : V.Deg.PHC (FCM)



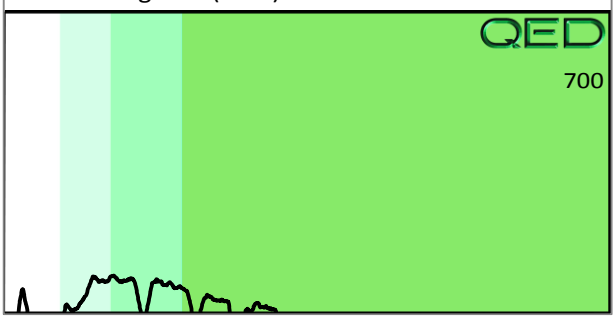
S25 : Degraded Oil (PFM) (FCM) 67.3%



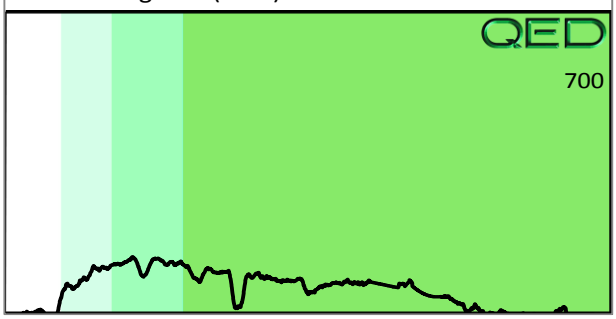
S26 : V.Deg.PHC (FCM) 88.3%



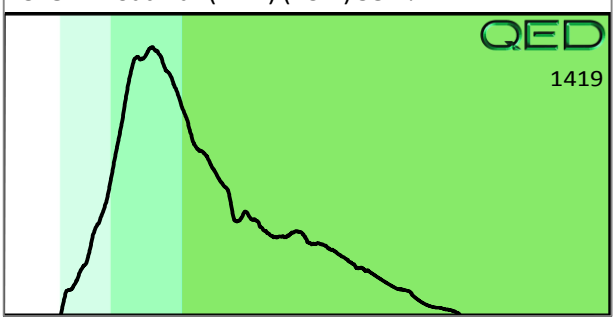
S27 : V.Deg.PHC (FCM)



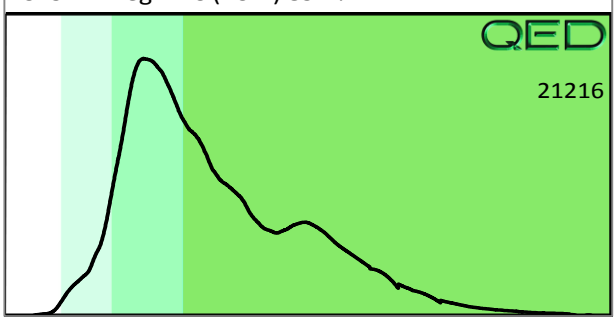
S28 : V.Deg.PHC (FCM)



S28A : Road Tar (PFM) (FCM) 93.2%



S29 : V.Deg.PHC (FCM) 89.4%



QROS

Chain of Custody Record and Analytical Request Form

Sample ID	Sample Collection			TAT Requested	
QED UVF	Date	Time	Initials	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: Seramur & Associates

Contact: Keith Seramur

Phone: 828 7730499

Email: Seramur@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.

KCR	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@grosllc.com

910-508-1940

QROS

Chain of Custody Record and Analytical Request Form

Sample ID	Sample Collection			TAT Requested	
QED UVF	Date	Time	Initials	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-[redacted]34	5/5/15	11:18	KCS		X

Client: Seramur & Associates

Contact: Keith Seramur

Phone: 828 773 0499

Email: seramur@ioland.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.

Relinquished by	Date/time	Accepted by	Date/time
[signature]	5/6/15	FedEx	5/6/15 15:00
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@grosllc.com

910-508-1940

QROS

Chain of Custody Record and Analytical Request Form

Sample ID	Sample Collection			TAT Requested	
QED UVF	Date	Time	Initials	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: Seramur & Associates

Contact: Keith Seramur

Phone: 8287730499

Email: seramur@iclaid.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.

[signature] 5/6/15		FedEx 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@grosllc.com

910-508-1940

QROS

Chain of Custody Record and Analytical Request Form

Sample ID	Sample Collection			TAT Requested	
QED UVF	Date	Time	Initials	24 Hour	48 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: Seramur & Associates

Contact: Keith Seramur

Phone: 828 7230499

Email: seramur@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.

[signature] 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@grosllc.com

910-508-1940