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

at

**Parcel 039, John B. Cox Property
Jack and Dean's Comm. Corner Mart AKA: Doyle's
8742 Highway 221 South Fleetwood, NC 28626
Facility I.D. #: 0-000454, 0-028118, 0-34269, Incident 13684**

Prepared For:

**Mr. Gordon Box
NC DOT, Geotechnical Engineering Unit
GeoEnvironmental Section
1589 Mail Service Center
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Prepared By:

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

May 22, 2015 (Revised 6-2-15)

Keith C. Seramur



Keith C. Seramur, P.G.

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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 Cox Property in Fleetwood, North Carolina (Figure 1). The property is:

Jack and Dean's AKA: Doyle's and Heartland Grocery
8742 Highway 221 South Fleetwood, NC 28626
Facility I.D. #: 0-000454, 0-028118, 0-34269, Incident 13684

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 3 grids for geophysical surveys at the Cox Property. Geophysical data was collected along transects with a 2-foot spacing. Magnetometer surveys were completed with a MF-1 Fluxgate magnetometer. The MF-1 Fluxgate magnetometer is designed to measure changes in the earth's magnetic field associated with larger objects. It does not respond to smaller objects such as nails or wire, but responds well to manholes, steel pipe, buried drums and tanks. The sensitivity level is well suited for detecting buried USTs at commercial and industrial facilities. 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.

A Ground Penetrating Radar (GPR) survey was completed across each 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 Radan® software. The GPR data processing included adjusting time zero, completing a background removal and adjusting the time variable gain to enhance deep reflections.

Three-dimensional models of the GPR grid data were produced with the Radan software. Three time slices (or depth slices) were imaged in each grid at depths of 1-1.5, 2 and 3 feet. These depth slices are horizontal slices or plan views of the GPR grid data at selected depths. The thickness of the horizontal slices can be adjusted to show reflections across a particular depth range. We used a 0.5-foot thickness for these time slices. For example, Figure 4b is a 2-foot depth slice with a thickness of 0.5 feet. This image shows GPR reflections in the radar data between depths of 1.75 and 2.25 feet (0.25 feet above and below the slice depth of 2 feet).

2.2 Soil Sampling and Analyses

On May 5, 2015, Geonetics Corporation, Dba: Techdrill mobilized to the site to drill soil test borings and collect soil samples. Our project design called for collecting a shallow and deep soil sample from each boring (Figure 2). Soil borings were drilled in the around the existing USTs and along the product line (Figure 2).

A track-mounted rotary drilling rig with hollow-stem augers was used to drill the soil borings. Drilling tools were decontaminated between 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. Soil samples were collected from depths of 2-4 feet and 8-10 feet.

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

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

Seramur and Associates reviewed the NCDENR UST Database for the Cox property and the incident file for Jack & Dean's (GW Incident #13684). The UST Database shows the site listed as three different facilities, Jack and Dean's, Doyle's and Heartland grocery.

Jack and Dean's has three USTs listed as being installed in 1974 and one UST installed in 1983. All these USTs were removed in 1991. Heartland Grocery has two 4,000 gallon USTs listed as being installed in January of 1991. Doyle's has one 3,000 gallon and one 5,000 gallon UST listed as being installed in August of 1991. A 2009 UST permit posted in the window of the store was issued to Charles and Teresa Jones and has the facility name as Heartland Grocery. The permit indicates that there are two USTs with a capacity of >3500 gallons.

There are two tanks on the property. It appears that the USTs registered for Heartland Grocery and Doyle's are the same USTs even though they are registered as tanks of different volumes. Heartland Grocery appears to have been the last owner/operator of the USTs.

Geonetics Corporation completed a Comprehensive Site Assessment and prepared Corrective Action Plan for a release discovered when Jack and Dean's USTs were closed. Appendix C includes select figures and tables from the CSA and CAP reports.

This source of release was a leak at the dispenser island. The CSA delineated the horizontal and vertical extent of soil contamination around the dispenser island (Appendix C). Soil contamination was not detected in the vicinity of the former tank pit. Geonetics Corporation determined that soil contamination around the dispenser island covered a horizontal area 40 feet by 25 feet and extended to a depth of 15 feet.

$$\begin{aligned} &\text{Volume of contaminated soil at the dispenser island} \\ &40 \text{ ft.} \times 25 \text{ ft.} \times 15 \text{ ft.} \\ &= 15000 \text{ cubic feet} = 555.6 \text{ cubic yards} \end{aligned}$$

The CAP recommended soil remediation by natural attenuation. The surface has been sealed with asphalt and a soil vapor extraction system that had been installed was not utilized. This contaminated soil has not been remediated.

Geonetics measured groundwater elevations ranging between 40.94 and 46.95 feet below ground surface in monitoring well MW-1 (Appendix C). Groundwater contamination was not detected during the CSA investigation.

3.1 Geophysical Surveys

Two magnetometer anomalies were detected in Grid 1 above the two USTs (Figure 3). The western UST is the smaller of the two USTs. No other USTs were detected by the magnetometer. Well vaults for two vapor-monitoring wells were detected in Grids 2 and 3 (Figure 3).

The 1 to 1.5 foot GPR depth slice shows several linear anomalies that probably represent buried utility lines (Figure 4a). A linear anomaly along the west side of Grid 2 on the 2-foot depth slice appears to be the product lines extending from the USTs to the dispenser island (Figure 4b). The top of the eastern UST is imaged on the 3-foot GPR slice in Grid 1 (Figure 4c). The west side of the GPR grid ran across the top of the western UST but did not provide a good image of this second tank. The grid transects were ran parallel to the tanks which is not the best orientation for imaging two USTs lying side by side.

Three GPR transects (cross-sections) were selected from the grid data to show site features. The 26-foot transect from Grid 1 shows the top of the eastern UST (A-A' on Figure 4d). The 38-foot transect from Grid 1 shows the top of the western UST (B-B' on Figure 4d). Two areas of soil disturbance are shown on the 0-foot transect of Grid 2 (C-C' on Figure 4d). The southern area of soil disturbance (left side of transect) is probably the former tank pit. The northern area of soil

disturbance (center of transect) was imaged along the dispenser island.

3.2 Soil Borings, Sampling and Laboratory Results

Soil material at the Cox property is primarily a sandy silt fill material. Saprolite or residuum was encountered in the base of borings B-4, B-5 and B-6. This is a cut and fill setting where the highway crosses the toe of a ridge. The upslope side of the roadway is residuum and the downslope side of the roadway is fill material. The Cox property appears to have about 10 feet of fill material around the UST system.

Soil borings B-1 and B-2 were drilled on each end of the smaller western UST and two soil samples were collected from each boring (Figure 5). Petroleum constituents were detected in all four soil samples (S28a, S-29, S-30 and S-31), but only the 8.0-10.0 foot soil sample (S-29) in boring B-1 contained TPH DRO concentrations above 10 ppm. The laboratory fingerprint for soil sample S-28a is road tar. The laboratory fingerprint for soil sample S-29 is very degraded petroleum hydrocarbons (PHC). The laboratory fingerprints for soil samples S-30 and S-31 are degraded fuel.

Borings B-3 and B-4 were drilled on each end of the eastern UST and boring B-5 was drilled on the east side of the tank pit. Petroleum constituents were not detected above 3.8 ppm in any of the soil samples collected from these three borings. The laboratory fingerprints for soil samples S-34, S-35 and S-36 are very degraded PHC. The laboratory fingerprint for soil sample S-32 is degraded fuel.

Boring B-6 was drilled along the product line between the USTs and the dispenser island. Soil samples S-39 and S-40 were collected from boring B-6. Petroleum constituents were not detected above the NCDENR Action Level of 10 ppm in these soil samples. The laboratory fingerprints for soil samples S-39 and S-40 are degraded gas.

Although petroleum constituents were detected in soil at the base of the tank pit adjacent to the western UST, there does not appear to be a significant release in the vicinity of the existing USTs or along the product lines.

3.3 Volumes and Extent of Contaminated Soil

The area of soil contamination related to the former UST system is limited to the vicinity of the dispenser island (Figure 7). This soil contamination extends to a depth of about 15 feet and covers an area of 25 by 40 feet. Approximately 555 cubic yards of contaminated soil are present in the vicinity of the dispenser island.

Soil contamination in the vicinity of the existing USTs appears to be limited to the north end of the tank pit (Figure 7). This is an area of about 200 ft² laterally and 5 feet in thickness.

$$\begin{aligned} &= 10 \text{ ft.} \times 20 \text{ ft.} \times 5 \text{ ft.} \\ &= 1000 \text{ cubic feet} = 37 \text{ cubic yards} \end{aligned}$$

3.4 Conclusions

There is conflicting information in the NCDENR database on the size of the two USTs at the site. The UST registration for Heartland Grocery, the last owner/operator of the USTs, lists the size as two 4,000-gallon USTs. The western UST is smaller than the eastern UST. The UST database information for Doyle's maybe more accurate as it lists one 3,000 gallon UST and one 5,000 gallon UST.

Geonetics Corporation completed an assessment of soil contamination from a release at the dispenser island and documented 555 cubic yards of contaminated soil (Figure 6). Seramur and Associates completed an assessment of soil quality around the existing UST system and documented approximately 37 cubic yards of contaminated soil (Figure 6). There is a total of about 592 cubic yards of contaminated soil at the Cox property.

Seramur & Associates has reviewed the plans provided for the widening of US 221. A 15" reinforced concrete pipe is proposed across the paved area in front of the store (Figure 6). This drainage pipe is about 10 feet east of the area of contaminated soil associated with the release at the dispenser island. It does not appear that contaminated soil will be encountered during the Highway 221 construction at the Cox Property. However, contaminated soil could be encountered during demolition of the former gas station building.

3.5 Recommendations

Contaminated soil is present between the dispenser island and the building. No excavations were shown in this area but it is our understanding that the road widening will include removing the onsite building. Removal of the structure will likely encounter contaminated soil. Seramur & Associates recommends that a licensed geologist or engineer supervise the excavation and removal of any contaminated soil associated with demolition of the onsite building.

Petroleum constituent concentrations were detected in the vicinity of the two USTs on the property. These are commercial USTs and will require that a licensed geologist or engineer supervise the UST closures and collect the required soil samples below the USTs and along the product lines. Contaminated soil removed as part of these UST closures should be sent to a remediation facility.

Appendix A

Tables and Figures

Table 1. Soil Boring Data -8742 Highway 221 South

Boring No.	Depth (ft)	Lithology	Soil type	Soil Sample	PID ppm
B-1	2.0 to 4.0	Sand	Fill	S-28A	63.1
B-1	8.5 to 10.0	Sandy Silt	Fill/Soil	S-29	72.3
B-2	4.0	Sandy Silt	Fill	S-30	114.7
B-2	8.0 to 10.0	Sandy Silt	Fill	S-31	62.2
B-3	2.0 to 4.0	Sandy Silt	Fill	S-32	61.1
B-3	6.0 to 8.0	Sandy Silt	Fill	S-33	62.6
B-3	8.0 to 10.0	Sandy Silt	Fill	S-34	60.2
B-4	2.0 to 4.0	Sandy Silt	Fill	S-35	66.3
B-4	8.0 to 10.0	Saprolite	Residuum	S-36	60.8
B-5	2.0 to 4.0	Sandy Silt	Fill	S-37	35.2
B-5	8.0 to 10.0	Sandy Silt	Residuum	S-38	45.7
B-6	2.0 to 4.0	Sandy Silt	Residuum	S-39	8.8
B-6	8.0 to 10.0	Sandy Silt	Residuum	S-40	13.4

Table 2: NCDENR UST Data - 8742 Highway 221 South								
Facility Name	Address	City	State	Zip	Contact	Address	City	State
Jack and Dean	8742 US HWY 221 S	Fleetwood	NC	28626-9113	Seagraves Oil Company, INC.	920 East Main Street	Jefferson	NC

Tank ID	Installation Date	Closure Date	Capacity	Commercial	Regulated	Product Key	Product Name
1	5/3/74	7/15/91	2000	Y	Y	3	Gasoline, Gas Mix
2	5/3/74	7/15/91	1000	Y	Y	3	Gasoline, Gas Mix
3	5/3/74	7/15/91	1000	Y	Y	3	Gasoline, Gas Mix
4	5/1/83	7/15/91	500	Y	Y	8	Kerosene, Kero Mix

Facility Name	Address	City	State	Zip	Contact	Address	City	State
Doyle's	8742 US HWY 221 S	Fleetwood	NC	28626-9113	Marjorie Waln	229 Windy Acres Ridge Road	Fleetwood	NC

Tank ID	Installation Date	Closure Date	Capacity	Commercial	Regulated	Product Key	Product Name
1	8/30/91		3000	Y	Y	3	Gasoline, Gas Mix
2	8/30/91		5000	Y	Y	3	Gasoline, Gas Mix

Facility Name	Address	City	State	Zip	Contact	Address	City	State
Heartland Grocery	8742 US HWY 221 S	Fleetwood	NC	28626-9113	Charles and Teresa D Jones	8742 US Highway 221 S	Fleetwood	NC

Tank ID	Installation Date	Closure Date	Capacity	Commercial	Regulated	Product Key	Product Name
1	1/1/91		4000	Y	Y	3	Gasoline, Gas Mix
2	1/1/91		4000	Y	Y	3	Gasoline, Gas Mix

Table B-3: Summary of Soil Sampling Results – 8742 Highway 221 South
 Revision Date: 5-11-2015 Name: Parcel #039 Cox Property

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-28A	5/5/15	B-1	2.0-4.0 ft	PSA	<0.48	1.4	Road Tar
S-29	5/5/15	B-1	8.5-10.0 ft	PSA	<0.5	14.3	V. Deg. PHC
S-30	5/5/15	B-2	4.0 ft	PSA	<0.55	7.9	Deg. Fuel
S-31	5/5/15	B-2	8.0-10.0 ft	PSA	<0.55	8.1	Deg. Fuel
S-32	5/5/15	B-3	2.0-4.0 ft	PSA	<0.59	3.8	Deg. Fuel
S-34	5/5/15	B-3	8.0-10.0 ft	PSA	<0.6	0.82	V. Deg. PHC
S-35	5/5/15	B-4	2.0-4.0 ft	PSA	<0.5	0.69	V. Deg. PHC
S-36	5/5/15	B-4	8.0-10.0 ft	PSA	<0.66	1	V. Deg. PHC
S-37	5/5/15	B-5	2.0-4.0 ft	PSA	<0.37	1.5	Deg. Fuel
S-38	5/5/15	B-5	8.0-10.0 ft	PSA	<0.37	<0.15	V. Deg. PHC
S-39	5/5/15	B-6	2.0-4.0 ft	PSA	4.1	<0.16	Deg. Gas
S-40	5/5/15	B-6	8.0-10.0 ft	PSA	1.5	0.15	Deg. Gas
NCDENR Action Level					10	10	

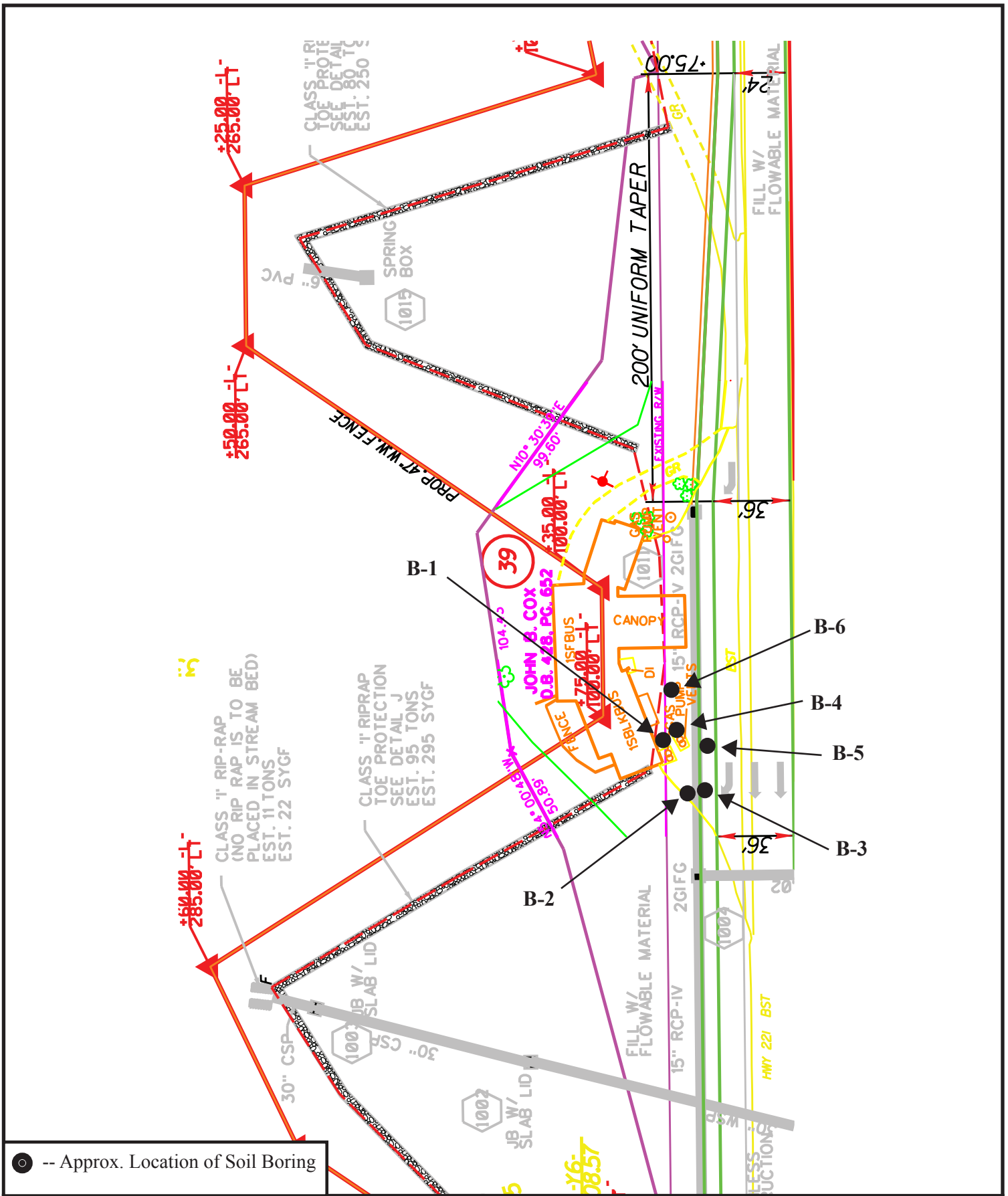


Cox Property
8742 Highway 221

Figure 1
Site Location Map

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

Source: U.S. Geological Survey, The National Map



● -- Approx. Location of Soil Boring

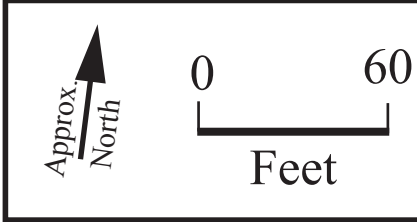


Figure 2
Site Map with
Soil Boring
Locations

Cox Property
8742 Highway 221 South
Fleetwood, NC

Seramur & Associates, PC
165 Knoll Drive
Boone, NC

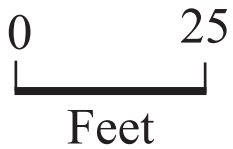
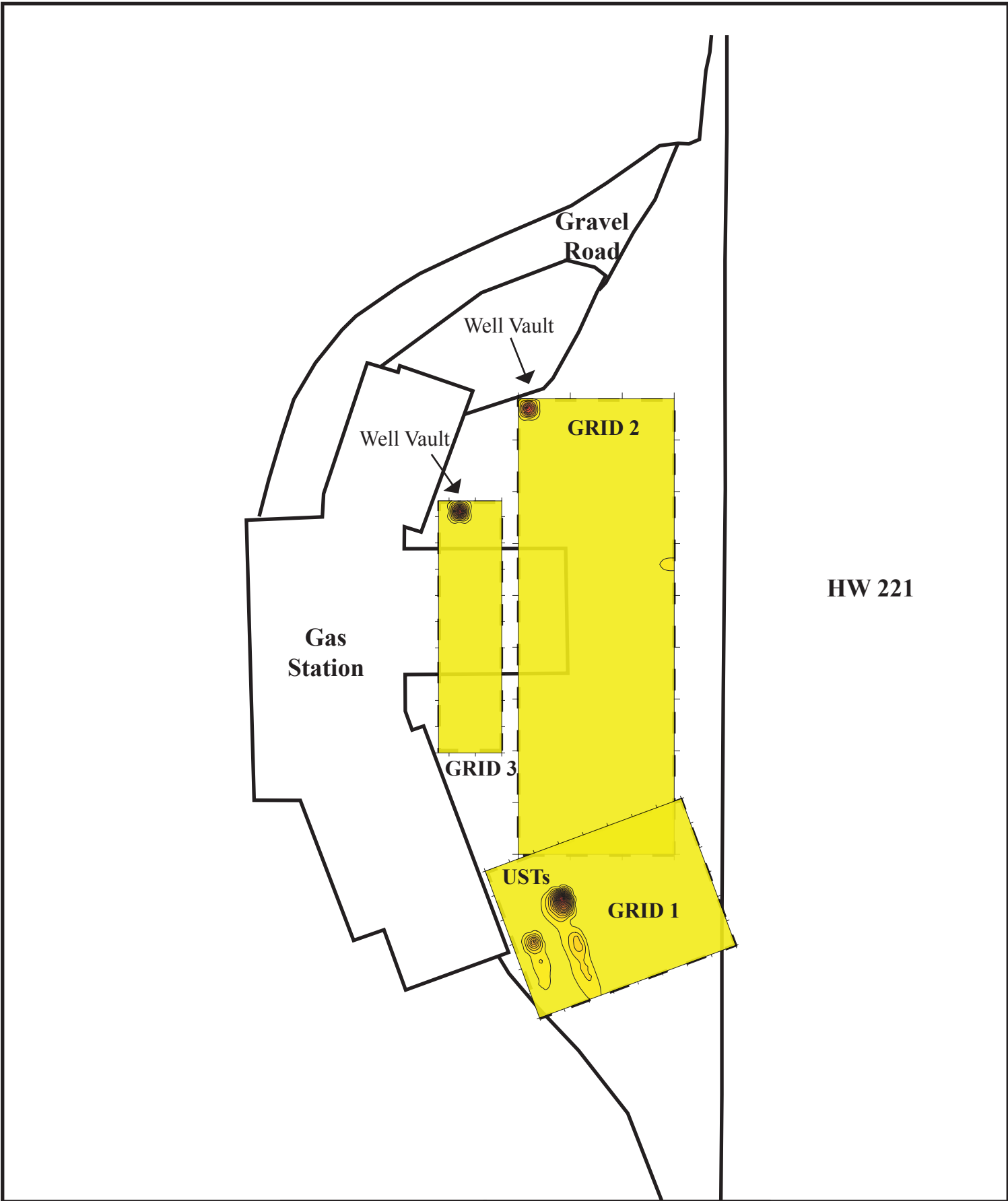


Figure 3
Magnetometer
Contour Map

Cox Property
8742 Highway 221 South
Fleetwood, NC

Seramur & Associates, PC
165 Knoll Drive
Boone, NC

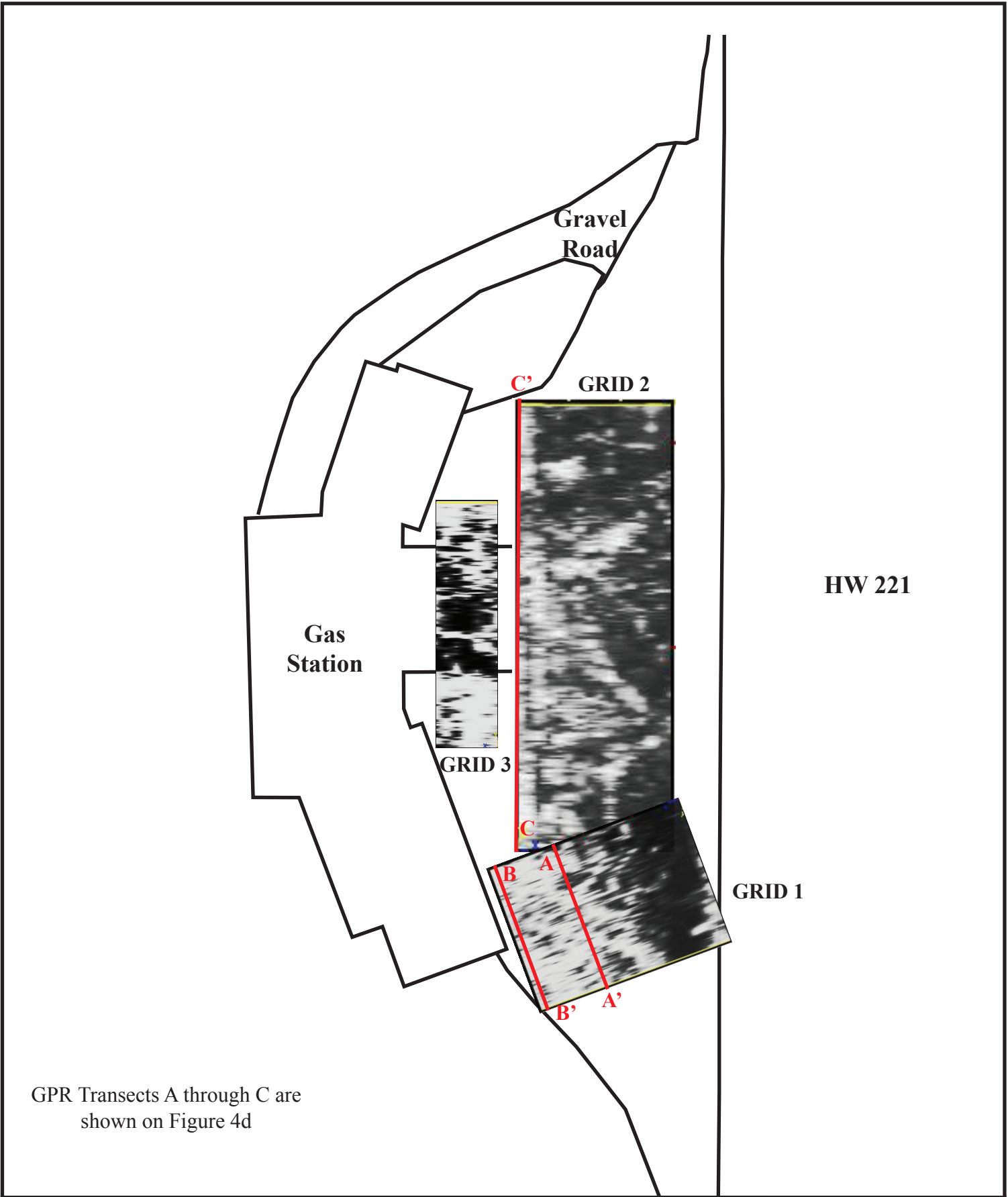


Figure 4a
1 to 1.5-Foot
GPR Depth
Slice

Cox Property
8742 Highway 221 South
Fleetwood, NC

Seramur & Associates, PC
165 Knoll Drive
Boone, NC

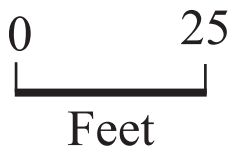
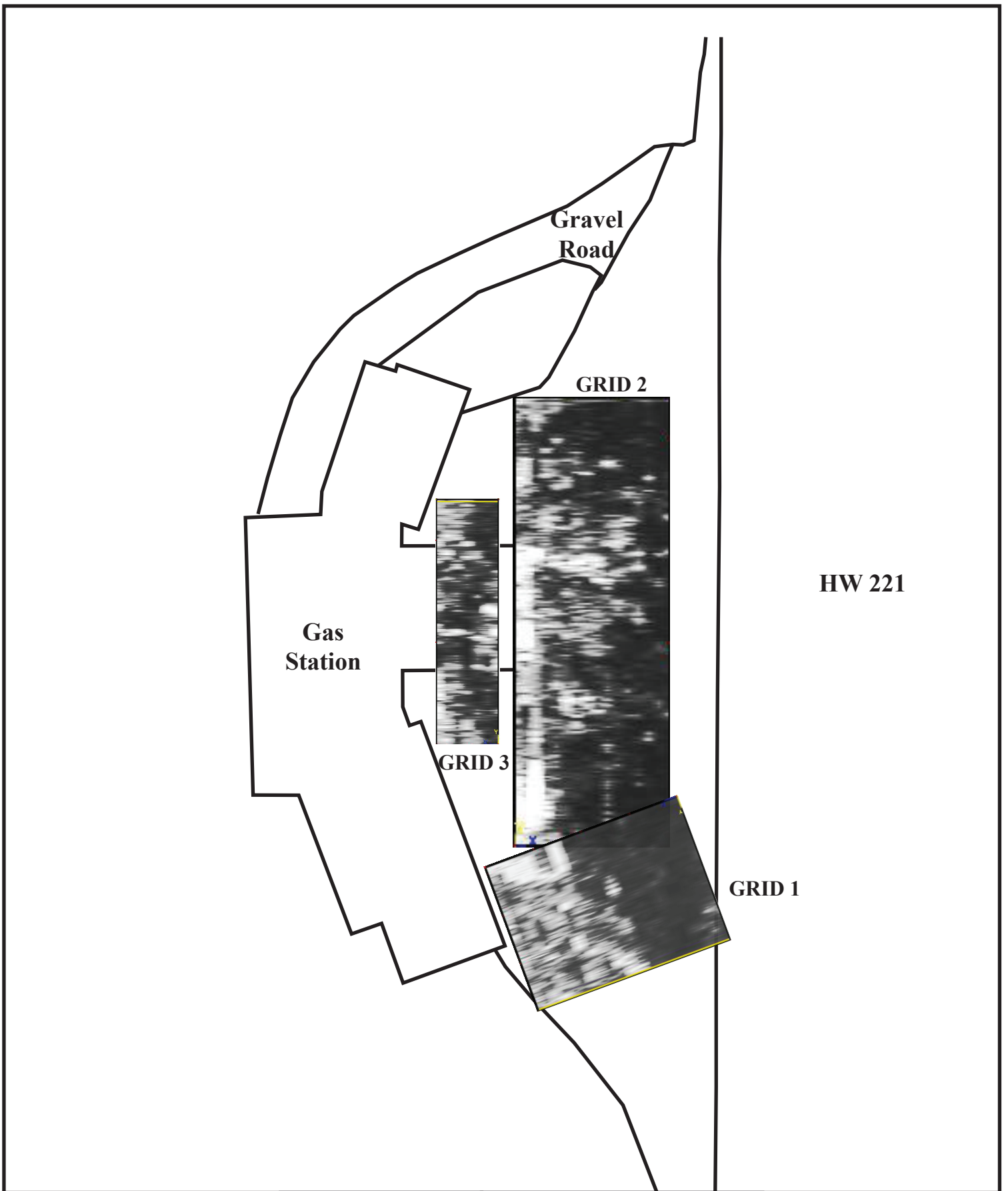


Figure 4b
2-Foot GPR
Time Slice

Cox Property
8742 Highway 221 South
Fleetwood, NC

Seramur & Associates, PC
165 Knoll Drive
Boone, NC

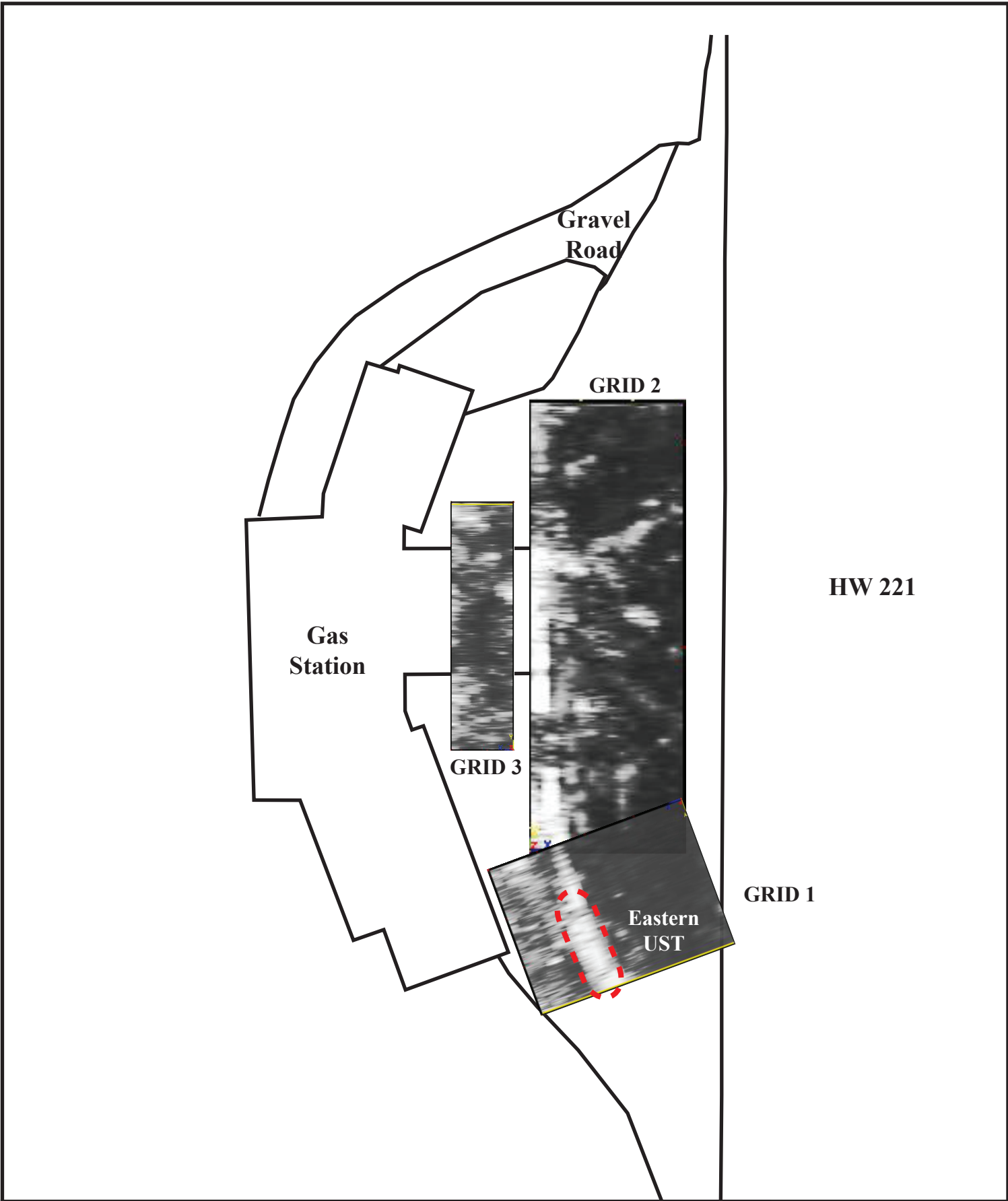
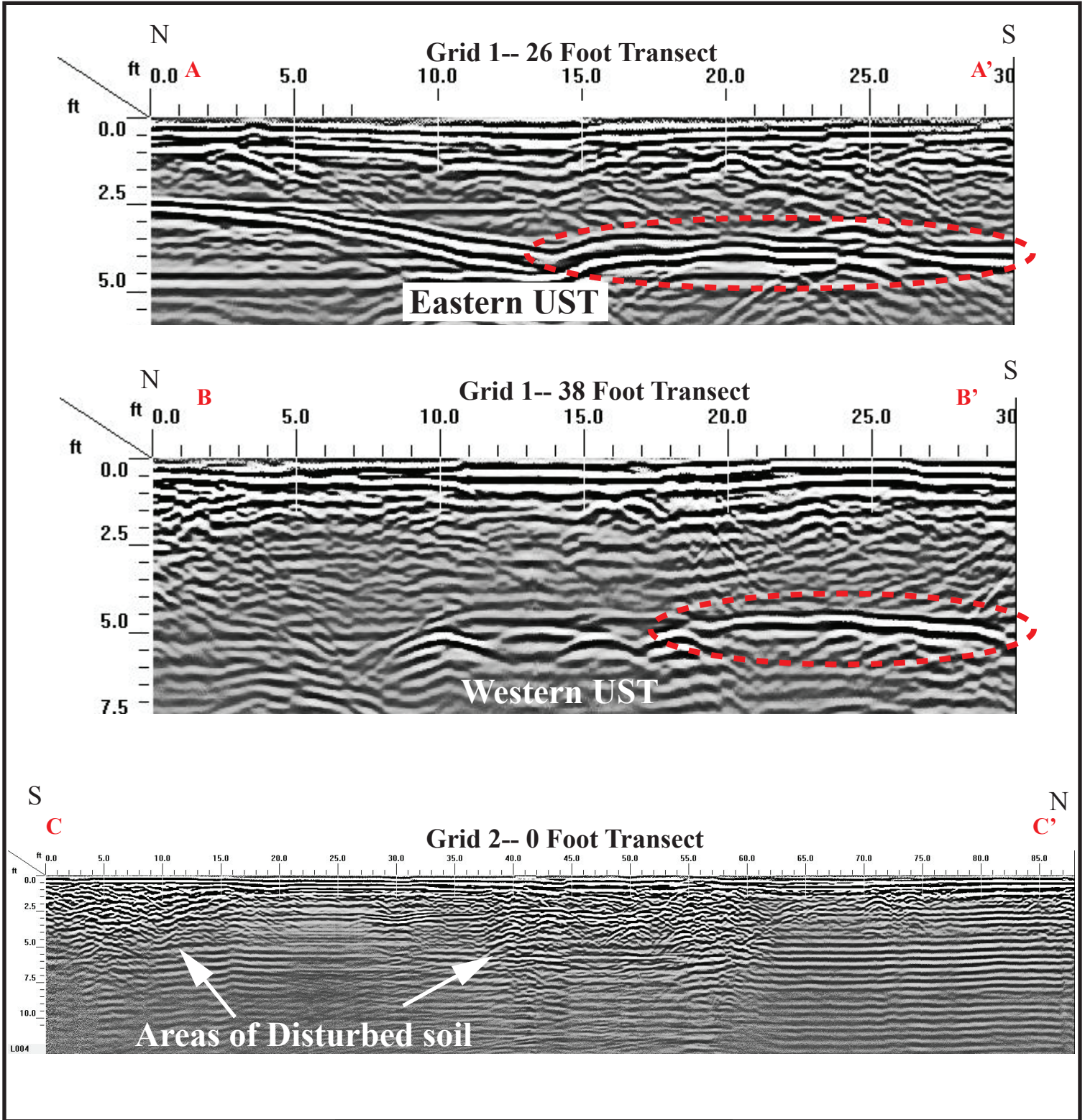


Figure 4c
3-Foot GPR
Time Slice

Cox Property
8742 Highway 221 South
Fleetwood, NC

Seramur & Associates, PC
165 Knoll Drive
Boone, NC



Cox Property
 8742 Highway 221 South
 Fleetwood, NC

Figure 4d
 GPR Transects

Seramur & Associates, PC
 165 Knoll Drive
 Boone, NC

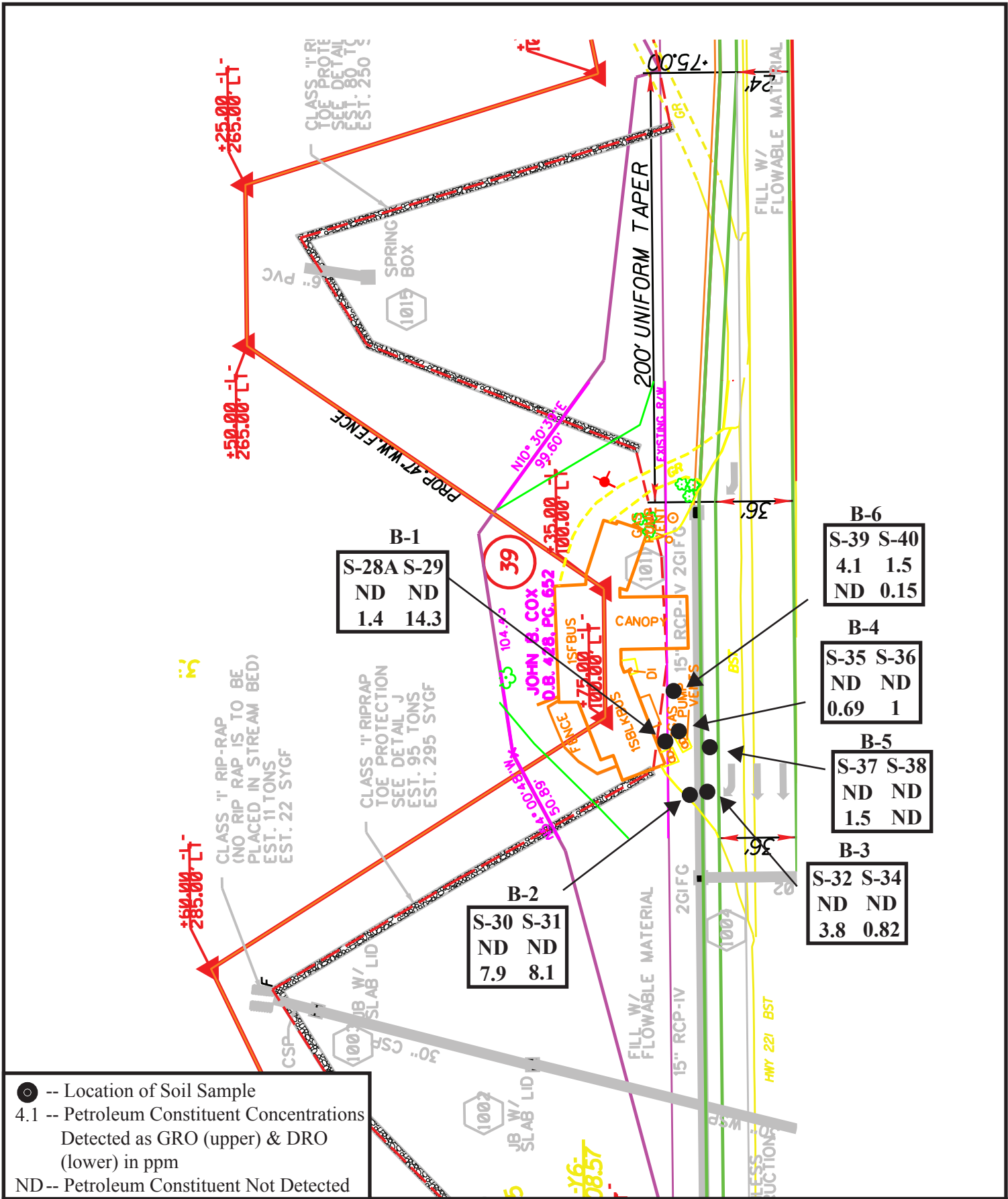
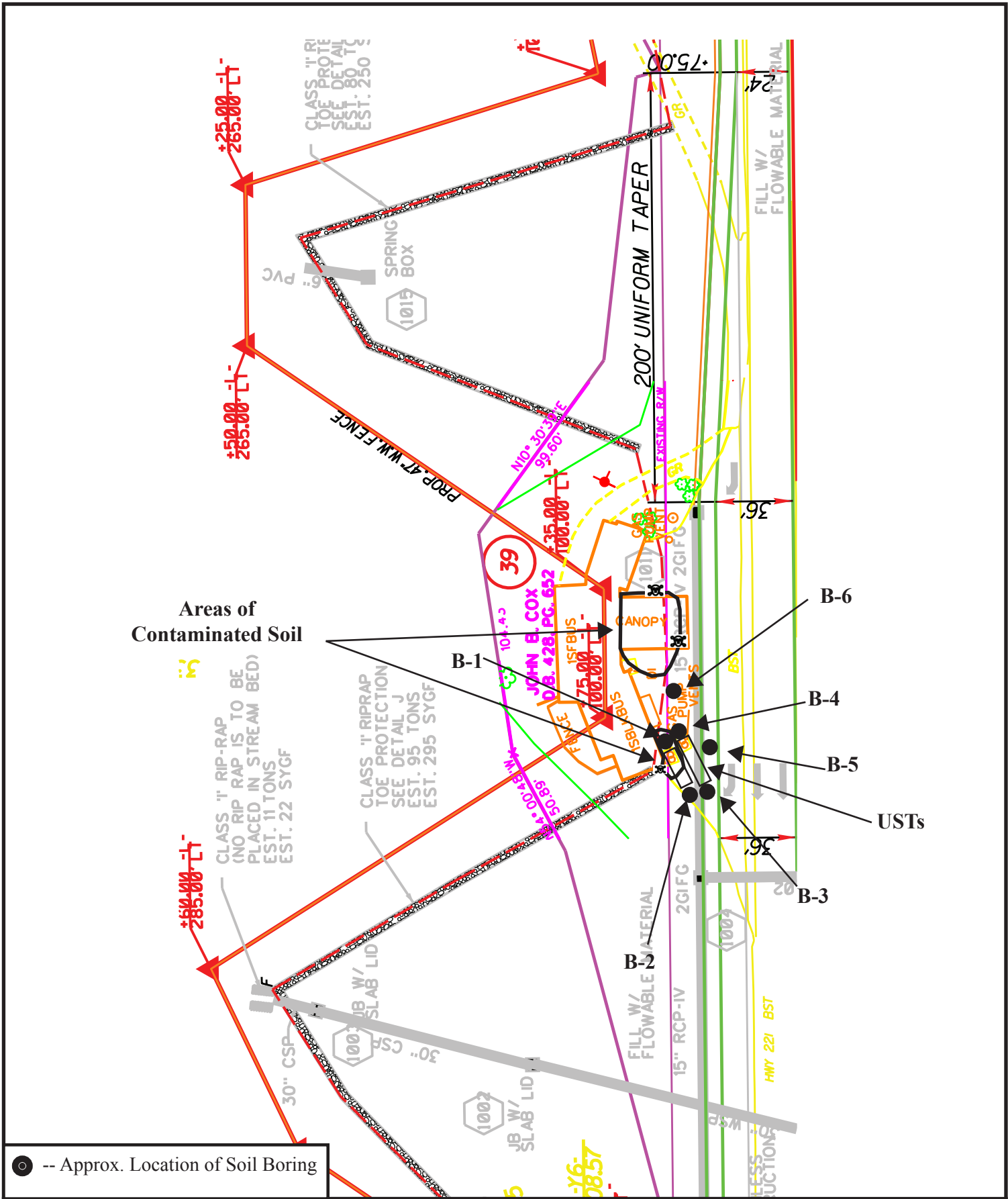


Figure 5
Soil Sampling Analytical Results

Cox Property
8742 Highway 221 South
Fleetwood, NC

Seramur & Associates, PC
165 Knoll Drive
Boone, NC



● -- Approx. Location of Soil Boring

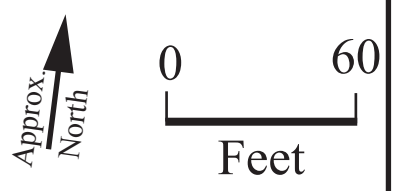


Figure 6
Extent of
Contaminated
Soils

Cox Property
8742 Highway 221 South
Fleetwood, NC

Seramur & Associates, PC
165 Knoll Drive
Boone, NC

Appendix B

Laboratory Reports and Chain of Custody Records



Hydrocarbon Analysis Results

Client: Seramur and Associates
Address: Boone, NC

Samples taken
Samples extracted
Samples analysed

Wednesday, May 6, 15
Wednesday, May 6, 15
Thursday, May 7, 15

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



Hydrocarbon Analysis Results

Client: Seramur and Associates
Address: Boone, NC

Samples taken
Samples extracted
Samples analysed

Wednesday, May 6, 15
 Wednesday, May 6, 15
 Thursday, May 7, 15

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	S30	21.8	<1.1	<0.55	7.9	7.9	2.9	0.11	<0.011	0	95.6	4.4	Deg Fuel (FCM) 94.5%
s	S31	22.0	<1.1	<0.55	8.1	8.1	2.9	0.11	<0.011	0	93	7	Deg Fuel (FCM) 94%
s	S32	23.4	<1.2	<0.59	3.8	3.8	1.5	0.06	<0.012	0	92.8	7.2	Deg Fuel (FCM) 89.1%
s	S34	23.9	<1.2	<0.6	0.82	0.82	0.82	0.09	<0.012	0	92.3	7.7	V.Deg.PHC (FCM)
s	S35	19.8	<0.5	<0.5	0.69	0.69	0.69	0.08	<0.01	0	90.7	9.3	V.Deg.PHC (FCM)
s	S36	26.3	<1.3	<0.66	1	1	1	0.12	<0.013	0	94.7	5.3	V.Deg.PHC (FCM)
Initial Calibrator QC check			OK			Final FCM QC Check			OK			100.6%	

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



Hydrocarbon Analysis Results

Client: Seramur and Associates
Address: Boone, NC

Samples taken
Samples extracted
Samples analysed

Wednesday, May 6, 15
 Wednesday, May 6, 15
 Friday, May 8, 15

Contact: Keith Seramur

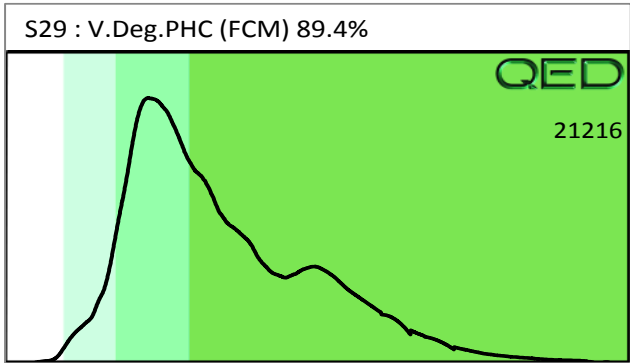
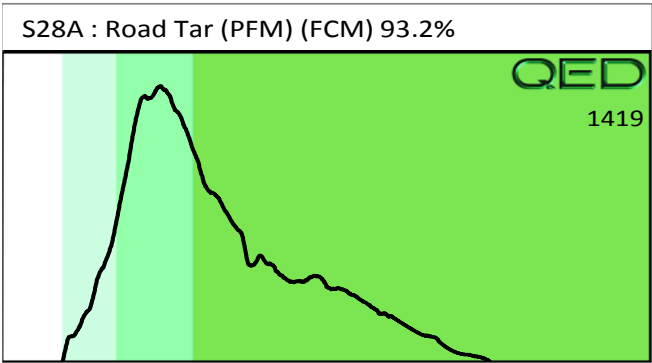
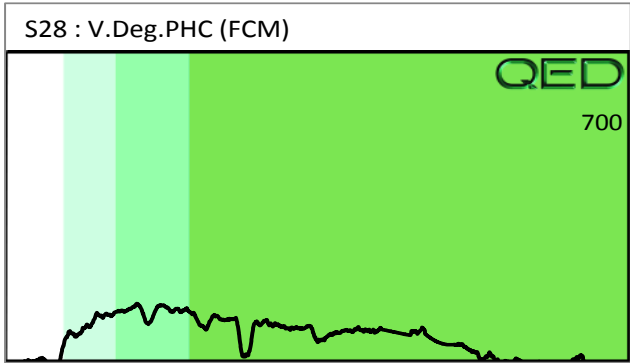
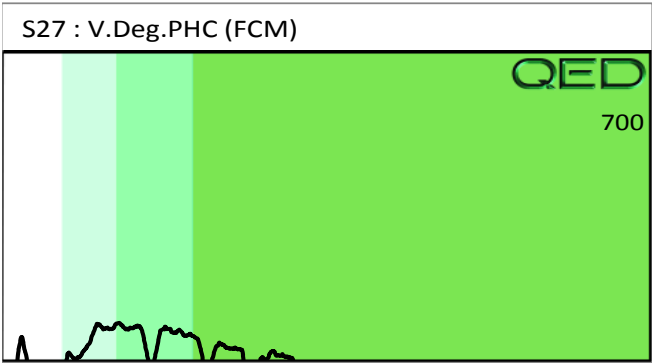
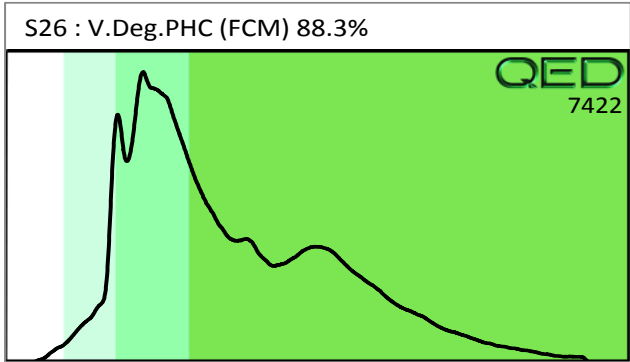
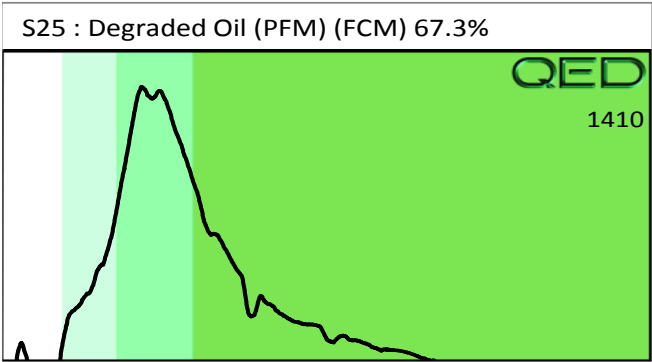
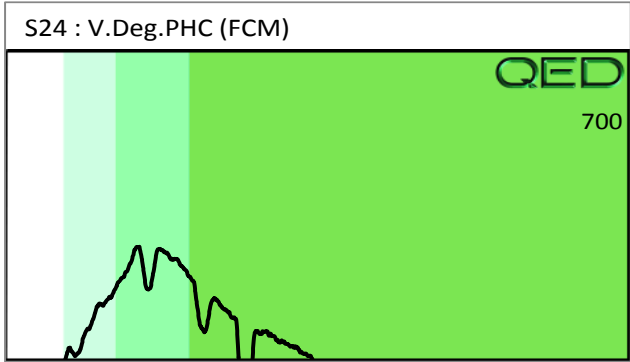
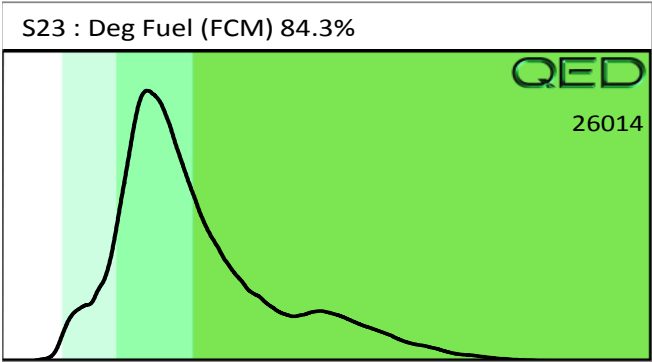
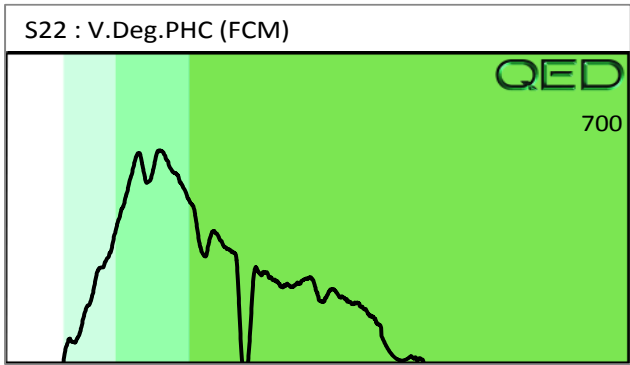
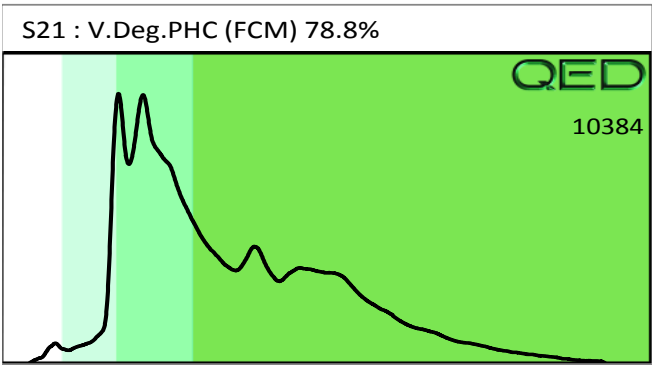
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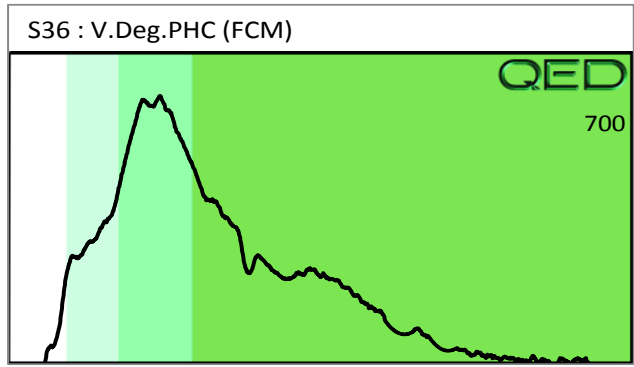
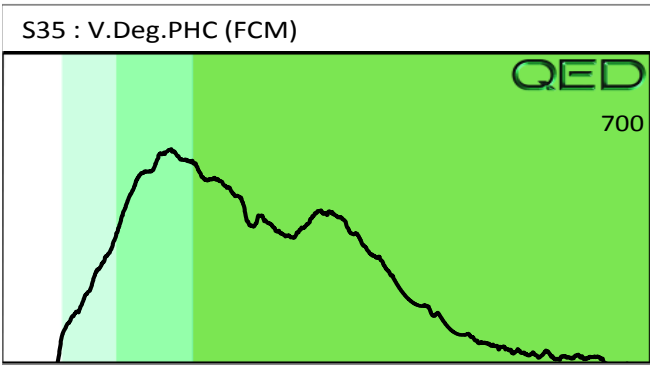
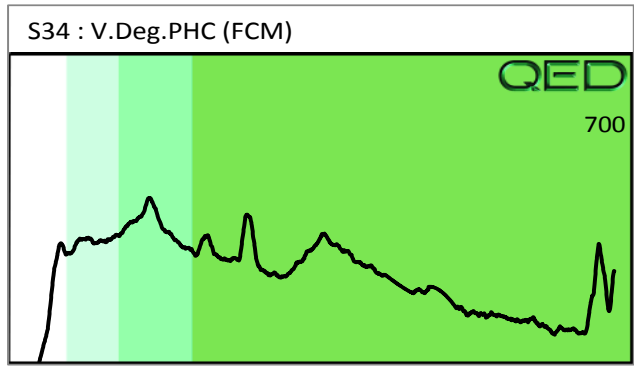
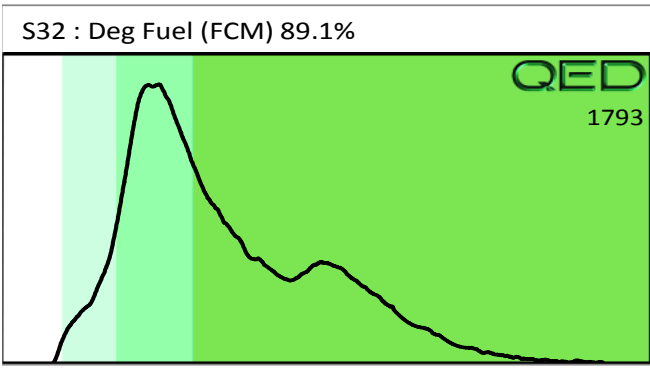
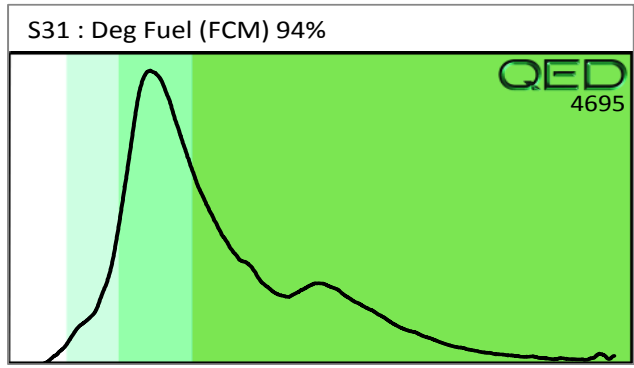
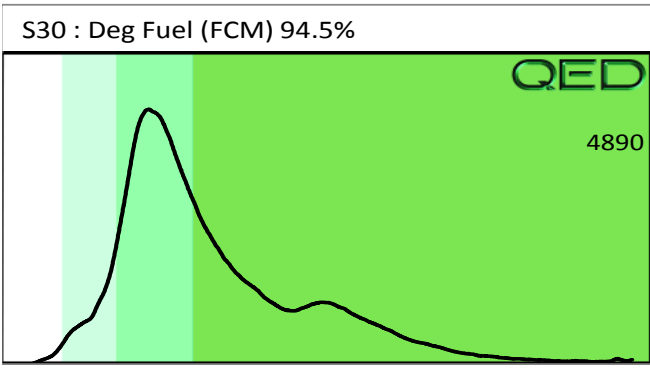
F. Owen

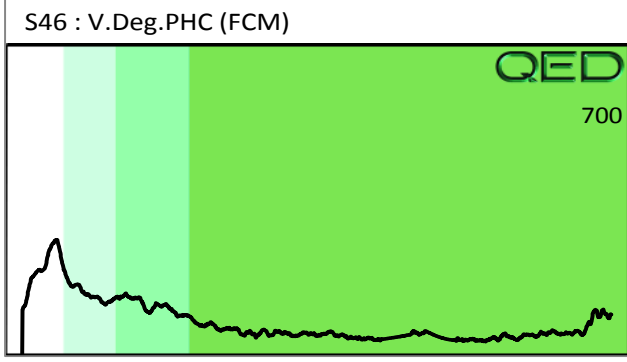
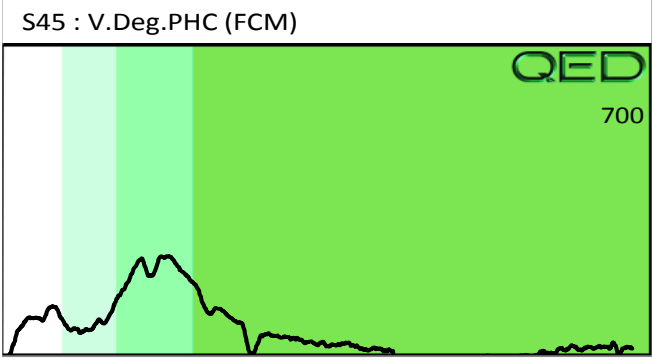
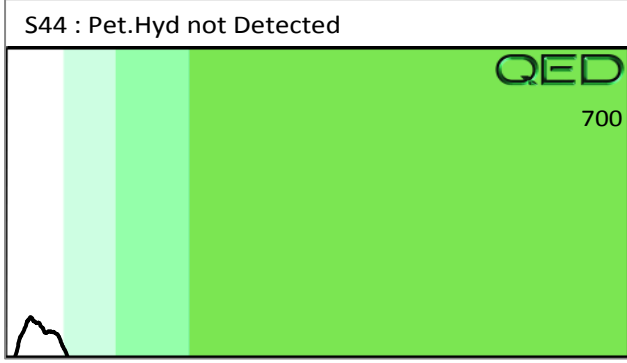
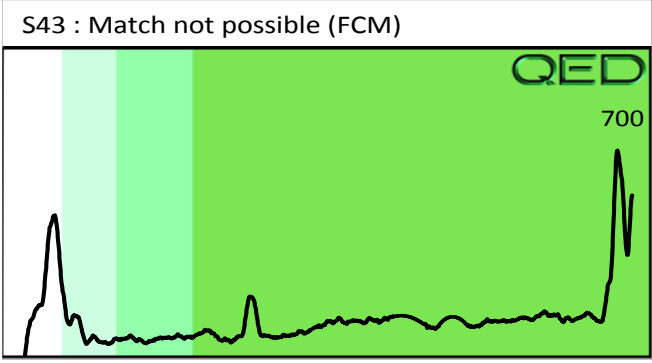
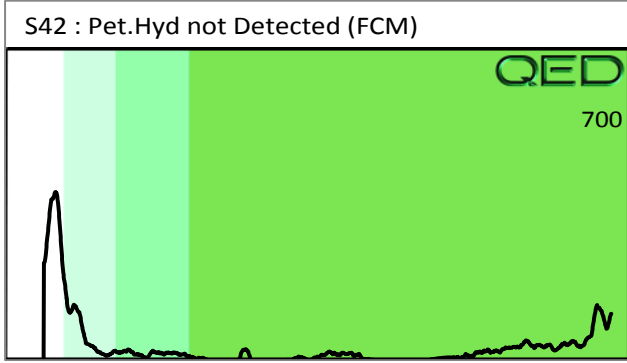
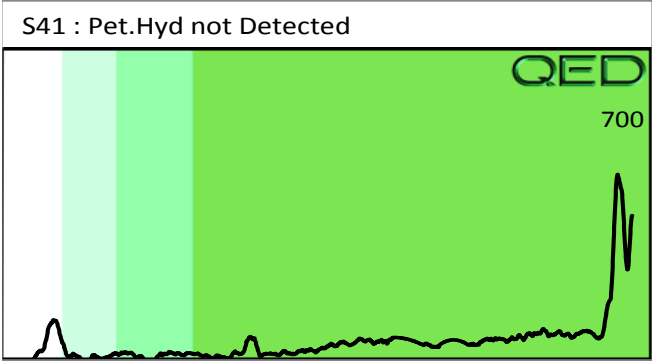
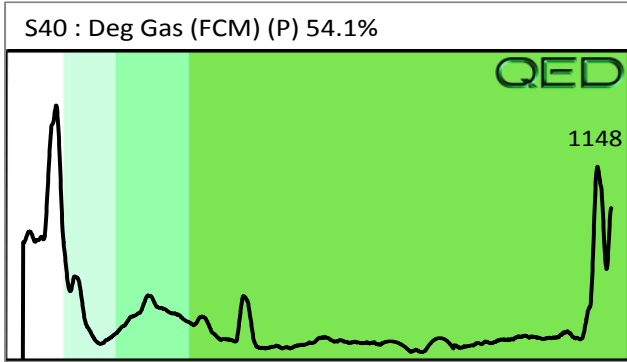
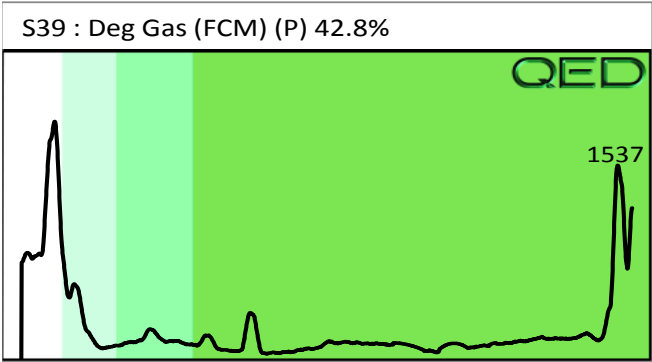
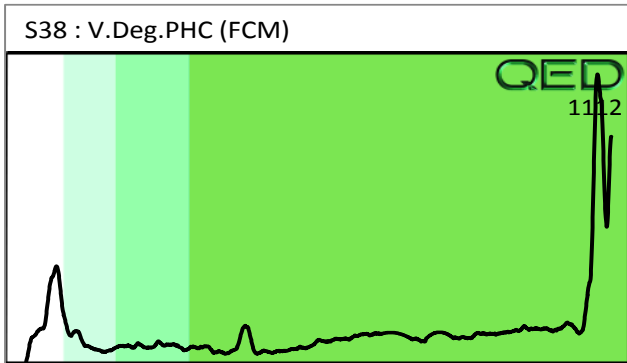
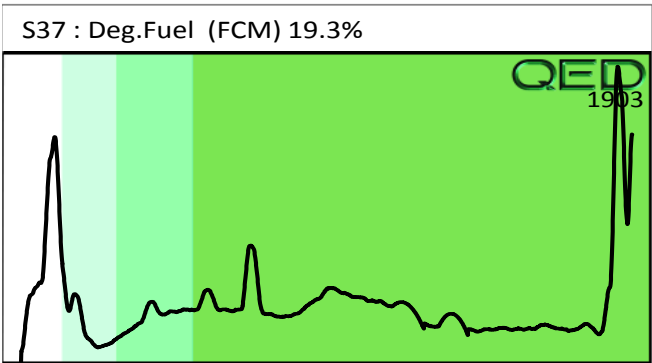
Project: NC DOT R-2915C

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	S37	14.9	<0.75	<0.37	1.5	1.5	<0.12	<0.01	<0.007	0	54.9	45.1	Deg.Fuel (FCM) 19.3%	
s	S38	14.7	<0.73	<0.37	<0.15	<0.37	<0.07	<0.01	<0.007	0	25.3	74.7	V.Deg.PHC (FCM)	
s	S39	15.6	<0.78	4.1	<0.16	4.1	<0.08	<0.02	<0.008	98.5	1	0.4	Deg Gas (FCM) (P) 42.8%	
s	S40	15.4	1.5	1.5	0.15	1.65	<0.08	<0.02	<0.008	95.1	3.3	1.6	Deg Gas (FCM) (P) 54.1%	
s	S41	13.8	<0.69	<0.34	<0.14	<0.34	<0.07	<0.01	<0.007	0	0	0	Pet.Hyd not Detected	
s	S42	14.8	<0.74	<0.37	<0.15	<0.37	<0.07	<0.01	<0.007	0	0	0	Pet.Hyd not Detected (FCM)	
s	S43	14.1	<0.71	<0.35	<0.14	<0.35	<0.07	<0.01	<0.007	0	0	100	Match not possible (FCM)	
s	S44	13.6	<0.68	<0.34	<0.14	<0.34	<0.07	<0.01	<0.007	0	0	0	Pet.Hyd not Detected	
s	S45	14.4	<0.72	<0.36	<0.14	<0.36	<0.07	<0.01	<0.007	0	100	0	V.Deg.PHC (FCM)	
s	S46	14.3	<0.71	<0.36	<0.14	<0.36	<0.07	<0.01	<0.007	0	100	0	V.Deg.PHC (FCM)	
Initial Calibrator QC check			OK		Final FCM QC Check					OK		109.5%		

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







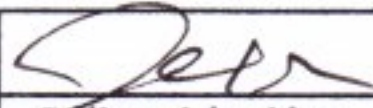


Chain of Custody Record and Analytical Request Form

Sample ID	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

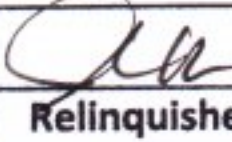
Phone: 828 723 0499

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

Appendix C

Select Tables and Figures from the Jack and Deans Comprehensive Site Assessment and Corrective Action Plan

TABLE 1

**Groundwater Elevation Data for Well MW-1
Former Jack and Dean's
Fleetwood, North Carolina**

Date Measured	Relative T.O.C. Elevation	Depth To Water	Relative Groundwater Elevation
10/13/99	100.00	46.95	53.05
6/15/99	100.00	46.30	53.70
1/21/99	100.00	45.31	54.69
7/21/98	100.00	39.40	60.60
2/19/98	100.00	42.64	57.36
6/16/97	100.00	40.94	59.06

NOTE: 1) All measurements are in feet.
2) T.O.C. = Top of Casing (well casing)
3) Top of casing at well MW-1 was
assigned an arbitrary datum of 100.0 feet.

TABLE 2

**Groundwater Field Measurements
Former Jack and Dean's
Fleetwood, North Carolina**

WELL NUMBER	Date Measured	pH	Temp. °F	Electric Conductivity μ S/cm
MW-1	10/13/99	7.4	55.6	19.05
MW-1	6/15/99	9.1	56.1	150.0
MW-1	1/21/99	9.3	56.1	72.3
MW-1	7/21/98	5.9	61.1	82.4
MW-1	2/19/98	5.8	54.2	61.4
MW-1	6/16/97	4.65	58.7	50.6

TABLE 1
HYDROCARBON ANALYTICAL DATA
JACK AND DEAN'S
COMMUNITY CORNER
FLEETWOOD, NORTH CAROLINA

Sample Number	Sample Method	Sample Date	Depth Of Sample in Feet	Boring Number	Volatile TPH 5030 in ppm	Semi-Volatile TPH 3550 in ppm	Residential/Soil to Groundwater MSCC (in ppm)
VMW1-15	Split Spoon	02/19/98	15.0	VMW-1	NA	NA	469/34
VMW2-15	Hand Auger	02/20/98	15.0	VMW-2	13.3	ND	469/34
VMW2-25	Hand Auger	02/20/98	25.0	VMW-2	717	ND	469/34

ANALYTICAL RESULTS FOR EPA METHOD 8021

Parameter $\mu\text{g}/\text{kg}$	VMW2-15	VMW2-25	Residential MSCC	Soil-to-Groundwater MSCC
n-Butylbenzene	2,059	3,210	156,000	4,000
sec-Butylbenzene	ND	5,993	156,000	3,000
Ethyl Benzene	59	2,993	1,560,000	240
Isopropyl benzene	25	1,679	1,564,000	2,000
p-Isopropyltoluene	1,518	3,085	NL	NL
Naphthalene	3,137	5,061	63,000	580
n-Propylbenzene	350	2,118	156,000	2,000
Styrene	ND	186	NL	NL
Toluene	ND	3,013	3,200,000	7,000
1,2,4-Trimethylbenzene	2,151	2,640	782,000	8,000
1,3,5-Trimethylbenzene	1,138	2,123	782,000	7,000
Xylenes	1,279	9,990	32,000,000	5,000

- NOTE: 1) ND = Not detected at or above minimum quantification limits.
2) NL = MSCC not listed for this constituent.
3) Concentrations shown in bold exceed the Residential and/or Soil-to-Groundwater MSCC.

TABLE 3
SOIL SAMPLING DATA
JACK & DEANS COMMUNITY CORNER
FLEETWOOD, NORTH CAROLINA

SAMPLE NUMBER	COLLECTION DATE	COLLECTION METHOD	SAMPLE DEPTH (Feet)	PID READINGS (ppm)	TPH VOLATILE EPA METHOD 5030 in ppm (date analyzed)	TPH SEMI VOLATILE EPA METHOD 3550 in ppm (date analyzed)
S-1	3/20/97	Split Spoon	14.5	2.2	ND (3/25/97)	NA
S-2	3/20/97	Split Spoon	14.5	1.4	ND (3/25/97)	NA
S-3	3/20/97	Split Spoon	14.5	0.4	ND (3/25/97)	NA
S-4	3/21/97	Split Spoon	14.5	0.3	ND (3/25/97)	NA
S-5	3/21/97	Auger	30.5	2.0	ND (3/25/97)	NA
S-6	3/21/97	Auger	39.0	0.6	ND (3/25/97)	NA
SB-1	6/17/97	Auger	15.7	NA	NA	ND (6/25/97)
SB-2	6/17/97	Auger	15.2	NA	NA	ND (6/25/97)
SB-3	6/17/97	Auger	15.0	NA	NA	119 (6/25/97)
SB-4	6/17/97	Auger	24.0	NA	NA	ND (6/25/97)
SB-5	6/17/97	Auger	2.7	NA	NA	ND (6/25/97)
SB-6	6/27/97	Auger	16.0	NA	NA	ND (7/1/97)
H-17*	5/7/92	Auger	17.0	NA	1122 (5/11/92)	234 (5/8/92)
D-18*	4/22/92	Cuttings	18.0	NA	1461 (4/22/92)	92.5 (4/23/92)
D-25*	4/22/92	Auger	25.0	NA	919 (4/22/92)	ND (4/23/92)
10**	7/17/91	Auger	12.0	NA	NA	830 (7/18/91)

- NOTES: 1) ND = Not detected at or above minimum quantification limits.
2) NA = Sample not Analyzed for this Constituent
3) * --Samples H-17, D-18, and D-25 reported by Certifoam (1992).
4)** --Sample 10 reported by EnviroSpec (1991).



Water Supply
Well

WSW-1

VMW-1

JACK & DEAN'S

Extent of Soil
Contamination

VMW-2

MW-1

US HWY. 221

EXPLANATION

- Ⓧ -- Approx. Location of Vapor Monitoring Well
- ⊕ -- Approx. Location of Groundwater Monitoring Well
- ▲ -- Approx. Location of Water Supply Well



GEONETICS CORPORATION

P.O. Box 1577 Boone, North Carolina 28607

704/265-1577

**JACK & DEAN'S COMMUNITY CORNER
FLEETWOOD, NORTH CAROLINA**

JOB NO.
97525

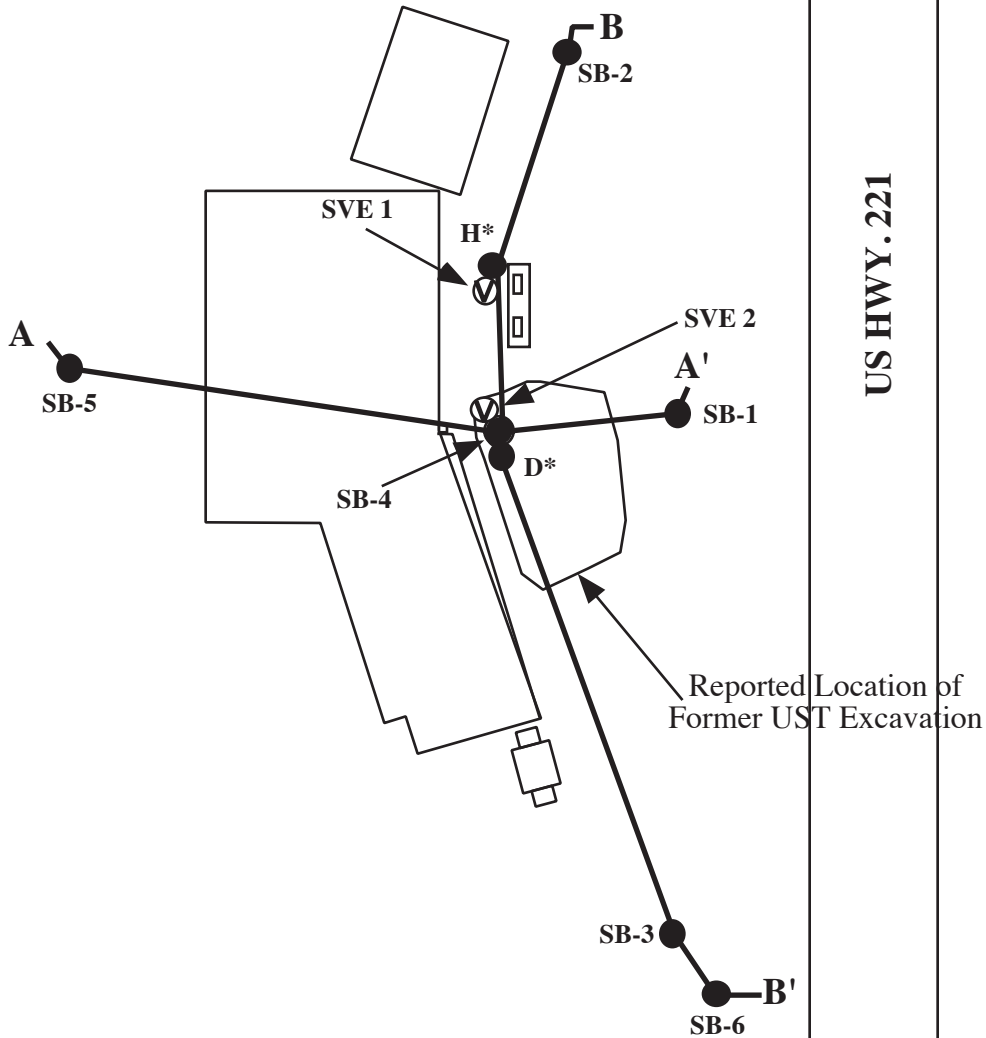
SITE MAP

FIGURE 2

KCS 9/18/98

NOTE :

1) * --Borings H and D reported by Certifoam (1992).
The location of these borings are approximate.



EXPLANATION

- -- Approx. Location of Soil Boring
- A A' -- Location of Cross-Section Lines (See Figures 7 & 8)
- ⊙ -- Approx. Location of Soil Vapor Extraction Wells (not in use)

EEF 7/2/97



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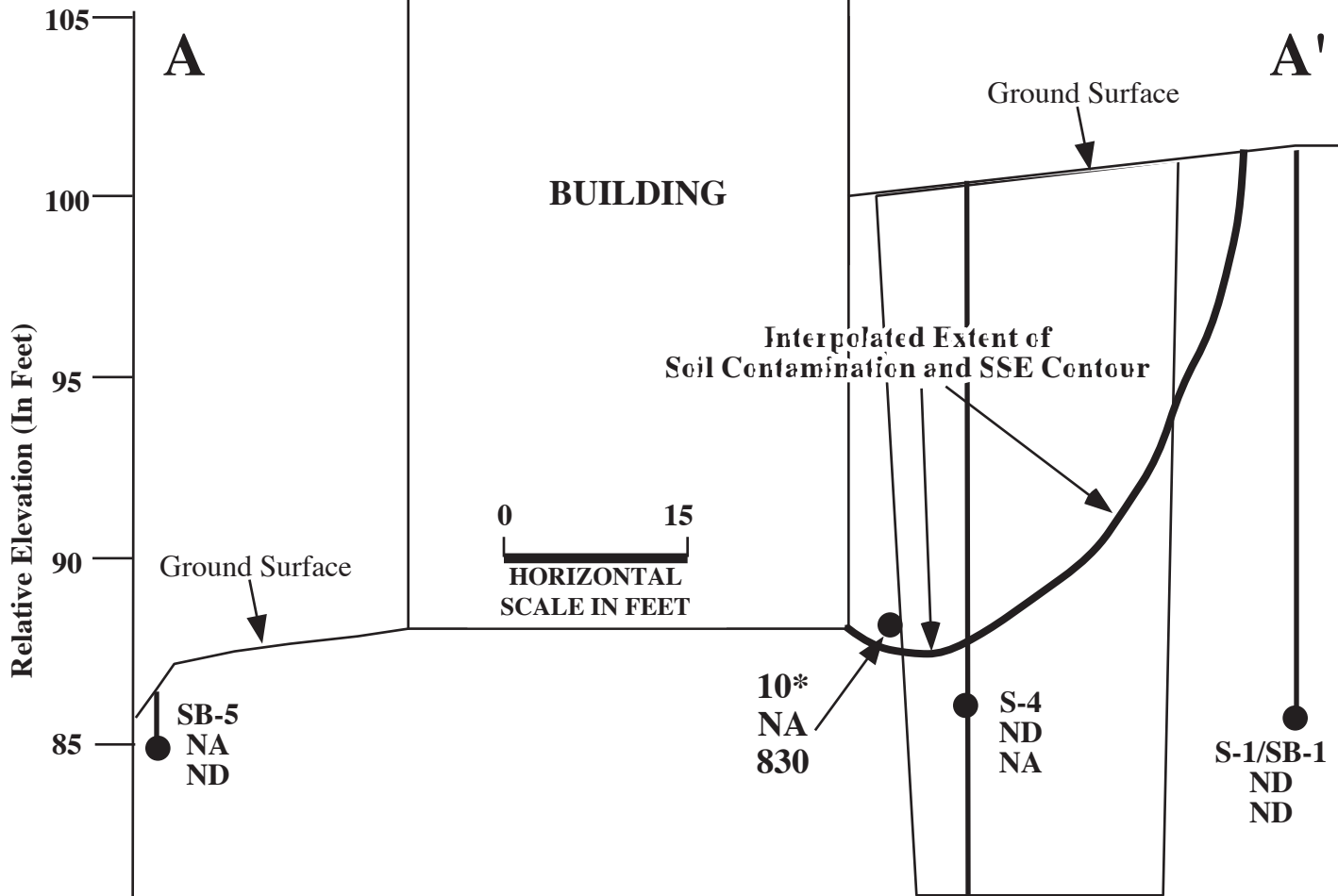
704/265-1577

**JACK & DEAN'S COMMUNITY CORNER
FLEETWOOD, NORTH CAROLINA**

JOB NO.
97525

SOIL SAMPLING PLAN

FIGURE 6



NOTE: 1) Relative elevation references the top of pipe at MW-1 at 100.00 ft.
 2) * --Sample 10 reported by EnviroSpec (1991). The location of 10 is approximate.

EXPLANATION

- -- Soil Sample Collection Points
- ND -- Concentration of Volatile TPH (upper) and Semi-Volatile TPH (lower) in ppm
- -- Reported Location of UST Excavation
- NA -- Sample not Analyzed for this Constituent
- ND -- TPH not detected at or above Minimum Quantification Limits



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 704/265-1577

**JACK & DEAN'S COMMUNITY CORNER
 FLEETWOOD, NORTH CAROLINA**

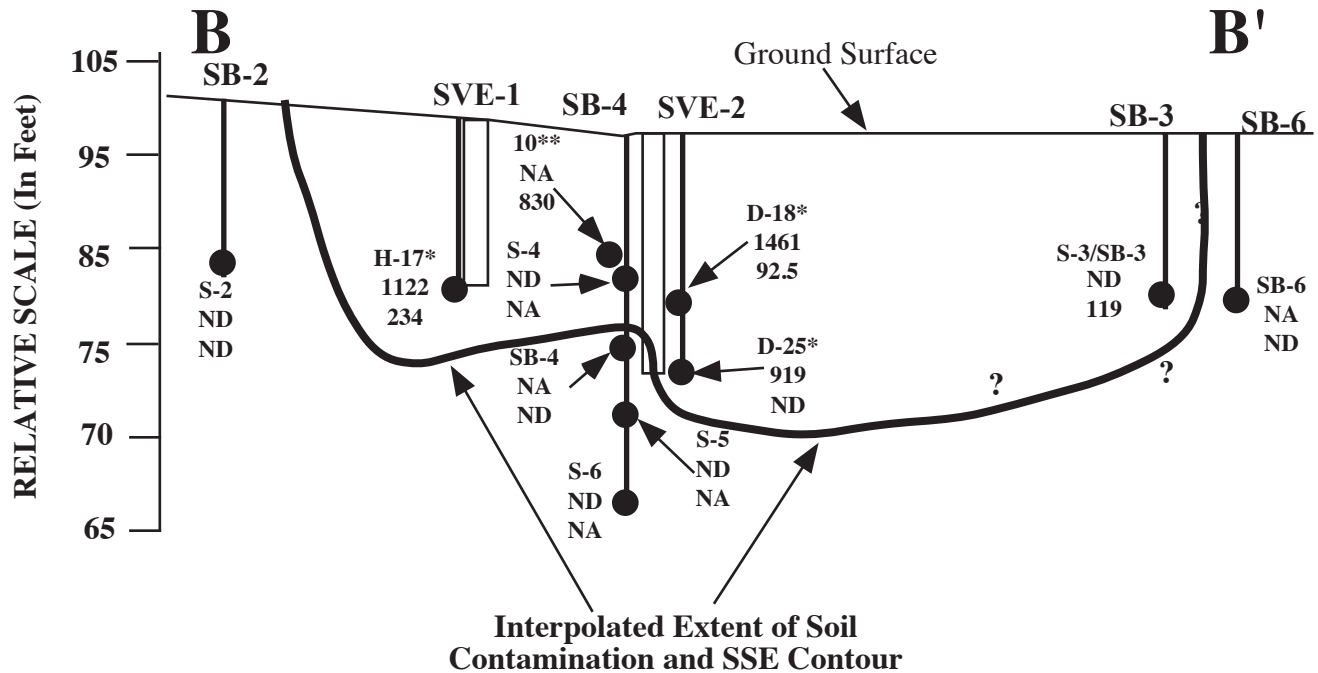
JOB NO.
97525

**CROSS-SECTION
 A - A'**

FIGURE 7

EEF 7/3/97

105
100
95
90
85
80
75
70
65
60



EXPLANATION

- -- Soil Sample Collection Points
- ND -- Concentration of Volatile TPH (upper) and Semi-Volatile TPH (lower) in ppm
- 119
- -- Reported Location of Former UST Excavation
- ▭ -- Soil Vapor Extraction Well (not in use)
- ND -- TPH not detected at or above Minimum Quantification Limits
- NA -- Sample not Analyzed for this Constituent

NOTE :

- 1) * --Samples H-17, D-18, and D-25 reported by Certifoam (1992). The location of these samples are approximate. Sample D-18 was collected from auger cuttings.
- 2) ** --Sample 10 reported by EnviroSpec (1991). The location of 10 is approximate.
- 3) Relative elevation references the top of pipe in MW-1 at 100.00 ft.



GEONETICS CORPORATION

P.O. Box 1577 Boone, North Carolina 28607

704/265-1577

**JACK & DEAN'S COMMUNITY CORNER
FLEETWOOD, NORTH CAROLINA**

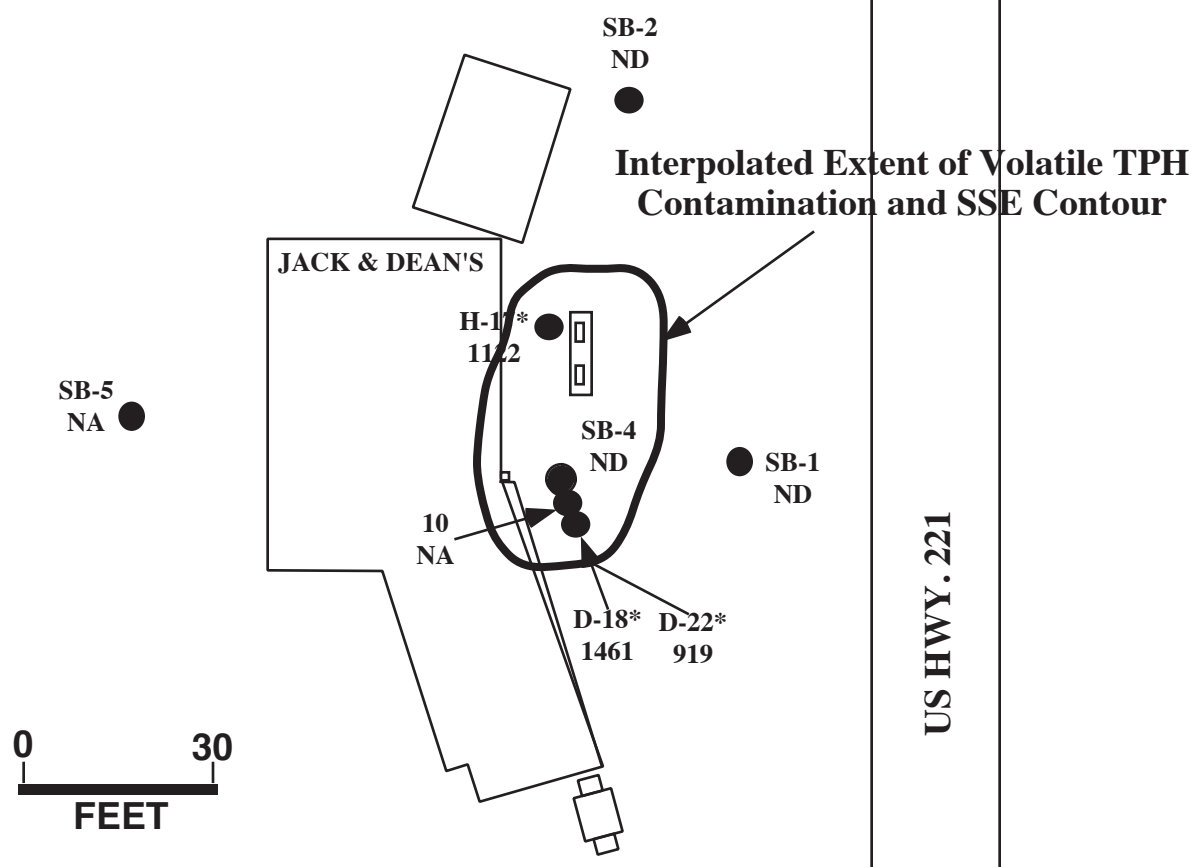
JOB NO.
97525

**CROSS-SECTION
B - B'**

FIGURE 8

EEF 7/2/97

NOTE : * --Samples H-17, D-18 and D-25 reported by Certifoam (1992).
 The location of these samples is approximate. Sample D-18
 was collected from auger cuttings.



EXPLANATION

- -- Approx. Location of Soil Boring
- 1461 -- Concentration of Volatile TPH in ppm
- ND -- Volatile TPH not Detected at or above Minimum Quantification Limits
- NA -- Sample not Analyzed for this Constituent

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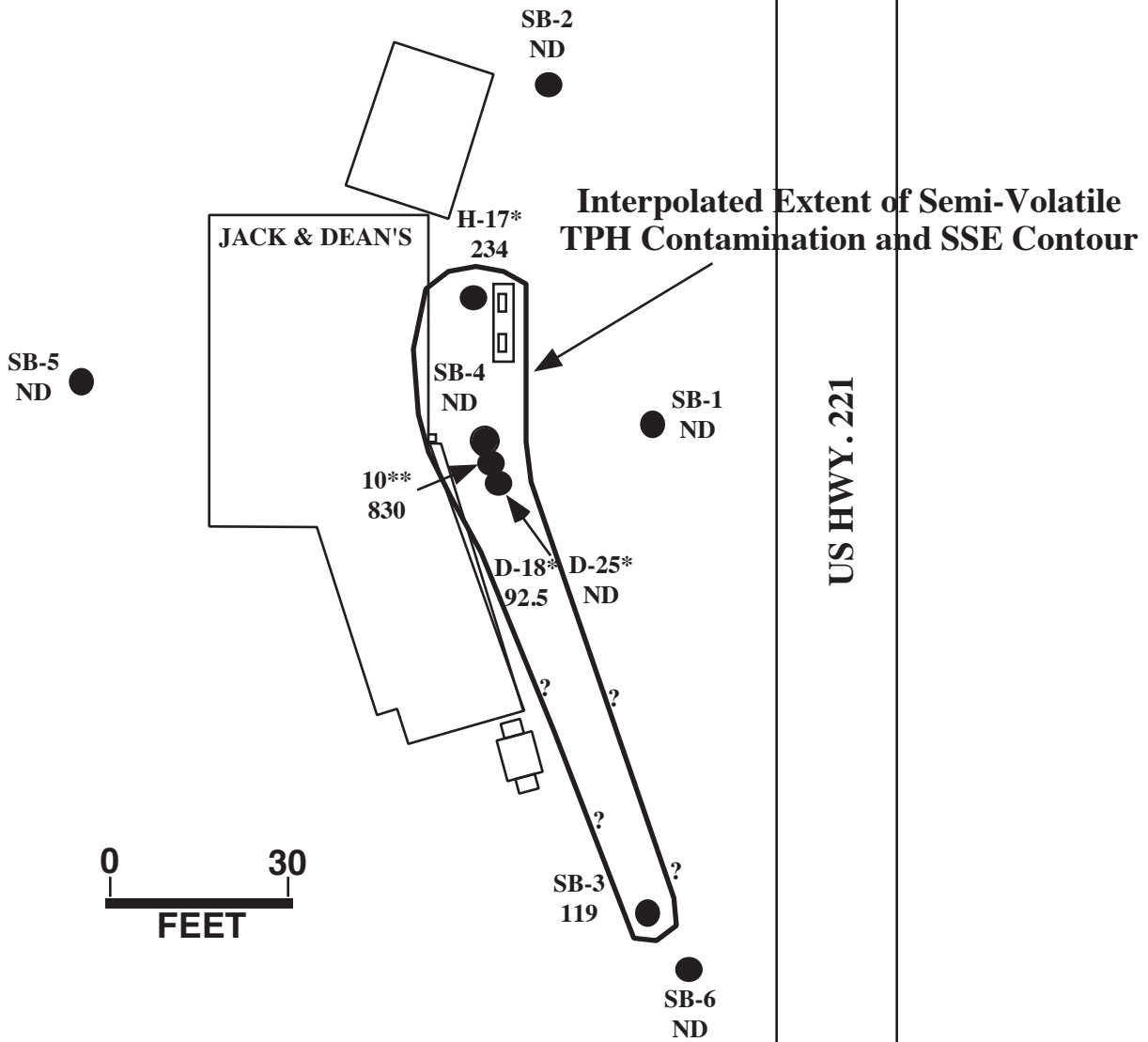
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JOB NO.
97525

**VOLATILE SOIL
 ISOCON MAP**

FIGURE 9

NOTE : 1) * --Samples H-17, D-18, and D-25 reported by Certifoam (1992).
 The location of these samples is approximate. Sample D-18 was collected from auger cuttings.
 2) ** --Sample 10 reported by Enviro Spec (1991). The location of 10 is approximate.



EXPLANATION

- -- Approx. Location of Soil Boring
- 119 -- Concentration of Semi-Volatile TPH in ppm
- ND-- TPH not Detected at or above Minimum Quantification Limits



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**SEMI-VOLATILE SOIL
 ISOCON MAP**

FIGURE 10

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