

**This electronic collection of documents is provided
for the convenience of the user
and is Not a Certified Document –**

**The documents contained herein were originally issued
and sealed by the individuals whose names and license
numbers appear on each page, on the dates appearing
with their signature on that page.**

**This file or an individual page
shall not be considered a certified document.**



Mid Atlantic
Engineering & Environmental Solutions

EXPERIENCED
CUSTOMER FOCUSED
INNOVATIVE

Preliminary Site Assessment Report
Alex Economy Property
Parcel No. 17



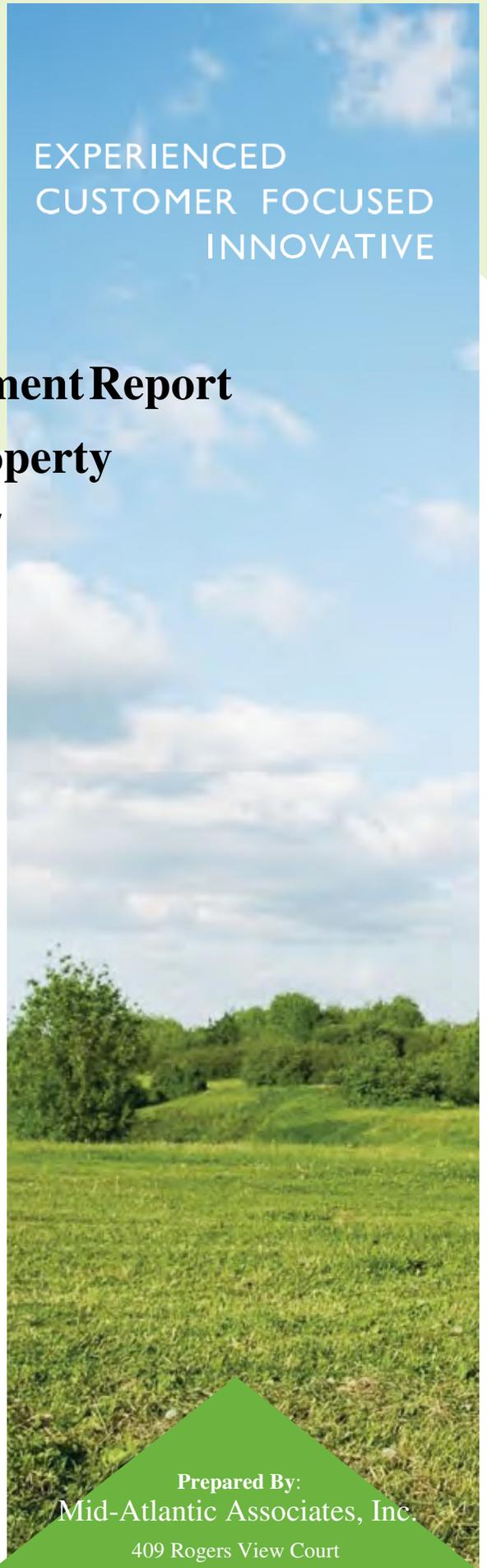
Location:

Alex Economy Property
3114 Central Heights Road
Goldsboro, North Carolina 27534
Wayne County PIN 3529040190.00

Description:

US 13 (Berkeley Blvd) – Realignment of SR 1709
(Central Heights Road) at Berkeley Blvd.
TIP No.: U-5724
WBS Element: 54016.1.2

Report Date: October 30, 2018
MAA Job #: 000R3203.00



Prepared By:
Mid-Atlantic Associates, Inc.

409 Rogers View Court
Raleigh, North Carolina 27610
919-250-9918

MAAONLINE.COM

**PRELIMINARY SITE ASSESSMENT REPORT
ALEX ECONOMY PROPERTY
PARCEL NO. 17
TIP NO: U-5724
WBS ELEMENT: 54016.1.2
WAYNE COUNTY
WAYNE COUNTY PIN 3529040190.00**

DESCRIPTION:

US 13 (Berkeley Blvd) – Realignment of SR 1709 (Central Heights Road)
at Berkeley Blvd.

SITE:

Alex Economy Property
3114 Central Heights Road
Goldsboro, North Carolina 27534

Prepared For:

North Carolina Department of Transportation
Geotechnical Engineering Unit
GeoEnvironmental Section
1589 Mail Service Center
Raleigh, NC 27699-1589

Prepared By:

Mid-Atlantic Associates, Inc.
409 Rogers View Court
Raleigh, North Carolina 27610
Mid-Atlantic Job No. 000R3203.00

October 30, 2018

**PRELIMINARY SITE ASSESSMENT REPORT
ALEX ECONOMY PROPERTY
PARCEL NO. 17
TIP NO: U-5724
WBS ELEMENT: 54016.1.2
WAYNE COUNTY
WAYNE COUNTY PIN 3529040190.00**

DESCRIPTION:
US 13 (Berkeley Blvd) – Realignment of SR 1709 (Central Heights Road)
at Berkeley Blvd.

Mid-Atlantic Associates Job No. 000R3203.00

October 30, 2018

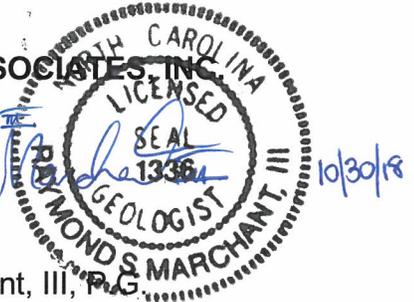
Prepared For:

North Carolina Department of Transportation
Geotechnical Engineering Unit
GeoEnvironmental Section
1589 Mail Service Center
Raleigh, North Carolina 27699-1589

Prepared By:

MID-ATLANTIC ASSOCIATES, INC.

DocuSigned by:
Raymond S. Marchant, III
5F022D5841FC438



Raymond S. Marchant, III, P.E.
Principal Geologist

DocuSigned by:
[Signature]
DAC98CAB8CA24E8...

[Signature]
Daniel H. Nielsen, P.E.
Principal Engineer

TABLE OF CONTENTS

LIST OF ACRONYMS	I
1.0 INTRODUCTION	1
2.0 SITE HISTORY	2
2.1 Parcel Usage	2
2.2 Facility ID Numbers	2
2.3 Groundwater Incident Numbers.....	2
3.0 SITE OBSERVATIONS	2
3.1 Groundwater Monitoring Wells	2
3.2 Active USTs.....	3
3.3 Features Apparent Beyond ROW/Easement	3
4.0 METHODS	3
4.1 Geophysics.....	3
4.2 Borings and Temporary Well Installation.....	3
4.2.1 Soil Sampling Activities	4
5.0 RESULTS	5
5.1 Objects	5
5.1.1 Underground Storage Tanks	5
5.1.2 Hydraulic Lifts.....	5
5.1.3 Monitoring Wells.....	5
5.1.4 Oil-Water Separators	5
5.2 Impacted Media.....	6
5.2.1 Impacted Soil &/or Water & Groundwater	6
5.2.2 Depth.....	6
5.2.3 Quantities Calculation	6
6.0 CONCLUSIONS	7
6.1 Interpretation of Results	7
6.2 Geophysics.....	7
6.3 Sampling	7
6.4 Groundwater.....	8
6.5 Quantities	8
7.0 RECOMMENDATIONS	8

TABLE OF CONTENTS (CONTINUED)

TABLE

Table 5.1 Soil Sampling Results

DRAWINGS

Drawing 1.1 Topographic Site Map

Drawing 4.1 Soil Sample Map

APPENDICES

Appendix A Historical Aerials & Site Photo Log

Appendix B Geophysical Report

Appendix C Boring Logs

Appendix D Mid-Atlantic Field Procedures

Appendix E Soil Laboratory Analytical Reports and Lab Graphs

Appendix F Groundwater Laboratory Analytical Report and Chain of Custody Record

LIST OF ACRONYMS

2000 Guidelines	Groundwater Section Guidelines for Investigation and Remediation of Soil and Groundwater, DENR, Division of Water Quality Groundwater Section, July 2000.	MTBE μg/Kg μg/L	Methyl tertiary butyl ether Micrograms per Kilogram Micrograms per Liter
2008 Guidelines	Underground Storage Tank Section Guidelines for Assessment and Corrective Action, DENR, Division of Waste Management UST Section, July 15, 2008.	NA N/A NC NCAC NCDENR	Not Analyzed Not Applicable North Carolina North Carolina Administrative Code North Carolina Department of Environment and Natural Resources
AFVR	Aggressive Fluid-Vapor Recovery	NCDOT	North Carolina Department of Transportation
AS	Air Sparge	NCGQS	North Carolina Groundwater Quality Standards
AST	Aboveground Storage Tank	NCSWQS	North Carolina Surface Water Quality Standards
BQL	Below (Laboratory Practical) Quantitation Limit	ND	Not Detected
BLS	Below Land Surface	NM	Not Measured
BTEX	Benzene, Toluene, Ethylbenzene, Xylenes	NORR	Notice of Regulatory Requirements
CAP	Corrective Action Plan	NOV	Notice of Violation
cm	Centimeter	NRP	Notice of Residual Petroleum
COC	Constituents of Concern	NS	Not Sampled
CSA	Comprehensive Site Assessment	OVA	Organic Vapor Analyzer
DIPE	Diisopropyl Ether (also IPE: Isopropyl Ether)	PA	Prioritization Assessment
DNAPL	Dense Non-Aqueous Phase Liquids	PAA	Prioritization Assessment Agreement
DO	Dissolved Oxygen	PAH	Polynuclear Aromatic Hydrocarbons
DPT	Direct Push Technology	Pb	Lead
DRO	Diesel Range Organics	PCBs	Polychlorinated Biphenyls
DSCA	North Carolina Dry-Cleaning Solvent Act	PCE	Perchloroethylene (also tetrachloroethene)
DTW	Depth to Water	PPB	Parts Per Billion
DWM	Division of Waste Management	PPM	Parts Per Million
DWQ	Division of Water Quality	PID	Photo Ionization Detector
EDB	Ethylene di-bromide	POTW	Publicly Owned Treatment Works
EPA	Environmental Protection Agency	PQL	Practical Quantitation Limit
EPH	Extractable Petroleum Hydrocarbons	PRF	Prioritization Ranking Form
FID	Flame Ionization Detector	PVC	Polyvinyl chloride
FT	Feet	RBCA	Risk-Based Corrective Action
GCL	Gross Contamination Level	RCRA	Resource Conservation and Recovery Act
GIS	Geographic Information System	ROI	Radius of Influence
GPM	Gallons Per Minute	s	Seconds
GPS	Global Positioning System	SAR	Soil Assessment Report
GRO	Gasoline Range Organics	SOW	Scope of Work
ID	Identification	STG	Soil-to-Groundwater
IDW	Investigation Derived Waste	SVE	Soil Vapor Extraction
IGQS	Interim Groundwater Quality Standards	SVOC	Semi-Volatile Organic Compound
LSA	Limited Site Assessment	TDHF	Toxicologically Defined Hydrocarbon Fractions
LUST	Leaking Underground Storage Tank	TCLP	Toxicity Characteristic Leaching Procedure
m	Meter	TIC	Tentatively Identified Compound
MADEP	Massachusetts Department of Environmental Protection	TOC	Top of Casing
Mid-Atlantic	Mid-Atlantic Associates, Inc.	TPH	Total Petroleum Hydrocarbons
MDL	Method Detection Limit	US	United States
mg/Kg	Milligrams per Kilogram	USCS	Unified Soil Classification System
mg/L	Milligrams per Liter	USGS	United States Geological Survey
MMP	Minimum Management Practices	UST	Underground Storage Tank
MMPE	Mobile Multi-Phase Extraction	UT	Unnamed Tributary
MNA	Monitored Natural Attenuation	VOC	Volatile Organic Compounds
MSCC	Maximum Soil Contaminant Concentration	VPH	Volatile Petroleum Hydrocarbons
MSL	Mean Sea Level	yr	Year

1.0 INTRODUCTION

Mid-Atlantic Associates, Inc. (Mid-Atlantic) has prepared this Preliminary Site Assessment (PSA) Report in response to the North Carolina Department of Transportation's (NCDOT) Request for Technical and Cost Proposal (RFP) dated July 30, 2018 and in accordance with Mid-Atlantic's "Revision No. 1 Technical and Cost Proposal for Preliminary Site Assessment" dated August 15, 2018. Mid-Atlantic has performed the PSA for the Alex Economy property (Subject Site), located at 3114 Central Heights Road in Goldsboro, North Carolina (**Drawing 1.1**). The Subject Site is one of four parcels being assessed in association with this project. Acquisition of the right-of-way/easement is necessary for roadway improvements along this project. The Subject Site is currently occupied by a mobile home park. A concrete block building is located on the northern end of the site and appears as though it could have historically operated as a gasoline retail station. The concrete block building was reported by the former owner to have been used for retail purposes (a convenience store and a thrift store).

The NCDOT contracted with Mid-Atlantic to perform the PSA due to the possible historical use of the site for petroleum retail. The PSA was performed to determine if relict UST systems may exist and/or if the soils and/or groundwater have been impacted as a result of the historical use of the Subject Site.

This report documents the results of the geophysical survey, the locations and volume of any USTs identified in the investigation area, and the subsurface investigation of identified areas of concern conducted at the site. The opinions included herein are based on our experience and information obtained during the study. This report is based on limited observations made on the dates noted using procedures described herein. If additional information becomes available, we request the opportunity to review the information, reassess the potential environmental concerns, and modify our conclusions, if appropriate.

1.1 Site Description

The Subject Site is located in a mostly residential area of Goldsboro, although commercial properties are located nearby to the south and west of the site. It is currently developed with a mobile home park. A concrete block building, which was reportedly used for retail purposes in the past, is located on the northern portion of the property. The site is bounded to the north (across Central Heights Road) and east by agricultural fields, to the south (across Central Heights Road; note: the road forks) by commercial/industrial enterprises, and to the west by residential properties and additional agricultural land. Please refer to **Drawing 1.1** for the site location and site topography.

1.2 Scope of Work

Per the NCDOT RFP, the scope of work for this PSA is as follows:

- Notify property owner/tenant of proposed work scope.
- Locate all USTs and determine approximate size and contents (if any).
- Determine if contaminated soils are present.
- Test soil for contaminants relevant to the site's past use and/or possible release(s) using UVF methodology.
- Include the RedLab graphs in reports in the report and send the GeoEnvironmental Section a copy of the RedLab Excel file(s).
- If contamination is evident and groundwater is encountered, convert one boring into a temporary well and collect a groundwater sample.
- If contamination is evident, estimate the quantity of impacted soils and indicate the approximate area of soil contamination on a site map.
- Provide a MicroStation file with the location of soil borings, USTs, soil contamination and monitoring wells.
- Prepare a report including field activities, findings, and recommendations for the site.

2.0 SITE HISTORY

2.1 Parcel Usage

Based on historical aerial photography, the Subject Site was operated as a mobile home park as far back as 1967. A concrete block building is located on the northern end of the site and appears as though it could have historically operated as a gasoline retail station. The concrete block building was reported by the former owner to have been used for retail purposes (a convenience store and a thrift store). Historical aerial photographs from NCDOT and Google Earth are included as **Appendix A**.

2.2 Facility ID Numbers

No registered USTs are associated with the property address.

2.3 Groundwater Incident Numbers

No groundwater incidents are associated with the property address.

3.0 SITE OBSERVATIONS

3.1 Groundwater Monitoring Wells

No groundwater monitoring wells were observed at the property address during site reconnaissance.

3.2 Active USTs

No “Active” USTs were identified on site during our reconnaissance. However, evidence of two USTs were discovered during the geophysical survey, as discussed below.

3.3 Features Apparent Beyond ROW/Easement

No suspect features (i.e. monitoring wells, remediation systems, hydraulic lifts) were observed by Mid-Atlantic during the completion of this PSA.

4.0 METHODS

The PSA field activities included a geophysical survey of the proposed right-of-way and temporary construction easement areas to help identify potential underground storage tanks or other subsurface anomalies that may require further investigation. Based on the results of the survey and historical information, soil and groundwater samples were collected to help identify contaminated soils and/or groundwater that may affect future roadbuilding or utility construction activities. These activities are outlined below. Field work was conducted under a Health and Safety Plan prepared by Mid-Atlantic Associates.

4.1 Geophysics

A geophysical survey of the area of concern on the Subject Site was conducted by Pyramid Geophysical Services (Pyramid) from August 22 and 23, 2018. The Geophysical survey was completed to locate subsurface utilities and buried objects such as USTs, private utilities, etc. Sub-surface utilities and buried objects were scanned using a combination of electromagnetic (EM) and ground penetrating radar (GPR) methods. A description of the geophysical survey methods used at the Subject Site are included in Pyramid’s “Geophysical Survey, Metallic UST Investigation: Parcel 17, NCDOT Project U-5724” dated September 5, 2018 and included in **Appendix B**. In addition, the area of the geophysical survey is shown in the drawings provided in Pyramid’s report.

4.2 Borings and Temporary Well Installation

Before fieldwork was initiated, North Carolina 811 was contacted to mark public utility service lines. Following utility location, Mid-Atlantic completed assessment activities on September 24 and 25, 2018 [Note: Mid-Atlantic’s field work was delayed approximately one week due to Hurricane Florence]. The activities included collection of soil samples from the borings and installation of one temporary monitoring well in the event that evidence of contamination was encountered in the soil. The drilling and temporary well construction services were performed by Quantex, Inc. of Raleigh, North Carolina and Mid-Atlantic’s technician provided oversight. Boring locations were placed on the Subject

Site in areas of the right of way and construction easement, focusing on areas where probable USTs were located by the GPR survey.

4.2.1 Soil Sampling Activities

On September 25, 2018, Mid-Atlantic mobilized to the site to oversee the advancement of eight soil borings on the parcel. The work was completed during the same mobilization as sampling conducted for Parcels 5, 22, and 24. Sampling locations are shown on **Drawing 4.1**. Borings SB-17-2 through SB-17-6 were placed to focus on two probable USTs and a possible pump island discovered during the geophysical survey.

Using a GeoProbe “macrocore” sampling device and direct push technology (DPT), continuous soil samples were collected at each soil boring and scanned for the presence of volatile organic compounds (VOCs) using a RKI GX6000 Photo-Ionization Detector (PID). The borings were advanced to a depth of approximately 5 feet BLS (note: the water table was typically found in the 2 to 3 ft BLS range). The soils were classified for soil type and screened at approximate two-foot intervals using the PID. Boring Logs (**Appendix C**) note the PID readings and soil type descriptions recorded by Mid-Atlantic personnel as drilling progressed. In general, the soils at the site consisted of light to dark brown to tan clayey to silty fine to medium sands.

Upon completion of the borings (and completion of the borings at the other three parcels), Mid-Atlantic collected GPS coordinates on September 26, 2018 for the sampling locations using a Trimble Geo 7X unit. The coordinates were used to place the final locations of the sample points on the provided drawings.

4.2.2 Groundwater Sampling Activities

One temporary monitoring well (TMW-17-4) was installed in boring the SB-17-4 location, which was adjacent to the northernmost probable UST and exhibited slightly elevated PID readings and a mild petroleum odor. The temporary well was constructed as follows:

- The boring was advanced using the Geoprobe’s macrocore sampler through the saturated zone to a depth of 10 feet BLS (water table at 2.2 feet BLS);
- A one-inch diameter, Schedule 40 PVC well was installed with 10 feet of 0.010-inch slotted screen (screened 0 to 10) and was fitted with a threaded bottom cap and threaded riser to approximately six inches above land surface;
- A sand pack was installed from bottom of well to just above the top of the screened interval; and
- The well was developed by purging with a bailer to remove fine particles.

Upon completion of the well construction and sample collection, the well was abandoned by pulling the casing from the ground and filling the hole with soil cuttings.

4.2.3 Sample Protocol

A total of eight soil samples were collected for laboratory analysis in accordance with the Mid-Atlantic procedures located in **Appendix D**. Samples were collected into sampling containers provided by the laboratory, packed into an ice-filled cooler and shipped to Rapid Environmental Diagnostics Laboratories, LLC (RED Lab) in Wilmington, North Carolina. The soil samples were analyzed for total petroleum hydrocarbons (TPH GRO and DRO) and other constituents using the ultraviolet fluorescence (UVF) detector method.

Additionally, a groundwater sample was collected from well TMW-17-4 using the methods described in **Appendix D**. The sample was shipped to Pace Analytical Laboratories in Mt. Juliet, Tennessee, where they were analyzed for VOCs using Standard Method 6200B and SVOCs using EPA Method 625.

5.0 RESULTS

5.1 Objects

5.1.1 Underground Storage Tanks

The geophysical survey conducted by Pyramid found two probable USTs directly off the northwest corner of the concrete block building, as shown in their report provided in **Appendix B**. Based on the GPR results, the USTs appear to be laying side-by-side in an east-west trending direction and are approximately 10 feet in length by 5 feet in diameter. These dimensions appear to be consistent with USTs that are approximately 1,500 or 2,000 gallons in capacity.

5.1.2 Hydraulic Lifts

No Hydraulic lifts were identified during Mid-Atlantic's completion of this PSA.

5.1.3 Monitoring Wells

No monitoring wells were identified during Mid-Atlantic's completion of the PSA.

5.1.4 Oil-Water Separators

No Oil-Water Separators (OWS) were identified during Mid-Atlantic's completion of this PSA.

5.2 Impacted Media

Impacts to soil and groundwater, including the depths and volume calculations (if applicable), are discussed below.

5.2.1 Impacted Soil &/or Water & Groundwater

As documented in RED Lab's report located in **Appendix E** and summarized (along with PID readings) in **Table 5.1**, TPH GRO were detected in five of the eight samples at concentrations exceeding the UVF analyzer's detection limit. However, none of the samples exhibited concentrations exceeding the NCDEQ Action Level of 50 mg/kg. TPH DRO were detected in all eight samples at concentrations exceeding the UVF analyzer's detection limit. However, none of the samples exhibited concentrations exceeding the NCDEQ Action Level of 100 mg/kg. The laboratory analytical report and graphs for the soil samples collected at the site are provided in **Appendix E**. Detected chemical constituents in soil samples are shown on **Drawing 4.1**.

An assessment of water (surface water) was not included in this scope of work. Surface water was not observed on site.

A laboratory report for the groundwater sample collected from temporary monitoring well TMW-17-4 is provided in **Appendix F**. As noted in the report, several petroleum fuel-related constituents were detected in the sample, but not at concentrations exceeding the NCGQS.

5.2.2 Depth

As documented in the soil boring logs and laboratory analytical reports, impacted soil above regulatory action limits was not encountered in the unsaturated zone in borings placed on the site. The depth to water in the borings ranged from approximately 1.8 feet to approximately 3.1 feet BLS.

Although groundwater is very shallow at the site, it does not appear that it has been impacted, based on sampling results for the temporary well installed adjacent to the probable USTs discovered on site.

5.2.3 Quantities Calculation

During the advancement of the soil borings completed for this PSA, petroleum-impacted soil was not encountered at concentrations exceeding NCDEQ's Action Levels for TPH. However, given the historical use of probable USTs at the site, it is possible that petroleum contamination could exist in vadose zone soils in the area near the USTs, underground piping, and former pump island. Based on the size of the former UST

system and the shallow water table, it appears that only minor quantities of petroleum contaminated soil (if any) would be present.

6.0 CONCLUSIONS

6.1 Interpretation of Results

Based on the results of this assessment, Mid-Atlantic concludes the following:

- Geophysical survey data indicates that the site contains two approximate 1,500 gallon USTs that likely were used historically for gasoline retail. Although petroleum-impacted vadose zone soil was not found in this area during this assessment, it is possible that minor quantities could be present; and
- A groundwater sample collected from a temporary monitoring well installed adjacent to the USTs did not reveal evidence of a significant release of petroleum (trace concentrations of petroleum fuel-related constituents were found). However, it is possible that higher concentrations (exceeding the NCGQS) could be present beneath the site (for example, in the former pump island area). Based on the depth to groundwater (approximately 1.8 to 3.1 feet BLS) and the proposed construction plans for grading and drainage and the sampling results, it does not appear likely that the impacted groundwater will be encountered during road improvement activities.

6.2 Geophysics

Based on the results of the Geophysical assessment, Mid-Atlantic concludes the following:

- The geophysical survey indicated the presence of two probable metallic USTs located on the northern portion of the site near the concrete block building. The USTs appear to be in the 1,500 to 2,000 gallon capacity range.

6.3 Sampling

Based on the results of the sampling, Mid-Atlantic concludes the following:

- Based on the eight soil borings advanced at the site, vadose zone contamination was not encountered but small quantities could possibly exist in shallow soils in the vicinity of the USTs, piping, and/or former dispenser island;
- Petroleum-impacted groundwater exceeding the NCGQS was not encountered in a temporary well installed at location SB-17-4, which is immediately adjacent to the northern-most UST.

6.4 Groundwater

- The depth to groundwater at the site ranges from 1.8 to 3.1 feet BLS. Based on the depth to groundwater and the proposed construction plans for grading and drainage and the sampling results, it does not appear likely that the impacted groundwater will be encountered during road improvement activities.

6.5 Quantities

During the advancement of the soil borings completed for this PSA, petroleum-impacted soil was not encountered at concentrations exceeding NCDEQ's Action Levels for TPH. However, given the apparent historical use of the site, small quantities could possibly exist in shallow soils in the vicinity of the USTs, piping, and/or former dispenser island.

7.0 **RECOMMENDATIONS**

Based on these results, Mid-Atlantic recommends the following:

- Removal of the USTs, piping, and former dispenser island, as applicable; and
- If impacted soils or groundwater are encountered during removal of the USTs and generated as waste, they should be properly managed and disposed at a permitted facility.

TABLE

**TABLE 5.1
SOIL SAMPLING RESULTS
ALEX ECONOMY PROPERTY
GOLDSBORO, NORTH CAROLINA
MID-ATLANTIC JOB NO. R3203.00**

SAMPLE ID	SAMPLE DATE	SAMPLE DEPTH (FEET BLS)	PID FIELD SCREENING (PPM)	TPH GRO (C5 - C10) MG/KG	TPH DRO (C5 - C35) MG/KG
SB-17-1	9/24/2018	1 - 1.5	0.40	<0.55	2.4
SB-17-2	9/25/2018	1 - 1.5	0.30	<0.45	1.1
SB-17-3	9/25/2018	1 - 1.5	0.20	1.1	15.5
SB-17-4	9/25/2018	1 - 1.5	0.40	1.1	9.1
SB-17-5	9/25/2018	1 - 1.5	0.30	1.7	7.4
SB-17-6	9/25/2018	1 - 1.5	0.70	1.2	8.3
SB-17-7	9/25/2018	1 - 1.5	0.00	1.6	14.6
SB-17-8	9/25/2018	1 - 1.5	0.60	<0.16	1.9

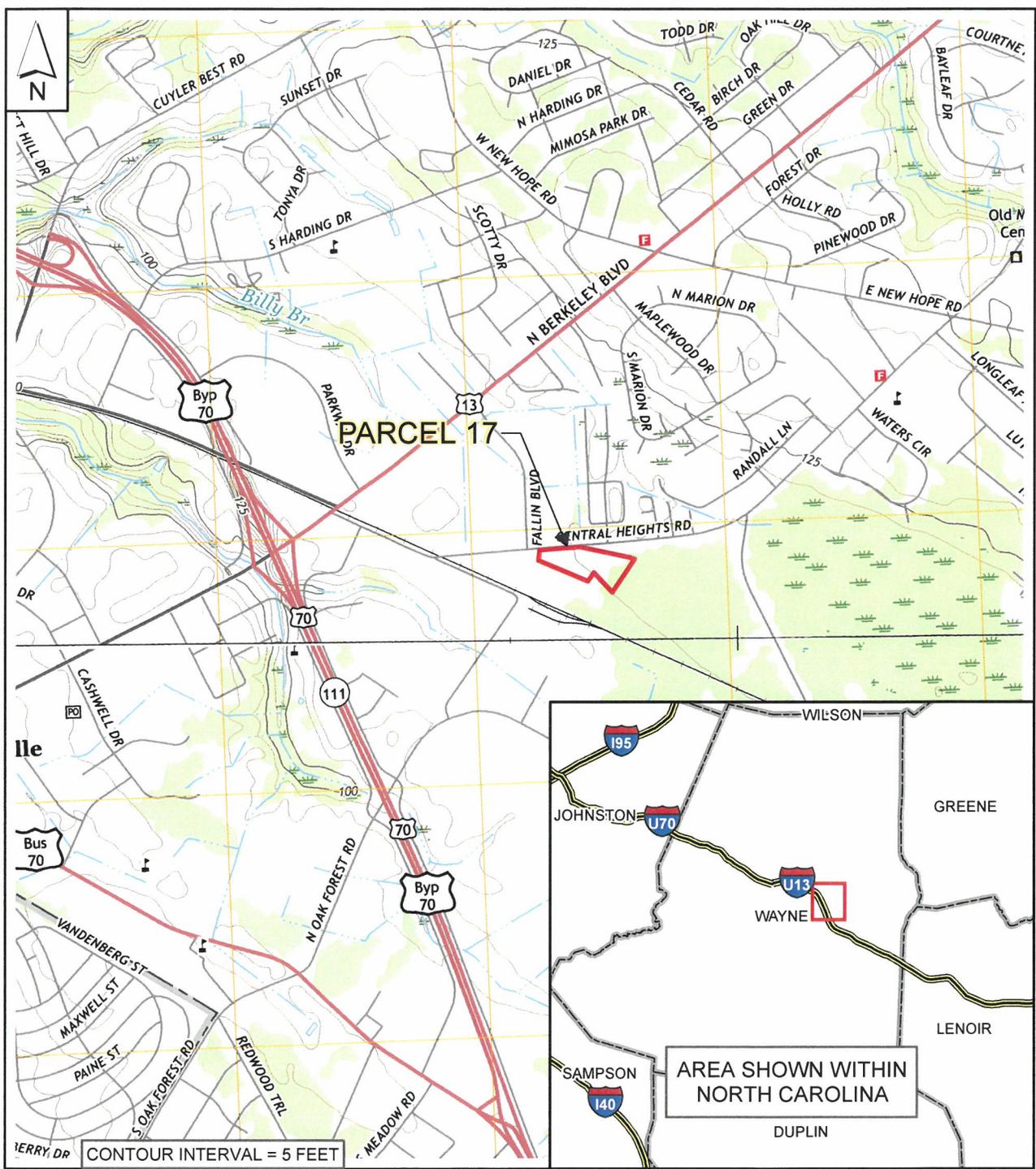
Notes:

BLS - Below Land Surface

PPM - Parts per million

MG/KG - milligrams per kilogram (ppm)

DRAWINGS



REFERENCES:

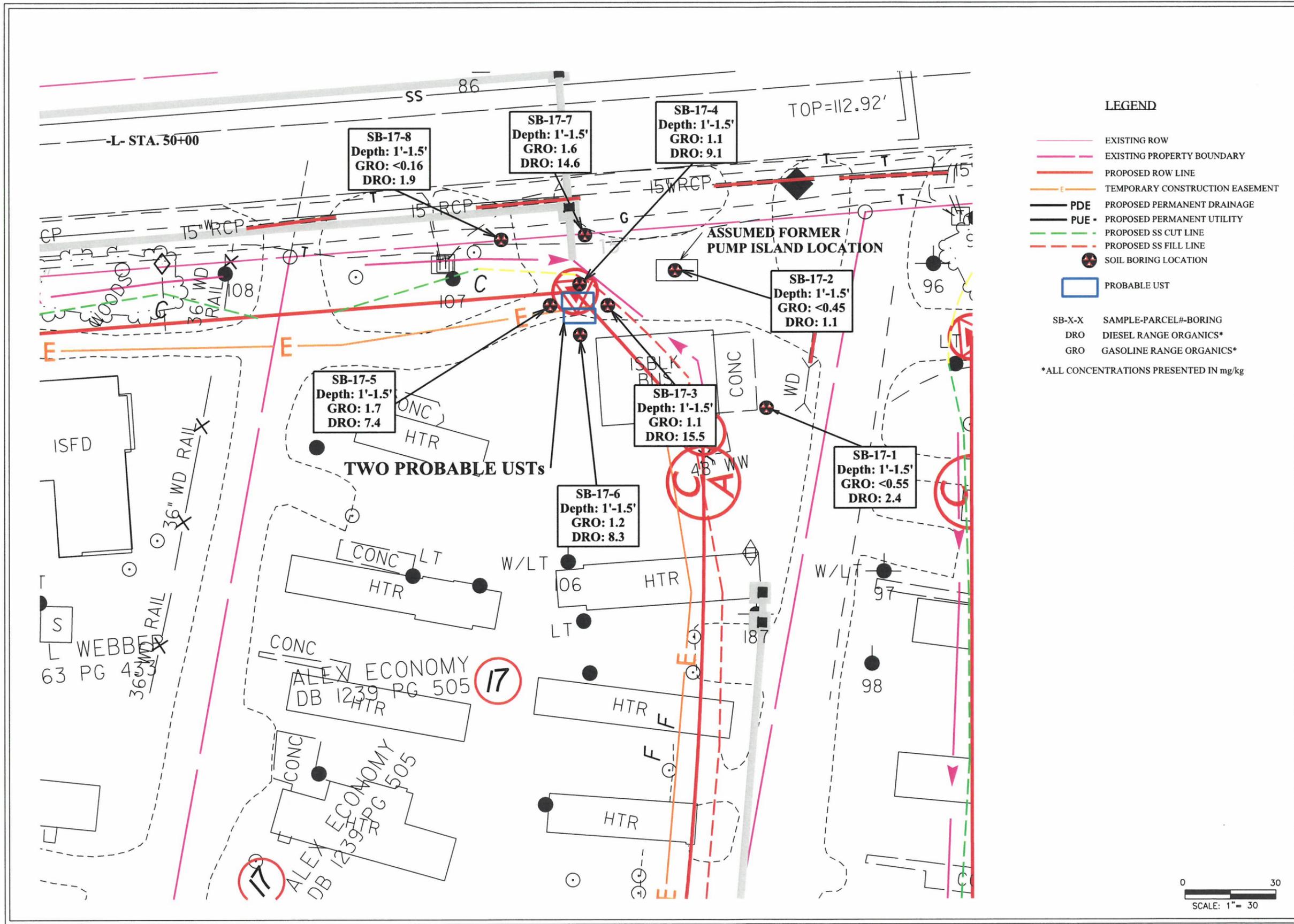
1. USGS TOPOGRAPHIC QUADRANGLES: NORTHEAST GOLDSBORO, NC - 2016; SOUTHEAST GOLDSBORO, NC - 2016
2. PROPERTY BOUNDARY FROM WAYNE COUNTY GIS
3. INSET MAP DIGITAL DATA FROM 2002 NATIONAL TRANSPORTATION ATLAS, BUREAU OF TRANSPORTATION STATISTICS, WASHINGTON, D.C.

SCALE: 1:24,000

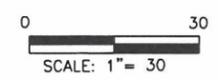


TOPOGRAPHIC SITE MAP
 PARCEL 17
 ALEX ECONOMY PROPERTY
 3114 CENTRAL HEIGHTS ROAD
 GOLDSBORO, NORTH CAROLINA

DRAWN BY: <i>JS</i>	DATE: OCTOBER 2018
DRAFT CHECK: <i>BSM</i>	JOB NO: 000R3203.00
ENG. CHECK: <i>BSM</i>	GIS NO: 5G-R3203.00-02
APPROVAL: <i>hnp</i>	DWG NO: 1.1



- LEGEND**
- EXISTING ROW
 - EXISTING PROPERTY BOUNDARY
 - PROPOSED ROW LINE
 - TEMPORARY CONSTRUCTION EASEMENT
 - PROPOSED PERMANENT DRAINAGE
 - PROPOSED PERMANENT UTILITY
 - PROPOSED SS CUT LINE
 - PROPOSED SS FILL LINE
 - SOIL BORING LOCATION
 - PROBABLE UST
- SB-X-X SAMPLE-PARCEL#-BORING
 DRO DIESEL RANGE ORGANICS*
 GRO GASOLINE RANGE ORGANICS*
- *ALL CONCENTRATIONS PRESENTED IN mg/kg



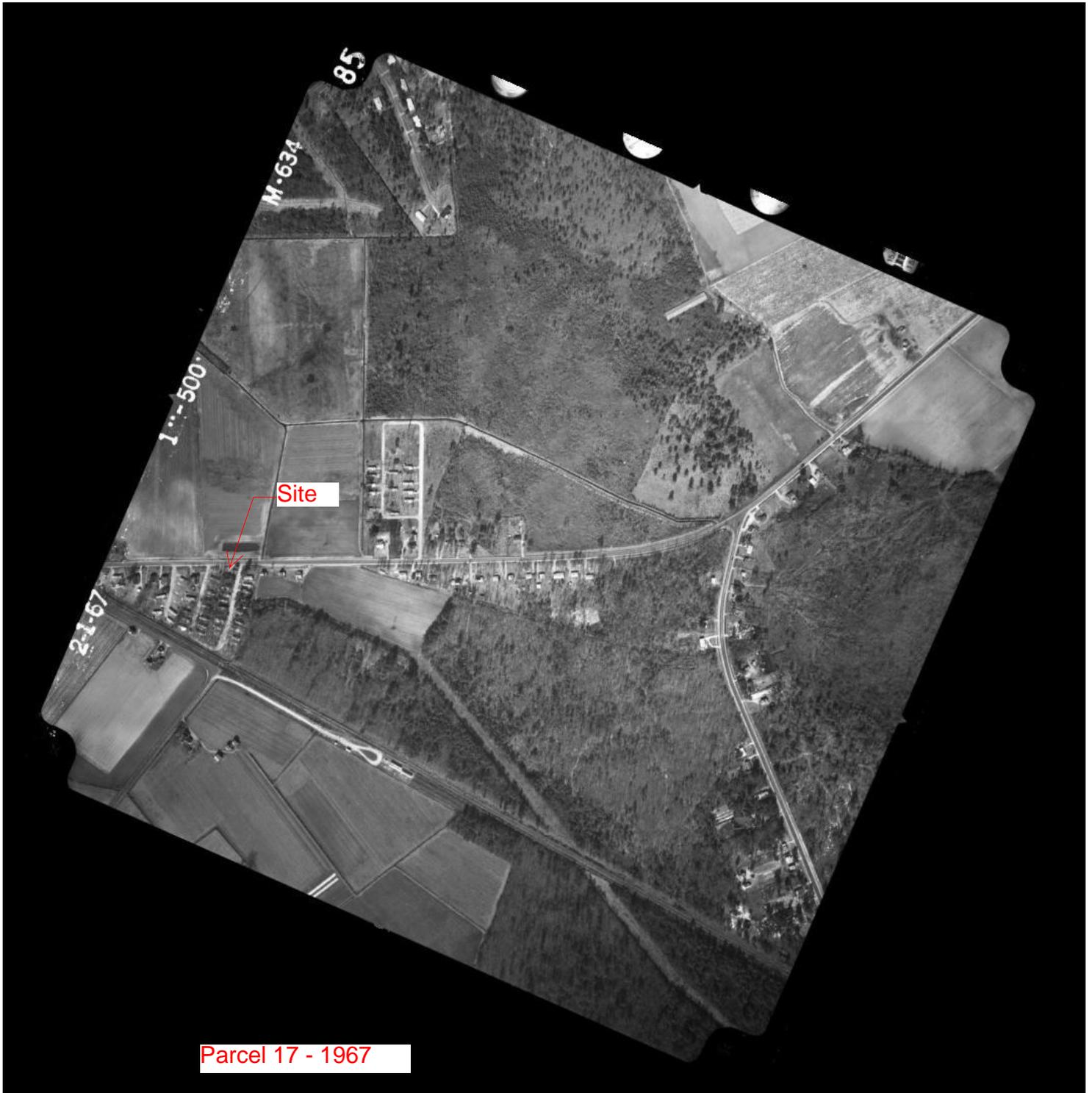
DATE:	OCTOBER 2018
JOB NO.:	R3203.00
CAD #	FIGURE 2
DWG NO.:	4.1
DRAWN BY:	EC
DRAFTING CHECK BY:	RSM
ENGINEER CHECK BY:	RSM
APPROVED BY:	DAU

SOIL SAMPLE MAP
 ALEX ECONOMY PROPERTY
 (PARCEL 17)
 NCDOT PROJECT U-5724
 3114 CENTRAL HEIGHTS ROAD
 GOLDSBORO, NC

Mid Atlantic
Engineering & Environmental Solutions

REFERENCE: NCDOT MICROSTATION (FS, HYD_DRN, ROW, SS, DSN)

APPENDIX A
HISTORICAL AERIALS AND SITE
PHOTO LOG



Parcel 17 - 1967

3114 Central Heights Rd.

TIP No.: U-5724, Parcel 17
1993

Legend

 3114 Central Heights Rd

1709

 3114 Central Heights Rd

Central Heights Rd

Google™ earth

Image U.S. Geological Survey



300 ft

3114 Central Heights Rd.

TIP No.: U-5724, Parcel 17
1998

Legend

 3114 Central Heights Rd

Site

1709

3114 Central Heights Rd

$N35^{\circ}22'37.92''$

Central Heights Rd

Google earth

Image U.S. Geological Survey



300 ft

3114 Central Heights Rd.

TIP No.: U-5724, Parcel 17
2008

Legend

 3114 Central Heights Rd

Site

1709

3114 Central Heights Rd

$N35^{\circ}22'37.92''$

Central Heights Rd

Google earth

Image U.S. Geological Survey



300 ft

3114 Central Heights Rd.

TIP No.: U-5724, Parcel 17
2016

Legend

 3114 Central Heights Rd

Site

1709

3114 Central Heights Rd

$N35^{\circ}22'37.92''$

Central Heights Rd





Photo 1 – A general view of site. Concrete block building at center.
(photo courtesy of Google Earth)



Photo 2 – A view of the probable UST locations (in white paint), looking south.



Photo 3 – A view of the probable UST locations (in white paint), looking east.

APPENDIX B
GEOPHYSICAL REPORT



PYRAMID GEOPHYSICAL SERVICES
(PROJECT 2018-230)

GEOPHYSICAL SURVEY

METALLIC UST INVESTIGATION: PARCEL 17 NCDOT PROJECT U-5724 (54016.1.2)

3114 CENTRAL HEIGHTS ROAD, GOLDSBORO, NC

SEPTEMBER 5, 2018

Report prepared for: Trey Marchant, P.G.
Mid-Atlantic Associates, Inc.
409 Rogers View Court
Raleigh, NC 27610

Prepared by: _____

Eric C. Cross, P.G.
NC License #2181

Reviewed by: _____

Douglas A. Canavello, P.G.
NC License #1066

503 INDUSTRIAL AVENUE, GREENSBORO, NC 27406

P: 336.335.3174 F: 336.691.0648

C257: GEOLOGY C1251: ENGINEERING

GEOPHYSICAL INVESTIGATION REPORT
Parcel 17 – 3114 Central Heights Road
Goldsboro, Wayne County, North Carolina

Table of Contents

Executive Summary 1
Introduction..... 2
Field Methodology..... 2
Discussion of Results..... 3
 Discussion of EM Results..... 3
 Discussion of GPR Results..... 4
Summary & Conclusions 5
Limitations 6

Figures

- Figure 1 – Parcel 17 - Geophysical Survey Boundaries and Site Photographs
- Figure 2 – Parcel 17 - EM61 Results Contour Map
- Figure 3 – Parcel 17 - GPR Transect Locations and Images
- Figure 4 – Parcel 17 - Locations and Sizes of Two Probable USTs
- Figure 5 – Overlay of Geophysical Survey Boundaries with Two Probable USTs on NCDOT Engineering Plans

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 Mid-Atlantic Associates, Inc. at Parcel 17, located at 3114 Central Heights Road, in Goldsboro, NC. The survey was part of a North Carolina Department of Transportation (NCDOT) Right-of-Way (ROW) investigation (NCDOT Project U-5724). The survey was designed to extend from the existing edge of pavement into the proposed ROW and/or easements, whichever distance was greater. Conducted from August 22-23, 2018, 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 ten EM anomalies were identified. The majority of the EM anomalies were directly attributed to visible cultural features. One large high-amplitude EM anomaly was observed on the north side of the parcel that was suggestive a UST(s) and was investigated further by GPR. A second EM feature was suspected to be associated with buried debris and was investigated by GPR. GPR performed across the high-amplitude EM feature on the north side of the property recorded two isolated hyperbolic reflectors and two discreet lateral reflectors that were consistent with two metallic USTs.

The combined EM and GPR evidence result in these features being classified as two probable metallic USTs. UST #1 (north) was approximately 10' long by 5' wide. UST #2 (south) was approximately 10' long by 4.5' wide. GPR performed across the second unknown EM feature recorded intermittent and isolated high-amplitude reflectors that are consistent with suspected debris. Collectively, the geophysical data recorded evidence of two probable metallic USTs at Parcel 17.

INTRODUCTION

Pyramid Environmental conducted a geophysical investigation for Mid-Atlantic Associates, Inc. at Parcel 17, located at 3114 Central Heights Road, in Goldsboro, NC. The survey was part of a North Carolina Department of Transportation (NCDOT) Right-of-Way (ROW) investigation (NCDOT Project U-5724). The survey was designed to extend from the existing edge of pavement into the proposed ROW and/or easements, whichever distance was greater. Conducted from August 22-23, 2018, the geophysical investigation was performed to determine if unknown, metallic underground storage tanks (USTs) were present beneath the survey area.

The site included a cinderblock building and three mobile homes surrounded by grass and gravel 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 August 23, 2018, using a Geophysical Survey Systems, Inc. (GSSI) UtilityScan DF unit equipped with a dual frequency 300/800 MHz antenna. Data were collected both in reconnaissance fashion as well as along formal transect lines across EM features. The GPR data were viewed in real-time using a vertical scan of 512 samples, at a rate of 48 scans per second. GPR data were viewed down to a maximum depth of approximately 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	Suspected Utilities	
2	Two Probable Metallic USTs	Ø
3	Suspected Debris	Ø
4	Clothesline	
5	Mailboxes	
6	Utility	
7	Building/Fence	
8	Trailer	
9	Water Meters	
10	Trailer	

The majority of the EM anomalies were directly attributed to visible cultural features at the ground surface, including utilities, a clothesline, mailboxes, a building, a fence, trailers, and water meters. EM Anomaly 2 was associated with unknown buried metal exhibiting a high-amplitude EM response that was characteristic of a UST(s) and was further investigated with GPR. Anomaly 3 was associated with suspected debris and further investigated with GPR.

Discussion of GPR Results

Figure 3 presents the locations of the representative GPR transects performed at the property, as well as the transect images. A total of four GPR transects were recorded. Transects 1-3 were collected across EM Anomaly 2. These transects recorded two isolated hyperbolic reflectors and two discreet lateral reflectors that were consistent with two metallic USTs. The combined EM and GPR evidence result in these features being classified as two probable metallic USTs. UST #1 (north) was approximately 10’ long by 5’ wide. UST #2 (south) was approximately 10’ long by 4.5’ wide. **Figure 4** presents the locations and sizes of the probable USTs on an aerial photograph along with ground-level photographs.

Transect 4 was collected across EM Anomaly 3. This transect recorded isolated and intermittent high-amplitude reflections that are consistent with suspected debris.

Collectively, the geophysical data recorded evidence of two probable metallic USTs at Parcel 17. **Figure 5** provides an overlay of the geophysical survey onto the NCDOT MicroStation engineering plans for reference.

SUMMARY & CONCLUSIONS

Pyramid's evaluation of the EM61 and GPR data collected at Parcel 17 in Goldsboro, 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 anomalies were directly attributed to visible cultural features.
- One large high-amplitude EM anomaly was observed on the north side of the parcel that was suggestive a UST(s) and was investigated further by GPR. A second EM feature was suspected to be associated with buried debris and was investigated by GPR.
- GPR performed across the high-amplitude EM feature on the north side of the property recorded two isolated hyperbolic reflectors and two discreet lateral reflectors that were consistent with two metallic USTs.
- The combined EM and GPR evidence result in these features being classified as two probable metallic USTs. UST #1 (north) was approximately 10' long by 5' wide. UST #2 (south) was approximately 10' long by 4.5' wide.
- GPR performed across the second unknown EM feature recorded intermittent and isolated high-amplitude reflectors that are consistent with suspected debris.
- Collectively, the geophysical data recorded evidence of two probable metallic USTs at Parcel 17.

LIMITATIONS

Geophysical surveys have been performed and this report was prepared for Mid-Atlantic Associates, Inc. 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 South)



View of Survey Area
(Facing Approximately West)

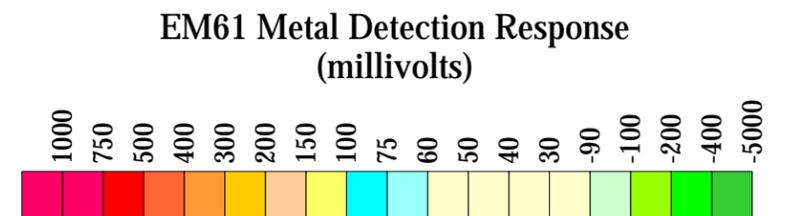
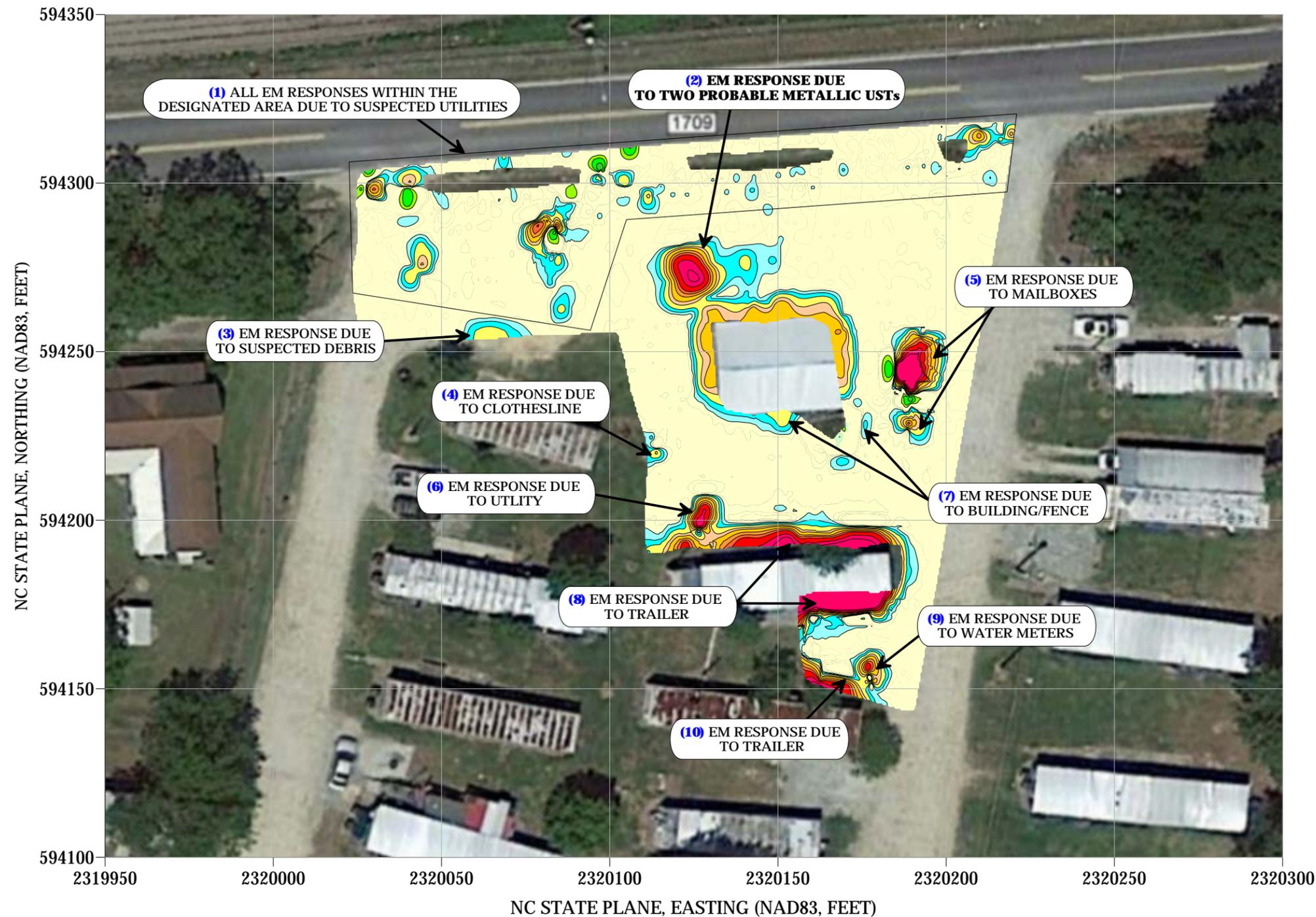


 <p>503 INDUSTRIAL AVENUE GREENSBORO, NC 27460 (336) 335-3174 (p) (336) 691-0648 (f) License # C1251 Eng. / License # C257 Geology</p>	<p>PROJECT</p> <p>PARCEL 17 GOLDSBORO, NORTH CAROLINA NCDOT PROJECT U-5724</p>	<p>TITLE</p> <p>PARCEL 17 - GEOPHYSICAL SURVEY BOUNDARIES AND SITE PHOTOGRAPHS</p>	<p>DATE</p> <p>8/22/2018</p>	<p>CLIENT</p> <p>MID-ATLANTIC ASSOCIATES, INC.</p>
			<p>PYRAMID PROJECT #:</p> <p>2018-230</p>	<p>FIGURE 1</p>

EM61 METAL DETECTION RESULTS

EVIDENCE OF TWO PROBABLE METALLIC USTs OBSERVED.

The contour plot shows the differential results of the EM61 instrument in millivolts (mV). The differential results focus on larger metallic objects such as USTs and drums. The EM61 data were collected on August 22, 2018, using a Geonics EM61 instrument. Verification GPR data were collected using a GSSI UtilityScan DF instrument with a dual frequency 300/800 MHz antenna on August 23, 2018.



503 INDUSTRIAL AVENUE
GREENSBORO, NC 27460
(336) 335-3174 (p) (336) 691-0648 (f)
License # C1251 Eng. / License # C257 Geology

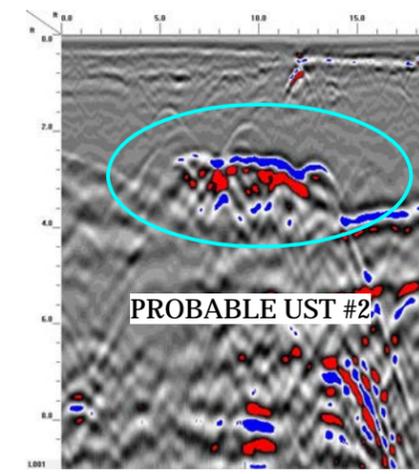
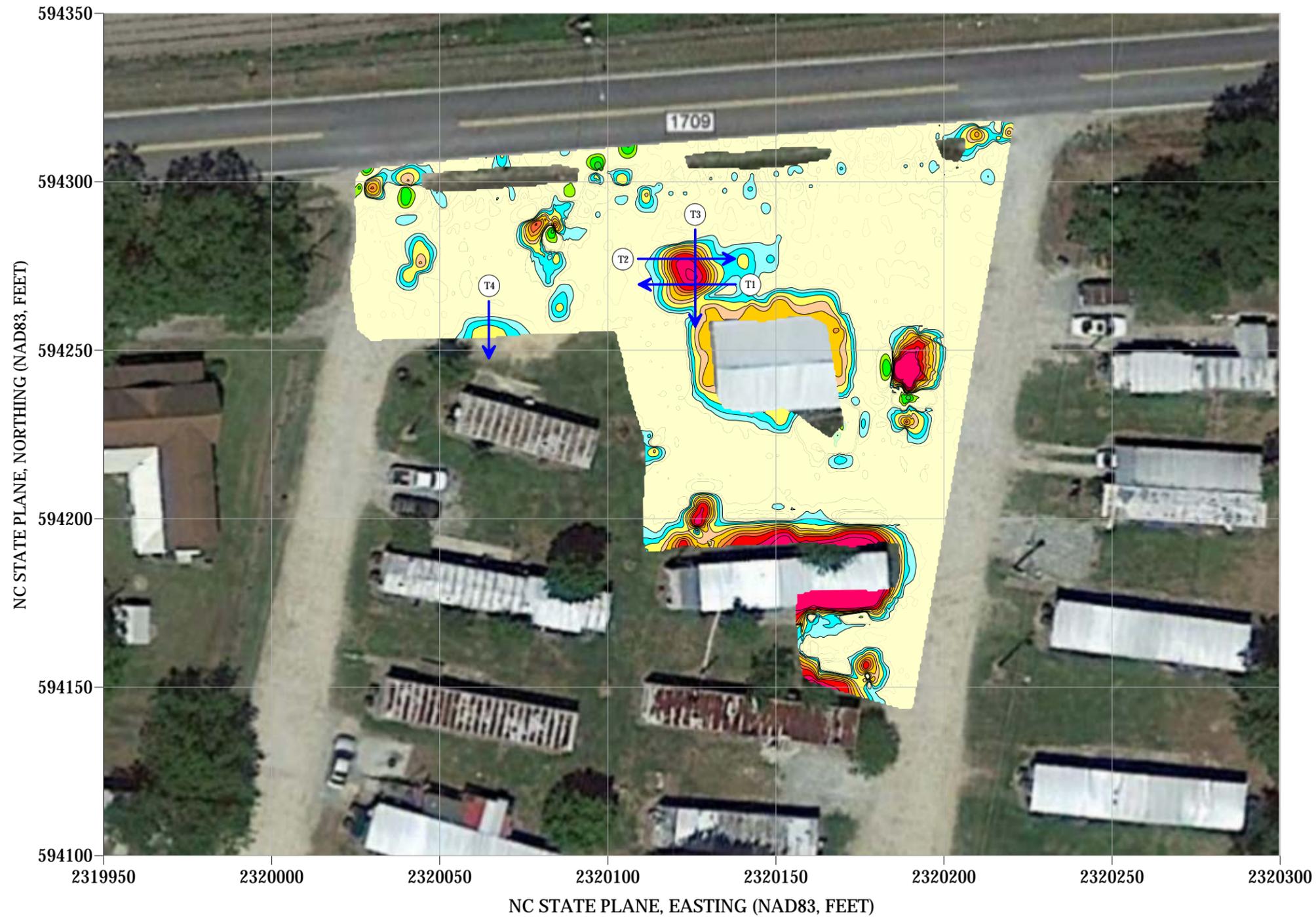
PROJECT
PARCEL 17
GOLDSBORO, NORTH CAROLINA
NCDOT PROJECT U-5724

TITLE
PARCEL 17 - EM61 METAL DETECTION
CONTOUR MAP

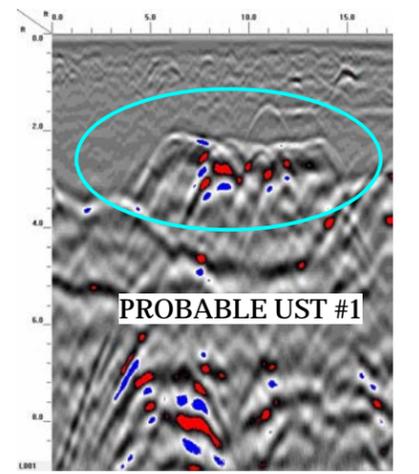
DATE
8/22/2018
PYRAMID PROJECT #:
2018-230

CLIENT
MID-ATLANTIC ASSOCIATES, INC.
FIGURE 2

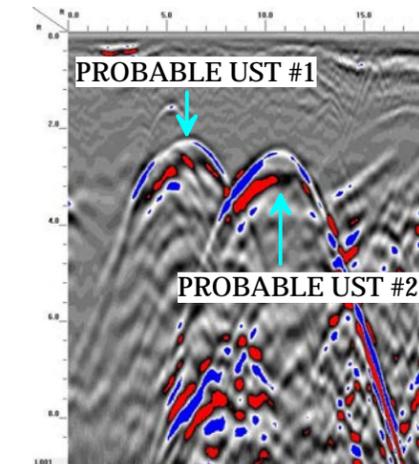
LOCATIONS OF GPR TRANSECTS



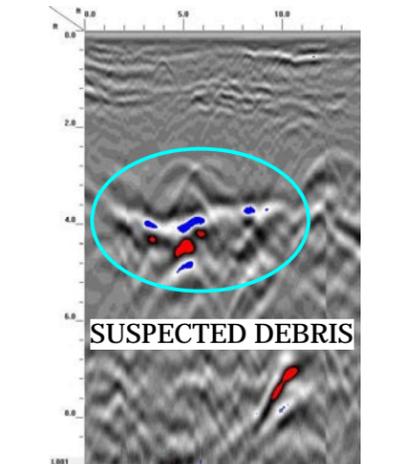
GPR TRANSECT 1 (T1)



GPR TRANSECT 2 (T2)



GPR TRANSECT 3 (T3)



GPR TRANSECT 4 (T4)

*EXTENSIVE GPR SCANS WERE CONDUCTED OVER THE ENTIRE SITE. TRANSECT LINES ON THE MAP ABOVE INDICATE LOCATIONS WHERE DATA WERE SAVED. THESE LOCATIONS WERE CHOSEN TO HIGHLIGHT STRUCTURES IDENTIFIED IN THE SUBSURFACE OR TRANSECTS THAT ARE REPRESENTATIVE OF GENERAL SUBSURFACE CONDITIONS.

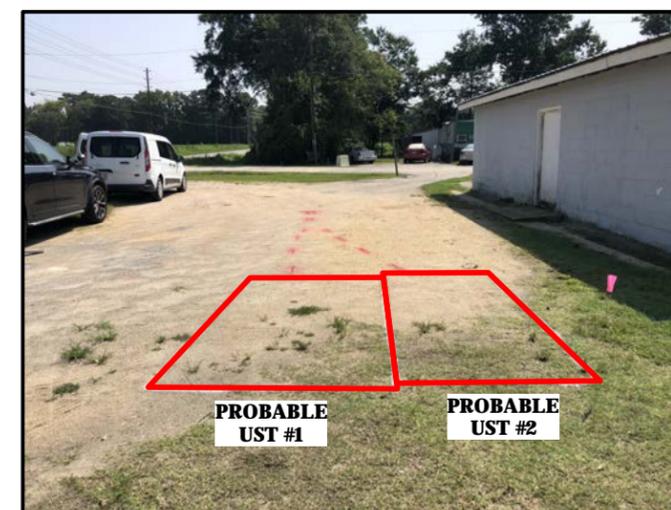


<p>503 INDUSTRIAL AVENUE GREENSBORO, NC 27460 (336) 335-3174 (p) (336) 691-0648 (f) License # C1251 Eng. / License # C257 Geology</p>	<p>PROJECT</p> <p>PARCEL 17 GOLDSBORO, NORTH CAROLINA NCDOT PROJECT U-5724</p>	<p>TITLE</p> <p>PARCEL 17 - GPR TRANSECT LOCATIONS AND IMAGES</p>	<p>DATE</p> <p>8/23/2018</p>	<p>CLIENT</p> <p>MID-ATLANTIC ASSOCIATES, INC.</p>
			<p>PYRAMID PROJECT #:</p> <p>2018-230</p>	<p>FIGURE 3</p>

LOCATIONS OF TWO PROBABLE METALLIC USTs



View of Two Probable USTs Facing Approximately South



View of Two Probable USTs Facing Approximately West



503 INDUSTRIAL AVENUE
GREENSBORO, NC 27460
(336) 335-3174 (p) (336) 691-0648 (f)
License # C1251 Eng. / License # C257 Geology

PROJECT
PARCEL 17
GOLDSBORO, NORTH CAROLINA
NCDOT PROJECT U-5724

TITLE
**PARCEL 17 - LOCATIONS AND SIZES OF
TWO PROBABLE METALLIC USTs**

DATE
8/23/2018

PYRAMID
PROJECT #:
2018-230

CLIENT
MID-ATLANTIC
ASSOCIATES, INC.

FIGURE 4

APPENDIX C
BORING LOGS



NCDOT

Site Name: U-5724 PSA	Drilling/Boring Method: Geoprobe	Total Boring Depth (ft): 5
Project Number: 000R3203.00	Sampling Method: Macrocore	Well Depth (ft): N/A
Location: Goldsboro, NC	Subcontractor/Drillers: Quantex, Inc.	Screen Depth (ft): N/A
Date Started: 9/24/2018	Driller: James Barker	DTW (ft): N/A
Date Completed: 9/24/2018	Monitoring Equipment: RKI GX6000 PID	MAA Field Staff: Gary Fischer

ft -bgs	Sampling Interval, Odors	PID (ppm)	Sample to Laboratory	SOIL DESCRIPTION (color, texture, moisture, etc.)	Construction Details	ft-bgs
0	None	0.40	Yes	Grass/topsoil		0
2	None	0.60		Dark brown silty very fine SAND		2
4						4
6				Boring Terminated at 5 ft-bgs Water level in borehole at 1.8 ft-bgs		6
8						8
10						10
12						12
14						14
16						16
18						18
20						20

COMMENTS: DTW - Depth to Water ▼

in - indicates inches
ft - indicates depth in feet
ft-bgs - indicates feet below ground surface

N/A - indicates not applicable to this boring
ppm - indicates parts per million
TD - Total Depth of Boring for Sampling



NCDOT

Site Name: U-5724 PSA

Drilling/Boring Method: Geoprobe

Total Boring Depth (ft): 5

Project Number: 000R3203.00

Sampling Method: Macrocore

Well Depth (ft): N/A

Location: Goldsboro, NC

Subcontractor/Drillers: Quantex, Inc.

Screen Depth (ft): N/A

Date Started: 9/25/2018

Driller: James Barker

DTW (ft): N/A

Date Completed: 9/25/2018

Monitoring Equipment: RKI GX6000 PID

MAA Field Staff: Gary Fischer

ft -bgs	Sampling Interval, Odors	PID (ppm)	Sample to Laboratory	SOIL DESCRIPTION (color, texture, moisture, etc.)	Construction Details	ft-bgs
				Tan SAND and GRAVEL		
2	None	0.30	Yes	Dark brown clayey fine to medium SAND with GRAVEL		2
4	None	0.30		Medium brown silty fine to medium SAND		4
6				Boring Terminated at 5 ft-bgs Water level in borehole at 2.3 ft-bgs		6
8						8
10						10
12						12
14						14
16						16
18						18
20						20

COMMENTS:
DTW - Depth to Water ▼

in - indicates inches
ft - indicates depth in feet
ft-bgs - indicates feet below ground surface

N/A - indicates not applicable to this boring
ppm - indicates parts per million
TD - Total Depth of Boring for Sampling



NCDOT

Site Name: U-5724 PSA

Drilling/Boring Method: Geoprobe

Total Boring Depth (ft): 5

Project Number: 000R3203.00

Sampling Method: Macrocore

Well Depth (ft): N/A

Location: Goldsboro, NC

Subcontractor/Drillers: Quantex, Inc.

Screen Depth (ft): N/A

Date Started: 9/25/2018

Driller: James Barker

DTW (ft): N/A

Date Completed: 9/25/2018

Monitoring Equipment: RKI GX6000 PID

MAA Field Staff: Gary Fischer

ft -bgs	Sampling Interval, Odors	PID (ppm)	Sample to Laboratory	SOIL DESCRIPTION (color, texture, moisture, etc.)	Construction Details	ft-bgs
	None	0.20	Yes	GRAVEL		
2				Light and dark brown silty fine SAND with GRAVEL		2
4	None	0.90		Dark brown silty very fine to fine SAND		4
6				Boring Terminated at 5 ft-bgs Water level in borehole 3 ft-bgs		6
8						8
10						10
12						12
14						14
16						16
18						18
20						20

COMMENTS:
DTW - Depth to Water ▼

in - indicates inches
ft - indicates depth in feet
ft-bgs - indicates feet below ground surface

N/A - indicates not applicable to this boring
ppm - indicates parts per million
TD - Total Depth of Boring for Sampling



Site Name: NC DOT U-5724 PSA	Drilling/Boring Method: Geoprobe	Total Boring Depth (ft): 5
Project Number: 000R3203.00	Sampling Method: Macrocore	Well Depth (ft): N/A
Location: Goldsboro, NC	Subcontractor/Drillers: Quantex, Inc.	Screen Depth (ft): N/A
Date Started: 9/25/2018	Driller: James Barker	DTW (ft): N/A
Date Completed: 9/25/2018	Monitoring Equipment: RKI GX6000 PID	MAA Field Staff: Gary Fischer

ft-bgs	Sampling Interval, Odors	PID (ppm)	Sample to Laboratory	SOIL DESCRIPTION (color, texture, moisture, etc.)	Construction Details	ft-bgs
	None	0.40	Yes	GRAVEL	1-in PVC temp well installed	
2				Light brown silty fine SAND with GRAVEL		2
4	Faint	4.90		Dark brown silty very fine SAND		4
6				Boring Terminated at 5 ft-bgs Water level in borehole 3.1 ft-bgs After all 8 borings were completed the drillers came back to SB-17-4 and extended the borehole to 10', set 1" PVC temporary well.	Screen 0-10 ft	6
8						8
10						10
12						12
14						14
16						16
18						18
20						20

COMMENTS: DTW - Depth to Water ▼

in - indicates inches
ft - indicates depth in feet
ft-bgs - indicates feet below ground surface

N/A - indicates not applicable to this boring
ppm - indicates parts per million
TD - Total Depth of Boring for Sampling



NCDOT

Site Name: U-5724 PSA	Drilling/Boring Method: Geoprobe	Total Boring Depth (ft): 5
Project Number: 000R3203.00	Sampling Method: Macrocore	Well Depth (ft): N/A
Location: Goldsboro, NC	Subcontractor/Drillers: Quantex, Inc.	Screen Depth (ft): N/A
Date Started: 9/25/2018	Driller: James Barker	DTW (ft): N/A
Date Completed: 9/25/2018	Monitoring Equipment: RKI GX6000 PID	MAA Field Staff: Gary Fischer

ft -bgs	Sampling Interval, Odors	PID (ppm)	Sample to Laboratory	SOIL DESCRIPTION (color, texture, moisture, etc.)	Construction Details	ft-bgs
				GRAVEL		
2	None	0.30	Yes	Medium brown silty fine to coarse SAND with GRAVEL		2
4	None	0.90		Dark brown silty fine to medium SAND		4
6				Boring Terminated at 5 ft-bgs Water level in borehole 2.2 ft-bgs		6
8						8
10						10
12						12
14						14
16						16
18						18
20						20

COMMENTS:
 DTW - Depth to Water ▼
 in - indicates inches
 ft - indicates depth in feet
 ft-bgs - indicates feet below ground surface
 N/A - indicates not applicable to this boring
 ppm - indicates parts per million
 TD - Total Depth of Boring for Sampling



NCDOT

Site Name: U-5724 PSA	Drilling/Boring Method: Geoprobe	Total Boring Depth (ft): 5
Project Number: 000R3203.00	Sampling Method: Macrocore	Well Depth (ft): N/A
Location: Goldsboro, NC	Subcontractor/Drillers: Quantex, Inc.	Screen Depth (ft): N/A
Date Started: 9/25/2018	Driller: James Barker	DTW (ft): N/A
Date Completed: 9/25/2018	Monitoring Equipment: RKI GX6000 PID	MAA Field Staff: Gary Fischer

ft - bgs	Sampling Interval, Odors	PID (ppm)	Sample to Laboratory	SOIL DESCRIPTION (color, texture, moisture, etc.)	Construction Details	ft - bgs
				GRAVEL		
2	None	0.70	Yes	Medium brown silty fine SAND		2
4	None	0.60		Dark brown silty very fine to fine SAND		4
6				Boring Terminated at 5 ft-bgs Water level in borehole 1.9 ft-bgs		6
8						8
10						10
12						12
14						14
16						16
18						18
20						20

COMMENTS:
DTW - Depth to Water ▼

in - indicates inches
ft - indicates depth in feet
ft-bgs - indicates feet below ground surface

N/A - indicates not applicable to this boring
ppm - indicates parts per million
TD - Total Depth of Boring for Sampling



NCDOT U-

Site Name: 5724 PSA Drilling/Boring Method: Geoprobe Total Boring Depth (ft): 5
 Project Number: 000R3203.00 Sampling Method: Macrocore Well Depth (ft): N/A
 Location: Goldsboro, NC Subcontractor/Drillers: Quantex, Inc. Screen Depth (ft): N/A
 Date Started: 9/25/2018 Driller: James Barker DTW (ft): N/A
 Date Completed: 9/25/2018 Monitoring Equipment: RKI GX6000 PID MAA Field Staff: Gary Fischer

ft - bgs	Sampling Interval, Odors	PID (ppm)	Sample to Laboratory	SOIL DESCRIPTION (color, texture, moisture, etc.)	Construction Details	ft - bgs
				GRAVEL		
				Light brown silty fine SAND with GRAVEL		
			Yes			
2	None	--		Dark brown silty clay fine to medium SAND		2
4				Dark brown slightly silty fine to medium SAND		4
6				Boring Terminated at 5 ft-bgs Water level in borehole 2ft-bgs		6
8						8
10						10
12						12
14						14
16						16
18						18
20						20

COMMENTS:
 DTW - Depth to Water ▼
 -- not recorded by technician
 in - indicates inches
 ft - indicates depth in feet
 ft-bgs - indicates feet below ground surface
 N/A - indicates not applicable to this boring
 ppm - indicates parts per million
 TD - Total Depth of Boring for Sampling



NCDOT

Site Name:	U-5724 PSA	Drilling/Boring Method:	Geoprobe	Total Boring Depth (ft):	5
Project Number:	000R3203.00	Sampling Method:	Macrocore	Well Depth (ft):	N/A
Location:	Goldsboro, NC	Subcontractor/Drillers:	Quantex, Inc.	Screen Depth (ft):	N/A
Date Started:	9/25/2018	Driller:	James Barker	DTW (ft):	N/A
Date Completed:	9/25/2018	Monitoring Equipment:	RKI GX6000 PID	MAA Field Staff:	Gary Fischer

ft -bgs	Sampling Interval, Odors	PID (ppm)	Sample to Laboratory	SOIL DESCRIPTION (color, texture, moisture, etc.)	Construction Details	ft-bgs
				Grass/Topsoil		
2	None	0.60	Yes	Dark brown fine SAND and SILT		2
4	None	0.90		Dark brown silty very fine to fine SAND		4
6				Boring Terminated at 5 ft-bgs Water level in borehole 1.9 ft-bgs		6
8						8
10						10
12						12
14						14
16						16
18						18
20						20

COMMENTS:
DTW - Depth to Water ▼

in - indicates inches
ft - indicates depth in feet
ft-bgs - indicates feet below ground surface

N/A - indicates not applicable to this boring
ppm - indicates parts per million
TD - Total Depth of Boring for Sampling

APPENDIX D
MID-ATLANTIC FIELD PROCEDURES

Soil Sampling Procedures

I. Sample Collection

Direct Push Technology (DPT, or “Geoprobe”)

DPT uses a truck-mounted hydraulic rig to push a steel sampling probe into the subsurface to collect soil and/or groundwater samples. The sampling device used to collect the soil samples during this investigation was the “macrocore” sampler. This sampler consists of a four-foot long, two-inch diameter stainless steel spoon containing a clear, acetate liner. When the macrocore sampler is driven into the subsurface, the soil is collected into the acetate liner and then retrieved to the land surface. The liner is then cut open and the soil lithology is characterized and soil samples are collected.

Split Spoon Sampling

This method of soil sampling is typically used during advancement of hollowstem augers for the construction of monitoring wells. Soil samples are obtained from the borings by driving a prewashed, 1-3/8-inch inner-diameter split-spoon sampler at five foot intervals to termination in general accordance with ASTM D-1586 (Standard Penetration Test) specifications. Blow counts for each six inches of split-spoon penetration are recorded during advancement of the spoon. Samples are then retrieved to the land surface, the split-spoon is opened, and the soil lithology is characterized and soil samples are collected.

Hand Augering

This method is typically used for shallow sampling in areas where access is limited or underground obstacles such as utilities may be present. A pre-washed, three-inch diameter steel auger bucket is attached to extension rods and manually turned to penetrate the subsurface to the desired sampling depth. Samples are then retrieved to the land surface and the soil lithology is characterized and soil samples are collected directly from the hand auger bucket.

Excavator Bucket Sampling

This method is typically used during UST excavation and soil excavation projects. The soil samples are collected from the excavator bucket when it is not safe to collect the samples by other means. Care is taken when collecting samples from the bucket to avoid soil that has come in contact with the bucket itself to avoid cross contamination.

II. Headspace Field Screening

A portion of each sample is removed from the sampling device and placed in a pre-labeled, plastic "ziploc" bag. After several minutes, the gas contained in the "headspace" or void area within the bag is tested with a photoionization detection (PID) and/or Flame Ionization Detector (FID). These are useful as scanning devices to detect the presence of volatile organic compounds (VOCs) but are not relied upon to determine specific levels of contamination. Typically, the samples exhibiting the highest headspace readings will be submitted to the laboratory for analysis.

III. Preparation for Laboratory Analysis

The sample collector dons new nitrile sampling gloves prior to handling each sample. The samples are placed into laboratory-prepared, pre-labeled, sampling containers, packed in ice, and shipped to a certified laboratory under chain-of-custody control. The sampler places an executed custody seal on the cooler prior to leaving the sampler's custody. Laboratory analyses to be performed on the samples, along with other sampling information, are specified on the chain-of-custody, which is placed in the cooler with the samples.

Groundwater Sampling Procedures

I. Sample Collection

A. Monitoring Wells

Prior to sample collection, each well is purged of three to five standing well volumes or to dryness to remove stagnant water from the well and well bore in an effort to collect samples that are representative of the water quality in the formation surrounding each well. Purging is performed either with a new, polyethylene bailer dedicated to each well, or with a decontaminated pump. Samples are retrieved from the monitoring well using the dedicated bailer. New nylon string is used on each dedicated bailer, and new nitrile sampling gloves are donned prior to purging and sampling of each well.

B. Geoprobe “Screen Point Sampler”

The screen point sampler is a “grab” sampling device that is driven into the saturated zone and a surrounding metal sheath is retracted, exposing a screen. Groundwater entering the screen is then drawn to land surface through disposable tubing that is placed through the hollow push rods. The sample is collected from the tubing into the appropriate sampling glassware.

C. Water-Supply Wells

Water samples are typically collected from the available spigot that is nearest to the well. The water is allowed to run at a high flow from the spigot for approximately 10 to 15 minutes to allow the water in the delivery lines to be purged. The sample flow is then reduced and the samples are collected directly into pre-labeled containers as described below. New nitrile sampling gloves are donned prior to sampling of each well.

D. Treatment System Influent/Effluent

Samples are typically collected from the influent or effluent of pump-and-treat groundwater remediation systems using designated sampling ports in the influent and effluent water transport lines. The water is typically allowed to run for several seconds to clear potential debris in the sampling port. The sample is then collected directly into sampling containers as described below. New nitrile sampling gloves are donned prior to sample collection.

II. Preparation for Laboratory Analysis

Groundwater samples are decanted directly into laboratory-prepared, pre-labeled, sampling containers, packed in ice, and shipped to a certified laboratory under chain-of-custody control. Laboratory analyses performed on the samples are specified on the chain-of-custody.

APPENDIX E

**SOIL LABORATORY ANALYTICAL REPORTS
AND GRAPHS**



Hydrocarbon Analysis Results

Client: MID ATLANTIC ASSOCIATES
Address: 409 ROGERS VIEW CT
 RALEIGH NC 27610

Samples taken Monday, September 24, 2018
Samples extracted Monday, September 24, 2018
Samples analysed Thursday, September 27, 2018

Contact: TREY MARCHANT
 COLLECTED BY GARY FISCHER
Project: NCDOT

Operator NICK HENDRIX

H09382

Matrix	Sample ID	Dilution used	BTEX (C6 - C9)	GRO (C5 - C10)	DRO (C10 - C35)	TPH (C5 - C35)	Total Aromatics (C10-C35)	16 EPA PAHs	BaP	% Ratios			HC Fingerprint Match
										C5 - C10	C10 - C18	C18	
s	SB-17-1 (1'-1.5')	21.8	<0.55	<0.55	2.4	2.4	1.4	<0.17	<0.022	0	66.1	33.9	V.Deg.PHC 77.4%,(FCM),(BO)
s	SB-17-2 (1'-1.5')	18.1	<0.45	<0.45	1.1	1.1	0.75	<0.14	<0.018	0	63.3	36.7	V.Deg.PHC 76%,(FCM)
s	SB-17-3 (1'-1.5')	20.6	<0.52	1.1	15.5	16.6	9	0.45	<0.021	10.9	70.9	18.2	Deg.PHC 75.1%,(FCM),(PFM),(BO)
s	SB-17-4 (1'-1.5')	23.0	<0.58	1.1	9.1	10.2	4.7	0.24	<0.023	19.5	60.4	20.1	Deg.PHC 77.4%,(FCM),(BO)
s	SB-17-5 (1'-1.5')	21.1	<0.53	1.7	7.4	9.1	4.8	0.24	<0.021	28.9	47.1	24	V.Deg.PHC 77.2%,(FCM),(BO)
s	SB-17-6 (1'-1.5')	20.0	<0.5	1.2	8.3	9.5	4.9	0.25	<0.02	22.2	53	24.8	Deg.PHC 90.4%,(FCM),(BO)
s	SB-17-7 (1'-1.5')	17.9	<0.45	1.6	14.6	16.2	10.2	0.59	<0.018	15.5	74.2	10.2	Deg Fuel 75.5%,(FCM),(BO)
s	SB-17-8 (1'-1.5')	6.2	<0.16	<0.16	1.9	1.9	1.8	0.09	<0.006	0	59.9	40.1	V.Deg.PHC 71.7%,(FCM),(BO)
s													
s													

Initial Calibrator QC check **OK**

Final FCM QC Check **OK**

98 %

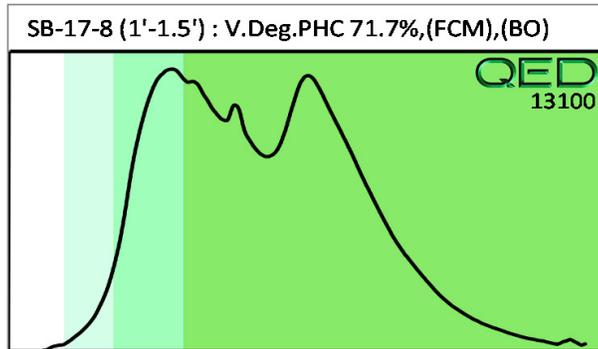
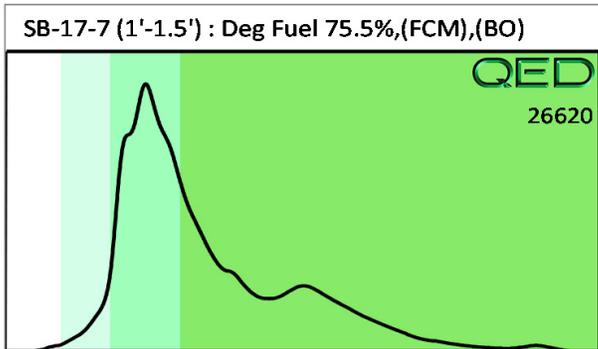
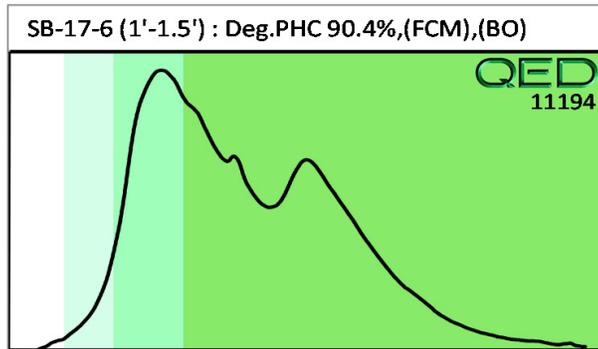
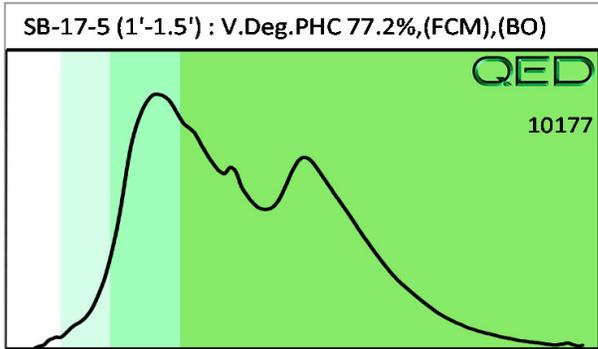
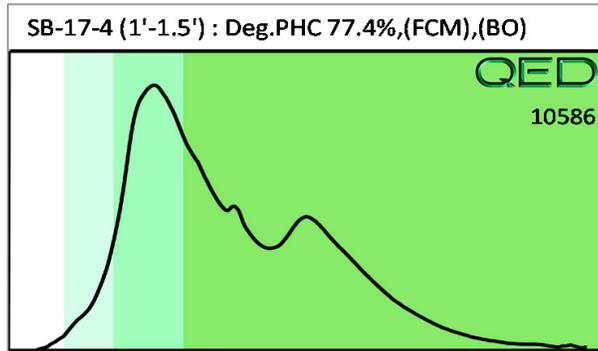
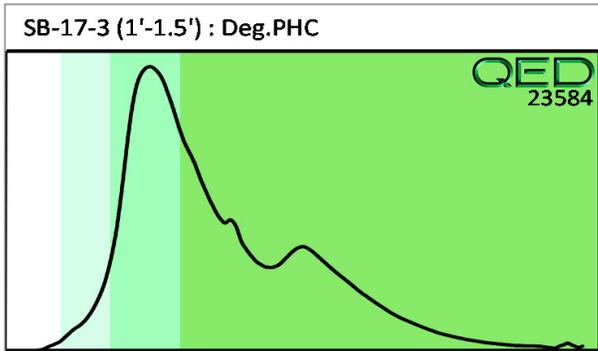
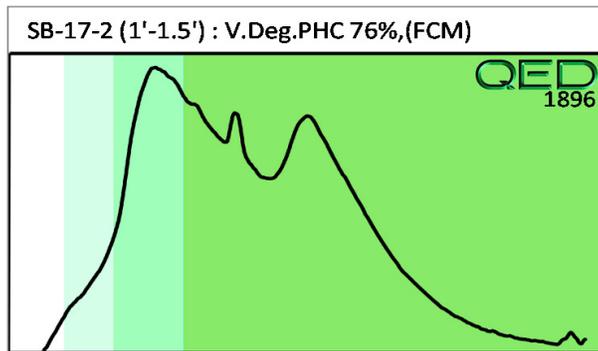
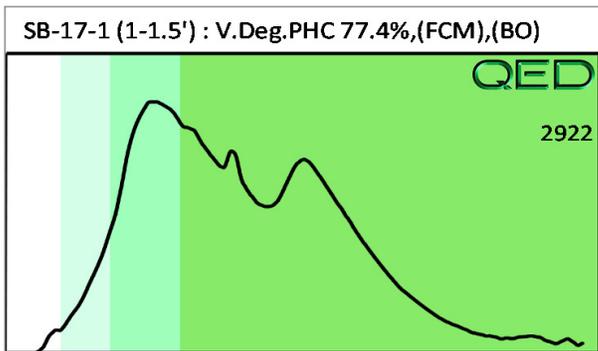
Concentration values in mg/kg for soil samples and mg/L for water samples. Soil values uncorrected for moisture or stone content. Fingerprints provide a tentative hydrocarbon identification.

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

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

% Ratios estimated aromatic carbon number proportions : HC = Hydrocarbon : PHC = Petroleum HC : FP = Fingerprint only.

Data generated by HC-1 Analyser



APPENDIX F

GROUNDWATER LABORATORY ANALYTICAL REPORT AND CHAIN OF CUSTODY RECORD

Mid-Atlantic Associates, Inc.

Sample Delivery Group: L1029586
Samples Received: 09/27/2018
Project Number: R3203.00
Description: NCDOT U5724 PSA

Report To: Mr. Trey Marchant
409 Rogers View Court
Raleigh, NC 27610

Entire Report Reviewed By:



T. Alan Harvill
Project Manager

Results relate only to the items tested or calibrated and are reported as rounded values. This test report shall not be reproduced, except in full, without written approval of the laboratory. Where applicable, sampling conducted by Pace National is performed per guidance provided in laboratory standard operating procedures: 060302, 060303, and 060304.



Cp: Cover Page	1	¹Cp
Tc: Table of Contents	2	
Ss: Sample Summary	3	²Tc
Cn: Case Narrative	4	
Sr: Sample Results	5	³Ss
TMW-17-4 L1029586-01	5	
Qc: Quality Control Summary	8	⁴Cn
Volatile Organic Compounds (GC/MS) by Method 6200B-1997	8	⁵Sr
Semi Volatile Organic Compounds (GC/MS) by Method 625.1	12	
Gl: Glossary of Terms	16	⁶Qc
Al: Accreditations & Locations	17	⁷Gl
Sc: Sample Chain of Custody	18	⁸Al
		⁹Sc

SAMPLE SUMMARY



TMW-17-4 L1029586-01 GW

Collected by	Collected date/time	Received date/time
Cory A. Fisher	09/25/18 13:50	09/27/18 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Volatile Organic Compounds (GC/MS) by Method 6200B-1997	WG1173054	1	09/28/18 21:10	09/28/18 21:10	ACG
Semi Volatile Organic Compounds (GC/MS) by Method 625.1	WG1173780	1	10/01/18 16:58	10/02/18 10:44	AO

¹Cp

²Tc

³Ss

⁴Cn

⁵Sr

⁶Qc

⁷Gl

⁸Al

⁹Sc



All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times, unless qualified or notated within the report. Where applicable, all MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.

T. Alan Harvill
Project Manager

- ¹ Cp
- ² Tc
- ³ Ss
- ⁴ Cn
- ⁵ Sr
- ⁶ Qc
- ⁷ Gl
- ⁸ Al
- ⁹ Sc



Volatile Organic Compounds (GC/MS) by Method 6200B-1997

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	ug/l		ug/l	ug/l		date / time	
Acetone	U		10.0	50.0	1	09/28/2018 21:10	WG1173054
Acrolein	U		8.87	50.0	1	09/28/2018 21:10	WG1173054
Acrylonitrile	U		1.87	10.0	1	09/28/2018 21:10	WG1173054
Benzene	U		0.331	1.00	1	09/28/2018 21:10	WG1173054
Bromobenzene	U		0.352	1.00	1	09/28/2018 21:10	WG1173054
Bromodichloromethane	U		0.380	1.00	1	09/28/2018 21:10	WG1173054
Bromoform	U		0.469	1.00	1	09/28/2018 21:10	WG1173054
Bromomethane	U		0.866	5.00	1	09/28/2018 21:10	WG1173054
n-Butylbenzene	U		0.361	1.00	1	09/28/2018 21:10	WG1173054
sec-Butylbenzene	0.425	J	0.365	1.00	1	09/28/2018 21:10	WG1173054
tert-Butylbenzene	U		0.399	1.00	1	09/28/2018 21:10	WG1173054
Carbon tetrachloride	U		0.379	1.00	1	09/28/2018 21:10	WG1173054
Chlorobenzene	U		0.348	1.00	1	09/28/2018 21:10	WG1173054
Chlorodibromomethane	U		0.327	1.00	1	09/28/2018 21:10	WG1173054
Chloroethane	U		0.453	5.00	1	09/28/2018 21:10	WG1173054
Chloroform	U		0.324	5.00	1	09/28/2018 21:10	WG1173054
Chloromethane	U		0.276	2.50	1	09/28/2018 21:10	WG1173054
2-Chlorotoluene	U		0.375	1.00	1	09/28/2018 21:10	WG1173054
4-Chlorotoluene	U		0.351	1.00	1	09/28/2018 21:10	WG1173054
1,2-Dibromo-3-Chloropropane	U		1.33	5.00	1	09/28/2018 21:10	WG1173054
1,2-Dibromoethane	U		0.381	1.00	1	09/28/2018 21:10	WG1173054
Dibromomethane	U		0.346	1.00	1	09/28/2018 21:10	WG1173054
1,2-Dichlorobenzene	U		0.349	1.00	1	09/28/2018 21:10	WG1173054
1,3-Dichlorobenzene	U		0.220	1.00	1	09/28/2018 21:10	WG1173054
1,4-Dichlorobenzene	U		0.274	1.00	1	09/28/2018 21:10	WG1173054
Dichlorodifluoromethane	U		0.551	5.00	1	09/28/2018 21:10	WG1173054
1,1-Dichloroethane	U		0.259	1.00	1	09/28/2018 21:10	WG1173054
1,2-Dichloroethane	U		0.361	1.00	1	09/28/2018 21:10	WG1173054
1,1-Dichloroethene	U		0.398	1.00	1	09/28/2018 21:10	WG1173054
cis-1,2-Dichloroethene	U		0.260	1.00	1	09/28/2018 21:10	WG1173054
trans-1,2-Dichloroethene	U		0.396	1.00	1	09/28/2018 21:10	WG1173054
1,2-Dichloropropane	U		0.306	1.00	1	09/28/2018 21:10	WG1173054
1,1-Dichloropropene	U		0.352	1.00	1	09/28/2018 21:10	WG1173054
1,3-Dichloropropane	U		0.366	1.00	1	09/28/2018 21:10	WG1173054
2,2-Dichloropropane	U		0.321	1.00	1	09/28/2018 21:10	WG1173054
Di-isopropyl ether	U		0.320	1.00	1	09/28/2018 21:10	WG1173054
Ethylbenzene	U		0.384	1.00	1	09/28/2018 21:10	WG1173054
Hexachloro-1,3-butadiene	U		0.256	1.00	1	09/28/2018 21:10	WG1173054
Isopropylbenzene	U		0.326	1.00	1	09/28/2018 21:10	WG1173054
p-Isopropyltoluene	U		0.350	1.00	1	09/28/2018 21:10	WG1173054
2-Butanone (MEK)	U		3.93	10.0	1	09/28/2018 21:10	WG1173054
Methylene Chloride	U		1.00	5.00	1	09/28/2018 21:10	WG1173054
4-Methyl-2-pentanone (MIBK)	U		2.14	10.0	1	09/28/2018 21:10	WG1173054
Methyl tert-butyl ether	U		0.367	1.00	1	09/28/2018 21:10	WG1173054
Naphthalene	1.76	J	1.00	5.00	1	09/28/2018 21:10	WG1173054
n-Propylbenzene	U		0.349	1.00	1	09/28/2018 21:10	WG1173054
Styrene	U		0.307	1.00	1	09/28/2018 21:10	WG1173054
1,1,1,2-Tetrachloroethane	U		0.385	1.00	1	09/28/2018 21:10	WG1173054
1,1,2,2-Tetrachloroethane	U		0.130	1.00	1	09/28/2018 21:10	WG1173054
Tetrachloroethene	U		0.372	1.00	1	09/28/2018 21:10	WG1173054
Toluene	0.879	J	0.412	1.00	1	09/28/2018 21:10	WG1173054
1,2,3-Trichlorobenzene	U		0.230	1.00	1	09/28/2018 21:10	WG1173054
1,2,4-Trichlorobenzene	U		0.355	1.00	1	09/28/2018 21:10	WG1173054
1,1,1-Trichloroethane	U		0.319	1.00	1	09/28/2018 21:10	WG1173054
1,1,2-Trichloroethane	U		0.383	1.00	1	09/28/2018 21:10	WG1173054
Trichloroethene	U		0.398	1.00	1	09/28/2018 21:10	WG1173054

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



Collected date/time: 09/25/18 13:50

L1029586

Volatile Organic Compounds (GC/MS) by Method 6200B-1997

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	ug/l		ug/l	ug/l		date / time	
Trichlorofluoromethane	U		1.20	5.00	1	09/28/2018 21:10	WG1173054
1,2,3-Trichloropropane	U		0.807	2.50	1	09/28/2018 21:10	WG1173054
1,2,4-Trimethylbenzene	3.27		0.373	1.00	1	09/28/2018 21:10	WG1173054
1,3,5-Trimethylbenzene	1.01		0.387	1.00	1	09/28/2018 21:10	WG1173054
Vinyl chloride	U		0.259	1.00	1	09/28/2018 21:10	WG1173054
o-Xylene	U		0.341	1.00	1	09/28/2018 21:10	WG1173054
m&p-Xylenes	1.32	J	0.719	2.00	1	09/28/2018 21:10	WG1173054
(S) Toluene-d8	101			80.0-120		09/28/2018 21:10	WG1173054
(S) Dibromofluoromethane	109			75.0-120		09/28/2018 21:10	WG1173054
(S) a,a,a-Trifluorotoluene	98.1			80.0-120		09/28/2018 21:10	WG1173054
(S) 4-Bromofluorobenzene	105			77.0-126		09/28/2018 21:10	WG1173054

- 1 Cp
- 2 Tc
- 3 Ss
- 4 Cn
- 5 Sr
- 6 Qc
- 7 Gl
- 8 Al
- 9 Sc

Semi Volatile Organic Compounds (GC/MS) by Method 625.1

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	ug/l		ug/l	ug/l		date / time	
Acenaphthene	U		0.316	1.00	1	10/02/2018 10:44	WG1173780
Acenaphthylene	U		0.309	1.00	1	10/02/2018 10:44	WG1173780
Anthracene	U		0.291	1.00	1	10/02/2018 10:44	WG1173780
Benzidine	U		4.32	10.0	1	10/02/2018 10:44	WG1173780
Benzo(a)anthracene	U		0.0975	1.00	1	10/02/2018 10:44	WG1173780
Benzo(b)fluoranthene	U		0.0896	1.00	1	10/02/2018 10:44	WG1173780
Benzo(k)fluoranthene	U		0.355	1.00	1	10/02/2018 10:44	WG1173780
Benzo(g,h,i)perylene	U		0.161	1.00	1	10/02/2018 10:44	WG1173780
Benzo(a)pyrene	U		0.340	1.00	1	10/02/2018 10:44	WG1173780
Bis(2-chloroethoxy)methane	U		0.329	10.0	1	10/02/2018 10:44	WG1173780
Bis(2-chloroethyl)ether	U		1.62	10.0	1	10/02/2018 10:44	WG1173780
Bis(2-chloroisopropyl)ether	U		0.445	10.0	1	10/02/2018 10:44	WG1173780
4-Bromophenyl-phenylether	U		0.335	10.0	1	10/02/2018 10:44	WG1173780
2-Chloronaphthalene	U	J4	0.330	1.00	1	10/02/2018 10:44	WG1173780
4-Chlorophenyl-phenylether	U		0.303	10.0	1	10/02/2018 10:44	WG1173780
Chrysene	U		0.332	1.00	1	10/02/2018 10:44	WG1173780
Dibenz(a,h)anthracene	U		0.279	1.00	1	10/02/2018 10:44	WG1173780
3,3-Dichlorobenzidine	U		2.02	10.0	1	10/02/2018 10:44	WG1173780
2,4-Dinitrotoluene	U		1.65	10.0	1	10/02/2018 10:44	WG1173780
2,6-Dinitrotoluene	U		0.279	10.0	1	10/02/2018 10:44	WG1173780
Fluoranthene	U		0.310	1.00	1	10/02/2018 10:44	WG1173780
Fluorene	U		0.323	1.00	1	10/02/2018 10:44	WG1173780
Hexachlorobenzene	U		0.341	1.00	1	10/02/2018 10:44	WG1173780
Hexachloro-1,3-butadiene	U		0.329	10.0	1	10/02/2018 10:44	WG1173780
Hexachlorocyclopentadiene	U		2.33	10.0	1	10/02/2018 10:44	WG1173780
Hexachloroethane	U	J4	0.365	10.0	1	10/02/2018 10:44	WG1173780
Indeno(1,2,3-cd)pyrene	U		0.279	1.00	1	10/02/2018 10:44	WG1173780
Isophorone	U		0.272	10.0	1	10/02/2018 10:44	WG1173780
Naphthalene	0.568	J	0.372	1.00	1	10/02/2018 10:44	WG1173780
Nitrobenzene	U		0.367	10.0	1	10/02/2018 10:44	WG1173780
n-Nitrosodimethylamine	U		1.26	10.0	1	10/02/2018 10:44	WG1173780
n-Nitrosodiphenylamine	U		1.19	10.0	1	10/02/2018 10:44	WG1173780
n-Nitrosodi-n-propylamine	U		0.403	10.0	1	10/02/2018 10:44	WG1173780
Phenanthrene	U		0.366	1.00	1	10/02/2018 10:44	WG1173780
Benzylbutyl phthalate	U		0.275	3.00	1	10/02/2018 10:44	WG1173780
Bis(2-ethylhexyl)phthalate	U		0.709	3.00	1	10/02/2018 10:44	WG1173780
Di-n-butyl phthalate	U		0.266	3.00	1	10/02/2018 10:44	WG1173780
Diethyl phthalate	U		0.282	3.00	1	10/02/2018 10:44	WG1173780
Dimethyl phthalate	U		0.283	3.00	1	10/02/2018 10:44	WG1173780
Di-n-octyl phthalate	U		0.278	3.00	1	10/02/2018 10:44	WG1173780
Pyrene	U		0.330	1.00	1	10/02/2018 10:44	WG1173780



Collected date/time: 09/25/18 13:50

L1029586

Semi Volatile Organic Compounds (GC/MS) by Method 625.1

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
1,2,4-Trichlorobenzene	U	<u>J4</u>	0.355	10.0	1	10/02/2018 10:44	WG1173780
4-Chloro-3-methylphenol	U		0.263	10.0	1	10/02/2018 10:44	WG1173780
2-Chlorophenol	U		0.283	10.0	1	10/02/2018 10:44	WG1173780
2,4-Dichlorophenol	U		0.284	10.0	1	10/02/2018 10:44	WG1173780
2,4-Dimethylphenol	U		0.624	10.0	1	10/02/2018 10:44	WG1173780
4,6-Dinitro-2-methylphenol	U		2.62	10.0	1	10/02/2018 10:44	WG1173780
2,4-Dinitrophenol	U		3.25	10.0	1	10/02/2018 10:44	WG1173780
2-Nitrophenol	U		0.320	10.0	1	10/02/2018 10:44	WG1173780
4-Nitrophenol	U		2.01	10.0	1	10/02/2018 10:44	WG1173780
Pentachlorophenol	U		0.313	10.0	1	10/02/2018 10:44	WG1173780
Phenol	0.418	<u>J</u>	0.334	10.0	1	10/02/2018 10:44	WG1173780
2,4,6-Trichlorophenol	U		0.297	10.0	1	10/02/2018 10:44	WG1173780
(S) Nitrobenzene-d5	27.9			15.0-314		10/02/2018 10:44	WG1173780
(S) 2-Fluorobiphenyl	24.2			22.0-127		10/02/2018 10:44	WG1173780
(S) p-Terphenyl-d14	40.8			29.0-141		10/02/2018 10:44	WG1173780
(S) Phenol-d5	6.99	<u>J2</u>		8.00-424		10/02/2018 10:44	WG1173780
(S) 2-Fluorophenol	9.85	<u>J2</u>		10.0-120		10/02/2018 10:44	WG1173780
(S) 2,4,6-Tribromophenol	4.01	<u>J2</u>		10.0-153		10/02/2018 10:44	WG1173780

- 1 Cp
- 2 Tc
- 3 Ss
- 4 Cn
- 5 Sr
- 6 Qc
- 7 Gl
- 8 Al
- 9 Sc

Sample Narrative:

L1029586-01 WG1173780: Duplicate analysis was performed.



Method Blank (MB)

(MB) R3346330-4 09/28/18 14:53

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Acetone	U		10.0	50.0
Acrylonitrile	U		1.87	10.0
Acrolein	U		8.87	50.0
Benzene	U		0.331	1.00
Bromobenzene	U		0.352	1.00
Bromodichloromethane	U		0.380	1.00
Bromoform	U		0.469	1.00
Bromomethane	U		0.866	5.00
n-Butylbenzene	U		0.361	1.00
sec-Butylbenzene	U		0.365	1.00
tert-Butylbenzene	U		0.399	1.00
Carbon tetrachloride	U		0.379	1.00
Chlorobenzene	U		0.348	1.00
Chlorodibromomethane	U		0.327	1.00
Chloroethane	U		0.453	5.00
Chloroform	U		0.324	5.00
Chloromethane	U		0.276	2.50
2-Chlorotoluene	U		0.375	1.00
4-Chlorotoluene	U		0.351	1.00
1,2-Dibromo-3-Chloropropane	U		1.33	5.00
1,2-Dibromoethane	U		0.381	1.00
Dibromomethane	U		0.346	1.00
1,2-Dichlorobenzene	U		0.349	1.00
1,3-Dichlorobenzene	U		0.220	1.00
1,4-Dichlorobenzene	U		0.274	1.00
Dichlorodifluoromethane	U		0.551	5.00
1,1-Dichloroethane	U		0.259	1.00
1,2-Dichloroethane	U		0.361	1.00
1,1-Dichloroethene	U		0.398	1.00
cis-1,2-Dichloroethene	U		0.260	1.00
trans-1,2-Dichloroethene	U		0.396	1.00
1,2-Dichloropropane	U		0.306	1.00
1,1-Dichloropropene	U		0.352	1.00
1,3-Dichloropropane	U		0.366	1.00
2,2-Dichloropropane	U		0.321	1.00
Di-isopropyl ether	U		0.320	1.00
Ethylbenzene	U		0.384	1.00
Hexachloro-1,3-butadiene	U		0.256	1.00
Isopropylbenzene	U		0.326	1.00
p-Isopropyltoluene	U		0.350	1.00

¹Cp

²Tc

³Ss

⁴Cn

⁵Sr

⁶Qc

⁷Gl

⁸Al

⁹Sc



Method Blank (MB)

(MB) R3346330-4 09/28/18 14:53

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	ug/l		ug/l	ug/l
2-Butanone (MEK)	U		3.93	10.0
Methylene Chloride	U		1.00	5.00
4-Methyl-2-pentanone (MIBK)	U		2.14	10.0
Methyl tert-butyl ether	U		0.367	1.00
Naphthalene	U		1.00	5.00
n-Propylbenzene	U		0.349	1.00
Styrene	U		0.307	1.00
1,1,1,2-Tetrachloroethane	U		0.385	1.00
1,1,2,2-Tetrachloroethane	U		0.130	1.00
Tetrachloroethene	U		0.372	1.00
Toluene	U		0.412	1.00
1,2,3-Trichlorobenzene	U		0.230	1.00
1,2,4-Trichlorobenzene	U		0.355	1.00
1,1,1-Trichloroethane	U		0.319	1.00
1,1,2-Trichloroethane	U		0.383	1.00
Trichloroethene	U		0.398	1.00
Trichlorofluoromethane	U		1.20	5.00
1,2,3-Trichloropropane	U		0.807	2.50
1,2,4-Trimethylbenzene	U		0.373	1.00
1,3,5-Trimethylbenzene	U		0.387	1.00
Vinyl chloride	U		0.259	1.00
o-Xylene	U		0.341	1.00
m&p-Xylenes	U		0.719	2.00
(S) Toluene-d8	102			80.0-120
(S) Dibromofluoromethane	105			75.0-120
(S) 4-Bromofluorobenzene	102			77.0-126
(S) a,a,a-Trifluorotoluene	103			80.0-120

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3346330-1 09/28/18 13:38 • (LCSD) R3346330-2 09/28/18 13:57

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	ug/l	ug/l	ug/l	%	%	%			%	%
Acetone	125	139	139	111	111	19.0-160			0.248	27
Acrylonitrile	125	133	136	106	108	55.0-149			2.01	20
Benzene	25.0	22.9	23.5	91.7	93.9	70.0-123			2.42	20
Bromobenzene	25.0	25.4	25.5	101	102	73.0-121			0.416	20
Bromodichloromethane	25.0	24.0	24.1	95.9	96.5	75.0-120			0.661	20
Bromoform	25.0	26.6	26.6	107	106	68.0-132			0.271	20



Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3346330-1 09/28/18 13:38 • (LCSD) R3346330-2 09/28/18 13:57

Analyte	Spike Amount ug/l	LCS Result ug/l	LCSD Result ug/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Bromomethane	25.0	26.1	25.7	104	103	10.0-160			1.42	25
n-Butylbenzene	25.0	23.9	24.4	95.4	97.7	73.0-125			2.36	20
sec-Butylbenzene	25.0	24.2	24.8	96.8	99.1	75.0-125			2.31	20
tert-Butylbenzene	25.0	25.6	26.1	102	104	76.0-124			1.96	20
Carbon tetrachloride	25.0	24.7	25.3	98.8	101	68.0-126			2.59	20
Chlorobenzene	25.0	24.4	23.7	97.6	94.7	80.0-121			3.02	20
Chlorodibromomethane	25.0	24.8	24.0	99.2	95.9	77.0-125			3.38	20
Chloroethane	25.0	25.6	24.6	102	98.2	47.0-150			4.13	20
Chloroform	25.0	24.0	24.8	96.1	99.2	73.0-120			3.21	20
Chloromethane	25.0	30.7	31.1	123	124	41.0-142			1.16	20
2-Chlorotoluene	25.0	25.5	25.7	102	103	76.0-123			1.02	20
4-Chlorotoluene	25.0	25.3	25.6	101	102	75.0-122			1.23	20
1,2-Dibromo-3-Chloropropane	25.0	23.8	23.8	95.2	95.2	58.0-134			0.0506	20
1,2-Dibromoethane	25.0	25.0	23.8	100	95.3	80.0-122			4.91	20
Dibromomethane	25.0	24.5	24.4	97.8	97.7	80.0-120			0.141	20
1,2-Dichlorobenzene	25.0	23.6	24.3	94.3	97.0	79.0-121			2.80	20
1,3-Dichlorobenzene	25.0	24.0	24.4	96.2	97.7	79.0-120			1.58	20
1,4-Dichlorobenzene	25.0	23.8	24.2	95.1	96.8	79.0-120			1.71	20
Dichlorodifluoromethane	25.0	28.6	28.8	114	115	51.0-149			0.759	20
1,1-Dichloroethane	25.0	24.5	24.5	97.9	98.0	70.0-126			0.0873	20
1,2-Dichloroethane	25.0	26.0	26.3	104	105	70.0-128			1.15	20
1,1-Dichloroethene	25.0	23.6	23.9	94.2	95.8	71.0-124			1.62	20
cis-1,2-Dichloroethene	25.0	23.3	23.5	93.1	94.1	73.0-120			1.03	20
trans-1,2-Dichloroethene	25.0	23.8	24.2	95.3	97.0	73.0-120			1.72	20
1,2-Dichloropropane	25.0	23.8	23.9	95.0	95.5	77.0-125			0.515	20
1,1-Dichloropropene	25.0	24.4	24.7	97.8	98.7	74.0-126			1.01	20
1,3-Dichloropropane	25.0	24.3	23.9	97.2	95.8	80.0-120			1.47	20
2,2-Dichloropropane	25.0	23.1	24.5	92.4	97.8	58.0-130			5.65	20
Di-isopropyl ether	25.0	26.1	27.0	104	108	58.0-138			3.24	20
Ethylbenzene	25.0	24.9	24.1	99.7	96.4	79.0-123			3.34	20
Hexachloro-1,3-butadiene	25.0	24.6	25.8	98.5	103	54.0-138			4.69	20
Isopropylbenzene	25.0	25.7	26.2	103	105	76.0-127			1.96	20
p-Isopropyltoluene	25.0	25.4	25.8	102	103	76.0-125			1.61	20
2-Butanone (MEK)	125	139	138	111	111	44.0-160			0.174	20
Acrolein	125	131	154	105	123	10.0-160			16.2	26
Methylene Chloride	25.0	25.0	23.9	100	95.6	67.0-120			4.69	20
4-Methyl-2-pentanone (MIBK)	125	144	138	115	110	68.0-142			4.38	20
Methyl tert-butyl ether	25.0	23.8	25.1	95.1	101	68.0-125			5.48	20
Naphthalene	25.0	22.8	23.1	91.2	92.4	54.0-135			1.31	20
n-Propylbenzene	25.0	25.3	25.4	101	102	77.0-124			0.652	20

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc



Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3346330-1 09/28/18 13:38 • (LCSD) R3346330-2 09/28/18 13:57

Analyte	Spike Amount ug/l	LCS Result ug/l	LCSD Result ug/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	<u>LCS Qualifier</u>	<u>LCSD Qualifier</u>	RPD %	RPD Limits %
Styrene	25.0	27.9	27.5	111	110	73.0-130			1.24	20
1,1,1,2-Tetrachloroethane	25.0	24.7	23.7	99.0	95.0	75.0-125			4.14	20
1,1,2,2-Tetrachloroethane	25.0	25.3	25.0	101	100	65.0-130			1.20	20
Tetrachloroethene	25.0	24.4	23.7	97.7	94.8	72.0-132			3.03	20
Toluene	25.0	23.1	22.3	92.6	89.4	79.0-120			3.53	20
1,2,3-Trichlorobenzene	25.0	23.7	24.1	95.0	96.5	50.0-138			1.58	20
1,2,4-Trichlorobenzene	25.0	24.1	24.8	96.4	99.4	57.0-137			3.03	20
1,1,1-Trichloroethane	25.0	25.9	26.1	104	104	73.0-124			0.717	20
1,1,2-Trichloroethane	25.0	25.0	24.2	100	96.9	80.0-120			3.29	20
Trichloroethene	25.0	23.8	23.7	95.2	95.0	78.0-124			0.256	20
Trichlorofluoromethane	25.0	27.3	26.7	109	107	59.0-147			2.42	20
1,2,3-Trichloropropane	25.0	26.6	26.0	106	104	73.0-130			2.40	20
1,2,4-Trimethylbenzene	25.0	24.8	25.2	99.0	101	76.0-121			1.85	20
1,3,5-Trimethylbenzene	25.0	25.8	25.9	103	104	76.0-122			0.492	20
Vinyl chloride	25.0	26.1	27.1	104	109	67.0-131			4.11	20
o-Xylene	25.0	24.6	24.1	98.4	96.6	80.0-122			1.90	20
m&p-Xylenes	50.0	50.0	48.5	99.9	96.9	80.0-122			3.07	20
(S) Toluene-d8				104	99.4	80.0-120				
(S) Dibromofluoromethane				103	104	75.0-120				
(S) 4-Bromofluorobenzene				105	105	77.0-126				
(S) a,a,a-Trifluorotoluene				101	101	80.0-120				

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



Method Blank (MB)

(MB) R3346721-3 10/02/18 00:38

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Acenaphthene	U		0.316	1.00
Acenaphthylene	U		0.309	1.00
Anthracene	U		0.291	1.00
Benzidine	U		4.32	10.0
Benzo(a)anthracene	U		0.0975	1.00
Benzo(b)fluoranthene	U		0.0896	1.00
Benzo(k)fluoranthene	U		0.355	1.00
Benzo(g,h,i)perylene	U		0.161	1.00
Benzo(a)pyrene	U		0.340	1.00
Bis(2-chlorethoxy)methane	U		0.329	10.0
Bis(2-chloroethyl)ether	U		1.62	10.0
Bis(2-chloroisopropyl)ether	U		0.445	10.0
4-Bromophenyl-phenylether	U		0.335	10.0
2-Chloronaphthalene	U		0.330	1.00
4-Chlorophenyl-phenylether	U		0.303	10.0
Chrysene	U		0.332	1.00
Dibenz(a,h)anthracene	U		0.279	1.00
3,3-Dichlorobenzidine	U		2.02	10.0
2,4-Dinitrotoluene	U		1.65	10.0
2,6-Dinitrotoluene	U		0.279	10.0
Fluoranthene	U		0.310	1.00
Fluorene	U		0.323	1.00
Hexachlorobenzene	U		0.341	1.00
Hexachloro-1,3-butadiene	U		0.329	10.0
Hexachlorocyclopentadiene	U		2.33	10.0
Hexachloroethane	U		0.365	10.0
Indeno(1,2,3-cd)pyrene	U		0.279	1.00
Isophorone	U		0.272	10.0
Naphthalene	U		0.372	1.00
Nitrobenzene	U		0.367	10.0
n-Nitrosodimethylamine	U		1.26	10.0
n-Nitrosodiphenylamine	U		1.19	10.0
n-Nitrosodi-n-propylamine	U		0.403	10.0
Phenanthrene	U		0.366	1.00
Benzylbutyl phthalate	U		0.275	3.00
Bis(2-ethylhexyl)phthalate	U		0.709	3.00
Di-n-butyl phthalate	U		0.266	3.00
Diethyl phthalate	U		0.282	3.00
Dimethyl phthalate	U		0.283	3.00
Di-n-octyl phthalate	U		0.278	3.00

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc



Method Blank (MB)

(MB) R3346721-3 10/02/18 00:38

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Pyrene	U		0.330	1.00
1,2,4-Trichlorobenzene	U		0.355	10.0
4-Chloro-3-methylphenol	U		0.263	10.0
2-Chlorophenol	U		0.283	10.0
2-Nitrophenol	U		0.320	10.0
4-Nitrophenol	U		2.01	10.0
Pentachlorophenol	U		0.313	10.0
Phenol	U		0.334	10.0
2,4,6-Trichlorophenol	U		0.297	10.0
2,4-Dichlorophenol	U		0.284	10.0
2,4-Dimethylphenol	U		0.624	10.0
4,6-Dinitro-2-methylphenol	U		2.62	10.0
2,4-Dinitrophenol	U		3.25	10.0
<i>(S) Nitrobenzene-d5</i>	62.3			15.0-314
<i>(S) 2-Fluorobiphenyl</i>	59.3			22.0-127
<i>(S) p-Terphenyl-d14</i>	73.7			29.0-141
<i>(S) Phenol-d5</i>	27.1			8.00-424
<i>(S) 2-Fluorophenol</i>	46.9			10.0-120
<i>(S) 2,4,6-Tribromophenol</i>	45.3			10.0-153

- 1 Cp
- 2 Tc
- 3 Ss
- 4 Cn
- 5 Sr
- 6 Qc
- 7 Gl
- 8 Al
- 9 Sc

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3346721-1 10/01/18 23:50 • (LCSD) R3346721-2 10/02/18 00:14

Analyte	Spike Amount ug/l	LCS Result ug/l	LCSD Result ug/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Acenaphthene	50.0	32.6	34.4	65.2	68.8	47.0-145			5.37	48
Acenaphthylene	50.0	32.0	33.8	64.0	67.6	33.0-145			5.47	74
Anthracene	50.0	32.1	33.9	64.2	67.8	27.0-133			5.45	66
Benzidine	50.0	12.7	14.5	25.4	29.0	1.00-120			13.2	36
Benzo(a)anthracene	50.0	36.2	39.5	72.4	79.0	33.0-143			8.72	53
Benzo(b)fluoranthene	50.0	37.3	37.2	74.6	74.4	24.0-159			0.268	71
Benzo(k)fluoranthene	50.0	36.0	41.6	72.0	83.2	11.0-162			14.4	63
Benzo(g,h,i)perylene	50.0	37.4	40.5	74.8	81.0	1.00-219			7.96	97
Benzo(a)pyrene	50.0	36.3	38.5	72.6	77.0	17.0-163			5.88	72
Bis(2-chlorethoxy)methane	50.0	28.8	30.1	57.6	60.2	1.00-219			4.41	54
Bis(2-chloroethyl)ether	50.0	31.9	34.1	63.8	68.2	33.0-185			6.67	108
Bis(2-chloroisopropyl)ether	50.0	30.6	31.9	61.2	63.8	36.0-166			4.16	76
4-Bromophenyl-phenylether	50.0	34.0	35.8	68.0	71.6	53.0-127			5.16	43
2-Chloronaphthalene	50.0	29.6	30.9	59.2	61.8	60.0-120	J4		4.30	24



Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3346721-1 10/01/18 23:50 • (LCSD) R3346721-2 10/02/18 00:14

Analyte	Spike Amount ug/l	LCS Result ug/l	LCSD Result ug/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	<u>LCS Qualifier</u>	<u>LCSD Qualifier</u>	RPD %	RPD Limits %
4-Chlorophenyl-phenylether	50.0	33.8	35.4	67.6	70.8	25.0-158			4.62	61
Chrysene	50.0	36.4	39.1	72.8	78.2	17.0-168			7.15	87
Dibenz(a,h)anthracene	50.0	35.8	38.4	71.6	76.8	1.00-227			7.01	126
3,3-Dichlorobenzidine	50.0	32.4	35.5	64.8	71.0	1.00-262			9.13	108
2,4-Dinitrotoluene	50.0	36.7	39.5	73.4	79.0	39.0-139			7.35	42
2,6-Dinitrotoluene	50.0	33.9	36.5	67.8	73.0	50.0-158			7.39	48
Fluoranthene	50.0	35.8	39.0	71.6	78.0	26.0-137			8.56	66
Fluorene	50.0	34.6	36.2	69.2	72.4	59.0-121			4.52	38
Hexachlorobenzene	50.0	36.0	37.8	72.0	75.6	1.00-152			4.88	55
Hexachloro-1,3-butadiene	50.0	12.5	13.1	25.0	26.2	24.0-120			4.69	62
Hexachlorocyclopentadiene	50.0	16.4	17.7	32.8	35.4	10.0-120			7.62	31
Hexachloroethane	50.0	13.9	14.7	27.8	29.4	40.0-120	J4	J4	5.59	52
Indeno(1,2,3-cd)pyrene	50.0	37.6	40.4	75.2	80.8	1.00-171			7.18	99
Isophorone	50.0	29.3	30.5	58.6	61.0	21.0-196			4.01	93
Naphthalene	50.0	25.9	26.5	51.8	53.0	21.0-133			2.29	65
Nitrobenzene	50.0	29.6	30.8	59.2	61.6	35.0-180			3.97	62
n-Nitrosodimethylamine	50.0	22.7	22.2	45.4	44.4	10.0-120			2.23	34
n-Nitrosodiphenylamine	50.0	35.6	37.8	71.2	75.6	44.0-120			5.99	21
n-Nitrosodi-n-propylamine	50.0	31.3	34.2	62.6	68.4	1.00-230			8.85	87
Phenanthrene	50.0	32.8	34.9	65.6	69.8	54.0-120			6.20	39
Benzylbutyl phthalate	50.0	26.4	29.8	52.8	59.6	1.00-152			12.1	60
Bis(2-ethylhexyl)phthalate	50.0	34.6	37.7	69.2	75.4	8.00-158			8.58	82
Di-n-butyl phthalate	50.0	32.4	35.3	64.8	70.6	1.00-120			8.57	47
Diethyl phthalate	50.0	25.5	27.3	51.0	54.6	1.00-120			6.82	100
Dimethyl phthalate	50.0	12.7	13.3	25.4	26.6	1.00-120			4.62	183
Di-n-octyl phthalate	50.0	34.9	38.0	69.8	76.0	4.00-146			8.50	69
Pyrene	50.0	35.8	38.1	71.6	76.2	52.0-120			6.22	49
1,2,4-Trichlorobenzene	50.0	20.7	21.7	41.4	43.4	44.0-142	J4	J4	4.72	50
4-Chloro-3-methylphenol	50.0	30.9	32.7	61.8	65.4	22.0-147			5.66	73
2-Chlorophenol	50.0	32.2	33.6	64.4	67.2	23.0-134			4.26	61
2,4-Dichlorophenol	50.0	31.1	33.4	62.2	66.8	39.0-135			7.13	50
2,4-Dimethylphenol	50.0	30.8	32.0	61.6	64.0	32.0-120			3.82	58
4,6-Dinitro-2-methylphenol	50.0	25.2	25.3	50.4	50.6	1.00-181			0.396	203
2,4-Dinitrophenol	50.0	21.3	22.9	42.6	45.8	1.00-191			7.24	132
2-Nitrophenol	50.0	32.2	34.8	64.4	69.6	29.0-182			7.76	55
4-Nitrophenol	50.0	13.1	14.1	26.2	28.2	1.00-132			7.35	131
Pentachlorophenol	50.0	17.9	19.5	35.8	39.0	14.0-176			8.56	86
Phenol	50.0	15.3	16.6	30.6	33.2	5.00-120			8.15	64
2,4,6-Trichlorophenol	50.0	32.7	32.7	65.4	65.4	37.0-144			0.000	58
(S) Nitrobenzene-d5				55.2	58.8	15.0-314				

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3346721-1 10/01/18 23:50 • (LCSD) R3346721-2 10/02/18 00:14

Analyte	Spike Amount ug/l	LCS Result ug/l	LCSD Result ug/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	<u>LCS Qualifier</u>	<u>LCSD Qualifier</u>	RPD %	RPD Limits %
(S) 2-Fluorobiphenyl				56.2	60.8	22.0-127				
(S) p-Terphenyl-d14				70.3	76.2	29.0-141				
(S) Phenol-d5				27.6	30.0	8.00-424				
(S) 2-Fluorophenol				45.2	49.4	10.0-120				
(S) 2,4,6-Tribromophenol				60.0	62.5	10.0-153				

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc



Guide to Reading and Understanding Your Laboratory Report

The information below is designed to better explain the various terms used in your report of analytical results from the Laboratory. This is not intended as a comprehensive explanation, and if you have additional questions please contact your project representative.

Abbreviations and Definitions

MDL	Method Detection Limit.
RDL	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
(S)	Surrogate (Surrogate Standard) - Analytes added to every blank, sample, Laboratory Control Sample/Duplicate and Matrix Spike/Duplicate; used to evaluate analytical efficiency by measuring recovery. Surrogates are not expected to be detected in all environmental media.
U	Not detected at the Reporting Limit (or MDL where applicable).
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state "ND" (Not Detected) or "BDL" (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

- 1 Cp
- 2 Tc
- 3 Ss
- 4 Cn
- 5 Sr
- 6 Qc
- 7 Gl
- 8 Al
- 9 Sc

Qualifier	Description
J	The identification of the analyte is acceptable; the reported value is an estimate.
J2	Surrogate recovery limits have been exceeded; values are outside lower control limits.
J4	The associated batch QC was outside the established quality control range for accuracy.



Pace National is the only environmental laboratory accredited/certified to support your work nationwide from one location. One phone call, one point of contact, one laboratory. No other lab is as accessible or prepared to handle your needs throughout the country. Our capacity and capability from our single location laboratory is comparable to the collective totals of the network laboratories in our industry. The most significant benefit to our one location design is the design of our laboratory campus. The model is conducive to accelerated productivity, decreasing turn-around time, and preventing cross contamination, thus protecting sample integrity. Our focus on premium quality and prompt service allows us to be YOUR LAB OF CHOICE.

* Not all certifications held by the laboratory are applicable to the results reported in the attached report.
 * Accreditation is only applicable to the test methods specified on each scope of accreditation held by Pace National.

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

State Accreditations

Alabama	40660	Nebraska	NE-OS-15-05
Alaska	17-026	Nevada	TN-03-2002-34
Arizona	AZ0612	New Hampshire	2975
Arkansas	88-0469	New Jersey-NELAP	TN002
California	2932	New Mexico ¹	n/a
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina ¹	DW21704
Georgia	NELAP	North Carolina ³	41
Georgia ¹	923	North Dakota	R-140
Idaho	TN00003	Ohio-VAP	CL0069
Illinois	200008	Oklahoma	9915
Indiana	C-TN-01	Oregon	TN200002
Iowa	364	Pennsylvania	68-02979
Kansas	E-10277	Rhode Island	LA000356
Kentucky ^{1,6}	90010	South Carolina	84004
Kentucky ²	16	South Dakota	n/a
Louisiana	AI30792	Tennessee ^{1,4}	2006
Louisiana ¹	LA180010	Texas	T 104704245-17-14
Maine	TN0002	Texas ⁵	LAB0152
Maryland	324	Utah	TN00003
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	460132
Minnesota	047-999-395	Washington	C847
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	9980939910
Montana	CERT0086	Wyoming	A2LA

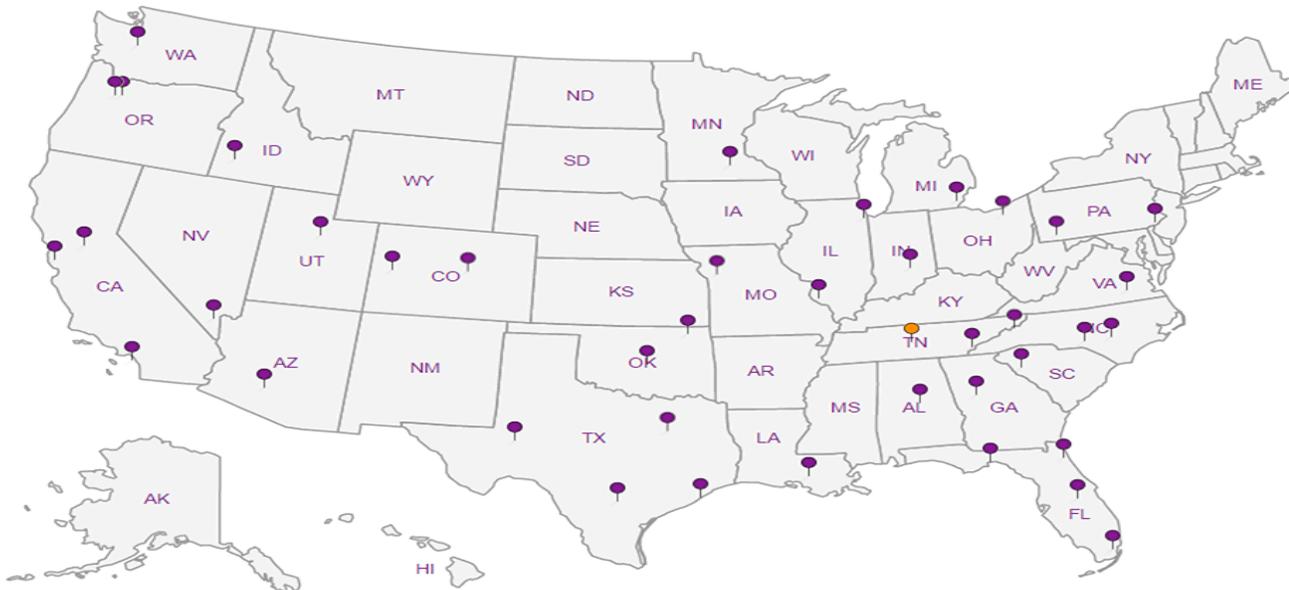
Third Party Federal Accreditations

A2LA – ISO 17025	1461.01	AIHA-LAP,LLC EMLAP	100789
A2LA – ISO 17025 ⁵	1461.02	DOD	1461.01
Canada	1461.01	USDA	P330-15-00234
EPA-Crypto	TN00003		

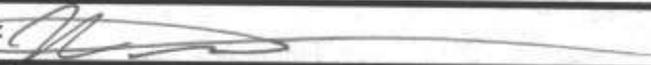
¹ Drinking Water ² Underground Storage Tanks ³ Aquatic Toxicity ⁴ Chemical/Microbiological ⁵ Mold ⁶ Wastewater n/a Accreditation not applicable

Our Locations

Pace National has sixty-four client support centers that provide sample pickup and/or the delivery of sampling supplies. If you would like assistance from one of our support offices, please contact our main office. Pace National performs all testing at our central laboratory.



**Pace Analytical National Center for Testing & Innovation
Cooler Receipt Form**

Client:	MZDAPLNC	SDG#	L1029586
Cooler Received/Opened On: 09/27 /18		Temperature:	1.8
Received By: Kevin Turner			
Signature: 			
Receipt Check List			
	NP	Yes	No
COC Seal Present / Intact?		/	
COC Signed / Accurate?		/	
Bottles arrive intact?		/	
Correct bottles used?		/	
Sufficient volume sent?		/	
If Applicable			
VOA Zero headspace?		/	
Preservation Correct / Checked?			