

Preliminary Site Assessment Report

Parcel 3

Old Brogden Farms II, LLC

**I-95 and US 70 Business (East Market Street) Exit 95 interchange from Outlet Center Drive
to west of Yelverton Grove Road**

Southeast Quadrant of East Market Street and the I-95 North Exit Ramp

Johnston County, North Carolina

TIP Number I-5972

WBS Number 44989.1.1

NCDOT Parcel No. 3

Johnston County PIN 260306-28-7599

Prepared for

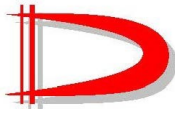
**North Carolina Department of Transportation
Geotechnical Engineering Unit
GeoEnvironmental Section
Raleigh, North Carolina**

Prepared by

**Duncklee & Dunham, P.C.
Cary, North Carolina**

August 22, 2019





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August 22, 2019

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

Reference: **Preliminary Site Assessment Report
Parcel 3
Old Brogden Farms II, LLC
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Johnston County, North Carolina
TIP Number I-5972
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NCDOT Parcel No. 3
Johnston County PIN 260306-28-7599**

Dear Mr. Haden:

Duncklee & Dunham, P.C. (Duncklee & Dunham) is pleased to submit this *Preliminary Site Assessment Report* for the referenced site. The objective of our services was to assist the North Carolina Department of Transportation (NCDOT) – Geotechnical Engineering Unit with identifying potential environmental concerns within the rights-of-way and/or easements of the above-referenced site. This work is consistent with the NCDOT's Request for Technical and Cost Proposal dated June 7, 2019 and our *Revised Technical and Cost Proposal* dated June 19, 2019. Based on the findings from this work, Duncklee & Dunham recommends submitting this report to the Raleigh Regional Office of the North Carolina Department of Environmental Quality.

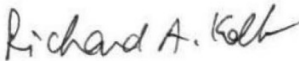
Please contact Rick Kolb at rkolb@dunckleedunham.com or (919) 858-9898, ext. 111 if you have any questions or require additional information.

Sincerely,

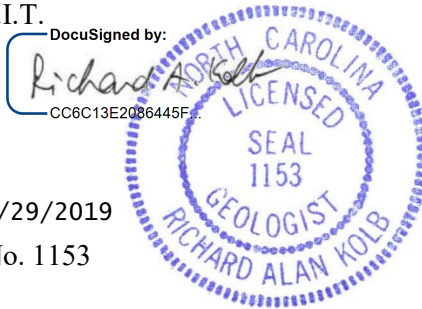
Duncklee & Dunham, P.C.



Alec N. Dziwanowski, G.I.T.
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Attachment: Preliminary Site Assessment Report



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NCDOT Parcel No. 3
Johnston County PIN 260306-28-7599
August 22, 2019

1 Introduction

Dunklee & Dunham, P.C. (Dunklee & Dunham) conducted a Preliminary Site Assessment of the referenced site in the southeast quadrant at the intersection of U.S. Highway 70 Business (East Market Street) and the I-95 North exit Ramp, east of Smithfield in Johnston County, North Carolina (Figures 1 and 2). The North Carolina Department of Transportation (NCDOT) plans to make changes to the I-95 North exit ramp at East Market Street. Our work is consistent with the NCDOT's *Request for Technical and Cost Proposal* dated June 7, 2019, and our *Revised Technical and Cost Proposal* dated June 19, 2019. The objective of our services was to assist NCDOT – Geotechnical Engineering Unit with identifying potential environmental concerns within the rights-of-way and/or easements of the above-referenced site. Our services included a geophysical survey to identify subsurface metallic features such as underground storage tank (UST) systems, and the advancement of 11 borings to test for the presence of contaminants in the areas where the new roadway will be constructed, along rights-of-way for NCDOT, and at new utility easements.

2 History

The NCDOT prepared a GeoEnvironmental Phase I Report dated December 6, 2018, that identified the site as a former B&S Texaco gasoline station, now a vacant parcel. NCDOT determined that six USTs were reported to have been removed from the site in 1994. After review of the incident list of the UST Section of the North Carolina Department of Environment and Natural Resources (NCDENR, now the North Carolina Department of Environmental Quality – NCDEQ), the NCDOT determined NCDENR closed a leaking UST incident file for the site in 2012.

3 Methods

Dunklee & Dunham called NC811 on July 17, 2019 and requested utilities to be marked in the areas of investigation. NC811 notified Johnston County Public Utilities, Duke Energy, CenturyLink, Conterra Ultra Broadband, Time Warner Cable-Charter, and the Town of Smithfield. The clearance was valid through August 7, 2019. Dunklee & Dunham notified the property owner of when we would conduct field work at the site and then again before the field work began.



Duncklee & Dunham reviewed regulatory records on NCDEQ's Laserfiche website and found documentation of a leaking UST system (Incident No. 11797) that was discovered on the site in 1993. NCDENR classified the site as low-risk and closed the incident file in 2012 with a Notice of Residual Petroleum because contaminants in groundwater were at concentrations that exceeded the North Carolina groundwater quality standards promulgated in Title 15A, Subchapter 2L, Section .0202 of the North Carolina Administrative Code (15A NCAC 2L .0202; the "2L standards"). The last groundwater monitoring report on Laserfiche was prepared by Science Applications International Corporation (SAIC) in 2008. This report showed contaminated groundwater beneath a majority of the site. SAIC recommended the installation of an additional well to delineate the southern extent of contaminant plume in groundwater but we did not find records in the file that the southern extent of the plume had been delineated. SAIC abandoned the monitoring wells at the site in 2011. We observed the former locations of some of these monitoring wells during our field work.

The last soil assessment report on Laserfiche was prepared by SAIC in 2006, in which they collected 18 soil samples in a gridded pattern throughout the site. A majority of these samples exhibited petroleum constituents at concentrations that exceeded the Soil to Water Maximum Soil Contaminant Concentrations, even in the samples collected where the UST system had not been located.

Duncklee & Dunham contacted Johnston County Emergency Management to inquire about additional records of releases and did not find such records.

3.1 Geophysics

Pyramid Geophysical Services (Pyramid), under contract to Duncklee & Dunham, conducted a geophysical survey at the site on July 22, 2019. Pyramid used a Geonics EM61 MK2[®] metal detector with an integrated Geode External GPS/GLONASS receiver to locate buried metal objects, and then used a Geophysical Survey Systems, Inc. SIR 4000 GPR instrument with a 350-megahertz antenna to image selected anomalies.

3.2 Soil Borings

Troxler Geologic Services, Inc. (Troxler), under contract to Duncklee & Dunham, used a Geoprobe[®] equipped with direct-push technology to advance 11 soil borings, nos. B-1 through B-11 (Photograph No. 1, Appendix A) on July 26, 2019. As shown on Figure 2, Troxler advanced B-1, -4, -5, -6, -8, and -11 along the proposed NCDOT right of way and control access line (Photograph No. 2), B-2 near the proposed slope stake cut line, B-3 near the former location of a dispensing island (Photograph No. 3), B-7 near the proposed drainage outlet in the southwestern corner of the site (Photograph No. 4), and B-9 and -10 near the proposed drainage outlet near the northwestern corner of the subject site (Photograph No. 5). We observed up to 8 inches of standing water in the area west of borings B-3 and -4 and between B-3 and -4, thus limiting our boring locations.



The boring depths and depths to water below land surface (bls) for each boring are shown in the following table:

Boring ID	Boring Depth (feet bls)	Depth to Water (feet bls)
B-1	8.0	5.5
B-2	8.0	5.0
B-3	8.0	5.87
B-4	4.0	2.0
B-5	12.0	8.5
B-6	8.0	7.5
B-7	8.0	6.5
B-8	6.5	2.0
B-9	4.0	3.0
B-10	4.0	2.0
B-11	8.0	7.5

Duncklee & Dunham used a Trimble Geo 7x[®] handheld GPS unit to determine the locations of each boring. Table 1 shows the Northings and Eastings for these borings.

Troxler collected soil samples in new acetate sleeves, each 4 feet long. A majority of the soil samples were comprised of light brown, silty sand with clay and light gray silt. Boring logs are in Appendix B. Duncklee & Dunham collected representative samples of native material at selected intervals in each soil boring and stored the samples in twin Ziploc[®] bags, except for B-4, which encountered the water table just below a 2-foot-thick layer of asphalt. After allowing one of the bags to sit untouched in the sun and the other in a cooler for approximately 15 minutes, we used a photoionization detector (PID) to screen the headspace in each bag left in the sun for volatile organic compounds (VOCs). We recorded the soil-screening results in the field log. Table 2 summarizes the screening results. The soil samples collected above the water table were not stained and did not exhibit petroleum odors except for the samples from B-2 and B-3, which exhibited petroleum odors with increasing concentration from 2 to 4 feet bls. These two borings are in locations near SAIC borings that exhibited contamination. As shown on Table 2, the PID readings of the soil samples from B-2 and B-3 ranged from 6.4 to 142 parts per million (ppm) in B-2 and 32.2 to 97.9 ppm in B-3. The PID readings of the remaining samples did not exceed 0.2 ppm, and we did not detect a petroleum odor in these samples.

Duncklee & Dunham collected a soil sample from each boring except B-4 to be tested in the laboratory. We placed the soil samples from the Ziploc[®] bags from the cooler into laboratory-supplied containers, placed the containers in a cooler with ice, and shipped the cooler under chain-of-custody to RED Lab, LLC (RED Lab) in Wilmington, North Carolina. RED Lab tested the samples for total petroleum hydrocarbons (TPH)–diesel range organics (DRO) and TPH–gasoline range organics (GRO) using Ultraviolet Fluorescence methodology.



3.3 Groundwater

Troxler constructed temporary monitoring well TW-1 in boring B-3 to a depth of 10 feet bls using 1-inch diameter PVC and placed the well screen from 5 to 10 feet bls. Duncklee & Dunham purged groundwater from the well using a peristaltic pump with a new length of low-density polyethylene tubing and silicon tubing for the pump head. Once the purge water appeared clear, Duncklee & Dunham sampled TW-1. We discharged groundwater directly from the peristaltic pump tubing into laboratory-supplied containers, placed the containers in a cooler with ice, and delivered the cooler under chain-of-custody to Environmental Conservation Laboratories (ENCO) in Cary, North Carolina. ENCO laboratory tested the groundwater samples for VOCs according to EPA Method 8260D and semivolatile organic compounds according to EPA Method 8270E. In accordance with NCDEQ guidance, Duncklee & Dunham discharged the purge water on the ground around TW-1 once we had collected the groundwater sample. Troxler abandoned TW-1 by filling the borehole with bentonite pellets in accordance with well abandonment procedures promulgated in Title 15A, Subchapter 2C, Section .0113 of the North Carolina Administrative Code (15A NCAC 2C .0113).

4 Results

4.1 Geophysics

Pyramid's *Geophysical Survey* report, dated August 5, 2019, is in Appendix C. Pyramid identified 11 electromagnetic anomalies that they attributed to visible cultural features on the ground surface or buried, metallic debris and/or utilities. The ground penetrating radar survey confirmed three of the electromagnetic anomalies were associated with unknown buried metallic features. Pyramid did not identify anomalies indicative of abandoned USTs or buried metal drums.

4.2 Soil Borings

Table 2 and Figure 3 summarize the laboratory results for the soil samples collected from each soil boring. The laboratory reports are in Appendix D. RED Lab detected TPH-GRO and/or -DRO in each of the soil samples, except for the samples from B-9 and B-11. RED Lab did not detect TPH at concentrations that exceeded NCDEQ's action levels of 100 mg/kg for TPH-GRO or 50 mg/kg for TPH-DRO except in the sample collected from B-2. RED Lab detected TPH-GRO at a concentration of 65.7 mg/kg in B-2. RED Lab identified the hydrocarbon fingerprint of the TPH-DRO in B-2 as "degraded gas."

4.3 Groundwater

Table 3 and Figure 3 summarize the laboratory results for the sample collected from TW-1. ENCO detected 17 petroleum constituents in this groundwater sample; the concentrations of 14 analytes exceeded the respective 2L Standards. The concentrations did not exceed the respective Gross Contamination Levels.



5 Conclusions

5.1 Geophysics

Pyramid identified 11 magnetic anomalies on the site that they attributed to cultural features on the ground surface or buried, metallic debris and/or utilities. Pyramid did not identify anomalies indicative of abandoned USTs or buried metal drums.

5.2 Soil Samples

The soil sample from B-2 exhibited TPH-GRO at a concentration that exceeded NCDEQ's action level. The extent of contamination shown in Figure 3 reflects what we estimate is 100 cubic yards of contaminated soil above the water table based on the data collected during our assessment. However, SAIC reported soil contamination throughout the site during their assessment in 2006, including locations where the former UST system was not located. Duncklee & Dunham detected petroleum odors from 2 to 8 feet bls in the soil samples from B-2 and B-3, but we did not observe stains in these soil samples. Duncklee & Dunham did not detect petroleum odors or observe stains in the other soil samples collected above the water table.

5.3 Groundwater Samples

ENCO detected 14 analytes at concentrations that exceeded the respective 2L Standards in the groundwater sample collected from TW-1. Most of the exceedances were VOCs, which suggests that a majority of the contaminants were derived from a low boiling point fuel such as gasoline that had been stored in the USTs formerly at the site. The estimated extent of contamination is shown on Figure 3. The bounds of the plume reflect the extent of groundwater contamination from the data collected during this assessment. However, the SAIC's 2008 Groundwater Monitoring Report shows groundwater contamination beneath a majority of the subject site. Figure 3 shows the extent of the plume shown in SAIC's monitoring report.

6 Recommendations

Duncklee & Dunham recommends submitting this report to the Raleigh Regional Office of the NCDEQ.



Tables

Table 1
Coordinates of Soil Borings
Parcel 3
Johnston County, North Carolina
TIP Number I-5972; WBS Number 44989.1.1

Boring Identification	Northing (feet)	Easting (feet)
B-1	638619.82	2202888.76
B-2	638647.58	2202882.74
B-3	638671.89	2202865.07
B-4	638642.02	2202815.59
B-5	638664.57	2202742.00
B-6	638635.35	2202629.52
B-7	638588.46	2202566.32
B-8	638691.93	2202690.88
B-9	638694.94	2202728.27
B-10	638741.14	2202722.90
B-11	638572.90	2202981.56

Notes:

Coordinate system NAD83 NC State Plane - Survey Feet

GPS data collected using a Trimble Geo 7x handheld unit

Table 2
Summary of Soil Screening and Soil Test Results
Parcel 3
Johnston County, North Carolina
TIP Number I-5972; WBS Number 44989.1.1

Soil Screening Results		
Boring Identification	Depth (feet bls)	PID Reading (ppm)
B-1	2	0.0
	4*	0.0
B-2	2	6.4
	4*	142
B-3	2	32.2
	4*	97.9
B-4	Sample Not Collected	
B-5	2	0.0
	4	0.0
	6*	0.0
	7.5	0.0
B-6	2*	0.0
	4	0.0
	6	0.2
B-7	2*	0.0
	4	0.0
B-8	1*	0.0
B-9	2*	0.0
B-10	1*	0.0
B-11	2	0.0
	4*	0.0
	6	0.0
Soil Test Results		
Sample Identification	TPH-GRO (mg/kg)	TPH-DRO (mg/kg)
B-1	<0.51	0.51
B-2	65.7	10.7
B-3	2	0.49
B-4	Sample Not Collected	
B-5	<0.68	0.68
B-6	1.8	0.86
B-7	1.5	3.9
B-8	<0.27	0.8
B-9	<0.28	<0.28
B-10	2.1	0.3
B-11	<0.26	<0.26
Notes:		
Soil sample and PID data collected on July 26, 2019		
* - Sample selected from this interval for laboratory testing		
Sample not collected from B-4 because we did not observe soil above the water table in this boring		
TPH-GRO - Total Petroleum Hydrocarbons-Gasoline Range Organics		
TPH-DRO - Total Petroleum Hydrocarbons-Diesel Range Organics		
NCDEQ Action Level for TPH-GRO - 50 mg/kg		
NCDEQ Action Level for TPH-DRO - 100 mg/kg		
mg/kg - Milligrams per kilogram		
bls - Feet below land surface		
ppm - Parts per million		
PID - Photoionization detector		
Result in bold exceeds the reporting limit		
Result in bold and shaded cell exceeds the respective action levels		
<# - Analyte not detected at a concentration that exceeds the reporting limit shown		

Table 3
Summary of Groundwater Test Results
Parcel 3
Johnston County, North Carolina
TIP Number I-5972; WBS Number 44989.1.1

Sample Identification →			TW-1	
Analyte	2L Standard	GCL	Value	Q
<i>Volatile Organic Compounds by EPA Method 6200B</i>				
1,2,4-Trimethylbenzene	400	28,500	2,800	D
1,3,5-Trimethylbenzene	400	25,000	680	D
Benzene	1	5,000	440	D
Ethylbenzene	600	84,500	2,200	D
Isopropylbenzene	70	25,000	97	D
m,p-Xylenes	500	85,500	6,700	D
Methyl tert-butyl ether	20	20,000	24	J, D
Naphthalene	6	6,000	480	D
n-Butylbenzene	70	6,900	200	D
n-Propylbenzene	70	30,000	390	D
o-Xylene	500	85,500	24	J, D
Toluene	600	260,000	360	D
Xylenes, total	500	85,500	6,700	D
<i>Semivolatile Organic Compounds by EPA Method 625.1</i>				
1-Methylnaphthalene	1	1,000	78	D
2-Methylnaphthalene	30	12,500	150	D
Diethylphthalate	6,000	NE	15	J, D
Naphthalene	6	6,000	310	D

Notes:

Units are μ g/L

Sample collected on July 26, 2019

2L Standard - North Carolina Groundwater Quality Standard (15A NCAC 2L .0202)

GCL - North Carolina Gross Contamination Levels for groundwater

Result in bold exceeds the reported detection limit

Result with shaded cell exceeds the 2L Standard

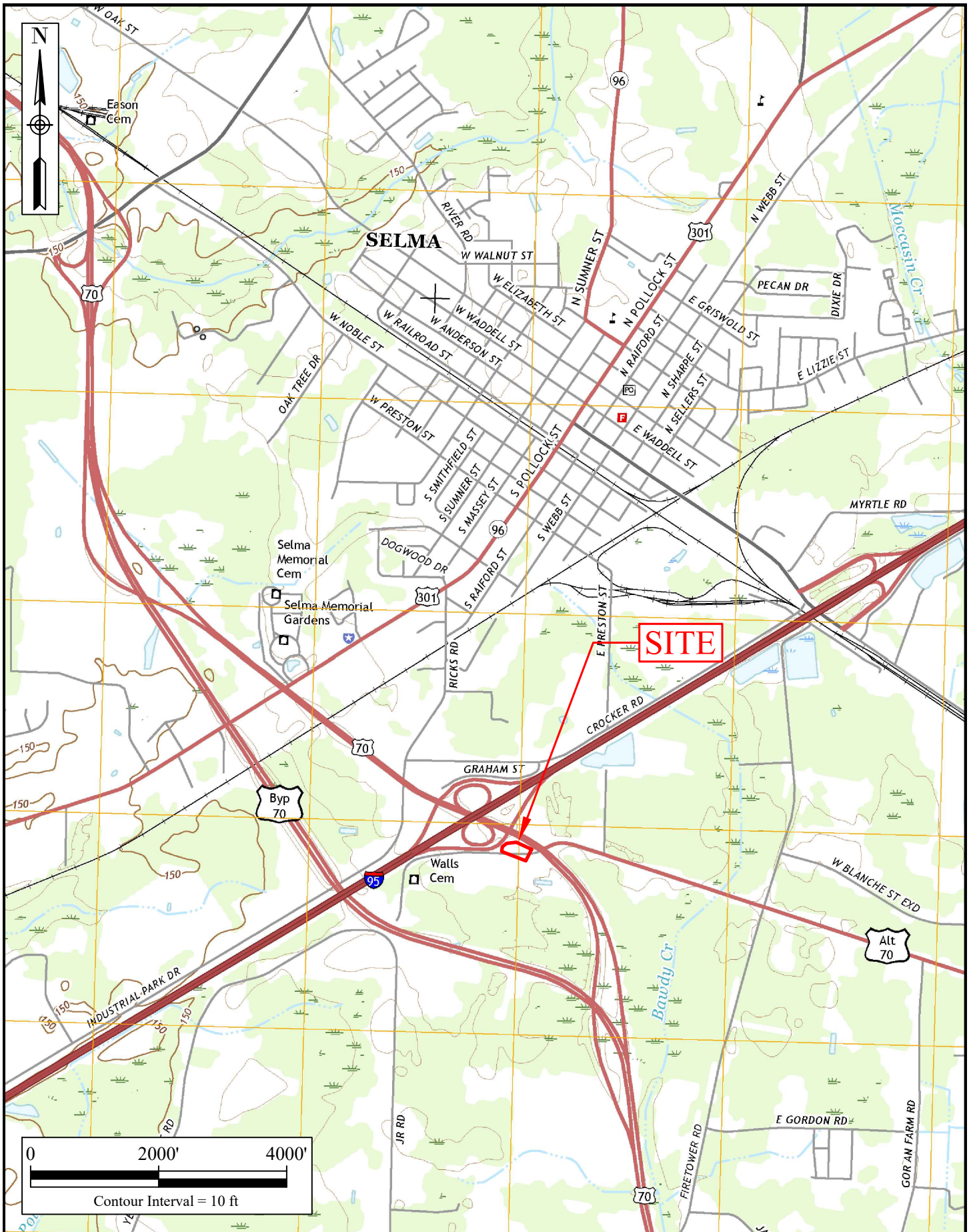
NE - Not Established

Q - Qualifier

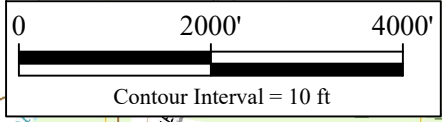
J - Estimated concentration above the method detection limit and below the reported detection limit

D - The sample was analyzed at dilution

Figures



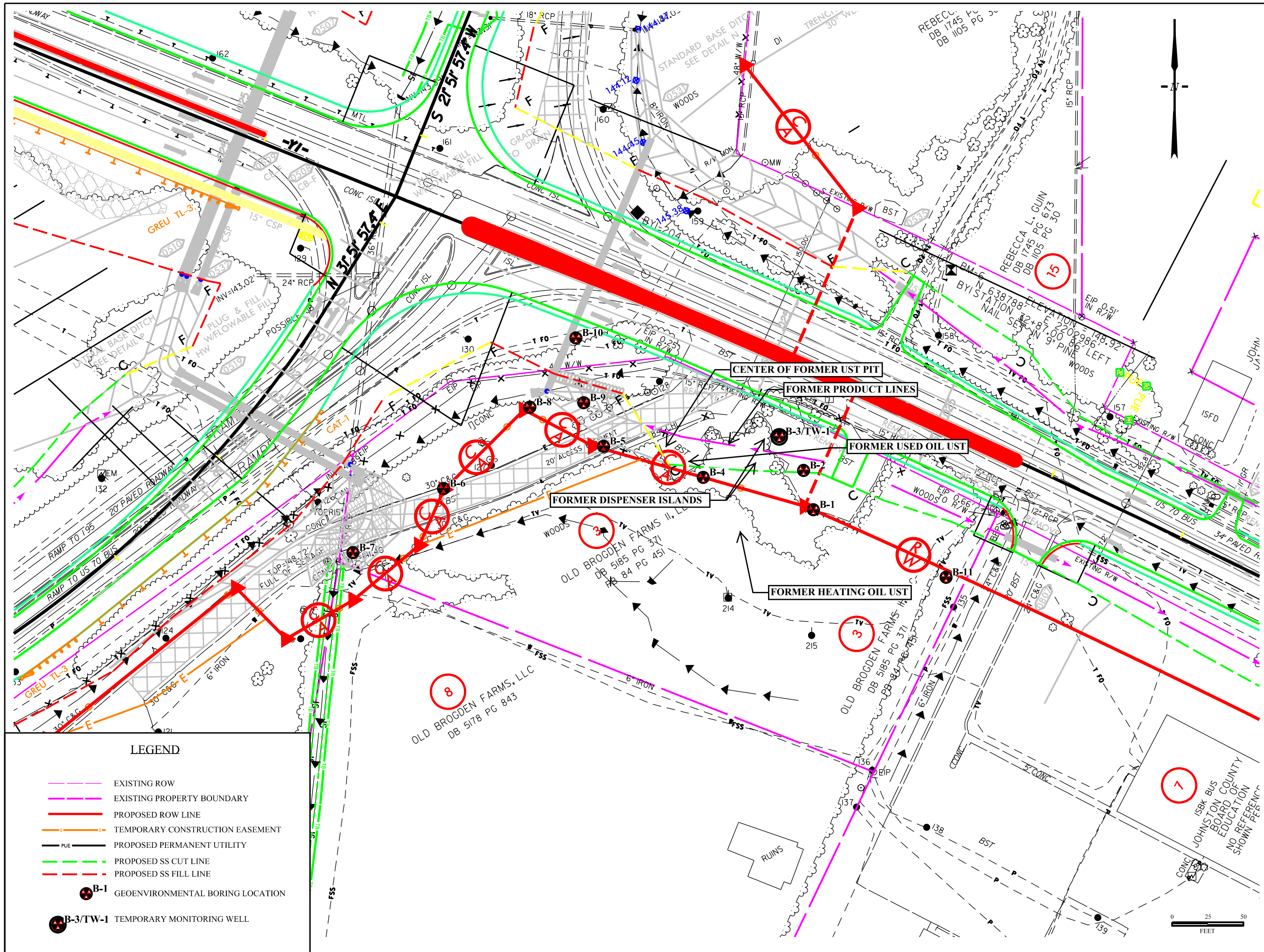
SITE



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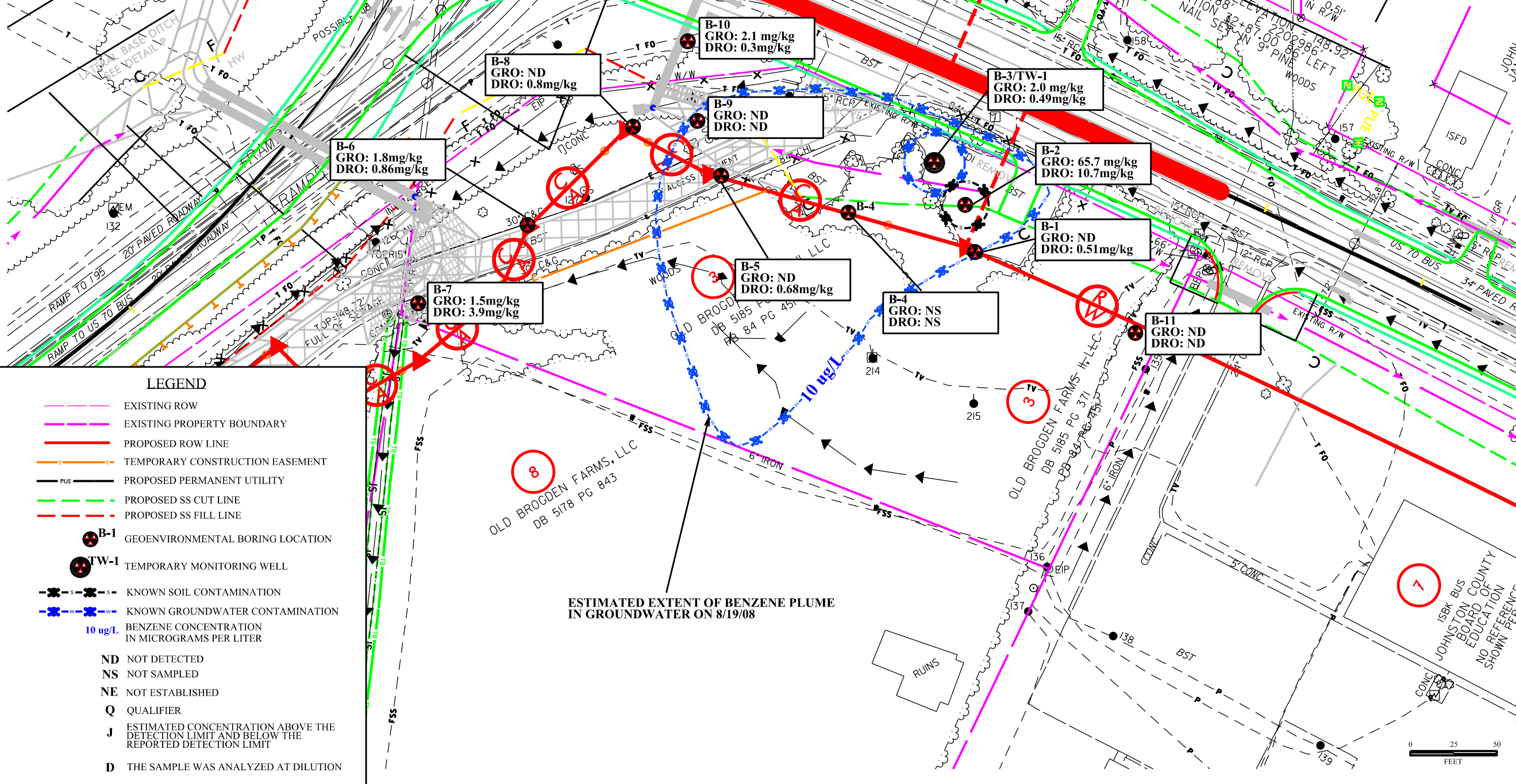
Site Topographic Map					
Old Brogden Farms II Site Smithfield, North Carolina					
Drawn By: pjs	Checked By: PAC	Project Number: 2019127	Date: August 2019	References: USGS:Selma 2016	
Scale: 1" = 2000'	Size: 8.5" x 11"	Layers: 0,1	Filename: F:\NCDOT-Geocv\2019127 - Johnston Co. Phase II\CAD\topo		

Figure
1



Site Map		References:	
NCDOT Geotech - Market St. and I-95 Smithfield, North Carolina NCDOT Parcel No. 3		Drawings provided by NCDOT, Field Notes	
Checked By:	Project Number:	Date:	Filename:
ECC	2019127	August 2019	P:\NCDOT-Geotech\2019127 - Johnston Co.Phased Figures\Figure 2 - Site Map
Scale:	Size:	Layers:	Layers:
1" = 25'	11" x 17"	N/A	N/A

Sample Identification →			TW-1	
Analyte	2L Standard	GCL	Value	Q
Volatile Organic Compounds by EPA Method 6200B				
1,2,4-Trimethylbenzene	400	28,500	2,800	D
1,3,5-Trimethylbenzene	400	25,000	680	D
Benzene	1	5,000	440	D
Ethylbenzene	600	84,500	2,200	D
Isopropylbenzene	70	25,000	97	D
m,p-Xylenes	500	85,500	6,700	D
Methyl tert-butyl ether	20	20,000	24	J, D
Naphthalene	6	6,000	480	D
n-Butylbenzene	70	6,900	200	D
n-Propylbenzene	70	30,000	390	D
o-Xylene	500	85,500	24	J, D
Toluene	600	260,000	360	D
Xylenes, total	500	85,500	6,700	D
Semivolatile Organic Compounds by EPA Method 625.1				
1-Methylnaphthalene	1	1,000	78	D
2-Methylnaphthalene	30	12,500	150	D
Diethylphthalate	6,000	NE	15	J, D
Naphthalene	6	6,000	310	D



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Site Map with Test Results
NCDOT Geotech - Market St. and I-95
Smithfield, North Carolina
NCDOT Parcel No. 3

Drawn By:	ECC	Checked By:	ECC	Project Number:	2019127	Date:	August 2019	References:	Drawings provided by NCDOT, Field Notes SAIC Groundwater Monitoring Report dated 10/30/08
Scale:	1" = 25'	Layers:	N/A	Filename:	P:\NCDOT-Geotech\2019127 - Johnston Co-Phase II Figures\Figure 3 - Site Map With Test Results				

Figure
3

Appendix A

PHOTOGRAPHIC LOG



Client Name:

NCDOT-GeoEnvironmental

Site Location:

Parcel 3; Johnston County, North Carolina

Project No.

2019127

Photo No.

1

Date:

7/26/2019

Direction of Photo:

East

Description:

Troxler Geologic using a Geoprobe® to advance B-5.



Photo No.

2

Date:

7/26/2019

Direction of Photo:

West

Description:

The location of B-1, which Troxler advanced along the proposed NCDOT right of way. The photograph is taken looking down the length of the proposed right of way.



PHOTOGRAPHIC LOG

Client Name: NCDOT-GeoEnvironmental	Site Location: Parcel 3; Johnston County, North Carolina	Project No. 2019127
---	--	-------------------------------

Photo No. 3	Date: 7/26/2019
Direction of Photo: West	

Description:
Soil boring B-3 and temporary monitoring well TW-1



Photo No. 4	Date: 7/26/2019
Direction of Photo: Northwest	

Description:
Soil boring B-7 advanced along the proposed NCDOT right of way



PHOTOGRAPHIC LOG



Client Name:
NCDOT-GeoEnvironmental

Site Location:
Parcel 3; Johnston County, North Carolina

Project No.
2019127

Photo No.
5

Date:
7/26/2019

Direction of Photo:

Northwest

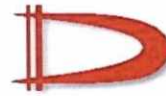
Description:

Soil boring B-10 advanced along the proposed drainage outlet near the northwestern corner of the site



Appendix B

Boring/Well Construction Log



**DUNCKLEE
& DUNHAM**

I. D. Number	B-1	Purpose	Soil Boring
Project Name	Old Brogden Farms II Site	Contractor	Troxler Geologic
Project No.	2019127	Registration No.	2511
Geologist	Alec N. Dziwanowski, G.I.T.	Driller	Ben Troxler
Start Date	7/23/2019 26	Complete Date	7/23/2019 26
		Equipment	Geoprobe

Drilling Method Direct-push method
Comments Water-table observed at 5.5' bts
 Petroleum staining? NO
 Sample time/depth: 1030 @ 4' bts

Well Construction Information	Depth From - To (ft.)	Lithology	FID / PID (ppm)	Petroleum Odor?
			@ Depth (ft.)	
Borehole Diameter	0 - 0.5	dark brown, sandy SILT w/ organics	NA	NO
Riser Type	0.5 - 1	asphalt and gravel	NA	NO
Diameter	1 - 3	silty, SAND w/ clay (light brown)	0.0 @ 2'	NO
Screen Type	3 - 4.5	Orange, light brown SAND w/ clay	0.0 @ 4'	NO ← Sampled
Diameter	4.5 - 5.5	brown, sandy, silty CLAY	NA	NO
Riser Interval	5.5 - 8	dark to light gray, SILT	NA	YES
Screen Interval				
Slot Size				
Grout Type				
Interval				
Bentonite Type				
Interval				
Filter Pack				
Interval				
Total Depth				
R.P. Elevation				
Datum				
Water Level Information				
Date	W.L. Below R.P.			

R.P. = Reference Point W.L. = Water Level TBM = Temporary Benchmark MSL = Mean Sea Level

Boring/Well Construction Log



**DUNCKLEE
& DUNHAM**

I. D. Number	B-2	Purpose	Soil Boring
Project Name	Old Brogden Farms II Site	Contractor	Troxler Geologic
Project No.	2019127	Registration No.	2511
Geologist	Alec N. Dziwanowski, G.I.T.	Driller	Ben Troxler
Start Date	7/25/2019 26	Complete Date	7/25/2019 26
		Equipment	Geoprobe

Drilling Method: Direct-push method
 Comments: Water-table observed at 5' b/s
 Petroleum staining? NO
 Sample time & depth: 1130 @ 4' b/s

Well Construction Information	Depth From - To (ft.)	Lithology	FID / PID (ppm) @ Depth (ft.)	Petroleum Odor?
Borehole Diameter	0-1	asphalt and gravel	NA	NO
Riser Type	1-3	Silty, SAND w/ clay (light brown)	6.4 @ 2'	YES
Diameter	3-4.5	light brown, SAND w/ clay	142 @ 4'	YES ← Sampled
Screen Type	4.5-5.5	brown, sandy, Silty CLAY	NA	YES
Diameter	5.5-8	dark to light gray SILT	NA	YES
Riser Interval				
Screen Interval				
Slot Size				
Grout Type				
Interval				
Bentonite Type				
Interval				
Filter Pack				
Interval				
Total Depth				
R.P. Elevation				
Datum				
Water Level Information				
Date	W.L. Below R.P.			

R.P. = Reference Point W.L. = Water Level TBM = Temporary Benchmark MSL = Mean Sea Level

Boring/Well Construction Log



**DUNCKLEE
& DUNHAM**

I. D. Number	B-3 / TW-1	Purpose	Soil Boring
Project Name	Old Brogden Farms II Site	Contractor	Troxler Geologic
Project No.	2019127	Registration No.	2511
Geologist	Alec N. Dziwanowski, G.I.T.	Driller	Ben Troxler
Start Date	7/25/2019	Equipment	Geoprobe
Complete Date	7/28/2019		

Drilling Method Direct-push method
Comments Water-table observed at : 5.87' bls
 Petroleum staining? NO
 Sample time / depth : 1210 @ 4' bls

Well Construction Information	Depth From - To (ft.)	Lithology	FID / PID (ppm) @ Depth (ft.)	Petroleum Odor?
Borehole Diameter	2.25"	0-0.5	NA	NO
Riser Type	PVC	0.5-1	NA	NO
Diameter	1"	1-3	32.2 @ 2'	YES
Screen Type	PVC	3-4.5	97.9 @ 4'	YES ← Sampled
Diameter	1"	4.5-5.5	NA	YES
Riser Interval	0-5'	5.5-7.5	NA	YES
Screen Interval	5-10'	7.5-8	NA	YES
Slot Size	0.010"			
Grout Type	NA			
Interval	NA			
Bentonite Type	NA			
Interval	NA			
Filter Pack	SAND-#2			
Interval	5-10'			
Total Depth	10'			
R.P. Elevation	land surface			
Datum	↓ 0'			
Water Level Information				
Date	W.L. Below R.P.			
7/26/19	5.87'			

R.P. = Reference Point W.L. = Water Level TBM = Temporary Benchmark MSL = Mean Sea Level

Boring/Well Construction Log



**DUNCKLEE
& DUNHAM**

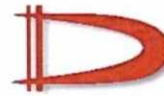
I. D. Number	B-4	Purpose	Soil Boring
Project Name	Old Brogden Farms II Site	Contractor	Troxler Geologic
Project No.	2019127	Registration No.	2511
Geologist	Alec N. Dziwanowski, G.I.T.	Driller	Ben Troxler
Start Date	7/25/2019	Equipment	Geoprobe
	26	Complete Date	7/23/2019
			26

Drilling Method Direct-push method
Comments Water-table observed at 2' b/s
 Petroleum staining? No
 No sample collected - asphalt and gravel present to 2' b/s, soil is below WT from 2'-4'

Well Construction Information	Depth From - To (ft.)	Lithology	FID / PID (ppm) @ Depth (ft.)	Petroleum Odor?
Borehole Diameter	0-0.5	Dark brown, silty SILT w/organics	NA	NO
Riser Type	0.5-2	Asphalt and gravel	NA	NO
Diameter	2-4	Light brown SAND w/clay	Below WT	NO
Screen Type				
Diameter				
Riser Interval				
Screen Interval				
Slot Size				
Grout Type				
Interval				
Bentonite Type				
Interval				
Filter Pack				
Interval				
Total Depth				
R.P. Elevation				
Datum				
Water Level Information				
Date	W.L. Below R.P.			

R.P. = Reference Point W.L. = Water Level TBM = Temporary Benchmark MSL = Mean Sea Level

Boring/Well Construction Log



**DUNCKLEE
& DUNHAM**

I. D. Number	<u>B-5</u>	Purpose	<u>Soil Boring</u>
Project Name	<u>Old Brogden Farms II Site</u>	Contractor	<u>Troxler Geologic</u>
Project No.	<u>2019127</u>	Registration No.	<u>2511</u>
Geologist	<u>Alec N. Dziwanowski, G.I.T.</u>	Driller	<u>Ben Troxler</u>
Start Date	<u>7/25/2019</u> <u>26</u>	Complete Date	<u>7/28/2019</u> <u>26</u>
		Equipment	<u>Geoprobe</u>

Drilling Method Direct-push method
 Comments Water-table observed at 8.5' b/s
Petroleum staining? NO
Sample time/depth: 1245 @ 6' b/s

Well Construction Information	Depth From - To (ft.)	Lithology	FID / PID (ppm) @ Depth (ft.)	Petroleum Odor?
Borehole Diameter	<u>0-0.5</u>	<u>Dark brown, sandy SILT w/ organic</u>	<u>NA</u>	<u>NO</u>
Riser Type	<u>0.5-1</u>	<u>Asphalt and gravel</u>	<u>NA</u>	<u>NO</u>
Diameter	<u>1-4.5</u>	<u>orange brown, SAND w/ silt and gravel</u>	<u>0.0 @ 2' 0.0 @ 4'</u>	<u>NO</u>
Screen Type	<u>4.5-7</u>	<u>orange brown, SAND w/ gravel</u>	<u>0.0 @ 6'</u>	<u>NO</u> ← sampled
Diameter	<u>7-8</u>	<u>Silty CLAY (gray)</u>	<u>0.0 @ 7.5'</u>	<u>NO</u>
Riser Interval	<u>8-12</u>	<u>dark gray, Silty CLAY</u>	<u>NA</u>	<u>Yes from 9-12'</u>
Screen Interval				
Slot Size				
Grout Type				
Interval				
Bentonite Type				
Interval				
Filter Pack				
Interval				
Total Depth				
R.P. Elevation				
Datum				
Water Level Information				
Date	W.L. Below R.P.			

R.P. = Reference Point W.L. = Water Level TBM = Temporary Benchmark MSL = Mean Sea Level

Boring/Well Construction Log



**DUNCKLEE
& DUNHAM**

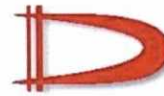
I. D. Number	B-6	Purpose	Soil Boring
Project Name	Old Brogden Farms II Site	Contractor	Troxler Geologic
Project No.	2019127	Registration No.	2511
Geologist	Alec N. Dziwanowski, G.I.T.	Driller	Ben Troxler
Start Date	7/25/2019	Complete Date	7/25/2019
	26		26
		Equipment	Geoprobe

Drilling Method Direct-push method
Comments Water-table observed at 7.5' b/s
 Petroleum staining? NO
 Sample time/depth: 1300 @ 2' b/s

Well Construction Information	Depth From - To (ft.)	Lithology	FID / PID (ppm) @ Depth (ft.)	Petroleum Odor?
Borehole Diameter	0-1	asphalt and gravel	NA	NO
Riser Type	1-4.5	orange brown SAND w/ silt and gravel	0.0 @ 2'	NO ← Sampled
Diameter	4.5-7	orange brown SAND w/ gravel	0.0 @ 4'	NO
Screen Type	7-8	gray, Silty CLAY	0.2 @ 6'	NO
Diameter			NA	NO
Riser Interval				
Screen Interval				
Slot Size				
Grout Type				
Interval				
Bentonite Type				
Interval				
Filter Pack				
Interval				
Total Depth				
R.P. Elevation				
Datum				
Water Level Information				
Date	W.L. Below R.P.			

R.P. = Reference Point W.L. = Water Level TBM = Temporary Benchmark MSL = Mean Sea Level

Boring/Well Construction Log



**DUNCKLEE
& DUNHAM**

I. D. Number	B-7	Purpose	Soil Boring
Project Name	Old Brogden Farms II Site	Contractor	Troxler Geologic
Project No.	2019127	Registration No.	2511
Geologist	Alec N. Dziwanowski, G.I.T.	Driller	Ben Troxler
Start Date	7/25/2019 26	Complete Date	7/28/2019 26
		Equipment	Geoprobe

Drilling Method Direct-push method
Comments Water-table observed at 6.5' BLS
 Petroleum staining? No
 Sample time/depth: 1330 @ 2' b1s

Well Construction Information	Depth From - To (ft.)	Lithology	FID / PID (ppm) @ Depth (ft.)	Petroleum Odor?
Borehole Diameter	0-1	Dark brown sandy SILT w/ organics	NA	NO
Riser Type	1-4	Light brown silty SAND w/ gravel	0-0.2'	NO ← Sampled
Diameter	4-7	Light gray to yellow sandy CLAY	0-0.9'	NO
Screen Type	7-8	Light brown silty SAND with gravel	NA	NO
Diameter				
Riser Interval				
Screen Interval				
Slot Size				
Grout Type				
Interval				
Bentonite Type				
Interval				
Filter Pack				
Interval				
Total Depth				
R.P. Elevation				
Datum				
Water Level Information				
Date	W.L. Below R.P.			

R.P. = Reference Point W.L. = Water Level TBM = Temporary Benchmark MSL = Mean Sea Level

Boring/Well Construction Log



**DUNCKLEE
& DUNHAM**

I. D. Number	B-8	Purpose	Soil Boring
Project Name	Old Brogden Farms II Site	Contractor	Troxler Geologic
Project No.	2019127	Registration No.	2511
Geologist	Alec N. Dziwanowski, G.I.T.	Driller	Ben Troxler
Start Date	7/23/2019 26	Complete Date	7/23/2019 26
		Equipment	Geoprobe

Drilling Method Direct-push method
Comments Water-table observed at 2' b/s
 Petroleum staining? NO
 Sample time/depth: 1345 @ 1' b/s

Well Construction Information	Depth From - To (ft.)	Lithology	FID / PID (ppm)	Petroleum Odor?
			@ Depth (ft.)	
Borehole Diameter	0-0.5	Dark brown sandy SILT w/ organics	NA	NO
Riser Type	0.5-3	Light gray SILT w/ clay	0.001	NO ← sampled
Diameter	5-6.5	gray silty SAND w/ clay	NA	NO
Screen Type				
Diameter				
Riser Interval				
Screen Interval				
Slot Size				
Grout Type				
Interval				
Bentonite Type				
Interval				
Filter Pack				
Interval				
Total Depth				
R.P. Elevation				
Datum				
Water Level Information				
Date	W.L. Below R.P.			

R.P. = Reference Point W.L. = Water Level TBM = Temporary Benchmark MSL = Mean Sea Level

Boring/Well Construction Log



**DUNCKLEE
& DUNHAM**

I. D. Number	<u>B-9</u>	Purpose	<u>Soil Boring</u>
Project Name	<u>Old Brogden Farms II Site</u>	Contractor	<u>Troxler Geologic</u>
Project No.	<u>2019127</u>	Registration No.	<u>2511</u>
Geologist	<u>Alec N. Dziwanowski, G.I.T.</u>	Driller	<u>Ben Troxler</u>
Start Date	<u>7/23/2019</u> <u>26</u>	Complete Date	<u>7/25/2019</u> <u>26</u>
		Equipment	<u>Geoprobe</u>

Drilling Method Direct-push method
 Comments Water-table observed at 3' BLS
Petroleum staining? NO
Sample time/depth: 1400 @ 2' b/s

Well Construction Information	Depth From - To (ft.)	Lithology	FID / PID (ppm) @ Depth (ft.)	Petroleum Odor?
Borehole Diameter	<u>0-3</u>	<u>dry, gray, SILT with gravel and clay</u>	<u>0.0 @ 2'</u>	<u>no</u> ← sampled
Riser Type	<u>3-4</u>	<u>MOIST, gray, Silty SAND w/ clay</u>	<u>NA</u>	<u>no</u>
Diameter				
Screen Type				
Diameter				
Riser Interval				
Screen Interval				
Slot Size				
Grout Type				
Interval				
Bentonite Type				
Interval				
Filter Pack				
Interval				
Total Depth				
R.P. Elevation				
Datum				
Water Level Information				
Date	W.L. Below R.P.			

R.P. = Reference Point W.L. = Water Level TBM = Temporary Benchmark MSL = Mean Sea Level

Boring/Well Construction Log



**DUNCKLEE
& DUNHAM**

I. D. Number	B-10	Purpose	Soil Boring
Project Name	Old Brogden Farms II Site	Contractor	Troxler Geologic
Project No.	2019127	Registration No.	2511
Geologist	Alec N. Dziwanowski, G.I.T.	Driller	Ben Troxler
Start Date	7/23/2019 26	Complete Date	7/23/2019 26
		Equipment	Geoprobe

Drilling Method: Direct-push method
 Comments: Water-table observed at 2' b/s
 Petroleum staining? NO
 Sample time/depth: 1430 @ 1' b/s

Well Construction Information	Depth From - To (ft.)	Lithology	FID / PID (ppm) @ Depth (ft.)	Petroleum Odor?
Borehole Diameter	0-0.5	dark brown sandy SILT w/ organics	NA	NO
Riser Type	0.5-1.5	sandy SILT w/ clay (gray)	0.0 @ 1'	NO ← Sampled
Diameter	1.5-3	orange brown, silty SAND	NA	NO
Screen Type	3-4	gray SILT w/ clay	NA	NO
Diameter				
Riser Interval				
Screen Interval				
Slot Size				
Grout Type				
Interval				
Bentonite Type				
Interval				
Filter Pack				
Interval				
Total Depth				
R.P. Elevation				
Datum				
Water Level Information				
Date	W.L. Below R.P.			

R.P. = Reference Point W.L. = Water Level TBM = Temporary Benchmark MSL = Mean Sea Level

Boring/Well Construction Log



**DUNCKLEE
& DUNHAM**

I. D. Number	<u>B-11</u>	Purpose	<u>Soil Boring</u>
Project Name	<u>Old Brogden Farms II Site</u>	Contractor	<u>Troxler Geologic</u>
Project No.	<u>2019127</u>	Registration No.	<u>2511</u>
Geologist	<u>Alec N. Dziejwanowski, G.I.T.</u>	Driller	<u>Ben Troxler</u>
Start Date	<u>7/23/2019</u>	Equipment	<u>Geoprobe</u>
	<u>26</u>	Complete Date	<u>7/23/2019</u>
	<u>26</u>		<u>26</u>

Drilling Method Direct-push method
 Comments Water-table observed at 7.5' bbs
Petroleum staining? NO
Sample time/depth: 1445 @ 4' bbs

Well Construction Information	Depth From - To (ft.)	Lithology	FID / PID (ppm) @ Depth (ft.)	Petroleum Odor?
Borehole Diameter	0-1	dark brown, sandy SILT w/ organics	NA	no
Riser Type	1-3	light brown, sandy SILT w/ clay	0.0 @ 2'	no
Diameter	3-6	gray, sandy SILT w/ clay	0.0 @ 4'	no
Screen Type	6-8	orange, silty SAND	0.0 @ 6'	no
Diameter			NA	no
Riser Interval				
Screen Interval				
Slot Size				
Grout Type				
Interval				
Bentonite Type				
Interval				
Filter Pack				
Interval				
Total Depth				
R.P. Elevation				
Datum				
Water Level Information				
Date	W.L. Below R.P.			

← sampled

R.P. = Reference Point W.L. = Water Level TBM = Temporary Benchmark MSL = Mean Sea Level

Appendix C



PYRAMID GEOPHYSICAL SERVICES
(PROJECT 2019-217)

GEOPHYSICAL SURVEY

METALLIC UST INVESTIGATION: PARCEL 3 NCDOT PROJECT I-5972 (44989.1.1)

SOUTHEAST QUADRANT OF EAST MARKET STREET AND THE I-95
NORTH EXIT RAMP, SMITHFIELD, NC

August 5, 2019

Report prepared for: Don Malone, PE
Duncklee & Dunham
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Prepared by: _____

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C257: GEOLOGY C1251: ENGINEERING

GEOPHYSICAL INVESTIGATION REPORT
Parcel 3 - Southeast Quadrant of East Market Street and the I-95 North Exit Ramp
Smithfield, Johnston County, North Carolina

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Executive Summary	1
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Field Methodology.....	2
Discussion of Results.....	3
<i>Discussion of EM Results</i>	3
<i>Discussion of GPR Results</i>	4
Summary & Conclusions	4
Limitations	5

Figures

- Figure 1 – Parcel 3 - Geophysical Survey Boundaries and Site Photographs
- Figure 2 – Parcel 3 - EM61 Results Contour Map
- Figure 3 – Parcel 3 - GPR Transect Locations and Select Images
- Figure 4 – Overlay of Metal Detection Results onto the NCDOT Engineering Plans

Appendices

- Appendix A – GPR Transect Images

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
UST	Underground Storage Tank

EXECUTIVE SUMMARY

Project Description: Pyramid Environmental conducted a geophysical investigation for Duncklee & Dunham at Parcel 3 located at the Southeast Quadrant of East Market Street and the I-95 North Exit Ramp in Smithfield, NC. The survey was part of an NCDOT Right-of-Way (ROW) investigation (NCDOT Project I-5972). The survey was designed to extend from the existing edge of pavement into the proposed ROW and/or easements, whichever distance was greater. Conducted on July 22, 2019, the geophysical investigation was performed to determine if unknown, metallic underground storage tanks (USTs) were present beneath the survey area.

Geophysical Results: The geophysical investigation consisted of electromagnetic (EM) induction-metal detection and ground penetrating radar (GPR) surveys. A total of eleven EM anomalies were identified. The majority of the EM responses were directly attributed to visible cultural features. Three locations containing minor unknown buried metal were investigated with GPR. GPR identified the presence of potential minor buried metallic debris at the site. No evidence of larger structures such as USTs was observed. Collectively, the geophysical data did not record any evidence of unknown metallic USTs at Parcel 3.

INTRODUCTION

Pyramid Environmental conducted a geophysical investigation for Duncklee & Dunham at Parcel 3 located at the Southeast Quadrant of East Market Street and the I-95 North Exit Ramp in Smithfield, NC. The survey was part of an NCDOT Right-of-Way (ROW) investigation (NCDOT Project I-5972). The survey was designed to extend from the existing edge of pavement into the proposed ROW and/or easements, whichever distance was greater. Conducted on July 22, 2019, the geophysical investigation was performed to determine if unknown, metallic underground storage tanks (USTs) were present beneath the survey area.

The site included one lot consisting of grass, asphalt, and concrete surfaces. An aerial photograph 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-MK2 (EM61) metal detector integrated with a Geode External GPS/GLONASS receiver. 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 15.0 software programs.

GPR data were acquired across select EM anomalies on July 22, 2019, using a Geophysical Survey Systems, Inc. (GSSI) SIR 4000 controller using a 350 MHz HS 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 6 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	Signs	
2	Suspected Buried Metallic Debris	✓
3	Utility	
4	Reinforced Concrete Pipe	
5	Utilities	
6	Suspected Buried Metallic Debris	✓
7	Light	
8	Fence/Suspected Utility	
9	Suspected Buried Metallic Debris	✓
10	Reinforced Concrete Pipe	
11	Utility/Fence	

The majority of the EM responses were directly attributed to visible cultural features including signs, utilities, reinforced concrete pipes, a light, and fences. GPR was performed across EM Anomalies 2, 6, and 9 to investigate for the presence of unknown buried metal.

Discussion of GPR Results

Figure 3 presents the locations of the formal GPR transects performed at the property as well as select transect images. All formal GPR transect images can be found in **Appendix A**. A total of six formal GPR transects were performed at the parcel. GPR Transects 1-6 recorded evidence of minor, discrete hyperbolic reflectors consistent with buried metallic debris. No evidence of larger structures such as USTs was observed.

Collectively, the geophysical data did not record any evidence of unknown metallic USTs at Parcel 3. **Figure 4** provides an overlay of the metal detection results on the NCDOT MicroStation engineering plans for reference.

SUMMARY & CONCLUSIONS

Pyramid's evaluation of the EM61 and GPR data collected at Parcel 3 in Smithfield, 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.
- The majority of the EM responses were directly attributed to visible cultural features. Three locations containing minor unknown buried metal were investigated with GPR.
- GPR identified the presence of potential minor buried metallic debris at the site. No evidence of larger structures such as USTs was observed.
- Collectively, the geophysical data did not record any evidence of unknown metallic USTs at Parcel 3.

LIMITATIONS

Geophysical surveys have been performed and this report was prepared for Duncklee & Dunham 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.

APPROXIMATE BOUNDARIES OF GEOPHYSICAL SURVEY AREA



View of Survey Area
(Facing Approximately North)



View of Survey Area
(Facing Approximately East)



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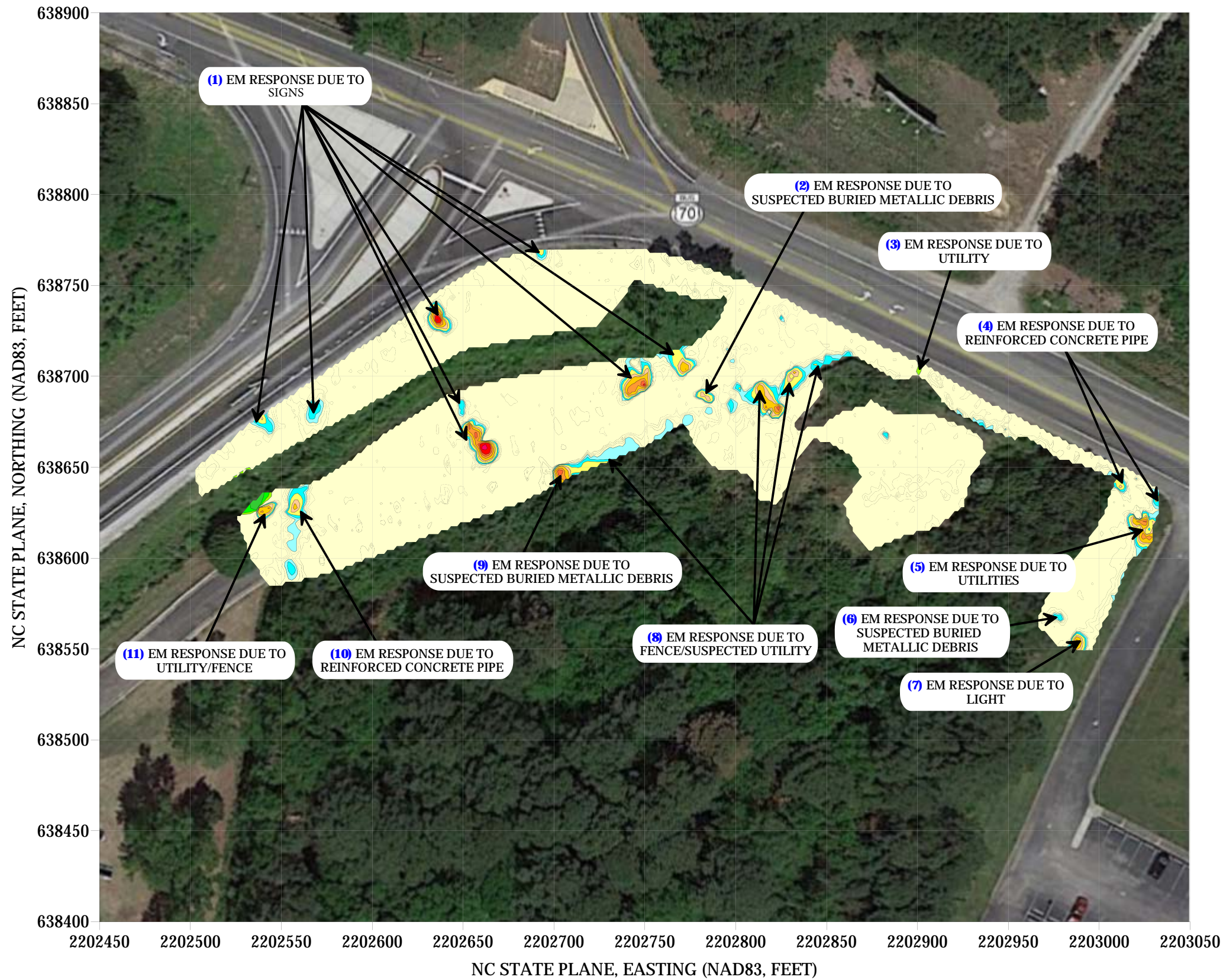
PROJECT
PARCEL 3
SMITHFIELD, NORTH CAROLINA
NCDOT PROJECT I-5972

TITLE
**PARCEL 3 - GEOPHYSICAL SURVEY
BOUNDARIES AND SITE PHOTOGRAPHS**

DATE
7/25/2019
PYRAMID
PROJECT #:
2019-217

CLIENT
DUNCKLEE &
DUNHAM
FIGURE 1

EM61 METAL DETECTION RESULTS



NO EVIDENCE OF METALLIC USTs WAS 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 EM data were collected on July 22, 2019, using a Geonics EM61-MK2 instrument. Verification GPR data were collected using a GSSI SIR 4000 instrument with a 350 MHz HS antenna on July 22, 2019.

EM61 Metal Detection Response (millivolts)



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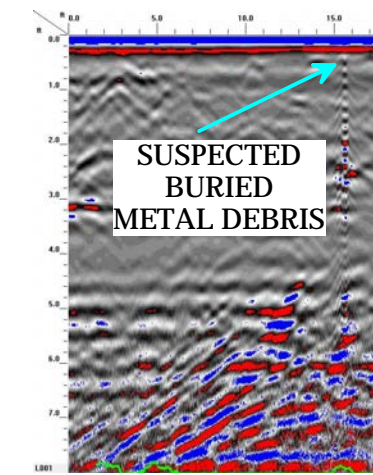
PROJECT
PARCEL 3
SMITHFIELD, NORTH CAROLINA
NCDOT PROJECT I-5972

TITLE
**PARCEL 3 - EM61 METAL DETECTION
CONTOUR MAP**

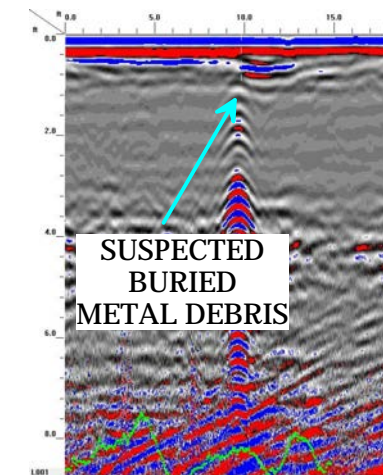
DATE
7/25/2019
PYRAMID
PROJECT #:
2019-217

CLIENT
DUNCKLEE &
DUNHAM
FIGURE 2

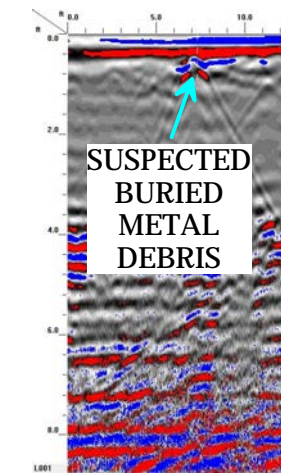
LOCATIONS OF GPR TRANSECTS



GPR TRANSECT 1 (T1)



GPR TRANSECT 5 (T5)



GPR TRANSECT 6 (T6)



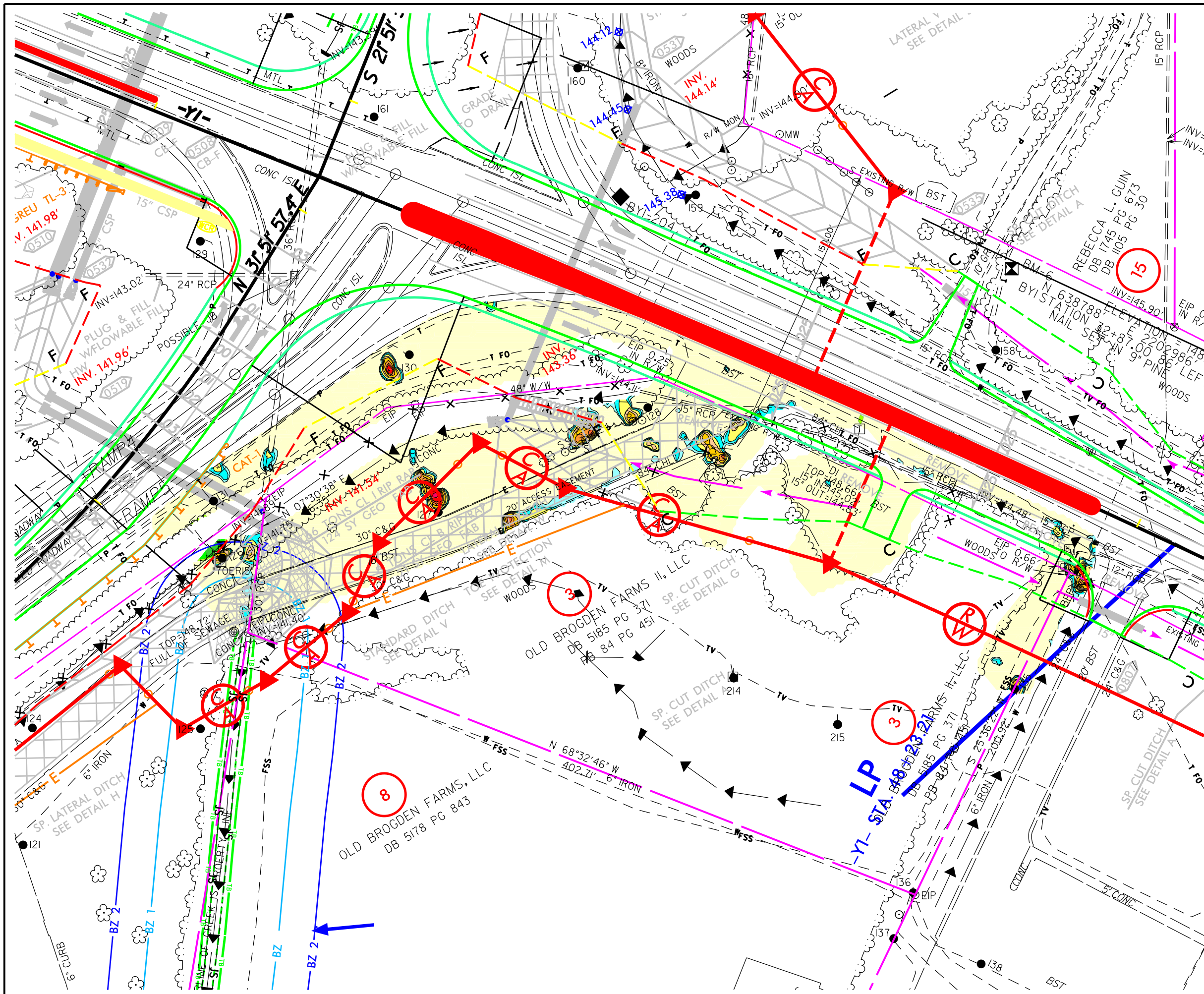
503 INDUSTRIAL AVENUE
GREENSBORO, NC 27406
(336) 335-3174 (p) (336) 691-0648 (f)
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PROJECT
PARCEL 3
SMITHFIELD, NORTH CAROLINA
NCDOT PROJECT I-5972

TITLE
**PARCEL 3 - GPR TRANSECT LOCATIONS
AND SELECT IMAGES**

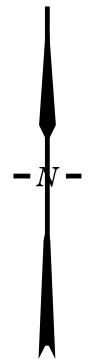
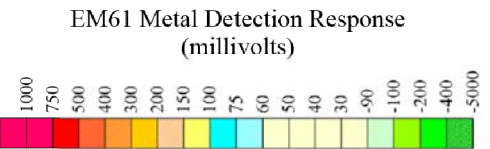
DATE
7/25/2019
PYRAMID PROJECT #:
2019-217

CLIENT
DUNCKLEE &
DUNHAM
FIGURE 3



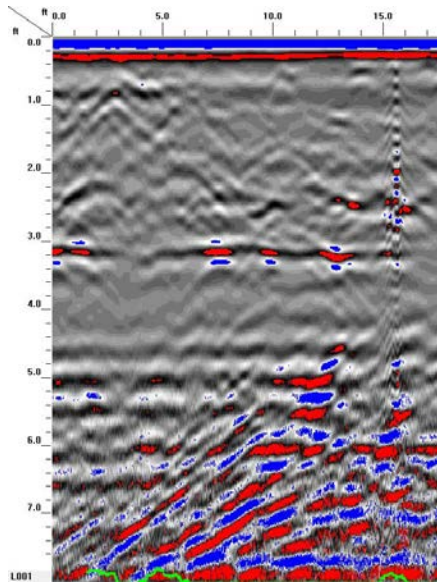
LEGEND

- EXISTING ROW
- EXISTING PROPERTY BOUNDARY
- PROPOSED ROW LINE
- TEMPORARY CONSTRUCTION EASEMENT
- PUE
- PROPOSED PERMANENT UTILITY
- PROPOSED SS CUT LINE
- PROPOSED SS FILL LINE

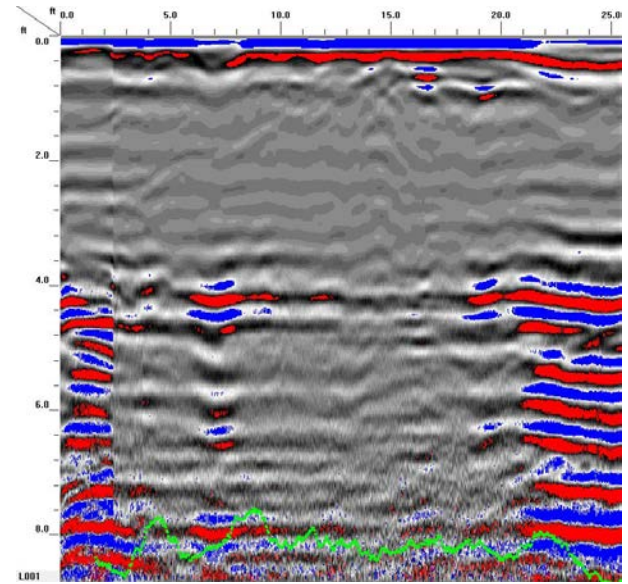


TITLE	OVERLAY OF METAL DETECTION RESULTS ON NCDOT ENGINEERING PLANS	
PROJECT	PARCEL 3 SMITHFIELD, NORTH CAROLINA NCDOT PROJECT I-5792	
	503 INDUSTRIAL AVENUE GREENSBORO, NC 27406 336.335.3174 (p) 336.691.0648 (f) License # C1251 Eng. / #C257 Geology	
DATE: 07-22-2019	REVISION NO. 0	
PYRAMID PROJECT NO. 2019-217	FIGURE NO. 4	

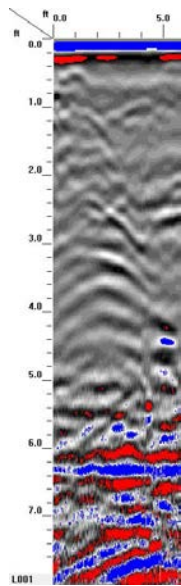
Appendix A – GPR Transect Images



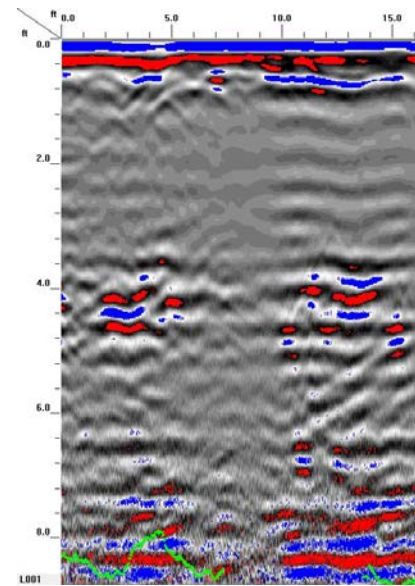
GPR TRANSECT 1



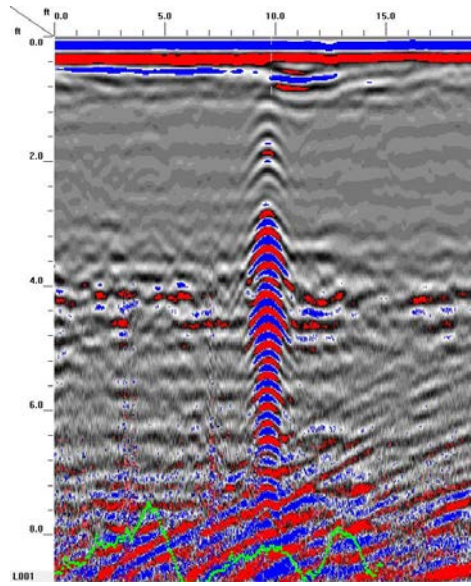
GPR TRANSECT 3



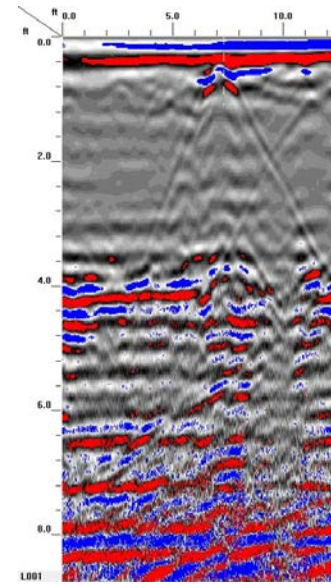
GPR TRANSECT 2



GPR TRANSECT 4



GPR TRANSECT 5



GPR TRANSECT 6

Appendix D



Hydrocarbon Analysis Results

Client: DUNCKLEE & DUNHAM
Address: 511 KEISLER DR SUITE 102
 CARY, NC 27518

Samples taken Friday, July 26, 2019
Samples extracted Friday, July 26, 2019
Samples analysed Monday, July 29, 2019

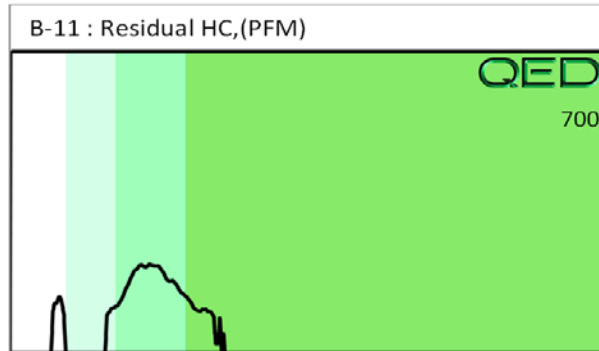
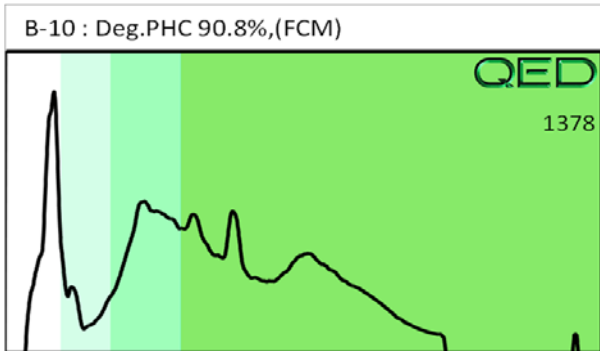
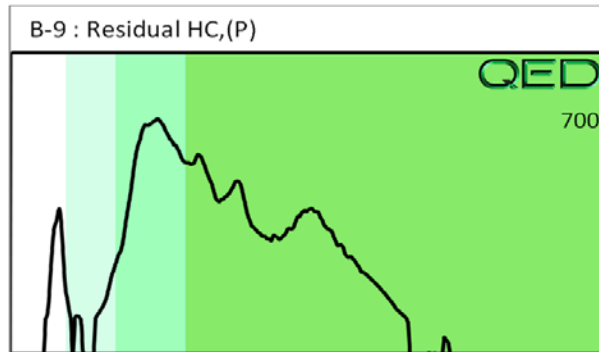
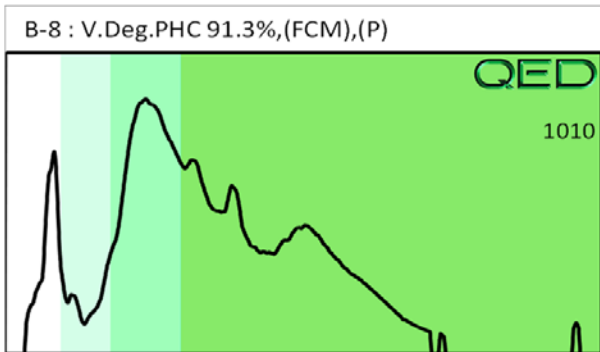
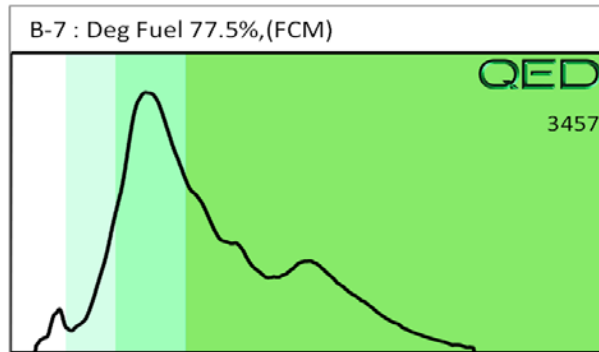
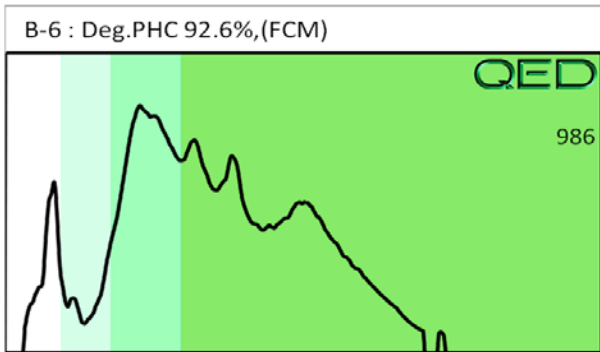
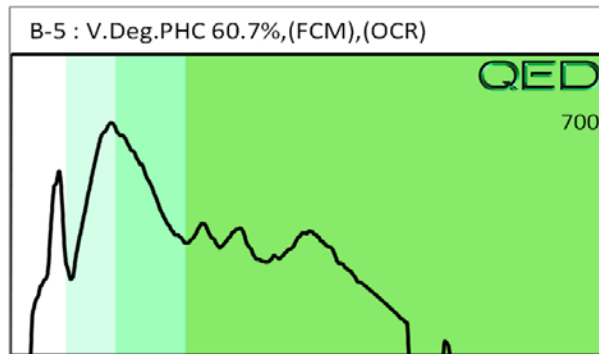
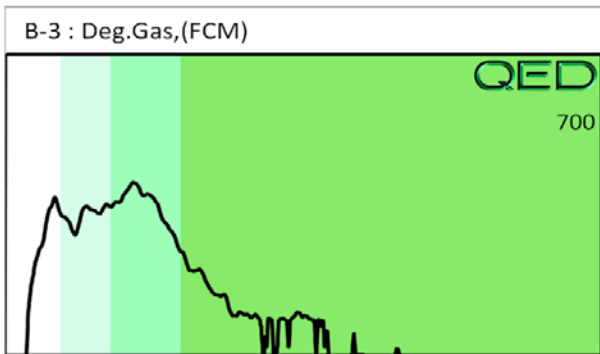
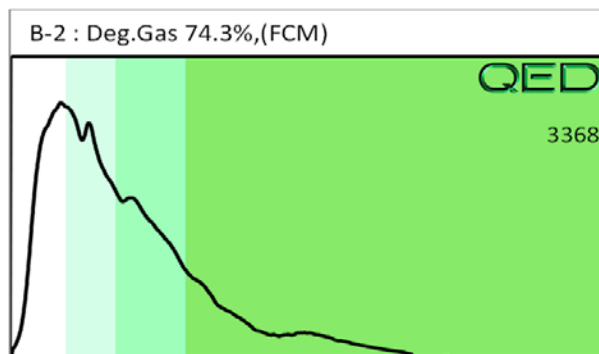
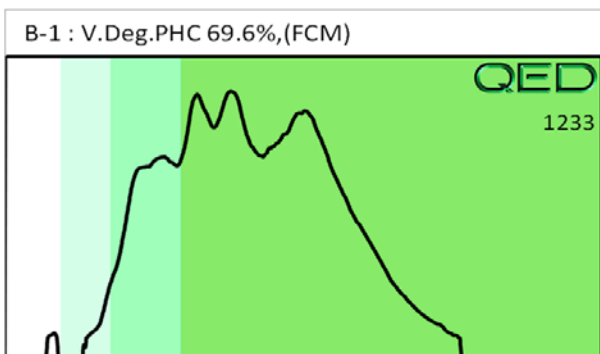
Contact: ALEC DZIWANOWSKI

Operator CAROLINE STEVENS

Project: 2019127

											U04049		
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	B-1	20.5	<0.51	<0.51	0.51	0.51	0.42	<0.16	<0.02	0	46.9	53.1	V.Deg.PHC 69.6%,(FCM)
s	B-2	20.3	29.5	65.7	10.7	76.4	10.4	0.41	<0.02	99.5	0.4	0.1	Deg.Gas 74.3%,(FCM)
s	B-3	19.5	<0.49	2	0.49	2.49	0.27	<0.16	<0.02	97.7	1.9	0.3	Deg.Gas,(FCM)
s	B-5	27.4	<0.68	<0.68	0.68	0.68	0.54	<0.22	<0.027	0	41.6	58.4	V.Deg.PHC 60.7%,(FCM),(OCR)
s	B-6	25.7	<0.64	1.8	0.86	2.66	0.42	<0.21	<0.026	86.2	8.4	5.4	Deg.PHC 92.6%,(FCM)
s	B-7	22.6	<0.57	1.5	3.9	5.4	2	<0.18	<0.023	67.1	23	9.9	Deg Fuel 77.5%,(FCM)
s	B-8	10.9	<0.27	<0.27	0.8	0.8	0.39	<0.09	<0.011	0	67.9	32.1	V.Deg.PHC 91.3%,(FCM),(P)
s	B-9	11.2	<0.28	<0.28	<0.28	0.22	0.22	<0.09	<0.011	0	58.2	41.8	Residual HC,(P)
s	B-10	12.1	<0.3	2.1	0.3	2.4	0.15	<0.1	<0.012	94.2	3.6	2.1	Deg.PHC 90.8%,(FCM)
s	B-11	10.4	<0.26	<0.26	<0.26	<0.26	<0.05	<0.08	<0.01	0	100	0	Residual HC,(PFM)
			Initial Calibrator QC check				OK	Final FCM QC Check				OK	101.7 %

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



Divider
Page



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Monday, August 5, 2019
Duncklee & Dunham, PC (DU009)
Attn: Alec Dziwanowski
511 Keisler Drive, Suite 102
Cary, NC 27518

RE: Laboratory Results for
Project Number: 2019127, Project Name/Desc: Old Brogden Farms II Site
ENCO Workorder(s): CC12467

Dear Alec Dziwanowski,

Enclosed is a copy of your laboratory report for test samples received by our laboratory on Friday, July 26, 2019.

Unless otherwise noted in an attached project narrative, all samples were received in acceptable condition and processed in accordance with the referenced methods/procedures. Results for these procedures apply only to the samples as submitted.

The analytical results contained in this report are in compliance with NELAC standards, except as noted in the project narrative if applicable. This report shall not be reproduced except in full, without the written approval of the Laboratory.

This report contains only those analyses performed by Environmental Conservation Laboratories. Unless otherwise noted, all analyses were performed at ENCO Cary. Data from outside organizations will be reported under separate cover.

If you have any questions or require further information, please do not hesitate to contact me.

Sincerely,

Chuck Smith
Project Manager
Enclosure(s)

SAMPLE DETECTION SUMMARY**Client ID: TW-1****Lab ID: CC12467-01**

Analyte	Results	Flag	MDL	PQL	Units	Method	Notes
1-Methylnaphthalene	78	D	14	50	ug/L	EPA 8270E	
2-Methylnaphthalene	150	D	14	50	ug/L	EPA 8270E	
Diethylphthalate	15	JD	12	50	ug/L	EPA 8270E	
Naphthalene	310	D	14	50	ug/L	EPA 8270E	

Client ID: TW-1**Lab ID: CC12467-01RE1**

Analyte	Results	Flag	MDL	PQL	Units	Method	Notes
1,2,4-Trimethylbenzene	2800	D	5.0	50	ug/L	EPA 8260D	
1,3,5-Trimethylbenzene	680	D	15	50	ug/L	EPA 8260D	
Benzene	440	D	7.5	50	ug/L	EPA 8260D	
Ethylbenzene	2200	D	6.5	50	ug/L	EPA 8260D	
Isopropylbenzene	97	D	7.0	50	ug/L	EPA 8260D	
m,p-Xylenes	6700	D	8.5	100	ug/L	EPA 8260D	
Methyl-tert-Butyl Ether	24	JD	8.0	50	ug/L	EPA 8260D	
Naphthalene	480	D	5.5	50	ug/L	EPA 8260D	
n-Butyl Benzene	200	D	2.9	50	ug/L	EPA 8260D	
n-Propyl Benzene	390	D	6.0	50	ug/L	EPA 8260D	
o-Xylene	24	JD	3.2	50	ug/L	EPA 8260D	
Toluene	360	D	7.0	50	ug/L	EPA 8260D	
Xylenes (Total)	6700	D	22	150	ug/L	EPA 8260D	

ANALYTICAL RESULTS

Description: TW-1

Lab Sample ID: CC12467-01

Received: 07/26/19 16:05

Matrix: Ground Water

Sampled: 07/26/19 11:45

Work Order: CC12467

Project: Old Brogden Farms II Site

Sampled By: Alec Dziwanowski

Volatile Organic Compounds by GCMS

^ - ENCO Cary certified analyte [NC 591]

Analyte [CAS Number]	Results	Flag	Units	DF	MDL	PQL	Batch	Method	Analyzed	By	Notes
1,1,1,2-Tetrachloroethane [630-20-6]^	8.5	UD	ug/L	50	8.5	50	9G31037	EPA 8260D	07/31/19 21:39	REF	
1,1,1-Trichloroethane [71-55-6]^	6.0	UD	ug/L	50	6.0	50	9G31037	EPA 8260D	07/31/19 21:39	REF	
1,1,2,2-Tetrachloroethane [79-34-5]^	14	UD	ug/L	50	14	50	9G31037	EPA 8260D	07/31/19 21:39	REF	
1,1,2-Trichloroethane [79-00-5]^	7.0	UD	ug/L	50	7.0	50	9G31037	EPA 8260D	07/31/19 21:39	REF	
1,1-Dichloroethane [75-34-3]^	6.5	UD	ug/L	50	6.5	50	9G31037	EPA 8260D	07/31/19 21:39	REF	
1,1-Dichloroethene [75-35-4]^	10	UD	ug/L	50	10	50	9G31037	EPA 8260D	07/31/19 21:39	REF	
1,1-Dichloropropene [563-58-6]^	7.5	UD	ug/L	50	7.5	50	9G31037	EPA 8260D	07/31/19 21:39	REF	
1,2,3-Trichlorobenzene [87-61-6]^	0.60	UD	ug/L	50	0.60	50	9G31037	EPA 8260D	07/31/19 21:39	REF	
1,2,3-Trichloropropane [96-18-4]^	12	UD	ug/L	50	12	50	9G31037	EPA 8260D	07/31/19 21:39	REF	
1,2,4-Trichlorobenzene [120-82-1]^	7.0	UD	ug/L	50	7.0	50	9G31037	EPA 8260D	07/31/19 21:39	REF	
1,2,4-Trimethylbenzene [95-63-6]^	2800	D	ug/L	50	5.0	50	9G31037	EPA 8260D	07/31/19 21:39	REF	
1,2-Dibromo-3-chloropropane [96-12-8]^	24	UD	ug/L	50	24	50	9G31037	EPA 8260D	07/31/19 21:39	REF	
1,2-Dibromoethane [106-93-4]^	33	UD	ug/L	50	33	50	9G31037	EPA 8260D	07/31/19 21:39	REF	
1,2-Dichlorobenzene [95-50-1]^	9.5	UD	ug/L	50	9.5	50	9G31037	EPA 8260D	07/31/19 21:39	REF	
1,2-Dichloroethane [107-06-2]^	10	UD	ug/L	50	10	50	9G31037	EPA 8260D	07/31/19 21:39	REF	
1,2-Dichloropropane [78-87-5]^	5.0	UD	ug/L	50	5.0	50	9G31037	EPA 8260D	07/31/19 21:39	REF	
1,3,5-Trimethylbenzene [108-67-8]^	680	D	ug/L	50	15	50	9G31037	EPA 8260D	07/31/19 21:39	REF	
1,3-Dichlorobenzene [541-73-1]^	7.5	UD	ug/L	50	7.5	50	9G31037	EPA 8260D	07/31/19 21:39	REF	
1,3-Dichloropropane [142-28-9]^	8.0	UD	ug/L	50	8.0	50	9G31037	EPA 8260D	07/31/19 21:39	REF	
1,4-Dichlorobenzene [106-46-7]^	9.5	UD	ug/L	50	9.5	50	9G31037	EPA 8260D	07/31/19 21:39	REF	
2,2-Dichloropropane [594-20-7]^	14	UD	ug/L	50	14	50	9G31037	EPA 8260D	07/31/19 21:39	REF	
2-Butanone [78-93-3]^	65	UD	ug/L	50	65	250	9G31037	EPA 8260D	07/31/19 21:39	REF	
2-Chloroethyl Vinyl Ether [110-75-8]^	55	UD	ug/L	50	55	250	9G31037	EPA 8260D	07/31/19 21:39	REF	
2-Chlorotoluene [95-49-8]^	4.0	UD	ug/L	50	4.0	50	9G31037	EPA 8260D	07/31/19 21:39	REF	
2-Hexanone [591-78-6]^	44	UD	ug/L	50	44	250	9G31037	EPA 8260D	07/31/19 21:39	REF	
4-Chlorotoluene [106-43-4]^	3.4	UD	ug/L	50	3.4	50	9G31037	EPA 8260D	07/31/19 21:39	REF	
4-Isopropyltoluene [99-87-6]^	4.2	UD	ug/L	50	4.2	50	9G31037	EPA 8260D	07/31/19 21:39	REF	
4-Methyl-2-pentanone [108-10-1]^	55	UD	ug/L	50	55	250	9G31037	EPA 8260D	07/31/19 21:39	REF	
Acetone [67-64-1]^	500	UD	ug/L	50	500	1000	9G31037	EPA 8260D	07/31/19 21:39	REF	
Benzene [71-43-2]^	440	D	ug/L	50	7.5	50	9G31037	EPA 8260D	07/31/19 21:39	REF	
Bromobenzene [108-86-1]^	8.0	UD	ug/L	50	8.0	50	9G31037	EPA 8260D	07/31/19 21:39	REF	
Bromochloromethane [74-97-5]^	24	UD	ug/L	50	24	50	9G31037	EPA 8260D	07/31/19 21:39	REF	
Bromodichloromethane [75-27-4]^	8.5	UD	ug/L	50	8.5	50	9G31037	EPA 8260D	07/31/19 21:39	REF	
Bromoform [75-25-2]^	11	UD	ug/L	50	11	50	9G31037	EPA 8260D	07/31/19 21:39	REF	
Bromomethane [74-83-9]^	7.0	UD	ug/L	50	7.0	50	9G31037	EPA 8260D	07/31/19 21:39	REF	
Carbon disulfide [75-15-0]^	75	UD	ug/L	50	75	250	9G31037	EPA 8260D	07/31/19 21:39	REF	
Carbon tetrachloride [56-23-5]^	8.5	UD	ug/L	50	8.5	50	9G31037	EPA 8260D	07/31/19 21:39	REF	
Chlorobenzene [108-90-7]^	8.5	UD	ug/L	50	8.5	50	9G31037	EPA 8260D	07/31/19 21:39	REF	
Chloroethane [75-00-3]^	12	UD	ug/L	50	12	50	9G31037	EPA 8260D	07/31/19 21:39	REF	
Chloroform [67-66-3]^	9.0	UD	ug/L	50	9.0	50	9G31037	EPA 8260D	07/31/19 21:39	REF	
Chloromethane [74-87-3]^	6.5	UD	ug/L	50	6.5	50	9G31037	EPA 8260D	07/31/19 21:39	REF	
cis-1,2-Dichloroethene [156-59-2]^	7.5	UD	ug/L	50	7.5	50	9G31037	EPA 8260D	07/31/19 21:39	REF	
cis-1,3-Dichloropropene [10061-01-5]^	10	UD	ug/L	50	10	50	9G31037	EPA 8260D	07/31/19 21:39	REF	
Dibromochloromethane [124-48-1]^	8.5	UD	ug/L	50	8.5	50	9G31037	EPA 8260D	07/31/19 21:39	REF	
Dibromomethane [74-95-3]^	14	UD	ug/L	50	14	50	9G31037	EPA 8260D	07/31/19 21:39	REF	
Dichlorodifluoromethane [75-71-8]^	10	UD	ug/L	50	10	50	9G31037	EPA 8260D	07/31/19 21:39	REF	
Ethylbenzene [100-41-4]^	2200	D	ug/L	50	6.5	50	9G31037	EPA 8260D	07/31/19 21:39	REF	

ANALYTICAL RESULTS

Description: TW-1

Lab Sample ID: CC12467-01

Received: 07/26/19 16:05

Matrix: Ground Water

Sampled: 07/26/19 11:45

Work Order: CC12467

Project: Old Brogden Farms II Site

Sampled By: Alec Dziwanowski

Volatile Organic Compounds by GCMS

^ - ENCO Cary certified analyte [NC 591]

Analyte [CAS Number]	Results	Flag	Units	DF	MDL	PQL	Batch	Method	Analyzed	By	Notes
Hexachlorobutadiene [87-68-3]^	11	UD	ug/L	50	11	50	9G31037	EPA 8260D	07/31/19 21:39	REF	QL-02
Isopropylbenzene [98-82-8]^	97	D	ug/L	50	7.0	50	9G31037	EPA 8260D	07/31/19 21:39	REF	
m,p-Xylenes [108-38-3/106-42-3]^	6700	D	ug/L	50	8.5	100	9G31037	EPA 8260D	07/31/19 21:39	REF	
Methylene chloride [75-09-2]^	12	UD	ug/L	50	12	50	9G31037	EPA 8260D	07/31/19 21:39	REF	
Methyl-tert-Butyl Ether [1634-04-4]^	24	JD	ug/L	50	8.0	50	9G31037	EPA 8260D	07/31/19 21:39	REF	
Naphthalene [91-20-3]^	480	D	ug/L	50	5.5	50	9G31037	EPA 8260D	07/31/19 21:39	REF	
n-Butyl Benzene [104-51-8]^	200	D	ug/L	50	2.9	50	9G31037	EPA 8260D	07/31/19 21:39	REF	
n-Propyl Benzene [103-65-1]^	390	D	ug/L	50	6.0	50	9G31037	EPA 8260D	07/31/19 21:39	REF	
o-Xylene [95-47-6]^	24	JD	ug/L	50	3.2	50	9G31037	EPA 8260D	07/31/19 21:39	REF	
sec-Butylbenzene [135-98-8]^	5.0	UD	ug/L	50	5.0	50	9G31037	EPA 8260D	07/31/19 21:39	REF	
Styrene [100-42-5]^	5.5	UD	ug/L	50	5.5	50	9G31037	EPA 8260D	07/31/19 21:39	REF	
tert-Butylbenzene [98-06-6]^	8.5	UD	ug/L	50	8.5	50	9G31037	EPA 8260D	07/31/19 21:39	REF	
Tetrachloroethene [127-18-4]^	8.5	UD	ug/L	50	8.5	50	9G31037	EPA 8260D	07/31/19 21:39	REF	
Toluene [108-88-3]^	360	D	ug/L	50	7.0	50	9G31037	EPA 8260D	07/31/19 21:39	REF	
trans-1,2-Dichloroethene [156-60-5]^	10	UD	ug/L	50	10	50	9G31037	EPA 8260D	07/31/19 21:39	REF	
trans-1,3-Dichloropropene [10061-02-6]^	7.5	UD	ug/L	50	7.5	50	9G31037	EPA 8260D	07/31/19 21:39	REF	
Trichloroethene [79-01-6]^	7.5	UD	ug/L	50	7.5	50	9G31037	EPA 8260D	07/31/19 21:39	REF	
Trichlorofluoromethane [75-69-4]^	12	UD	ug/L	50	12	50	9G31037	EPA 8260D	07/31/19 21:39	REF	
Vinyl chloride [75-01-4]^	16	UD	ug/L	50	16	50	9G31037	EPA 8260D	07/31/19 21:39	REF	
Xylenes (Total) [1330-20-7]^	6700	D	ug/L	50	22	150	9G31037	EPA 8260D	07/31/19 21:39	REF	

Surrogates	Results	DF	Spike Lvl	% Rec	% Rec Limits	Batch	Method	Analyzed	By	Notes
4-Bromofluorobenzene	50	1	50.0	101 %	53-136	9G31037	EPA 8260D	07/31/19 21:39	REF	
Dibromofluoromethane	49	1	50.0	97 %	67-129	9G31037	EPA 8260D	07/31/19 21:39	REF	
Toluene-d8	55	1	50.0	111 %	59-134	9G31037	EPA 8260D	07/31/19 21:39	REF	

Semivolatile Organic Compounds by GCMS

^ - ENCO Cary certified analyte [NC 591]

Analyte [CAS Number]	Results	Flag	Units	DF	MDL	PQL	Batch	Method	Analyzed	By	Notes
1,2,4-Trichlorobenzene [120-82-1]^	12	UD	ug/L	5	12	50	9G29005	EPA 8270E	07/30/19 14:46	DFM	
1,2-Dichlorobenzene [95-50-1]^	12	UD	ug/L	5	12	50	9G29005	EPA 8270E	07/30/19 14:46	DFM	
1,3-Dichlorobenzene [541-73-1]^	12	UD	ug/L	5	12	50	9G29005	EPA 8270E	07/30/19 14:46	DFM	
1,4-Dichlorobenzene [106-46-7]^	12	UD	ug/L	5	12	50	9G29005	EPA 8270E	07/30/19 14:46	DFM	
1-Methylnaphthalene [90-12-0]^	78	D	ug/L	5	14	50	9G29005	EPA 8270E	07/30/19 14:46	DFM	
2,4,5-Trichlorophenol [95-95-4]^	12	UD	ug/L	5	12	50	9G29005	EPA 8270E	07/30/19 14:46	DFM	
2,4,6-Trichlorophenol [88-06-2]^	13	UD	ug/L	5	13	50	9G29005	EPA 8270E	07/30/19 14:46	DFM	
2,4-Dichlorophenol [120-83-2]^	13	UD	ug/L	5	13	50	9G29005	EPA 8270E	07/30/19 14:46	DFM	
2,4-Dimethylphenol [105-67-9]^	12	UD	ug/L	5	12	50	9G29005	EPA 8270E	07/30/19 14:46	DFM	
2,4-Dinitrophenol [51-28-5]^	13	UD	ug/L	5	13	50	9G29005	EPA 8270E	07/30/19 14:46	DFM	
2,4-Dinitrotoluene [121-14-2]^	13	UD	ug/L	5	13	50	9G29005	EPA 8270E	07/30/19 14:46	DFM	
2,6-Dinitrotoluene [606-20-2]^	12	UD	ug/L	5	12	50	9G29005	EPA 8270E	07/30/19 14:46	DFM	
2-Chloronaphthalene [91-58-7]^	14	UD	ug/L	5	14	50	9G29005	EPA 8270E	07/30/19 14:46	DFM	
2-Chlorophenol [95-57-8]^	11	UD	ug/L	5	11	50	9G29005	EPA 8270E	07/30/19 14:46	DFM	
2-Methyl-4,6-dinitrophenol [534-52-1]^	16	UD	ug/L	5	16	50	9G29005	EPA 8270E	07/30/19 14:46	DFM	
2-Methylnaphthalene [91-57-6]^	150	D	ug/L	5	14	50	9G29005	EPA 8270E	07/30/19 14:46	DFM	
2-Methylphenol [95-48-7]^	10	UD	ug/L	5	10	50	9G29005	EPA 8270E	07/30/19 14:46	DFM	
2-Nitroaniline [88-74-4]^	12	UD	ug/L	5	12	50	9G29005	EPA 8270E	07/30/19 14:46	DFM	
2-Nitrophenol [88-75-5]^	5.5	UD	ug/L	5	5.5	50	9G29005	EPA 8270E	07/30/19 14:46	DFM	

ANALYTICAL RESULTS

Description: TW-1

Lab Sample ID: CC12467-01

Received: 07/26/19 16:05

Matrix: Ground Water

Sampled: 07/26/19 11:45

Work Order: CC12467

Project: Old Brogden Farms II Site

Sampled By: Alec Dziwanowski

Semivolatile Organic Compounds by GCMS

^ - ENCO Cary certified analyte [NC 591]

Analyte [CAS Number]	Results	Flag	Units	DF	MDL	PQL	Batch	Method	Analyzed	By	Notes
3 & 4-Methylphenol [108-39-4/106-44-5]^	10	UD	ug/L	5	10	50	9G29005	EPA 8270E	07/30/19 14:46	DFM	
3,3'-Dichlorobenzidine [91-94-1]^	18	UD	ug/L	5	18	50	9G29005	EPA 8270E	07/30/19 14:46	DFM	
3-Nitroaniline [99-09-2]^	13	UD	ug/L	5	13	50	9G29005	EPA 8270E	07/30/19 14:46	DFM	
4-Bromophenyl-phenylether [101-55-3]^	12	UD	ug/L	5	12	50	9G29005	EPA 8270E	07/30/19 14:46	DFM	
4-Chloro-3-methylphenol [59-50-7]^	12	UD	ug/L	5	12	50	9G29005	EPA 8270E	07/30/19 14:46	DFM	
4-Chloroaniline [106-47-8]^	10	UD	ug/L	5	10	50	9G29005	EPA 8270E	07/30/19 14:46	DFM	
4-Chlorophenyl-phenylether [7005-72-3]^	13	UD	ug/L	5	13	50	9G29005	EPA 8270E	07/30/19 14:46	DFM	
4-Nitroaniline [100-01-6]^	16	UD	ug/L	5	16	50	9G29005	EPA 8270E	07/30/19 14:46	DFM	
4-Nitrophenol [100-02-7]^	14	UD	ug/L	5	14	50	9G29005	EPA 8270E	07/30/19 14:46	DFM	QV-01
Acenaphthene [83-32-9]^	14	UD	ug/L	5	14	50	9G29005	EPA 8270E	07/30/19 14:46	DFM	
Acenaphthylene [208-96-8]^	13	UD	ug/L	5	13	50	9G29005	EPA 8270E	07/30/19 14:46	DFM	
Anthracene [120-12-7]^	12	UD	ug/L	5	12	50	9G29005	EPA 8270E	07/30/19 14:46	DFM	
Benidine [92-87-5]^	8.0	UD	ug/L	5	8.0	50	9G29005	EPA 8270E	07/30/19 14:46	DFM	
Benzo(a)anthracene [56-55-3]^	12	UD	ug/L	5	12	50	9G29005	EPA 8270E	07/30/19 14:46	DFM	
Benzo(a)pyrene [50-32-8]^	11	UD	ug/L	5	11	50	9G29005	EPA 8270E	07/30/19 14:46	DFM	
Benzo(b)fluoranthene [205-99-2]^	14	UD	ug/L	5	14	50	9G29005	EPA 8270E	07/30/19 14:46	DFM	
Benzo(g,h,i)perylene [191-24-2]^	12	UD	ug/L	5	12	50	9G29005	EPA 8270E	07/30/19 14:46	DFM	
Benzo(k)fluoranthene [207-08-9]^	12	UD	ug/L	5	12	50	9G29005	EPA 8270E	07/30/19 14:46	DFM	
Benzoic acid [65-85-0]^	5.0	UD	ug/L	5	5.0	250	9G29005	EPA 8270E	07/30/19 14:46	DFM	
Benzyl alcohol [100-51-6]^	12	UD	ug/L	5	12	50	9G29005	EPA 8270E	07/30/19 14:46	DFM	
Bis(2-chloroethoxy)methane [111-91-1]^	12	UD	ug/L	5	12	50	9G29005	EPA 8270E	07/30/19 14:46	DFM	
Bis(2-chloroethyl)ether [111-44-4]^	13	UD	ug/L	5	13	50	9G29005	EPA 8270E	07/30/19 14:46	DFM	
Bis(2-chloroisopropyl)ether [108-60-1]^	12	UD	ug/L	5	12	50	9G29005	EPA 8270E	07/30/19 14:46	DFM	
Bis(2-ethylhexyl)phthalate [117-81-7]^	9.5	UD	ug/L	5	9.5	25	9G29005	EPA 8270E	07/30/19 14:46	DFM	
Butylbenzylphthalate [85-68-7]^	19	UD	ug/L	5	19	50	9G29005	EPA 8270E	07/30/19 14:46	DFM	
Chrysene [218-01-9]^	11	UD	ug/L	5	11	50	9G29005	EPA 8270E	07/30/19 14:46	DFM	
Dibenzo(a,h)anthracene [53-70-3]^	12	UD	ug/L	5	12	50	9G29005	EPA 8270E	07/30/19 14:46	DFM	
Dibenzofuran [132-64-9]^	13	UD	ug/L	5	13	50	9G29005	EPA 8270E	07/30/19 14:46	DFM	
Diethylphthalate [84-66-2]^	15	JD	ug/L	5	12	50	9G29005	EPA 8270E	07/30/19 14:46	DFM	
Dimethylphthalate [131-11-3]^	12	UD	ug/L	5	12	50	9G29005	EPA 8270E	07/30/19 14:46	DFM	
Di-n-butylphthalate [84-74-2]^	14	UD	ug/L	5	14	50	9G29005	EPA 8270E	07/30/19 14:46	DFM	
Di-n-octylphthalate [117-84-0]^	16	UD	ug/L	5	16	50	9G29005	EPA 8270E	07/30/19 14:46	DFM	
Fluoranthene [206-44-0]^	16	UD	ug/L	5	16	50	9G29005	EPA 8270E	07/30/19 14:46	DFM	
Fluorene [86-73-7]^	12	UD	ug/L	5	12	50	9G29005	EPA 8270E	07/30/19 14:46	DFM	
Hexachlorobenzene [118-74-1]^	12	UD	ug/L	5	12	50	9G29005	EPA 8270E	07/30/19 14:46	DFM	
Hexachlorobutadiene [87-68-3]^	14	UD	ug/L	5	14	50	9G29005	EPA 8270E	07/30/19 14:46	DFM	
Hexachlorocyclopentadiene [77-47-4]^	14	UD	ug/L	5	14	50	9G29005	EPA 8270E	07/30/19 14:46	DFM	
Hexachloroethane [67-72-1]^	13	UD	ug/L	5	13	50	9G29005	EPA 8270E	07/30/19 14:46	DFM	
Indeno(1,2,3-cd)pyrene [193-39-5]^	11	UD	ug/L	5	11	50	9G29005	EPA 8270E	07/30/19 14:46	DFM	
Isophorone [78-59-1]^	12	UD	ug/L	5	12	50	9G29005	EPA 8270E	07/30/19 14:46	DFM	
Naphthalene [91-20-3]^	310	D	ug/L	5	14	50	9G29005	EPA 8270E	07/30/19 14:46	DFM	
Nitrobenzene [98-95-3]^	12	UD	ug/L	5	12	50	9G29005	EPA 8270E	07/30/19 14:46	DFM	
N-Nitrosodimethylamine [62-75-9]^	9.5	UD	ug/L	5	9.5	50	9G29005	EPA 8270E	07/30/19 14:46	DFM	
N-Nitroso-di-n-propylamine [621-64-7]^	12	UD	ug/L	5	12	50	9G29005	EPA 8270E	07/30/19 14:46	DFM	
N-nitrosodiphenylamine/Diphenylamine [86-30-6/122-39-4]^	12	UD	ug/L	5	12	50	9G29005	EPA 8270E	07/30/19 14:46	DFM	
Pentachlorophenol [87-86-5]^	10	UD	ug/L	5	10	50	9G29005	EPA 8270E	07/30/19 14:46	DFM	
Phenanthrene [85-01-8]^	13	UD	ug/L	5	13	50	9G29005	EPA 8270E	07/30/19 14:46	DFM	



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ANALYTICAL RESULTS

Description: TW-1

Lab Sample ID: CC12467-01

Received: 07/26/19 16:05

Matrix: Ground Water

Sampled: 07/26/19 11:45

Work Order: CC12467

Project: Old Brogden Farms II Site

Sampled By: Alec Dziwanowski

Semivolatile Organic Compounds by GCMS

^ - ENCO Cary certified analyte [NC 591]

<u>Analyte [CAS Number]</u>	<u>Results</u>	<u>Flag</u>	<u>Units</u>	<u>DF</u>	<u>MDL</u>	<u>PQL</u>	<u>Batch</u>	<u>Method</u>	<u>Analyzed</u>	<u>By</u>	<u>Notes</u>
Phenol [108-95-2]^	8.5	UD	ug/L	5	8.5	50	9G29005	EPA 8270E	07/30/19 14:46	DFM	
Pyrene [129-00-0]^	18	UD	ug/L	5	18	50	9G29005	EPA 8270E	07/30/19 14:46	DFM	
Pyridine [110-86-1]^	11	UD	ug/L	5	11	50	9G29005	EPA 8270E	07/30/19 14:46	DFM	

<u>Surrogates</u>	<u>Results</u>	<u>DF</u>	<u>Spike Lvl</u>	<u>% Rec</u>	<u>% Rec Limits</u>	<u>Batch</u>	<u>Method</u>	<u>Analyzed</u>	<u>By</u>	<u>Notes</u>
2,4,6-Tribromophenol	61	5	100	61 %	10-179	9G29005	EPA 8270E	07/30/19 14:46	DFM	
2-Fluorobiphenyl	34	5	50.0	69 %	10-149	9G29005	EPA 8270E	07/30/19 14:46	DFM	
2-Fluorophenol	59	5	100	59 %	10-110	9G29005	EPA 8270E	07/30/19 14:46	DFM	
Nitrobenzene-d5	34	5	50.0	67 %	10-149	9G29005	EPA 8270E	07/30/19 14:46	DFM	
Phenol-d5	40	5	100	40 %	10-88	9G29005	EPA 8270E	07/30/19 14:46	DFM	
Terphenyl-d14	35	5	50.0	71 %	10-188	9G29005	EPA 8270E	07/30/19 14:46	DFM	

QUALITY CONTROL DATA

Volatile Organic Compounds by GCMS - Quality Control

Batch 9G31037 - EPA 5030B_MS

Blank (9G31037-BLK1)

Prepared: 07/31/2019 14:09 Analyzed: 07/31/2019 18:37

<u>Analyte</u>	<u>Result</u>	<u>Flag</u>	<u>POL</u>	<u>Units</u>	<u>Spike Level</u>	<u>Source Result</u>	<u>%REC</u>	<u>%REC Limits</u>	<u>RPD</u>	<u>RPD Limit</u>	<u>Notes</u>
1,1,1,2-Tetrachloroethane	0.17	U	1.0	ug/L							
1,1,1-Trichloroethane	0.12	U	1.0	ug/L							
1,1,2,2-Tetrachloroethane	0.28	U	1.0	ug/L							
1,1,2-Trichloroethane	0.14	U	1.0	ug/L							
1,1-Dichloroethane	0.13	U	1.0	ug/L							
1,1-Dichloroethene	0.21	U	1.0	ug/L							
1,1-Dichloropropene	0.15	U	1.0	ug/L							
1,2,3-Trichlorobenzene	0.41	J	1.0	ug/L							
1,2,3-Trichloropropane	0.23	U	1.0	ug/L							
1,2,4-Trichlorobenzene	0.14	U	1.0	ug/L							
1,2,4-Trimethylbenzene	0.10	U	1.0	ug/L							
1,2-Dibromo-3-chloropropane	0.48	U	1.0	ug/L							
1,2-Dibromoethane	0.66	U	1.0	ug/L							
1,2-Dichlorobenzene	0.19	U	1.0	ug/L							
1,2-Dichloroethane	0.21	U	1.0	ug/L							
1,2-Dichloropropane	0.10	U	1.0	ug/L							
1,3,5-Trimethylbenzene	0.30	U	1.0	ug/L							
1,3-Dichlorobenzene	0.15	U	1.0	ug/L							
1,3-Dichloropropane	0.16	U	1.0	ug/L							
1,4-Dichlorobenzene	0.19	U	1.0	ug/L							
2,2-Dichloropropane	0.28	U	1.0	ug/L							
2-Butanone	1.3	U	5.0	ug/L							
2-Chloroethyl Vinyl Ether	1.1	U	5.0	ug/L							
2-Chlorotoluene	0.081	U	1.0	ug/L							
2-Hexanone	0.88	U	5.0	ug/L							
4-Chlorotoluene	0.068	U	1.0	ug/L							
4-Isopropyltoluene	0.085	U	1.0	ug/L							
4-Methyl-2-pentanone	1.1	U	5.0	ug/L							
Acetone	10	U	20	ug/L							
Benzene	0.15	U	1.0	ug/L							
Bromobenzene	0.16	U	1.0	ug/L							
Bromochloromethane	0.48	U	1.0	ug/L							
Bromodichloromethane	0.17	U	1.0	ug/L							
Bromoform	0.22	U	1.0	ug/L							
Bromomethane	0.14	U	1.0	ug/L							
Carbon disulfide	1.5	U	5.0	ug/L							
Carbon tetrachloride	0.17	U	1.0	ug/L							
Chlorobenzene	0.17	U	1.0	ug/L							
Chloroethane	0.23	U	1.0	ug/L							
Chloroform	0.18	U	1.0	ug/L							
Chloromethane	0.13	U	1.0	ug/L							
cis-1,2-Dichloroethene	0.15	U	1.0	ug/L							
cis-1,3-Dichloropropene	0.20	U	1.0	ug/L							
Dibromochloromethane	0.17	U	1.0	ug/L							
Dibromomethane	0.27	U	1.0	ug/L							
Dichlorodifluoromethane	0.20	U	1.0	ug/L							
Ethylbenzene	0.13	U	1.0	ug/L							
Hexachlorobutadiene	1.0		1.0	ug/L							
Isopropylbenzene	0.14	U	1.0	ug/L							

QUALITY CONTROL DATA

Volatile Organic Compounds by GCMS - Quality Control

Batch 9G31037 - EPA 5030B_MS - Continued

Blank (9G31037-BLK1) Continued

Prepared: 07/31/2019 14:09 Analyzed: 07/31/2019 18:37

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
m,p-Xylenes	0.17	U	2.0	ug/L							
Methylene chloride	0.23	U	1.0	ug/L							
Methyl-tert-Butyl Ether	0.16	U	1.0	ug/L							
Naphthalene	0.11	U	1.0	ug/L							
n-Butyl Benzene	0.058	U	1.0	ug/L							
n-Propyl Benzene	0.12	U	1.0	ug/L							
o-Xylene	0.065	U	1.0	ug/L							
sec-Butylbenzene	0.10	U	1.0	ug/L							
Styrene	0.11	U	1.0	ug/L							
tert-Butylbenzene	0.17	U	1.0	ug/L							
Tetrachloroethene	0.17	U	1.0	ug/L							
Toluene	0.14	U	1.0	ug/L							
trans-1,2-Dichloroethene	0.21	U	1.0	ug/L							
trans-1,3-Dichloropropene	0.15	U	1.0	ug/L							
Trichloroethene	0.15	U	1.0	ug/L							
Trichlorofluoromethane	0.24	U	1.0	ug/L							
Vinyl chloride	0.32	U	1.0	ug/L							
Xylenes (Total)	0.45	U	3.0	ug/L							
<i>4-Bromofluorobenzene</i>	<i>50</i>			<i>ug/L</i>	<i>50.0</i>		<i>100</i>	<i>53-136</i>			
<i>Dibromofluoromethane</i>	<i>50</i>			<i>ug/L</i>	<i>50.0</i>		<i>101</i>	<i>67-129</i>			
<i>Toluene-d8</i>	<i>55</i>			<i>ug/L</i>	<i>50.0</i>		<i>109</i>	<i>59-134</i>			

LCS (9G31037-BS1)

Prepared: 07/31/2019 14:09 Analyzed: 07/31/2019 17:06

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
1,1-Dichloroethene	21		1.0	ug/L	20.0		107	75-133			
Benzene	22		1.0	ug/L	20.0		108	80-134			
Chlorobenzene	20		1.0	ug/L	20.0		99	80-120			
Toluene	21		1.0	ug/L	20.0		105	71-120			
Trichloroethene	20		1.0	ug/L	20.0		102	74-120			
<i>4-Bromofluorobenzene</i>	<i>48</i>			<i>ug/L</i>	<i>50.0</i>		<i>95</i>	<i>53-136</i>			
<i>Dibromofluoromethane</i>	<i>49</i>			<i>ug/L</i>	<i>50.0</i>		<i>97</i>	<i>67-129</i>			
<i>Toluene-d8</i>	<i>55</i>			<i>ug/L</i>	<i>50.0</i>		<i>109</i>	<i>59-134</i>			

Matrix Spike (9G31037-MS1)

Prepared: 07/31/2019 14:09 Analyzed: 07/31/2019 17:37

Source: CC12017-02

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
1,1-Dichloroethene	22		1.0	ug/L	20.0	0.21 U	108	75-133			
Benzene	21		1.0	ug/L	20.0	0.15 U	106	80-134			
Chlorobenzene	19		1.0	ug/L	20.0	0.17 U	95	80-120			
Toluene	21		1.0	ug/L	20.0	0.14 U	104	71-120			
Trichloroethene	19		1.0	ug/L	20.0	0.15 U	97	74-120			
<i>4-Bromofluorobenzene</i>	<i>48</i>			<i>ug/L</i>	<i>50.0</i>		<i>96</i>	<i>53-136</i>			
<i>Dibromofluoromethane</i>	<i>49</i>			<i>ug/L</i>	<i>50.0</i>		<i>98</i>	<i>67-129</i>			
<i>Toluene-d8</i>	<i>55</i>			<i>ug/L</i>	<i>50.0</i>		<i>109</i>	<i>59-134</i>			

QUALITY CONTROL DATA

Volatile Organic Compounds by GCMS - Quality Control

Batch 9G31037 - EPA 5030B_MS - Continued

Matrix Spike Dup (9G31037-MSD1)

Prepared: 07/31/2019 14:09 Analyzed: 07/31/2019 18:07

Source: CC12017-02

Analyte	Result	Flaq	POL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
1,1-Dichloroethene	22		1.0	ug/L	20.0	0.21 U	112	75-133	4	20	
Benzene	21		1.0	ug/L	20.0	0.15 U	106	80-134	0.5	17	
Chlorobenzene	20		1.0	ug/L	20.0	0.17 U	98	80-120	3	16	
Toluene	20		1.0	ug/L	20.0	0.14 U	102	71-120	2	17	
Trichloroethene	19		1.0	ug/L	20.0	0.15 U	97	74-120	0.5	22	
4-Bromofluorobenzene	48			ug/L	50.0		96	53-136			
Dibromofluoromethane	49			ug/L	50.0		99	67-129			
Toluene-d8	55			ug/L	50.0		110	59-134			

Semivolatile Organic Compounds by GCMS - Quality Control

Batch 9G29005 - EPA 3510C_MS

Blank (9G29005-BLK1)

Prepared: 07/29/2019 09:40 Analyzed: 07/29/2019 15:41

Analyte	Result	Flaq	POL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
1,2,4-Trichlorobenzene	2.5	U	10	ug/L							
1,2-Dichlorobenzene	2.5	U	10	ug/L							
1,3-Dichlorobenzene	2.5	U	10	ug/L							
1,4-Dichlorobenzene	2.4	U	10	ug/L							
1-Methylnaphthalene	2.7	U	10	ug/L							
2,4,5-Trichlorophenol	2.5	U	10	ug/L							
2,4,6-Trichlorophenol	2.6	U	10	ug/L							
2,4-Dichlorophenol	2.6	U	10	ug/L							
2,4-Dimethylphenol	2.3	U	10	ug/L							
2,4-Dinitrophenol	2.6	U	10	ug/L							
2,4-Dinitrotoluene	2.6	U	10	ug/L							
2,6-Dinitrotoluene	2.5	U	10	ug/L							
2-Chloronaphthalene	2.8	U	10	ug/L							
2-Chlorophenol	2.2	U	10	ug/L							
2-Methyl-4,6-dinitrophenol	3.3	U	10	ug/L							
2-Methylnaphthalene	2.8	U	10	ug/L							
2-Methylphenol	2.0	U	10	ug/L							
2-Nitroaniline	2.5	U	10	ug/L							
2-Nitrophenol	1.1	U	10	ug/L							
3 & 4-Methylphenol	2.1	U	10	ug/L							
3,3'-Dichlorobenzidine	3.5	U	10	ug/L							
3-Nitroaniline	2.6	U	10	ug/L							
4-Bromophenyl-phenylether	2.4	U	10	ug/L							
4-Chloro-3-methylphenol	2.4	U	10	ug/L							
4-Chloroaniline	2.0	U	10	ug/L							
4-Chlorophenyl-phenylether	2.6	U	10	ug/L							
4-Nitroaniline	3.2	U	10	ug/L							
4-Nitrophenol	2.8	U	10	ug/L							QV-01
Acenaphthene	2.7	U	10	ug/L							
Acenaphthylene	2.6	U	10	ug/L							
Anthracene	2.4	U	10	ug/L							
Benzidine	1.6	U	10	ug/L							
Benzo(a)anthracene	2.4	U	10	ug/L							

QUALITY CONTROL DATA

Semivolatile Organic Compounds by GCMS - Quality Control

Batch 9G29005 - EPA 3510C_MS - Continued

Blank (9G29005-BLK1) Continued

Prepared: 07/29/2019 09:40 Analyzed: 07/29/2019 15:41

<u>Analyte</u>	<u>Result</u>	<u>Flag</u>	<u>PQL</u>	<u>Units</u>	<u>Spike Level</u>	<u>Source Result</u>	<u>%REC</u>	<u>%REC Limits</u>	<u>RPD</u>	<u>RPD Limit</u>	<u>Notes</u>
Benzo(a)pyrene	2.2	U	10	ug/L							
Benzo(b)fluoranthene	2.8	U	10	ug/L							
Benzo(g,h,i)perylene	2.4	U	10	ug/L							
Benzo(k)fluoranthene	2.4	U	10	ug/L							
Benzoic acid	1.0	U	50	ug/L							
Benzyl alcohol	2.4	U	10	ug/L							
Bis(2-chloroethoxy)methane	2.4	U	10	ug/L							
Bis(2-chloroethyl)ether	2.6	U	10	ug/L							
Bis(2-chloroisopropyl)ether	2.5	U	10	ug/L							
Bis(2-ethylhexyl)phthalate	1.9	U	5.0	ug/L							
Butylbenzylphthalate	3.8	U	10	ug/L							
Chrysene	2.2	U	10	ug/L							
Dibenzo(a,h)anthracene	2.3	U	10	ug/L							
Dibenzofuran	2.6	U	10	ug/L							
Diethylphthalate	2.4	U	10	ug/L							
Dimethylphthalate	2.5	U	10	ug/L							
Di-n-butylphthalate	2.8	U	10	ug/L							
Di-n-octylphthalate	3.1	U	10	ug/L							
Fluoranthene	3.1	U	10	ug/L							
Fluorene	2.5	U	10	ug/L							
Hexachlorobenzene	2.3	U	10	ug/L							
Hexachlorobutadiene	2.8	U	10	ug/L							
Hexachlorocyclopentadiene	2.7	U	10	ug/L							
Hexachloroethane	2.6	U	10	ug/L							
Indeno(1,2,3-cd)pyrene	2.2	U	10	ug/L							
Isophorone	2.5	U	10	ug/L							
Naphthalene	2.8	U	10	ug/L							
Nitrobenzene	2.5	U	10	ug/L							
N-Nitrosodimethylamine	1.9	U	10	ug/L							
N-Nitroso-di-n-propylamine	2.3	U	10	ug/L							
N-nitrosodiphenylamine/Diphenylamine	2.5	U	10	ug/L							
Pentachlorophenol	2.1	U	10	ug/L							
Phenanthrene	2.6	U	10	ug/L							
Phenol	1.7	U	10	ug/L							
Pyrene	3.5	U	10	ug/L							
Pyridine	2.2	U	10	ug/L							
<i>2,4,6-Tribromophenol</i>	<i>91</i>			<i>ug/L</i>	<i>100</i>		<i>91</i>	<i>10-179</i>			
<i>2-Fluorobiphenyl</i>	<i>43</i>			<i>ug/L</i>	<i>50.0</i>		<i>86</i>	<i>10-149</i>			
<i>2-Fluorophenol</i>	<i>58</i>			<i>ug/L</i>	<i>100</i>		<i>58</i>	<i>10-110</i>			
<i>Nitrobenzene-d5</i>	<i>42</i>			<i>ug/L</i>	<i>50.0</i>		<i>83</i>	<i>10-149</i>			
<i>Phenol-d5</i>	<i>48</i>			<i>ug/L</i>	<i>100</i>		<i>48</i>	<i>10-88</i>			
<i>Terphenyl-d14</i>	<i>47</i>			<i>ug/L</i>	<i>50.0</i>		<i>93</i>	<i>10-188</i>			

LCS (9G29005-BS1)

Prepared: 07/29/2019 09:40 Analyzed: 07/29/2019 16:10

<u>Analyte</u>	<u>Result</u>	<u>Flag</u>	<u>PQL</u>	<u>Units</u>	<u>Spike Level</u>	<u>Source Result</u>	<u>%REC</u>	<u>%REC Limits</u>	<u>RPD</u>	<u>RPD Limit</u>	<u>Notes</u>
1,2,4-Trichlorobenzene	41		10	ug/L	50.0		83	27-90			
1,2-Dichlorobenzene	39		10	ug/L	50.0		77	26-88			
1,3-Dichlorobenzene	37		10	ug/L	50.0		73	22-81			

QUALITY CONTROL DATA

Semivolatile Organic Compounds by GCMS - Quality Control

Batch 9G29005 - EPA 3510C_MS - Continued

LCS (9G29005-BS1) Continued

Prepared: 07/29/2019 09:40 Analyzed: 07/29/2019 16:10

<u>Analyte</u>	<u>Result</u>	<u>Flag</u>	<u>POL</u>	<u>Units</u>	<u>Spike Level</u>	<u>Source Result</u>	<u>%REC</u>	<u>%REC Limits</u>	<u>RPD</u>	<u>RPD Limit</u>	<u>Notes</u>
1,4-Dichlorobenzene	38		10	ug/L	50.0		76	23-84			
1-Methylnaphthalene	46		10	ug/L	50.0		93	33-121			
2,4,5-Trichlorophenol	47		10	ug/L	50.0		95	59-121			
2,4,6-Trichlorophenol	48		10	ug/L	50.0		96	61-119			
2,4-Dichlorophenol	48		10	ug/L	50.0		96	49-118			
2,4-Dimethylphenol	45		10	ug/L	50.0		89	42-111			
2,4-Dinitrophenol	46		10	ug/L	50.0		92	1-149			
2,4-Dinitrotoluene	52		10	ug/L	50.0		104	67-132			
2,6-Dinitrotoluene	48		10	ug/L	50.0		96	59-125			
2-Chloronaphthalene	44		10	ug/L	50.0		88	27-116			
2-Chlorophenol	41		10	ug/L	50.0		82	40-109			
2-Methyl-4,6-dinitrophenol	57		10	ug/L	50.0		114	33-160			
2-Methylnaphthalene	46		10	ug/L	50.0		91	32-120			
2-Methylphenol	42		10	ug/L	50.0		84	38-112			
2-Nitroaniline	46		10	ug/L	50.0		91	63-117			
2-Nitrophenol	45		10	ug/L	50.0		90	36-113			
3 & 4-Methylphenol	42		10	ug/L	50.0		83	49-103			
3,3'-Dichlorobenzidine	43		10	ug/L	50.0		85	50-150			
3-Nitroaniline	44		10	ug/L	50.0		87	50-150			
4-Bromophenyl-phenylether	46		10	ug/L	50.0		92	49-105			
4-Chloro-3-methylphenol	47		10	ug/L	50.0		94	58-121			
4-Chloroaniline	42		10	ug/L	50.0		84	50-150			
4-Chlorophenyl-phenylether	50		10	ug/L	50.0		100	44-130			
4-Nitroaniline	50		10	ug/L	50.0		99	50-150			
4-Nitrophenol	36		10	ug/L	50.0		71	33-105			
Acenaphthene	48		10	ug/L	50.0		96	39-125			
Acenaphthylene	47		10	ug/L	50.0		93	42-133			
Anthracene	52		10	ug/L	50.0		105	41-144			
Benzidine	31		10	ug/L	50.0		62	14-24			
Benzo(a)anthracene	49		10	ug/L	50.0		97	44-139			
Benzo(a)pyrene	48		10	ug/L	50.0		95	39-141			
Benzo(b)fluoranthene	50		10	ug/L	50.0		99	38-142			
Benzo(g,h,i)perylene	46		10	ug/L	50.0		92	30-143			
Benzo(k)fluoranthene	51		10	ug/L	50.0		101	27-154			
Benzoic acid	17	J	50	ug/L	50.0		34	10-120			
Benzyl alcohol	42		10	ug/L	50.0		84	41-141			
Bis(2-chloroethoxy)methane	45		10	ug/L	50.0		91	45-136			
Bis(2-chloroethyl)ether	43		10	ug/L	50.0		86	32-114			
Bis(2-chloroisopropyl)ether	38		10	ug/L	50.0		77	29-120			
Bis(2-ethylhexyl)phthalate	49		5.0	ug/L	50.0		99	72-126			
Butylbenzylphthalate	50		10	ug/L	50.0		100	64-150			
Chrysene	48		10	ug/L	50.0		96	47-134			
Dibenzo(a,h)anthracene	48		10	ug/L	50.0		96	24-147			
Dibenzofuran	49		10	ug/L	50.0		97	48-125			
Diethylphthalate	54		10	ug/L	50.0		107	62-127			
Dimethylphthalate	50		10	ug/L	50.0		100	60-124			
Di-n-butylphthalate	54		10	ug/L	50.0		108	64-128			
Di-n-octylphthalate	49		10	ug/L	50.0		98	70-133			
Fluoranthene	52		10	ug/L	50.0		104	43-146			

QUALITY CONTROL DATA

Semivolatile Organic Compounds by GCMS - Quality Control

Batch 9G29005 - EPA 3510C_MS - Continued

LCS (9G29005-BS1) Continued

Prepared: 07/29/2019 09:40 Analyzed: 07/29/2019 16:10

<u>Analyte</u>	<u>Result</u>	<u>Flag</u>	<u>PQL</u>	<u>Units</u>	<u>Spike Level</u>	<u>Source Result</u>	<u>%REC</u>	<u>%REC Limits</u>	<u>RPD</u>	<u>RPD Limit</u>	<u>Notes</u>
Fluorene	51		10	ug/L	50.0		102	42-132			
Hexachlorobenzene	50		10	ug/L	50.0		99	62-114			
Hexachlorobutadiene	42		10	ug/L	50.0		84	11-99			
Hexachlorocyclopentadiene	28		10	ug/L	50.0		56	10-99			
Hexachloroethane	36		10	ug/L	50.0		73	12-82			
Indeno(1,2,3-cd)pyrene	47		10	ug/L	50.0		95	31-142			
Isophorone	47		10	ug/L	50.0		93	49-117			
Naphthalene	44		10	ug/L	50.0		89	30-131			
Nitrobenzene	45		10	ug/L	50.0		90	44-115			
N-Nitrosodimethylamine	35		10	ug/L	50.0		70	24-94			
N-Nitroso-di-n-propylamine	43		10	ug/L	50.0		86	48-126			
Pentachlorophenol	41		10	ug/L	50.0		81	51-135			
Phenanthrene	52		10	ug/L	50.0		103	42-130			
Phenol	28		10	ug/L	50.0		56	19-78			
Pyrene	52		10	ug/L	50.0		104	44-137			
Pyridine	29		10	ug/L	50.0		57	34-54			
<i>2,4,6-Tribromophenol</i>	<i>110</i>			<i>ug/L</i>	<i>100</i>		<i>112</i>	<i>10-179</i>			
<i>2-Fluorobiphenyl</i>	<i>45</i>			<i>ug/L</i>	<i>50.0</i>		<i>91</i>	<i>10-149</i>			
<i>2-Fluorophenol</i>	<i>65</i>			<i>ug/L</i>	<i>100</i>		<i>65</i>	<i>10-110</i>			
<i>Nitrobenzene-d5</i>	<i>45</i>			<i>ug/L</i>	<i>50.0</i>		<i>91</i>	<i>10-149</i>			
<i>Phenol-d5</i>	<i>52</i>			<i>ug/L</i>	<i>100</i>		<i>52</i>	<i>10-88</i>			
<i>Terphenyl-d14</i>	<i>52</i>			<i>ug/L</i>	<i>50.0</i>		<i>104</i>	<i>10-188</i>			

Matrix Spike (9G29005-MS1)

Prepared: 07/29/2019 09:40 Analyzed: 07/29/2019 16:39

Source: CC12631-02

<u>Analyte</u>	<u>Result</u>	<u>Flag</u>	<u>PQL</u>	<u>Units</u>	<u>Spike Level</u>	<u>Source Result</u>	<u>%REC</u>	<u>%REC Limits</u>	<u>RPD</u>	<u>RPD Limit</u>	<u>Notes</u>
1,2,4-Trichlorobenzene	33		10	ug/L	50.0	2.5 U	67	27-90			
1,2-Dichlorobenzene	33		10	ug/L	50.0	2.5 U	66	26-88			
1,3-Dichlorobenzene	32		10	ug/L	50.0	2.5 U	63	22-81			
1,4-Dichlorobenzene	33		10	ug/L	50.0	2.4 U	65	23-84			
1-Methylnaphthalene	40		10	ug/L	50.0	2.7 U	80	33-121			
2,4,5-Trichlorophenol	44		10	ug/L	50.0	2.5 U	88	59-121			
2,4,6-Trichlorophenol	43		10	ug/L	50.0	2.6 U	85	61-119			
2,4-Dichlorophenol	43		10	ug/L	50.0	2.6 U	87	49-118			
2,4-Dimethylphenol	21		10	ug/L	50.0	2.3 U	43	42-111			
2,4-Dinitrophenol	47		10	ug/L	50.0	2.6 U	95	11-149			
2,4-Dinitrotoluene	48		10	ug/L	50.0	2.6 U	96	67-132			
2,6-Dinitrotoluene	41		10	ug/L	50.0	2.5 U	83	59-125			
2-Chloronaphthalene	37		10	ug/L	50.0	2.8 U	74	27-116			
2-Chlorophenol	38		10	ug/L	50.0	2.2 U	77	40-109			
2-Methyl-4,6-dinitrophenol	55		10	ug/L	50.0	3.3 U	110	33-160			
2-Methylnaphthalene	39		10	ug/L	50.0	2.8 U	78	32-120			
2-Methylphenol	38		10	ug/L	50.0	2.0 U	76	38-112			
2-Nitroaniline	40		10	ug/L	50.0	2.5 U	80	63-117			
2-Nitrophenol	39		10	ug/L	50.0	1.1 U	79	36-113			
3 & 4-Methylphenol	37		10	ug/L	50.0	2.1 U	75	49-103			
3,3'-Dichlorobenzidine	20		10	ug/L	50.0	3.5 U	40	50-150			
3-Nitroaniline	5.5	J	10	ug/L	50.0	2.6 U	11	50-150			
4-Bromophenyl-phenylether	40		10	ug/L	50.0	2.4 U	80	49-105			

QUALITY CONTROL DATA

Semivolatile Organic Compounds by GCMS - Quality Control

Batch 9G29005 - EPA 3510C_MS - Continued

Matrix Spike (9G29005-MS1) Continued

Prepared: 07/29/2019 09:40 Analyzed: 07/29/2019 16:39

Source: CC12631-02

<u>Analyte</u>	<u>Result</u>	<u>Flag</u>	<u>POL</u>	<u>Units</u>	<u>Spike Level</u>	<u>Source Result</u>	<u>%REC</u>	<u>%REC Limits</u>	<u>RPD</u>	<u>RPD Limit</u>	<u>Notes</u>
4-Chloro-3-methylphenol	45		10	ug/L	50.0	2.4 U	90	58-121			
4-Chloroaniline	2.2	J	10	ug/L	50.0	2.0 U	4	50-150			
4-Chlorophenyl-phenylether	44		10	ug/L	50.0	2.6 U	89	44-130			
4-Nitroaniline	20		10	ug/L	50.0	3.2 U	41	50-150			
4-Nitrophenol	52		10	ug/L	50.0	2.8 U	103	33-105			
Acenaphthene	40		10	ug/L	50.0	2.7 U	79	39-125			
Acenaphthylene	33		10	ug/L	50.0	2.6 U	66	42-133			
Anthracene	44		10	ug/L	50.0	2.4 U	89	41-144			
Benzidine	1.6	U	10	ug/L	50.0	1.6 U		14-24			QM-07
Benzo(a)anthracene	44		10	ug/L	50.0	2.4 U	89	44-139			
Benzo(a)pyrene	37		10	ug/L	50.0	2.2 U	74	39-141			
Benzo(b)fluoranthene	49		10	ug/L	50.0	2.8 U	99	38-142			
Benzo(g,h,i)perylene	36		10	ug/L	50.0	2.4 U	72	30-143			
Benzo(k)fluoranthene	51		10	ug/L	50.0	2.4 U	102	27-154			
Benzoic acid	26	J	50	ug/L	50.0	1.0 U	52	10-120			
Benzyl alcohol	39		10	ug/L	50.0	2.4 U	78	41-141			
Bis(2-chloroethoxy)methane	40		10	ug/L	50.0	2.4 U	81	45-136			
Bis(2-chloroethyl)ether	37		10	ug/L	50.0	2.6 U	75	32-114			
Bis(2-chloroisopropyl)ether	35		10	ug/L	50.0	2.5 U	70	29-120			
Bis(2-ethylhexyl)phthalate	47		5.0	ug/L	50.0	1.9 U	93	72-126			
Butylbenzylphthalate	47		10	ug/L	50.0	3.8 U	94	64-150			
Chrysene	44		10	ug/L	50.0	2.2 U	88	47-134			
Dibenzo(a,h)anthracene	39		10	ug/L	50.0	2.3 U	79	24-147			
Dibenzofuran	42		10	ug/L	50.0	2.6 U	85	48-125			
Diethylphthalate	46		10	ug/L	50.0	2.4 U	93	62-127			
Dimethylphthalate	44		10	ug/L	50.0	2.5 U	87	60-124			
Di-n-butylphthalate	49		10	ug/L	50.0	2.8 U	98	64-128			
Di-n-octylphthalate	43		10	ug/L	50.0	3.1 U	85	70-133			
Fluoranthene	48		10	ug/L	50.0	3.1 U	95	43-146			
Fluorene	45		10	ug/L	50.0	2.5 U	89	42-132			
Hexachlorobenzene	43		10	ug/L	50.0	2.3 U	86	62-114			
Hexachlorobutadiene	34		10	ug/L	50.0	2.8 U	67	11-99			
Hexachlorocyclopentadiene	35		10	ug/L	50.0	2.7 U	71	10-99			
Hexachloroethane	32		10	ug/L	50.0	2.6 U	63	12-82			
Indeno(1,2,3-cd)pyrene	39		10	ug/L	50.0	2.2 U	77	31-142			
Isophorone	42		10	ug/L	50.0	2.5 U	85	49-117			
Naphthalene	37		10	ug/L	50.0	2.8 U	73	30-131			
Nitrobenzene	39		10	ug/L	50.0	2.5 U	77	44-115			
N-Nitrosodimethylamine	28		10	ug/L	50.0	1.9 U	56	24-94			
N-Nitroso-di-n-propylamine	42		10	ug/L	50.0	2.3 U	85	48-126			
Pentachlorophenol	44		10	ug/L	50.0	2.1 U	89	51-135			
Phenanthrene	46		10	ug/L	50.0	2.6 U	92	42-130			
Phenol	29		10	ug/L	50.0	1.7 U	58	19-78			
Pyrene	48		10	ug/L	50.0	3.5 U	95	44-137			
Pyridine	4.2	J	10	ug/L	50.0	2.2 U	8	34-54			
<i>2,4,6-Tribromophenol</i>	<i>110</i>			<i>ug/L</i>	<i>100</i>		<i>113</i>	<i>10-179</i>			
<i>2-Fluorobiphenyl</i>	<i>41</i>			<i>ug/L</i>	<i>50.0</i>		<i>81</i>	<i>10-149</i>			
<i>2-Fluorophenol</i>	<i>68</i>			<i>ug/L</i>	<i>100</i>		<i>68</i>	<i>10-110</i>			
<i>Nitrobenzene-d5</i>	<i>41</i>			<i>ug/L</i>	<i>50.0</i>		<i>81</i>	<i>10-149</i>			

QUALITY CONTROL DATA

Semivolatile Organic Compounds by GCMS - Quality Control

Batch 9G29005 - EPA 3510C_MS - Continued

Matrix Spike (9G29005-MS1) Continued

Prepared: 07/29/2019 09:40 Analyzed: 07/29/2019 16:39

Source: CC12631-02

<u>Analyte</u>	<u>Result</u>	<u>Flag</u>	<u>POL</u>	<u>Units</u>	<u>Spike Level</u>	<u>Source Result</u>	<u>%REC</u>	<u>%REC Limits</u>	<u>RPD</u>	<u>RPD Limit</u>	<u>Notes</u>
Phenol-d5	65			ug/L	100		65	10-88			
Terphenyl-d14	50			ug/L	50.0		100	10-188			

Matrix Spike Dup (9G29005-MSD1)

Prepared: 07/29/2019 09:40 Analyzed: 07/29/2019 17:08

Source: CC12631-02

<u>Analyte</u>	<u>Result</u>	<u>Flag</u>	<u>POL</u>	<u>Units</u>	<u>Spike Level</u>	<u>Source Result</u>	<u>%REC</u>	<u>%REC Limits</u>	<u>RPD</u>	<u>RPD Limit</u>	<u>Notes</u>
1,2,4-Trichlorobenzene	35		10	ug/L	50.0	2.5 U	70	27-90	5	43	
1,4-Dichlorobenzene	32		10	ug/L	50.0	2.4 U	64	23-84	1	39	
2,4-Dinitrotoluene	45		10	ug/L	50.0	2.6 U	91	67-132	5	17	
2-Chlorophenol	37		10	ug/L	50.0	2.2 U	74	40-109	3	22	
4-Chloro-3-methylphenol	42		10	ug/L	50.0	2.4 U	84	58-121	7	22	
4-Nitrophenol	36		10	ug/L	50.0	2.8 U	72	33-105	35	27	QM-11
Acenaphthene	42		10	ug/L	50.0	2.7 U	84	39-125	6	25	
N-Nitroso-di-n-propylamine	39		10	ug/L	50.0	2.3 U	79	48-126	7	23	
Pentachlorophenol	41		10	ug/L	50.0	2.1 U	82	51-135	8	11	
Phenol	24		10	ug/L	50.0	1.7 U	48	19-78	18	18	
Pyrene	46		10	ug/L	50.0	3.5 U	92	44-137	3	24	
2,4,6-Tribromophenol	94			ug/L	100		94	10-179			
2-Fluorobiphenyl	39			ug/L	50.0		79	10-149			
2-Fluorophenol	56			ug/L	100		56	10-110			
Nitrobenzene-d5	39			ug/L	50.0		78	10-149			
Phenol-d5	48			ug/L	100		48	10-88			
Terphenyl-d14	44			ug/L	50.0		89	10-188			

FLAGS/NOTES AND DEFINITIONS

- B** The analyte was detected in the associated method blank.
- D** The sample was analyzed at dilution.
- J** The reported value is between the laboratory method detection limit (MDL) and the laboratory method reporting limit (MRL), adjusted for actual sample preparation data and moisture content, where applicable.
- U** The analyte was analyzed for but not detected to the level shown, adjusted for actual sample preparation data and moisture content, where applicable.
- E** The concentration indicated for this analyte is an estimated value above the calibration range of the instrument. This value is considered an estimate.
- MRL** Method Reporting Limit. The MRL is roughly equivalent to the practical quantitation limit (PQL) and is based on the low point of the calibration curve, when applicable, sample preparation factor, dilution factor, and, in the case of soil samples, moisture content.
- PQL** PQL: Practical Quantitation Limit. The PQL presented is the laboratory MRL.
- N** The analysis indicates the presence of an analyte for which there is presumptive evidence (85% or greater confidence) to make a "tentative identification".
- P** Greater than 25% concentration difference was observed between the primary and secondary GC column. The lower concentration is reported.
- [CALC]** Calculated analyte - MDL/MRL reported to the highest reporting limit of the component analyses.
- QL-02** The associated laboratory control sample exhibited high bias; since the result is ND, there is no impact.
- QM-07** The spike recovery was outside acceptance limits for the MS and/or MSD. The batch was accepted based on acceptable LCS recovery.
- QM-11** Precision between duplicate matrix spikes of the same sample was outside acceptance limits.
- QV-01** The associated continuing calibration verification standard exhibited high bias; since the result is ND, there is no impact.
- QV-02** The associated continuing calibration verification standard exhibited low bias; the reported result should be considered to be a minimum estimate.



ENVIRONMENTAL CONSERVATION LABORATORIES CHAIN-OF-CUSTODY RECORD

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Orlando, FL 32824
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102-A Woodwinds Industrial Ct.
Cary, NC 27511
(919) 467-3090 Fax (919) 467-3515

Client Name Dunklee & Dunham, PC (DU009)		Project Number 2019127		Requested Analyses						Requested Turnaround Times		
Address 511 Keisler Drive, Suite 102		Project Name/Desc Old Brogden Farms II Site		8260D	8270E						Note: Rush requests subject to acceptance by the facility	
City/ST/Zip Cary, NC 27518		PO # / Billing Info									<input checked="" type="checkbox"/> Standard	
Tel (919) 858-9898	Fax	Reporting Contact Alec Dziwanowski									<input type="checkbox"/> Expedited	
Sampler(s) Name, Affiliation (Print) Alec Dziwanowski, Dunklee & Dunham		Billing Contact Rick Kolb									Due ___/___/___	
Sampler(s) Signature <i>[Signature]</i>		Site Location / Time Zone		Preservation (See Codes) (Combine as necessary)						Lab Workorder CC12467		

Item #	Sample ID (Field Identification)	Collection Date	Collection Time	Comp / Grab	Matrix (see codes)	Total # of Containers	Preservation (See Codes) (Combine as necessary)				Sample Comments	
	TW-1	7/26/19	1145	G1	GW	4	X	X				
					GW	4	X	X				
	Trip Blank				WA	2	X					

Sample Kit Prepared By <i>[Signature]</i>		Date/Time 7/23	Relinquished By <i>[Signature]</i>		Date/Time 7/26/19 1605	Received By <i>[Signature]</i>	Date/Time 7/26/19 1605
Comments/Special Reporting Requirements			Relinquished By		Date/Time	Received By	Date/Time
			Relinquished By		Date/Time	Received By	Date/Time
Cooler #'s & Temps on Receipt BLUE				2.8.c		Condition Upon Receipt <input checked="" type="checkbox"/> Acceptable <input type="checkbox"/> Unacceptable	

Matrix : GW-Groundwater SO-Soil DW-Drinking Water SE-Sediment SW-Surface Water WW-Wastewater A-Air O-Other (detail in comments) Preservation: I-Ice H-HCl N-HNO3 S-H2SO4 NO-NaOH O-Other (detail in comments)

Note : All samples submitted to ENCO Labs are in accordance with the terms and conditions listed on the reverse of this form, unless prior written agreements exist