ERM NC, Inc.
15720 Brixham Hill Avenue.
Suite 120
Charlotte, NC 28277
(704) 541-8345
(704) 541-8416 (fax)

May 20, 2015

Matthew Aufman
NCDENR - Division of Waste Management
217 West Jones Street
Raleigh, North Carolina 27603

Subject: **Submittal of Proposed Remedial Action Plan**
Engineered Controls International, LLC (ECI)
100 Rego Drive
Elon, Alamance County, North Carolina
Docket No. 13-SF-367
NONCD0002904

Dear Mr. Aufman: ***Via Electronic Transmittal***

On behalf of ECI, ERM NC, Inc. (ERM) is transmitting this proposed *Remedial Action Plan* for the referenced ECI facility located in Elon, North Carolina. If you have questions or comments regarding this submittal, please contact ERM at 704-541-8345.

Sincerely,

Edward Hollifield, P.G.
Project Manager

Thomas Wilson, P.G., RSM
Principal

cc: Jimmy McCandies - ECI

Attachments:
Proposed Remedial Action Plan

REC PROGRAM DOCUMENT CERTIFICATION FORM - PAGE 2 OF 2
IHSB SITE NAME Engineered Controls International - Elon (Docket No. 13-SF-367, NONCD0002904)
DATE & NAME OF DOCUMENT May 20, 2015 Remedial Action Plan
TYPE OF SUBMITTAL (circle all that apply): Report, Work plan, Work Phase Comp. Statement, Schedule Change

REGISTERED SITE MANAGER CERTIFICATION OF SIGNATURES

As the Registered Environmental Consultant for the Site for which this filing is made, I certify that the signatures included herewith are genuine and authentic original handwritten signatures and/or true, accurate, and complete copies of the genuine and authentic original handwritten signatures of the persons who purport to sign for this filing. I further certify that I have collected through reliable means the originals and/or copies of said signatures from the persons authorized to sign for this filing who, in fact, signed the originals thereof. Those persons and I understand and agree that any copies of signatures have the same legally binding effect as original handwritten signatures, and I certify that any person for whom I am submitting a copy of their signature has provided me with their express consent to submit said copy. Additionally, I certify that I am authorized to attest to the genuineness and authenticity of the signatures, both originals and any copies, being submitted herewith and that by signing below, I do in fact attest to the genuineness and authenticity of all the signatures, both originals and copies, being submitted for this filing.

Tom Wilson, PG, RSM
Name of Registered Site Manager

Thomas M Wilson
Signature of Registered Site Manager

5-20-2015
Date

REGISTERED SITE MANAGER DOCUMENT CERTIFICATION STATEMENT (.0306(b)(1))

"I certify under penalty of law that I am personally familiar with the information contained in this submittal, including any and all supporting documents accompanying this certification, and that the material and information contained herein is, to the best of my knowledge and belief, true, accurate and complete and complies with the Inactive Hazardous Sites Response Act N.C.G.S. 130A-310, et seq, and the remedial action program Rules 15A NCAC 13C .0300. I am aware that there are significant penalties for willfully submitting false, inaccurate or incomplete information."

Thomas M Wilson
Name of Registered Site Manager

Thomas M Wilson
Signature of Registered Site Manager

5-20-2015
Date

NOTARIZATION

North Carolina (Enter State)
Mecklenburg COUNTY

I, Debra C Pressley a Notary Public of said County and State, do hereby certify that Thomas M Wilson did personally appear and sign before me this day, produced proper identification in the form of NCDL, was duly sworn or affirmed, and declared that, he or she is the duly authorized environmental consultant of the remediating party of the property referenced above and that, to the best of his or her knowledge and belief, after thorough investigation, the information contained in the above certifications is true and accurate, and he or she then signed these Certifications in my presence.

WITNESS my hand and official seal this 20 day of May, 2015.

Debra C Pressley
Notary Public (signature)

(OFFICIAL SEAL)

My commission expires: 10/27/2017

DEBRA C PRESSLEY
Notary Public
North Carolina
Union County

Document Certification Form No. DC - II
(Revised 8/11)

REC PROGRAM DOCUMENT CERTIFICATION FORM - PAGE 1 OF 2

IHSB SITE NAME Engineered Controls International - Elon (Docket No. 13-SF-367, NONCD0002904)

DATE & NAME OF DOCUMENT May 20, 2015 Remedial Action Plan

TYPE OF SUBMITTAL (circle all that apply): Report, (Work plan) Work Phase Comp. Statement, Schedule Change

REMEDIATING PARTY DOCUMENT CERTIFICATION STATEMENT (.0306(B)(2))

"I certify under penalty of law that I have personally examined and am familiar with the information contained in this submittal, including any and all documents accompanying this certification, and that, based on my inquiry of those individuals immediately responsible for obtaining the information, the material and information contained herein is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for willfully submitting false, inaccurate or incomplete information."

Mr. Jimmy McCandies

Name of Remediating Party

Jimmy McCandies

Signature of Remediating Party

05/19/15

Date

NOTARIZATION

NC (Enter State)

Guilford **COUNTY**

I, C. Marie Burns, a Notary Public of said County and State, do hereby certify that Jimmy McCandies did personally appear and sign before me this day, produced proper identification in the form of NC driver license was duly sworn or affirmed, and declared that, to the best of his or her knowledge and belief, after thorough investigation, the information contained in the above certification is true and accurate, and he or she then signed this Certification in my presence.

WITNESS my hand and official seal this 19th day of May, 2015.

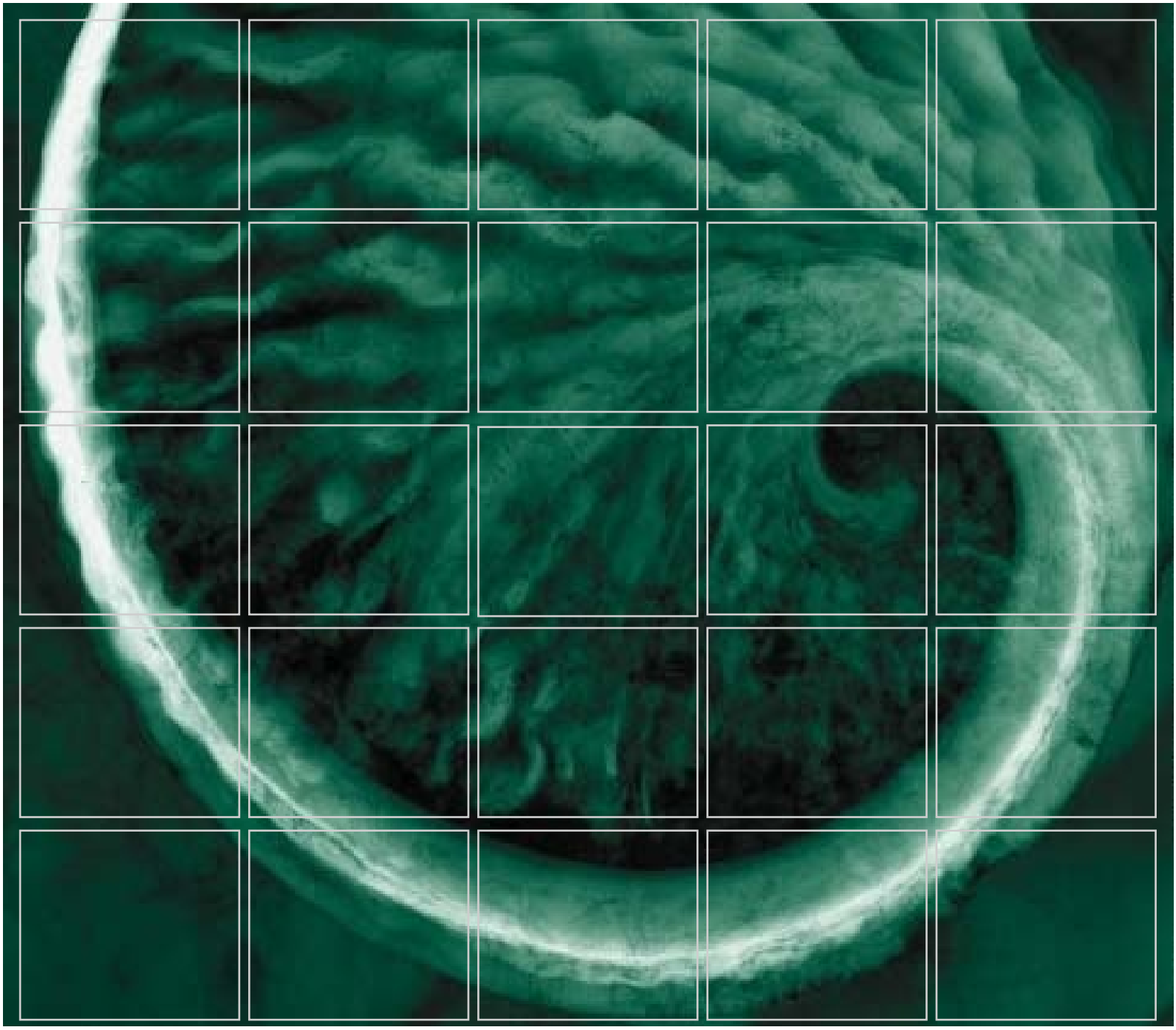
C. Marie Burns

Notary Public (signature)

(OFFICIAL SEAL)

C. MARIE BURNS
NOTARY PUBLIC
ALAMANCE COUNTY, NC
MY COMMISSION EXPIRES ON 6-19-18

My commission expires: 6-19-18



Engineered Controls International, LLC

Proposed Remedial Action Plan
May 2015

Engineered Controls International, LLC
Elon Facility
100 Rego Drive, Elon, Alamance County, North Carolina
Site ID: NONCD0002904

Delivering sustainable solutions in a more competitive world

ERM

Engineered Controls International, LLC

Proposed Remedial Action Plan

Engineered Controls International, LLC

Elon Facility
100 Rego Drive, Elon, Alamance County, North Carolina
Site ID: NONCD0002904

May 20, 2015

Thomas M. Wilson, P.G., RSM
Principal-in-Charge

Edward B. Hollifield, P.G.
Project Manager

Jennifer N. Gliem Byrd, P.E.
Senior Engineer

ERM NC, Inc.
Ballantyne One
15720 Brixham Hill Avenue
Suite 120
Charlotte, North Carolina 28277
(704) 541-8345

TABLE OF CONTENTS

1.0 INTRODUCTION 1

1.1 SITE OPERATIONAL HISTORY 1

1.2 SITE DESCRIPTION 2

1.3 SITE HYDROGEOLOGY 4

1.4 WATER SUPPLY 5

1.5 REMEDIAL INVESTIGATIONS 6

2.0 SUMMARY OF REMEDIAL INVESTIGATION RESULTS 7

2.1 SOURCE AREA (FORMER VAPOR DEGREASER) 7

2.2 NATURE AND EXTENT OF CONTAMINATION 7

2.3 SUMMARY OF MAJOR FINDINGS 9

3.0 REMEDIAL ALTERNATIVES ANALYSIS 12

3.1 REMEDIAL ACTION OBJECTIVES 12

3.2 ESTIMATED AREAS AND VOLUMES OF MEDIA REQUIRING REMEDIAL ACTION 12

3.3 FEASIBILITY STUDY PROCESS 13

3.4 REMEDIATION TECHNOLOGIES CONSIDERED 14

3.5 FEASIBILITY STUDY RESULTS 20

4.0 SUMMARY OF AS/SVE PILOT TESTING 23

4.1 PILOT TEST PROCEDURES 23

4.2 SUMMARY OF PILOT STUDY FINDINGS 24

5.0 PROPOSED REMEDY 25

5.1 CONCEPTUAL REMEDIAL DESIGN 25

5.2 PERFORMANCE MONITORING 26

5.3 MONITORED NATURAL ATTENUATION 26

5.4 PERMITTING 26

6.0 PROPOSED CRITERIA FOR REMEDIAL ACTION COMPLETION 28

7.0 HEALTH & SAFETY PLAN WITH SURROUNDING COMMUNITY MEASURES 29

8.0 REPORTING AND SCHEDULE 30

List of Tables

TABLE 1 *MONITOR WELL CONSTRUCTION AND GROUNDWATER ELEVATION SUMMARY*
TABLE 2 *HYDRAULIC GRADIENT SUMMARY*
TABLE 3 *SUMMARY OF HISTORICAL SOIL RESULTS*
TABLE 4 *SUMMARY OF HISTORICAL GROUNDWATER RESULTS FOR VOCS, SVOCS & TPH*
TABLE 5 *SUMMARY OF HISTORICAL GROUNDWATER RESULTS FOR METALS*
TABLE 6 *SUMMARY OF NATURAL ATTENUATION PARAMETERS*
TABLE 7A *TREATMENT TECHNOLOGIES SCREENING MATRIX – GROUNDWATER AT SOURCE AREA*
TABLE 7B *TREATMENT TECHNOLOGIES SCREENING MATRIX – SOIL AT SOURCE AREA*
TABLE 8A *EPA CRITERIA SCREENING MATRIX - GROUNDWATER IN SOURCE AREA*
TABLE 8B *EPA CRITERIA SCREENING MATRIX - SOIL IN SOURCE AREA*

List of Figures

FIGURE 1 *SITE LOCATION MAP*
FIGURE 2 *SITE MAP*
FIGURE 3 *ADJACENT PROPERTIES MAP*
FIGURE 4 *GROUNDWATER SAMPLE LOCATIONS*
FIGURE 5 *POTENTIOMETRIC SURFACE MAP SAPROLITE AQUIFER ZONE - JANUARY 2015*
FIGURE 6 *POTENTIOMETRIC SURFACE MAP UPPER BEDROCK AQUIFER ZONE - JANUARY 2015*
FIGURE 7 *SENSITIVE RECEPTOR SURVEY*
FIGURE 8 *AREAS OF CONCERN*
FIGURE 9 *SOIL ISOCONCENTRATION MAP - TRICHLOROETHENE*
FIGURE 10 *TCE ISOCONCENTRATION CONTOURS SAPROLITE AQUIFER ZONE*
FIGURE 11 *TCE ISOCONCENTRATION CONTOURS BEDROCK AQUIFER ZONE*
FIGURE 12 *PCE ISOCONCENTRATION CONTOURS VERTICAL MAXIMUM*
FIGURE 13 *CROSS SECTION LOCATION MAP*
FIGURE 14 *HYDROGEOLOGIC CROSS SECTION A-A'*
FIGURE 15 *HYDROGEOLOGIC CROSS SECTION B-B'*
FIGURE 16 *AS/SVE PILOT TEST LAYOUT*
FIGURE 17 *CONCEPTUAL AS/SVE SYSTEM LAYOUT*

List of Appendices

APPENDIX A *AS/SVE PILOT TEST RESULTS*
APPENDIX B *HASP*

Acronyms

″ Hg	inches of mercury
µg/L	micrograms per liter
AA	Administrative Agreement
AOC	Area of Concern
AS/SVE	Air sparge/soil vapor extraction
AST	above ground storage tank
CERCLA	Comprehensive Environmental Response, Compensation, & Liability Act
cfm	cubic feet per minute
cm/sec	centimeters per second
COC	constituents of concern
DO	dissolved oxygen
ECI	Engineered Controls International, LLC
ERH	electrical resistance heating
ERM	ERM NC, Inc.
ft bls	feet below land surface
^{o}F	degrees Fahrenheit
HAPs	hazardous air pollutants
HSL	Hazardous Substance List
IC	Institutional Controls
ISCO	*in-situ* chemical oxidation
LP	Liquefied Petroleum
mg/kg	milligrams per kilograms
mm Hg	millimeters mercury
NCAC 2L	North Carolina groundwater standards under 15A NCAC 2L.0106
NCDENR	North Carolina Department of Environment and Natural Resources
O&M	operations and maintenance
ORP	oxidation-reduction potential
OSHA	Occupational Safety and Health Administration
PCE	tetrachloroethene
PELs	Permissible Exposure Limits
PSRG	Preliminary Soil Remediation Goal
RAP	Remedial Action Plan
REC	Registered Environmental Consultant
REMChlor	Remediation Evaluation Model for Chlorinated Solvents
RI	remedial investigation
SOD	soil oxidant demand
SVOCs	semi-volatile organic compounds
TCE	trichloroethene
ug/kg	micrograms per kilogram
UIC	Underground Injection Control

Acronyms

UST	underground storage tank
VI	vapor intrusion
VOC	volatile organic compounds
WWTP	waste water treatment plant
ZVI	Zero Valent Iron

1.0 INTRODUCTION

On behalf of Engineered Controls International, LLC (ECI), ERM NC, Inc. (ERM) has prepared this *Proposed Remedial Action Plan* (RAP) to assess potential remediation strategies for abatement of the volatile organic compounds (VOC) in soils and groundwater at the ECI Elon facility located at 100 Rego Drive in Elon, Alamance County, North Carolina (hereafter called the "Site" or "subject property"). This document has been prepared in accordance with the Administrative Agreement (AA) for a voluntary Registered Environmental Consultant (REC) directed assessment and remedial action between the North Carolina Department of Environment and Natural Resources (NCDENR) Division of Waste Management Superfund Section and ECI (the Remediator), Docket Number 13-SF-367 executed on July 23, 2013 and subsequently amended on January 30, 2014. The site location is shown in Figure 1. A site map is attached as Figure 2.

The RAP was developed following the completion of a comprehensive remedial investigation (RI) conducted at the site by ERM from 2014 to 2015. The RI activities identified and characterized the areas, nature and extent of soil and groundwater contamination that resulted from the former use of VOC solvents at the site. Surface water and sediment are not present on the Site and were therefore not considered under the RI or this RAP. The nature and extent of the contamination present at the Elon site is summarized in Section 2.0.

1.1 SITE OPERATIONAL HISTORY

The Site was originally constructed in 1964 and used to manufacture corrugated cardboard from 1964 until approximately 1980. The Site has been used for the manufacture of valves for the Liquefied Petroleum (LP) gas industry since 1980. Based on historical information, a trichloroethene (TCE) vapor degreaser was used in parts cleaning activities from 1980 through the 1990s when the degreasing operation was removed from the facility. The degreaser, which consisted of an approximately 600-gallon above ground storage tank (AST), was formerly located in the shipping/receiving area along the eastern side of the building. Current activities at the Site primarily include the assembly of brass valve bodies that are forged or cast at off-Site facilities along with miscellaneous parts (rubber seals, washers, knobs, springs, and pipes) that are also manufactured off site. Parts are assembled, tested, brazed, welded, thermally de-burred and bright dipped in manual or robotic operations. Thermal deburring is a semi-automated process in which valves are sealed in an air tight chamber that is flooded with a natural gas/oxygen mixture and ignited to burn off filings. Bright Dipping is a process to clean and treat the surface of parts (to remove an oxide layer resulting from thermal deburring) that includes steps for alkaline

cleaning, muriatic acid pickling, sulfuric/nitric acid cleaning, and chromate sealing. Ancillary operations on site include operation of a small, permitted waste water treatment plant (WWTP), analytical testing in connection with the WWTP, spray painting (of parts in the ductile iron department), research and development, product testing, and equipment maintenance. A summary of the ownership and Site facility usage is presented below:

Historical Ownership Summary

Dates	Owner	Uses of Site
Prior to 1964	Not Available	Undeveloped land
1964 - 1967	Unknown	Corrugated cardboard box manufacturing
1967-1970	Oak Folding Cartons, Inc.	Corrugated cardboard box manufacturing Corrugated
1971-1979	Kardon Industries, Inc.	cardboard box manufacturing
1980-1989	RegO	Valve manufacturing for LP gas industry
1989-2015	Engineered Controls International, Inc. (2010 merged with Engineered Controls, LLC)	Valve manufacturing for LP gas industry

1.2 SITE DESCRIPTION

The facility is currently occupied and is developed with a building covering approximately 100,000 square feet utilized as office, manufacturing, and warehouse space situated on approximately 13 acres of land. The approximate coordinates of the Site are: latitude 36.10118^{o} N; longitude 79.5185^{o} W.

Reportedly, the main building was constructed in 1964 with three additions taking place after the original construction. The building consists of three main operational areas: an approximately 20,000-square-foot office area (along the western side of the main building), an approximate 1,500-square-foot engineering room (near the northeastern corner of the building), and a large manufacturing/assembly area that occupies the remainder of the building. A maintenance shop and adjacent compressor room are located in the northern portion of the manufacturing area. A bright dip line, thermal deburring area, and WWTP are located in the central portion of the manufacturing area. A former paint storage room is located along the exterior of the southeastern corner of the building. Asphalt-paved parking and driveways surround the Site building. A covered and bermed hazardous waste storage area and fenced valve testing area (where liquid propane gas is transferred through valves between ASTs) are located near the southeastern corner of the Site building. Subgrade areas identified at the Site include wastewater collection pits and trenches in the WWTP/bright dip area and a sump that collects liquids from the hazardous

waste storage area. ECI empties and inspects the wastewater pits every two years and relines the pits (with a fiberglass resin) every ten years.

A 10,000-gallon diesel underground storage tank (UST) was located to the north of the building and was removed in 1991.

Access to the subject property is provided from West Haggard Street from the north and from Rego Drive, located to the west of the Site building. Landscaped areas are located adjacent to the north and northeast of the building (between the building and parking areas) and surrounding the hazardous waste storage and valve testing areas. The eastern approximately one-third of the Site is densely wooded.

The addresses of adjacent property owners were obtained on-line from the Alamance County database system. The Site is surrounded by a mix of commercial/industrial and residential properties as shown on Figure 3.

Adjacent properties include the following:

- *North*: Properties located to the North of the Site building, across West Haggard Avenue appear to have been undeveloped or developed for residential purposes as early as 1951. An automotive service facility and Elon Self Storage were constructed in the early and late 1990s, respectively, and are located to the north of the Site building across West Haggard Street between Rego Drive and Center Street. Residential properties are located to the North of the Site building across West Haggard Avenue between Center Street and Moonelon Drive. Property northeast of the western property boundary, across West Haggard Avenue (east of Moonelon Drive) was residential until the early 2000s when it was developed with a shopping center consisting of various retail shops and a restaurant.
- *East*: Properties located to the east of the Site have been used for residential purposes since at least 1951.
- *South*: With exception of the railroad line located south of the Site, properties were used for either agricultural or undeveloped purposes until the 1970s, when the first portion of a Sonoco facility was constructed.
- *West*: Properties to the west of the Site appear to have been undeveloped or used for agricultural purposes from at least 1951 until the late 1980s when the current facility (used as Elon University's Physical Plant – the Dickson Building) and gas station (west of the Dickson Building) were constructed in the late 1980s and early 1990s, respectively.

1.3 *SITE HYDROGEOLOGY*

The Site is located within the Piedmont Physiographic Province of North Carolina, underlain by metamorphic and igneous rocks of varying age subdivided into geologic belts. Based on the North Carolina Geologic map, bedrock at the Site consists primarily of metamorphosed diorite. Bedrock was encountered at approximately 60 feet below land surface (ft bls) during previous environmental assessments. Saprolite, a layer of weathered and variably decomposed bedrock, was observed above bedrock at the Site and generally mantles bedrock in this region. Saprolite has the appearance of compact clayey to sandy soil, often with original bedrock textures and features preserved.

The locations of site groundwater monitoring wells are shown on Figure 4. Construction details and water level measurement for the 24 permanent wells are presented in Table 1. The depth to groundwater at the site in January 2015 ranged from approximately 19 ft bls at monitor well DW-3 located in the wooded area on the east side of the site to approximately 62 ft bls at DW-2 in the central portion of the property. Bedrock was encountered at depths of 54 to 66 ft bls in monitor well boreholes during completion of the RI activities.

Based on the groundwater elevation data collected in January 2015 and as shown on Figure 5, the groundwater flow in the shallow (saprolite) aquifer is generally to the northeast. Groundwater flow for the upper bedrock aquifer zone is to the north-northwest as shown on Figure 6. Using top of casing elevations and depth to water measurements, site groundwater elevations and hydraulic gradients for the Site were calculated as summarized below.

Hydraulic Gradients – January 2015

Well Pair	Vertical Gradients Gradient	Direction
MW-1 DW-4	0.2909	Down
MW-4 DW-5	-0.0022	Up
MW-7 DW-1	0.0188	Down
MW-9 DW-2	0.3476	Down
MW-16 DW-3	-0.0099	Up
DW-6 DW-6D	0.1406	Down

Aquifer	Horizontal Gradient Well Pair	Gradient
Saprolite	MW-4 MW-7	0.0491
	MW-7 MW-16	0.0041
Upper Bedrock	DW-5 DW-1	0.0441
	DW-1 DW-3	0.0014

The hydraulic conductivity of the shallow aquifer was calculated by the Bower and Rice method using slug test data collected from saprolite monitor wells MW-1, MW-4 and MW-7, and upper bedrock monitor wells DW-3 and DW-5 and DW-2 for deeper bedrock. Site hydraulic conductivity in the range of the calculated geometric mean for the saprolite aquifer zone is typical of a silt or silty fine sand aquifer matrix (Sanders, 1998). A summary of hydraulic conductivities is provided in the table below.

Summary of Calculated Hydraulic Conductivities by Aquifer Zone

Hydraulic Conductivities	Feet / day	cm/sec
Shallow Aquifer (geometric mean)	0.116	4.08×10^{-5}
Upper Bedrock (geometric mean)	0.782	2.76×10^{-4}
Deeper Bedrock	0.011	3.84×10^{-6}

cm/sec = centimeters per second

Based on the January 2105 water level gauging and calculated hydraulic conductivities, the average groundwater seepage velocity in the saprolite aquifer zone using a porosity of 35% is approximately 3.0 feet per year. Using a primary porosity of 25% average groundwater seepage velocity of the upper bedrock is approximately 24 feet per year. A summary of hydraulic characteristics is provided on Table 2.

1.4 *WATER SUPPLY*

The Site and nearby properties obtain potable water through Elon Water Department, which purchases water from the City of Burlington. The City of Burlington obtains its drinking water from three surface water bodies: Lake Mackintosh, Stoney Creek Reservoir, and Lake Cammack.

During the May 2014 environmental assessment activities, ERM conducted a water supply well survey for wells located within ½-miles of the subject property. A visual survey of the area was augmented by interviews with residential and business owners/occupants and Town of Elon representatives,

Google aerial and street level maps, and information from publicly available environmental databases.

Results of the survey indicate the subject area is served by the Elon Water Department; however, a total of 18 water supply wells (active and inactive) were identified within ½ miles of the subject property. Water supply wells identified during the survey are shown on Figure 7. The nearest well location (mapped well no. 1 on Figure 7) is approximately 100 feet north and downgradient of the Site, at a residence located at 606 West Haggard Avenue. Based observations made during the survey, this well is not currently equipped with a pump and is therefore inactive. Another inactive well (mapped well no. 3) is located approximately 100 feet north from the northeast property corner of the Site at a residence located at 516 West Haggard Avenue. The nearest active water supply well (mapped well no. 2) is located approximately 300 feet northwest and sidegradient from the northwest property corner of the Site at a commercial business at 802 West Haggard Avenue.

1.5 REMEDIAL INVESTIGATIONS

Previous remedial investigations at the site were conducted by MACTEC in 2009 and GaiaTech from 2010-2013. A detailed summary of previous environmental activities was provided in the *Remedial Investigation Work Plan* (ERM, April 2014) and the *Remedial Investigation Report* (ERM, March 2015).

2.0 SUMMARY OF REMEDIAL INVESTIGATION RESULTS

ERM performed RI activities at the Site between May 2014 and February 2015. The results were presented in a *Remedial Investigation Report* (ERM, March 2015). The RI characterized and delineated concentrations of VOCs, primarily TCE and tetrachloroethene (PCE), in soils and groundwater at the Site. The VOCs in soils and groundwater were attributed to apparent historical releases related to the former use of TCE for parts cleaning at the Vapor Degreaser Area (Area of Concern or AOC 1). Based on the RI soil assessment results, there were no apparent releases of TCE or other site-related hazardous substance at the five other AOCs at the site. The areas of concern investigated as part of the RI are presented on Figure 8.

2.1 SOURCE AREA (FORMER VAPOR DEGREASER)

Based on historical information, a TCE vapor degreaser was used in parts cleaning activities from 1980 through the 1990s when it was removed. The degreaser, which consisted of an approximately 600-gallon above ground tank, was formerly located in the shipping/receiving area along the eastern side of the building (see Figure 8). Based on site assessment results, historical releases of TCE have occurred at the former vapor degreaser area. The area of VOC-impacted groundwater from the former vapor degreaser area extends from AOC 1 to the northeast in the shallow saprolite aquifer and in the upper and intermediate bedrock aquifer zones.

2.2 NATURE AND EXTENT OF CONTAMINATION

Soil

A current and historical soil analytical results summary is presented in Table 3, and soil sample locations are shown on Figure 9. To further evaluate and delineate Site groundwater quality impacts, five temporary monitor wells and six additional permanent monitor wells were installed and sampled as part of the RI activities. The analytical results for the groundwater sampling events conducted in 2014 and 2015 were compared to the applicable North Carolina groundwater standards under 15A NCAC 2L.0106 (NCAC 2L). Groundwater analytical results for VOCs and Hazardous Substance List (HSL) metals are summarized in Tables 4 and 5, respectively. Natural attenuation parameters were also analyzed during the May 2014 groundwater sampling event, with results provided in Table 6. A discussion of groundwater sampling results by major contaminant category is provided below.

Volatile Organic Compounds

The VOCs detected during the RI groundwater sampling activities are summarized below with their corresponding NCAC 2L groundwater standard.

Maximum Detected Volatile Organic Compound Concentrations in Groundwater

Compound	Maximum Concentration	NC 2L Groundwater Standard
Carbon disulfide	0.81	700
Chloroform	8.4	70
cis 1,2-Dichloroethene	55.8	70
1,4-Dioxane	0.81J	3
Ethylbenzene	1.1	600
Methyl-tert butyl Ether	0.47J	20
Tetrachloroethene	**98.7**	0.7
Toluene	10.9	600
Trichloroethene	**3,030**	3
Xylenes (Total)	4.7	500

Concentrations in micrograms per liter (µg/L)
Bold and shaded values exceed the regulatory standard (15A NCAC 2L.0106 -April 2013)

As shown above, only two VOCs, TCE and PCE are detected in Site groundwater above their respective North Carolina groundwater standards. The primary VOC and driver for remediation detected in Site groundwater is TCE. The Figures 10 and 11 show the distribution of TCE in the saprolite and upper bedrock aquifer zones, respectively based on results of the 2014/2015 groundwater sampling events. Figure 12 shows the distribution of PCE across the site as vertical maximums at each well, where detected. A cross section location map and generalized geologic cross sections and plume distribution profiles for TCE are included as Figures 13, 14 and 15.

Vapor Intrusion Evaluation

As part of initial assessment activities, a vapor intrusion (VI) assessment was conducted at the Site between November 2012 and March 2013 that included sub-slab screening of soil vapor concentrations with results indicating a potential VI condition may be present in indoor air at the facility. The initial soil gas screening was followed by two rounds of indoor air sampling. Results of the initial indoor sampling results indicated various VOCs, including TCE, were detected between the collective cancer risk screening values of 1.0E-06 and 1.0E-04 and within a Hazard Index of 1. Results of a second VI sampling indicated TCE was detected above the collective cancer risk screening value of 1.0E-04 or above the Hazard Index of 1 at select locations.

In February 2014, ERM conducted a material use survey and determined that TCE and possibly PCE-containing products are actively in use in small quantities (<5 gallons) at the Site. The wide variability between results of the two indoor air sampling events is likely associated with occasional use of PCE and TCE-containing solvent products. Based on the current use of PCE and TCE in the facility operations, the governing indoor air quality concentration thresholds for workers are the Occupational Safety and Health Administration (OSHA) Permissible Exposure Limits (PELs). The 2013 indoor air sample concentrations were below applicable PELs. Thus, no additional VI assessment activities were conducted as part of the RI.

2.3 *SUMMARY OF MAJOR FINDINGS*

The major findings of the RI at the Site include the following:

Soils

- A residual VOC source mass in soils has been characterized and delineated at the Former Vapor Degreaser Area (AOC 1). The affected soils are attributed to historical releases related to the former use of TCE at the Vapor Degreaser Area. As required, the extent of the VOC-affected soils has been delineated to the unrestricted/residential Preliminary Soil Remediation Goal (PSRG) of 880 micrograms per kilogram (ug/kg) TCE. Only two soil samples, both located beneath the concrete floor, contain VOC concentrations above the industrial PSRG.
- Based on the soil assessment results, there are no apparent releases of TCE or other site-related hazardous substances at the five other AOCs at the site: Bright Dip Line (AOC 2), Former Zinc Plating Line (AOC 3), Former Solvent-Based Painting/Storage Area (AOC 4), Drum & Debris Piles (AOC 5) and Hazardous Waste Storage Area (AOC 6).
- In accordance with IHSB guidance, a site specific protection of groundwater remediation goal for TCE affected soil of 6,600 µg/kg (6.6 milligrams per kilograms (mg/kg)) has been calculated for the affected soils in AOC 1.
- The detected metals concentrations in site soils are determined to be within naturally occurring background concentrations (arsenic and manganese), are sporadic and isolated in occurrence (mercury and nickel) and/or are not site related (selenium).
- Based on soil sampling, semi-volatile organic compounds (SVOCs) are not compounds of concern at the site.

Groundwater

- TCE is the primary contaminant of concern in Site groundwater with the highest concentration detected in the samples collected from MW-7, installed in the immediate downgradient vicinity of the Former Vapor Degreaser Area (AOC 1). The VOC-affected groundwater, as defined by TCE concentrations, extends from AOC 1 to the northeast in the shallow saprolite aquifer and in the upper and intermediate bedrock aquifer zones.
- The lateral extent of the VOC-affected (TCE and PCE) groundwater in the shallow saprolite aquifer zone is delineated within the property boundary. With the installation and sampling of monitor well DW-6 and DW-6D, the lateral extent of the VOC-affected groundwater in the upper and intermediate bedrock aquifer zones has been effectively delineated to the NCAC 2L standard of 3.0 µg/L with a detected concentration of 3.6 µg/L (shallow bedrock aquifer zone) and 3.0 µg/L (intermediate bedrock aquifer zone), respectively.
- Based on analyses of groundwater samples from vertical extent well DW-2D, the VOC-affected groundwater extends into the intermediate-depth bedrock aquifer zone to approximately 160 ft bls and the vertical extent has been delineated.
- The VOC PCE is a secondary contaminant at the Site and is detected in groundwater samples in both shallow saprolite, shallow and intermediate bedrock aquifer zones. No detectable levels of PCE are present in the shallow aquifer groundwater samples collected from the downgradient monitor wells (MW-1, MW-2 & MW-16). Relative to the NCAC 2L standard for PCE of 0.7 µg/L, low levels of PCE were detected in groundwater collected samples from the downgradient off-site wells to the northeast completed in the upper bedrock aquifer (0.55J µg /L PCE at DW-6) and in the intermediate bedrock aquifer(1.8 µg /L PCE at DW-6D). Based on these results, the PCE is considered to be practically delineated in these aquifer zones at the site. Continued monitoring is warranted to confirm the PCE delineation.
- Based on results of natural attenuation analysis, site groundwater conditions appear generally favorable to natural attenuation by reductive dechlorination with respect to nitrate, nitrite, and sulfate. The capacity for natural attenuation appears to be limited with respect to total organic carbon and oxidation reduction potential.
- Metals are not considered to be constituents of concern in groundwater at the site. Detected metals are presumed to be related to GP-2 well construction or naturally occurring background conditions. It is

anticipated that additional groundwater sampling will confirm that the detected metals are not related to the source area release. .

Sensitive Receptor Survey

- The area in the vicinity of the site is served by the Town of Elon public water supply system.
- Based on a water supply well survey performed in 2014 within ½-mile of the subject property, two inactive water wells are located on separate residential properties to the north (hydraulically downgradient) of the site on West Haggard Avenue. Both properties are served by the Town of Elon public water supply system. The nearest active water supply well is located approximately 300 feet northwest and sidegradient from the northwest property corner of the Site at a commercial business at West Haggard Avenue.

3.0 REMEDIAL ALTERNATIVES ANALYSIS

The following section presents an analysis of applicable remedial technologies available for implementation at the ECI Elon facility to address VOCs in soil and groundwater. Site-specific hydrogeologic conditions and the physical and chemical properties of the contaminants of concern have been used to screen and identify potential corrective action technologies appropriate to treat saturated and unsaturated soil and the dissolved-phase VOC-affected groundwater. A scoring process has been applied to each set of potential corrective action alternatives to aid in the identification of the most technologically and economically feasible alternatives.

3.1 REMEDIAL ACTION OBJECTIVES

To the extent practical, the primary objective of groundwater remediation at the ECI Elon facility is to achieve compliance with the applicable NCDENR 2L Groundwater Standards for the reported analytes (15A NCAC 2L .0106) or other end-point criteria approved by NCDENR for remediation of VOC-affected groundwater. Site-wide compliance with the NC 2L standards is considered a long-term, ultimate objective.

The primary objective of soil remediation at the ECI Elon facility is to achieve the site specific soil remediation goals of 6.6 mg/kg for TCE.

The general strategy is to utilize active remedial measures to achieve VOC source depletion and to allow natural attenuation processes to remediate the downgradient portion of the VOC plume. Active remediation efforts will target the impacted soils and shallow aquifer at the primary source zone identified by the RI. More specifically, treatment will be focused in the upper saprolite zone in the source areas where the greatest mass of contamination has been identified. Reduction of contaminant mass in the source areas will decrease mass loading to groundwater and VOC migration to the downgradient portion of the plume. Remediation of the source mass will also mitigate potential vapor intrusion to the on-site buildings.

3.2 ESTIMATED AREAS AND VOLUMES OF MEDIA REQUIRING REMEDIAL ACTION

The remedial actions will target specific areas and volumes for each impacted media. The estimated areas and volumes of impacted media that may require remedial action at the Site were calculated for the applicable remedial goals and constituents of concern (COCs) in soil and groundwater. The preliminary results of the volume calculations for soil and groundwater are presented in the table below.

Areas and Volumes of Affected Media Targeted for Remediation

Media	Estimated Area (Sq. Ft)	Estimated Depth of Treatment Area	Estimated Volume (Cu. Yds.)	Comment
Soil	400	30	150	Area where contaminant concentrations in soil exceed the site specific standard (6.6 mg/kg)
Groundwater	23,400	60	26,000	Estimated dimensions of the residual source area with TCE concentrations greater than 300 ug/L.

3.3 FEASIBILITY STUDY PROCESS

ERM conducted a feasibility study to select a potential remediation method for soil and groundwater at the ECI Elon facility. Specifically, the feasibility study focuses on an evaluation of remediation technologies appropriate for source area mass reduction of VOCs in the soils and groundwater identified at the ECI Elon facility. The feasibility study scoring system is separated into a two-step process.

Step 1 – Screening Based on Site Specific Problem Statement

In the first step, technologies are screened based on site specific conditions. Remedial technologies that are capable of being effectively implemented based on the site specific conditions are retained for the next phase of screening. The general categories for site specific conditions used for screening are listed below.

- Contaminants of concern
- Depth to groundwater
- Geology
- Depth to confining unit
- Groundwater pH
- Dissolved Oxygen/ORP
- Contaminant Concentration Trends
- Technology Specific Parameters

It should be noted that all technologies that can be implemented under the site specific conditions are retained for further evaluation. This phase of the feasibility study process does not differentiate between technologies that may be more successful or appropriate then other technologies. The Step 1 screening process for the ECI Elon facility is included as Table 7A (groundwater) and 7B (soil).

Step 2 – Screening Based on the Required Criteria for Feasibility Studies

The second phase of the feasibility study assigns a numerical ranking to each of the technologies that were retained in Step 1 based on the eight screening criteria for feasibility studies under Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). The eight criteria are listed below.

- Overall protection of human health and the environment
- Long term effectiveness and performance
- Short term effectiveness
- Implementability
- Compliance with regulatory requirements
- Reduction of toxicity, mobility, or volume
- Community acceptance
- Cost

The criteria coincide with the criteria outlined in 15A NCAC 13C.0306(l)(3)(A) through (H) by NCDENR as the appropriate evaluation criteria for use during a feasibility study.

The overall rating for the technology was then taken as the sum of the ratings for each criterion. The maximum score that can be attained by each technology for each category is 10, which makes the maximum score possible 80. The technologies with the highest ratings each for soil and groundwater treatment were retained. The Step 2 screening process for the ECI Elon facility is included as Table 8A (groundwater) and 8B (soil).

3.4 REMEDIATION TECHNOLOGIES CONSIDERED

The following technologies were considered for soil and groundwater remediation at the Elon facility as part of the first step of the feasibility process.

Remediation Technology	Unsaturated Soil	Groundwater
Anaerobic Bioremediation		√
Aerobic Bioremediation		√
In Situ Chemical Oxidation		√
Air Sparge/Soil Vapor Extraction	√	√
Zero Valent Iron – Chemical Reduction		√
Dual Phase Extraction	√	√
Thermal Treatment	√	√
Hydraulic Containment		√
Physical Containment		√
Monitored Natural Attenuation		√
Bioventing	√	
Chemical Oxidation Soil Blending	√	
Excavation	√	
Soil Vapor Extraction	√	
Engineering/Institutional Controls	√	

Following the first phase of the feasibility study, four groundwater remediation technologies and two soil remediation technologies were removed from consideration for source area remediation. A summary of the technologies that were removed from the feasibility study process after Step 1 and the reason the technology was not retained is provided below.

Technology	Reason Technology Was Not Retained
Groundwater	
Anaerobic Bioremediation	Ambient site conditions are not amenable to reductive dechlorination (i.e. low pH, high dissolved oxygen, and no evidence of daughter products)
Aerobic Bioremediation	Not effective for TCE and PCE
Dual Phase Extraction	Not efficient for remediation of dissolved phase VOCs
Monitored Natural Attenuation	Source mass has not been depleted (planned for use after source area treatment)
Unsaturated Soil	
Bioventing	Not effective for TCE and PCE
Dual Phase Extraction	Not efficient for remediation of dissolved phase VOCs

A brief description of the technologies retained for further evaluation in the second phase of the feasibility study process is provided below.

In Situ Chemical Oxidation

Chemical oxidation is a direct chemical reaction involving the application or injection of oxidants into groundwater to destroy or chemically transform the contaminants. When a material is oxidized it is converted to a higher valence state. Typically with organic chemicals (carbon based) this results in their conversion to carbon dioxide (CO_2) and water (H_2O).

There are a number of oxidants that can be used to remediate VOCs. They are, in order of decreasing oxidative strength, ozone, persulfate, hydrogen peroxide, and permanganate. Of these oxidants, persulfate and permanganate are the most widely used and are generally commercially available.

An effective technique to deliver the oxidant involves injection of the oxidant solution into the aquifer via a direct push rig or permanent wells, thus the reaction will occur *in-situ*. As such, this remedial approach is often referred to as *in-situ* chemical oxidation (ISCO).

Oxidants injected in the subsurface will react with any organic compounds encountered, including contaminants and naturally occurring organic matter. The background oxidant demand, known as the soil oxidant demand (SOD) is measured prior to oxidant delivery so that sufficient oxidant can be delivered to

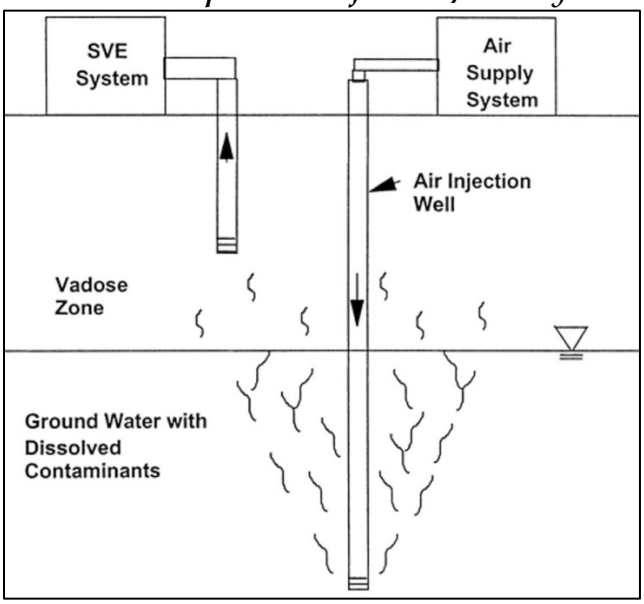
the subsurface to oxidize both the naturally occurring organic matter and the contaminants targeted by ISCO.

Air Sparge/Soil Vapor Extraction

Air sparging (AS) is an *in-situ* technology in which pressurized air is injected into a contaminated aquifer. Air streams traverse horizontally and vertically through the aquifer, thus removing contaminants by volatilization. A soil vapor extraction (SVE) system is often used to then remove the vapor-phase contaminants. The AS/SVE technology is designed to operate at a relatively high flow rate so that contact between groundwater and air is maintained.

The following factors may limit the applicability and effectiveness of the process: low permeability soils, proper design of injection wells to ensure adequate air-water contact, and aquifer heterogeneity that limits uniform air flow through the saturated zone. The technology generally has relatively low operation and maintenance (O&M) costs, since limited water is generated and the equipment is not complex. A generalized diagram of the AS/SVE operational concept is provided below.

Generalized Operation of an AS/SVE System



Zero Valent Iron (ZVI)

ZVI involves the introduction of iron particles to act as a bulk reducing agent to chemically reduce the COCs via electron transfer. The process involves a contact reaction whereby the COCs dissolved in groundwater come into contact with the iron surface. Iron corrosion also produces free hydrogen, which is involved in the electron transfer process during biological reductive dechlorination. Delivery of the iron particles to saturated soils can be achieved using an emulsion with

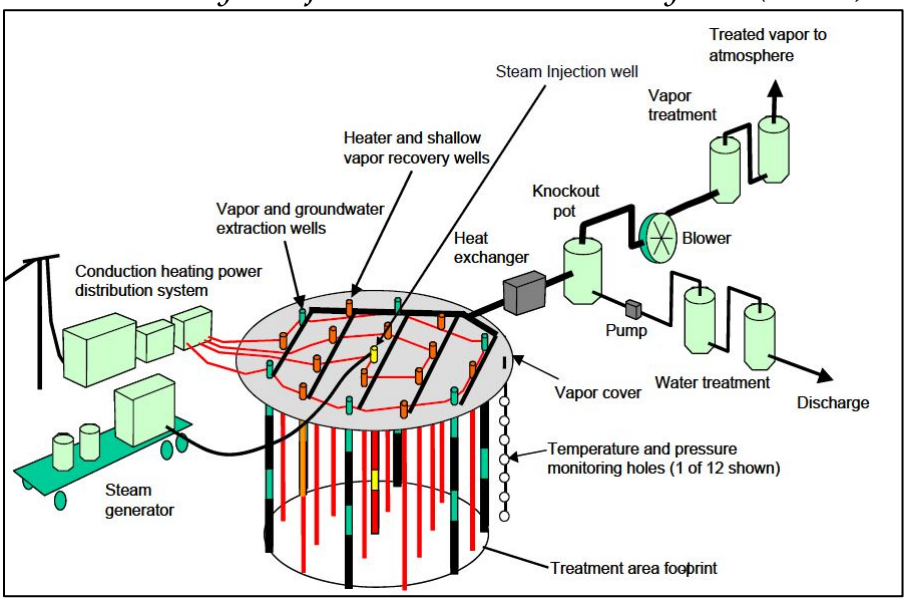
micro-scale iron through vertical direct push technology injection points, auger blending, or trenching.

Thermal Treatment

The main types of thermal treatment which can be employed to remove COCs in the subsurface are steam injection, and 2) electrical resistance heating (ERH). For both technologies, mass reduction is principally achieved by altering the temperature-dependent properties of contaminants to increase their mobility and facilitate their removal.

Thermally enhanced COC recovery using steam injection involves the injection of steam into the vadose and saturated zones to enhance the mobilization of the COCs for extraction by multiphase recovery wells. Steam is injected through injection wells at and below the depth being treated, optimally bringing the entire treated volume to the target soil temperature (over 200 degrees Fahrenheit (^{o}F)). The main recovery mechanism for contaminants in the steam zone is by steam displacement (stripping). Steam stripping occurs as the injected steam sweeps the mobilized COC to the extraction wells in response to the large pressure and thermal gradients. Steam injection will also be effective in removing any trapped ganglia of COC that cannot be removed by pumping or other viscous forces. Steam injection is most effective in subsurface geology that contains more permeable material (i.e. sands and fine sandy silts). Aboveground infrastructure is required to generate the steam and capture, treat, and cool the recovered vapors.

Generalized Layout of Thermal Remediation System (Steam)



ERH increases the subsurface temperature by passing electrical current between a network of electrodes embedded into the subsurface. The heating pattern in the subsurface is affected by the amount and position of the electrodes, the voltage difference applied to each electrode, and the electrical resistance of the soil. Vapor and liquid recovery wells are placed throughout the electrode network to recover contaminant vapors and impacted groundwater from the subsurface. ERH is most effective in subsurface geology with high conductivity (i.e. clays). ERH also requires an above ground treatment system to collect, treat, and cool recovered contaminant vapors and impacted groundwater.

Hydraulic Containment

The three basic components of hydraulic containment system (i.e. groundwater pump and treat technology) are groundwater extraction, treatment and discharge. Groundwater extraction wells are installed within or downgradient of impacted areas to intercept the COC plume. The extracted groundwater can be treated by a number of processes, such as, for VOCs, air stripping, activated carbon, or chemical/ultraviolet oxidation. The treated groundwater would then be discharged to surface water or the local publically owned treatment works (POTW) or re-injected into the aquifer under respective permits. Groundwater pump and treat is a proven technology that is effective at reducing the off-site migration through containment of dissolved constituents in groundwater.

Physical Containment

Physical containment is used to isolate the contaminated media and to restrict migration of contaminants. Since containment response actions do not have a treatment component, they do not reduce the concentration or volume of contaminants. Physical containment systems typically consist of pushing, injecting, or trenching a solid impermeable material around the source area or area of concern to restrict groundwater into the treatment area and restrict groundwater and contaminant migration into or out of the treatment area. Physical containment systems are typically coupled with an engineered barrier system at the land surface to prevent infiltration of rainwater into the isolated treatment area. Materials typically used for physical containment systems include concrete slurry or sheet metal.

Chemical Oxidation Soil Blending

Chemical oxidation soil blending consists of blending an oxidant into impacted unsaturated soil to destroy contaminant mass sorbed to soil above the water table. The most effective oxidants for soil blending are the liquid oxidants permanganate and persulfate. Oxidants are typically blended using a large diameter auger. Sufficient water must be added during the mixing process to allow the oxidant to react with the contaminant and organic material in the soil.

As a result of the additional water, soil slurry is generated in the treatment area. This must be allowed to stabilize before the remedial action is complete. Typically, following treatment, a stabilizing agent (i.e. cement) is blended into the soil slurry to restore the soil cohesive strength in order to allow re-use of the treated area.

Soil Vapor Extraction

SVE removes VOCs from unsaturated soils by inducing air flow through impacted areas. SVE is typically performed by applying a vacuum to vertical or horizontal extraction wells screened within the impacted soil. The resulting pressure gradient causes the soil gas to migrate through the soil pores toward the vapor extraction wells. VOCs are transported out of the subsurface in the migrating soil gas. This technology is generally applicable for compounds with vapor pressures greater than 0.5 millimeters mercury (mm Hg) and is an established method for remediation of VOCs in permeable unsaturated deposits.

Excavation

Excavation involves removal of contaminated source materials using conventional earth-moving equipment, such as a front end loader or excavator. The excavated waste is stockpiled, characterized then transported in covered vehicles to either an onsite or offsite permitted landfill or treatment facility for disposal. Dust suppression and surface water run on/run off measures to prevent migration of COCs during operations are required. Excavation, if conducted at the Elon facility as part of the remedial action, will be necessary inside the production and loading dock area (source area). Excavation will negatively impact production and shipping operations and will require a vapor intrusion mitigation component which may also hinder or require production to be suspended in the facility. As such, excavation is considered impractical and is thus undesirable by ECI.

Engineering/Institutional Controls

Institutional controls (ICs) represent non-engineered administrative or legal controls that limit land or resource use and are considered a limited action remedial alternative. ICs can be a stand-alone remedy or can serve as a supplement to an engineering control remedial action throughout all stages of the cleanup process. ICs are particularly beneficial when incorporated as a layered component of the cleanup process to provide overlapping assurances of protection from contamination.

Engineering controls include physical measures that are implemented to either prevent access to the contaminant or prevent migration of the contaminant. The most commonly implemented engineering control is an impermeable physical

barrier at the land surface to prevent public access to contaminated media and prevent the infiltration of rainwater to the contaminated media. Impermeable physical barriers can be constructed of compacted clay, geosynthetic materials, concrete, and asphalt.

3.5 *FEASIBILITY STUDY RESULTS*

During the second phase of the feasibility study, the technologies retained from the first phase were ranked based on the eight criteria for feasibility studies. The technologies with the highest ranking were retained for further consideration.

A summary of the results of the second phase of the feasibility process is provided below. The detailed analysis can be found in Table 7 for groundwater and Table 8 for soil.

	Groundwater Technologies							Unsaturated Soil Technologies			
Performance Criteria	**In Situ Chemical Oxidation**	**Air Sparge/Soil Vapor Extraction**	**Zero Valent Iron**	**Thermal Treatment**	**Hydraulic Containment**	**Physical Containment**	**Chemical Oxidation Soil Blending**	**Soil Vapor Extraction**	**Excavation**	**Thermal Treatment**	**Engineering/Institutional Controls**
Overall Protection of Human Heath and the Environment	10	10	10	10	6	6	10	10	10	10	4
*Compliance with Regulatory Requirements	5	5	5	10	0	0	10	10	10	10	0
Long Term Effectiveness and Performance	10	10	10	10	4	4	10	10	10	10	4
Reduction of Toxicity, Mobility, or Volume	10	10	10	10	0	0	10	10	10	10	0
Short Term Effectiveness	7	10	7	5	5	5	7	10	10	5	5
Implementability	10	10	4	4	7	7	4	10	10	4	10
Cost	10	7	10	2	2	2	10	7	10	4	10
Community Acceptance	10	10	10	10	10	10	10	10	10	10	0
Total (Maximum is 80)	72	72	66	61	34	34	71	77	80	63	23
Retained	√	√						√	√		

**If active remediation does not achieve compliance with applicable groundwater standards within 3 to 5 years, monitored natural attenuation will continue until regulatory requirements are met, if appropriate.*

Based on the results of the feasibility study, the following two remedial strategies to address both soil and groundwater impacts were retained and considered for the ECI Elon facility:

Air Sparge/Soil Vapor Extraction

An air sparge/soil vapor extraction system would be installed at the source area beneath the footprint of the existing ECI Elon building and extended east into the loading area to address the highest concentrations of TCE in the saprolite aquifer zone. Air sparge wells would be installed to the PWR/bedrock interface (approximately 60 feet below ground surface). Soil vapor extraction wells would be installed to the top of the water table to collect the vapors generated by the air sparge system and to address the residual contaminant mass in the unsaturated soil zone. The area for treatment is generally defined by groundwater impact located and mapped within the 300 ug/L contour interval as shown on Figure 10. The system, once installed, would require monthly operation and maintenance, but would not substantially impact the day to day operations at the facility. The anticipated required active remediation duration is for the air sparge/soil vapor extraction system is typically 3 to 5 years.

In Situ Chemical Oxidation and Excavation

In situ chemical oxidation would be implemented to address the contaminant impacts to the saprolite aquifer zone. An oxidant (sodium permanganate) would be injected via direct push injection technology between the bottom of the saprolite aquifer and the smear zone at the top of the water table, between approximately 30 and 60 feet below ground surface. The injection points would be placed at the source area beneath the footprint of the existing ECI Elon building and extended east into the loading area to address the highest concentrations of TCE in the saprolite aquifer zone (i.e. the same area targeted by the AS/SVE system). The area for treatment is generally defined by groundwater impact within the 300 ug/L contour interval as shown on Figure 10. It is anticipated that up to three ISCO injection events conducted over approximately 6 years would be required.

Because ISCO will not address the residual contaminant mass present in the unsaturated zone, limited excavation would be required and conducted inside the existing ECI facility building. Excavation activities would be focused on the area identified during the RI where TCE concentrations in soil exceed the site specific cleanup standard. Based on the RI activities, the excavation area is approximately 20 foot by 20 foot by 10 foot area. Excavated soil would be staged on site, characterized then transported off site to an approved receiving facility for proper disposal. As discussed, excavation and associated VI mitigation inside

the active manufacturing building is not a preferred remediation method to ECI due to potential significant disruptions to manufacturing processes.

Preliminary Cost Estimate

A preliminary cost estimate was prepared for the two comprehensive remediation strategies selected as a result of the feasibly study. A summary of the preliminary cost estimate is included below

Cost Category	Air Sparge/Soil Vapor Extraction	In Situ Chemical Oxidation/Excavation
Capital Cost	$533,963	$909,072
Operation and Maintenance Cost	$422,458	---
Monitoring/Reporting	$591,609	$608,681
Closure Costs	$31,255	$15,295
TOTAL	$1,578,285	$1,533,047

Preliminary Cost Estimate Assumptions

- Costs reflect remediation duration for 20 years for both technologies
- AS/SVE is expected to operate for 3 to 5 years
- ISCO costs reflect up to 3 full scale injections over 6 years
- Costs for O&M and monitoring reflect Net Present Value using a 2% discount rate
- Groundwater monitoring costs reflect monitoring/reporting will be conducted quarterly for the first year, semi-annually for years 2 through 5, and then annually for the remaining years (5 through 20).

4.0 SUMMARY OF AS/SVE PILOT TESTING

As part of the feasibility study process, an air sparge /soil vapor extraction (AS/SVE) pilot test was conducted at the Site to further evaluate its potential effectiveness to remediate areas of chlorinated solvent-affected soils and groundwater at the Site. Details of the pilot testing activities are presented in Pilot Test Completion Report included as Appendix A.

Based on the results of the pilot test, AS/SVE was confirmed to be a viable remedial strategy for the site. A summary of the pilot test procedure, results, and recommendations is presented below.

4.1 PILOT TEST PROCEDURES

One AS well, one SVE well and two observation point were installed as part of the pilot test. Two existing monitoring points were also used as monitoring points during the pilot test. Well construction details are provided below. A pilot test layout map is included as Figure 16.

Summary of Pilot Test Wells and Monitoring Points

Monitoring Point ID	Monitoring Point Type	Distance from AS well (ft)	Distance from SVE well (ft)	Screened Interval (ft bgs)
AS-1	Air Sparge	0	5	54′ – 60′
SVE-1	Soil Vapor Extraction	5	0	10′ – 30′
OB-1a	Vapor	8.5	7	10′ – 30′
OB-1b	Groundwater			45′ – 60′
OB-2a	Vapor	9.5	14.5	10′ – 30′
OB-2b	Groundwater			45′ – 60′
MW-7	Groundwater	33	35	30′ – 40′
DW-1	Groundwater	10	12	75′ – 85′

The AS/SVE test was completed to evaluate the single and combined effects of air sparging and soil vapor extraction at varying flow rates and pressures. Pilot testing was conducted over a period of 2 days. Throughout the pilot test, the

following operational and effluent parameters were monitored:

- Effluent airflow rate (cfm)
- SVE vacuum (in Hg)
- Effluent VOC concentrations using a PID (ppm) and laboratory analysis
- Effluent temperature (°F)
- AS pressure at well head (psi)
- AS flow rate (cfm)
- Vacuum/pressure measurements from the monitoring points (in H_2O)
- Depth to water, DO, and ORP measurements in the observation points

4.2 *SUMMARY OF PILOT STUDY FINDINGS*

Soil Vapor Extraction

For SVE to be considered an effective remediation technology, it is desirable to observe 1) induced vacuums at a significant radial distance from the extraction point; 2) significant recovery airflow that indicates ideal soil porosity and bulk removal of soil vapor from the subsurface; and 3) significant effluent-air VOC concentrations that indicate bulk removal of VOCs in the extracted air stream. All of the above conditions were observed when SVE was conducted alone and when paired with air sparging.

When operating SVE alone at a vacuum of at least 5" Hg, effective influence was observed in monitoring points at a distance of 35 feet. When combined with AS, the ROI decreased slightly. As a factor of safety, the recommended ROI for design purposes is 25 feet. The SVE well averaged a recovery flow rate of approximately 55 cfm.

Air Sparge

For AS to be considered an effective remediation technology, it is desirable to observe; 1) induced pressures at a significant radial distance from the injection point; 2) increases in groundwater DO values; 3) increases in soil vapor VOC concentrations that demonstrate stripping of COCs from groundwater; and 4) practical injection airflows. All of these criteria were observed during the AS/SVE pilot test.

Increases in DO, pressure, and water level were observed in wells extending beyond 33 feet from the AS point. To be conservative for design purposes, a radius of influence of 25 feet is assumed. An injection rate of 8 cfm was achieved.

5.0 PROPOSED REMEDY

Per the feasibility study and results of the completed pilot test, AS/SVE is selected as the primary remedial technology for treatment of soil and groundwater at the former ECI Elon facility. The conceptual remedial approach is to perform AS/SVE treatment of soils and groundwater at the source area where the highest residual VOC source mass is present. Monitored natural attenuation will be relied upon to remediate the downgradient area of VOC-affected groundwater following contaminant mass removal via AS/SVE at the source area.

5.1 CONCEPTUAL REMEDIAL DESIGN

SVE involves the direct removal of vapor-phase COCs from the vadose zone through induced vacuum and airflow. Airflow is induced by applying a vacuum to extraction wells screened near the treatment zone. Air passing through the relatively permeable areas within the treatment zone results in the advective movement of COC-laden soil vapors towards the extraction point. Since advection within low permeability regions is relatively low, a concentration gradient is created between the high and low permeability regions. The concentration gradient causes COCs to diffuse into the higher permeability areas (i.e. the lower concentration regions) and be removed by the SVE system through advection.

Air sparging involves the injection of contaminant-free air into the saturated zone, enabling transfer of aqueous phase COCs to the vapor phase through in situ air stripping of aqueous phase COCs, volatilization of trapped and adsorbed phase COCs below the water table and in the capillary fringe, and aerobic biodegradation of amenable COCs with subsequent transport to the vadose zone. Once in the vadose zone, the air and vapor-phase COCs are extracted with the SVE system or the COCs may be biodegraded in the subsurface.

The preliminary conceptual design of the AS/SVE system consists of a grid of up to 15 AS wells installed to an approximate depth of 60 ft bls and 20 SVE points installed to an approximate depth of 30 ft bls, assuming an effective radius of influence for both of 25 feet and a 42,500 square foot treatment area (the treatment area generally defined by mapped groundwater impact within the 300 ug/L contour interval as shown on Figure 10). Based on the pilot test results, a blower capable of delivering at least 750 cfm at 8 inches of mercury will be required for the SVE system and a compressor capable of delivering a minimum of 120 cfm at 20 psi will be required for the AS system. Detailed system design including the well and header layout, friction loss calculations, a process flow diagram, and a process and instrumentation diagram will be submitted with the

preconstruction report. A preliminary conceptual design in plan view and cross section is provided as Figure 17.

5.2 *PERFORMANCE MONITORING*

A performance monitoring plan will also be developed for AS/SVE system operation and submitted with the preconstruction report. The performance monitoring plan will document the level and rate of source reduction and include a reporting schedule. While is not expected that an air permit will be required for the site, vapor samples from the SVE system exhaust will be monitored for the first and second year of operation to evaluate system effectiveness and to ensure that VOC emissions do not exceed regulatory permitting thresholds. Also included with the performance monitoring plan will be an O&M plan. The O&M plan will be based on the remediation equipment manufacturer's recommendations to maximize the operational capabilities of the system. The detailed performance monitoring plan will be provided in the pre-construction report.

As required by NCDENR, quarterly groundwater monitoring events will be conducted the first year the remedy is implemented. After the first year, semi-annual monitoring will be conducted until active remediation is complete then annually thereafter. It is expected that the AS/SVE system will be operated at the site for between 3 and 5 years.

5.3 *MONITORED NATURAL ATTENUATION*

Once it can be demonstrated that the source area contaminant mass has been depleted to a level that the overall dissolved plume is stabilized or contracting, the remaining contaminant mass will be allowed to attenuate through naturally occurring biotic and abiotic processes.

Annual groundwater monitoring will be conducted to ensure MNA is appropriate and effective to control the migration and risk from the groundwater VOC plume. The monitoring will include sampling of key indicator wells for VOCs and field measurements for DO, ORP, pH and temperature, so that concentration trends can be verified and deviations can be adequately explained. The remedial monitoring program will be evaluated annually and revised as appropriate.

5.4 *PERMITTING*

A permit will be obtained under the NCDENR Underground Injection Control (UIC) program for the air sparge injection wells. A copy of the UIC permit documentation will be included in the Preconstruction Report.

Since the remediation system discharge is not collocated with a major source of hazardous air pollutants (HAPs) and the remediation system should not emit sufficient HAPs to be considered a major source, air quality permitting of the air emissions of the AS/SVE system will likely not be required. An evaluation of the applicability of air permitting regulations will be conducted and included in the preconstruction report. All necessary permits will be applied for and obtained prior to full scale operation.

6.0 PROPOSED CRITERIA FOR REMEDIAL ACTION COMPLETION

The primary goal of remedial action implementation at the ECI Elon facility in Elon, North Carolina is sufficient reduction of contaminant mass in groundwater to reach NCDENR 2L groundwater standards. The proposed strategy for remediation is to reduce contaminant concentrations in the source area through active remediation (i.e. AS/SVE). Sufficient source area reduction will result in reduced contaminant flux to the more dilute downgradient portion of the plume. In turn, downgradient groundwater conditions will improve.

Once the contaminant mass in the source area has been sufficiently reduced, the remedial strategy at the site will transition from active remediation to a monitored natural attenuation approach. Groundwater at the site will continue to be monitored until groundwater contaminant concentrations across the site are in compliance with the NCDENR 2L groundwater standards for identified contaminants of concern or other end-point criteria approved by NCDENR for remediation of VOC-affected groundwater.

After laboratory analysis of the key indicator wells indicates that remedial goals have been met, groundwater samples from all monitoring wells on site and soil samples from remediated former source areas will be collected for analysis and comparison against the remedial goals. When it can be demonstrated that all wells meet the criteria, a Remedial Action Completion Report will be prepared and submitted to NCDENR.

7.0 HEALTH & SAFETY PLAN WITH SURROUNDING COMMUNITY MEASURES

A site-specific Health & Safety Plan has been developed for remediation and sampling activities conducted at the ECI Elon facility. The Health & Safety Plan includes provisions that are protective of workers at the plant and the surrounding community. A copy of the Health & Safety Plan is included as Appendix B.

8.0 REPORTING AND SCHEDULE

The proposed project schedule is as follows:

Remedial Action Schedule

Task	Target Completion Date
Submit certified proposed RAP to NCDENR	May 20, 2015
End Public Notification (35 days)	Mid-July 2015
Submit remedial action plan completion certification to NCDENR	Mid-July 2015
Submit quarterly progress report to NCDENR	July 15, 2015
Request for Bids from qualified remedial contractors, bid review and contractor selection	August 2015
Submit certified Preconstruction Report (final remedial design) with certified remedial design completion certification to NCDENR	September 2015
Construct and implement full-scale remedial actions - AS/SVE and excavation	October-November 2015
Submit quarterly progress report to NCDENR	October 15, 2015
Implement groundwater and performance effectiveness monitoring plan.	November 2015
Submit remedial construction completion certification with as-built drawings to NCDENR	November-December 2015
Remedial action completion and certification	TBD

Quarterly progress reports will be submitted to the state during the life cycle of the project as outlined and required in the REC Guidance.

Tables

TABLE 1. MONITOR WELL CONSTRUCTION AND GROUNDWATER ELEVATION SUMMARY - ECI ELON FACILITY - ELON, NORTH CAROLINA

Well ID	Installation Date	Drilling Method	Well Type	Diameter/ Material/ Casing	Monitored Aquifer Zone	Surface Casing Depth (ft bls)	Total Depth (ft bls)	Screen Interval (ft bls)	Land Surface Elevation (ft msl)	Measuring Point Elevation TOC (ft msl)	Elevation Top of Screen (ft msl)	Elevation Bottom of Screen (ft msl)	Depth to Water (bmp)	Groundwater Elevation	Depth to Water (bmp)	Groundwater Elevation
													May 2014		January 2015	
Deep Wells																
DW-1	11/5-7/2012	HSA/Air Rotary	III	2-in PVC	Upper Bedrock	65	85	75 - 85	707.93	707.68	632.93	622.93	31.61	676.07	37.80	669.88
DW-2	2/14-20/2013	HSA/Air Rotary	III	2-in PVC	Intermediate Bedrock	100	131	101 - 131	705.31	705.06	604.31	574.31	58.57	646.49	62.31	642.75
DW-2D	10/6-7-2014	HSA/Air Rotary	III	2-in PVC	Lower Bedrock	150	227	217 - 227	705.19	704.94	488.19	478.19	70.00	Measured 10/9/2014	62.61	642.33
DW-3	5/12-14/2014	HSA/Air Rotary	III	2-in PVC	Upper Bedrock	59	80	70 - 80	685.40	688.23	615.4	605.4	14.00	674.23	18.91	669.32
DW-4	5/14-16-2014	HSA/Air Rotary	III	2-in PVC	Upper Bedrock	60	85	74 - 84	695.75	695.40	621.75	611.75	37.48	657.92	41.51	653.89
DW-5	5/15-19/2014	HSA/Air Rotary	III	2-in PVC	Upper Bedrock	68	83	73 - 83	711.74	711.38	638.74	628.74	22.20	689.18	26.34	685.04
DW-6	1/12-19/2015	HSA/Air Rotary	III	2-in PVC	Upper Bedrock	63	85	75 - 85	693.57	693.26	618.57	608.57			43.77	649.49
DW-6D	1/12-19/2015	HSA/Air Rotary	III	2-in PVC	Intermediate Bedrock	100	140	120 - 140	693.43	693.30	573.43	553.43			50.86	642.44
Monitor Wells																
GP-2	7/20/2011	Direct Push	II	1-in PVC	Saprolite	--	45	35 - 45	712.52	712.35	677.52	667.52	35.67	676.68	NM	NM
MW-1	7/19/2011	Direct Push	II	2-in PVC	Saprolite	--	40	25 - 35	695.42	695.17	670.42	660.42	22.04	673.13	27.12	668.05
MW-2	7/19/2011	Direct Push	II	2-in PVC	Saprolite	--	35	25 - 35	703.33	703.08	678.33	668.33	26.90	676.18	29.07	674.01
MW-3	7/19/2011	Direct Push	II	2-in PVC	Saprolite	--	35	25 - 35	709.34	709.09	684.34	674.34	29.45	679.64	32.90	676.19
MW-4	7/19/2011	Direct Push	II	2-in PVC	Saprolite	--	40	28 - 38	711.79	711.54	683.79	673.79	23.08	688.46	26.60	684.94
MW-5	7/19/2011	Direct Push	II	2-in PVC	Saprolite	--	35	22 - 32	708.93	708.68	686.93	676.93	21.23	687.45	25.13	683.55
MW-6	7/19/2011	Direct Push	II	2-in PVC	Saprolite	--	35	25 - 35	707.28	707.03	682.28	672.28	26.41	680.62	32.65	674.38
MW-7	7/19/2011	Direct Push	II	2-in PVC	Saprolite	--	40	30 - 40	708.29	708.04	678.29	668.29	32.01	676.03	37.38	670.66
MW-8	11/6/2012	Direct Push	II	2-in PVC	Saprolite	--	40	30 - 40	707.49	707.24	677.49	667.49	31.37	675.87	36.26	670.98
MW-9	11/6/2012	Direct Push	II	2-in PVC	Saprolite	--	39	29 - 39	705.22	704.97	676.22	666.22	29.72	675.25	34.80	670.17
MW-10	11/6/2012	Direct Push	II	2-in PVC	Saprolite	--	40	30 - 40	708.79	708.54	678.79	668.79	28.16	680.38	31.25	677.29
MW-11	11/6/2012	Direct Push	II	2-in PVC	Saprolite	--	40	30 - 40	704.05	703.80	674.05	664.05	27.57	676.23	33.40	670.40
MW-12	11/5/2012	Direct Push	II	2-in PVC	Saprolite	--	40	30 - 40	701.05	700.80	671.05	661.05	21.27	679.53	28.33	672.47
MW-13	11/6/2012	Direct Push	II	2-in PVC	Saprolite	--	30	20 - 30	706.91	706.66	686.91	676.91	21.02	685.64	25.77	680.89
MW-14	2/11/2013	Direct Push	II	2-in PVC	Saprolite	--	30	20 - 30	687.41	690.81	667.41	657.41	13.20	677.61	19.76	671.05
MW-15	2/11/2013	Direct Push	II	2-in PVC	Saprolite	--	30	20 - 30	685.10	688.47	665.1	655.1	13.72	674.75	18.96	669.51
MW-16	2/11/2013	Direct Push	II	2-in PVC	Saprolite	--	30	20 - 30	684.91	688.24	664.91	654.91	15.23	673.01	19.41	668.83

Notes:
ft bls = feet below land surface
ft msl = feet above mean sea level
bmp = below monitor point

TABLE 2. HYDRAULIC GRADIENT SUMMARY - ECI ELON FACILITY - ELON, NORTH CAROLINA

Vertical Hydraulic Gradients

Well Designation	January 2015							
	Reference Elevation (ft ASL)	Depth to Water (ft)	Head Measurement Location Elevation (relative ft ASL)	Head Elevation (ft)	Head Change (ft)	Length Change (ft)	Hydraulic Gradient (ft/ft)	Up/ Down
MW-1	695.17	27.12	665.42	668.05	14.16	48.67	0.2909	Down
DW-4	695.40	41.51	616.75	653.89				
MW-4	711.54	26.60	678.79	684.94	-0.10	45.05	-0.0022	Up
DW-5	711.38	26.34	633.74	685.04				
MW-7	708.04	37.38	669.48	670.66	0.78	41.54	0.0188	Down
DW-1	707.68	37.80	627.93	669.88				
MW-9	704.97	34.80	668.20	670.17	27.42	78.89	0.3476	Down
DW-2	705.06	62.31	589.31	642.75				
MW-16	688.24	19.41	659.91	668.83	-0.49	49.51	-0.0099	Up
DW-3	688.23	18.91	610.40	669.32				
DW-6	693.26	43.77	613.57	649.49	7.05	50.14	0.1406	Down
DW-6D	693.30	50.86	563.43	642.44				

Notes:
(-) vertical gradient represents upward groundwater flow
(+) vertical gradient represents downward groundwater flow

Horizontal Hydraulic Gradient - Saprolite

Well Designation	January 2015					
	Reference Elevation (ft ASL)	Depth to Water (ft)	Head Elevation (ft)	Head Change (ft)	Distance Change (ft)	Hydraulic Gradient (ft/ft)
MW-4	711.54	26.60	684.94	14.28	290.93	0.0491
MW-7	708.04	37.38	670.66			
MW-7	708.04	37.38	670.66	1.83	450.84	0.0041
MW-16	688.24	19.41	668.83			
					Average Hydraulic Gradient	**0.0266**

Horizontal Hydraulic Gradient - Upper Bedrock

Well Designation	January 2015					
	Reference Elevation (ft ASL)	Depth to Water (ft)	Head Elevation (ft)	Head Change (ft)	Distance Change (ft)	Hydraulic Gradient (ft/ft)
DW-5	711.38	26.34	685.04	15.16	344.14	0.0441
DW-1	707.68	37.80	669.88			
DW-1	707.68	37.80	669.88	0.56	412.50	0.0014
DW-3	688.23	18.91	669.32			
					Average Hydraulic Gradient	**0.0227**

Seepage Velocity Calculation

Slug Test and Aquifer Test Analysis Summary			
Monitoring Well	Hydrostratigraphic Unit	Hydraulic Conductivity (cm/sec)	(ft/day)
MW-1	Shallow	1.52E-04	0.429
	Shallow	1.71E-04	0.484
MW-4	Shallow	2.02E-05	0.057
MW-7	Shallow	1.79E-05	0.051
	Shallow	1.21E-05	0.034
	Geometric Mean for Shallow:	**4.08E-05**	**0.116**
DW-3	Upper Bedrock	1.31E-04	0.372
	Upper Bedrock	5.62E-04	1.592
	Upper Bedrock	1.26E-04	0.358
DW-5	Upper Bedrock	4.68E-04	1.325
	Upper Bedrock	3.67E-04	1.040
	Geometric Mean for Upper Bedrock:	**2.76E-04**	**0.782**
DW-2	Intermediate Bedrock	3.09E-06	0.009
	Intermediate Bedrock	4.77E-06	0.014
	Geometric Mean for Lower Bedrock:	**3.84E-06**	**0.011**

Saprolite aquifer seepage velocity = Ki/n_e

where:
K is hydraulic conductivity (geometric mean for the primary flowpath)
i = horizontal hydraulic gradient (average of values presented above)
n_e = effective porosity

Estimated Effective Porosity Values

Shallow	0.35
Upper Bedrock	0.10
Lower Bedrock	0.10

Seepage Velocity (Saprolite) =
= (0.000041) (0.0266) / (0.35) = 3.10E-06 cm/sec
or 0.009 ft/day
or **3.20 ft/yr**

Seepage Velocity (Upper Bedrock) =
= (0.000276) (0.0227) / (0.1) = 6.26E-05 cm/sec
or 0.178 ft/day
or **64.80 ft/yr**

Seepage Velocity (Intermediate Bedrock) =
= (0.00000384) (0.0227) / (0.1) = 8.72E-07 cm/sec
* assumes same horizontal gradient as upper bedrock
or 0.002 ft/day
or **0.90 ft/yr**

TABLE 3. SUMMARY OF HISTORICAL SOIL RESULTS - ECI ELON FACILITY - ELON, NORTH CAROLINA

Sample ID	Depth	Date	VOCs - Method 5035A/8260B (µg/kg)								SVOCs - Method 8270 (µg/kg)		Metals - Method 6010B/7471 (mg/kg)																TPH - Method 8015D and 3546/DRO (mg/kg)	
			Acetone	Chloroform	cis-1,2-Dichloroethylene	Methyl ethyl ketone	Tetrachloroethylene	Trichloroethylene	1,4-Dioxane	TICs	Standard Analytes	TICs	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Chromium VI	Copper	Lead	Manganese	Mercury	Nickel	Selenium	Silver	Thallium	Zinc	Gasoline Range - GRO	Diesel Range - DRO
Delineation Criteria - Residential			1E+07	290	32000	6E+06	17000	880	4900	Varies	Varies	Varies	6.2	0.61	3000	32	14	24000	0.29	620	400	360	2	300	78	78	0.61	4600	10*	40*
PSRGs - Industrial			1E+08	1500	400000	3E+07	82000	4000	17000	Varies	Varies	Varies	82	2.4	38000	400	160	1E+05	5.6	8200	800	4600	3.1	4000	1000	1000	2	62000		
PSRGs - Protection of Groundwater			24000	340	360	16000	5	18	12	Varies	Varies	Varies	0.9	5.8	580	63	3	4E+05	3.8	700	270	65	1	130	2.1	3.4	0.28	1200		
Background Samples																														
BG-1	5'	5/6/2014	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<1.5	<0.73	NA	0.29 B	0.55	26.9	NA	27	8.4	**165**	0.024 B	3.9	<1.5	0.4 B	<0.73	9.7	NA	NA
BG-1	15'	5/6/2014	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**1.3** B	**1.4** B	NA	0.51 B	0.36 B	8.9	NA	44.6	6.6	**698**	0.008 B	6.3 B	**2.5** B	<3.6	<3.6	29.3	NA	NA
BG-2	5'	5/6/2014	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<2.5	<1.3	NA	0.27 B	0.63	41.5	NA	26.5	10.8	56.6	0.015 B	6.1	**2.9**	0.18 B	<1.3	13.4	NA	NA
BG-2	15'	5/6/2014	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<1.2	0.23 B	NA	0.095 B	<0.24	2.1	NA	11.6	3.3	**126**	<0.055	2.4	<1.2	<0.6	<0.6	20	NA	NA
BG-3	5'	5/6/2014	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<1.2	0.34 B	NA	0.13 B	<0.24	11.1	NA	13.7	5.8	29.5	0.011 B	1.6 B	<1.2	0.078 B	<0.6	10.8	NA	NA
BG-3	15'	5/6/2014	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<4.5	0.56 B	NA	<1.1	<0.9	5.1	NA	46.4	4.7	**198**	<0.057	2.4 B	0.76 B	<2.2	<2.2	42.5	NA	NA
BG-4	5'	5/6/2014	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<2.5	0.3 B	NA	0.15 B	0.26 B	10.2	NA	19.8	7.3	**127**	0.033 B	2.4 B	1.9 B	0.094 B	<2.6	39.2	NA	NA
BG-4	15'	5/6/2014	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<13	**1.7** B	NA	0.45 B	<2.5	9.4	NA	40.7	8	**1060**	<0.06	8.9 B	**2.2** B	<6.4	<6.4	107	NA	NA
BG-5	5'	5/6/2014	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<5.9	**1** B	NA	<1.5	0.15 B	17.8	NA	6.1 B	20.6	**1080**	0.024 B	7 B	1.1 B	<3	<3	64	NA	NA
BG-5	13'	5/6/2014	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<28	**3.5** B	NA	0.88 B	<5.6	28.8	NA	23.3 B	8.3	**1260**	<0.063	25.4 B	<28	<14	<14	104	NA	NA
ERM Samples																														
HA-4	0-1'	5/6/2014	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<1	NA	NA	0.23 B	NA	NA	NA	13.2	NA	**519**	NA	2.9	NA	NA	<0.52	11.4	NA	NA
GP-39	2-3'	5/5/2014	31.1 J	<5.7	<5.7	<28	<5.7	<5.7	<230	BDL	BDL	see Table 3	<2.2	0.4 B	NA	0.2 B	0.06 B	29	NA	14.9	9	**76.2**	0.1	3.4 B	<2.2	0.1 B	<2.2	9	NA	NA
GP-39	10-11'	5/5/2014	<56	<5.6	<5.6	<28	<5.6	<5.6	<220	BDL	BDL	see Table 3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-40	5-7'	5/7/2014	23.5 J	2 J	12.8	<29	<5.9	**157**	<240	BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-40 (Dup-2)	5-7'	5/7/2014	22.7 J	3.1 J	21.3	<31	<6.2	**464**	<250	BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-40	18-20'	5/7/2014	19.3 J	<6.4	11.1	<32	4.3 J	**308** J	<250	BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-41	5-7'	5/7/2014	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<1.2	NA	NA	0.21 B	NA	NA	NA	22.4	NA	**157**	NA	3.7	NA	NA	<0.58	8	NA	NA
GP-41 (Dup-1)	5-7'	5/7/2014	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<1.1	NA	NA	0.18 B	NA	NA	NA	18.3	NA	**125**	NA	3.1	NA	NA	<0.55	7.7	NA	NA
GP-42	5-7'	5/7/2014	32.8 J	30.6	15.6	<30	<6.1	**8290**	<240	BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-42	20-22'	5/7/2014	29.9 J	2.7 J	11.7	<29	<5.8	**182**	<230	BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-43	8-10'	5/7/2014	74.2	<6.3	**428**	<31	<6.3	**205**	<250	BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-43	28-30'	5/7/2014	<71	<7.1	1.7 J	<35	<7.1	10	<280	BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-44	5-7'	5/7/2014	185	3.8 J	12.5	9.1 J	<6	**201**	<240	BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-44	23-25'	5/7/2014	<67	<6.7	<6.7	<33	<6.7	9.8	<270	BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-49	5-7'	5/8/2014	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<1.1	NA	NA	0.12 B	NA	NA	NA	11.8	NA	55.8	NA	2.1 B	NA	NA	<0.57	5.8	NA	NA
GaiaTech Samples																														
MW-1	5-7'	7/19/2011	BDL	BDL	BDL	BDL	BDL	BDL		BDL	BDL	BDL	NA	BDL	43	NA	BDL	34	NA	NA	36	NA	0.048	NA	**4**	0.66	NA	NA	NA	NA
MW-2	3-5'	7/19/2011	BDL	BDL	BDL	BDL	BDL	BDL		BDL	BDL	BDL	NA	BDL	36	NA	BDL	17	NA	NA	19	NA	BDL	NA	BDL	BDL	NA	NA	NA	NA
MW-3	5-7'	7/19/2011	BDL	BDL	BDL	BDL	BDL	BDL		BDL	BDL	BDL	NA	BDL	20	NA	BDL	11	NA	NA	8.7	NA	0.029	NA	**12**	BDL	NA	NA	NA	NA
MW-4	8-10'	7/19/2011	BDL	BDL	BDL	BDL	BDL	BDL		BDL	BDL	BDL	NA	BDL	31	NA	BDL	81	NA	NA	10	NA	0.1	NA	**5.8**	1.2	NA	NA	BDL	BDL
MW-5	3-5'	7/19/2011	BDL	BDL	BDL	BDL	BDL	BDL		BDL	BDL	BDL	NA	BDL	24	NA	BDL	140	BDL	NA	10	NA	0.037	NA	**7.8**	BDL	NA	NA	NA	NA
MW-6	0-2'	7/19/2011	BDL	BDL	BDL	BDL	BDL	BDL		BDL	BDL	BDL	NA	BDL	54	NA	BDL	48	NA	NA	8.7	NA	0.03	NA	**5.4**	0.85	NA	NA	NA	NA
MW-7	3-5'	7/19/2011	BDL	BDL	78	BDL	BDL	**110**		BDL	BDL	BDL	NA	BDL	22	NA	BDL	57	NA	NA	10	NA	BDL	NA	**4.4**	0.65	NA	NA	NA	NA
MW-7	18-20'	7/19/2011	BDL	BDL	66	BDL	BDL	BDL		BDL	BDL	BDL	NA	BDL	68	NA	BDL	62	NA	NA	3.2	NA	BDL	NA	**10**	BDL	NA	NA	NA	BDL
HA-1	0-1'	7/20/2011	BDL	BDL	BDL	BDL	BDL	BDL		BDL	BDL	BDL	NA	**1.4**	63	NA	BDL	50	NA	NA	19	NA	0.04	NA	BDL	BDL	NA	NA	BDL	17
HA-2	0-1'	7/20/2011	BDL	BDL	BDL	BDL	BDL	BDL		BDL	BDL	BDL	NA	BDL	61	NA	BDL	43	NA	NA	12	NA	0.034	NA	BDL	BDL	NA	NA	BDL	17
HA-3	0-1'	7/20/2011	BDL	BDL	BDL	BDL	BDL	BDL		BDL	BDL	BDL	NA	BDL	290	NA	BDL	68	NA	NA	44	NA	BDL	NA	BDL	BDL	NA	NA	BDL	7.1
GP-1	5-7'	7/20/2011	BDL	BDL	BDL	BDL	BDL	BDL		BDL	BDL	BDL	NA	BDL	22	NA	BDL	49	NA	NA	11	NA	0.028	NA	**3.6**	BDL	NA	NA	BDL	BDL
GP-1	38-40'	7/20/2011	NA	NA	NA	BDL	NA	NA		BDL	BDL	BDL	NA	BDL	120	NA	BDL	78	NA	NA	BDL	NA	BDL	NA	**12**	BDL	NA	NA	BDL	BDL
GP-2	5-7'	7/20/2011	BDL	BDL	BDL	BDL	BDL	4.8		BDL	NA	NA	NA	BDL	27	NA	BDL	100	BDL	NA	8.6	NA	0.039	NA	BDL	BDL	NA	NA	BDL	BDL
GP-2	18-20'	7/20/2011	BDL	BDL	BDL	BDL	BDL	BDL		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-2	35-36'	7/20/2011	BDL	BDL	BDL	BDL	2.9	**160**		BDL	BDL	BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-3	1-3'	7/20/2011	BDL	BDL	BDL	BDL	BDL	**26**		BDL	BDL	BDL	NA	BDL	38	NA	BDL	44	NA	NA	14	NA	0.05	NA	1.6	BDL	NA	20	BDL	BDL
GP-4	1-3'	7/20/2011	BDL	BDL	BDL	BDL	BDL	**20**		BDL	BDL	BDL	NA	BDL	25	NA	BDL	41	NA	NA	6.9	NA	0.067	NA	**4.5**	BDL	NA	NA	NA	NA
GP-5	13-15'	7/20/2011	BDL	BDL	BDL	BDL	BDL	BDL		BDL	BDL	BDL	NA	BDL	21	NA	BDL	16	NA	NA	5.9	NA	BDL	NA	BDL	BDL	NA	6.9	BDL	BDL
GP-6	10-12'	7/21/2011	BDL	BDL	BDL	BDL	BDL	1.6		BDL	BDL	BDL	NA	BDL	26	NA	BDL	210	BDL	NA	BDL	NA	0.057	NA	**24**	BDL	NA	NA	BDL	BDL
GP-7	13-15'	7/21/2011	BDL	BDL	BDL	BDL	BDL	BDL		BDL	BDL	BDL	NA	BDL	150	NA	BDL	140	NA	NA	BDL	NA	BDL	NA	**22**	BDL	NA	NA	BDL	BDL

TABLE 3. SUMMARY OF HISTORICAL SOIL RESULTS - ECI ELON FACILITY - ELON, NORTH CAROLINA

Sample ID	Depth	Date	VOCs - Method 5035A/8260B (µg/kg)								SVOCs - Method 8270 (µg/kg)		Metals - Method 6010B/7471 (mg/kg)																TPH - Method 8015D and 3546/DRO (mg/kg)	
			Acetone	Chloroform	cis-1,2-Dichloroethylene	Methyl ethyl ketone	Tetrachloroethylene	Trichloroethylene	1,4-Dioxane	TICs	Standard Analytes	TICs	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Chromium VI	Copper	Lead	Manganese	Mercury	Nickel	Selenium	Silver	Thallium	Zinc	Gasoline Range - GRO	Diesel Range - DRO
Delineation Criteria - Residential			1E+07	290	32000	6E+06	17000	880	4900	Varies	Varies	Varies	6.2	0.61	3000	32	14	24000	0.29	620	400	360	2	300	78	78	0.61	4600	10*	40*
PSRGs - Industrial			1E+08	1500	400000	3E+07	82000	4000	17000	Varies	Varies	Varies	82	2.4	38000	400	160	1E+05	5.6	8200	800	4600	3.1	4000	1000	1000	2	62000		
PSRGs - Protection of Groundwater			24000	340	360	16000	5	18	12	Varies	Varies	Varies	0.9	5.8	580	63	3	4E+05	3.8	700	270	65	1	130	2.1	3.4	0.28	1200		
GP-7	30-32'	7/21/2011	BDL	BDL	BDL	BDL	BDL	BDL		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-8	10-12'	7/21/2011	BDL	BDL	BDL	BDL	BDL	3.1		BDL	BDL	BDL	NA	BDL	32	NA	BDL	48	NA	NA	6.7	NA	0.034	NA	**21**	BDL	NA	NA	BDL	BDL
GP-9	1-3'	7/21/2011	BDL	BDL	BDL	BDL	BDL	BDL		BDL	BDL	BDL	NA	BDL	30	NA	BDL	48	NA	NA	4.6	NA	0.16	NA	**15**	BDL	NA	NA	BDL	BDL
GP-10	1-3'	7/22/2011	BDL	BDL	BDL	BDL	BDL	BDL		BDL	BDL	BDL	NA	**2**	33	NA	BDL	150	NA	NA	14	NA	**2.3**	NA	**10**	BDL	NA	NA	NA	NA
GP-11	8-10'	7/22/2011	BDL	BDL	BDL	BDL	BDL	BDL		BDL	BDL	BDL	NA	BDL	33	NA	BDL	88	NA	NA	21	NA	0.041	NA	**15**	BDL	NA	NA	BDL	BDL
GP-12	6"	11/14/2012	BDL	BDL	BDL	BDL	BDL	BDL		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-12	5'	11/14/2012	BDL	BDL	BDL	BDL	BDL	BDL		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-12	10'	11/14/2012	BDL	BDL	BDL	BDL	BDL	BDL		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-12	15'	11/14/2012	BDL	BDL	BDL	BDL	BDL	BDL		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-12	20'	11/14/2012	BDL	BDL	BDL	BDL	BDL	BDL		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-12	25'	11/14/2012	BDL	BDL	BDL	BDL	BDL	BDL		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-12	30'	11/14/2012	BDL	BDL	BDL	BDL	BDL	BDL		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-12	35'	-	BDL	BDL	BDL	BDL	BDL	BDL		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-13	6"	11/14/2012	BDL	BDL	BDL	BDL	BDL	BDL		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-13	5'	11/14/2012	BDL	BDL	BDL	BDL	BDL	BDL		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-13	10'	11/14/2012	BDL	BDL	BDL	BDL	BDL	BDL		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-13	15'	11/14/2012	166	BDL	BDL	BDL	BDL	BDL		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-13	20'	11/14/2012	BDL	BDL	BDL	BDL	BDL	BDL		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-13	25'	11/14/2012	BDL	BDL	BDL	BDL	BDL	BDL		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-13	30'	11/14/2012	BDL	BDL	BDL	BDL	BDL	BDL		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-13	35'	11/14/2012	BDL	BDL	BDL	BDL	BDL	BDL		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-14	6"	11/14/2012	140	16.1	BDL	BDL	BDL	**462**		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-14	5'	11/14/2012	BDL	12.1	8.9	BDL	BDL	**9000**		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-14	10'	11/14/2012	BDL	BDL	12.6	BDL	BDL	**232**		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-14	15'	11/14/2012	182	BDL	19.4	BDL	BDL	**391**		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-14	20'	11/14/2012	BDL	BDL	BDL	BDL	BDL	**89.7**		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-14	25'	11/14/2012	BDL	BDL	BDL	BDL	BDL	**81.1**		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-14	30'	11/14/2012	BDL	BDL	BDL	BDL	BDL	**106**		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-14	35'	11/14/2012	BDL	BDL	BDL	BDL	**7.7**	**227**		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-15	6"	11/14/2012	151	BDL	BDL	BDL	BDL	**34.9**		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-15	5'	11/14/2012	BDL	BDL	BDL	BDL	BDL	**34.8**		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-15	10'	11/14/2012	BDL	BDL	12.4	BDL	BDL	**172**		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-15	15'	11/14/2012	BDL	BDL	BDL	BDL	BDL	**30.6**		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-15	20'	11/14/2012	BDL	BDL	BDL	BDL	BDL	**135**		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-15	25'	11/14/2012	BDL	BDL	BDL	BDL	BDL	**37.5**		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-15	30'	11/14/2012	BDL	BDL	BDL	BDL	BDL	**26**		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-15	35'	11/14/2012	BDL	BDL	BDL	BDL	**10.7**	**414**		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-16	6"	11/14/2012	BDL	BDL	BDL	BDL	BDL	BDL		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-16	5'	11/14/2012	BDL	BDL	BDL	BDL	BDL	BDL		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-16	10'	11/14/2012	115	BDL	BDL	BDL	BDL	14.5		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-16	15'	11/14/2012	BDL	BDL	BDL	BDL	BDL	6.2		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-16	20'	11/14/2012	BDL	BDL	BDL	BDL	BDL	BDL		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-16	25'	11/14/2012	BDL	BDL	BDL	BDL	BDL	12.2		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-16	30'	11/14/2012	BDL	BDL	BDL	BDL	BDL	**21.6**		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-16	35'	11/14/2012	BDL	BDL	BDL	BDL	BDL	**44.1**		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-17	6"	11/14/2012	109	BDL	BDL	BDL	BDL	BDL		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-17	5'	11/14/2012	BDL	BDL	BDL	BDL	BDL	BDL		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-17	10'	11/14/2012	BDL	BDL	BDL	BDL	BDL	BDL		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-17	15'	11/14/2012	BDL	BDL	BDL	BDL	BDL	BDL		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-17	20'	11/14/2012	BDL	BDL	BDL	BDL	BDL	BDL		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-17	25'	11/14/2012	BDL	BDL	BDL	BDL	BDL	BDL		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-17	30'	11/14/2012	BDL	BDL	BDL	BDL	BDL	BDL		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-17	35'	11/14/2012	BDL	BDL	BDL	BDL	BDL	BDL		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-18	6"	11/14/2012	BDL	BDL	BDL	BDL	BDL	BDL		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-18	5'	11/14/2012	BDL	BDL	BDL	BDL	BDL	BDL		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-18	10'	11/14/2012	BDL	BDL	BDL	BDL	BDL	BDL		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-18	15'	11/14/2012	BDL	BDL	BDL	BDL	BDL	BDL		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

TABLE 3. SUMMARY OF HISTORICAL SOIL RESULTS - ECI ELON FACILITY - ELON, NORTH CAROLINA

Sample ID	Depth	Date	VOCs - Method 5035A/8260B (µg/kg)								SVOCs - Method 8270 (µg/kg)		Metals - Method 6010B/7471 (mg/kg)																TPH - Method 8015D and 3546/DRO (mg/kg)	
			Acetone	Chloroform	cis-1,2-Dichloroethylene	Methyl ethyl ketone	Tetrachloroethylene	Trichloroethylene	1,4-Dioxane	TICs	Standard Analytes	TICs	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Chromium VI	Copper	Lead	Manganese	Mercury	Nickel	Selenium	Silver	Thallium	Zinc	Gasoline Range - GRO	Diesel Range - DRO
Delineation Criteria - Residential			1E+07	290	32000	6E+06	17000	880	4900	Varies	Varies	Varies	6.2	0.61	3000	32	14	24000	0.29	620	400	360	2	300	78	78	0.61	4600	10*	40*
PSRGs - Industrial			1E+08	1500	400000	3E+07	82000	4000	17000	Varies	Varies	Varies	82	2.4	38000	400	160	1E+05	5.6	8200	800	4600	3.1	4000	1000	1000	2	62000		
PSRGs - Protection of Groundwater			24000	340	360	16000	5	18	12	Varies	Varies	Varies	0.9	5.8	580	63	3	4E+05	3.8	700	270	65	1	130	2.1	3.4	0.28	1200		
GP-18	20'	11/14/2012	BDL	BDL	BDL	BDL	BDL	BDL		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-18	25'	11/14/2012	BDL	BDL	BDL	BDL	BDL	BDL		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-18	30'	11/14/2012	BDL	BDL	BDL	BDL	BDL	9.2		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-18	35'	-	NA	NA	NA	BDL	NA	NA		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-19	6"	11/14/2012	BDL	BDL	BDL	BDL	BDL	BDL		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-19	5'	11/14/2012	BDL	BDL	BDL	BDL	BDL	BDL		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-19	10'	11/14/2012	BDL	BDL	BDL	BDL	**5.1**	**44.4**		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-19	15'	11/14/2012	BDL	BDL	BDL	BDL	BDL	BDL		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-19	20'	11/14/2012	BDL	BDL	BDL	BDL	BDL	BDL		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-19	25'	11/14/2012	BDL	BDL	BDL	BDL	BDL	**40.4**		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-19	30'	11/14/2012	BDL	BDL	BDL	BDL	BDL	BDL		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-19	35'	11/14/2012	BDL	BDL	BDL	BDL	BDL	BDL		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-20	6"	11/14/2012	BDL	BDL	BDL	BDL	BDL	BDL		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-20	5'	11/14/2012	BDL	BDL	BDL	BDL	BDL	BDL		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-20	10'	11/14/2012	BDL	BDL	BDL	BDL	BDL	**44**		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-20	15'	11/14/2012	BDL	BDL	BDL	BDL	BDL	**20.2**		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-20	20'	11/14/2012	BDL	BDL	BDL	BDL	BDL	BDL		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-20	25'	11/14/2012	BDL	BDL	BDL	BDL	BDL	16.9		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-20	30'	11/14/2012	BDL	BDL	BDL	BDL	BDL	BDL		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-20	35'	11/14/2012	BDL	BDL	BDL	BDL	BDL	9		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-21	6"	11/14/2012	232	11.9	BDL	BDL	**26.2**	**140**		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-21	5'	11/14/2012	BDL	6.1	BDL	BDL	**19.6**	**113**		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-21	10'	11/14/2012	BDL	BDL	BDL	BDL	BDL	**24.3**		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-21	15'	11/14/2012	BDL	BDL	BDL	BDL	BDL	**61.1**		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-21	20'	11/14/2012	BDL	BDL	BDL	BDL	BDL	7.4		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-21	25'	11/14/2012	BDL	BDL	BDL	BDL	BDL	12.5		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-21	30'	11/14/2012	BDL	BDL	BDL	BDL	BDL	**74.7**		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-21	35'	11/14/2012	BDL	BDL	BDL	BDL	BDL	**136**		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-22	6"	11/14/2012	BDL	BDL	33.3	BDL	BDL	**71.3**		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-22	5'	11/14/2012	BDL	BDL	47.2	BDL	BDL	**36.2**		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-22	10'	11/14/2012	BDL	BDL	69.3	BDL	BDL	**53.7**		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-22	15'	11/14/2012	BDL	BDL	294	BDL	BDL	**21.5**		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-22	20'	11/14/2012	BDL	BDL	93.1	BDL	BDL	17.5		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-22	25'	11/14/2012	BDL	BDL	85	BDL	BDL	7.6		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-22	30'	11/14/2012	BDL	BDL	30.6	BDL	BDL	BDL		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-22	35'	11/14/2012	-	-	-	BDL	-	-		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-23	6"	11/14/2012	BDL	BDL	61.2	BDL	BDL	**157**		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-23	5'	11/14/2012	BDL	BDL	39.9	BDL	BDL	**65.4**		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-23	10'	11/14/2012	BDL	BDL	116	BDL	BDL	**18.2**		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-23	15'	11/14/2012	BDL	BDL	87.2	BDL	BDL	**21.4**		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-23	20'	11/14/2012	BDL	BDL	43	BDL	BDL	BDL		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-23	25'	11/14/2012	BDL	BDL	88.1	BDL	BDL	**21.9**		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-23	30'	11/14/2012	BDL	BDL	151	BDL	BDL	**54.8**		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-23	35'	11/14/2012	-	-	-	BDL	-	-		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-24	6"	11/8/2012	BDL	BDL	BDL	BDL	BDL	14.8		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-24	5'	11/8/2012	BDL	BDL	BDL	BDL	BDL	BDL		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-24	10'	11/8/2012	BDL	BDL	18.4	BDL	BDL	BDL		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-24	15'	11/8/2012	BDL	BDL	BDL	BDL	BDL	BDL		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-24	20'	11/8/2012	BDL	BDL	BDL	BDL	BDL	BDL		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-24	25'	11/8/2012	BDL	BDL	BDL	BDL	BDL	BDL		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-24	30'	11/8/2012	BDL	BDL	BDL	BDL	BDL	BDL		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-24	35'	-	-	-	-	BDL	-	-		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-25	6"	11/8/2012	158	BDL	BDL	BDL	BDL	BDL		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-25	5'	11/8/2012	BDL	BDL	BDL	BDL	BDL	BDL		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-25	10'	11/8/2012	BDL	BDL	BDL	BDL	BDL	BDL		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-25	15'	11/8/2012	BDL	BDL	BDL	BDL	BDL	BDL		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-25	20'	11/8/2012	BDL	BDL	BDL	BDL	BDL	BDL		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-25	25'	11/8/2012	BDL	BDL	BDL	BDL	BDL	BDL		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

TABLE 3. SUMMARY OF HISTORICAL SOIL RESULTS - ECI ELON FACILITY - ELON, NORTH CAROLINA

Sample ID	Depth	Date	VOCs - Method 5035A/8260B (µg/kg)								SVOCs - Method 8270 (µg/kg)		Metals - Method 6010B/7471 (mg/kg)																TPH - Method 8015D and 3546/DRO (mg/kg)	
			Acetone	Chloroform	cis-1,2-Dichloroethylene	Methyl ethyl ketone	Tetrachloroethylene	Trichloroethylene	1,4-Dioxane	TICs	Standard Analytes	TICs	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Chromium VI	Copper	Lead	Manganese	Mercury	Nickel	Selenium	Silver	Thallium	Zinc	Gasoline Range - GRO	Diesel Range - DRO
Delineation Criteria - Residential			1E+07	290	32000	6E+06	17000	880	4900	Varies	Varies	Varies	6.2	0.61	3000	32	14	24000	0.29	620	400	360	2	300	78	78	0.61	4600	10*	40*
PSRGs - Industrial			1E+08	1500	400000	3E+07	82000	4000	17000	Varies	Varies	Varies	82	2.4	38000	400	160	1E+05	5.6	8200	800	4600	3.1	4000	1000	1000	2	62000		
PSRGs - Protection of Groundwater			24000	340	360	16000	5	18	12	Varies	Varies	Varies	0.9	5.8	580	63	3	4E+05	3.8	700	270	65	1	130	2.1	3.4	0.28	1200		
GP-25	30'	11/8/2012	BDL	BDL	BDL	BDL	BDL	BDL		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-25	35'	-	-	-	-	BDL	-	-		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-26	6"	11/8/2012	NA	NA	NA	BDL	NA	NA		BDL	NA	NA	BDL	BDL	BDL	0.15	BDL	19.4	BDL	15.2	14.1	**220**	0.032	2.1	BDL	BDL	BDL	14	NA	NA
GP-26	5'	11/8/2012	NA	NA	NA	BDL	NA	NA		BDL	NA	NA	BDL	BDL	BDL	0.17	0.25	28.9	BDL	11.8	11	**153**	0.087	1.4	1.6	BDL	BDL	9.8	NA	NA
GP-26	10'	11/8/2012	NA	NA	NA	BDL	NA	NA		BDL	NA	NA	BDL	BDL	BDL	BDL	BDL	16.3	BDL	7.3	5.4	25.8	0.012	0.87	1.2	BDL	BDL	5.8	NA	NA
GP-26	15'	11/8/2012	NA	NA	NA	BDL	NA	NA		BDL	NA	NA	BDL	BDL	BDL	BDL	BDL	7.8	BDL	7.1	1.9	**103**	0.011	0.9	BDL	BDL	BDL	20.7	NA	NA
GP-26	20'	11/8/2012	NA	NA	NA	BDL	NA	NA		BDL	NA	NA	BDL	BDL	BDL	0.17	BDL	6	BDL	11.2	2.6	**247**	BDL	5.3	BDL	BDL	BDL	25.5	NA	NA
GP-26	25'	11/8/2012	NA	NA	NA	BDL	NA	NA		BDL	NA	NA	BDL	BDL	BDL	1.9	BDL	93.7	BDL	42.4	4.9	**1270**	BDL	48.2	**9.5**	BDL	BDL	110	NA	NA
GP-26	30'	11/8/2012	NA	NA	NA	BDL	NA	NA		BDL	NA	NA	BDL	BDL	BDL	1.1	0.63	62.7	BDL	26	3.8	**611**	BDL	33.4	BDL	BDL	BDL	93.2	NA	NA
GP-26	35'	-	NA	NA	NA	BDL	NA	NA		BDL	NA	NA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	NA	NA
GP-27	6"	11/8/2012	NA	NA	NA	BDL	NA	NA		BDL	NA	NA	BDL	BDL	BDL	0.27	1	34.2	BDL	73	11.8	**195**	0.035	3.7	1.9	BDL	BDL	97.8	NA	NA
GP-27	5'	11/8/2012	NA	NA	NA	BDL	NA	NA		BDL	NA	NA	BDL	BDL	BDL	BDL	BDL	34.2	BDL	5.2	5	14.7	0.078	BDL	1.6	BDL	BDL	2.9	NA	NA
GP-27	10'	11/8/2012	NA	NA	NA	BDL	NA	NA		BDL	NA	NA	BDL	BDL	BDL	0.18	0.99	67.2	BDL	16.4	13.2	9.6	0.027	1.1	1.6	BDL	BDL	7.4	NA	NA
GP-27	15'	11/8/2012	NA	NA	NA	BDL	NA	NA		BDL	NA	NA	BDL	BDL	BDL	0.53	1.6	19.6	BDL	16.6	29.7	**261**	0.009	3	**3.1**	BDL	BDL	23.3	NA	NA
GP-27	20'	11/8/2012	NA	NA	NA	BDL	NA	NA		BDL	NA	NA	0.82	BDL	BDL	0.6	0.57	9.6	BDL	9.3	9	**561**	0.006	3.9	BDL	BDL	BDL	101	NA	NA
GP-27	25'	11/8/2012	NA	NA	NA	BDL	NA	NA		BDL	NA	NA	BDL	**0.73**	BDL	1.3	0.89	14.6	BDL	18.3	171	**9960**	0.008	**136**	**3.5**	BDL	BDL	232	NA	NA
GP-27	30'	11/8/2012	NA	NA	NA	BDL	NA	NA		BDL	NA	NA	BDL	BDL	BDL	0.56	0.21	4.9	BDL	4.3	13.9	**452**	BDL	1.7	BDL	BDL	BDL	111	NA	NA
GP-27	35'	-	NA	NA	NA	BDL	NA	NA		BDL	NA	NA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	NA	NA
GP-28	6"	11/8/2012	NA	NA	NA	BDL	NA	NA		BDL	NA	NA	BDL	BDL	BDL	0.3	2.3	41.8	BDL	83.2	14.3	**338**	0.029	3.8	1.6	BDL	BDL	61.9	NA	NA
GP-28	5'	11/8/2012	NA	NA	NA	BDL	NA	NA		BDL	NA	NA	BDL	BDL	BDL	0.31	1	275	BDL	5.8	14.9	**247**	0.034	1.5	1.4	BDL	BDL	6.3	NA	NA
GP-28	10'	11/8/2012	NA	NA	NA	BDL	NA	NA		BDL	NA	NA	BDL	**1.6**	BDL	0.15	0.85	20.9	BDL	8.3	7.4	**81.1**	0.029	1.3	2	BDL	BDL	7.1	NA	NA
GP-28	15'	11/8/2012	NA	NA	NA	BDL	NA	NA		BDL	NA	NA	BDL	BDL	BDL	0.22	1.8	53.1	BDL	33	4.8	12.5	0.043	2.3	2	BDL	BDL	20.5	NA	NA
GP-28	20'	11/8/2012	NA	NA	NA	BDL	NA	NA		BDL	NA	NA	BDL	**0.68**	BDL	0.15	BDL	2.9	BDL	15.6	2.7	**151**	0.007	2.7	BDL	BDL	BDL	35.8	NA	NA
GP-28	25'	11/8/2012	NA	NA	NA	BDL	NA	NA		BDL	NA	NA	BDL	0.6	BDL	0.29	BDL	4	BDL	7.5	4.8	**383**	0.007	7.3	BDL	BDL	BDL	46.6	NA	NA
GP-28	30'	11/8/2012	NA	NA	NA	BDL	NA	NA		BDL	NA	NA	BDL	BDL	BDL	0.3	BDL	2	BDL	2.7	4.8	**355**	BDL	4.7	BDL	BDL	BDL	54.7	NA	NA
GP-28	35'	-	NA	NA	NA	BDL	NA	NA		BDL	NA	NA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	NA	NA
GP-29	6"	11/8/2012	NA	NA	NA	BDL	NA	NA		BDL	NA	NA	BDL	**0.8**	BDL	0.28	1.5	34.6	BDL	20.1	13.6	**318**	0.023	3	1.8	BDL	BDL	20.5	NA	NA
GP-29	5'	11/8/2012	NA	NA	NA	BDL	NA	NA		BDL	NA	NA	BDL	**1.5**	BDL	0.23	0.87	34.2	BDL	15.4	8.4	**156**	0.032	2.8	1.2	BDL	BDL	11.4	NA	NA
GP-29	10'	11/8/2012	NA	NA	NA	BDL	NA	NA		BDL	NA	NA	BDL	BDL	BDL	0.6	**8.6**	75.7	BDL	46.8	13.5	**181**	0.039	4.4	**4.2**	BDL	BDL	28.1	NA	NA
GP-29	15'	11/8/2012	NA	NA	NA	BDL	NA	NA		BDL	NA	NA	BDL	BDL	BDL	1.9	**8.9**	16.5	BDL	93.3	9.8	**660**	0.018	10	**3.5**	BDL	BDL	38.4	NA	NA
GP-29	20'	11/8/2012	NA	NA	NA	BDL	NA	NA		BDL	NA	NA	0.77	BDL	BDL	2.2	**5.6**	5.7	BDL	96.8	6.4	**825**	0.015	13.1	**2.8**	BDL	BDL	48.4	NA	NA
GP-29	25'	11/8/2012	NA	NA	NA	BDL	NA	NA		BDL	NA	NA	BDL	**1.2**	BDL	1.5	1.3	BDL	BDL	87	3.2	**414**	BDL	12.3	1.6	BDL	BDL	79.2	NA	NA
GP-29	30'	11/8/2012	NA	NA	NA	BDL	NA	NA		BDL	NA	NA	BDL	**1.7**	BDL	1.4	0.5	9.9	BDL	63.4	BDL	**342**	BDL	20.9	**3.6**	BDL	BDL	138	NA	NA
GP-29	35'	-	NA	NA	NA	BDL	NA	NA		BDL	NA	NA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
GP-30	6"	-	BDL	BDL	BDL	BDL	BDL	BDL		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-30	5'	-	BDL	BDL	BDL	BDL	BDL	BDL		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-30	10'	2/12/2013	BDL	BDL	7.9	BDL	BDL	BDL		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-30	15'	-	BDL	BDL	BDL	BDL	BDL	BDL		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-30	20'	2/12/2013	BDL	BDL	BDL	BDL	BDL	9		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-30	25'	2/12/2013	BDL	BDL	BDL	BDL	BDL	**19.9**		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-30	30'	2/12/2013	BDL	BDL	BDL	BDL	BDL	**24.2**		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-30	35'	2/12/2013	BDL	BDL	BDL	BDL	BDL	**56.6**		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-31	6"	2/12/2013	BDL	BDL	BDL	BDL	BDL	BDL		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-31	5'	2/12/2013	BDL	BDL	BDL	BDL	BDL	BDL		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-31	10'	2/12/2013	BDL	BDL	BDL	BDL	BDL	BDL		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-31	15'	2/12/2013	BDL	BDL	BDL	BDL	BDL	BDL		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-31	20'	2/12/2013	BDL	BDL	BDL	BDL	BDL	BDL		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-31	25'	2/12/2013	BDL	BDL	BDL	BDL	BDL	BDL		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-31	30'	2/12/2013	BDL	BDL	BDL	BDL	BDL	BDL		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-31	35'	-	-	-	-	BDL	-	-		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-32	6"	2/12/2013	BDL	BDL	BDL	BDL	BDL	BDL		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-32	5'	2/12/2013	BDL	BDL	BDL	BDL	BDL	BDL		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-32	10'	2/12/2013	BDL	BDL	BDL	BDL	BDL	BDL		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-32	15'	2/12/2013	BDL	BDL	BDL	BDL	BDL	BDL		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-32	20'	2/12/2013	BDL	BDL	BDL	BDL	BDL	BDL		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-32	25'	2/12/2013	BDL	BDL	BDL	BDL	BDL	BDL		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-32	30'	-	-	-	-	BDL	-	-		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-32	35'	-	-	-	-	BDL	-	-		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

TABLE 3. SUMMARY OF HISTORICAL SOIL RESULTS - ECI ELON FACILITY - ELON, NORTH CAROLINA

Sample ID	Depth	Date	VOCs - Method 5035A/8260B (µg/kg)								SVOCs - Method 8270 (µg/kg)		Metals - Method 6010B/7471 (mg/kg)																TPH - Method 8015D and 3546/DRO (mg/kg)	
			Acetone	Chloroform	cis-1,2-Dichloroethylene	Methyl ethyl ketone	Tetrachloroethylene	Trichloroethylene	1,4-Dioxane	TICs	Standard Analytes	TICs	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Chromium VI	Copper	Lead	Manganese	Mercury	Nickel	Selenium	Silver	Thallium	Zinc	Gasoline Range - GRO	Diesel Range - DRO
Delineation Criteria - Residential			1E+07	290	32000	6E+06	17000	880	4900	Varies	Varies	Varies	6.2	0.61	3000	32	14	24000	0.29	620	400	360	2	300	78	78	0.61	4600	10*	40*
PSRGs - Industrial			1E+08	1500	400000	3E+07	82000	4000	17000	Varies	Varies	Varies	82	2.4	38000	400	160	1E+05	5.6	8200	800	4600	3.1	4000	1000	1000	2	62000		
PSRGs - Protection of Groundwater			24000	340	360	16000	5	18	12	Varies	Varies	Varies	0.9	5.8	580	63	3	4E+05	3.8	700	270	65	1	130	2.1	3.4	0.28	1200		
GP-33	6"	2/12/2013	BDL	BDL	BDL	BDL	BDL	BDL		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-33	5'	2/12/2013	BDL	BDL	BDL	BDL	BDL	BDL		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-33	10'	2/12/2013	BDL	BDL	BDL	BDL	BDL	**19.5**		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-33	15'	2/12/2013	BDL	BDL	BDL	BDL	BDL	13.4		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-33	20'	-	BDL	BDL	BDL	BDL	BDL	BDL		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-33	25'	2/12/2013	BDL	BDL	BDL	BDL	BDL	13.3		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-33	30'	2/12/2013	BDL	BDL	BDL	BDL	BDL	12.8		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-33	35'	-	-	-	-	BDL	-	-		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-34	6"	2/12/2013	BDL	BDL	BDL	BDL	BDL	BDL		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-34	5'	2/12/2013	BDL	BDL	BDL	BDL	BDL	BDL		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-34	10'	2/12/2013	BDL	BDL	BDL	BDL	BDL	BDL		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-34	15'	2/12/2013	BDL	BDL	BDL	BDL	BDL	BDL		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-34	20'	2/12/2013	BDL	BDL	BDL	BDL	BDL	BDL		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-34	25'	2/12/2013	BDL	BDL	BDL	BDL	BDL	BDL		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-34	30'	2/12/2013	BDL	BDL	BDL	BDL	BDL	BDL		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-34	35'	2/12/2013	BDL	BDL	BDL	BDL	BDL	BDL		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-35	6"	2/12/2013	BDL	BDL	BDL	BDL	BDL	BDL		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-35	5'	2/12/2013	BDL	BDL	BDL	BDL	BDL	BDL		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-35	10'	2/12/2013	BDL	BDL	BDL	BDL	BDL	BDL		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-35	15'	2/12/2013	BDL	BDL	BDL	BDL	BDL	BDL		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-35	20'	2/12/2013	BDL	BDL	BDL	BDL	BDL	BDL		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-35	25'	2/12/2013	BDL	BDL	BDL	BDL	BDL	BDL		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-35	30'	2/12/2013	BDL	BDL	BDL	BDL	BDL	BDL		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-35	35'	2/12/2013	BDL	BDL	BDL	BDL	BDL	BDL		BDL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:
IHSB Preliminary health-based soil remediation goals (PSRGs) , updated January 2014
(µg/kg) = micrograms per kilogram
(mg/kg) = miligrams per kilogram
* Non-UST Program Action Levels
Only detected compounds are listed.
BDL: Below Laboratory Detection Limit; NA: Not Analyzed; NE: Not Established
VOCs: Volatile organic compounds; SVOCs: Semi-Volatile organic compounds; TPH: Total Petroleum Hydrocarbons
Highlighted values exceed the lowest of the listed PSRGs

TABLE 4. SUMMARY OF HISTORICAL GROUNDWATER RESULTS FOR VOCs, SVOCs & TPH - ECI ELON FACILITY - ELON, NORTH CAROLINA

Sample ID	Date	VOCs - Method 5035A/8260B (µg/L)													SVOCs-8270	TPH 8015 & 3546 DRO	
		Total VOCs	Acetone	Bromodichloromethane	Carbon disulfide	Chloroform	cis-1,2-Dichloroethylene	Ethylbenzene	Methyl Tert Butyl Ether	Tetrachloroethylene	Toluene	Trichloroethylene	Xylene (total)	1,4-Dioxane	Total SVOCs	Gasoline Range - GRO (C5 to C9) *	Diesel Range - DRO (C9 to C18)*
NC 2L Groundwater		NE	6000	0.6	700	70	70	600	20	0.7	600	3	500	3	Varies	400	700
DW-1	11/13/12	95.8	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	**95.8**	BDL	NA	BDL	NA	NA
DW-1 (DUP)	11/13/12	96.1	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	**96.1**	BDL	NA	BDL	NA	NA
DW-1	05/21/14	103.96	<25	<1	<2	0.33 J	16.4	<1	<1	**1.7**	0.23 J	**85.3**	<2	<1	NA	NA	NA
DW-1	10/16/14	73.34	<20	<1	NA	0.7 J	1.9	<1	<1	**0.74 J**	<1	**70**	<1	<3	NA	NA	NA
DW-1	12/08/14	94	<20	<5	<5	<5	<5	<5	<5	<5	<5	**94**	<5	NA	NA	NA	NA
DW-1	12/10/14	100	<20	<5	<5	<5	<5	<5	<5	<5	<5	**100**	<5	NA	NA	NA	NA
DW-2	02/20/13	26.5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1.9	**22.2**	2.4	NA	NA	NA	NA
DW-2 (DUP)	02/20/13	25.2	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1.8	**21.2**	2.2	NA	NA	NA	NA
DW-2	03/13/13	47.9	42.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	**5.2**	BDL	NA	NA	NA	NA
DW-2 (DUP)	03/13/13	46.1	41	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	**5.1**	BDL	NA	NA	NA	NA
DW-2	05/19/14	52.29	<25	<1	<2	<1	<1	0.37 J	<1	0.56 J	0.22 J	**49.7**	1.44 J	<1	NA	NA	NA
DW-2	06/12/14	57.47	<25	<1	<2	<1	<1	1.1	<1	0.53 J	0.24 J	**50.9**	4.7	NA	NA	NA	NA
DW-2	10/16/14	49.18	<20	<1	NA	<1	<1	<1	<1	0.6 J	<1	**48**	0.58 J	<3	NA	NA	NA
DW-2D	10/16/14	1.6	<20	<1	NA	<1	<1	<1	<1	<1	<1	1.6	<1	<3	NA	NA	NA
DW-2D	02/12/15	1.7	<20	<1	NA	<1	<1	<1	<1	<1	<1	1.7	<1	<3	NA	NA	NA
DW-3	05/21/14	BDL	<25	<1	<2	<1	<1	<1	<1	<1	<1	<1	<2	<1	NA	NA	NA
DW-3	06/12/14	BDL	<25	<1	<2	<1	<1	<1	<1	<1	<1	<1	<3	NA	NA	NA	NA
DW-4	05/21/14	8.61	<25	<1	<2	<1	<1	<1	<1	<1	<1	**7.6**	1.01 J	<1	NA	NA	NA
DW-4	06/12/14	13.23	<25	<1	0.81 J	<1	<1	0.54 J	<1	<1	<1	**9.8**	2.08 J	NA	NA	NA	NA
DW-4	10/16/14	21.93	<20	<1	NA	<1	<1	<1	<1	0.43 J	<1	**20**	1.5	<3	NA	NA	NA
DW-5	05/21/14	1.8	<25	<1	<2	1.8	<1	<1	<1	<1	<1	<1	<2	<1	NA	NA	NA
DW-6	01/29/15	12.2	<20	<1	NA	<1	<1	<1	<1	**8.2**	<1	**4**	<1	<3	NA	NA	NA
DW-6	02/12/15	5.11	<20	<1	NA	0.15 J	0.81 J	<1	<1	0.55 J	<1	**3.6**	<1	<3	NA	NA	NA
DW-6D	01/29/15	6.89	<20	<1	NA	<1	0.69 J	<1	<1	**3**	<1	**3.2**	<1	<3	NA	NA	NA
DW-6D	02/12/15	5.65	<20	<1	NA	0.45 J	<1	<1	<1	**1.8**	<1	3	0.4 J	<3	NA	NA	NA
MW-1	06/12/11	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	NA	BDL	NA	NA
MW-1	07/28/11	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	NA	BDL	NA	NA
MW-1	05/20/14	BDL	<25	<1	<2	<1	<1	<1	<1	<1	<1	<1	<2	<1	NA	NA	NA
MW-2	06/12/11	1.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	**1.7**	BDL	BDL	BDL	NA	21.3	NA	75
MW-2	07/28/11	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	NA	BDL	NA	NA
MW-2	05/19/14	BDL	<25	<1	<2	<1	<1	<1	<1	<1	<1	<1	<2	<1	NA	NA	NA
MW-3	06/12/11	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	NA	14	NA	NA
MW-3	07/28/11	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	NA	BDL	NA	NA
MW-3	05/20/14	BDL	<25	<1	<2	<1	<1	<1	<1	<1	<1	<1	<2	<1	NA	NA	NA
MW-4	06/12/11	13.3	BDL	BDL	BDL	13.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	NA	1	BDL	35
MW-4	07/28/11	16	BDL	BDL	BDL	16	BDL	BDL	BDL	BDL	BDL	BDL	BDL	NA	BDL	NA	NA
MW-4	05/20/14	8.4	<25	<1	<2	8.4	<1	<1	<1	<1	<1	<1	<2	<1	NA	NA	NA
MW-5	06/12/11	1.1	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1.1	BDL	NA	26	BDL	72
MW-5	07/28/11	1.1	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1.1	BDL	NA	BDL	NA	NA
MW-5	05/20/14	0.47	<25	<1	<2	<1	<1	<1	<1	<1	<1	<1	<2	0.47 J	NA	NA	NA
MW-6	07/12/11	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	NA	11	BDL	85
MW-6	07/28/11	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	NA	BDL	NA	NA
MW-6	05/19/14	BDL	<25	<1	<2	<1	<1	<1	<1	<1	<1	<1	<2	<1	NA	NA	NA
MW-7	07/28/11	2987	BDL	BDL	BDL	BDL	14	BDL	BDL	**73**	BDL	**2900**	BDL	NA	15	**1200**	91
MW-7	08/12/11	2509.3	BDL	BDL	BDL	3.6	60.5	BDL	BDL	**92.9**	BDL	**2350**	2.3	NA	BDL	**1200**	NA
MW-7	05/22/14	3190.12	<1300	<50	<100	<50	59.6	<50	<50	**99.7**	<50	**3030**	<100	0.82 J	NA	NA	NA
MW-7 (DUP-2)	05/22/14	3126.21	<1300	<50	<100	<50	55.8	<50	<50	**98.7**	10.9 J	**2960**	<100	0.81 J	NA	NA	NA

TABLE 4. SUMMARY OF HISTORICAL GROUNDWATER RESULTS FOR VOCs, SVOCs & TPH - ECI ELON FACILITY - ELON, NORTH CAROLINA

Sample ID	Date	VOCs - Method 5035A/8260B (µg/L)													SVOCs-8270	TPH 8015 & 3546 DRO	
		Total VOCs	Acetone	Bromodichloromethane	Carbon disulfide	Chloroform	cis-1,2-Dichloroethylene	Ethylbenzene	Methyl Tert Butyl Ether	Tetrachloroethylene	Toluene	Trichloroethylene	Xylene (total)	1,4-Dioxane	Total SVOCs	Gasoline Range - GRO (C5 to C9) *	Diesel Range - DRO (C9 to C18)*
NC 2L Groundwater		**NE**	**6000**	**0.6**	**700**	**70**	**70**	**600**	**20**	**0.7**	**600**	**3**	**500**	**3**	Varies	400	700
MW-8	08/12/11	155.5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1.5	**154**	BDL	NA	BDL	NA	NA
MW-8	05/21/14	94.37	<25	<1	0.5 J	0.35 J	0.49 J	<1	<1	**0.73 J**	<1	**92.3**	<2	<1	NA	NA	NA
MW-9	08/12/11	1615.9	BDL	BDL	BDL	1.4	16	BDL	BDL	**36**	BDL	**1560**	2.5	NA	BDL	NA	NA
MW-9	05/21/14	2007.09	<50	<2	<4	1.2 J	14.7	<2	<2	**39.7**	<2	**1950**	0.97 J	0.52 J	NA	NA	NA
MW-10	11/13/12	33.4	27.9	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	**5.5**	BDL	NA	BDL	NA	NA
MW-10	05/20/14	10.7	<25	<1	<2	<1	<1	<1	<1	<1	<1	**9.5**	0.76 J	0.44 J	NA	NA	NA
DUP-1	05/20/14	9.89	<25	<1	<2	<1	<1	<1	<1	<1	<1	**9.5**	<2	0.39 J	NA		
MW-11	09/12/11	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	NA	NA	NA	NA
MW-11	05/21/14	BDL	<25	<1	<2	<1	<1	<1	<1	<1	<1	<1	<2	<1	NA	NA	NA
MW-12	09/12/11	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	NA	NA	NA	NA
MW-12	05/20/14	BDL	<25	<1	<2	<1	<1	<1	<1	<1	<1	<1	<2	<1	NA	NA	NA
MW-13	09/12/11	BDL	NA	NA		NA	NA	NA		NA	NA	NA	NA	NA	NA	NA	NA
MW-13	05/19/14	BDL	<25	<1	<2	<1	<1	<1	<1	<1	<1	<1	<2	<1	NA	NA	NA
MW-14	02/18/13	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	NA	NA	NA	NA
MW-14	05/21/14	BDL	<25	<1	<2	<1	<1	<1	<1	<1	<1	<1	<2	<1	NA	NA	NA
MW-15	02/18/13	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	NA	NA	NA	NA
MW-15	05/21/14	BDL	<25	<1	<2	<1	<1	<1	<1	<1	<1	<1	<2	<1	NA	NA	NA
MW-16	02/18/13	17.8	BDL	BDL	BDL	BDL	BDL	1.3	BDL BD	BDL	6.5	BDL	10	NA	NA	NA	NA
MW-16	03/13/13	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	NA	NA	NA	NA
MW-16	05/21/14	BDL	<25	<1	<2	<1	<1	<1	<1	<1	<1	<1	<2	<1	NA	NA	NA
GP-1	07/20/11	1154	BDL	BDL	BDL	BDL	BDL	BDL	BDL	**54**	BDL	**1100**	BDL	NA	BDL	**670**	120
GP-2	07/12/11	1274.2	BDL	BDL	BDL	2.6	BDL	BDL	BDL	**81.6**	BDL	**1190**	BDL	NA	1.4	**670**	120
GP-2	07/21/11	1458	BDL	BDL	BDL	BDL	BDL	BDL	BDL	**58**	BDL	**1400**	BDL	NA	BDL	**610**	NA
GP-2	05/22/14	1550.93	<50	<2	<4	3.3	1.5 J	<2	<2	**75.7**	<2	**1470**	<4	0.43 J	NA	NA	NA
GP-3	07/21/11	615	BDL	BDL	BDL	BDL	BDL	BDL	BDL	**25**	BDL	**590**	BDL	NA	5.1	330	12
GP-4	07/22/11	336.4	BDL	BDL	BDL	5.4	BDL	BDL	BDL	**11**	BDL	**320**	BDL	NA	1.6	NA	NA
GP-5	07/22/11	888.1	BDL	**2.1**	BDL	BDL	BDL	BDL	BDL	**26**	BDL	**860**	BDL	NA	1.7	NA	NA
GP-6	07/19/11	225.6	BDL	BDL	BDL	BDL	BDL	BDL	BDL	**5.6**	BDL	**220**	BDL	NA	BDL	NA	NA
GP-7	07/22/11	280	BDL	BDL	BDL	BDL	BDL	BDL	BDL	**30**	BDL	**250**	BDL	NA	BDL	NA	9.6
GP-8	07/22/11	315	BDL	BDL	BDL	BDL	BDL	BDL	BDL	**45**	BDL	**270**	BDL	NA	BDL	95	16
GP-9	07/22/11	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	NA	BDL	BDL	12
GP-10	07/28/11	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	NA	BDL	NA	NA
GP-11	07/28/11	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	NA	BDL	NA	NA
GP-45-41	05/08/14	2.32	<25	<1	<2	<1	<1	<1	<1	<1	0.32 J	2	<2	<1	NA	NA	NA
GP-46-39.5	05/08/14	5	<25	<1	<2	0.62 J	<1	<1	<1	<1	0.28 J	**4.1**	<2	<1	NA	NA	NA
GP-47-39	05/08/14	9.82	<25	<1	<2	1.1	<1	<1	0.47 J	<1	0.25 J	**8**	<2	<1	NA	NA	NA
GP-48-43	05/08/14	4.65	<25	<1	0.33 J	4.1	<1	<1	<1	<1	0.22 J	<1	<2	<1	NA	NA	NA
GP-50-48	05/08/14	55.59	<25	<1	<2	1.3	<1	<1	<1	<1	0.49 J	**53.8**	<2	<1	NA	NA	NA

Notes:
Only detected compounds are listed. µg/L = micrograms per liter
Groundwater criteria are NC2L Standards
BDL: Below Laboratory Detection Limit; NA: Not Analyzed; NE: Not Established
VOCs: Volatile organic compounds; SVOCs: Semi-Volatile organic compounds; TPH: Total Petroleum Hydrocarbons
Highlighted values exceed NC2L Standards

TABLE 5. SUMMARY OF HISTORICAL GROUNDWATER RESULTS FOR METALS - ECI ELON FACILITY - ELON, NORTH CAROLINA

Sample ID	Date	Metals - EPA Method 6010 (µg/L)															
		Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium, Total	Chromium VI	Copper	Lead	Manganese	Mercury	Nickel	Selenium	Silver	Thallium	Zinc
NC 2L Groundwater		**1 ***	**10**	**700**	**4 ***	**2**	**10**		**1000**	**15**	**50**	**1**	**100**	**20**	**20**	**0.2 ***	**1000**
DW-1	11/13/12	BDL	BDL	NA	BDL	BDL	**12.4**	NA	BDL	BDL	7.1	BDL	6.5	BDL	BDL	BDL	BDL
DW-1 (Dup)	11/13/12	BDL	BDL	NA	BDL	BDL	**22.4**	NA	BDL	BDL	6.7	BDL	12.4	BDL	BDL	BDL	BDL
DW-2	02/20/13	BDL	BDL	NA	BDL	BDL	**23.6**	NA	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	24.2
DW-2 (Dup)	02/20/13	BDL	BDL	NA	BDL	BDL	**23.8**	NA	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
DW-2	03/13/13	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DW-2 (Dup)	03/13/13	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-1	07/28/11	NA	BDL	97	NA	BDL	BDL	NA	NA	6.7	NA	BDL	NA	BDL	BDL	NA	NA
MW-1	11/06/12	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-1	05/20/14	<6	NA	NA	<4	NA	NA	NA	4.9 B	NA	**117**	NA	1.4 B	NA	NA	<10	22.3
MW-2	07/28/11	NA	BDL	38	NA	BDL	BDL	NA	NA	5	NA	BDL	NA	BDL	BDL	NA	NA
MW-2	11/06/12	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-3	07/28/11	NA	BDL	27	NA	BDL	BDL	NA	NA	7.4	NA	BDL	NA	BDL	BDL	NA	NA
MW-3	11/06/12	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-4	07/28/11	NA	BDL	38	NA	BDL	BDL	NA	NA	BDL	NA	BDL	NA	BDL	BDL	NA	NA
MW-4	11/06/12	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-5	07/28/11	NA	BDL	52	NA	BDL	BDL	BDL	NA	BDL	NA	BDL	NA	BDL	BDL	NA	NA
MW-5	11/06/12	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-5	05/20/14	<6	NA	NA	<4	NA	NA	NA	6.6 B	NA	45	NA	4.7 B	NA	NA	<10	33.3
MW-6	07/28/11	NA	BDL	67	NA	BDL	BDL	NA	NA	**84**	NA	BDL	NA	BDL	BDL	NA	NA
MW-6	11/07/12	BDL	BDL	NA	BDL	BDL	BDL	NA	BDL	BDL	17.3	BDL	BDL	BDL	BDL	BDL	BDL
MW-7	07/28/11	NA	BDL	53	NA	BDL	BDL	NA	NA	6.3	NA	BDL	NA	BDL	BDL	NA	NA
MW-7	11/08/12	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-8	11/08/12	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-9	11/08/12	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-10	11/13/12	BDL	BDL	NA	BDL	BDL	BDL	NA	BDL	BDL	**54.1**	BDL	BDL	BDL	BDL	BDL	BDL
MW-10	05/20/14	<6	NA	NA	<4	NA	NA	NA	3.7 B	NA	24.1	NA	3.2 B	NA	NA	<10	26.9
MW-11	11/09/12	BDL	BDL	NA	BDL	BDL	BDL	NA	18.1	BDL	**73**	BDL	BDL	BDL	BDL	BDL	24.6
MW-12	11/09/12	BDL	BDL	NA	BDL	BDL	BDL	NA	7.6	BDL	**103**	BDL	BDL	BDL	BDL	BDL	10.2
MW-13	11/09/12	BDL	BDL	NA	BDL	BDL	BDL	NA	BDL	BDL	18.1	BDL	BDL	BDL	BDL	BDL	BDL
MW-14	02/18/13	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-15	02/18/13	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

TABLE 5. SUMMARY OF HISTORICAL GROUNDWATER RESULTS FOR METALS - ECI ELON FACILITY - ELON, NORTH CAROLINA

Sample ID	Date	Metals - EPA Method 6010 (µg/L)															
		Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium, Total	Chromium VI	Copper	Lead	Manganese	Mercury	Nickel	Selenium	Silver	Thallium	Zinc
NC 2L Groundwater		**1 ***	**10**	**700**	**4 ***	**2**	**10**		**1000**	**15**	**50**	**1**	**100**	**20**	**20**	**0.2 ***	**1000**
MW-16	02/18/13	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-16	03/13/13	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-1	07/20/11	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-2	07/21/11	NA	BDL	83	NA	BDL	BDL	NA	NA	7.5	NA	BDL	NA	BDL	BDL	NA	31
GP-2	11/07/12	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-2	05/22/14	<120	NA	NA	<80	NA	NA	NA	**1410**	NA	**8610**	NA	**422 B**	NA	NA	<200	983
GP-3	07/21/11	NA	BDL	60	NA	BDL	BDL	NA	NA	BDL	NA	BDL	NA	BDL	BDL	NA	NA
GP-4	07/22/11	NA	BDL	23	NA	**18**	BDL	NA	NA	5.1	NA	BDL	NA	BDL	BDL	NA	NA
GP-5	07/22/11	NA	BDL	38	NA	BDL	BDL	NA	NA	BDL	NA	BDL	NA	BDL	BDL	NA	NA
GP-6	07/19/11	NA	BDL	21	NA	BDL	BDL	NA	NA	BDL	NA	BDL	NA	BDL	BDL	NA	BDL
GP-7	07/22/11	NA	BDL	59	NA	BDL	BDL	NA	NA	BDL	NA	BDL	NA	BDL	BDL	NA	NA
GP-8	07/22/11	NA	BDL	48	NA	**15**	BDL	NA	NA	BDL	NA	BDL	NA	BDL	BDL	NA	NA
GP-9	07/22/11	NA	BDL	36	NA	BDL	BDL	NA	NA	BDL	NA	BDL	NA	BDL	BDL	NA	NA
GP-10	07/28/11	NA	BDL	44	NA	BDL	BDL	NA	NA	BDL	NA	BDL	NA	BDL	BDL	NA	NA
GP-11	07/28/11	NA	BDL	88	NA	BDL	BDL	NA	NA	**81**	NA	BDL	NA	BDL	BDL	NA	NA

Notes:
Groundwater criteria are NC2L Standards (15A NCAC 02L .0202 Groundwater Standards, effective April 1, 2013) or Interm Maximum Allowable Concentrations (IMACs); IMACs denoted by *
BDL: Below Laboratory Detection Limit; NA: Not Analyzed; NE: Not Established
µg/L = micrograms per liter
Highlighted values exceed NC2L Standards

TABLE 6. SUMMARY OF NATURAL ATTENUATION PARAMETERS (MAY 2014) - ECI ELON FACILITY - ELON, NORTH CAROLINA

Monitoring Well ID	Sample Date	Nitrogen, Nitrate mg/l	Nitrogen, Nitrite mg/l	Sulfate mg/l	Total Organic Carbon mg/l	pH	Specific Conductivity (mS/cm)	Dissolved Oxygen (mg/l)	Temperature (˚C)	Oxidation Reduction Potential (mV)	Turbidity (NTU)
Ideal Requirements for Natural Attenuation		<1	<1	<20	>20	5 to 9	(Purge Stabilization Parameter)	<1	>20 (Microbial Activity Slows at Lower Temperatures	<50	(Purge Stabilization Parameter)
DW-1	05/21/14	0.15	<0.1	8	0.4 B	6.43	157	1.21	22.00	41	11
DW-1	10/16/14	NA	NA	NA	NA	6.75	127	2.99	19.45	148	3
DW-1	12/08/14	NA	NA	NA	NA	7.36	119	2.51	17.04	65.3	NM
DW-1	12/10/14	NA	NA	NA	NA	6.48	123	4.24	17.38	244.9	NM
DW-2	05/19/14	NA	NA	NA	NA	6.81	168	1.87	21.00	50	9
DW-2	10/16/14	NA	NA	NA	NA	9.27	139	1.21	17.85	138	4
DW-2D	10/16/14	NA	NA	NA	NA	9.20	306	0.80	17.73	139	8
DW-3	05/21/14	0.79	<0.1	25.8	1.4	7.53	243.9	2.39	20.20	36.3	8.32
DW-4	05/21/14	0.56	<0.1	51.8	2	8.48	391	4.72	20.70	83	41
DW-4	10/16/14	NA	NA	NA	NA	6.13	108	1.59	17.70	148	185
DW-5	05/21/14	0.25	<0.1	31.7	0.71 B	6.51	207	5.12	24.10	149	95
MW-1	05/20/14	0.34	<0.1	1 B	0.23 B	4.51	47.3	2.31	16.70	269.4	2.07
MW-2	05/19/14	NA	NA	NA	NA	4.87	60	5.22	19.50	130	3
MW-3	05/20/14	0.11	<0.1	1.1 B	<1	4.74	57	5.53	19.90	141	222
MW-4	05/20/14	0.17	<0.1	11.3	0.31 B	6.31	152.9	5.78	18.70	188.8	0.96
MW-5	05/20/14	NA	NA	NA	NA	4.79	53.1	4.55	20.30	245.5	1.27
MW-6	05/19/14	NA	NA	NA	NA	5.15	53.4	4.83	17.80	206.7	3.28
MW-7	05/22/14	0.25	<0.1	0.67 B	<1	5.18	41.1	0.55	22.30	179.1	47.8
MW-7	12/08/14	NA	NA	NA	NA	5.29	41	1.8	17.83	115.2	NM
MW-7	12/10/14	NA	NA	NA	NA	5.04	41	4.44	17.79	269.7	NM
MW-8	05/21/14	1.4	<0.1	0.97 B	<1	4.41	44.9	0.93	21.60	223.2	22
MW-9	05/21/14	0.34	<0.1	0.86 B	0.24 B	4.55	38	0.59	19.20	176	>999
MW-10	05/20/14	0.78	<0.1	<2	0.28 B	5.11	56	3.75	21.90	153	60
MW-11	05/21/14	NA	NA	NA	NA	5.48	85.2	3.54	19.30	207.1	2.89
MW-12	05/20/14	NA	NA	NA	NA	5.58	68	4.09	21.90	200.4	1.93
MW-13	05/19/14	NA	NA	NA	NA	5.16	41.9	4.81	17.80	199.6	5.97
MW-14	05/21/14	NA	NA	NA	NA	5.23	42	6.37	13.50	18.2	34
MW-15	05/21/14	NA	NA	NA	NA	4.96	26	4.92	13.90	175	59
MW-16	05/21/14	<0.1	<0.1	<2	0.49 B	6.70	110.1	0.8	16.70	-99.3	65.9
AS-1	12/08/14	NA	NA	NA	NA	11.59	985	4.33	18.17	-54.9	NM
AS-1	12/10/14	NA	NA	NA	NA	6.52	128	9.12	17.51	240.1	NM
OB-1B	12/08/14	NA	NA	NA	NA	5.93	102	5.9	17.64	175	NM
OB-1B	12/10/14	NA	NA	NA	NA	6.02	90	7.83	17.84	240.3	NM
OB-2B	12/08/14	NA	NA	NA	NA	6.20	103	7.71	17.58	160.4	NM
OB-2B	12/10/14	NA	NA	NA	NA	6.15	105	6.78	17.40	240.4	NM
GP-2	05/22/14	0.99	<0.1	1.3 B	0.4 B	4.97	130.1	3.63	20.60	209.6	>1000

Notes:
NA = Not applicable
Highlighted values indicate Ideal Requirements for Natural Attenuation
mg/l = milligrams per liter
mS/cm = milliSiemens per centimeter
mV = millivolts
NTU = Nephelometric turbidity unit

Table 7A. Treatment Technologies Screening Matrix - Groundwater at Source Area
ECI - Elon, North Carolina

RATING CODES

● - Technology is very effective under these conditions

○ - Technology has limited effectiveness under these conditions

⊗ - Technology will not be effective under these conditions

	Anaerobic Bioremediation			In Situ Chemical Oxidation					Thermal Treatment				
	Reductive Dechlorination	Sulfate Reduction	Aerobic Bioremediation	Permanganate	Persulfate	Air Sparge/Soil Vapor Extraction	Zero Valent Iron	Dual Phase Extraction	Steam	Electric Resistance Heating	Hydraulic Containment	Physical Containment	Monitored Natural Attenuation
Contaminants of Concern													
Chlorinated ethenes and ethanes	●	⊗	⊗	●	●	●	●	⊗	●	●	●	●	●
Depth to Groundwater													
>20 ft bgs	●	●	●	●	●	●	●	●	●	●	●	●	●
Total Depth of Treatment Area													
less than 60 ft bgs	●	●	●	●	●	●	●	●	●	●	●	●	●
Geology													
primarily silty material (moderate permeability)	●	●	●	●	●	●	●	●	○	○	●	●	●
Depth to Confining Unit													
Less than 60 ft bgs	●	●	●	●	●	●	●	●	●	●	●	●	●
pH													
less than 5	⊗	⊗	⊗	●	●	●	●	●	●	●	●	●	●
Dissolved Oxygen/ORP													
ORP greater than 0, DO greater than 2 mg/L	○	○	●	●	●	●	●	●	●	●	●	●	●
Contaminant Trends													
Contaminant concentration trends are increasing, variable, or stable across the site (residual contaminant source mass present)	●	●	●	●	●	●	●	●	●	●	●	●	⊗
Technology Specific Parameters													
No Vinyl Chloride is present at the site	○	●	●	●	●	●	●	●	●	●	●	●	●
The background oxidant demand is expected to be less than 5 mg/kg	●	●	●	●	●	●	●	●	●	●	●	●	●
Retained for Further Consideration	No	No	No	Yes		Yes	Yes	No	Yes		Yes	Yes	No

Table 7B. Treatment Technologies Screening Matrix - Soil at Source Area
ECI - Elon, North Carolina

RATING CODES
● - Technology is very effective under these conditions
○- Technology has limited effectiveness under these conditions
⊗ - Technology will not be effective under these conditions

	Bioventing (Aerobic Bioremediation)	Chemical Oxidation Soil Blending		Excavation	Soil Vapor Extraction	Dual Phase Extraction	Thermal Treatment		Engineering/Institutional Controls
		Permanganate	Persulfate				Steam	Electric Resistance Heating	
Contaminants of Concern									
Chlorinated ethenes and ethanes	⊗	●	●	●	●	⊗	●	●	●
Depth of Treatment Area									
10 to 20 ft bgs	●	●	●	●	●	●	●	●	●
Geology									
primarily silty material (moderate permeability)	●	●	●	●	●	●	○	○	●
Technology Specific Parameters									
The background oxidant demand is expected to be less than 5 g/kg (48 hour test)	●	●	●	●	●	●	●	●	●
Retained for Further Consideration	**No**	**Yes**		**Yes**	**Yes**	**No**	**Yes**		**Yes**

Table 8A. EPA Criteria Screening Matrix - Groundwater in Source Area
ECI - Elon, North Carolina

EPA Performance Criteria	Rating Guidance		In Situ Chemical Oxidation	Air Sparge/Soil Vapor Extraction	Zero Valent Iron	Thermal Treatment	Hydraulic Containment	Physical Containment
Overall Protection of Human Heath and the Environment								
Does the treatment technology protect the site specific primary exposure pathways?	Risks eliminated or reduced to minimal levels	8	8	8	8	8	4	4
	Risks reduced to adequate levels	4						
	Risks controlled	0						
Could the treatment technology pose any short term or cross-media impacts?	Yes	0	2	2	2	2	2	2
	No	2						
Compliance with Regulatory Requirements								
Is the treatment technology capable of reducing contaminant concentrations to the regulatory limits?	Regulatory limits can be attained by the technology	10	5	5	5	10	0	0
	Regulatory limits can be attained following a period of natural attenuation or other remedial action	5						
	Regulatory limits will not be attained	0						
Long Term Effectiveness and Performance								
Potential residual risk for untreated contamination	No significant residual contamination or related risk	5	5	5	5	5	2	2
	Some residual contamination and related risk to be controlled, but limited (i.e. institutional controls only)	2						
Adequacy and reliability of required controls	No long term controls (engineering controls, long term O&M, long term maintenance) are required	5	5	5	5	5	2	2
	Long term O&M or maintenance of mitigation measure will be required	2						
Reduction of Toxicity, Mobility, or Volume								
Does the treatment technology reduce the toxicity, mobility or volume of the contamination?	Technology destroys or removes contaminant mass	5	5	5	5	5	0	0
	Technology contains/reduces mobility of contaminant mass but does not destroy it	0						
Is the treatment technology irreversible?	Contaminant mass is permanently destroyed or removed	5	5	5	5	5	0	0
	Technology contains/reduces mobility of contaminant mass but does not destroy it	0						
Short Term Effectiveness								
Will there be significant additional risks to the community, workers, or the environment as a result of implementing this technology?	Technology requires use of extremely hazardous material or may result in extreme added risk if not properly managed	0	2	5	2	0	5	5
	Additional hazards may be used or generated by this technology (chemicals, hazardous waste, etc) but can be mitigated	2						
	No additional risks will be incured as result of implementing this technology	5						
Time until remedial response objectives are achieved	Treatment time is expected to be between 0 and 5 years	5	5	5	5	5	0	0
	Treatment time is expected to be between 5 and 10 years	2						
	Treatment time is expected to be greater than 10 years	0						
Implementability								
Ability to construct and operate technology	Construction and operation is average compared to other technologies	5	5	5	2	2	2	2
	Construction and operation is expected to be more difficult when compared to other technologies	2						
Availability of vendors and specialists	Commonly implemented technology, several vendors/specialists available	5	5	5	2	2	5	5
	Difficult technology to implement or technology currently under development	2						

Table 8A. EPA Criteria Screening Matrix - Groundwater in Source Area
ECI - Elon, North Carolina

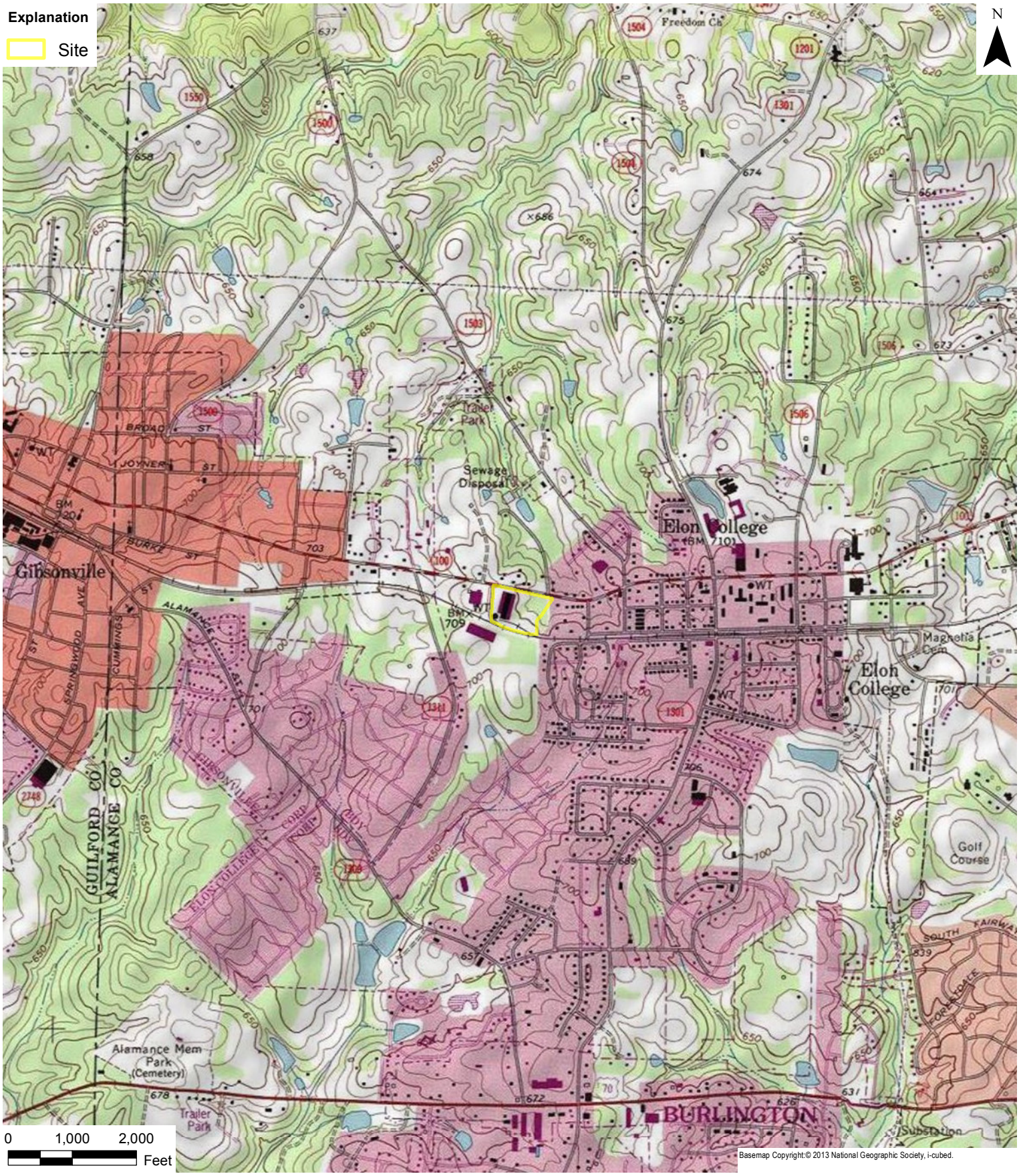
EPA Performance Criteria	Rating Guidance		In Situ Chemical Oxidation	Air Sparge/Soil Vapor Extraction	Zero Valent Iron	Thermal Treatment	Hydraulic Containment	Physical Containment
Cost								
Capital costs	Anticipated capital cost is relatively low (i.e. <$500,000)	5	5	5	5	0	2	2
	Anticipated capital cost is moderate (i.e. $500,000 - $1,500,000)	2						
	Anticipated capital cost is relatively high (i.e. >$1,500,000)	0						
Operation and maintenance costs	No ongoing operation and maintenance requirements	5	5	2	5	2	0	0
	Operation and maintenance will be required for less than 5 years	2						
	Long term operation and maintenance will be required	0						
State Acceptance								
Is the technology likely acceptable by the state regulatory agency?	Technology will be completely acceptable to the state	10	10	10	10	10	10	10
	State may have concerns about the technology, but will ultimately approve the remedy	5						
	State is unlikely to approve the remedy	0						
Community Acceptance								
Is the technology likely acceptable by the community?	Technology will be acceptable to the community	10	10	10	10	10	10	10
	Community may have concerns about the technology, but will ultimately approve the remedy	5						
	Community is unlikely to approve the remedy	0						
		TOTAL (maximum score is 90)	**82**	**82**	**76**	**71**	**44**	**44**
		Precentage of Maximum Score	**91%**	**91%**	**84%**	**79%**	**49%**	**49%**
		Retained	✓	✓				

Table 8B. EPA Criteria Screening Matrix - Soil in Source Area
ECI - Elon, North Carolina

EPA Performance Criteria	Rating Guidance		Chemical Oxidation Soil Blending	Soil Vapor Extraction	Excavation	Thermal Treatment	Engineering/Institutional Controls
Overall Protection of Human Heath and the Environment							
Does the treatment technology protect the site specific primary exposure pathways?	Risks eliminated or reduced to minimal levels	8	8	8	8	8	4
	Risks reduced to adequate levels	4					
	Risks controlled but not reduced	0					
Could the treatment technology pose any short term or cross-media impacts?	Yes	0	2	2	2	2	0
	No	2					
Compliance with Regulatory Requirements							
Is the treatment technology capable of reducing contaminant concentrations to the regulatory limits?	Regulatory limits can be attained by the technology	10	10	10	10	10	0
	Regulatory limits can be attained following a period of natural attenuation or other remedial action	5					
	Regulatory limits will not be attained	0					
Long Term Effectiveness and Performance							
Potential residual risk for untreated contamination	No significant residual contamination or related risk	5	5	5	5	5	2
	Some residual contamination and related risk to be controlled, but limited (i.e. institutional controls only)	2					
Adequacy and reliability of required controls	No long term controls (engineering controls, long term O&M, long term maintenance) are required	5	5	5	5	5	2
	Long term O&M or maintenance of mitigation measure will be required	2					
Reduction of Toxicity, Mobility, or Volume							
Does the treatment technology reduce the toxicity, mobility or volume of the contamination?	Technology destroys or removes contaminant mass	5	5	5	5	5	0
	Technology contains/reduces mobility of contaminant mass but does not destroy it	0					
Is the treatment technology irreversible?	Contaminant mass is permanently destroyed or removed	5	5	5	5	5	0
	Technology contains/reduces mobility of contaminant mass but does not destroy it	0					
Short Term Effectiveness							
Will there be significant additional risks to the community, workers, or the environment as a result of implementing this technology?	Technology requires use of extremely hazardous material or may result in extreme added risk if not properly managed	0	2	5	5	0	5
	Additional hazards may be used or generated by this technology (chemicals, hazardous waste, etc) but can be mitigated	2					
	No additional risks will be incured as result of implementing this technology	5					
Time until remedial response objectives are achieved	Treatment time is expected to be between 0 and 5 years	5	5	5	5	5	0
	Treatment time is expected to be between 5 and 10 years	2					
	Treatment time is expected to be greater than 10 years	0					
Implementability							
Ability to construct and operate technology	Construction and operation is average compared to other technologies	5	2	5	5	2	5
	Construction and operation is expected to be more difficult when compared to other technologies	2					
Availability of vendors and specialists	Commonly implemented technology, several vendors/specialists available	5	2	5	5	2	5
	Difficult technology to implement or technology currently under development	2					

Cost							
Capital costs	Anticipated capital cost is relatively low (i.e. <$500,000)	5	5	5	5	2	5
	Anticipated capital cost is moderate (i.e. $500,000 - $1,500,000)	2					
	Anticipated capital cost is relatively high (i.e. >$1,500,000)	0					
Operation and maintenance costs	No ongoing operation and maintenance requirements	5	5	2	5	2	5
	Operation and maintenance will be required for less than 5 years	2					
	Long term operation and maintenance will be required	0					
State Acceptance							
Is the technology likely acceptable by the state regulatory agency?	Technology will be completely acceptable to the state	10	10	10	10	10	0
	State may have concerns about the technology, but will ultimately approve the remedy	5					
	State is unlikely to approve the remedy	0					
Community Acceptance							
Is the technology likely acceptable by the community?	Technology will be acceptable to the community	10	10	10	10	10	0
	Community may have concerns about the technology, but will ultimately approve the remedy	5					
	Community is unlikely to approve the remedy	0					
	TOTAL (maximum score is 90)		**81**	**87**	**90**	**73**	**33**
	Precentage of Maximum Score		**90%**	**97%**	**100%**	**81%**	**37%**
	Retained			✓	✓		

Figures



ERM NC, Inc.

DATE: 4/24/2015	SCALE: AS SHOWN	DRAWN: A Freeman

FILE: T:\Projects A to M\ECI\01 - Elon\6. Maps\ElonGIS\MXD\2015 04_RAP\Figure 1_SLM.mxd

FIGURE 1
Site Location Map
Engineered Controls International, LLC.
100 Rego Drive
Elon, Alamance County, North Carolina

ERM NC, Inc.

SCALE: AS SHOWN DRAWN: A Freeman DATE: 4/24/2015

T:\Projects A to M\ECI\01 - Elon\6. Maps\ElonGIS\MXD\2015 04_RAP\Figure 2_SM.mxd

FIGURE 2
Site Map
Engineered Controls International, LLC.
100 Rego Drive
Elon, Alamance County, North Carolina

ERM

ERM NC, Inc.

SCALE: AS SHOWN DRAWN: A Freeman DATE: 4/24/2015

T:\Projects A to M\ECI\01 - Elon\6. Maps\ElonGIS\MXD\2015 04_RAP\Figure 3_AdjProp.mxd

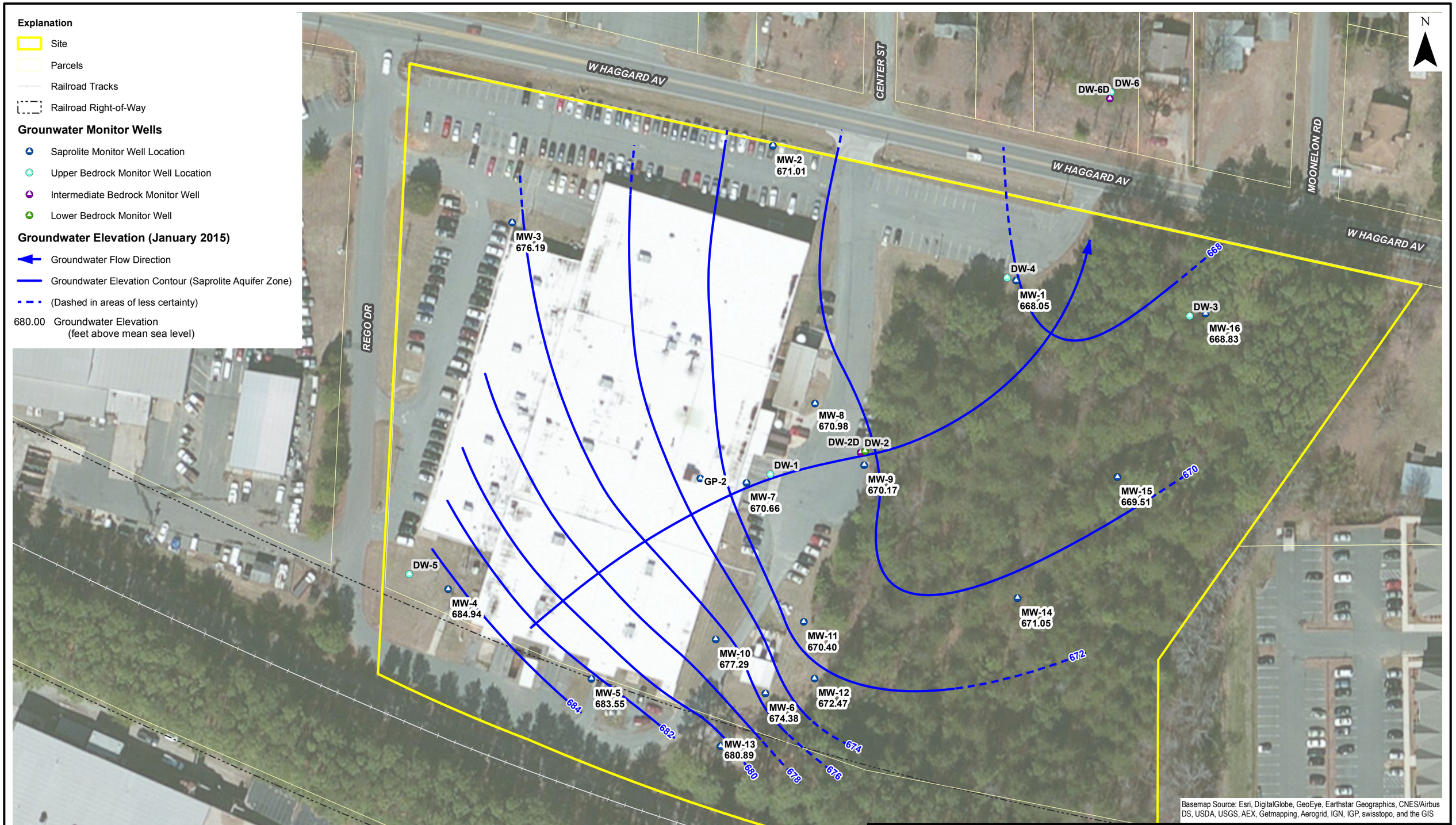
FIGURE 3
Adjacent Properties Map
Engineered Controls International, LLC.
100 Rego Drive
Elon, Alamance County, North Carolina

ERM NC, Inc.

SCALE: AS SHOWN DRAWN: A Freeman DATE: 4/24/2015

T:\Projects A to M\ECI\01 - Elon\6_ Maps\ElonGIS\MXD\2015 04 RAP\Figure 4_GWLoc.mxd

FIGURE 4
Groundwater Sample Locations
Engineered Controls International, LLC.
100 Rego Drive
Elon, Alamance County, North Carolina

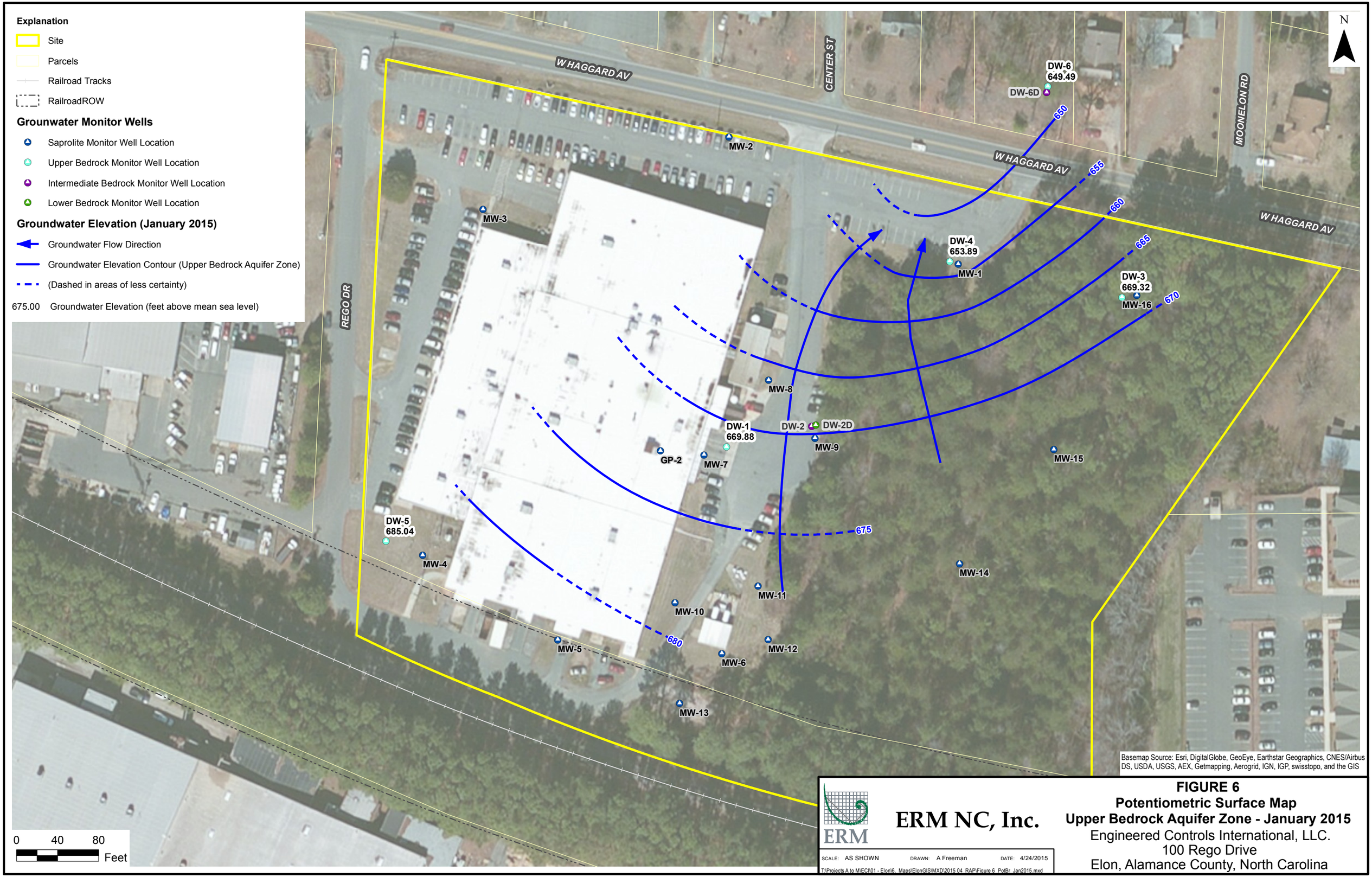


ERM NC, Inc.

SCALE: AS SHOWN DRAWN: A Freeman DATE: 4/24/2015

T:\Projects A to M\ECI\01 - Elon\6. Maps\ElonGIS\MXD\2015 04 RAP\Figure 5 PotSap Jan2015.mxd

FIGURE 5
Potentiometric Surface Map
Saprolite Aquifer Zone - January 2015
Engineered Controls International, LLC.
100 Rego Drive
Elon, Alamance County, North Carolina

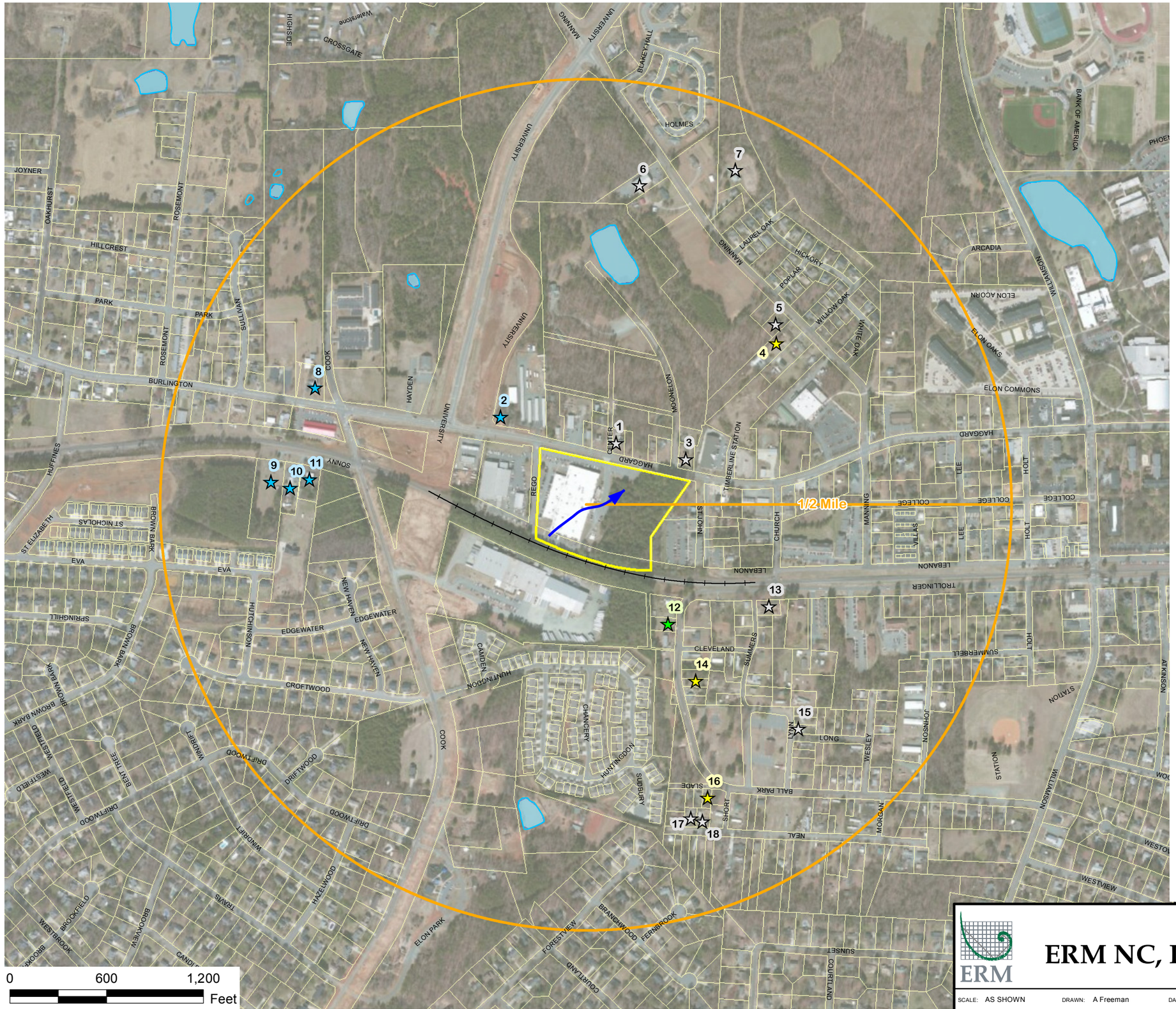


ERM NC, Inc.

SCALE: AS SHOWN DRAWN: A Freeman DATE: 4/24/2015

T:\Projects A to M\ECI\01 - Elon\6. Maps\ElonGIS\MXD\2015 04 RAP\Figure 6 PotBr Jan2015.mxd

FIGURE 6
Potentiometric Surface Map
Upper Bedrock Aquifer Zone - January 2015
Engineered Controls International, LLC.
100 Rego Drive
Elon, Alamance County, North Carolina



Observed Supply Wells

Well ID	Address	Notes
1	606 W Haggard Ave, Elon	24" dug well, Status Confirmed
2	802 W Haggard Ave, ELon	Status Confirmed
3	516 W Haggard Ave, Elon	Status Confirmed
4	418 Manning Ave, Elon	Well Observed
5	420 Manning Ave, Elon	Shared by 420 & 422
6	456 Manning Ave, Elon	Status Confirmed
7	441 Manning Ave, Elon	Status Confirmed
8	962 Burlington Ave, Gibsonville	Status Confirmed
9	955 Sonny Ln, Elon	Well Observed
10	963 Sonny Ln, Elon	Shared by 963 & 963A
11	963 Sonny Ln, Elon	Well Observed
12	503 Ballpark Ave, Elon	Status Confirmed
13	602 Ballpark Ave, Elon	Well Observed
14	430 Ballpark Ave, Elon	Water Meter Observed
15	202 Lynn St, Elon	2 Wells Observed
16	103 Slade St, Elon	Water Meter Observed
17	304 Neal St, Elon	Well Observed
18	302 Neal St, Elon	Well Observed

Basemap Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS

ERM

ERM NC, Inc.

SCALE: AS SHOWN DRAWN: A Freeman DATE: 4/24/2015

T:\Projects A to M\ECI\01 - Elon\6. Maps\ElonGIS\MXD\2015 04_RAP\Figure 7_SRS.mxd

FIGURE 7
Sensitive Receptor Survey
Engineered Controls International, LLC.
100 Rego Drive
Elon, Alamance County, North Carolina

ERM NC, Inc.

SCALE: AS SHOWN DRAWN: A Freeman DATE: 4/24/2015

T:\Projects A to M\ECI\01 - Elon\6. Maps\ElonGIS\MXD\2015 04_RAP\Figure 8_AOC.mxd

FIGURE 8
Areas of Concern
Engineered Controls International, LLC.
100 Rego Drive
Elon, Alamance County, North Carolina

Explanation

Sample Type (Maximum TCE Result in µg/kg)

- Background Soil Sample Location
- Direct Push Soil Sample Location
- Hand Auger Soil Sample Location
- Monitor Well Soil Sample Location
- Lateral Extent of TCE above Site Specific SRG

Concentration of TCE in Soil (µg/kg)

- >1,800 µg/kg TCE
- >180 µg/kg TCE
- >18 µg/kg TCE

Trichloroethene (TCE) concentrations in micrograms per kilogram (µg/kg)

Vertical maximum concentration shown at each location

NA - Not Analyzed
BDL - Below Detection Limits

NC Protection of Groundwater Screening Threshold for TCE = 18 µg/kg

NC Delineation Standard for TCE = 880 µg/kg

Site Specific Soil Remediation Goal (SRG) for TCE = 6,600 µg/kg (6.6 mg/kg)

ERM

ERM NC, Inc.

SCALE: AS SHOWN DRAWN: A Freeman DATE: 4/24/2015

T:\Projects A to M\ECI\01 - Elon\6. Maps\ElonGIS\MXD\2015 04_RAP\Figure 9_SIso.mxd

FIGURE 9
Soil Isoconcentration Map - TCE
Engineered Controls International, LLC.
100 Rego Drive
Elon, Alamance County, North Carolina

Explanation

- Site
- Parcels
- Railroad Tracks
- Railroad Right-of-Way

Sample ID (TCE Concentration (µg/L)

- Saprolite Monitor Well Location
- Upper Bedrock Well Location
- Intermediate Bedrock Well Location
- Lower Bedrock Well Location
- Historical Temporary Well Location

TCE in the Saprolite Aquifer (Most Recent)

- > 300 µg/L
- > 30 µg/L
- > 3 µg/L

Trichloroethene (TCE) concentrations in micrograms per liter (µg/L)

"<" - Below Practical Quantitation Limit

NC 2L Groundwater Standard for TCE = 3 µg/L

*** Historical TCE Concentration**
Most recent groundwater concentration from each monitor well location used for contouring
(See analytical table for exact sample dates)

Basemap Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP,

ERM

ERM NC, Inc.

SCALE: AS SHOWN DRAWN: A Freeman DATE: 4/24/2015

T:\Projects A to M\ECI\01 - Elon\6. Maps\ElonGIS\MXD\2015 04 RAP\Figure 10 GWIsoSap.mxd

FIGURE 10
TCE Isoconcentration Contours
Saprolite Aquifer Zone
Engineered Controls International, LLC.
100 Rego Drive
Elon, Alamance County, North Carolina

Explanation

- Site
- Parcels
- Railroad Tracks
- Railroad Right-of-Way

Sample ID (TCE Concentration (µg/L)

- Saprolite Monitor Well Location
- Upper Bedrock Well Location
- Intermediate Bedrock Well Location
- Lower Bedrock Well Location

TCE in the Bedrock Aquifer (Most Recent)

- > 30 µg/L
- > 3 µg/L

Trichloroethene (TCE) concentrations in micrograms per liter (µg/L)

"<" - Below Practical Quantitation Limit

NC 2L Groundwater Standard for TCE = 3 µg/L

Most recent groundwater concentration from each monitor well location used for controuring (See analytical table for exact sample dates)

Basemap Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP,

ERM

ERM NC, Inc.

SCALE: AS SHOWN DRAWN: A Freeman DATE: 4/24/2015

T:\Projects A to M\ECI\01 - Elon\6. Maps\ElonGIS\MXD\2015 04 RAP\Figure 11 GWIsoBr.mxd

FIGURE 11
TCE Isoconcentration Contours
Bedrock Aquifer Zone

Engineered Controls International, LLC.
100 Rego Drive
Elon, Alamance County, North Carolina

Explanation

- Site
- Parcels
- Railroad Tracks
- Railroad Right-of-Way

Sample ID (PCE Concentration (µg/L)

- Saprolite Monitor Well Location
- Upper Bedrock Well Location
- Intermediate Bedrock Well Location
- Lower Bedrock Well Location
- Historical Temporary Well Location

PCE in Groundwater (Most Recent)

- > 70 µg/L
- > 7 µg/L
- > 0.7 µg/L

Tetrachloroethene (PCE) concentrations in micrograms per liter (µg/L)

"<" - Below Practical Quantitation Limit

NC 2L Groundwater Standard for PCE = 0.7 µg/L

*** Historical PCE Concentration**
Most recent groundwater concentration from each monitor well location used for contouring
(See analytical table for exact sample dates)

Basemap Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP,

ERM

ERM NC, Inc.

SCALE: AS SHOWN DRAWN: A Freeman DATE: 4/24/2015

T:\Projects A to M\ECI\01 - Elon\6. Maps\ElonGIS\MXD\2015 04 RAP\Figure 12 GWPCEIso.mxd

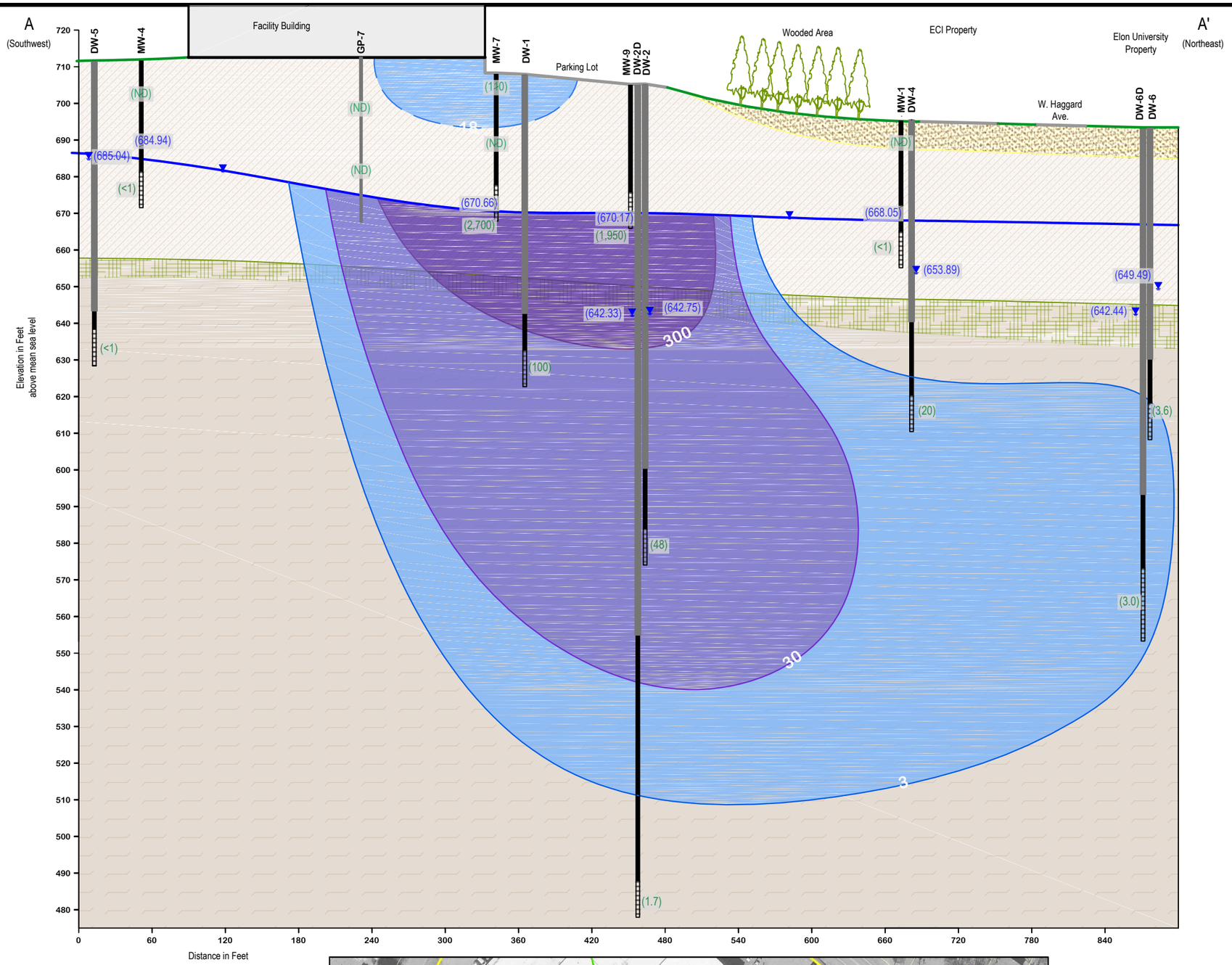
FIGURE 11
PCE Isoconcentration Contours
Vertical Maximum
Engineered Controls International, LLC.
100 Rego Drive
Elon, Alamance County, North Carolina

ERM NC, Inc.

SCALE: AS SHOWN DRAWN: A Freeman DATE: 4/24/2015

T:\Projects A to M\ECI\01 - Elon\6. Maps\ElonGIS\MXD\2015 04 RAP\Figure 13 Transects.mxd

FIGURE 13
Cross Section Location Map
Engineered Controls International, LLC.
100 Rego Drive
Elon, Alamance County, North Carolina



NOTES

- Outer Casing
- Monitor Well Riser
- Monitor Well Screened Interval
- Estimated Ground Surface (Grass)
- Estimated Ground Surface (Asphalt)
- Groundwater Surface
- Approximate Groundwater Surface Contour
- (600) Groundwater Elevation (feet above mean sea level)
- Fine Sand
- Silty Clay / Clayey Silt
- Partially Weathered Rock
- Bedrock

Soil - TCE Isoconcentration Contours

(110) TCE concentration in soil in micrograms per kilogram (µg/Kg)
NA = Not Analyzed
< = Below Detection Limit

TCE Concentration in Soil >18 µg/kg

Groundwater - TCE Isoconcentration Contours

(990) TCE concentration in monitor wells in micrograms per liter (µg/L)
Groundwater samples collected May/June 2014 through January 2015
(See Table for exact sampling dates)

TCE Concentration >300 µg/L

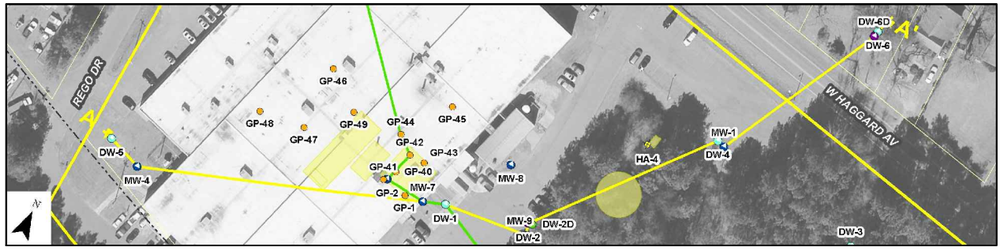
TCE Concentration >30 µg/L

TCE Concentration >3 µg/L

VE = Vertical Exaggeration

VE = 3x

SCALE IN FEET

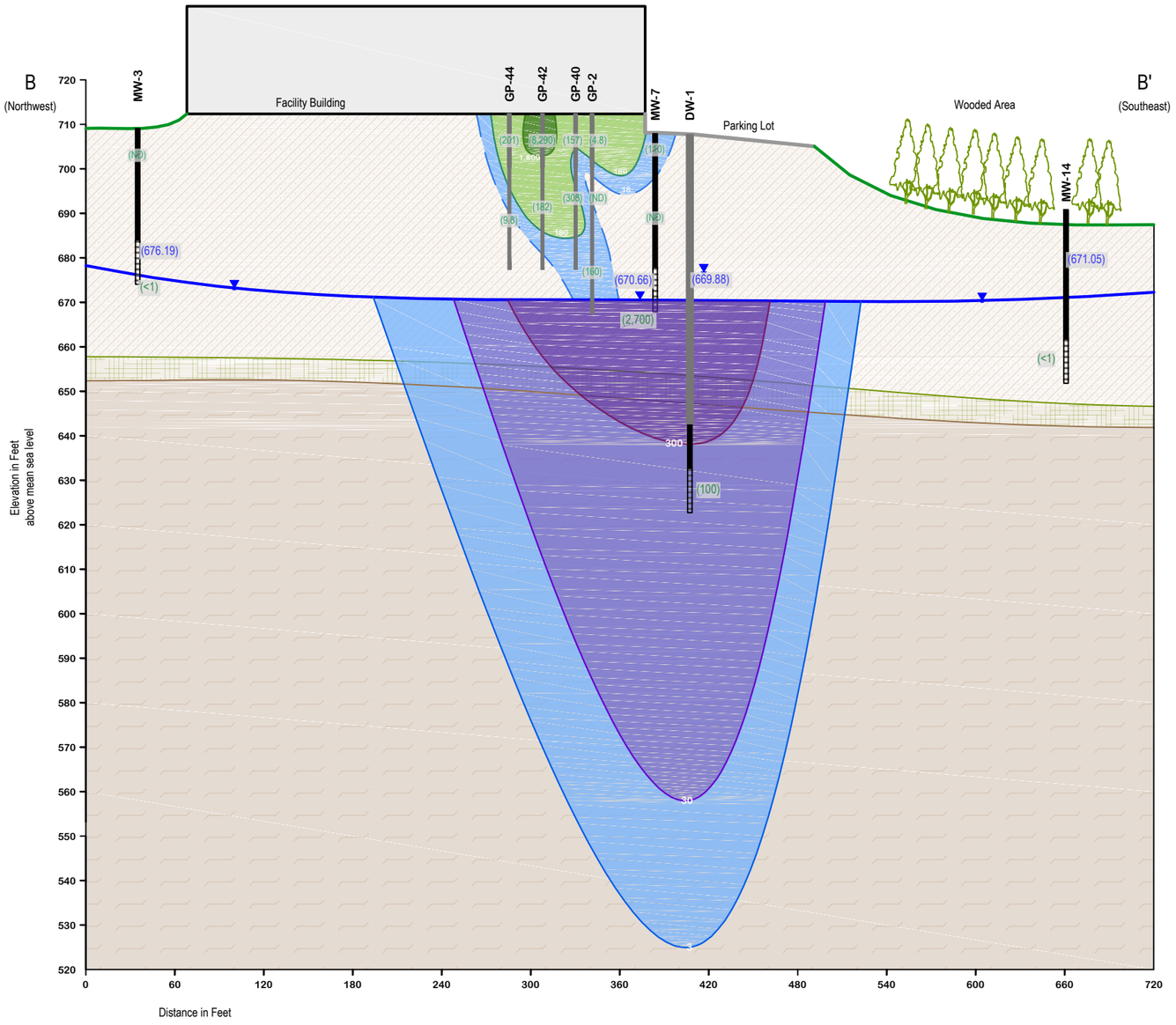


ERM NC, Inc.

FIGURE 14
Hydrogeologic Cross Section A-A'

Engineered Controls International, LLC.
100 Rego Drive
Elon, Alamance County, North Carolina

CrossSecOutput.DWG 4/24/2015



NOTES

- Outer Casing
- Monitor Well Riser
- Monitor Well Screened Interval
- Estimated Ground Surface (Grass)
- Estimated Ground Surface (Asphalt)
- Groundwater Surface
- Approximate Groundwater Surface Contour
- (600) Groundwater Elevation (feet above mean sea level)
- Silty Clay / Clayey Silt
- Partially Weathered Rock
- Bedrock

Soil - TCE Isoconcentration Contours

(110) TCE concentration in soil in micrograms per kilogram (µg/Kg)
NA = Not Analyzed
< = Below Detection Limit

- TCE Concentration in Soil >1,800 µg/kg
- TCE Concentration in Soil >180 µg/kg
- TCE Concentration in Soil >18 µg/kg

Groundwater - TCE Isoconcentration Contours

(990) TCE concentration in monitor wells in micrograms per liter (µg/L)
Groundwater samples collected May/June 2014 through January 2015
(See Table for exact sampling dates)

- TCE Concentration >300 µg/L
- TCE Concentration >30 µg/L
- TCE Concentration >3 µg/L

VE = Vertical Exaggeration

30
15
0
VE = 3x
SCALE IN FEET
0 45 90

ERM NC, Inc.

CrossSecOutput.DWG 4/24/2015

FIGURE 15
Hydrogeologic Cross Section B-B'

Engineered Controls International, LLC.
100 Rego Road
Elon, Alamance County, North Carolina

FIGURE 16
Pilot Test Wells and Layout
Engineered Controls International, LLC.
100 Rego Drive
Elon, Alamance County, North Carolina

Explanation

Conceptual Remedial Design Covering a 40,500' Area

- Proposed AS Well Location (42' Offset Grid Spacing)
- Proposed AS Well Location (42' Offset Grid Spacing)
- Soil Vapor Extraction Effective Radius of Influence (25')
- Air Sparge Effective Radius of Influence (25')

Sample ID (TCE Concentration (µg/L)

- Saprolite Monitor Well Location
- Upper Bedrock Well Location
- Intermediate Bedrock Well Location
- Lower Bedrock Well Location
- Historical Temporary Well Location

TCE in the Saprolite Aquifer (Most Recent)

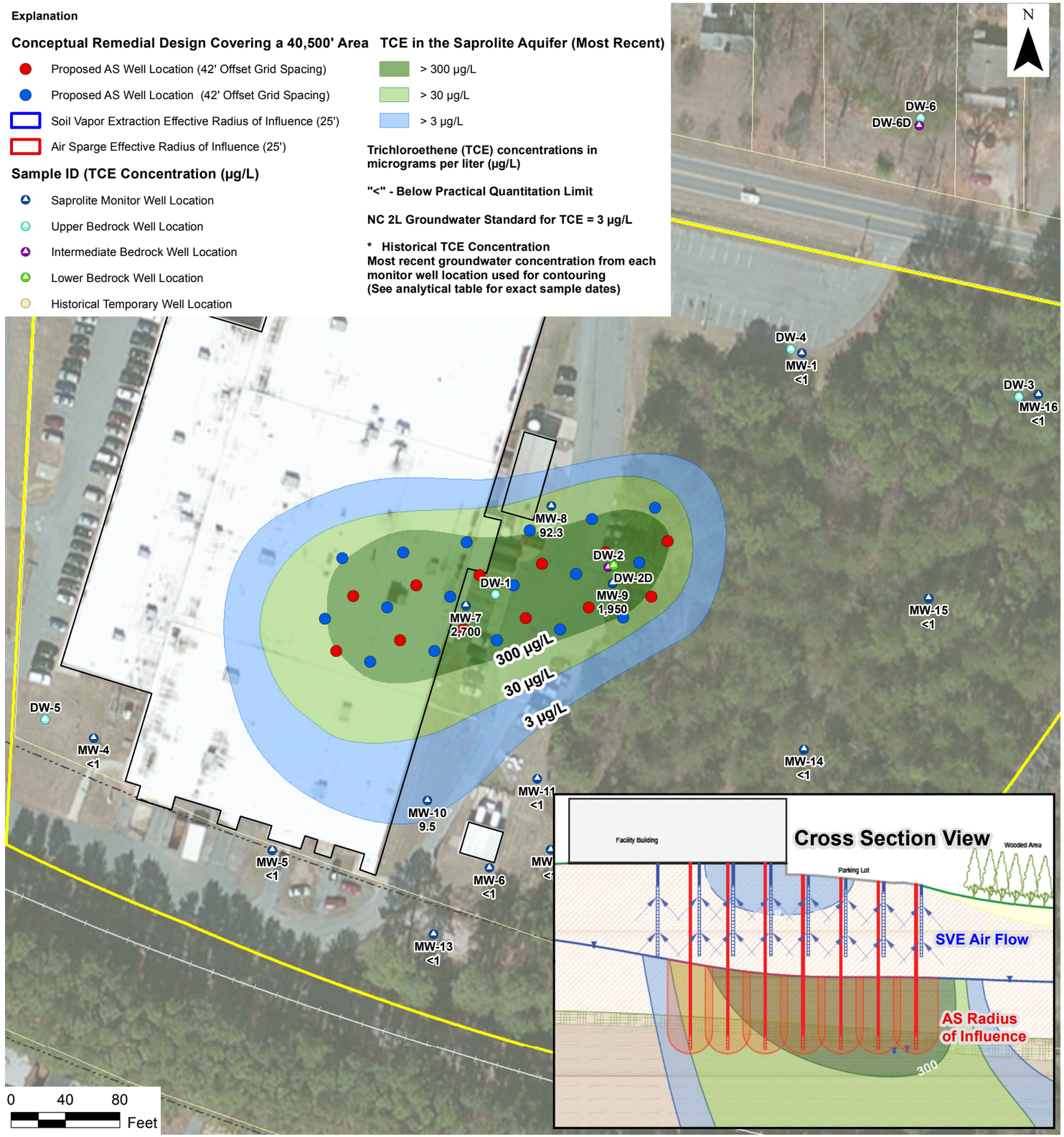
- > 300 µg/L
- > 30 µg/L
- > 3 µg/L

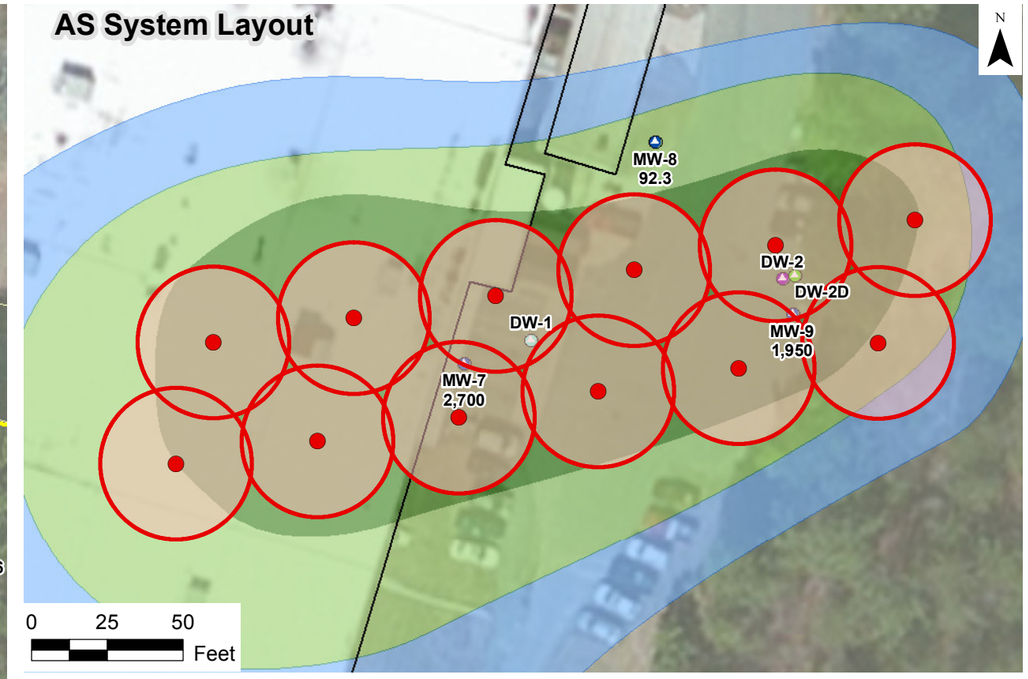
Trichloroethene (TCE) concentrations in micrograms per liter (µg/L)

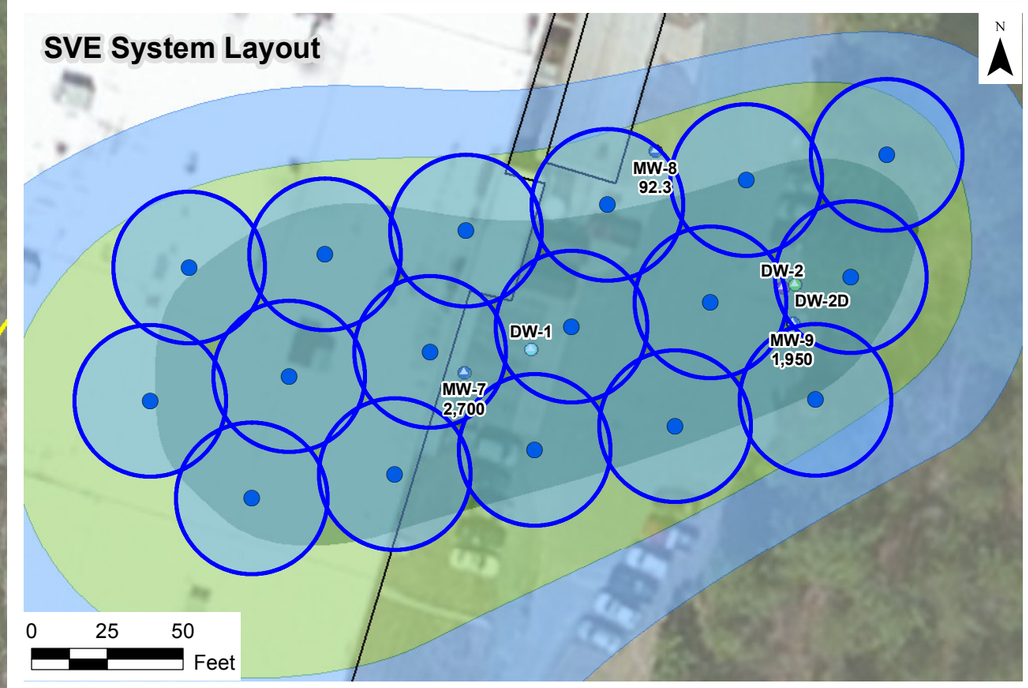
"<" - Below Practical Quantitation Limit

NC 2L Groundwater Standard for TCE = 3 µg/L

*** Historical TCE Concentration**
Most recent groundwater concentration from each monitor well location used for contouring
(See analytical table for exact sample dates)







Basemap Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community.

ERM

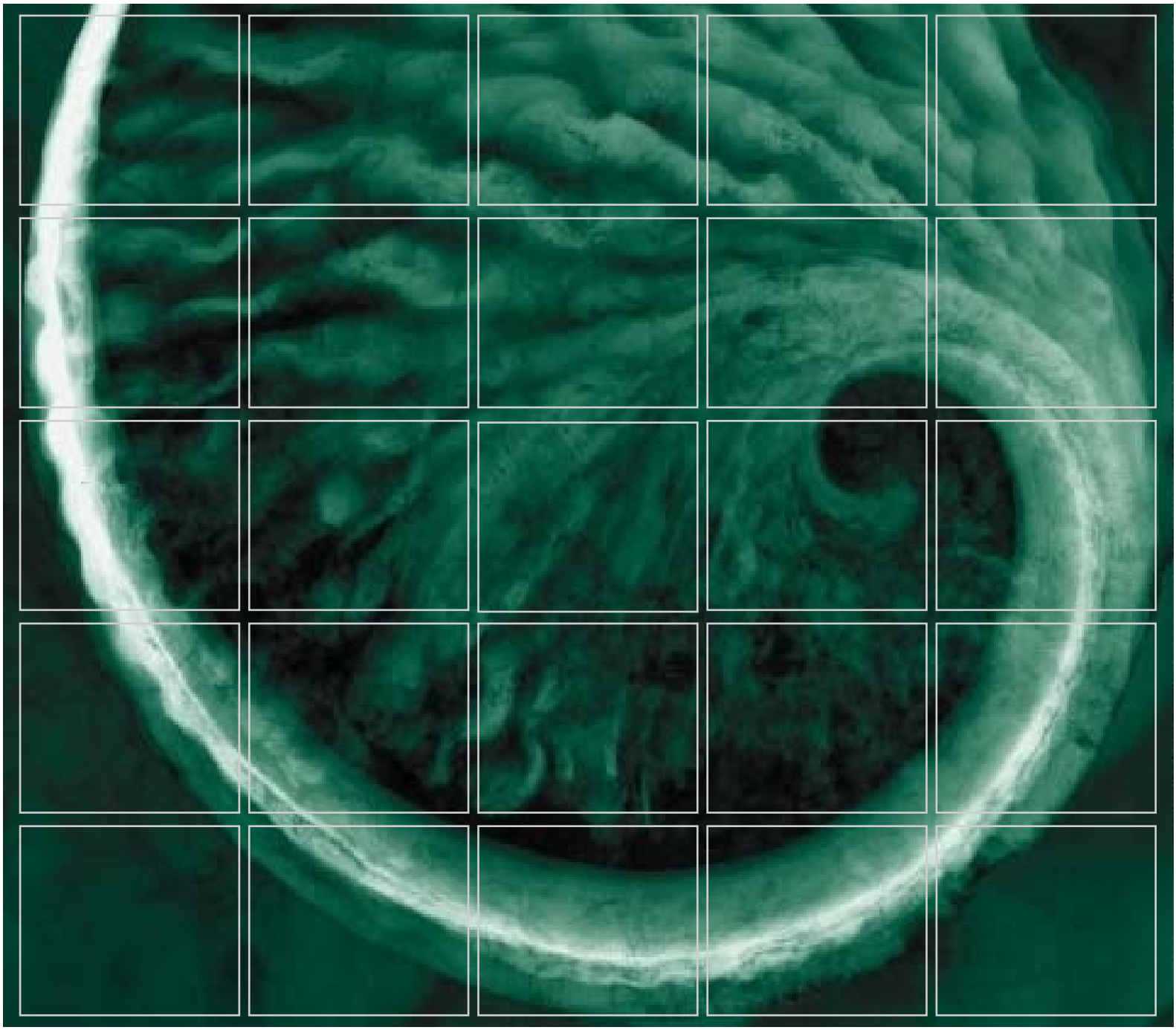
ERM NC, Inc.

SCALE: AS SHOWN DRAWN: A Freeman DATE: 5/8/2015

T:\Projects A to M\ECI\01 - Elon\6. Maps\ElonGIS\MXD\2015 04 RAP\Figure 17R_ConcepASSVE.mxd

FIGURE 17
Conceptual Remedial Design
AS/SVE System Layout
Engineered Controls International, LLC.
100 Rego Drive
Elon, Alamance County, North Carolina

Appendix A
AS/SVE Pilot Test Results



Engineered Controls International, LLC

Pilot Test Completion Report

Engineered Controls International, LLC
Elon Facility
100 Rego Drive, Elon, Alamance County, North Carolina
Site ID: NONCD0002904

Delivering sustainable solutions in a more competitive world

ERM

1.0 INTRODUCTION 1

2.0 AS/SVE PILOT TESTING 1

2.1 PILOT TEST OBJECTIVES 1

2.2 PILOT TEST WELL AND MONITORING POINT SUMMARY 1

2.2.1 Air Sparge Well 1

2.2.2 SVE Well 2

2.2.3 Observation Wells 2

2.3 PILOT TEST EQUIPMENT 2

2.3.1 Testing & Monitoring Equipment Summary 3

2.4 PILOT TEST PROCEDURES 4

2.5 PILOT TESTING RESULTS 6

2.5.1 SVE Summary 6

2.5.2 AS Summary 7

2.5.3 Effluent Sample Laboratory Data Evaluation 8

2.5.4 Groundwater Monitoring Results 9

3.0 PILOT STUDY CONCLUSIONS 10

List of Figures

FIGURE 1 SITE LOCATION MAP
FIGURE 2 SITE MAP

List of Appendices

APPENDIX A BORING LOGS AND WELL RECORDS
APPENDIX B FIELD MEASUREMENT SHEETS
APPENDIX C LABORATORY ANALYTICAL REPORTS – AIR
APPENDIX D LABORATORY ANALYTICAL REPORTS – GROUNDWATER
APPENDIX E LOW FLOW SAMPLE COLLECTION SHEETS

1.0 INTRODUCTION

Engineered Controls International, Inc. (ECI) retained ERM NC, Inc. (ERM) to conduct an Air Sparging/Soil Vapor Extraction (AS/SVE) pilot test for the ECI Elon site located at 100 Rego Drive in Elon, Alamance County, North Carolina (hereafter called the "Site" or "subject property") (NONCD0002903). The site topographic map is shown in Figure 1 and a site layout map is presented in Figure 2. The ECI Elon facility is situated on approximately 13 acres and includes approximately 100,000 square feet of manufacturing, warehousing and office space. The approximate coordinates of the site are: latitude 36.10118° N; longitude 79.5185° W.

The purpose of this Pilot Test Completion Report is to document the AS/SVE pilot test conducted at the Site in December 2014 and to evaluate the efficacy of the technologies to remediate areas of chlorinated solvent-affected soils and groundwater at the Site.

2.0 AS/SVE PILOT TESTING

2.1 PILOT TEST OBJECTIVES

An AS/SVE pilot test was completed in December 2014 to evaluate the efficacy of AS/SVE as individual and combined remedial technologies and to determine suitable design and operational criteria for full-scale implementation. The following sub-sections provide details on the pilot test activities. Prior to the testing, ERM submitted an *Air Sparge / Soil Vapor Extraction Pilot Test Work Plan* and an *Underground Injection Control Permit Notice of Intent* form in November 2014.

2.2 PILOT TEST WELL AND MONITORING POINT SUMMARY

2.2.1 *Air Sparge Well*

One AS well (AS-1) was installed using a hollow stem auger (HSA) drill rig to a depth of 60 feet bgs and was constructed as a Type II (single-cased) well with 6 feet of schumasoil 40 micron screen and 54 feet of Schedule 40 PVC riser. A 20-40 washed fine silica sand filter pack was used to fill the annular space between the borehole wall and the AS well screen. The well head was finished with a locking expandable cap and a traffic rated vault cover. The boring log and well record are attached in Appendix A.

2.2.2 *SVE Well*

One SVE well (SVE-1) was installed using HSA drilling technology to a total depth of 30 feet bgs and was constructed as a Type II (single-cased) well with 20 feet of 0.010″ slotted Schedule 40 PVC screen and 10 feet of Schedule 40 PVC riser. A fine washed silica sand filter pack (#1 grade) was used to fill the annular space between the borehole wall and the SVE well screen. The well head was finished with a locking expandable cap and a traffic rated vault cover. The boring log and well record are attached in Appendix A.

2.2.3 *Observation Wells*

Influence achieved by the AS and SVE wells were evaluated by monitoring the water levels and/or pressures in multiple observation points. AS/SVE influence was evaluated using existing monitoring wells (MW-7 and DW-1) and newly installed observation wells (OB-1 and OB-2). The observation wells were installed as nested monitoring points, each with a vapor monitoring point (OB-1a, OB-2a) installed to a depth of 30 feet bgs with 20 feet of 0.010″ slotted one-inch internal diameter Schedule 40 PVC well screen and 10 feet of solid PVC riser and a groundwater monitoring point (OB-1b, OB-2b) installed to a total depth of 60 feet with 15 feet of 0.010″ slotted one-inch internal diameter Schedule 40 PVC wells screen. The boring logs and well records are attached in Appendix A.

Table 1: Summary of Pilot Test Wells and Monitoring Points

Monitoring Point ID	Monitoring Point Type	Distance from AS well (ft)	Distance from SVE well (ft)	Screened Interval (ft bgs)
AS-1	Air Sparge	0	5	54′ – 60′
SVE-1	Soil Vapor Extraction	5	0	10′ – 30′
OB-1a	Vapor	8.5	7	10′ – 30′
OB-1b	Groundwater			45′ – 60′
OB-2a	Vapor	9.5	14.5	10′ – 30′
OB-2b	Groundwater			45′ – 60′
MW-7	Groundwater	33	35	30′ – 40′
DW-1	Groundwater	10	12	75′ – 85′

2.3 *PILOT TEST EQUIPMENT*

This section lists the major components and specifications used for the AS/SVE pilot test.

SVE Equipment Details

Equipment specifications for the SVE test system are based, in part, on achieving a balance with the AS system components or based on conservative estimates relative to performance at sites with similar geologic conditions. The primary components of the SVE system included the following:

- Regenerative air blower
- Manifold assembly including flow control valves and dilution ports to control flow to the SVE well
- Vacuum and flow monitoring gauges and connections
- Sample port(s)
- Exhaust stack
- Muffler
- Moisture knockout tank
- Associated piping and fittings, and
- Safety shutdown switch

Schedule 40 PVC fittings and pipe were used to connect the blower to SVE-1. An individual in-line ball valve and dilution valve, located between the blower and the vapor extraction well, was used to control the SVE vacuum and flow rate.

AS Equipment Details

The primary components of the AS test system included the following:

- Oil-free air compressor
- Flow control devices (valves, fittings, etc.)
- Pressure and flow monitoring gauges and connections
- Inlet silencer
- Influent particulate filter
- Associated piping and pressure rated hose, and
- Safety shutdown switch

Galvanized steel fittings and 1-inch pressure rated hose was used to connect the air compressor system to AS-1. An in-line regulator between the compressor and the AS well was used to control the sparging pressure and air flow rate.

Electricity was provided from a generator included with the AS/SVE test package.

2.3.1 *Testing & Monitoring Equipment Summary*

Throughout the pilot test, ERM personnel collected a series of readings to evaluate system performance. These readings included:

- AS flow rates and pressures,
- Water table elevations within the nearby water monitoring and observation wells,
- VOC concentrations at the SVE exhaust,
- SVE extraction rates and vacuums,

- Groundwater field measurements within the observation wells and nearby monitoring wells,
- Effluent temperatures, and
- SVE effluent VOC concentrations.

Testing equipment specifications were based on achieving the conservative estimates of the test ranges as presented in the *Pilot Test Work Plan*.

2.4 *PILOT TEST PROCEDURES*

The AS/SVE test was completed to evaluate the single and combined effects of air sparging and soil vapor extraction at varying flow rates and pressures. Pilot testing was conducted over a period of 2 days. Each day had a specific set of operational criteria. The following provides a summary of the pilot testing activities accomplished each day:

Test	Test Day	Test Objective
SVE	1	To evaluate the ROI of the SVE wells under different operational criteria and to measure the recovered VOC concentrations.
AS	1	To evaluate the achievable AS ROI and air injection rates. The test lasted 3 hours.
AS/SVE	2	To evaluate the influence of AS on SVE and to estimate the recoverable VOCs when operating the combined system.

Pilot Test Stages

Test	Stage	Length of time (minutes)	SVE Vacuum	AS Pressure
SVE	1	90	3″ Hg	--
	2	90	5″ Hg	--
	3	60	7″ Hg	--
AS	1	90	--	4.0 scfm / 15 psi
	2	90	--	8.0 scfm / 20 psi
AS/SVE	1	90	3″ Hg	4.0 scfm / 16 psi
	2	90	5″ Hg	4.0 scfm / 16 psi
	3	60	7″ Hg	4.0 scfm / 16 psi

Throughout the SVE pilot test, the following operational and effluent parameters were monitored:

Summary of Test Parameters Monitored

SVE Pilot Test	
Effluent airflow rate (cfm)	Effluent VOC concentrations using a photo-ionization detector (PID) (ppm)
SVE vacuum (in Hg)	Vacuum measurements from the observation points (in H_2O)
Effluent temperature (°F)	Depth to water, DO, and ORP measurements in the observation points

AS Pilot Test	
Air injection rate (cfm)	Induced pressure within nearby observation points (in H_2O)
AS pressure (psi)	Vacuum measurements from the observation points (in H_2O)
Soil vapor VOC concentration (ppm)	Depth to water, DO, and ORP measurements in the observation points

AS/SVE Combined Pilot Test	
Effluent airflow rate (cfm)	AS pressure at well head (psi)
SVE vacuum (in Hg)	AS flow rate (cfm)
Effluent VOC concentrations using a PID (ppm)	Vacuum/pressure measurements from the monitoring points (in H_2O)
Effluent temperature (°F)	Depth to water, DO, and ORP measurements in the observation points

Pilot test field measurement sheets are included as Appendix B.

Effluent Air Samples

Effluent air samples were collected during select pilot test periods for laboratory analysis of VOCs via method TO-15. Samples were collected from a sample port installed upstream of the SVE blower. The analytical air samples were pumped into tedlar bags using a rotary vane pump. The air samples were placed in protective packaging and shipped under chain of custody (COC) to Test America in Knoxville, TN. Samples were collected during the following periods:

- Day 1 (SVE only at 5" Hg) – 12/9/2014,
- Day 2 (AS/SVE combined; SVE at 5" Hg, AS at 4 scfm) – 12/10/2014

Laboratory analytical reports for the effluent air samples are included as Appendix C.

The effects of air sparging on VOC concentrations were evaluated through pre- and post-test groundwater sampling. The AS well (AS-1), 2 observation wells (OB-1b & OB-2b), and 2 existing monitoring wells (MW-7 & DW-1) were utilized for pre-test and post-test groundwater quality sampling. Samples were collected

from each point prior to and following the pilot test. Samples were submitted to Shealy Environmental Services, Inc. of West Columbia, SC for laboratory analysis of VOCs (SW-846 EPA Method 8260). Laboratory analytical reports for the groundwater sampling are presented in Appendix D.

The pre-pilot samples were collected on December 8, 2014, and post-pilot samples were collected on December 10, 2014.

Water quality field measurements were collected for DO, temperature, pH, specific conductivity, and ORP. Sample collection sheets are included as Appendix E.

2.5 *PILOT TESTING RESULTS*

2.5.1 *SVE Summary*

ERM measured vacuum within the observation wells and nearby monitoring wells throughout the SVE pilot test. A measurement greater than 0.1″ H_2O is the industry standard for effective vapor recovery.

Summary of Incremental Vacuum Readings

Location	Distance from SVE-1	SVE Only Test			AS/SVE Test		
		3″ Hg	5″ Hg	7″ Hg	3″ Hg	5″ Hg	7″ Hg
AS-1	5′	--	--	--	--	--	--
SVE-1	0	--	--	--	--	--	--
OB-1	7′	1.2	7.4	9.5	1.8	16	18
OB-2	14.5′	1.9	17	22	4	11	15
MW-7	35′	0	0.41	0.32	0.08	0	0
DW-1	12′	0	0	0	0	0	0

Measurement values in inches of H_20
***Green** values indicate measurements greater than the industry standard for effective vapor recovery.*

At Elon, adequate vacuum influence was noted at all pilot test vacuums in OB-1a, located approximately 7 feet from SVE-1 and OB-2a, located approximately 13.5 feet from SVE-1. Starting approximately 60 minutes after increasing to a vacuum of 5″ Hg and increasing to a vacuum of 7″ Hg, adequate vacuums were measured in MW-7, which is positioned approximately 35 feet from the SVE well.

When AS was introduced, pressure/vacuum measurements were once again collected from the monitoring points. Adequate vacuums continued to be present in observation points OB-1a and OB-2a throughout the test. However, the introduction of air through sparging decreased the effective capture zone for the

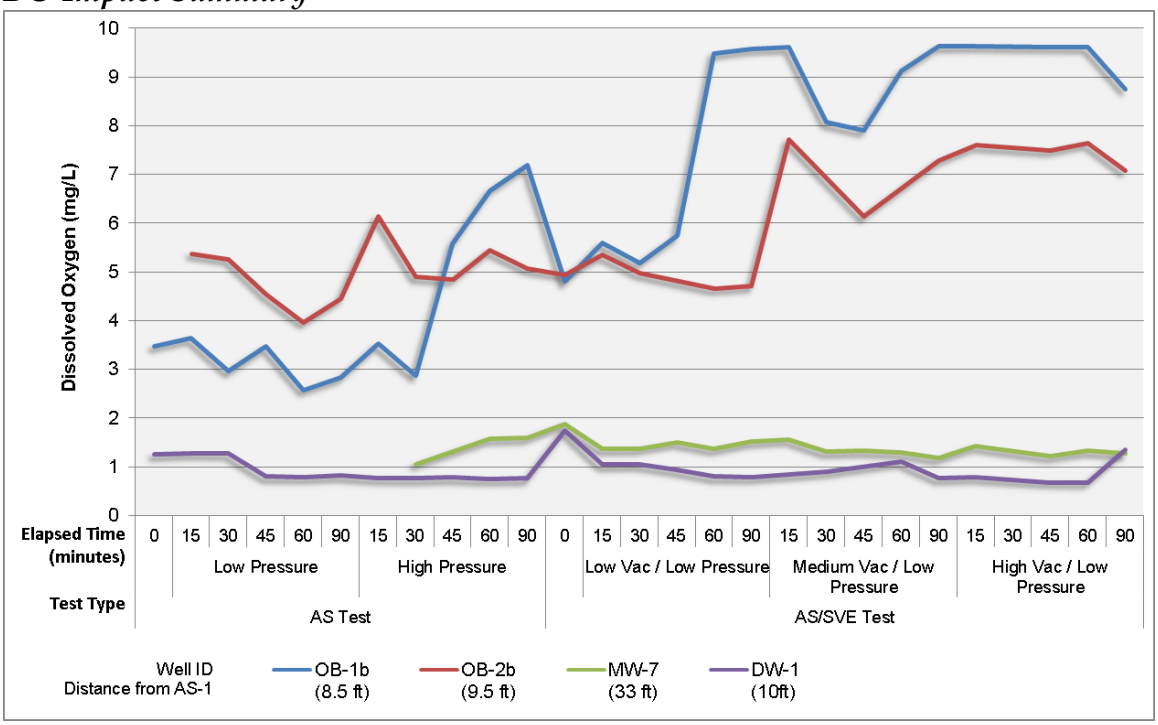
SVE well, which is not uncommon. During the combined test, adequate vacuum was not detected in MW-7 (35 feet away) at any air sparging pressure. This effect could be overcome by increasing the SVE vacuum beyond 7" Hg. Assuming the full-scale SVE system will operate in excess of 5" Hg, ERM estimates the effective SVE radius of influence at 25 feet.

2.5.2 *AS Summary*

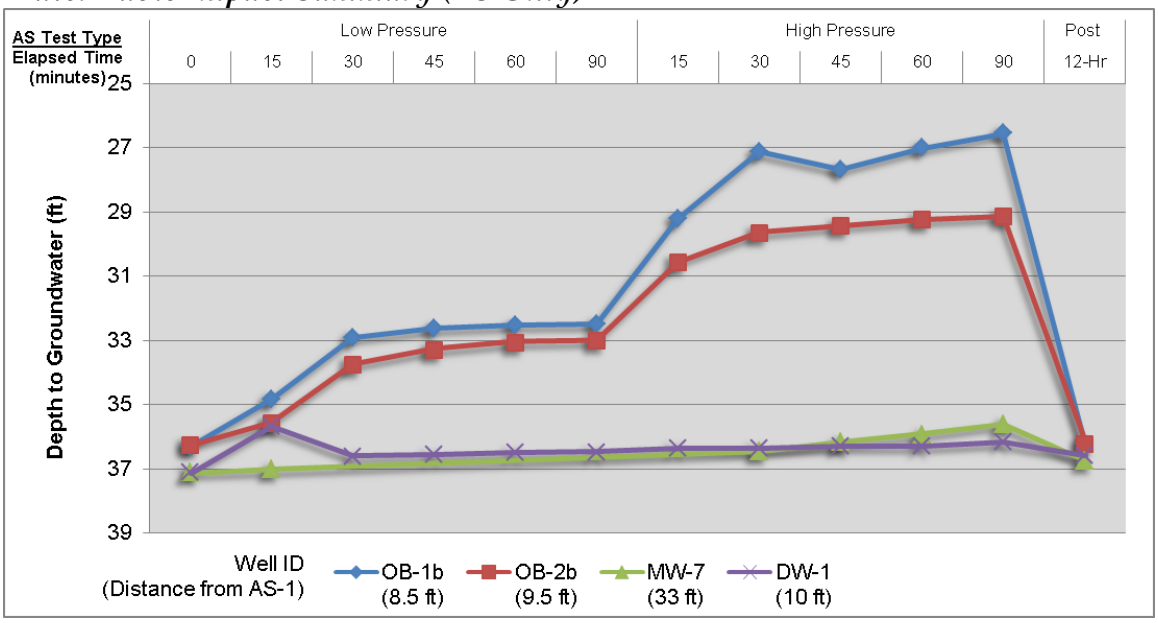
Dissolved oxygen concentrations were measured in several nearby wells and observation points throughout the AS pilot test. DO readings are included in Appendix B. According to the measurements taken immediately before and after the AS pilot test, all but one point experienced an increase in DO concentration. Observation point DW-1, positioned approximately 10 feet away, experienced a negligible decrease in concentration, likely due to the depth of its screened interval. The monitoring points were re-measured the following morning before starting the AS/SVE test. At that time, all monitoring points demonstrated an increase in DO concentration. This is attributed to the additional time (approx. 12 hours) for the injection zone to equilibrate. Dissolved oxygen measurements increased from an average concentration of 4.1 mg/L to an average of 6.1 mg/L.

Observation well OB-1, positioned closest to AS-1, experienced the most significant increase in DO, as expected.

DO Impact Summary



Water Table Impact Summary (AS Only)



An increase in groundwater elevation was noted in monitoring points OB-1b, OB-2b, MW-7, and DW-1 during the AS pilot test. The degree of mounding correlates with the distance from AS-1, with the greatest mounding near AS-1 and then decreasing further away horizontally and vertically. The increased elevations quickly leveled off during each phase of the test. With prolonged operation, the water level is likely to return closer to static conditions as preferential pathways are formed and the matrix adjusts for the presence of the injected volume of air. Furthermore, the use of a variable frequency drive (VFD) is recommended to minimize initial mounding by gradually ramping up the AS pressure and flow. Each well that experienced an increase in groundwater elevation returned to the pre-test range following completion of the AS pilot test.

Based on DO and water table measurements, it appears air sparging can achieve influence beyond 33 feet at the site. To be conservative, an effective ROI of 25 feet was assumed for the full-scale design.

2.5.3 *Effluent Sample Laboratory Data Evaluation*

Effluent air samples were collected during key pilot test periods for laboratory analysis of VOCs via method TO-15. Samples were collected during the following periods:

- Day 1 (SVE only @ 5" Hg) – 12/9/2014, and
- Day 2 (Combined AS @ 4 cfm/SVE @ 5"Hg) – 12/10/2014.

Laboratory analytical reports for the effluent air samples are included as Appendix C. The following presents a summary of the VOCs detected:

Summary of VOCs in Effluent Air

Sample	Units	cis-1,2-DCE	1,1-DCE	PCE	TCE	Vinyl Chloride
SVE-5″	µg/m³	44,000	440 J	1,700	41,000	610
AS-4 cfm/ SVE-5″	µg/m³	48,000	200 J	4,000	74,000	390

Notable concentrations of VOCs were detected in each sample. In general, concentrations of key analytes (PCE, TCE, and cis-1,2-DCE) increased following introduction of AS. This can be interpreted as a sign of successful stripping of VOCs from the saturated zone.

The following is a summary of the estimated mass removal rate of vapor-phase VOCs for a single SVE well through combined AS/SVE based on the results of laboratory analysis of the shallow SVE with air sparge effluent air samples. This calculation assumes a constant rate of VOC removal, which is unlikely as VOC concentrations are expected to decrease with time. Therefore, this is presented as a conceptual estimate.

Estimated Mass Removal Rates of COCs through Combined AS/SVE

COC	A Conc. (g/m3)	B Air Flow Rate (cfm)	C Conversion Factor (m3/ ft3)	D Conversion Factor (lbs/g)	E Conversion Factor (min/day)	F Mass Removed (lbs/day)
cis-1,2-DCE	0.048	55	0.0283	0.0022	1,440	0.237
1,1-DCE	0.0002	55	0.0283	0.0022	1,440	0.001
PCE	0.004	55	0.0283	0.0022	1,440	0.020
TCE	0.074	55	0.0283	0.0022	1,440	0.365
Vinyl Chloride	0.00039	55	0.0283	0.0022	1,440	0.002

F = A x B x C x D x E

2.5.4 *Groundwater Monitoring Results*

Groundwater monitoring was conducted before and after the pilot test to evaluate the effects of air sparging on groundwater VOC concentrations. Air sparging well AS-1, the two observation wells (OB-1b and OB-2b), and two nearby existing monitoring wells (MW-7 and DW-1) were utilized for groundwater quality sampling. The pre-test samples were collected on December 8th and post-test samples were collected on December 10th. Sample collection sheets, including field parameter measurements, are presented as Appendix E. Laboratory analytical reports for the groundwater sampling are presented in Appendix D. A summary of TCE concentrations is presented below:

Table 2: Summary of Groundwater TCE Concentrations

Location	Distance from AS-1	Pre-pilot (µg/L)	Post-pilot (µg/L)	% Change
AS-1	0	390	220	-77%
OB-1b	8.5	460	860	+47%
OB-2b	9.5	300	2,700	+89%
MW-7	33	2,700	2,700	0%
DW-1	10	94	100	+6%

The sample collected from AS-1 demonstrated a -77% reduction in TCE concentration following the pilot test. The remaining wells did not show a consistent trend in concentrations. There was also no apparent correlation between sample depth and/or distance from AS-1. Several wells showed an increase in concentration, which is likely the result of fracturing and mobilizing residual contaminant mass that was trapped within the soil matrix. It isn't uncommon to see a temporary increase in analyte concentrations after initiating AS. However, these concentrations are expected to decrease over time through effective captured by the AS/SVE system.

Likewise, the increase in groundwater concentrations in OB-1b and OB-2b may indicate that the temporary groundwater mounding, following by a return to static conditions, effectively pulled residual source mass out of the smear zone. With continued operation of the AS system, these impacts would be volatilized and subsequently captured by the SVE system. This process of mild groundwater mounding followed by retraction can be a useful strategy in remediating residual source mass in the smear zone.

3.0 PILOT STUDY CONCLUSIONS

For SVE to be considered an effective remediation technology, it is desirable to observe 1) induced vacuums at a significant radial distance from the extraction point; 2) significant recovery airflow that indicates ideal soil porosity and bulk removal of soil vapor from the subsurface; and 3) significant effluent-air VOC concentrations that indicate bulk removal of VOCs in the extracted air stream. All of the above conditions were observed when SVE was conducted alone and when paired with air sparging.

When operating SVE-1 alone at a vacuum of at least 5" Hg, effective influence was observed in monitoring points at a distance of 35 feet. When combined with AS, the ROI decreased slightly. As a factor of safety, the recommended ROI is 25 feet. The full-scale system should be designed to provide at least 8" Hg vacuum at each wellhead. The SVE well averaged a recovery flow rate of approximately

55 cfm. For the full scale system, the target flow will be approximately 50 cfm per well.

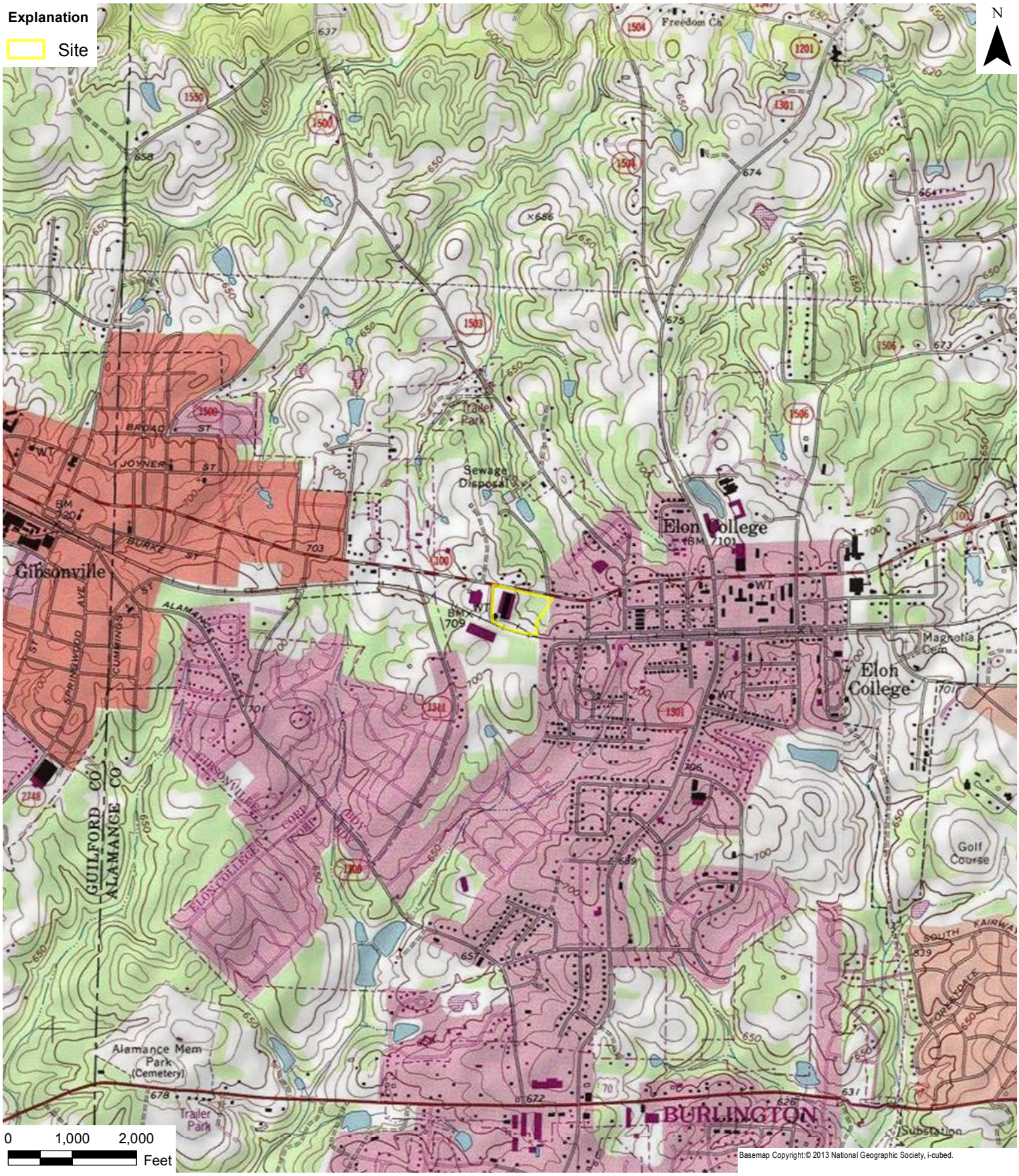
For AS to be considered an effective remediation technology, it is desirable to observe; 1) induced pressures at a significant radial distance from the injection point; 2) increases in groundwater DO values; 3) increases in soil vapor VOC concentrations that demonstrate stripping of COCs from groundwater; and 4) practical injection airflows. All of these criteria were observed during the AS/SVE pilot test. Increases in DO were observed in wells extending beyond 33 feet from AS-1. An injection rate of 8 cfm was achieved.

Induced pressures were noted in wells up to 33 feet from AS-1. Similarly, temporary increases in water table elevations were measured in monitoring points up to 33 feet from AS-1. Extreme mounding can be a sign of ineffective AS, which could limit the effectiveness of the combined system. Extreme values were not noted during the test, and the mounding quickly leveled off over the 90 minutes of system operation. With increased time, a gradual decrease in elevation may be achieved. Following the AS test, groundwater elevations quickly returned to pre-test ranges. ERM assumes full-scale mounding may be controlled through prolonged system operation, gradual startup, and cycling of system zones.

Lastly, ERM observed a significant increase in recovered VOCs when AS was introduced, indicating effective stripping and recovery of contaminants within the surficial aquifer.

Based on the items listed above, AS/SVE appears to be a viable remedial strategy for the site

FIGURES



Basemap Copyright:© 2013 National Geographic Society, i-cubed.

ERM NC, Inc.

DATE: 11/6/2014	SCALE: AS SHOWN	DRAWN: A Freeman

FILE: T:\Projects A to M\ECI\01 - Elon\6. Maps, Figures, Photographs\ElonGIS\MXD\2014-10_AS-SVE Work Plan\Figure 1_SLM.mxd

FIGURE 1
Site Location Map
Engineered Controls International, LLC.
100 Rego Drive
Elon, Alamance County, North Carolina

Explanation

- Site
- Parcels
- RailroadROW
- Areas of Concern (AOCs)

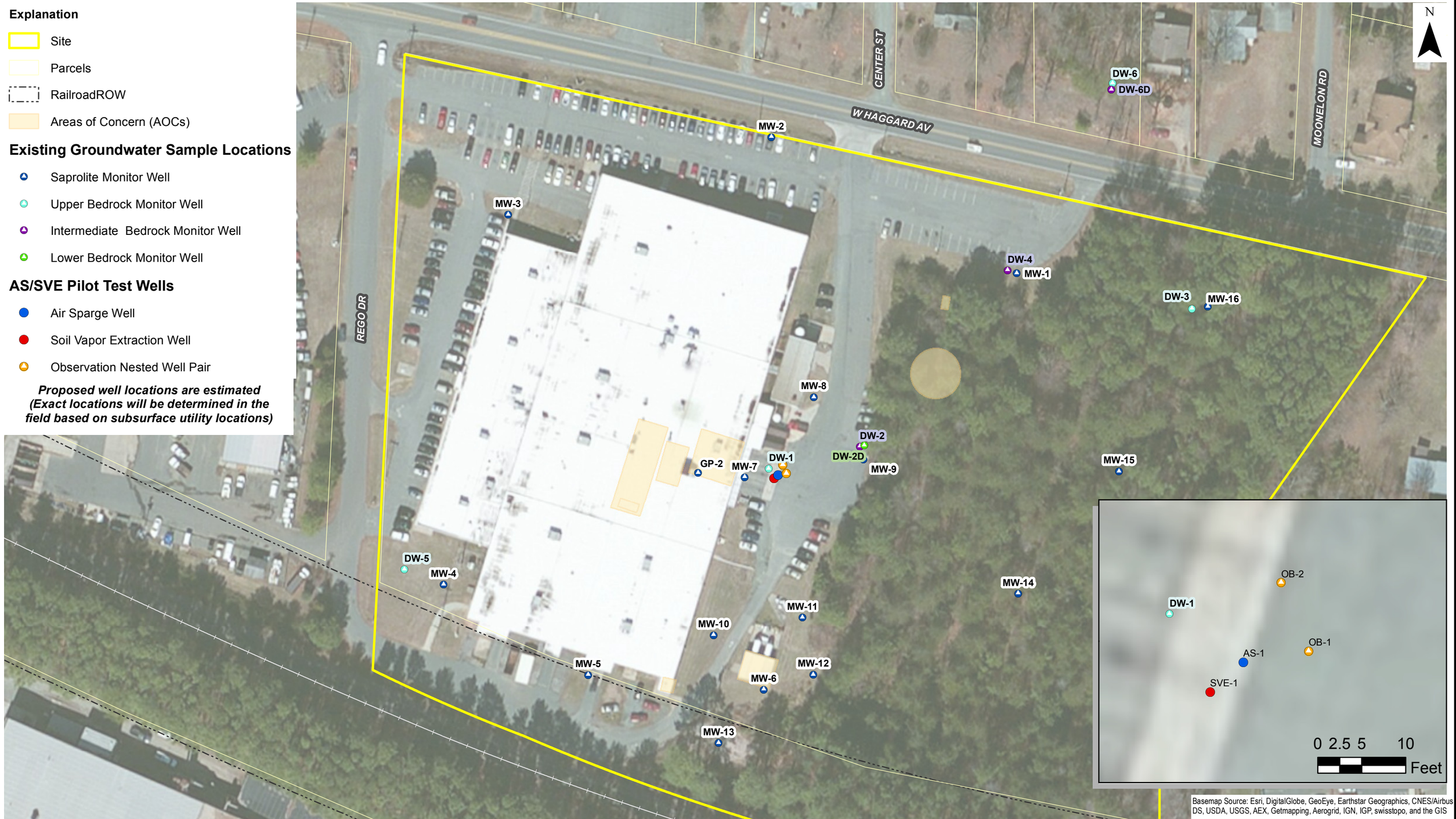
Existing Groundwater Sample Locations

- Saprolite Monitor Well
- Upper Bedrock Monitor Well
- Intermediate Bedrock Monitor Well
- Lower Bedrock Monitor Well

AS/SVE Pilot Test Wells

- Air Sparge Well
- Soil Vapor Extraction Well
- Observation Nested Well Pair

Proposed well locations are estimated (Exact locations will be determined in the field based on subsurface utility locations)



Basemap Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS

ERM

ERM NC, Inc.

SCALE: AS SHOWN DRAWN: A Freeman DATE: 4/24/2015

T:\Projects A to M\ECI\01 - Elon\6. Maps\ElonGIS\MXD\Figure 2_PilotTest.mxd

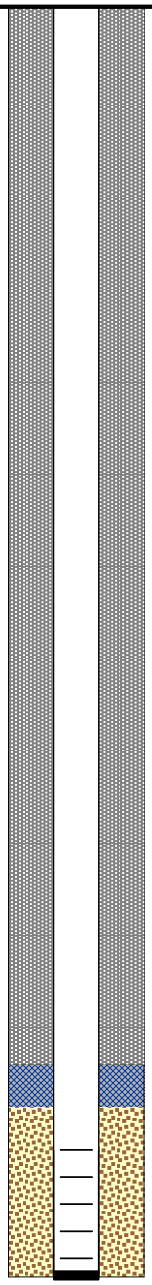
FIGURE 2
Pilot Test Wells and Layout

Engineered Controls International, LLC.
100 Rego Drive
Elon, Alamance County, North Carolina

APPENDIX A
Boring Logs and Well Records

Client:	Engineered Controls International, Inc.	**Boring ID:**	AS-1
Project:	ECI Elon	**Date Started:**	11/25/14
Site Location:	Elon, North Carolina	**Date Completed:**	11/25/14
Project Number:	0268950	**Northing:**	Not Surveyed
Logged By:	Greg Kanellis	**Easting:**	Not Surveyed

Depth	Lithology	Lithologic Description	Well Construction	Well Construction Details
0				Flush Grade Locking Cap
4				Portland/Bentonite Grout
8				6.25" Diameter Borehole
12				
16				
20				
24				2" Sch. 40 PVC Casing
28		Lithology not logged		
32				
36				
40				
44				
48				Bentonite Seal
52				Well Sand Filter Pack
56				2" Sch. 40 PVC 0.010" Slot Screen
60				End Cap
64				



Drilling Contractor:	Geologic Exploration	**Outer Casing Depth:**	NA
Drilling Method:	HSA/Air Rotary	**Total Depth (ft):**	60'
Drilling Equipment:	Diedrich D-120	**Screened Interval:**	54'-60'
Responsible Professional:	Mark Ireland	**Depth to Water (Final):**	
Borehole Diameter:	8.25"	**Elevation (msl):**	n/a

ERM

WELL CONSTRUCTION RECORD

This form can be used for single or multiple wells

1. Well Contractor Information:

MARK IRELAND

Well Contractor Name

A - 4163

NC Well Contractor Certification Number

GEOLOGIC EXPLORATION, INC

Company Name

2. Well Construction Permit #: _____

List all applicable well construction permits (i.e. County, State, Variance, etc.)

3. Well Use (check well use):

Water Supply Well:

- ☐Agricultural
- ☐Municipal/Public
- ☐Geothermal (Heating/Cooling Supply)
- ☐Residential Water Supply (single)
- ☐Industrial/Commercial
- ☐Residential Water Supply (shared)
- ☐Irrigation

Non-Water Supply Well:

- ☐Monitoring
- ☐Recovery

Injection Well:

- ☐Aquifer Recharge
- ☐Groundwater Remediation
- ☐Aquifer Storage and Recovery
- ☐Salinity Barrier
- ☐Aquifer Test
- ☐Stormwater Drainage
- ☐Experimental Technology
- ☐Subsidence Control
- ☐Geothermal (Closed Loop)
- ☐Tracer
- ☐Geothermal (Heating/Cooling Return)
- ☐Other (explain under #21 Remarks)

4. Date Well(s) Completed: 11/25/14 **Well ID#** AS-1

5a. Well Location:

ECI

Facility/Owner Name

Facility ID# (if applicable)

100 REGO DRIVE ELON 27244

Physical Address, City, and Zip

ALAMANCE

County

Parcel Identification No. (PIN)

5b. Latitude and Longitude in degrees/minutes/seconds or decimal degrees:
(if well field, one lat/long is sufficient)

36° 06' 05.37" N 79° 31' 01.67" W

6. Is (are) the well(s): ☑**Permanent** or ☐**Temporary**

7. Is this a repair to an existing well: ☐Yes or ☑No

If this is a repair, fill out known well construction information and explain the nature of the repair under #21 remarks section or on the back of this form.

8. Number of wells constructed: 1

For multiple injection or non-water supply wells ONLY with the same construction, you can submit one form.

9. Total well depth below land surface: 60.0 **(ft.)**

For multiple wells list all depths if different (example- 3@200' and 2@100')

10. Static water level below top of casing: 55.0 **(ft.)**

If water level is above casing, use "+"

11. Borehole diameter: 8.0 **(in.)**

12. Well construction method: AUGER

(i.e. auger, rotary, cable, direct push, etc.)

FOR WATER SUPPLY WELLS ONLY:

13a. Yield (gpm) _____ **Method of test:** _____

13b. Disinfection type: _____ **Amount:** _____

For Internal Use ONLY:

14. WATER ZONES

FROM	TO	DESCRIPTION
ft.	ft.	
ft.	ft.	

15. OUTER CASING (for multi-cased wells) OR LINER (if applicable)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
ft.	ft.	in.		

16. INNER CASING OR TUBING (geothermal closed-loop)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
0.0 ft.	54.0 ft.	2.0 in.	SCH 40	PVC
ft.	ft.	in.		

17. SCREEN

FROM	TO	DIAMETER	SLOT SIZE	THICKNESS	MATERIAL
54.0 ft.	60.0 ft.	2.0 in.	.010	SCH 40	PVC
ft.	ft.	in.			

18. GROUT

FROM	TO	MATERIAL	EMPLACEMENT METHOD & AMOUNT
0.0 ft.	50.0 ft.	PORTLAND BENTONITE	SLURRY
ft.	ft.		
ft.	ft.		

19. SAND/GRAVEL PACK (if applicable)

FROM	TO	MATERIAL	EMPLACEMENT METHOD
52.0 ft.	60.0 ft.	20-40	FINE SILICA SAND
ft.	ft.		

20. DRILLING LOG (attach additional sheets if necessary)

FROM	TO	DESCRIPTION (color, hardness, soil/rock type, grain size, etc.)
0.0 ft.	5.0 ft.	RED/BROWN SILTY CLAY
5.0 ft.	45.0 ft.	RED CLAY
45.0 ft.	60.0 ft.	BROWN CLAYEY SILT
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	

21. REMARKS

BENTONITE SEAL FROM 50.0 TO 52.0 FEET

AIR SPARGE

22. Certification:

Mark Ireland

Signature of Certified Well Contractor

12/01/14

Date

By signing this form, I hereby certify that the well(s) was (were) constructed in accordance with 15A NCAC 02C .0100 or 15A NCAC 02C .0200 Well Construction Standards and that a copy of this record has been provided to the well owner.

23. Site diagram or additional well details:

You may use the back of this page to provide additional well site details or well construction details. You may also attach additional pages if necessary.

SUBMITTAL INSTUCTIONS

24a. For All Wells: Submit this form within 30 days of completion of well construction to the following:

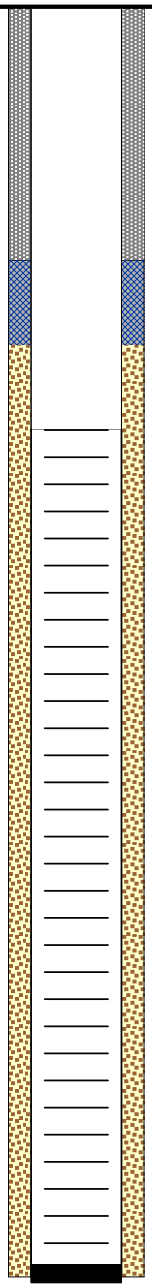
Division of Water Quality, Information Processing Unit,
1617 Mail Service Center, Raleigh, NC 27699-1617

24b. For Injection Wells: In addition to sending the form to the address in 24a above, also submit a copy of this form within 30 days of completion of well construction to the following:

Division of Water Quality, Underground Injection Control Program,
1636 Mail Service Center, Raleigh, NC 27699-1636

24c. For Water Supply & Injection Wells: In addition to sending the form to the address(es) above, also submit one copy of this form within 30 days of completion of well construction to the county health department of the county where constructed.

Client:	Engineered Controls International, Inc.	**Boring ID:**	SVE-1
Project:	ECI Elon	**Date Started:**	11/25/14
Site Location:	Elon, North Carolina	**Date Completed:**	11/25/14
Project Number:	0268950	**Northing:**	Not Surveyed
Logged By:	Greg Kanellis	**Easting:**	Not Surveyed

Depth	Lithology	Lithologic Description	Well Construction	Well Construction Details
0				Flush Grade Locking Cap
				Portland/Bentonite Grout
2				6.25" Diameter Borehole
4				
				4" Sch. 40 PVC Casing
6				Bentonite Seal
8				
10				
12				
14		Lithology not logged		Well Sand Filter Pack
16				
18				
20				
22				4" Sch. 40 PVC 0.010" Slot Screen
24				
26				
28				End Cap
30				
32				

Drilling Contractor:	Geologic Exploration	**Outer Casing Depth:**	NA
Drilling Method:	HSA/Air Rotary	**Total Depth (ft):**	30'
Drilling Equipment:	Diedrich D-120	**Screened Interval:**	10'-30'
Responsible Professional:	Mark Ireland	**Depth to Water (Final):**	
Borehole Diameter:	8.25"	**Elevation (msl):**	n/a

ERM

WELL CONSTRUCTION RECORD

This form can be used for single or multiple wells

1. Well Contractor Information:

MARK IRELAND

Well Contractor Name

A - 4163

NC Well Contractor Certification Number

GEOLOGIC EXPLORATION, INC

Company Name

2. Well Construction Permit #: _____

List all applicable well construction permits (i.e. County, State, Variance, etc.)

3. Well Use (check well use):

Water Supply Well:

- ☐Agricultural
- ☐Municipal/Public
- ☐Geothermal (Heating/Cooling Supply)
- ☐Residential Water Supply (single)
- ☐Industrial/Commercial
- ☐Residential Water Supply (shared)
- ☐Irrigation

Non-Water Supply Well:

- ☐Monitoring
- ☐Recovery

Injection Well:

- ☐Aquifer Recharge
- ☐Groundwater Remediation
- ☐Aquifer Storage and Recovery
- ☐Salinity Barrier
- ☐Aquifer Test
- ☐Stormwater Drainage
- ☐Experimental Technology
- ☐Subsidence Control
- ☐Geothermal (Closed Loop)
- ☐Tracer
- ☐Geothermal (Heating/Cooling Return)
- ☐Other (explain under #21 Remarks)

4. Date Well(s) Completed: 11/25/14 **Well ID#** SVE-1

5a. Well Location:

ECI

Facility/Owner Name

Facility ID# (if applicable)

100 REGO DRIVE ELON 27244

Physical Address, City, and Zip

ALAMANCE

County

Parcel Identification No. (PIN)

5b. Latitude and Longitude in degrees/minutes/seconds or decimal degrees:
(if well field, one lat/long is sufficient)

36° 06' 05.37" N 79° 31' 01.67" W

6. Is (are) the well(s): ☑**Permanent** or ☐**Temporary**

7. Is this a repair to an existing well: ☐Yes or ☑No

If this is a repair, fill out known well construction information and explain the nature of the repair under #21 remarks section or on the back of this form.

8. Number of wells constructed: 1

For multiple injection or non-water supply wells ONLY with the same construction, you can submit one form.

9. Total well depth below land surface: 30.0 **(ft.)**

For multiple wells list all depths if different (example- 3@200' and 2@100')

10. Static water level below top of casing: _____ **(ft.)**

If water level is above casing, use "+"

11. Borehole diameter: 10.0 **(in.)**

12. Well construction method: AUGER

(i.e. auger, rotary, cable, direct push, etc.)

FOR WATER SUPPLY WELLS ONLY:

13a. Yield (gpm) _____ **Method of test:** _____

13b. Disinfection type: _____ **Amount:** _____

For Internal Use ONLY:

14. WATER ZONES

FROM	TO	DESCRIPTION
ft.	ft.	
ft.	ft.	

15. OUTER CASING (for multi-cased wells) OR LINER (if applicable)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
ft.	ft.	in.		

16. INNER CASING OR TUBING (geothermal closed-loop)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
0.0 ft.	10.0 ft.	4.0 in.	SCH 40	PVC
ft.	ft.	in.		

17. SCREEN

FROM	TO	DIAMETER	SLOT SIZE	THICKNESS	MATERIAL
10.0 ft.	30.0 ft.	4.0 in.	.010	SCH 40	PVC
ft.	ft.	in.			

18. GROUT

FROM	TO	MATERIAL	EMPLACEMENT METHOD & AMOUNT
0.0 ft.	6.0 ft.	FORTLAND BENTONITE	SLURRY
ft.	ft.		
ft.	ft.		

19. SAND/GRAVEL PACK (if applicable)

FROM	TO	MATERIAL	EMPLACEMENT METHOD
8.0 ft.	30.0 ft.	20-40	FINE SILICA SAND
ft.	ft.		

20. DRILLING LOG (attach additional sheets if necessary)

FROM	TO	DESCRIPTION (color, hardness, soil/rock type, grain size, etc.)
0.0 ft.	5.0 ft.	RED/BROWN SILTY CLAY
5.0 ft.	30.0 ft.	RED CLAY
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	

21. REMARKS

BENTONITE SEAL FROM 6.0 TO 8.0 FEET

SOIL VAPOR EXTRACTION

22. Certification:

Mark Ireland 12/01/14

Signature of Certified Well Contractor

Date

By signing this form, I hereby certify that the well(s) was (were) constructed in accordance with 15A NCAC 02C .0100 or 15A NCAC 02C .0200 Well Construction Standards and that a copy of this record has been provided to the well owner.

23. Site diagram or additional well details:

You may use the back of this page to provide additional well site details or well construction details. You may also attach additional pages if necessary.

SUBMITTAL INSTUCTIONS

24a. For All Wells: Submit this form within 30 days of completion of well construction to the following:

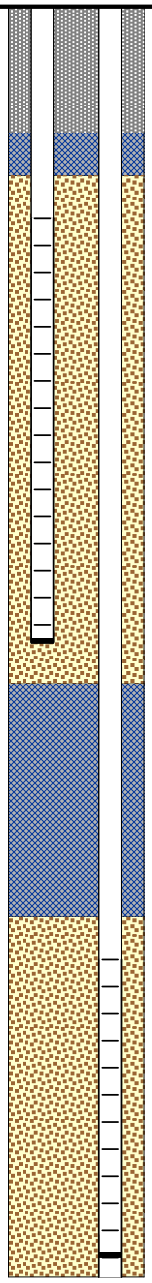
Division of Water Quality, Information Processing Unit,
1617 Mail Service Center, Raleigh, NC 27699-1617

24b. For Injection Wells: In addition to sending the form to the address in 24a above, also submit a copy of this form within 30 days of completion of well construction to the following:

Division of Water Quality, Underground Injection Control Program,
1636 Mail Service Center, Raleigh, NC 27699-1636

24c. For Water Supply & Injection Wells: In addition to sending the form to the address(es) above, also submit one copy of this form within 30 days of completion of well construction to the county health department of the county where constructed.

Client:	Engineered Controls International, Inc.	**Boring ID:**	OB-1
Project:	ECI Elon	**Date Started:**	11/24/14
Site Location:	Elon, North Carolina	**Date Completed:**	11/24/14
Project Number:	0268950	**Northing:**	Not Surveyed
Logged By:	Greg Kanellis	**Easting:**	Not Surveyed

Depth	Lithology	Lithologic Description	Well Construction	Well Construction Details
0				Flush Grade Locking Cap Portland/Bentonite Grout
4				6.25" Diameter Borehole
				OB-1a: 1" Sch. 40 PVC Casing Bentonite Seal
8				
12				
16				Well Sand Filter Pack
20				
24				OB-1a: 1" Sch. 40 PVC 0.010" Slot Screen
28				End Cap
		Lithology not logged		
32				
36				
40				
44				
48				OB-1b: 1" Sch. 40 PVC Casing Bentonite Seal
52				
56				Well Sand Filter Pack OB-1b: 1" Sch. 40 PVC 0.010" Slot Screen
60				End Cap
64				

Drilling Contractor:	Geologic Exploration	**Outer Casing Depth:**	NA
Drilling Method:	HSA/Air Rotary	**Total Depth (ft):**	60'
Drilling Equipment:	Diedrich D-120	**Screened Interval:**	10'-30', 45'-60'
Responsible Professional:	Mark Ireland	**Depth to Water (Final):**	
Borehole Diameter:	8.25"	**Elevation (msl):**	n/a

ERM

WELL CONSTRUCTION RECORD

This form can be used for single or multiple wells

1. Well Contractor Information:

MARK IRELAND

Well Contractor Name

A - 4163

NC Well Contractor Certification Number

GEOLOGIC EXPLORATION, INC

Company Name

2. Well Construction Permit #: _____

List all applicable well construction permits (i.e. County, State, Variance, etc.)

3. Well Use (check well use):

Water Supply Well:

- ☐Agricultural
- ☐Municipal/Public
- ☐Geothermal (Heating/Cooling Supply)
- ☐Residential Water Supply (single)
- ☐Industrial/Commercial
- ☐Residential Water Supply (shared)
- ☐Irrigation

Non-Water Supply Well:

- ☐Monitoring
- ☐Recovery

Injection Well:

- ☐Aquifer Recharge
- ☐Groundwater Remediation
- ☐Aquifer Storage and Recovery
- ☐Salinity Barrier
- ☐Aquifer Test
- ☐Stormwater Drainage
- ☐Experimental Technology
- ☐Subsidence Control
- ☐Geothermal (Closed Loop)
- ☐Tracer
- ☐Geothermal (Heating/Cooling Return)
- ☐Other (explain under #21 Remarks)

4. Date Well(s) Completed: 11/24/14 **Well ID#** OB-1D,S

5a. Well Location:

ECI

Facility/Owner Name

Facility ID# (if applicable)

100 REGO DRIVE ELON 27244

Physical Address, City, and Zip

ALAMANCE

County

Parcel Identification No. (PIN)

5b. Latitude and Longitude in degrees/minutes/seconds or decimal degrees:
(if well field, one lat/long is sufficient)

36° 06' 05.37" N 79° 31' 01.67" W

6. Is (are) the well(s): ☑**Permanent** or ☐**Temporary**

7. Is this a repair to an existing well: ☐Yes or ☑No

If this is a repair, fill out known well construction information and explain the nature of the repair under #21 remarks section or on the back of this form.

8. Number of wells constructed: 1

For multiple injection or non-water supply wells ONLY with the same construction, you can submit one form.

9. Total well depth below land surface: 60.0/30.0 **(ft.)**

For multiple wells list all depths if different (example- 3@200' and 2@100')

10. Static water level below top of casing: _____ **(ft.)**

If water level is above casing, use "+"

11. Borehole diameter: 8.0 **(in.)**

12. Well construction method: AUGER

(i.e. auger, rotary, cable, direct push, etc.)

FOR WATER SUPPLY WELLS ONLY:

13a. Yield (gpm) _____ **Method of test:** _____

13b. Disinfection type: _____ **Amount:** _____

For Internal Use ONLY:

14. WATER ZONES

FROM	TO	DESCRIPTION
ft.	ft.	
ft.	ft.	

15. OUTER CASING (for multi-cased wells) OR LINER (if applicable)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
ft.	ft.	in.		

16. INNER CASING OR TUBING (geothermal closed-loop)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
0.0 ft.	45.0 ft.	1.0 in.	SCH 40	PVC
0.0 ft.	10.0 ft.	1.0 in.	SCH 40	PVC

17. SCREEN

FROM	TO	DIAMETER	SLOT SIZE	THICKNESS	MATERIAL
45.0 ft.	60.0 ft.	1.0 in.	.010	SCH 40	PVC
10.0 ft.	30.0 ft.	1.0 in.	.010	SCH 40	PVC

18. GROUT

FROM	TO	MATERIAL	EMPLACEMENT METHOD & AMOUNT
0.0 ft.	6.0 ft.	PORTLAND BENTONITE	SLURRY
ft.	ft.		
ft.	ft.		

19. SAND/GRAVEL PACK (if applicable)

FROM	TO	MATERIAL	EMPLACEMENT METHOD
43.0 ft.	60.0 ft.	20-40	FINE SILICA SAND
8.0 ft.	39.0 ft.	20-40	FINE SILICA SAND

20. DRILLING LOG (attach additional sheets if necessary)

FROM	TO	DESCRIPTION (color, hardness, soil/rock type, grain size, etc.)
0.0 ft.	5.0 ft.	RED/BROWN SILTY CLAY
5.0 ft.	45.0 ft.	RED CLAY
45.0 ft.	60.0 ft.	BROWN CLAYEY SILT
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	

21. REMARKS

BENTONITE SEAL FROM 39.0 TO 43.0 FT & 6.0 TO 8.0 FT

OBSERVATION

22. Certification:

Mark Ireland — 12/01/14

Signature of Certified Well Contractor — Date

By signing this form, I hereby certify that the well(s) was (were) constructed in accordance with 15A NCAC 02C .0100 or 15A NCAC 02C .0200 Well Construction Standards and that a copy of this record has been provided to the well owner.

23. Site diagram or additional well details:

You may use the back of this page to provide additional well site details or well construction details. You may also attach additional pages if necessary.

SUBMITTAL INSTUCTIONS

24a. **For All Wells:** Submit this form within 30 days of completion of well construction to the following:

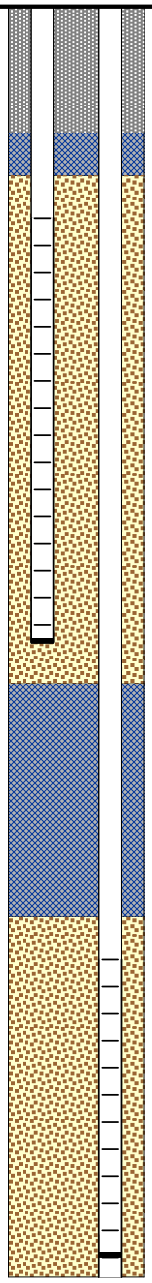
Division of Water Quality, Information Processing Unit,
1617 Mail Service Center, Raleigh, NC 27699-1617

24b. **For Injection Wells:** In addition to sending the form to the address in 24a above, also submit a copy of this form within 30 days of completion of well construction to the following:

Division of Water Quality, Underground Injection Control Program,
1636 Mail Service Center, Raleigh, NC 27699-1636

24c. **For Water Supply & Injection Wells:** In addition to sending the form to the address(es) above, also submit one copy of this form within 30 days of completion of well construction to the county health department of the county where constructed.

Client:	Engineered Controls International, Inc.	**Boring ID:**	OB-2
Project:	ECI Elon	**Date Started:**	11/24/14
Site Location:	Elon, North Carolina	**Date Completed:**	11/24/14
Project Number:	0268950	**Northing:**	Not Surveyed
Logged By:	Greg Kanellis	**Easting:**	Not Surveyed

Depth	Lithology	Lithologic Description	Well Construction	Well Construction Details
0				Flush Grade Locking Cap Portland/Bentonite Grout
4				6.25" Diameter Borehole
				OB-2a: 1" Sch. 40 PVC Casing Bentonite Seal
8				
12				
16				Well Sand Filter Pack
20				
24				OB-2a: 1" Sch. 40 PVC 0.010" Slot Screen
28				End Cap
		Lithology not logged		
32				
36				
40				
44				
48				OB-2b: 1" Sch. 40 PVC Casing Bentonite Seal
52				
56				Well Sand Filter Pack OB-2b: 1" Sch. 40 PVC 0.010" Slot Screen
60				End Cap
64				

Drilling Contractor:	Geologic Exploration	**Outer Casing Depth:**	NA
Drilling Method:	HSA/Air Rotary	**Total Depth (ft):**	60'
Drilling Equipment:	Diedrich D-120	**Screened Interval:**	10'-30', 45'-60'
Responsible Professional:	Mark Ireland	**Depth to Water (Final):**	
Borehole Diameter:	8.25"	**Elevation (msl):**	n/a

ERM

WELL CONSTRUCTION RECORD

This form can be used for single or multiple wells

1. Well Contractor Information:

MARK IRELAND

Well Contractor Name

A - 4163

NC Well Contractor Certification Number

GEOLOGIC EXPLORATION, INC

Company Name

2. Well Construction Permit #: _____

List all applicable well construction permits (i.e. County, State, Variance, etc.)

3. Well Use (check well use):

Water Supply Well:

☐Agricultural ☐Municipal/Public

☐Geothermal (Heating/Cooling Supply) ☐Residential Water Supply (single)

☐Industrial/Commercial ☐Residential Water Supply (shared)

☐Irrigation

Non-Water Supply Well:

☐Monitoring ☐Recovery

Injection Well:

☐Aquifer Recharge ☐Groundwater Remediation

☐Aquifer Storage and Recovery ☐Salinity Barrier

☐Aquifer Test ☐Stormwater Drainage

☐Experimental Technology ☐Subsidence Control

☐Geothermal (Closed Loop) ☐Tracer

☐Geothermal (Heating/Cooling Return) ☐Other (explain under #21 Remarks)

4. Date Well(s) Completed: 11/24/14 **Well ID#** OB-2D,S

5a. Well Location:

ECI

Facility/Owner Name

Facility ID# (if applicable)

100 REGO DRIVE ELON 27244

Physical Address, City, and Zip

ALAMANCE

County

Parcel Identification No. (PIN)

5b. Latitude and Longitude in degrees/minutes/seconds or decimal degrees:
(if well field, one lat/long is sufficient)

36° 06' 05.37" N 79° 31' 01.67" W

6. Is (are) the well(s): ☑**Permanent** or ☐**Temporary**

7. Is this a repair to an existing well: ☐**Yes** or ☑**No**

If this is a repair, fill out known well construction information and explain the nature of the repair under #21 remarks section or on the back of this form.

8. Number of wells constructed: 1

For multiple injection or non-water supply wells ONLY with the same construction, you can submit one form.

9. Total well depth below land surface: 60.0/30.0 **(ft.)**

For multiple wells list all depths if different (example- 3@200' and 2@100')

10. Static water level below top of casing: _____ **(ft.)**

If water level is above casing, use "+"

11. Borehole diameter: 8.0 **(in.)**

12. Well construction method: AUGER

(i.e. auger, rotary, cable, direct push, etc.)

FOR WATER SUPPLY WELLS ONLY:

13a. Yield (gpm) _____ **Method of test:** _____

13b. Disinfection type: _____ **Amount:** _____

For Internal Use ONLY:

14. WATER ZONES

FROM	TO	DESCRIPTION
ft.	ft.	
ft.	ft.	

15. OUTER CASING (for multi-cased wells) OR LINER (if applicable)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
ft.	ft.	in.		

16. INNER CASING OR TUBING (geothermal closed-loop)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
0.0 ft.	45.0 ft.	1.0 in.	SCH 40	PVC
0.0 ft.	10.0 ft.	1.0 in.	SCH 40	PVC

17. SCREEN

FROM	TO	DIAMETER	SLOT SIZE	THICKNESS	MATERIAL
45.0 ft.	60.0 ft.	1.0 in.	.010	SCH 40	PVC
10.0 ft.	30.0 ft.	1.0 in.	.010	SCH 40	PVC

18. GROUT

FROM	TO	MATERIAL	EMPLACEMENT METHOD & AMOUNT
0.0 ft.	6.0 ft.	PORTLAND BENTONITE	SLURRY
ft.	ft.		
ft.	ft.		

19. SAND/GRAVEL PACK (if applicable)

FROM	TO	MATERIAL	EMPLACEMENT METHOD
43.0 ft.	60.0 ft.	20-40	FINE SILICA SAND
8.0 ft.	39.0 ft.	20-40	FINE SILICA SAND

20. DRILLING LOG (attach additional sheets if necessary)

FROM	TO	DESCRIPTION (color, hardness, soil/rock type, grain size, etc.)
0.0 ft.	5.0 ft.	RED/BROWN SILTY CLAY
5.0 ft.	45.0 ft.	RED CLAY
45.0 ft.	60.0 ft.	BROWN CLAYEY SILT
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	

21. REMARKS

BENTONITE SEAL FROM 39.0 TO 43.0 FT & 6.0 TO 8.0 FT

OBSERVATION

22. Certification:

Signature of Certified Well Contractor 12/01/14 Date

By signing this form, I hereby certify that the well(s) was (were) constructed in accordance with 15A NCAC 02C .0100 or 15A NCAC 02C .0200 Well Construction Standards and that a copy of this record has been provided to the well owner.

23. Site diagram or additional well details:

You may use the back of this page to provide additional well site details or well construction details. You may also attach additional pages if necessary.

SUBMITTAL INSTUCTIONS

24a. For All Wells: Submit this form within 30 days of completion of well construction to the following:

Division of Water Quality, Information Processing Unit,
1617 Mail Service Center, Raleigh, NC 27699-1617

24b. For Injection Wells: In addition to sending the form to the address in 24a above, also submit a copy of this form within 30 days of completion of well construction to the following:

Division of Water Quality, Underground Injection Control Program,
1636 Mail Service Center, Raleigh, NC 27699-1636

24c. For Water Supply & Injection Wells: In addition to sending the form to the address(es) above, also submit one copy of this form within 30 days of completion of well construction to the county health department of the county where constructed.

APPENDIX B
Field Measurement Sheets

SVE Test

Date: 12/9/14

			3" Hg Start Time: 0800 Finish time: 1200						5" Hg					7" Hg			
		Time	7:10	15	30	45	60	90	15	30	45	60	90	15	30	45	60
			Pre-test	Low Vacuum					Med Vacuum					High Vacuum			
	Elapsed time	Minutes	0	15	30	45	60	90	105	120	135	150	165	180	195	210	225
AS-1	Depth to Water	feet BTOC	36.29	36.32													
	Dissolved Oxygen	mg/l	4.33					1.51									
	ORP		-55														
	Vacuum/Pressure (-/+)	inches H2O	0.0														
AS	Flow rate	SCFM															
	Temp	° F															
System	Pressure	psi															
SVE-1	Depth to Water	feet BTOC	Dry														
	Vacuum/Pressure (-/+)	inches Hg	0.0	-25.0		-40	-40	-40	-45	-45	-45	-45	-45	-45	-45	-45	-45
	O2		1.4	0.7													
	Air velocity	FPM	0	636		715	668	704	1280	1013		1751	1491	1904	2159	1609	2400
	Well Vapor - VOCs	ppm	197	47		48	46	38	31	34			37	39	36	38	36
SVE	Vacuum	inches Hg	0.0	3.0	3.0	3.0	3.0	3.0	5.0	5.0		5.0	5.0	7.0	7.0	7.0	7.00
System	Air emissions - VOCs	ppm	0.0	25		6.4	5.4	4.7	20	19		21	20	30	26	27	28
	Air Flow Rate (CALC FROM WELLHEAD)	CFM		65.6	71.6	71.6	65.8	65.9	61.5	52.4		46.5	47.4	46.3	39.3	40.2	37.4
	Temp	° F	38	93	99	99	103	104	123	126.0		118	122	143	142	143	144
	Air velocity	FPM	0	3009	3284	3284	3014	3019	2817	2402		2133	2172	2124	1800	1842	1714
OB-1a	Depth to Water	feet BTOC	Dry														
	Dissolved Oxygen	mg/l	Dry														
	ORP		Dry														
	Vacuum/Pressure (-/+)	inches H2O	0.0	-0.62	-0.98		-1.20	-1.20	-3.80	-4.20		-6.00	-7.40	-8.50	-9	-9.40	-9.50
	O2		14.90			20.90											
	Well Vapor - VOCs	ppm	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
OB-1b	Depth to Water	feet BTOC	36.27	36.32			36.30	36.35	36.49	36.55		37	36.54	36.68	36.71	36.75	36.79
	Dissolved Oxygen	mg/l	5.90	3.77	3.18		3.03	2.98	2.79	2.62		2.45	2.79	2.58	2.50	2.38	2.55
	ORP		175														
	Vacuum/Pressure (-/+)	inches H2O	0.00														
	O2		20.90														
	Well Vapor - VOCs	ppm	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
OB-2a	Depth to Water	feet BTOC	Dry														
	Dissolved Oxygen	mg/l	Dry														
	ORP		Dry														
	Vacuum/Pressure (-/+)	inches H2O	0.00	-1.1	-0.60	-1.00	-1.20	-1.90	-4.80	-8.00		-12.00	-17.00	-20.00	-21.00	-22.00	-22.00
	O2		15.40			20.90		20.90	20.90	20.90		20.90	20.90	20.90	20.90	20.90	20.90
	Well Vapor - VOCs	ppm	0			0.0		0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
OB-2b	Depth to Water	feet BTOC	36.30	36.39	36.33	36.33	36.34	36.42	36.44	36.58		36.73	36.76	36.75	36.79	36.82	36.81
	Dissolved Oxygen	mg/l	7.71	4.18	4.83	3.45	3.52	3.54	4.37	4.55		4.61	4.58	4.76	4.68	4.58	4.46
	ORP		160														
	Vacuum/Pressure (-/+)	inches H2O	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
	O2																
	Well Vapor - VOCs	ppm	0.0	0.1	0.1	0.1	0.1	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
MW-7	Depth to Water	feet BTOC	37.28	37.13	37.10		37.07	37.05	37.07	37.15		37.25	37.31	37.33			37.42
	Dissolved Oxygen	mg/l	1.80														
	ORP		115														
	Vacuum/Pressure (-/+)	inches H2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		-0.41	-0.16	-0.20	-0.20	-0.20	-0.32
	O2		20.90					20.90									
	Well Vapor - VOCs	ppm	0					0.8	1.4				0.6				2.3
DW-1	Depth to Water	feet BTOC	36.65	36.63	36.63		36.63	36.65		36.71		36.76	36.77	36.77	36.79	36.80	36.82
	Dissolved Oxygen	mg/l	2.51														
	ORP		65.3														
	Vacuum/Pressure (-/+)	inches H2O	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	O2		20.90														
	Well Vapor - VOCs	ppm	0.0	0.0													

* Note units if different than default.

* Recommended vacuums/pressures are starting points. Adjust as appropriate.

SVE Test

Date: 12/9/14

AS Test

Start: 1330 12/9/14
Finish time: 1600 12/9/14

		Time	0	15	30	45	60	90	15	30	45	60	90
			Pre-test	Low Pressure					High Pressure				
	Elapsed time	Minutes	240	255	270	285	300	315	330	345	360	375	390
AS-1	Depth to Water	feet BTOC											
	Dissolved Oxygen	mg/l											
	ORP												
	Vacuum/Pressure (-/+)	inches H2O											
AS	Flow rate	SCFM	0.0	4.0	4.0	4.0	4.0	4.0	8.0	8.0	8.0	8.0	8.0
	Temp	° F											
System	Pressure	psi	0	15	14	14	14	14	20	20	20	20	20
SVE-1	Depth to Water	feet BTOC											
	Vacuum/Pressure (-/+)	inches Hg											
	O2												
	Air velocity	FPM											
	Well Vapor - VOCs	ppm											
SVE	Vacuum	inches Hg											
System	Air emissions - VOCs	ppm											
	Air Flow Rate (CALC FROM WELLHEAD)	CFM											
	Temp	° F											
	Air velocity	FPM											
OB-1a	Depth to Water	feet BTOC	Dry										
	Dissolved Oxygen	mg/l	Dry										
	ORP		Dry										
	Vacuum/Pressure (-/+)	inches H2O	0.0	0.14	0.41	0.44	0.46	0.50	1.2	1.2	2.0	1.6	1.8
	O2		20.90										
	Well Vapor - VOCs	ppm		0	0	0	0	0	0	1	1	1	0
OB-1b	Depth to Water	feet BTOC	36.29	34.84	32.92	32.63	32.52	32.50	29.20	27.12	27.67	27.01	26.55
	Dissolved Oxygen	mg/l	3.48	3.65	2.97	3.48	2.59	2.84	3.53	2.88	5.58	6.67	7.19
	ORP												
	Vacuum/Pressure (-/+)	inches H2O	0.0	0.08	0.02	0.0	0.0	0.0	0.08	0.60		4.80	16.00
	O2									20.90	20.90	20.90	20.90
	Well Vapor - VOCs	ppm	0	0	0	0	0	0	0	0	0	0	0
OB-2a	Depth to Water	feet BTOC											
	Dissolved Oxygen	mg/l											
	ORP												
	Vacuum/Pressure (-/+)	inches H2O	0.00	0.00	0.12	0.18	0.38	0.42	0.78	0.96	2.00	0.60	0.60
	O2		20.90	20.90	20.90	20.90	20.90	20.90	20.90	20.90	20.90	20.90	20.90
	Well Vapor - VOCs	ppm	0	0	0	0	0	0	0	0	0	0	0
OB-2b	Depth to Water	feet BTOC	36.27	35.59	33.77	33.30	33.07	33.02	30.58	29.66	29.44	29.25	29.14
	Dissolved Oxygen	mg/l		5.38	5.27	4.54	3.97	4.45	6.15	4.90	4.85	5.45	5.08
	ORP												
	Vacuum/Pressure (-/+)	inches H2O	0.00	0.90	1.50	1.00	0.08	0.04	2.00	1.90		0.60	
	O2		20.90	20.90	20.90	20.90	20.90	20.90	20.90	20.90	20.90	20.90	20.90
	Well Vapor - VOCs	ppm		0	0	0	0	0	0	0	0	0	0
MW-7	Depth to Water	feet BTOC	37.12	37.03						36.46	36.18	35.93	35.61
	Dissolved Oxygen	mg/l								1.06		1.58	1.60
	ORP												
	Vacuum/Pressure (-/+)	inches H2O	0.00										
	O2		20.90										
	Well Vapor - VOCs	ppm								0	0	0	0
DW-1	Depth to Water	feet BTOC	37.12	35.67	36.61	36.55	36.51	36.48	36.36	36.38	36.30	36.30	36.18
	Dissolved Oxygen	mg/l	1.25	1.28	1.27	0.80	0.79	0.82	0.77	0.76	0.78	0.75	0.76
	ORP												
	Vacuum/Pressure (-/+)	inches H2O	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.00	0.00	0.00
	O2		20.90	20.90	20.90	20.90	20.90	20.90	20.90	20.90	20.90	20.90	20.90
	Well Vapor - VOCs	ppm		0	0	0	0	0	0	0	0	0	0

* Note units if different than default.

* Recommended vacuums/pressures are starting points. Adjust as appropriate.

SVE Test			AS/SVE Combo		Start: 815 12/10/14									Finish time: 1215				
					4 scfm AS/SVE 3"				4 scfm AS/SVE 5"					4 scfm AS/SVE 7"				Post-Test
Date:	12/9/14	Time	0	15	30	45	60	90	15	30	45	60	90	15	30	45	60	12:20
			Pre-test		Low Vac / Low Pressure				Medium Vac / Low Pressure					High Vac / Low Pressure				
	Elapsed time	Minutes	405	420	435	450	465	480	495	510	525	540	555	570	585	600	615	630
AS-1	Depth to Water	feet BTOC																60.20
	Dissolved Oxygen	mg/l																
	ORP																	
	Vacuum/Pressure (-/+)	inches H2O	0.00															
AS	Flow rate	SCFM	0.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
	Temp	° F																
System	Pressure	psi	0	16	16	16	16	16	14	16	16	16	16	16	16	16	16	
SVE-1	Depth to Water	feet BTOC																30.02
	Vacuum/Pressure (-/+)	inches Hg	0	-22	-22	-22	-22	-22	-45	-45	-45	-45	-45	-45	-45	-45	-45	
	O2																	
	Air velocity	FPM	0	586	626	658	728	642	1234		1403	1457	1704	2542		2677	1766	
	Well Vapor - VOCs	ppm	0.2	44	52	50	50	60	50		50	40	40	44		43	41	
SVE	Vacuum	inches Hg	0.0	3.0	3.0	3.0	3.0	3.0	5.0	5.0	5.0	5.0	5.0	7.0	7.0	7.0	7.0	
System	Air emissions - VOCs	ppm	0	5.8	5.3	5.8	5.6	8.3	23		25	27	26	32		31	30	
	Air Flow Rate (CALC FROM WELLHEAD)	CFM		59	66	66	87	69	52		42	43	48	42		47.887	56.876	
	Temp	° F	36	91	101	101	101	102	130		127	125	126	138		145	146	
	Air velocity	FPM	0	2713	3039	3011	3991	3159	2371		1932	1960	2205	1925		2195	2607	0
OB-1a	Depth to Water	feet BTOC																
	Dissolved Oxygen	mg/l																
	ORP																	
	Vacuum/Pressure (-/+)	inches H2O	0.0	-0.61	-0.72	-0.98	-1.05	-1.80	-4.2	-13.0	-15.0	-16.0	-10.0	-14.0		-15.0	-18.0	-14.0
	O2		20.90															
	Well Vapor - VOCs	ppm	0	0	0	0	0	0	0	0	0	0	0	0		0		0
OB-1b	Depth to Water	feet BTOC	36.24	35.29	32.63	31.72	31.31	31.15	30.88	33.97	36.52	34.57	31.63	31.18		31.45	31.13	35.12
	Dissolved Oxygen	mg/l	4.80	5.60	5.19	5.74	9.48	9.58	9.61	8.07	7.90	9.12	9.63	9.64		9.62	9.61	8.75
	ORP																	
	Vacuum/Pressure (-/+)	inches H2O	0.0	0.03	0.45	0.55	1.2	1.2		5.6		5.4	7.0	21.0		42.0	>50	50.0
	O2		20.90															
	Well Vapor - VOCs	ppm	0	0	0	0	0	1.2	34	33			47	48		65	56	28
OB-2a	Depth to Water	feet BTOC																
	Dissolved Oxygen	mg/l																
	ORP																	
	Vacuum/Pressure (-/+)	inches H2O	0.00	-0.90	-1.00	-1.30	-1.40	-0.80	-4.00	-6.90	-9.60	-9.60	-11.00	-14.00	-15.00	-12.00	-13.00	-3.00
	O2		20.90	20.90	20.90													
	Well Vapor - VOCs	ppm	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OB-2b	Depth to Water	feet BTOC	36.23	35.54	32.80	32.16	31.89	31.85	32.15	35.72	36.98	35.03	34.34	32.75		30.25	33.08	33.81
	Dissolved Oxygen	mg/l	4.95	5.35	4.98		4.66	4.71	7.73		6.14		7.28	7.60		7.50	7.65	7.08
	ORP																	
	Vacuum/Pressure (-/+)	inches H2O	0.00		0.00	0.00	0.08	0.08		3.70	3.70	26.00	33.00			28.00	29.00	
	O2		20.90	20.90														
	Well Vapor - VOCs	ppm	0	0	0	0	0	0	0	2.4			107	104		33	104	112
MW-7	Depth to Water	feet BTOC	36.77	36.75	36.76	36.75	36.48	36.29	36.18	36.15	36.26	36.29	36.35	36.35	36.34	36.33	36.35	36.28
	Dissolved Oxygen	mg/l	1.89	1.37	1.38	1.51	1.37	1.52	1.57	1.31	1.33	1.30	1.18	1.43		1.22	1.33	1.28
	ORP																	
	Vacuum/Pressure (-/+)	inches H2O	0.0	0.0	0.0													
	O2		20.90	20.90														
	Well Vapor - VOCs	ppm	0.3	0.4	0.1	0.1	0.1	0.4	0.4	0.1	0.8	0.4	0.4	0.1		0.6	0.8	0.6
DW-1	Depth to Water	feet BTOC	36.60	36.60	36.58	36.50	36.45	36.42	36.40	36.43	36.54	36.53	36.62	36.53		36.53	36.53	36.58
	Dissolved Oxygen	mg/l	1.75	1.04	1.05	0.94	0.80	0.79		0.90		1.11	0.77	0.79		0.70	0.69	1.35
	ORP																	
	Vacuum/Pressure (-/+)	inches H2O	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	O2		20.90	20.90														
	Well Vapor - VOCs	ppm	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

* Note units if different than default.

* Recommended vacuums/pressures are starting points. Adjust as appropriate.

APPENDIX C
Laboratory Analytical Reports – Air

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Knoxville
5815 Middlebrook Pike
Knoxville, TN 37921
Tel: (865)291-3000

TestAmerica Job ID: 140-2451-1
Client Project/Site: ECI - Elon

For:
ERM-Southeast, Inc.
15720 Brixham Hill Avenue
Suite 120
Charlotte, North Carolina 28277

Attn: Ed Hollifield, P.G.

Authorized for release by:
12/16/2014 2:33:52 PM

Terry Walker Wasmund, Project Manager II
(865)291-3000
terry.wasmund@testamericainc.com

LINKS

Review your project results through TotalAccess

Have a Question? Ask The Expert

Visit us at: www.testamericainc.com

The test results in this report meet all 2003 NELAC and 2009 TNI requirements for accredited parameters, exceptions are noted in this report. This report may not be reproduced except in full, and with written approval from the laboratory. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

Table of Contents

Cover Page 1
Table of Contents 2
Definitions/Glossary 3
Case Narrative 4
Detection Summary 5
Client Sample Results 6
QC Sample Results 9
QC Association Summary 14
Lab Chronicle 15
Certification Summary 16
Method Summary 17
Sample Summary 18
Chain of Custody 19
Receipt Checklists 20

Definitions/Glossary

Client: ERM-Southeast, Inc.
Project/Site: ECI - Elon

TestAmerica Job ID: 140-2451-1

Qualifiers

Air - GC/MS VOA

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
B	Compound was found in the blank and sample.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains no Free Liquid
DER	Duplicate error ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision level concentration
MDA	Minimum detectable activity
EDL	Estimated Detection Limit
MDC	Minimum detectable concentration
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative error ratio
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Job ID: 140-2451-1

Laboratory: TestAmerica Knoxville

Narrative

Job Narrative
140-2451-1

Receipt
The sample was received on 12/11/2014 10:15 AM; the sample arrived in good condition and properly preserved.

Except:

The following sample was received in air sample bags: 5"-SVE/AS-4 (140-2451-1) . EPA Methods TO-14A and TO-15 describe the use of canisters for sampling and analysis; therefore, the use of air sample bags constitutes a modification to the method.

Air - GC/MS VOA
Method(s) TO 14A, TO 15 LL, TO-14A, TO-15: EPA methods TO-14A and TO-15 specify the use of humidified “zero air” as the blank reagent for canister cleaning, instrument calibration and sample analysis. Ultra-high purity humidified nitrogen from a cryogenic reservoir is used in place of “zero air” by TestAmerica Knoxville.

Method(s) Air Transfer: The following sample was received in air sample bags: 5"-SVE/AS-4 (140-2451-1). In order to extend the holding time, the sample was transferred from the air sample bags into a Summa canister.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Comments
No additional comments.

Detection Summary

Client: ERM-Southeast, Inc.
Project/Site: ECI - Elon

TestAmerica Job ID: 140-2451-1

Client Sample ID: 5"-SVE/AS-4 — Lab Sample ID: 140-2451-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Benzene	60	J	120	34	ppb v/v	334.69		TO-15	Total/NA
cis-1,2-Dichloroethene	12000		120	37	ppb v/v	334.69		TO-15	Total/NA
1,1-Dichloroethene	49	J	120	21	ppb v/v	334.69		TO-15	Total/NA
Hexane	24	J	490	19	ppb v/v	334.69		TO-15	Total/NA
Methylene Chloride	110	J B	300	79	ppb v/v	334.69		TO-15	Total/NA
Tetrachloroethene	600		120	24	ppb v/v	334.69		TO-15	Total/NA
Tetrahydrofuran	250	J	3000	38	ppb v/v	334.69		TO-15	Total/NA
Toluene	85	J B	120	73	ppb v/v	334.69		TO-15	Total/NA
trans-1,2-Dichloroethene	62	J	120	30	ppb v/v	334.69		TO-15	Total/NA
Trichloroethene	14000		120	22	ppb v/v	334.69		TO-15	Total/NA
1,1,2-Trichloro-1,2,2-trifluoroethane	540		120	19	ppb v/v	334.69		TO-15	Total/NA
Vinyl chloride	150		120	43	ppb v/v	334.69		TO-15	Total/NA

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Benzene	190	J	390	110	ug/m3	334.69		TO-15	Total/NA
cis-1,2-Dichloroethene	48000		480	140	ug/m3	334.69		TO-15	Total/NA
1,1-Dichloroethene	200	J	480	82	ug/m3	334.69		TO-15	Total/NA
Hexane	83	J	1700	69	ug/m3	334.69		TO-15	Total/NA
Methylene Chloride	390	J B	1100	270	ug/m3	334.69		TO-15	Total/NA
Tetrachloroethene	4000		830	170	ug/m3	334.69		TO-15	Total/NA
Tetrahydrofuran	750	J	9000	110	ug/m3	334.69		TO-15	Total/NA
Toluene	320	J B	460	280	ug/m3	334.69		TO-15	Total/NA
trans-1,2-Dichloroethene	250	J	480	120	ug/m3	334.69		TO-15	Total/NA
Trichloroethene	74000		650	120	ug/m3	334.69		TO-15	Total/NA
1,1,2-Trichloro-1,2,2-trifluoroethane	4200		930	140	ug/m3	334.69		TO-15	Total/NA
Vinyl chloride	390		310	110	ug/m3	334.69		TO-15	Total/NA

This Detection Summary does not include radiochemical test results.

Client Sample Results

Client: ERM-Southeast, Inc.
Project/Site: ECI - Elon

TestAmerica Job ID: 140-2451-1

Client Sample ID: 5"-SVE/AS-4

Lab Sample ID: 140-2451-1

Date Collected: 12/10/14 11:15
Matrix: Air
Date Received: 12/11/14 10:15
Sample Container: Tedlar Bag 1L

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	ND		3000	850	ppb v/v		12/11/14 12:26	12/12/14 01:39	334.69
Benzene	**60**	**J**	120	34	ppb v/v		12/11/14 12:26	12/12/14 01:39	334.69
Benzyl chloride	ND		490	47	ppb v/v		12/11/14 12:26	12/12/14 01:39	334.69
Bromodichloromethane	ND		120	27	ppb v/v		12/11/14 12:26	12/12/14 01:39	334.69
Bromoform	ND		120	29	ppb v/v		12/11/14 12:26	12/12/14 01:39	334.69
Bromomethane	ND		120	19	ppb v/v		12/11/14 12:26	12/12/14 01:39	334.69
2-Butanone (MEK)	ND		610	120	ppb v/v		12/11/14 12:26	12/12/14 01:39	334.69
Carbon disulfide	ND		300	19	ppb v/v		12/11/14 12:26	12/12/14 01:39	334.69
Carbon tetrachloride	ND		120	23	ppb v/v		12/11/14 12:26	12/12/14 01:39	334.69
Chlorobenzene	ND		120	30	ppb v/v		12/11/14 12:26	12/12/14 01:39	334.69
Chloroethane	ND		490	21	ppb v/v		12/11/14 12:26	12/12/14 01:39	334.69
Chloroform	ND		120	23	ppb v/v		12/11/14 12:26	12/12/14 01:39	334.69
Chloromethane	ND		300	97	ppb v/v		12/11/14 12:26	12/12/14 01:39	334.69
cis-1,2-Dichloroethene	**12000**		120	37	ppb v/v		12/11/14 12:26	12/12/14 01:39	334.69
cis-1,3-Dichloropropene	ND		120	45	ppb v/v		12/11/14 12:26	12/12/14 01:39	334.69
Cyclohexane	ND		300	24	ppb v/v		12/11/14 12:26	12/12/14 01:39	334.69
Dibromochloromethane	ND		120	26	ppb v/v		12/11/14 12:26	12/12/14 01:39	334.69
1,2-Dibromoethane (EDB)	ND		120	27	ppb v/v		12/11/14 12:26	12/12/14 01:39	334.69
1,2-Dichlorobenzene	ND		120	43	ppb v/v		12/11/14 12:26	12/12/14 01:39	334.69
1,3-Dichlorobenzene	ND		120	40	ppb v/v		12/11/14 12:26	12/12/14 01:39	334.69
1,4-Dichlorobenzene	ND		120	39	ppb v/v		12/11/14 12:26	12/12/14 01:39	334.69
Dichlorodifluoromethane	ND		300	41	ppb v/v		12/11/14 12:26	12/12/14 01:39	334.69
1,1-Dichloroethane	ND		120	16	ppb v/v		12/11/14 12:26	12/12/14 01:39	334.69
1,2-Dichloroethane	ND		120	29	ppb v/v		12/11/14 12:26	12/12/14 01:39	334.69
1,1-Dichloroethene	**49**	**J**	120	21	ppb v/v		12/11/14 12:26	12/12/14 01:39	334.69
1,2-Dichloropropane	ND		120	32	ppb v/v		12/11/14 12:26	12/12/14 01:39	334.69
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		120	19	ppb v/v		12/11/14 12:26	12/12/14 01:39	334.69
1,4-Dioxane	ND		3000	49	ppb v/v		12/11/14 12:26	12/12/14 01:39	334.69
Ethylbenzene	ND		120	41	ppb v/v		12/11/14 12:26	12/12/14 01:39	334.69
Hexachlorobutadiene	ND		120	47	ppb v/v		12/11/14 12:26	12/12/14 01:39	334.69
Hexane	**24**	**J**	490	19	ppb v/v		12/11/14 12:26	12/12/14 01:39	334.69
Isopropyl alcohol	ND		3000	57	ppb v/v		12/11/14 12:26	12/12/14 01:39	334.69
Isopropylbenzene	ND		490	37	ppb v/v		12/11/14 12:26	12/12/14 01:39	334.69
Methylene Chloride	**110**	**J B**	300	79	ppb v/v		12/11/14 12:26	12/12/14 01:39	334.69
4-Methyl-2-pentanone (MIBK)	ND		300	27	ppb v/v		12/11/14 12:26	12/12/14 01:39	334.69
Methyl tert-butyl ether	ND		610	100	ppb v/v		12/11/14 12:26	12/12/14 01:39	334.69
m-Xylene & p-Xylene	ND		490	73	ppb v/v		12/11/14 12:26	12/12/14 01:39	334.69
Naphthalene	ND		300	55	ppb v/v		12/11/14 12:26	12/12/14 01:39	334.69
o-Xylene	ND		120	37	ppb v/v		12/11/14 12:26	12/12/14 01:39	334.69
Styrene	ND		120	35	ppb v/v		12/11/14 12:26	12/12/14 01:39	334.69
1,1,2,2-Tetrachloroethane	ND		120	37	ppb v/v		12/11/14 12:26	12/12/14 01:39	334.69
Tetrachloroethene	**600**		120	24	ppb v/v		12/11/14 12:26	12/12/14 01:39	334.69
Tetrahydrofuran	**250**	**J**	3000	38	ppb v/v		12/11/14 12:26	12/12/14 01:39	334.69
Toluene	**85**	**J B**	120	73	ppb v/v		12/11/14 12:26	12/12/14 01:39	334.69
trans-1,2-Dichloroethene	**62**	**J**	120	30	ppb v/v		12/11/14 12:26	12/12/14 01:39	334.69
trans-1,3-Dichloropropene	ND		120	29	ppb v/v		12/11/14 12:26	12/12/14 01:39	334.69
1,2,4-Trichlorobenzene	ND		1200	60	ppb v/v		12/11/14 12:26	12/12/14 01:39	334.69
1,1,1-Trichloroethane	ND		120	18	ppb v/v		12/11/14 12:26	12/12/14 01:39	334.69

Client: ERM-Southeast, Inc.
Project/Site: ECI - Elon

TestAmerica Job ID: 140-2451-1

Client Sample ID: 5"-SVE/AS-4
Date Collected: 12/10/14 11:15
Date Received: 12/11/14 10:15
Sample Container: Tedlar Bag 1L

Lab Sample ID: 140-2451-1
Matrix: Air

Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1,2-Trichloroethane	ND		120	33	ppb v/v		12/11/14 12:26	12/12/14 01:39	334.69
Trichloroethene	**14000**		120	22	ppb v/v		12/11/14 12:26	12/12/14 01:39	334.69
Trichlorofluoromethane	ND		120	15	ppb v/v		12/11/14 12:26	12/12/14 01:39	334.69
1,1,2-Trichloro-1,2,2-trifluoroetha ne	**540**		120	19	ppb v/v		12/11/14 12:26	12/12/14 01:39	334.69
1,2,4-Trimethylbenzene	ND		120	38	ppb v/v		12/11/14 12:26	12/12/14 01:39	334.69
1,3,5-Trimethylbenzene	ND		120	40	ppb v/v		12/11/14 12:26	12/12/14 01:39	334.69
Vinyl acetate	ND		3000	85	ppb v/v		12/11/14 12:26	12/12/14 01:39	334.69
Vinyl bromide	ND		120	21	ppb v/v		12/11/14 12:26	12/12/14 01:39	334.69
Vinyl chloride	**150**		120	43	ppb v/v		12/11/14 12:26	12/12/14 01:39	334.69

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	ND		7200	2000	ug/m3		12/11/14 12:26	12/12/14 01:39	334.69
Benzene	**190**	**J**	390	110	ug/m3		12/11/14 12:26	12/12/14 01:39	334.69
Benzyl chloride	ND		2500	250	ug/m3		12/11/14 12:26	12/12/14 01:39	334.69
Bromodichloromethane	ND		820	180	ug/m3		12/11/14 12:26	12/12/14 01:39	334.69
Bromoform	ND		1300	300	ug/m3		12/11/14 12:26	12/12/14 01:39	334.69
Bromomethane	ND		470	76	ug/m3		12/11/14 12:26	12/12/14 01:39	334.69
2-Butanone (MEK)	ND		1800	360	ug/m3		12/11/14 12:26	12/12/14 01:39	334.69
Carbon disulfide	ND		950	59	ug/m3		12/11/14 12:26	12/12/14 01:39	334.69
Carbon tetrachloride	ND		770	150	ug/m3		12/11/14 12:26	12/12/14 01:39	334.69
Chlorobenzene	ND		560	140	ug/m3		12/11/14 12:26	12/12/14 01:39	334.69
Chloroethane	ND		1300	56	ug/m3		12/11/14 12:26	12/12/14 01:39	334.69
Chloroform	ND		590	110	ug/m3		12/11/14 12:26	12/12/14 01:39	334.69
Chloromethane	ND		630	200	ug/m3		12/11/14 12:26	12/12/14 01:39	334.69
cis-1,2-Dichloroethene	**48000**		480	140	ug/m3		12/11/14 12:26	12/12/14 01:39	334.69
cis-1,3-Dichloropropene	ND		550	200	ug/m3		12/11/14 12:26	12/12/14 01:39	334.69
Cyclohexane	ND		1000	84	ug/m3		12/11/14 12:26	12/12/14 01:39	334.69
Dibromochloromethane	ND		1000	220	ug/m3		12/11/14 12:26	12/12/14 01:39	334.69
1,2-Dibromoethane (EDB)	ND		940	210	ug/m3		12/11/14 12:26	12/12/14 01:39	334.69
1,2-Dichlorobenzene	ND		730	260	ug/m3		12/11/14 12:26	12/12/14 01:39	334.69
1,3-Dichlorobenzene	ND		730	240	ug/m3		12/11/14 12:26	12/12/14 01:39	334.69
1,4-Dichlorobenzene	ND		730	230	ug/m3		12/11/14 12:26	12/12/14 01:39	334.69
Dichlorodifluoromethane	ND		1500	200	ug/m3		12/11/14 12:26	12/12/14 01:39	334.69
1,1-Dichloroethane	ND		490	64	ug/m3		12/11/14 12:26	12/12/14 01:39	334.69
1,2-Dichloroethane	ND		490	120	ug/m3		12/11/14 12:26	12/12/14 01:39	334.69
1,1-Dichloroethene	**200**	**J**	480	82	ug/m3		12/11/14 12:26	12/12/14 01:39	334.69
1,2-Dichloropropane	ND		560	150	ug/m3		12/11/14 12:26	12/12/14 01:39	334.69
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		850	140	ug/m3		12/11/14 12:26	12/12/14 01:39	334.69
1,4-Dioxane	ND		11000	180	ug/m3		12/11/14 12:26	12/12/14 01:39	334.69
Ethylbenzene	ND		530	180	ug/m3		12/11/14 12:26	12/12/14 01:39	334.69
Hexachlorobutadiene	ND		1300	510	ug/m3		12/11/14 12:26	12/12/14 01:39	334.69
Hexane	**83**	**J**	1700	69	ug/m3		12/11/14 12:26	12/12/14 01:39	334.69
Isopropyl alcohol	ND		7500	140	ug/m3		12/11/14 12:26	12/12/14 01:39	334.69
Isopropylbenzene	ND		2400	180	ug/m3		12/11/14 12:26	12/12/14 01:39	334.69
Methylene Chloride	**390**	**J B**	1100	270	ug/m3		12/11/14 12:26	12/12/14 01:39	334.69
4-Methyl-2-pentanone (MIBK)	ND		1200	110	ug/m3		12/11/14 12:26	12/12/14 01:39	334.69
Methyl tert-butyl ether	ND		2200	370	ug/m3		12/11/14 12:26	12/12/14 01:39	334.69
m-Xylene & p-Xylene	ND		2100	320	ug/m3		12/11/14 12:26	12/12/14 01:39	334.69

Client Sample Results

Client: ERM-Southeast, Inc.
Project/Site: ECI - Elon

TestAmerica Job ID: 140-2451-1

Client Sample ID: 5"-SVE/AS-4

Lab Sample ID: 140-2451-1

Date Collected: 12/10/14 11:15
Matrix: Air
Date Received: 12/11/14 10:15
Sample Container: Tedlar Bag 1L

Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Naphthalene	ND		1600	290	ug/m3		12/11/14 12:26	12/12/14 01:39	334.69
o-Xylene	ND		530	160	ug/m3		12/11/14 12:26	12/12/14 01:39	334.69
Styrene	ND		520	150	ug/m3		12/11/14 12:26	12/12/14 01:39	334.69
1,1,2,2-Tetrachloroethane	ND		840	250	ug/m3		12/11/14 12:26	12/12/14 01:39	334.69
Tetrachloroethene	**4000**		830	170	ug/m3		12/11/14 12:26	12/12/14 01:39	334.69
Tetrahydrofuran	**750**	**J**	9000	110	ug/m3		12/11/14 12:26	12/12/14 01:39	334.69
Toluene	**320**	**J B**	460	280	ug/m3		12/11/14 12:26	12/12/14 01:39	334.69
trans-1,2-Dichloroethene	**250**	**J**	480	120	ug/m3		12/11/14 12:26	12/12/14 01:39	334.69
trans-1,3-Dichloropropene	ND		550	130	ug/m3		12/11/14 12:26	12/12/14 01:39	334.69
1,2,4-Trichlorobenzene	ND		9000	440	ug/m3		12/11/14 12:26	12/12/14 01:39	334.69
1,1,1-Trichloroethane	ND		660	100	ug/m3		12/11/14 12:26	12/12/14 01:39	334.69
1,1,2-Trichloroethane	ND		660	180	ug/m3		12/11/14 12:26	12/12/14 01:39	334.69
Trichloroethene	**74000**		650	120	ug/m3		12/11/14 12:26	12/12/14 01:39	334.69
Trichlorofluoromethane	ND		680	82	ug/m3		12/11/14 12:26	12/12/14 01:39	334.69
1,1,2-Trichloro-1,2,2-trifluoroetha ne	**4200**		930	140	ug/m3		12/11/14 12:26	12/12/14 01:39	334.69
1,2,4-Trimethylbenzene	ND		600	190	ug/m3		12/11/14 12:26	12/12/14 01:39	334.69
1,3,5-Trimethylbenzene	ND		600	190	ug/m3		12/11/14 12:26	12/12/14 01:39	334.69
Vinyl acetate	ND		11000	300	ug/m3		12/11/14 12:26	12/12/14 01:39	334.69
Vinyl bromide	ND		530	93	ug/m3		12/11/14 12:26	12/12/14 01:39	334.69
Vinyl chloride	**390**		310	110	ug/m3		12/11/14 12:26	12/12/14 01:39	334.69

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Lab Sample ID: MB 140-2036/7
Matrix: Air
Analysis Batch: 2036

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	ND		5.0	1.4	ppb v/v			12/11/14 14:19	1
Benzene	ND		0.20	0.056	ppb v/v			12/11/14 14:19	1
Benzyl chloride	ND		0.80	0.078	ppb v/v			12/11/14 14:19	1
Bromodichloromethane	ND		0.20	0.044	ppb v/v			12/11/14 14:19	1
Bromoform	ND		0.20	0.048	ppb v/v			12/11/14 14:19	1
Bromomethane	ND		0.20	0.032	ppb v/v			12/11/14 14:19	1
2-Butanone (MEK)	ND		1.0	0.20	ppb v/v			12/11/14 14:19	1
Carbon disulfide	ND		0.50	0.031	ppb v/v			12/11/14 14:19	1
Carbon tetrachloride	ND		0.20	0.038	ppb v/v			12/11/14 14:19	1
Chlorobenzene	ND		0.20	0.049	ppb v/v			12/11/14 14:19	1
Chloroethane	ND		0.80	0.035	ppb v/v			12/11/14 14:19	1
Chloroform	ND		0.20	0.038	ppb v/v			12/11/14 14:19	1
Chloromethane	ND		0.50	0.16	ppb v/v			12/11/14 14:19	1
cis-1,2-Dichloroethene	ND		0.20	0.060	ppb v/v			12/11/14 14:19	1
cis-1,3-Dichloropropene	ND		0.20	0.074	ppb v/v			12/11/14 14:19	1
Cyclohexane	ND		0.50	0.040	ppb v/v			12/11/14 14:19	1
Dibromochloromethane	ND		0.20	0.042	ppb v/v			12/11/14 14:19	1
1,2-Dibromoethane (EDB)	ND		0.20	0.044	ppb v/v			12/11/14 14:19	1
1,2-Dichlorobenzene	ND		0.20	0.070	ppb v/v			12/11/14 14:19	1
1,3-Dichlorobenzene	ND		0.20	0.065	ppb v/v			12/11/14 14:19	1
1,4-Dichlorobenzene	ND		0.20	0.064	ppb v/v			12/11/14 14:19	1
Dichlorodifluoromethane	ND		0.50	0.068	ppb v/v			12/11/14 14:19	1
1,1-Dichloroethane	ND		0.20	0.026	ppb v/v			12/11/14 14:19	1
1,2-Dichloroethane	ND		0.20	0.047	ppb v/v			12/11/14 14:19	1
1,1-Dichloroethene	ND		0.20	0.034	ppb v/v			12/11/14 14:19	1
1,2-Dichloropropane	ND		0.20	0.052	ppb v/v			12/11/14 14:19	1
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.20	0.032	ppb v/v			12/11/14 14:19	1
1,4-Dioxane	ND		5.0	0.080	ppb v/v			12/11/14 14:19	1
Ethylbenzene	ND		0.20	0.068	ppb v/v			12/11/14 14:19	1
Hexachlorobutadiene	ND		0.20	0.078	ppb v/v			12/11/14 14:19	1
Hexane	ND		0.80	0.032	ppb v/v			12/11/14 14:19	1
Isopropyl alcohol	ND		5.0	0.094	ppb v/v			12/11/14 14:19	1
Isopropylbenzene	ND		0.80	0.060	ppb v/v			12/11/14 14:19	1
Methylene Chloride	0.188	J	0.50	0.13	ppb v/v			12/11/14 14:19	1
4-Methyl-2-pentanone (MIBK)	ND		0.50	0.045	ppb v/v			12/11/14 14:19	1
Methyl tert-butyl ether	ND		1.0	0.17	ppb v/v			12/11/14 14:19	1
m-Xylene & p-Xylene	ND		0.80	0.12	ppb v/v			12/11/14 14:19	1
Naphthalene	ND		0.50	0.090	ppb v/v			12/11/14 14:19	1
o-Xylene	ND		0.20	0.061	ppb v/v			12/11/14 14:19	1
Styrene	ND		0.20	0.058	ppb v/v			12/11/14 14:19	1
1,1,2,2-Tetrachloroethane	ND		0.20	0.061	ppb v/v			12/11/14 14:19	1
Tetrachloroethene	ND		0.20	0.040	ppb v/v			12/11/14 14:19	1
Tetrahydrofuran	ND		5.0	0.063	ppb v/v			12/11/14 14:19	1
Toluene	0.146	J	0.20	0.12	ppb v/v			12/11/14 14:19	1
trans-1,2-Dichloroethene	ND		0.20	0.050	ppb v/v			12/11/14 14:19	1
trans-1,3-Dichloropropene	ND		0.20	0.048	ppb v/v			12/11/14 14:19	1
1,2,4-Trichlorobenzene	ND		2.0	0.098	ppb v/v			12/11/14 14:19	1
1,1,1-Trichloroethane	ND		0.20	0.030	ppb v/v			12/11/14 14:19	1

Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Lab Sample ID: MB 140-2036/7
Matrix: Air
Analysis Batch: 2036

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1,2-Trichloroethane	ND		0.20	0.054	ppb v/v			12/11/14 14:19	1
Trichloroethene	ND		0.20	0.036	ppb v/v			12/11/14 14:19	1
Trichlorofluoromethane	ND		0.20	0.024	ppb v/v			12/11/14 14:19	1
1,1,2-Trichloro-1,2,2-trifluoroethane	ND		0.20	0.031	ppb v/v			12/11/14 14:19	1
1,2,4-Trimethylbenzene	ND		0.20	0.063	ppb v/v			12/11/14 14:19	1
1,3,5-Trimethylbenzene	ND		0.20	0.065	ppb v/v			12/11/14 14:19	1
Vinyl acetate	ND		5.0	0.14	ppb v/v			12/11/14 14:19	1
Vinyl bromide	ND		0.20	0.035	ppb v/v			12/11/14 14:19	1
Vinyl chloride	ND		0.20	0.071	ppb v/v			12/11/14 14:19	1

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	ND		12	3.3	ug/m3			12/11/14 14:19	1
Benzene	ND		0.64	0.18	ug/m3			12/11/14 14:19	1
Benzyl chloride	ND		4.1	0.40	ug/m3			12/11/14 14:19	1
Bromodichloromethane	ND		1.3	0.29	ug/m3			12/11/14 14:19	1
Bromoform	ND		2.1	0.50	ug/m3			12/11/14 14:19	1
Bromomethane	ND		0.78	0.12	ug/m3			12/11/14 14:19	1
2-Butanone (MEK)	ND		2.9	0.59	ug/m3			12/11/14 14:19	1
Carbon disulfide	ND		1.6	0.097	ug/m3			12/11/14 14:19	1
Carbon tetrachloride	ND		1.3	0.24	ug/m3			12/11/14 14:19	1
Chlorobenzene	ND		0.92	0.23	ug/m3			12/11/14 14:19	1
Chloroethane	ND		2.1	0.092	ug/m3			12/11/14 14:19	1
Chloroform	ND		0.98	0.19	ug/m3			12/11/14 14:19	1
Chloromethane	ND		1.0	0.33	ug/m3			12/11/14 14:19	1
cis-1,2-Dichloroethene	ND		0.79	0.24	ug/m3			12/11/14 14:19	1
cis-1,3-Dichloropropene	ND		0.91	0.34	ug/m3			12/11/14 14:19	1
Cyclohexane	ND		1.7	0.14	ug/m3			12/11/14 14:19	1
Dibromochloromethane	ND		1.7	0.36	ug/m3			12/11/14 14:19	1
1,2-Dibromoethane (EDB)	ND		1.5	0.34	ug/m3			12/11/14 14:19	1
1,2-Dichlorobenzene	ND		1.2	0.42	ug/m3			12/11/14 14:19	1
1,3-Dichlorobenzene	ND		1.2	0.39	ug/m3			12/11/14 14:19	1
1,4-Dichlorobenzene	ND		1.2	0.38	ug/m3			12/11/14 14:19	1
Dichlorodifluoromethane	ND		2.5	0.34	ug/m3			12/11/14 14:19	1
1,1-Dichloroethane	ND		0.81	0.11	ug/m3			12/11/14 14:19	1
1,2-Dichloroethane	ND		0.81	0.19	ug/m3			12/11/14 14:19	1
1,1-Dichloroethene	ND		0.79	0.13	ug/m3			12/11/14 14:19	1
1,2-Dichloropropane	ND		0.92	0.24	ug/m3			12/11/14 14:19	1
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		1.4	0.22	ug/m3			12/11/14 14:19	1
1,4-Dioxane	ND		18	0.29	ug/m3			12/11/14 14:19	1
Ethylbenzene	ND		0.87	0.30	ug/m3			12/11/14 14:19	1
Hexachlorobutadiene	ND		2.1	0.83	ug/m3			12/11/14 14:19	1
Hexane	ND		2.8	0.11	ug/m3			12/11/14 14:19	1
Isopropyl alcohol	ND		12	0.23	ug/m3			12/11/14 14:19	1
Isopropylbenzene	ND		3.9	0.29	ug/m3			12/11/14 14:19	1
Methylene Chloride	0.652	J	1.7	0.45	ug/m3			12/11/14 14:19	1
4-Methyl-2-pentanone (MIBK)	ND		2.0	0.18	ug/m3			12/11/14 14:19	1
Methyl tert-butyl ether	ND		3.6	0.61	ug/m3			12/11/14 14:19	1
m-Xylene & p-Xylene	ND		3.5	0.52	ug/m3			12/11/14 14:19	1

Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Lab Sample ID: MB 140-2036/7
Matrix: Air
Analysis Batch: 2036

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Naphthalene	ND		2.6	0.47	ug/m3			12/11/14 14:19	1
o-Xylene	ND		0.87	0.26	ug/m3			12/11/14 14:19	1
Styrene	ND		0.85	0.25	ug/m3			12/11/14 14:19	1
1,1,2,2-Tetrachloroethane	ND		1.4	0.42	ug/m3			12/11/14 14:19	1
Tetrachloroethene	ND		1.4	0.27	ug/m3			12/11/14 14:19	1
Tetrahydrofuran	ND		15	0.19	ug/m3			12/11/14 14:19	1
Toluene	0.549	J	0.75	0.45	ug/m3			12/11/14 14:19	1
trans-1,2-Dichloroethene	ND		0.79	0.20	ug/m3			12/11/14 14:19	1
trans-1,3-Dichloropropene	ND		0.91	0.22	ug/m3			12/11/14 14:19	1
1,2,4-Trichlorobenzene	ND		15	0.73	ug/m3			12/11/14 14:19	1
1,1,1-Trichloroethane	ND		1.1	0.16	ug/m3			12/11/14 14:19	1
1,1,2-Trichloroethane	ND		1.1	0.29	ug/m3			12/11/14 14:19	1
Trichloroethene	ND		1.1	0.19	ug/m3			12/11/14 14:19	1
Trichlorofluoromethane	ND		1.1	0.13	ug/m3			12/11/14 14:19	1
1,1,2-Trichloro-1,2,2-trifluoroethane	ND		1.5	0.24	ug/m3			12/11/14 14:19	1
1,2,4-Trimethylbenzene	ND		0.98	0.31	ug/m3			12/11/14 14:19	1
1,3,5-Trimethylbenzene	ND		0.98	0.32	ug/m3			12/11/14 14:19	1
Vinyl acetate	ND		18	0.49	ug/m3			12/11/14 14:19	1
Vinyl bromide	ND		0.87	0.15	ug/m3			12/11/14 14:19	1
Vinyl chloride	ND		0.51	0.18	ug/m3			12/11/14 14:19	1

Lab Sample ID: LCS 140-2036/1002
Matrix: Air
Analysis Batch: 2036

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Acetone	6.00	4.47		ppb v/v		74	60 - 140
Benzene	2.00	1.93		ppb v/v		97	70 - 130
Benzyl chloride	2.00	1.98		ppb v/v		99	70 - 130
Bromodichloromethane	2.00	2.01		ppb v/v		100	70 - 130
Bromoform	2.00	2.07		ppb v/v		103	60 - 140
Bromomethane	2.00	1.86		ppb v/v		93	70 - 130
2-Butanone (MEK)	2.00	1.80		ppb v/v		90	60 - 140
Carbon disulfide	2.00	1.95		ppb v/v		98	70 - 130
Carbon tetrachloride	2.00	2.43		ppb v/v		121	70 - 130
Chlorobenzene	2.00	1.88		ppb v/v		94	70 - 130
Chloroethane	2.00	1.83		ppb v/v		91	70 - 130
Chloroform	2.00	1.96		ppb v/v		98	70 - 130
Chloromethane	2.00	1.88		ppb v/v		94	60 - 140
cis-1,2-Dichloroethene	2.00	1.99		ppb v/v		100	70 - 130
cis-1,3-Dichloropropene	2.00	1.95		ppb v/v		97	70 - 130
Cyclohexane	2.00	1.88		ppb v/v		94	70 - 130
Dibromochloromethane	2.00	1.99		ppb v/v		99	70 - 130
1,2-Dibromoethane (EDB)	2.00	1.90		ppb v/v		95	70 - 130
1,2-Dichlorobenzene	2.00	1.90		ppb v/v		95	70 - 130
1,3-Dichlorobenzene	2.00	1.93		ppb v/v		96	70 - 130
1,4-Dichlorobenzene	2.00	1.94		ppb v/v		97	70 - 130
Dichlorodifluoromethane	2.00	2.01		ppb v/v		101	60 - 140

Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Lab Sample ID: LCS 140-2036/1002
Matrix: Air
Analysis Batch: 2036

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
1,1-Dichloroethane	2.00	1.93		ppb v/v		96	70 - 130
1,2-Dichloroethane	2.00	2.01		ppb v/v		100	70 - 130
1,1-Dichloroethene	2.00	2.29		ppb v/v		114	70 - 130
1,2-Dichloropropane	2.00	1.87		ppb v/v		94	70 - 130
1,2-Dichloro-1,1,2,2-tetrafluoroethane	2.00	2.02		ppb v/v		101	60 - 140
1,4-Dioxane	2.00	1.77	J	ppb v/v		88	60 - 140
Ethylbenzene	2.00	2.01		ppb v/v		100	70 - 130
Hexachlorobutadiene	2.00	1.78		ppb v/v		89	60 - 140
Hexane	2.00	1.77		ppb v/v		89	70 - 130
Isopropyl alcohol	6.00	5.04		ppb v/v		84	60 - 140
Isopropylbenzene	2.00	1.97		ppb v/v		99	70 - 130
Methylene Chloride	2.00	1.95		ppb v/v		98	70 - 130
4-Methyl-2-pentanone (MIBK)	2.00	1.82		ppb v/v		91	60 - 140
Methyl tert-butyl ether	2.00	2.08		ppb v/v		104	60 - 140
m-Xylene & p-Xylene	4.00	3.85		ppb v/v		96	70 - 130
Naphthalene	2.00	1.88		ppb v/v		94	40 - 140
o-Xylene	2.00	1.95		ppb v/v		98	70 - 130
Styrene	2.00	2.08		ppb v/v		104	70 - 130
1,1,2,2-Tetrachloroethane	2.00	2.02		ppb v/v		101	70 - 130
Tetrachloroethene	2.00	1.84		ppb v/v		92	70 - 130
Tetrahydrofuran	2.00	1.94	J	ppb v/v		97	60 - 140
Toluene	2.00	1.94		ppb v/v		97	70 - 130
trans-1,2-Dichloroethene	2.00	1.91		ppb v/v		95	70 - 130
trans-1,3-Dichloropropene	2.00	2.01		ppb v/v		101	70 - 130
1,2,4-Trichlorobenzene	2.00	1.86		ppb v/v		93	60 - 140
1,1,1-Trichloroethane	2.00	1.95		ppb v/v		98	70 - 130
1,1,2-Trichloroethane	2.00	1.90		ppb v/v		95	70 - 130
Trichloroethene	2.00	1.93		ppb v/v		96	70 - 130
Trichlorofluoromethane	2.00	1.98		ppb v/v		99	60 - 140
1,1,2-Trichloro-1,2,2-trifluoroethane	2.00	2.09		ppb v/v		104	70 - 130
1,2,4-Trimethylbenzene	2.00	2.10		ppb v/v		105	70 - 130
1,3,5-Trimethylbenzene	2.00	2.11		ppb v/v		105	70 - 130
Vinyl acetate	2.00	1.89	J	ppb v/v		95	60 - 140
Vinyl bromide	2.00	2.04		ppb v/v		102	60 - 140
Vinyl chloride	2.00	1.94		ppb v/v		97	70 - 130

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Acetone	14	10.6		ug/m3		74	60 - 140
Benzene	6.4	6.17		ug/m3		97	70 - 130
Benzyl chloride	10	10.3		ug/m3		99	70 - 130
Bromodichloromethane	13	13.5		ug/m3		100	70 - 130
Bromoform	21	21.4		ug/m3		103	60 - 140
Bromomethane	7.8	7.24		ug/m3		93	70 - 130
2-Butanone (MEK)	5.9	5.31		ug/m3		90	60 - 140
Carbon disulfide	6.2	6.08		ug/m3		98	70 - 130
Carbon tetrachloride	13	15.3		ug/m3		121	70 - 130
Chlorobenzene	9.2	8.65		ug/m3		94	70 - 130

Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Lab Sample ID: LCS 140-2036/1002
Matrix: Air
Analysis Batch: 2036

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloroethane	5.3	4.83		ug/m3		91	70 - 130
Chloroform	9.8	9.59		ug/m3		98	70 - 130
Chloromethane	4.1	3.88		ug/m3		94	60 - 140
cis-1,2-Dichloroethene	7.9	7.90		ug/m3		100	70 - 130
cis-1,3-Dichloropropene	9.1	8.83		ug/m3		97	70 - 130
Cyclohexane	6.9	6.46		ug/m3		94	70 - 130
Dibromochloromethane	17	16.9		ug/m3		99	70 - 130
1,2-Dibromoethane (EDB)	15	14.6		ug/m3		95	70 - 130
1,2-Dichlorobenzene	12	11.5		ug/m3		95	70 - 130
1,3-Dichlorobenzene	12	11.6		ug/m3		96	70 - 130
1,4-Dichlorobenzene	12	11.6		ug/m3		97	70 - 130
Dichlorodifluoromethane	9.9	9.96		ug/m3		101	60 - 140
1,1-Dichloroethane	8.1	7.81		ug/m3		96	70 - 130
1,2-Dichloroethane	8.1	8.14		ug/m3		100	70 - 130
1,1-Dichloroethene	7.9	9.06		ug/m3		114	70 - 130
1,2-Dichloropropane	9.2	8.65		ug/m3		94	70 - 130
1,2-Dichloro-1,1,2,2-tetrafluoroethane	14	14.1		ug/m3		101	60 - 140
1,4-Dioxane	7.2	6.37	J	ug/m3		88	60 - 140
Ethylbenzene	8.7	8.71		ug/m3		100	70 - 130
Hexachlorobutadiene	21	19.0		ug/m3		89	60 - 140
Hexane	7.1	6.24		ug/m3		89	70 - 130
Isopropyl alcohol	15	12.4		ug/m3		84	60 - 140
Isopropylbenzene	9.8	9.71		ug/m3		99	70 - 130
Methylene Chloride	7.0	6.79		ug/m3		98	70 - 130
4-Methyl-2-pentanone (MIBK)	8.2	7.45		ug/m3		91	60 - 140
Methyl tert-butyl ether	7.2	7.49		ug/m3		104	60 - 140
m-Xylene & p-Xylene	17	16.7		ug/m3		96	70 - 130
Naphthalene	10	9.84		ug/m3		94	40 - 140
o-Xylene	8.7	8.47		ug/m3		98	70 - 130
Styrene	8.5	8.84		ug/m3		104	70 - 130
1,1,2,2-Tetrachloroethane	14	13.9		ug/m3		101	70 - 130
Tetrachloroethene	14	12.5		ug/m3		92	70 - 130
Tetrahydrofuran	5.9	5.72	J	ug/m3		97	60 - 140
Toluene	7.5	7.33		ug/m3		97	70 - 130
trans-1,2-Dichloroethene	7.9	7.56		ug/m3		95	70 - 130
trans-1,3-Dichloropropene	9.1	9.13		ug/m3		101	70 - 130
1,2,4-Trichlorobenzene	15	13.8		ug/m3		93	60 - 140
1,1,1-Trichloroethane	11	10.7		ug/m3		98	70 - 130
1,1,2-Trichloroethane	11	10.4		ug/m3		95	70 - 130
Trichloroethene	11	10.4		ug/m3		96	70 - 130
Trichlorofluoromethane	11	11.1		ug/m3		99	60 - 140
1,1,2-Trichloro-1,2,2-trifluoroethane	15	16.0		ug/m3		104	70 - 130
1,2,4-Trimethylbenzene	9.8	10.3		ug/m3		105	70 - 130
1,3,5-Trimethylbenzene	9.8	10.4		ug/m3		105	70 - 130
Vinyl acetate	7.0	6.66	J	ug/m3		95	60 - 140
Vinyl bromide	8.8	8.94		ug/m3		102	60 - 140
Vinyl chloride	5.1	4.97		ug/m3		97	70 - 130

QC Association Summary

Client: ERM-Southeast, Inc.
Project/Site: ECI - Elon

TestAmerica Job ID: 140-2451-1

Air - GC/MS VOA

Analysis Batch: 2036

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-2451-1	5"-SVE/AS-4	Total/NA	Air	TO-15	2044
LCS 140-2036/1002	Lab Control Sample	Total/NA	Air	TO-15	
MB 140-2036/7	Method Blank	Total/NA	Air	TO-15	

Prep Batch: 2044

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-2451-1	5"-SVE/AS-4	Total/NA	Air	Air Transfer	

Lab Chronicle

Client: ERM-Southeast, Inc.
Project/Site: ECI - Elon

TestAmerica Job ID: 140-2451-1

Client Sample ID: 5"-SVE/AS-4

Lab Sample ID: 140-2451-1

Date Collected: 12/10/14 11:15

Matrix: Air

Date Received: 12/11/14 10:15

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	Air Transfer					2044	12/11/14 12:26	HMT	TAL KNX
Total/NA	Analysis	TO-15		334.69	110 mL	500 mL	2036	12/12/14 01:39	HMT	TAL KNX
	Instrument ID: MJ									

Laboratory References:

TAL KNX = TestAmerica Knoxville, 5815 Middlebrook Pike, Knoxville, TN 37921, TEL (865)291-3000

Certification Summary

Client: ERM-Southeast, Inc.
Project/Site: ECI - Elon

TestAmerica Job ID: 140-2451-1

Laboratory: TestAmerica Knoxville

All certifications held by this laboratory are listed. Not all certifications are applicable to this report.

Authority	Program	EPA Region	Certification ID	Expiration Date
	AFCEE		N/A	
Arkansas DEQ	State Program	6	88-0688	06-17-15
California	State Program	9	2423	06-30-16
Colorado	State Program	8	N/A	02-28-15
Connecticut	State Program	1	PH-0223	09-30-15
Florida	NELAP	4	E87177	06-30-15
Georgia	State Program	4	906	04-13-17
Hawaii	State Program	9	N/A	04-13-15
Kansas	NELAP	7	E-10349	01-31-15
Kentucky (DW)	State Program	4	90101	12-31-14
L-A-B	DoD ELAP		L2311	02-13-16
Louisiana	NELAP	6	LA110001	12-31-15
Maryland	State Program	3	277	03-31-15
Michigan	State Program	5	9933	04-13-17
Nevada	State Program	9	TN00009	07-31-15
New Jersey	NELAP	2	TN001	06-30-15
New York	NELAP	2	10781	03-31-15
North Carolina (DW)	State Program	4	21705	07-31-15
Ohio VAP	State Program	5	CL0059	03-26-15
Oklahoma	State Program	6	9415	08-31-15
Pennsylvania	NELAP	3	68-00576	12-31-14
South Carolina	State Program	4	84001	06-30-15
Tennessee	State Program	4	2014	04-13-17
Texas	NELAP	6	T104704380-TX	08-31-15
USDA	Federal		P330-13-00260	08-29-16
Utah	NELAP	8	QUAN3	07-31-15
Virginia	NELAP	3	460176	09-14-15
Virginia	State Program	3	165	06-30-15
Washington	State Program	10	C593	01-19-15
West Virginia (DW)	State Program	3	9955C	12-31-14
West Virginia DEP	State Program	3	345	04-30-15
Wisconsin	State Program	5	998044300	08-31-15

Method Summary

Client: ERM-Southeast, Inc.
Project/Site: ECI - Elon

TestAmerica Job ID: 140-2451-1

Method	Method Description	Protocol	Laboratory
TO-15	Volatile Organic Compounds in Ambient Air	EPA	TAL KNX

Protocol References:

EPA = US Environmental Protection Agency

Laboratory References:

TAL KNX = TestAmerica Knoxville, 5815 Middlebrook Pike, Knoxville, TN 37921, TEL (865)291-3000

Sample Summary

Client: ERM-Southeast, Inc.
Project/Site: ECI - Elon

TestAmerica Job ID: 140-2451-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
140-2451-1	5"-SVE/AS-4	Air	12/10/14 11:15	12/11/14 10:15

TEST AMERICA, KNOXVILLE 5815 ~~BR~~ MIDDLEBROOK PIKE, KNOXVILLE, TN 37921

~~SHEALY ENVIRONMENTAL SERVICES, INC.~~ 865-291-3000

~~SHEALY~~ **Chain of Custody Record**

~~106 Vantage Point Drive • West Columbia, SC 29172~~
~~Telephone No. 803-791-9700 Fax No. 803-791-9111~~
~~www.shealylab.com~~

Number 42793

Client: ERM	Report to Contact: ED.HOLIFIELD@ERM.COM	Telephone No. / E-mail: 704) 301-2262	Quote No.
Address: ~~175~~ 15720 BRIXHAM HILL AVE	Sampler's Signature: X Tom Naumann	Analysis (Attach list if more space is needed)	Page 1 of 1
City: CHARLOTTE; State: NC; Zip Code: 28277	Printed Name: TOM NAUMANN		
Project Name: ECI - ELON			Laboratory Lot Number
Project No.	P.O. No.		

Sample ID / Description (Containers for each sample may be combined on one line.)	Date	Time	G=Grab C=Composite	Matrix: Aqueous	Solid	Non-Aqueous	Air	No of Containers by Preservative Type: Unpres.	H2SO4	HNO3	HCl	NaOH	5035 Kit	TO-15	Remarks / Cooler I.D.
5"-SVE/AS-4	12/10/14	1115	G				X	2						X	(FOUR BAGS)

Received @ ambient, Fedex PO
tr.# 8064 9795 8200
Custody seal intact, ?? TAT
KW 12/11/14

2 tedlars

140-2451 Chain of Custody

Turn Around Time Required (Prior lab approval required for expedited TAT.)	Sample Disposal	Possible Hazard Identification	QC Requirements (Specify)
☑ Standard ☐ Rush (Specify)	☐ Return to Client ☑ Disposal by Lab	☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison ☑ Unknown	

	Date	Time		Date	Time
1. Relinquished by: TOM NAUMANN	12/10/14	1645	1. Received by: FED EX	12/10/14	1645
2. Relinquished by			2. Received by: KW	12/11/14	1015
3. Relinquished by			3. Received by		
4. Relinquished by			4. Laboratory received by		

Note: All samples are retained for four weeks from receipt unless other arrangements are made.

LAB USE ONLY
Received on ice (Circle) Yes No Ice Pack
Receipt Temp. _____ °C

DISTRIBUTION: WHITE & YELLOW-Return to laboratory with Sample(s); PINK-Field/Client Copy

Document Number: F-AD-133 Effective Date: 08-01-2014

Login Sample Receipt Checklist

Client: ERM-Southeast, Inc.

Job Number: 140-2451-1

Login Number: 2451

List Source: TestAmerica Knoxville

List Number: 1

Creator: Wilson, Ken

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	N/A	
Cooler Temperature is recorded.	N/A	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	N/A	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	N/A	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	N/A	
Samples do not require splitting or compositing.	N/A	
Residual Chlorine Checked.	N/A	

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Knoxville
5815 Middlebrook Pike
Knoxville, TN 37921
Tel: (865)291-3000

TestAmerica Job ID: 140-2444-1
Client Project/Site: ECI - Elon

For:
ERM-Southeast, Inc.
15720 Brixham Hill Avenue
Suite 120
Charlotte, North Carolina 28277

Attn: Ed Hollifield, P.G.

Authorized for release by:
12/17/2014 2:53:47 PM

Terry Walker Wasmund, Project Manager II
(865)291-3000
terry.wasmund@testamericainc.com

LINKS

Review your project results through TotalAccess

Have a Question? Ask The Expert

Visit us at: www.testamericainc.com

The test results in this report meet all 2003 NELAC and 2009 TNI requirements for accredited parameters, exceptions are noted in this report. This report may not be reproduced except in full, and with written approval from the laboratory. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

Table of Contents

Cover Page 1
Table of Contents 2
Definitions/Glossary 3
Case Narrative 4
Detection Summary 5
Client Sample Results 6
QC Sample Results 9
QC Association Summary 14
Lab Chronicle 15
Certification Summary 16
Method Summary 17
Sample Summary 18
Chain of Custody 19
Receipt Checklists 20

Qualifiers

Air - GC/MS VOA

Qualifier	Qualifier Description
*	LCS or LCSD exceeds the control limits
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
B	Compound was found in the blank and sample.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains no Free Liquid
DER	Duplicate error ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision level concentration
MDA	Minimum detectable activity
EDL	Estimated Detection Limit
MDC	Minimum detectable concentration
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative error ratio
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Job ID: 140-2444-1

Laboratory: TestAmerica Knoxville

Narrative

Job Narrative
140-2444-1

Receipt
The sample was received on 12/10/2014 10:00 AM; the sample arrived in good condition and properly preserved.

Except:

The following sample was received in air sample bags: SVE-5" (140-2444-1) . EPA Methods TO-14A and TO-15 describe the use of canisters for sampling and analysis; therefore, the use of air sample bags constitutes a modification to the method.

Air - GC/MS VOA
Method(s) TO 14A, TO 15 LL, TO-14A, TO-15: EPA methods TO-14A and TO-15 specify the use of humidified “zero air” as the blank reagent for canister cleaning, instrument calibration and sample analysis. Ultra-high purity humidified nitrogen from a cryogenic reservoir is used in place of “zero air” by TestAmerica Knoxville.

Method(s) TO-15: The following analyte(s) recovered outside control limits for the LCS associated with batch 2031: 1,1,-dichloroethene and 1,1,2-trichloro-1,2,2-trifluoroethane. This is not indicative of a systematic control problem because these were random marginal exceedances. Qualified results have been reported.

The continuing calibration verification (CCV) associated with batch 2031 exhibited % difference of > 30% for the following analyte(s) 1,1-dichloroethene, 1,1,2-trichloro-1,2,2-trifluoroethane and chloromethane, however the results were within the LCS acceptance limits. The EPA method requires that all target analytes in the continuing calibration verification standard be within 30% difference from the initial calibration. According to the laboratory standard operating procedure, the continuing calibration is acceptable if it meets the laboratory control sample acceptance criteria.

Method(s) Air Transfer: The following sample was received in air sample bags: SVE-5" (140-2444-1). In order to extend the holding time, the sample was transferred from the air sample bags into a Summa canister.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Comments
No additional comments.

Detection Summary

Client: ERM-Southeast, Inc.
Project/Site: ECI - Elon

TestAmerica Job ID: 140-2444-1

Client Sample ID: SVE-5"

Lab Sample ID: 140-2444-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
cis-1,2-Dichloroethene	11000		130	40	ppb v/v	428.57		TO-15	Total/NA
1,1-Dichloroethene	110	J *	130	22	ppb v/v	428.57		TO-15	Total/NA
Methylene Chloride	200	J B	330	86	ppb v/v	428.57		TO-15	Total/NA
4-Methyl-2-pentanone (MIBK)	260	J	330	30	ppb v/v	428.57		TO-15	Total/NA
Tetrachloroethene	250		130	26	ppb v/v	428.57		TO-15	Total/NA
Tetrahydrofuran	330	J	3300	42	ppb v/v	428.57		TO-15	Total/NA
trans-1,2-Dichloroethene	100	J	130	33	ppb v/v	428.57		TO-15	Total/NA
Trichloroethene	7500		130	24	ppb v/v	428.57		TO-15	Total/NA
1,1,2-Trichloro-1,2,2-trifluoroethane	350	*	130	20	ppb v/v	428.57		TO-15	Total/NA
Vinyl chloride	240		130	47	ppb v/v	428.57		TO-15	Total/NA

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
cis-1,2-Dichloroethene	44000		520	160	ug/m3	428.57		TO-15	Total/NA
1,1-Dichloroethene	440	J *	520	89	ug/m3	428.57		TO-15	Total/NA
Methylene Chloride	700	J B	1100	300	ug/m3	428.57		TO-15	Total/NA
4-Methyl-2-pentanone (MIBK)	1100	J	1400	120	ug/m3	428.57		TO-15	Total/NA
Tetrachloroethene	1700		890	180	ug/m3	428.57		TO-15	Total/NA
Tetrahydrofuran	960	J	9700	120	ug/m3	428.57		TO-15	Total/NA
trans-1,2-Dichloroethene	400	J	520	130	ug/m3	428.57		TO-15	Total/NA
Trichloroethene	41000		710	130	ug/m3	428.57		TO-15	Total/NA
1,1,2-Trichloro-1,2,2-trifluoroethane	2700	*	1000	160	ug/m3	428.57		TO-15	Total/NA
Vinyl chloride	610		340	120	ug/m3	428.57		TO-15	Total/NA

This Detection Summary does not include radiochemical test results.

Client Sample Results

Client: ERM-Southeast, Inc.
Project/Site: ECI - Elon

TestAmerica Job ID: 140-2444-1

Client Sample ID: SVE-5"

Lab Sample ID: 140-2444-1

Date Collected: 12/09/14 11:00

Matrix: Air

Date Received: 12/10/14 10:00

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	ND		3300	920	ppb v/v		12/10/14 12:44	12/10/14 19:37	428.57
Benzene	ND		130	37	ppb v/v		12/10/14 12:44	12/10/14 19:37	428.57
Benzyl chloride	ND		530	51	ppb v/v		12/10/14 12:44	12/10/14 19:37	428.57
Bromodichloromethane	ND		130	29	ppb v/v		12/10/14 12:44	12/10/14 19:37	428.57
Bromoform	ND		130	32	ppb v/v		12/10/14 12:44	12/10/14 19:37	428.57
Bromomethane	ND		130	21	ppb v/v		12/10/14 12:44	12/10/14 19:37	428.57
2-Butanone (MEK)	ND		660	130	ppb v/v		12/10/14 12:44	12/10/14 19:37	428.57
Carbon disulfide	ND		330	20	ppb v/v		12/10/14 12:44	12/10/14 19:37	428.57
Carbon tetrachloride	ND		130	25	ppb v/v		12/10/14 12:44	12/10/14 19:37	428.57
Chlorobenzene	ND		130	32	ppb v/v		12/10/14 12:44	12/10/14 19:37	428.57
Chloroethane	ND		530	23	ppb v/v		12/10/14 12:44	12/10/14 19:37	428.57
Chloroform	ND		130	25	ppb v/v		12/10/14 12:44	12/10/14 19:37	428.57
Chloromethane	ND		330	110	ppb v/v		12/10/14 12:44	12/10/14 19:37	428.57
cis-1,2-Dichloroethene	**11000**		130	40	ppb v/v		12/10/14 12:44	12/10/14 19:37	428.57
cis-1,3-Dichloropropene	ND		130	49	ppb v/v		12/10/14 12:44	12/10/14 19:37	428.57
Cyclohexane	ND		330	26	ppb v/v		12/10/14 12:44	12/10/14 19:37	428.57
Dibromochloromethane	ND		130	28	ppb v/v		12/10/14 12:44	12/10/14 19:37	428.57
1,2-Dibromoethane (EDB)	ND		130	29	ppb v/v		12/10/14 12:44	12/10/14 19:37	428.57
1,2-Dichlorobenzene	ND		130	46	ppb v/v		12/10/14 12:44	12/10/14 19:37	428.57
1,3-Dichlorobenzene	ND		130	43	ppb v/v		12/10/14 12:44	12/10/14 19:37	428.57
1,4-Dichlorobenzene	ND		130	42	ppb v/v		12/10/14 12:44	12/10/14 19:37	428.57
Dichlorodifluoromethane	ND		330	45	ppb v/v		12/10/14 12:44	12/10/14 19:37	428.57
1,1-Dichloroethane	ND		130	17	ppb v/v		12/10/14 12:44	12/10/14 19:37	428.57
1,2-Dichloroethane	ND		130	31	ppb v/v		12/10/14 12:44	12/10/14 19:37	428.57
1,1-Dichloroethene	**110**	**J ***	130	22	ppb v/v		12/10/14 12:44	12/10/14 19:37	428.57
1,2-Dichloropropane	ND		130	34	ppb v/v		12/10/14 12:44	12/10/14 19:37	428.57
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		130	21	ppb v/v		12/10/14 12:44	12/10/14 19:37	428.57
1,4-Dioxane	ND		3300	53	ppb v/v		12/10/14 12:44	12/10/14 19:37	428.57
Ethylbenzene	ND		130	45	ppb v/v		12/10/14 12:44	12/10/14 19:37	428.57
Hexachlorobutadiene	ND		130	51	ppb v/v		12/10/14 12:44	12/10/14 19:37	428.57
Hexane	ND		530	21	ppb v/v		12/10/14 12:44	12/10/14 19:37	428.57
Isopropyl alcohol	ND		3300	62	ppb v/v		12/10/14 12:44	12/10/14 19:37	428.57
Isopropylbenzene	ND		530	40	ppb v/v		12/10/14 12:44	12/10/14 19:37	428.57
Methylene Chloride	**200**	**J B**	330	86	ppb v/v		12/10/14 12:44	12/10/14 19:37	428.57
4-Methyl-2-pentanone (MIBK)	**260**	**J**	330	30	ppb v/v		12/10/14 12:44	12/10/14 19:37	428.57
Methyl tert-butyl ether	ND		660	110	ppb v/v		12/10/14 12:44	12/10/14 19:37	428.57
m-Xylene & p-Xylene	ND		530	79	ppb v/v		12/10/14 12:44	12/10/14 19:37	428.57
Naphthalene	ND		330	59	ppb v/v		12/10/14 12:44	12/10/14 19:37	428.57
o-Xylene	ND		130	40	ppb v/v		12/10/14 12:44	12/10/14 19:37	428.57
Styrene	ND		130	38	ppb v/v		12/10/14 12:44	12/10/14 19:37	428.57
1,1,2,2-Tetrachloroethane	ND		130	40	ppb v/v		12/10/14 12:44	12/10/14 19:37	428.57
Tetrachloroethene	**250**		130	26	ppb v/v		12/10/14 12:44	12/10/14 19:37	428.57
Tetrahydrofuran	**330**	**J**	3300	42	ppb v/v		12/10/14 12:44	12/10/14 19:37	428.57
Toluene	ND		130	79	ppb v/v		12/10/14 12:44	12/10/14 19:37	428.57
trans-1,2-Dichloroethene	**100**	**J**	130	33	ppb v/v		12/10/14 12:44	12/10/14 19:37	428.57
trans-1,3-Dichloropropene	ND		130	32	ppb v/v		12/10/14 12:44	12/10/14 19:37	428.57
1,2,4-Trichlorobenzene	ND		1300	65	ppb v/v		12/10/14 12:44	12/10/14 19:37	428.57
1,1,1-Trichloroethane	ND		130	20	ppb v/v		12/10/14 12:44	12/10/14 19:37	428.57
1,1,2-Trichloroethane	ND		130	36	ppb v/v		12/10/14 12:44	12/10/14 19:37	428.57

Client: ERM-Southeast, Inc.
Project/Site: ECI - Elon

TestAmerica Job ID: 140-2444-1

Client Sample ID: SVE-5"
Date Collected: 12/09/14 11:00
Date Received: 12/10/14 10:00

Lab Sample ID: 140-2444-1
Matrix: Air

Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Trichloroethene	**7500**		130	24	ppb v/v		12/10/14 12:44	12/10/14 19:37	428.57
Trichlorofluoromethane	ND		130	16	ppb v/v		12/10/14 12:44	12/10/14 19:37	428.57
1,1,2-Trichloro-1,2,2-trifluoroetha ne	**350**	*	130	20	ppb v/v		12/10/14 12:44	12/10/14 19:37	428.57
1,2,4-Trimethylbenzene	ND		130	42	ppb v/v		12/10/14 12:44	12/10/14 19:37	428.57
1,3,5-Trimethylbenzene	ND		130	43	ppb v/v		12/10/14 12:44	12/10/14 19:37	428.57
Vinyl acetate	ND		3300	92	ppb v/v		12/10/14 12:44	12/10/14 19:37	428.57
Vinyl bromide	ND		130	23	ppb v/v		12/10/14 12:44	12/10/14 19:37	428.57
Vinyl chloride	**240**		130	47	ppb v/v		12/10/14 12:44	12/10/14 19:37	428.57

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	ND		7800	2200	ug/m3		12/10/14 12:44	12/10/14 19:37	428.57
Benzene	ND		420	120	ug/m3		12/10/14 12:44	12/10/14 19:37	428.57
Benzyl chloride	ND		2700	270	ug/m3		12/10/14 12:44	12/10/14 19:37	428.57
Bromodichloromethane	ND		880	190	ug/m3		12/10/14 12:44	12/10/14 19:37	428.57
Bromoform	ND		1400	330	ug/m3		12/10/14 12:44	12/10/14 19:37	428.57
Bromomethane	ND		510	82	ug/m3		12/10/14 12:44	12/10/14 19:37	428.57
2-Butanone (MEK)	ND		1900	390	ug/m3		12/10/14 12:44	12/10/14 19:37	428.57
Carbon disulfide	ND		1000	64	ug/m3		12/10/14 12:44	12/10/14 19:37	428.57
Carbon tetrachloride	ND		830	160	ug/m3		12/10/14 12:44	12/10/14 19:37	428.57
Chlorobenzene	ND		610	150	ug/m3		12/10/14 12:44	12/10/14 19:37	428.57
Chloroethane	ND		1400	61	ug/m3		12/10/14 12:44	12/10/14 19:37	428.57
Chloroform	ND		640	120	ug/m3		12/10/14 12:44	12/10/14 19:37	428.57
Chloromethane	ND		680	220	ug/m3		12/10/14 12:44	12/10/14 19:37	428.57
cis-1,2-Dichloroethene	**44000**		520	160	ug/m3		12/10/14 12:44	12/10/14 19:37	428.57
cis-1,3-Dichloropropene	ND		600	220	ug/m3		12/10/14 12:44	12/10/14 19:37	428.57
Cyclohexane	ND		1100	91	ug/m3		12/10/14 12:44	12/10/14 19:37	428.57
Dibromochloromethane	ND		1100	240	ug/m3		12/10/14 12:44	12/10/14 19:37	428.57
1,2-Dibromoethane (EDB)	ND		1000	220	ug/m3		12/10/14 12:44	12/10/14 19:37	428.57
1,2-Dichlorobenzene	ND		790	280	ug/m3		12/10/14 12:44	12/10/14 19:37	428.57
1,3-Dichlorobenzene	ND		790	260	ug/m3		12/10/14 12:44	12/10/14 19:37	428.57
1,4-Dichlorobenzene	ND		790	250	ug/m3		12/10/14 12:44	12/10/14 19:37	428.57
Dichlorodifluoromethane	ND		1600	220	ug/m3		12/10/14 12:44	12/10/14 19:37	428.57
1,1-Dichloroethane	ND		530	69	ug/m3		12/10/14 12:44	12/10/14 19:37	428.57
1,2-Dichloroethane	ND		530	130	ug/m3		12/10/14 12:44	12/10/14 19:37	428.57
1,1-Dichloroethene	**440**	**J ***	520	89	ug/m3		12/10/14 12:44	12/10/14 19:37	428.57
1,2-Dichloropropane	ND		610	160	ug/m3		12/10/14 12:44	12/10/14 19:37	428.57
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		920	150	ug/m3		12/10/14 12:44	12/10/14 19:37	428.57
1,4-Dioxane	ND		12000	190	ug/m3		12/10/14 12:44	12/10/14 19:37	428.57
Ethylbenzene	ND		570	190	ug/m3		12/10/14 12:44	12/10/14 19:37	428.57
Hexachlorobutadiene	ND		1400	550	ug/m3		12/10/14 12:44	12/10/14 19:37	428.57
Hexane	ND		1900	74	ug/m3		12/10/14 12:44	12/10/14 19:37	428.57
Isopropyl alcohol	ND		8100	150	ug/m3		12/10/14 12:44	12/10/14 19:37	428.57
Isopropylbenzene	ND		2600	190	ug/m3		12/10/14 12:44	12/10/14 19:37	428.57
Methylene Chloride	**700**	**J B**	1100	300	ug/m3		12/10/14 12:44	12/10/14 19:37	428.57
4-Methyl-2-pentanone (MIBK)	**1100**	**J**	1400	120	ug/m3		12/10/14 12:44	12/10/14 19:37	428.57
Methyl tert-butyl ether	ND		2400	400	ug/m3		12/10/14 12:44	12/10/14 19:37	428.57
m-Xylene & p-Xylene	ND		2300	340	ug/m3		12/10/14 12:44	12/10/14 19:37	428.57
Naphthalene	ND		1700	310	ug/m3		12/10/14 12:44	12/10/14 19:37	428.57
o-Xylene	ND		570	170	ug/m3		12/10/14 12:44	12/10/14 19:37	428.57

Client Sample Results

Client: ERM-Southeast, Inc.
Project/Site: ECI - Elon

TestAmerica Job ID: 140-2444-1

Client Sample ID: SVE-5"

Lab Sample ID: 140-2444-1

Date Collected: 12/09/14 11:00

Matrix: Air

Date Received: 12/10/14 10:00

Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Styrene	ND		560	160	ug/m3		12/10/14 12:44	12/10/14 19:37	428.57
1,1,2,2-Tetrachloroethane	ND		910	280	ug/m3		12/10/14 12:44	12/10/14 19:37	428.57
Tetrachloroethene	**1700**		890	180	ug/m3		12/10/14 12:44	12/10/14 19:37	428.57
Tetrahydrofuran	**960**	**J**	9700	120	ug/m3		12/10/14 12:44	12/10/14 19:37	428.57
Toluene	ND		500	300	ug/m3		12/10/14 12:44	12/10/14 19:37	428.57
trans-1,2-Dichloroethene	**400**	**J**	520	130	ug/m3		12/10/14 12:44	12/10/14 19:37	428.57
trans-1,3-Dichloropropene	ND		600	140	ug/m3		12/10/14 12:44	12/10/14 19:37	428.57
1,2,4-Trichlorobenzene	ND		9800	480	ug/m3		12/10/14 12:44	12/10/14 19:37	428.57
1,1,1-Trichloroethane	ND		720	110	ug/m3		12/10/14 12:44	12/10/14 19:37	428.57
1,1,2-Trichloroethane	ND		720	190	ug/m3		12/10/14 12:44	12/10/14 19:37	428.57
Trichloroethene	**41000**		710	130	ug/m3		12/10/14 12:44	12/10/14 19:37	428.57
Trichlorofluoromethane	ND		740	89	ug/m3		12/10/14 12:44	12/10/14 19:37	428.57
1,1,2-Trichloro-1,2,2-trifluoroethane	**2700**	*****	1000	160	ug/m3		12/10/14 12:44	12/10/14 19:37	428.57
1,2,4-Trimethylbenzene	ND		650	200	ug/m3		12/10/14 12:44	12/10/14 19:37	428.57
1,3,5-Trimethylbenzene	ND		650	210	ug/m3		12/10/14 12:44	12/10/14 19:37	428.57
Vinyl acetate	ND		12000	330	ug/m3		12/10/14 12:44	12/10/14 19:37	428.57
Vinyl bromide	ND		580	100	ug/m3		12/10/14 12:44	12/10/14 19:37	428.57
Vinyl chloride	**610**		340	120	ug/m3		12/10/14 12:44	12/10/14 19:37	428.57

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Lab Sample ID: MB 140-2031/4
Matrix: Air
Analysis Batch: 2031

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	ND		5.0	1.4	ppb v/v			12/10/14 16:06	1
Benzene	ND		0.20	0.056	ppb v/v			12/10/14 16:06	1
Benzyl chloride	ND		0.80	0.078	ppb v/v			12/10/14 16:06	1
Bromodichloromethane	ND		0.20	0.044	ppb v/v			12/10/14 16:06	1
Bromoform	ND		0.20	0.048	ppb v/v			12/10/14 16:06	1
Bromomethane	ND		0.20	0.032	ppb v/v			12/10/14 16:06	1
2-Butanone (MEK)	ND		1.0	0.20	ppb v/v			12/10/14 16:06	1
Carbon disulfide	ND		0.50	0.031	ppb v/v			12/10/14 16:06	1
Carbon tetrachloride	ND		0.20	0.038	ppb v/v			12/10/14 16:06	1
Chlorobenzene	ND		0.20	0.049	ppb v/v			12/10/14 16:06	1
Chloroethane	ND		0.80	0.035	ppb v/v			12/10/14 16:06	1
Chloroform	ND		0.20	0.038	ppb v/v			12/10/14 16:06	1
Chloromethane	ND		0.50	0.16	ppb v/v			12/10/14 16:06	1
cis-1,2-Dichloroethene	ND		0.20	0.060	ppb v/v			12/10/14 16:06	1
cis-1,3-Dichloropropene	ND		0.20	0.074	ppb v/v			12/10/14 16:06	1
Cyclohexane	ND		0.50	0.040	ppb v/v			12/10/14 16:06	1
Dibromochloromethane	ND		0.20	0.042	ppb v/v			12/10/14 16:06	1
1,2-Dibromoethane (EDB)	ND		0.20	0.044	ppb v/v			12/10/14 16:06	1
1,2-Dichlorobenzene	ND		0.20	0.070	ppb v/v			12/10/14 16:06	1
1,3-Dichlorobenzene	ND		0.20	0.065	ppb v/v			12/10/14 16:06	1
1,4-Dichlorobenzene	ND		0.20	0.064	ppb v/v			12/10/14 16:06	1
Dichlorodifluoromethane	ND		0.50	0.068	ppb v/v			12/10/14 16:06	1
1,1-Dichloroethane	ND		0.20	0.026	ppb v/v			12/10/14 16:06	1
1,2-Dichloroethane	ND		0.20	0.047	ppb v/v			12/10/14 16:06	1
1,1-Dichloroethene	ND		0.20	0.034	ppb v/v			12/10/14 16:06	1
1,2-Dichloropropane	ND		0.20	0.052	ppb v/v			12/10/14 16:06	1
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.20	0.032	ppb v/v			12/10/14 16:06	1
1,4-Dioxane	ND		5.0	0.080	ppb v/v			12/10/14 16:06	1
Ethylbenzene	ND		0.20	0.068	ppb v/v			12/10/14 16:06	1
Hexachlorobutadiene	ND		0.20	0.078	ppb v/v			12/10/14 16:06	1
Hexane	ND		0.80	0.032	ppb v/v			12/10/14 16:06	1
Isopropyl alcohol	ND		5.0	0.094	ppb v/v			12/10/14 16:06	1
Isopropylbenzene	ND		0.80	0.060	ppb v/v			12/10/14 16:06	1
Methylene Chloride	0.251	J	0.50	0.13	ppb v/v			12/10/14 16:06	1
4-Methyl-2-pentanone (MIBK)	ND		0.50	0.045	ppb v/v			12/10/14 16:06	1
Methyl tert-butyl ether	ND		1.0	0.17	ppb v/v			12/10/14 16:06	1
m-Xylene & p-Xylene	ND		0.80	0.12	ppb v/v			12/10/14 16:06	1
Naphthalene	ND		0.50	0.090	ppb v/v			12/10/14 16:06	1
o-Xylene	ND		0.20	0.061	ppb v/v			12/10/14 16:06	1
Styrene	ND		0.20	0.058	ppb v/v			12/10/14 16:06	1
1,1,2,2-Tetrachloroethane	ND		0.20	0.061	ppb v/v			12/10/14 16:06	1
Tetrachloroethene	ND		0.20	0.040	ppb v/v			12/10/14 16:06	1
Tetrahydrofuran	ND		5.0	0.063	ppb v/v			12/10/14 16:06	1
Toluene	ND		0.20	0.12	ppb v/v			12/10/14 16:06	1
trans-1,2-Dichloroethene	ND		0.20	0.050	ppb v/v			12/10/14 16:06	1
trans-1,3-Dichloropropene	ND		0.20	0.048	ppb v/v			12/10/14 16:06	1
1,2,4-Trichlorobenzene	ND		2.0	0.098	ppb v/v			12/10/14 16:06	1
1,1,1-Trichloroethane	ND		0.20	0.030	ppb v/v			12/10/14 16:06	1

Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Lab Sample ID: MB 140-2031/4
Matrix: Air
Analysis Batch: 2031

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1,2-Trichloroethane	ND		0.20	0.054	ppb v/v			12/10/14 16:06	1
Trichloroethene	ND		0.20	0.036	ppb v/v			12/10/14 16:06	1
Trichlorofluoromethane	ND		0.20	0.024	ppb v/v			12/10/14 16:06	1
1,1,2-Trichloro-1,2,2-trifluoroethane	ND		0.20	0.031	ppb v/v			12/10/14 16:06	1
1,2,4-Trimethylbenzene	ND		0.20	0.063	ppb v/v			12/10/14 16:06	1
1,3,5-Trimethylbenzene	ND		0.20	0.065	ppb v/v			12/10/14 16:06	1
Vinyl acetate	ND		5.0	0.14	ppb v/v			12/10/14 16:06	1
Vinyl bromide	ND		0.20	0.035	ppb v/v			12/10/14 16:06	1
Vinyl chloride	ND		0.20	0.071	ppb v/v			12/10/14 16:06	1

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	ND		12	3.3	ug/m3			12/10/14 16:06	1
Benzene	ND		0.64	0.18	ug/m3			12/10/14 16:06	1
Benzyl chloride	ND		4.1	0.40	ug/m3			12/10/14 16:06	1
Bromodichloromethane	ND		1.3	0.29	ug/m3			12/10/14 16:06	1
Bromoform	ND		2.1	0.50	ug/m3			12/10/14 16:06	1
Bromomethane	ND		0.78	0.12	ug/m3			12/10/14 16:06	1
2-Butanone (MEK)	ND		2.9	0.59	ug/m3			12/10/14 16:06	1
Carbon disulfide	ND		1.6	0.097	ug/m3			12/10/14 16:06	1
Carbon tetrachloride	ND		1.3	0.24	ug/m3			12/10/14 16:06	1
Chlorobenzene	ND		0.92	0.23	ug/m3			12/10/14 16:06	1
Chloroethane	ND		2.1	0.092	ug/m3			12/10/14 16:06	1
Chloroform	ND		0.98	0.19	ug/m3			12/10/14 16:06	1
Chloromethane	ND		1.0	0.33	ug/m3			12/10/14 16:06	1
cis-1,2-Dichloroethene	ND		0.79	0.24	ug/m3			12/10/14 16:06	1
cis-1,3-Dichloropropene	ND		0.91	0.34	ug/m3			12/10/14 16:06	1
Cyclohexane	ND		1.7	0.14	ug/m3			12/10/14 16:06	1
Dibromochloromethane	ND		1.7	0.36	ug/m3			12/10/14 16:06	1
1,2-Dibromoethane (EDB)	ND		1.5	0.34	ug/m3			12/10/14 16:06	1
1,2-Dichlorobenzene	ND		1.2	0.42	ug/m3			12/10/14 16:06	1
1,3-Dichlorobenzene	ND		1.2	0.39	ug/m3			12/10/14 16:06	1
1,4-Dichlorobenzene	ND		1.2	0.38	ug/m3			12/10/14 16:06	1
Dichlorodifluoromethane	ND		2.5	0.34	ug/m3			12/10/14 16:06	1
1,1-Dichloroethane	ND		0.81	0.11	ug/m3			12/10/14 16:06	1
1,2-Dichloroethane	ND		0.81	0.19	ug/m3			12/10/14 16:06	1
1,1-Dichloroethene	ND		0.79	0.13	ug/m3			12/10/14 16:06	1
1,2-Dichloropropane	ND		0.92	0.24	ug/m3			12/10/14 16:06	1
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		1.4	0.22	ug/m3			12/10/14 16:06	1
1,4-Dioxane	ND		18	0.29	ug/m3			12/10/14 16:06	1
Ethylbenzene	ND		0.87	0.30	ug/m3			12/10/14 16:06	1
Hexachlorobutadiene	ND		2.1	0.83	ug/m3			12/10/14 16:06	1
Hexane	ND		2.8	0.11	ug/m3			12/10/14 16:06	1
Isopropyl alcohol	ND		12	0.23	ug/m3			12/10/14 16:06	1
Isopropylbenzene	ND		3.9	0.29	ug/m3			12/10/14 16:06	1
Methylene Chloride	0.870	J	1.7	0.45	ug/m3			12/10/14 16:06	1
4-Methyl-2-pentanone (MIBK)	ND		2.0	0.18	ug/m3			12/10/14 16:06	1
Methyl tert-butyl ether	ND		3.6	0.61	ug/m3			12/10/14 16:06	1
m-Xylene & p-Xylene	ND		3.5	0.52	ug/m3			12/10/14 16:06	1

Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Lab Sample ID: MB 140-2031/4
Matrix: Air
Analysis Batch: 2031

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Naphthalene	ND		2.6	0.47	ug/m3			12/10/14 16:06	1
o-Xylene	ND		0.87	0.26	ug/m3			12/10/14 16:06	1
Styrene	ND		0.85	0.25	ug/m3			12/10/14 16:06	1
1,1,2,2-Tetrachloroethane	ND		1.4	0.42	ug/m3			12/10/14 16:06	1
Tetrachloroethene	ND		1.4	0.27	ug/m3			12/10/14 16:06	1
Tetrahydrofuran	ND		15	0.19	ug/m3			12/10/14 16:06	1
Toluene	ND		0.75	0.45	ug/m3			12/10/14 16:06	1
trans-1,2-Dichloroethene	ND		0.79	0.20	ug/m3			12/10/14 16:06	1
trans-1,3-Dichloropropene	ND		0.91	0.22	ug/m3			12/10/14 16:06	1
1,2,4-Trichlorobenzene	ND		15	0.73	ug/m3			12/10/14 16:06	1
1,1,1-Trichloroethane	ND		1.1	0.16	ug/m3			12/10/14 16:06	1
1,1,2-Trichloroethane	ND		1.1	0.29	ug/m3			12/10/14 16:06	1
Trichloroethene	ND		1.1	0.19	ug/m3			12/10/14 16:06	1
Trichlorofluoromethane	ND		1.1	0.13	ug/m3			12/10/14 16:06	1
1,1,2-Trichloro-1,2,2-trifluoroethane	ND		1.5	0.24	ug/m3			12/10/14 16:06	1
1,2,4-Trimethylbenzene	ND		0.98	0.31	ug/m3			12/10/14 16:06	1
1,3,5-Trimethylbenzene	ND		0.98	0.32	ug/m3			12/10/14 16:06	1
Vinyl acetate	ND		18	0.49	ug/m3			12/10/14 16:06	1
Vinyl bromide	ND		0.87	0.15	ug/m3			12/10/14 16:06	1
Vinyl chloride	ND		0.51	0.18	ug/m3			12/10/14 16:06	1

Lab Sample ID: LCS 140-2031/1002
Matrix: Air
Analysis Batch: 2031

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Acetone	6.00	6.91		ppb v/v		115	60 - 140
Benzene	2.00	2.43		ppb v/v		121	70 - 130
Benzyl chloride	2.00	2.16		ppb v/v		108	70 - 130
Bromodichloromethane	2.00	2.41		ppb v/v		120	70 - 130
Bromoform	2.00	2.34		ppb v/v		117	60 - 140
Bromomethane	2.00	2.03		ppb v/v		101	70 - 130
2-Butanone (MEK)	2.00	2.22		ppb v/v		111	60 - 140
Carbon disulfide	2.00	2.51		ppb v/v		126	70 - 130
Carbon tetrachloride	2.00	2.48		ppb v/v		124	70 - 130
Chlorobenzene	2.00	2.04		ppb v/v		102	70 - 130
Chloroethane	2.00	2.29		ppb v/v		115	70 - 130
Chloroform	2.00	2.23		ppb v/v		112	70 - 130
Chloromethane	2.00	2.74		ppb v/v		137	60 - 140
cis-1,2-Dichloroethene	2.00	2.41		ppb v/v		120	70 - 130
cis-1,3-Dichloropropene	2.00	2.20		ppb v/v		110	70 - 130
Cyclohexane	2.00	2.16		ppb v/v		108	70 - 130
Dibromochloromethane	2.00	2.43		ppb v/v		121	70 - 130
1,2-Dibromoethane (EDB)	2.00	2.24		ppb v/v		112	70 - 130
1,2-Dichlorobenzene	2.00	1.92		ppb v/v		96	70 - 130
1,3-Dichlorobenzene	2.00	1.98		ppb v/v		99	70 - 130
1,4-Dichlorobenzene	2.00	1.99		ppb v/v		99	70 - 130
Dichlorodifluoromethane	2.00	2.26		ppb v/v		113	60 - 140

Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Lab Sample ID: LCS 140-2031/1002
Matrix: Air
Analysis Batch: 2031

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
1,1-Dichloroethane	2.00	2.40		ppb v/v		120	70 - 130
1,2-Dichloroethane	2.00	2.18		ppb v/v		109	70 - 130
1,1-Dichloroethene	2.00	2.66	*	ppb v/v		133	70 - 130
1,2-Dichloropropane	2.00	2.45		ppb v/v		123	70 - 130
1,2-Dichloro-1,1,2,2-tetrafluoroethane	2.00	2.05		ppb v/v		102	60 - 140
1,4-Dioxane	2.00	1.88	J	ppb v/v		94	60 - 140
Ethylbenzene	2.00	2.24		ppb v/v		112	70 - 130
Hexachlorobutadiene	2.00	2.30		ppb v/v		115	60 - 140
Hexane	2.00	2.32		ppb v/v		116	70 - 130
Isopropyl alcohol	6.00	7.07		ppb v/v		118	60 - 140
Isopropylbenzene	2.00	2.29		ppb v/v		115	70 - 130
Methylene Chloride	2.00	2.57		ppb v/v		129	70 - 130
4-Methyl-2-pentanone (MIBK)	2.00	2.41		ppb v/v		121	60 - 140
Methyl tert-butyl ether	2.00	2.26		ppb v/v		113	60 - 140
m-Xylene & p-Xylene	4.00	4.35		ppb v/v		109	70 - 130
Naphthalene	2.00	1.92		ppb v/v		96	40 - 140
o-Xylene	2.00	2.24		ppb v/v		112	70 - 130
Styrene	2.00	2.32		ppb v/v		116	70 - 130
1,1,2,2-Tetrachloroethane	2.00	2.60		ppb v/v		130	70 - 130
Tetrachloroethene	2.00	2.08		ppb v/v		104	70 - 130
Tetrahydrofuran	2.00	2.57		ppb v/v		129	60 - 140
Toluene	2.00	2.36		ppb v/v		118	70 - 130
trans-1,2-Dichloroethene	2.00	2.27		ppb v/v		113	70 - 130
trans-1,3-Dichloropropene	2.00	2.14		ppb v/v		107	70 - 130
1,2,4-Trichlorobenzene	2.00	1.51		ppb v/v		75	60 - 140
1,1,1-Trichloroethane	2.00	2.16		ppb v/v		108	70 - 130
1,1,2-Trichloroethane	2.00	2.31		ppb v/v		115	70 - 130
Trichloroethene	2.00	2.09		ppb v/v		105	70 - 130
Trichlorofluoromethane	2.00	2.28		ppb v/v		114	60 - 140
1,1,2-Trichloro-1,2,2-trifluoroethane	2.00	2.63	*	ppb v/v		131	70 - 130
1,2,4-Trimethylbenzene	2.00	2.27		ppb v/v		113	70 - 130
1,3,5-Trimethylbenzene	2.00	2.27		ppb v/v		114	70 - 130
Vinyl acetate	2.00	2.57		ppb v/v		128	60 - 140
Vinyl bromide	2.00	1.87		ppb v/v		94	60 - 140
Vinyl chloride	2.00	2.56		ppb v/v		128	70 - 130

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Acetone	14	16.4		ug/m3		115	60 - 140
Benzene	6.4	7.76		ug/m3		121	70 - 130
Benzyl chloride	10	11.2		ug/m3		108	70 - 130
Bromodichloromethane	13	16.2		ug/m3		120	70 - 130
Bromoform	21	24.2		ug/m3		117	60 - 140
Bromomethane	7.8	7.88		ug/m3		101	70 - 130
2-Butanone (MEK)	5.9	6.54		ug/m3		111	60 - 140
Carbon disulfide	6.2	7.82		ug/m3		126	70 - 130
Carbon tetrachloride	13	15.6		ug/m3		124	70 - 130
Chlorobenzene	9.2	9.41		ug/m3		102	70 - 130

Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Lab Sample ID: LCS 140-2031/1002
Matrix: Air
Analysis Batch: 2031

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloroethane	5.3	6.05		ug/m3		115	70 - 130
Chloroform	9.8	10.9		ug/m3		112	70 - 130
Chloromethane	4.1	5.67		ug/m3		137	60 - 140
cis-1,2-Dichloroethene	7.9	9.55		ug/m3		120	70 - 130
cis-1,3-Dichloropropene	9.1	9.96		ug/m3		110	70 - 130
Cyclohexane	6.9	7.43		ug/m3		108	70 - 130
Dibromochloromethane	17	20.7		ug/m3		121	70 - 130
1,2-Dibromoethane (EDB)	15	17.2		ug/m3		112	70 - 130
1,2-Dichlorobenzene	12	11.5		ug/m3		96	70 - 130
1,3-Dichlorobenzene	12	11.9		ug/m3		99	70 - 130
1,4-Dichlorobenzene	12	11.9		ug/m3		99	70 - 130
Dichlorodifluoromethane	9.9	11.2		ug/m3		113	60 - 140
1,1-Dichloroethane	8.1	9.70		ug/m3		120	70 - 130
1,2-Dichloroethane	8.1	8.83		ug/m3		109	70 - 130
1,1-Dichloroethene	7.9	10.6	*	ug/m3		133	70 - 130
1,2-Dichloropropane	9.2	11.3		ug/m3		123	70 - 130
1,2-Dichloro-1,1,2,2-tetrafluoroethane	14	14.3		ug/m3		102	60 - 140
1,4-Dioxane	7.2	6.78	J	ug/m3		94	60 - 140
Ethylbenzene	8.7	9.73		ug/m3		112	70 - 130
Hexachlorobutadiene	21	24.6		ug/m3		115	60 - 140
Hexane	7.1	8.18		ug/m3		116	70 - 130
Isopropyl alcohol	15	17.4		ug/m3		118	60 - 140
Isopropylbenzene	9.8	11.3		ug/m3		115	70 - 130
Methylene Chloride	7.0	8.94		ug/m3		129	70 - 130
4-Methyl-2-pentanone (MIBK)	8.2	9.89		ug/m3		121	60 - 140
Methyl tert-butyl ether	7.2	8.16		ug/m3		113	60 - 140
m-Xylene & p-Xylene	17	18.9		ug/m3		109	70 - 130
Naphthalene	10	10.1		ug/m3		96	40 - 140
o-Xylene	8.7	9.73		ug/m3		112	70 - 130
Styrene	8.5	9.87		ug/m3		116	70 - 130
1,1,2,2-Tetrachloroethane	14	17.9		ug/m3		130	70 - 130
Tetrachloroethene	14	14.1		ug/m3		104	70 - 130
Tetrahydrofuran	5.9	7.59		ug/m3		129	60 - 140
Toluene	7.5	8.89		ug/m3		118	70 - 130
trans-1,2-Dichloroethene	7.9	9.00		ug/m3		113	70 - 130
trans-1,3-Dichloropropene	9.1	9.71		ug/m3		107	70 - 130
1,2,4-Trichlorobenzene	15	11.2		ug/m3		75	60 - 140
1,1,1-Trichloroethane	11	11.8		ug/m3		108	70 - 130
1,1,2-Trichloroethane	11	12.6		ug/m3		115	70 - 130
Trichloroethene	11	11.3		ug/m3		105	70 - 130
Trichlorofluoromethane	11	12.8		ug/m3		114	60 - 140
1,1,2-Trichloro-1,2,2-trifluoroethane	15	20.2	*	ug/m3		131	70 - 130
1,2,4-Trimethylbenzene	9.8	11.2		ug/m3		113	70 - 130
1,3,5-Trimethylbenzene	9.8	11.2		ug/m3		114	70 - 130
Vinyl acetate	7.0	9.05		ug/m3		128	60 - 140
Vinyl bromide	8.8	8.19		ug/m3		94	60 - 140
Vinyl chloride	5.1	6.54		ug/m3		128	70 - 130

QC Association Summary

Client: ERM-Southeast, Inc.
Project/Site: ECI - Elon

TestAmerica Job ID: 140-2444-1

Air - GC/MS VOA

Analysis Batch: 2031

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-2444-1	SVE-5"	Total/NA	Air	TO-15	2039
LCS 140-2031/1002	Lab Control Sample	Total/NA	Air	TO-15	
MB 140-2031/4	Method Blank	Total/NA	Air	TO-15	

Prep Batch: 2039

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-2444-1	SVE-5"	Total/NA	Air	Air Transfer	

Lab Chronicle

Client: ERM-Southeast, Inc.
Project/Site: ECI - Elon

TestAmerica Job ID: 140-2444-1

Client Sample ID: SVE-5"

Date Collected: 12/09/14 11:00
Date Received: 12/10/14 10:00

Lab Sample ID: 140-2444-1

Matrix: Air

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	Air Transfer					2039	12/10/14 12:44	AFB	TAL KNX
Total/NA	Analysis	TO-15		428.57	130 mL	500 mL	2031	12/10/14 19:37	HMT	TAL KNX
	Instrument ID:	MG								

Laboratory References:

TAL KNX = TestAmerica Knoxville, 5815 Middlebrook Pike, Knoxville, TN 37921, TEL (865)291-3000

Certification Summary

Client: ERM-Southeast, Inc.
Project/Site: ECI - Elon

TestAmerica Job ID: 140-2444-1

Laboratory: TestAmerica Knoxville

All certifications held by this laboratory are listed. Not all certifications are applicable to this report.

Authority	Program	EPA Region	Certification ID	Expiration Date
	AFCEE		N/A	
Arkansas DEQ	State Program	6	88-0688	06-17-15
California	State Program	9	2423	06-30-16
Colorado	State Program	8	N/A	02-28-15
Connecticut	State Program	1	PH-0223	09-30-15
Florida	NELAP	4	E87177	06-30-15
Georgia	State Program	4	906	04-13-17
Hawaii	State Program	9	N/A	04-13-15
Kansas	NELAP	7	E-10349	01-31-15
Kentucky (DW)	State Program	4	90101	12-31-14
L-A-B	DoD ELAP		L2311	02-13-16
Louisiana	NELAP	6	LA110001	12-31-15
Maryland	State Program	3	277	03-31-15
Michigan	State Program	5	9933	04-13-17
Nevada	State Program	9	TN00009	07-31-15
New Jersey	NELAP	2	TN001	06-30-15
New York	NELAP	2	10781	03-31-15
North Carolina (DW)	State Program	4	21705	07-31-15
Ohio VAP	State Program	5	CL0059	03-26-15
Oklahoma	State Program	6	9415	08-31-15
Pennsylvania	NELAP	3	68-00576	12-31-14
South Carolina	State Program	4	84001	06-30-15
Tennessee	State Program	4	2014	04-13-17
Texas	NELAP	6	T104704380-TX	08-31-15
USDA	Federal		P330-13-00260	08-29-16
Utah	NELAP	8	QUAN3	07-31-15
Virginia	NELAP	3	460176	09-14-15
Virginia	State Program	3	165	06-30-15
Washington	State Program	10	C593	01-19-15
West Virginia (DW)	State Program	3	9955C	12-31-14
West Virginia DEP	State Program	3	345	04-30-15
Wisconsin	State Program	5	998044300	08-31-15

Method Summary

Client: ERM-Southeast, Inc.
Project/Site: ECI - Elon

TestAmerica Job ID: 140-2444-1

Method	Method Description	Protocol	Laboratory
TO-15	Volatile Organic Compounds in Ambient Air	EPA	TAL KNX

Protocol References:

EPA = US Environmental Protection Agency

Laboratory References:

TAL KNX = TestAmerica Knoxville, 5815 Middlebrook Pike, Knoxville, TN 37921, TEL (865)291-3000

Sample Summary

Client: ERM-Southeast, Inc.
Project/Site: ECI - Elon

TestAmerica Job ID: 140-2444-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
140-2444-1	SVE-5"	Air	12/09/14 11:00	12/10/14 10:00

TEST AM KNOXVILLE

~~ANALYTICAL ENVIRONMENTAL SERVICES, INC~~

~~3785 Presidential Parkway, Atlanta GA 30340-3704~~ 5815 MIDDLEBROOK PIKE, KNOXVILLE, TN 37921

AES TEL.: (770) 457-8177 / TOLL-FREE (800) 972-4889 / FAX: (770) 457-8188 865-291-3000

CHAIN OF CUSTODY

Work Order: _____

Date: 12/9/14 Page 1 of 1

COMPANY: ERM

ADDRESS: 15720 BRIXHAM HILL AVE CHARLOTTE, NC 28277

PHONE: 704-301-2262 ED HOLFIELD

FAX:

SAMPLED BY: TOMMY FISHER & TOM NAUMANN

SIGNATURE:

ANALYSIS REQUESTED: TO-15

Visit our website www.aesatlanta.com to check on the status of your results, place bottle orders, etc.

#	SAMPLE ID	SAMPLED DATE	SAMPLED TIME	Grab	Composite	Matrix (See codes)	PRESERVATION (See codes) NA	REMARKS	No # of Containers
1	SVE-5''	12/9/14	1100	✓		A	X	TEDLAR BAG	2
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									

140-2444 Chain of Custody

REC. @ AMBIENT
NO CUSTODY SEAL
1 BOX RH 12-10-14
FED EX # 806497958265

RELINQUISHED BY	DATE/TIME	RECEIVED BY	DATE/TIME
1: TOM NAUMANN	12/9/14 1730	1: FED EX	12/9/14 1730
2:		2: Ryan Henry	12/10/14 1000
3:		3:	

SPECIAL INSTRUCTIONS/COMMENTS:

SHIPMENT METHOD
OUT / / VIA:
IN / / VIA:
CLIENT FedEx UPS MAIL COURIER
GREYHOUND OTHER_____

PROJECT INFORMATION
PROJECT NAME: ECI ELON
PROJECT #:
SITE ADDRESS:
SEND REPORT TO: ED HOLFIELD
INVOICE TO:
(IF DIFFERENT FROM ABOVE)
QUOTE #:_____ PO#:_____

RECEIPT
Total # of Containers 2

Turnaround Time Request
- ✓ Standard 5 Business Days
- ○ 2 Business Day Rush
- ○ Next Business Day Rush
- ○ Same Day Rush (auth req.)
- ○ Other _____

STATE PROGRAM (if any): _____
E-mail? Y / N; Fax? Y / N
DATA PACKAGE: I II III IV

SAMPLES RECEIVED AFTER 3PM OR ON SATURDAY ARE CONSIDERED RECEIVED THE NEXT BUSINESS DAY. IF TURNAROUND TIME IS NOT INDICATED, AES WILL PROCEED WITH STANDARD TAT OF SAMPLES. SAMPLES ARE DISPOSED 30 DAYS AFTER REPORT COMPLETION UNLESS OTHER ARRANGEMENTS ARE MADE.

MATRIX CODES: A = Air GW = Groundwater SE = Sediment SO = Soil SW = Surface Water W = Water (Blanks) DW = Drinking Water (Blanks) O = Other (specify) WW = Waste Water

PRESERVATIVE CODES: H+I = Hydrochloric acid + ice I = Ice only N = Nitric acid S+I = Sulfuric acid + ice S/M+I = Sodium Bisulfate/Methanol + ice O = Other (specify) NA = None

White Copy - Original; Yellow Copy - Client

Login Sample Receipt Checklist

Client: ERM-Southeast, Inc.

Job Number: 140-2444-1

Login Number: 2444

List Source: TestAmerica Knoxville

List Number: 1

Creator: Dameron, Bryan K

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	N/A	
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	N/A	
Cooler Temperature is recorded.	N/A	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	N/A	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	N/A	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	N/A	
Samples do not require splitting or compositing.	N/A	
Residual Chlorine Checked.	N/A	

APPENDIX D
Laboratory Analytical Reports - Groundwater

SHEALY ENVIRONMENTAL SERVICES, INC.

Report of Analysis

ERM NC, Inc.
Ballantyne One
15720 Brixham Hill Avenue, Suite 120
Charlotte, NC 28277
Attention: Ed Hollifield

Project Name: **ECI - Elon**

Lot Number: **PL12058**

Date Completed: **12/20/2014**

Kelly M. Nance
Project Manager

This report shall not be reproduced, except in its entirety, without the written approval of Shealy Environmental Services, Inc.

The following non-paginated documents are considered part of this report: Chain of Custody Record and Sample Receipt Checklist.

* P L 1 2 0 5 8 *

Case Narrative
ERM NC, Inc.
Lot Number: PL12058

This Report of Analysis contains the analytical result(s) for the sample(s) listed on the Sample Summary following this Case Narrative. The sample receiving date is documented in the header information associated with each sample.

All results listed in this report relate only to the samples that are contained within this report.

Sample receipt, sample analysis, and data review have been performed in accordance with the most current approved NELAC standards, the Shealy Environmental Services, Inc. ("Shealy") Quality Assurance Management Plan (QAMP), standard operating procedures (SOPs), and Shealy policies. Any exceptions to the NELAC standards, the QAMP, SOPs or policies are qualified on the results page or discussed below.

If you have any questions regarding this report please contact the Shealy Project Manager listed on the cover page.

Sample Summary
ERM NC, Inc.
Lot Number: PL12058

Sample Number	Sample ID	Matrix	Date Sampled	Date Received
001	OB-1B	Aqueous	12/08/2014 1430	12/12/2014
002	OB-1B	Aqueous	12/10/2014 1445	12/12/2014
003	0B-2B	Aqueous	12/08/2014 1450	12/12/2014
004	0B-2B	Aqueous	12/10/2014 1505	12/12/2014
005	MW-7	Aqueous	12/08/2014 1550	12/12/2014
006	MW-7	Aqueous	12/10/2014 1425	12/12/2014
007	DW-1	Aqueous	12/08/2014 1530	12/12/2014
008	DW-1	Aqueous	12/10/2014 1405	12/12/2014
009	AS-1	Aqueous	12/08/2014 1510	12/12/2014
010	AS-1	Aqueous	12/10/2014 1530	12/12/2014

(10 samples)

Executive Summary

ERM NC, Inc.

Lot Number: PL12058

Sample	Sample ID	Matrix	Parameter	Method	Result	Q	Units	Page
001	OB-1B	Aqueous	Trichloroethene	8260B	460		ug/L	6
002	OB-1B	Aqueous	Trichloroethene	8260B	860		ug/L	8
003	0B-2B	Aqueous	Trichloroethene	8260B	300		ug/L	10
004	0B-2B	Aqueous	Trichloroethene	8260B	2700		ug/L	12
005	MW-7	Aqueous	Trichloroethene	8260B	2700		ug/L	14
006	MW-7	Aqueous	Trichloroethene	8260B	2700		ug/L	16
007	DW-1	Aqueous	1,1,2-Trichloro-1,2,2-Trifluoroethane	8260B	5.1		ug/L	17
007	DW-1	Aqueous	Trichloroethene	8260B	94		ug/L	18
008	DW-1	Aqueous	1,1,2-Trichloro-1,2,2-Trifluoroethane	8260B	5.2		ug/L	19
008	DW-1	Aqueous	Trichloroethene	8260B	100		ug/L	20
009	AS-1	Aqueous	Trichloroethene	8260B	390		ug/L	22
010	AS-1	Aqueous	Acetone	8260B	1400		ug/L	23
010	AS-1	Aqueous	2-Butanone (MEK)	8260B	810		ug/L	23
010	AS-1	Aqueous	Trichloroethene	8260B	220		ug/L	24

(14 detections)

Volatile Organic Compounds by GC/MS

Client: **ERM NC, Inc.**
Laboratory ID: **PL12058-001**
Description: **OB-1B**
Matrix: **Aqueous**
Date Sampled: **12/08/2014 1430**
Date Received: **12/12/2014**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	5030B	8260B	5	12/17/2014 0511	PMM2		63233

Parameter	CAS Number	Analytical Method	Result	Q	PQL	Units	Run
Acetone	67-64-1	8260B	ND		100	ug/L	1
Benzene	71-43-2	8260B	ND		25	ug/L	1
Bromodichloromethane	75-27-4	8260B	ND		25	ug/L	1
Bromoform	75-25-2	8260B	ND		25	ug/L	1
Bromomethane (Methyl bromide)	74-83-9	8260B	ND		25	ug/L	1
2-Butanone (MEK)	78-93-3	8260B	ND		50	ug/L	1
Carbon disulfide	75-15-0	8260B	ND		25	ug/L	1
Carbon tetrachloride	56-23-5	8260B	ND		25	ug/L	1
Chlorobenzene	108-90-7	8260B	ND		25	ug/L	1
Chloroethane	75-00-3	8260B	ND		25	ug/L	1
Chloroform	67-66-3	8260B	ND		25	ug/L	1
Chloromethane (Methyl chloride)	74-87-3	8260B	ND		25	ug/L	1
Cyclohexane	110-82-7	8260B	ND		25	ug/L	1
1,2-Dibromo-3-chloropropane (DBCP)	96-12-8	8260B	ND		25	ug/L	1
Dibromochloromethane	124-48-1	8260B	ND		25	ug/L	1
1,2-Dibromoethane (EDB)	106-93-4	8260B	ND		25	ug/L	1
1,2-Dichlorobenzene	95-50-1	8260B	ND		25	ug/L	1
1,3-Dichlorobenzene	541-73-1	8260B	ND		25	ug/L	1
1,4-Dichlorobenzene	106-46-7	8260B	ND		25	ug/L	1
Dichlorodifluoromethane	75-71-8	8260B	ND		25	ug/L	1
1,1-Dichloroethane	75-34-3	8260B	ND		25	ug/L	1
1,2-Dichloroethane	107-06-2	8260B	ND		25	ug/L	1
1,1-Dichloroethene	75-35-4	8260B	ND		25	ug/L	1
cis-1,2-Dichloroethene	156-59-2	8260B	ND		25	ug/L	1
trans-1,2-Dichloroethene	156-60-5	8260B	ND		25	ug/L	1
1,2-Dichloropropane	78-87-5	8260B	ND		25	ug/L	1
cis-1,3-Dichloropropene	10061-01-5	8260B	ND		25	ug/L	1
trans-1,3-Dichloropropene	10061-02-6	8260B	ND		25	ug/L	1
Ethylbenzene	100-41-4	8260B	ND		25	ug/L	1
2-Hexanone	591-78-6	8260B	ND		50	ug/L	1
Isopropylbenzene	98-82-8	8260B	ND		25	ug/L	1
Methyl acetate	79-20-9	8260B	ND		25	ug/L	1
Methyl tertiary butyl ether (MTBE)	1634-04-4	8260B	ND		25	ug/L	1
4-Methyl-2-pentanone	108-10-1	8260B	ND		50	ug/L	1
Methylcyclohexane	108-87-2	8260B	ND		25	ug/L	1
Methylene chloride	75-09-2	8260B	ND		25	ug/L	1
Styrene	100-42-5	8260B	ND		25	ug/L	1
1,1,2,2-Tetrachloroethane	79-34-5	8260B	ND		25	ug/L	1
Tetrachloroethene	127-18-4	8260B	ND		25	ug/L	1
Toluene	108-88-3	8260B	ND		25	ug/L	1
1,1,2-Trichloro-1,2,2-Trifluoroethane	76-13-1	8260B	ND		25	ug/L	1
1,2,4-Trichlorobenzene	120-82-1	8260B	ND		25	ug/L	1
1,1,1-Trichloroethane	71-55-6	8260B	ND		25	ug/L	1
1,1,2-Trichloroethane	79-00-5	8260B	ND		25	ug/L	1

PQL = Practical quantitation limit
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
H = Out of holding time
ND = Not detected at or above the PQL
J = Estimated result < PQL and ≥ MDL
P = The RPD between two GC columns exceeds 40%
N = Recovery is out of criteria
Where applicable, all soil sample analysis are reported on a dry weight basis unless flagged with a "W"

Volatile Organic Compounds by GC/MS

Client: **ERM NC, Inc.**
Laboratory ID: **PL12058-001**
Description: **OB-1B**
Matrix: **Aqueous**
Date Sampled: **12/08/2014 1430**
Date Received: **12/12/2014**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	5030B	8260B	5	12/17/2014 0511	PMM2		63233

Parameter	CAS Number	Analytical Method	Result	Q	PQL	Units	Run
Trichloroethene	**79-01-6**	**8260B**	**460**		**25**	**ug/L**	**1**
Trichlorofluoromethane	75-69-4	8260B	ND		25	ug/L	1
Vinyl chloride	75-01-4	8260B	ND		10	ug/L	1
Xylenes (total)	1330-20-7	8260B	ND		25	ug/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
1,2-Dichloroethane-d4		105	70-130
Bromofluorobenzene		113	70-130
Toluene-d8		115	70-130

PQL = Practical quantitation limit
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
H = Out of holding time
ND = Not detected at or above the PQL
J = Estimated result < PQL and ≥ MDL
P = The RPD between two GC columns exceeds 40%
N = Recovery is out of criteria
Where applicable, all soil sample analysis are reported on a dry weight basis unless flagged with a "W"

Volatile Organic Compounds by GC/MS

Client: **ERM NC, Inc.**
Laboratory ID: **PL12058-002**
Description: **OB-1B**
Matrix: **Aqueous**
Date Sampled: **12/10/2014 1445**
Date Received: **12/12/2014**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	5030B	8260B	10	12/17/2014 0533	PMM2		63233

Parameter	CAS Number	Analytical Method	Result	Q	PQL	Units	Run
Acetone	67-64-1	8260B	ND		200	ug/L	1
Benzene	71-43-2	8260B	ND		50	ug/L	1
Bromodichloromethane	75-27-4	8260B	ND		50	ug/L	1
Bromoform	75-25-2	8260B	ND		50	ug/L	1
Bromomethane (Methyl bromide)	74-83-9	8260B	ND		50	ug/L	1
2-Butanone (MEK)	78-93-3	8260B	ND		100	ug/L	1
Carbon disulfide	75-15-0	8260B	ND		50	ug/L	1
Carbon tetrachloride	56-23-5	8260B	ND		50	ug/L	1
Chlorobenzene	108-90-7	8260B	ND		50	ug/L	1
Chloroethane	75-00-3	8260B	ND		50	ug/L	1
Chloroform	67-66-3	8260B	ND		50	ug/L	1
Chloromethane (Methyl chloride)	74-87-3	8260B	ND		50	ug/L	1
Cyclohexane	110-82-7	8260B	ND		50	ug/L	1
1,2-Dibromo-3-chloropropane (DBCP)	96-12-8	8260B	ND		50	ug/L	1
Dibromochloromethane	124-48-1	8260B	ND		50	ug/L	1
1,2-Dibromoethane (EDB)	106-93-4	8260B	ND		50	ug/L	1
1,2-Dichlorobenzene	95-50-1	8260B	ND		50	ug/L	1
1,3-Dichlorobenzene	541-73-1	8260B	ND		50	ug/L	1
1,4-Dichlorobenzene	106-46-7	8260B	ND		50	ug/L	1
Dichlorodifluoromethane	75-71-8	8260B	ND		50	ug/L	1
1,1-Dichloroethane	75-34-3	8260B	ND		50	ug/L	1
1,2-Dichloroethane	107-06-2	8260B	ND		50	ug/L	1
1,1-Dichloroethene	75-35-4	8260B	ND		50	ug/L	1
cis-1,2-Dichloroethene	156-59-2	8260B	ND		50	ug/L	1
trans-1,2-Dichloroethene	156-60-5	8260B	ND		50	ug/L	1
1,2-Dichloropropane	78-87-5	8260B	ND		50	ug/L	1
cis-1,3-Dichloropropene	10061-01-5	8260B	ND		50	ug/L	1
trans-1,3-Dichloropropene	10061-02-6	8260B	ND		50	ug/L	1
Ethylbenzene	100-41-4	8260B	ND		50	ug/L	1
2-Hexanone	591-78-6	8260B	ND		100	ug/L	1
Isopropylbenzene	98-82-8	8260B	ND		50	ug/L	1
Methyl acetate	79-20-9	8260B	ND		50	ug/L	1
Methyl tertiary butyl ether (MTBE)	1634-04-4	8260B	ND		50	ug/L	1
4-Methyl-2-pentanone	108-10-1	8260B	ND		100	ug/L	1
Methylcyclohexane	108-87-2	8260B	ND		50	ug/L	1
Methylene chloride	75-09-2	8260B	ND		50	ug/L	1
Styrene	100-42-5	8260B	ND		50	ug/L	1
1,1,2,2-Tetrachloroethane	79-34-5	8260B	ND		50	ug/L	1
Tetrachloroethene	127-18-4	8260B	ND		50	ug/L	1
Toluene	108-88-3	8260B	ND		50	ug/L	1
1,1,2-Trichloro-1,2,2-Trifluoroethane	76-13-1	8260B	ND		50	ug/L	1
1,2,4-Trichlorobenzene	120-82-1	8260B	ND		50	ug/L	1
1,1,1-Trichloroethane	71-55-6	8260B	ND		50	ug/L	1
1,1,2-Trichloroethane	79-00-5	8260B	ND		50	ug/L	1

PQL = Practical quantitation limit
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
H = Out of holding time
ND = Not detected at or above the PQL
J = Estimated result < PQL and ≥ MDL
P = The RPD between two GC columns exceeds 40%
N = Recovery is out of criteria
Where applicable, all soil sample analysis are reported on a dry weight basis unless flagged with a "W"

Volatile Organic Compounds by GC/MS

Client: **ERM NC, Inc.**
Laboratory ID: **PL12058-002**
Description: **OB-1B**
Matrix: **Aqueous**
Date Sampled: **12/10/2014 1445**
Date Received: **12/12/2014**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	5030B	8260B	10	12/17/2014 0533	PMM2		63233

Parameter	CAS Number	Analytical Method	Result	Q	PQL	Units	Run
Trichloroethene	**79-01-6**	**8260B**	**860**		**50**	**ug/L**	**1**
Trichlorofluoromethane	75-69-4	8260B	ND		50	ug/L	1
Vinyl chloride	75-01-4	8260B	ND		20	ug/L	1
Xylenes (total)	1330-20-7	8260B	ND		50	ug/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
1,2-Dichloroethane-d4		106	70-130
Bromofluorobenzene		112	70-130
Toluene-d8		117	70-130

PQL = Practical quantitation limit
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
H = Out of holding time
ND = Not detected at or above the PQL
J = Estimated result < PQL and ≥ MDL
P = The RPD between two GC columns exceeds 40%
N = Recovery is out of criteria
Where applicable, all soil sample analysis are reported on a dry weight basis unless flagged with a "W"

Volatile Organic Compounds by GC/MS

Client: **ERM NC, Inc.**
Laboratory ID: **PL12058-003**
Description: **0B-2B**
Matrix: **Aqueous**
Date Sampled: **12/08/2014 1450**
Date Received: **12/12/2014**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	5030B	8260B	5	12/18/2014 0417	PMM2		63373

Parameter	CAS Number	Analytical Method	Result	Q	PQL	Units	Run
Acetone	67-64-1	8260B	ND		100	ug/L	1
Benzene	71-43-2	8260B	ND		25	ug/L	1
Bromodichloromethane	75-27-4	8260B	ND		25	ug/L	1
Bromoform	75-25-2	8260B	ND		25	ug/L	1
Bromomethane (Methyl bromide)	74-83-9	8260B	ND		25	ug/L	1
2-Butanone (MEK)	78-93-3	8260B	ND		50	ug/L	1
Carbon disulfide	75-15-0	8260B	ND		25	ug/L	1
Carbon tetrachloride	56-23-5	8260B	ND		25	ug/L	1
Chlorobenzene	108-90-7	8260B	ND		25	ug/L	1
Chloroethane	75-00-3	8260B	ND		25	ug/L	1
Chloroform	67-66-3	8260B	ND		25	ug/L	1
Chloromethane (Methyl chloride)	74-87-3	8260B	ND		25	ug/L	1
Cyclohexane	110-82-7	8260B	ND		25	ug/L	1
1,2-Dibromo-3-chloropropane (DBCP)	96-12-8	8260B	ND		25	ug/L	1
Dibromochloromethane	124-48-1	8260B	ND		25	ug/L	1
1,2-Dibromoethane (EDB)	106-93-4	8260B	ND		25	ug/L	1
1,2-Dichlorobenzene	95-50-1	8260B	ND		25	ug/L	1
1,3-Dichlorobenzene	541-73-1	8260B	ND		25	ug/L	1
1,4-Dichlorobenzene	106-46-7	8260B	ND		25	ug/L	1
Dichlorodifluoromethane	75-71-8	8260B	ND		25	ug/L	1
1,1-Dichloroethane	75-34-3	8260B	ND		25	ug/L	1
1,2-Dichloroethane	107-06-2	8260B	ND		25	ug/L	1
1,1-Dichloroethene	75-35-4	8260B	ND		25	ug/L	1
cis-1,2-Dichloroethene	156-59-2	8260B	ND		25	ug/L	1
trans-1,2-Dichloroethene	156-60-5	8260B	ND		25	ug/L	1
1,2-Dichloropropane	78-87-5	8260B	ND		25	ug/L	1
cis-1,3-Dichloropropene	10061-01-5	8260B	ND		25	ug/L	1
trans-1,3-Dichloropropene	10061-02-6	8260B	ND		25	ug/L	1
Ethylbenzene	100-41-4	8260B	ND		25	ug/L	1
2-Hexanone	591-78-6	8260B	ND		50	ug/L	1
Isopropylbenzene	98-82-8	8260B	ND		25	ug/L	1
Methyl acetate	79-20-9	8260B	ND		25	ug/L	1
Methyl tertiary butyl ether (MTBE)	1634-04-4	8260B	ND		25	ug/L	1
4-Methyl-2-pentanone	108-10-1	8260B	ND		50	ug/L	1
Methylcyclohexane	108-87-2	8260B	ND		25	ug/L	1
Methylene chloride	75-09-2	8260B	ND		25	ug/L	1
Styrene	100-42-5	8260B	ND		25	ug/L	1
1,1,2,2-Tetrachloroethane	79-34-5	8260B	ND		25	ug/L	1
Tetrachloroethene	127-18-4	8260B	ND		25	ug/L	1
Toluene	108-88-3	8260B	ND		25	ug/L	1
1,1,2-Trichloro-1,2,2-Trifluoroethane	76-13-1	8260B	ND		25	ug/L	1
1,2,4-Trichlorobenzene	120-82-1	8260B	ND		25	ug/L	1
1,1,1-Trichloroethane	71-55-6	8260B	ND		25	ug/L	1
1,1,2-Trichloroethane	79-00-5	8260B	ND		25	ug/L	1

PQL = Practical quantitation limit
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
H = Out of holding time
ND = Not detected at or above the PQL
J = Estimated result < PQL and ≥ MDL
P = The RPD between two GC columns exceeds 40%
N = Recovery is out of criteria
Where applicable, all soil sample analysis are reported on a dry weight basis unless flagged with a "W"

Volatile Organic Compounds by GC/MS

Client: **ERM NC, Inc.**
Laboratory ID: **PL12058-003**
Description: **0B-2B**
Matrix: **Aqueous**
Date Sampled: **12/08/2014 1450**
Date Received: **12/12/2014**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	5030B	8260B	5	12/18/2014 0417	PMM2		63373

Parameter	CAS Number	Analytical Method	Result	Q	PQL	Units	Run
Trichloroethene	**79-01-6**	**8260B**	**300**		**25**	**ug/L**	**1**
Trichlorofluoromethane	75-69-4	8260B	ND		25	ug/L	1
Vinyl chloride	75-01-4	8260B	ND		10	ug/L	1
Xylenes (total)	1330-20-7	8260B	ND		25	ug/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
1,2-Dichloroethane-d4		95	70-130
Bromofluorobenzene		102	70-130
Toluene-d8		94	70-130

PQL = Practical quantitation limit
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
H = Out of holding time
ND = Not detected at or above the PQL
J = Estimated result < PQL and ≥ MDL
P = The RPD between two GC columns exceeds 40%
N = Recovery is out of criteria
Where applicable, all soil sample analysis are reported on a dry weight basis unless flagged with a "W"

Volatile Organic Compounds by GC/MS

Client: **ERM NC, Inc.**
Laboratory ID: **PL12058-004**
Description: **0B-2B**
Matrix: **Aqueous**
Date Sampled: **12/10/2014 1505**
Date Received: **12/12/2014**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	5030B	8260B	50	12/18/2014 0439	PMM2		63373

Parameter	CAS Number	Analytical Method	Result	Q	PQL	Units	Run
Acetone	67-64-1	8260B	ND		1000	ug/L	1
Benzene	71-43-2	8260B	ND		250	ug/L	1
Bromodichloromethane	75-27-4	8260B	ND		250	ug/L	1
Bromoform	75-25-2	8260B	ND		250	ug/L	1
Bromomethane (Methyl bromide)	74-83-9	8260B	ND		250	ug/L	1
2-Butanone (MEK)	78-93-3	8260B	ND		500	ug/L	1
Carbon disulfide	75-15-0	8260B	ND		250	ug/L	1
Carbon tetrachloride	56-23-5	8260B	ND		250	ug/L	1
Chlorobenzene	108-90-7	8260B	ND		250	ug/L	1
Chloroethane	75-00-3	8260B	ND		250	ug/L	1
Chloroform	67-66-3	8260B	ND		250	ug/L	1
Chloromethane (Methyl chloride)	74-87-3	8260B	ND		250	ug/L	1
Cyclohexane	110-82-7	8260B	ND		250	ug/L	1
1,2-Dibromo-3-chloropropane (DBCP)	96-12-8	8260B	ND		250	ug/L	1
Dibromochloromethane	124-48-1	8260B	ND		250	ug/L	1
1,2-Dibromoethane (EDB)	106-93-4	8260B	ND		250	ug/L	1
1,2-Dichlorobenzene	95-50-1	8260B	ND		250	ug/L	1
1,3-Dichlorobenzene	541-73-1	8260B	ND		250	ug/L	1
1,4-Dichlorobenzene	106-46-7	8260B	ND		250	ug/L	1
Dichlorodifluoromethane	75-71-8	8260B	ND		250	ug/L	1
1,1-Dichloroethane	75-34-3	8260B	ND		250	ug/L	1
1,2-Dichloroethane	107-06-2	8260B	ND		250	ug/L	1
1,1-Dichloroethene	75-35-4	8260B	ND		250	ug/L	1
cis-1,2-Dichloroethene	156-59-2	8260B	ND		250	ug/L	1
trans-1,2-Dichloroethene	156-60-5	8260B	ND		250	ug/L	1
1,2-Dichloropropane	78-87-5	8260B	ND		250	ug/L	1
cis-1,3-Dichloropropene	10061-01-5	8260B	ND		250	ug/L	1
trans-1,3-Dichloropropene	10061-02-6	8260B	ND		250	ug/L	1
Ethylbenzene	100-41-4	8260B	ND		250	ug/L	1
2-Hexanone	591-78-6	8260B	ND		500	ug/L	1
Isopropylbenzene	98-82-8	8260B	ND		250	ug/L	1
Methyl acetate	79-20-9	8260B	ND		250	ug/L	1
Methyl tertiary butyl ether (MTBE)	1634-04-4	8260B	ND		250	ug/L	1
4-Methyl-2-pentanone	108-10-1	8260B	ND		500	ug/L	1
Methylcyclohexane	108-87-2	8260B	ND		250	ug/L	1
Methylene chloride	75-09-2	8260B	ND		250	ug/L	1
Styrene	100-42-5	8260B	ND		250	ug/L	1
1,1,2,2-Tetrachloroethane	79-34-5	8260B	ND		250	ug/L	1
Tetrachloroethene	127-18-4	8260B	ND		250	ug/L	1
Toluene	108-88-3	8260B	ND		250	ug/L	1
1,1,2-Trichloro-1,2,2-Trifluoroethane	76-13-1	8260B	ND		250	ug/L	1
1,2,4-Trichlorobenzene	120-82-1	8260B	ND		250	ug/L	1
1,1,1-Trichloroethane	71-55-6	8260B	ND		250	ug/L	1
1,1,2-Trichloroethane	79-00-5	8260B	ND		250	ug/L	1

PQL = Practical quantitation limit
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
H = Out of holding time
ND = Not detected at or above the PQL
J = Estimated result < PQL and ≥ MDL
P = The RPD between two GC columns exceeds 40%
N = Recovery is out of criteria
Where applicable, all soil sample analysis are reported on a dry weight basis unless flagged with a "W"

Volatile Organic Compounds by GC/MS

Client: **ERM NC, Inc.**
Laboratory ID: **PL12058-004**
Description: **0B-2B**
Matrix: **Aqueous**
Date Sampled: **12/10/2014 1505**
Date Received: **12/12/2014**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	5030B	8260B	50	12/18/2014 0439	PMM2		63373

Parameter	CAS Number	Analytical Method	Result	Q	PQL	Units	Run
Trichloroethene	**79-01-6**	**8260B**	**2700**		**250**	**ug/L**	**1**
Trichlorofluoromethane	75-69-4	8260B	ND		250	ug/L	1
Vinyl chloride	75-01-4	8260B	ND		100	ug/L	1
Xylenes (total)	1330-20-7	8260B	ND		250	ug/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
1,2-Dichloroethane-d4		94	70-130
Bromofluorobenzene		101	70-130
Toluene-d8		95	70-130

PQL = Practical quantitation limit
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
H = Out of holding time
ND = Not detected at or above the PQL
J = Estimated result < PQL and ≥ MDL
P = The RPD between two GC columns exceeds 40%
N = Recovery is out of criteria
Where applicable, all soil sample analysis are reported on a dry weight basis unless flagged with a "W"

Volatile Organic Compounds by GC/MS

Client: **ERM NC, Inc.**
Laboratory ID: **PL12058-005**
Description: **MW-7**
Matrix: **Aqueous**
Date Sampled: **12/08/2014 1550**
Date Received: **12/12/2014**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	5030B	8260B	50	12/18/2014 0501	PMM2		63373

Parameter	CAS Number	Analytical Method	Result	Q	PQL	Units	Run
Acetone	67-64-1	8260B	ND		1000	ug/L	1
Benzene	71-43-2	8260B	ND		250	ug/L	1
Bromodichloromethane	75-27-4	8260B	ND		250	ug/L	1
Bromoform	75-25-2	8260B	ND		250	ug/L	1
Bromomethane (Methyl bromide)	74-83-9	8260B	ND		250	ug/L	1
2-Butanone (MEK)	78-93-3	8260B	ND		500	ug/L	1
Carbon disulfide	75-15-0	8260B	ND		250	ug/L	1
Carbon tetrachloride	56-23-5	8260B	ND		250	ug/L	1
Chlorobenzene	108-90-7	8260B	ND		250	ug/L	1
Chloroethane	75-00-3	8260B	ND		250	ug/L	1
Chloroform	67-66-3	8260B	ND		250	ug/L	1
Chloromethane (Methyl chloride)	74-87-3	8260B	ND		250	ug/L	1
Cyclohexane	110-82-7	8260B	ND		250	ug/L	1
1,2-Dibromo-3-chloropropane (DBCP)	96-12-8	8260B	ND		250	ug/L	1
Dibromochloromethane	124-48-1	8260B	ND		250	ug/L	1
1,2-Dibromoethane (EDB)	106-93-4	8260B	ND		250	ug/L	1
1,2-Dichlorobenzene	95-50-1	8260B	ND		250	ug/L	1
1,3-Dichlorobenzene	541-73-1	8260B	ND		250	ug/L	1
1,4-Dichlorobenzene	106-46-7	8260B	ND		250	ug/L	1
Dichlorodifluoromethane	75-71-8	8260B	ND		250	ug/L	1
1,1-Dichloroethane	75-34-3	8260B	ND		250	ug/L	1
1,2-Dichloroethane	107-06-2	8260B	ND		250	ug/L	1
1,1-Dichloroethene	75-35-4	8260B	ND		250	ug/L	1
cis-1,2-Dichloroethene	156-59-2	8260B	ND		250	ug/L	1
trans-1,2-Dichloroethene	156-60-5	8260B	ND		250	ug/L	1
1,2-Dichloropropane	78-87-5	8260B	ND		250	ug/L	1
cis-1,3-Dichloropropene	10061-01-5	8260B	ND		250	ug/L	1
trans-1,3-Dichloropropene	10061-02-6	8260B	ND		250	ug/L	1
Ethylbenzene	100-41-4	8260B	ND		250	ug/L	1
2-Hexanone	591-78-6	8260B	ND		500	ug/L	1
Isopropylbenzene	98-82-8	8260B	ND		250	ug/L	1
Methyl acetate	79-20-9	8260B	ND		250	ug/L	1
Methyl tertiary butyl ether (MTBE)	1634-04-4	8260B	ND		250	ug/L	1
4-Methyl-2-pentanone	108-10-1	8260B	ND		500	ug/L	1
Methylcyclohexane	108-87-2	8260B	ND		250	ug/L	1
Methylene chloride	75-09-2	8260B	ND		250	ug/L	1
Styrene	100-42-5	8260B	ND		250	ug/L	1
1,1,2,2-Tetrachloroethane	79-34-5	8260B	ND		250	ug/L	1
Tetrachloroethene	127-18-4	8260B	ND		250	ug/L	1
Toluene	108-88-3	8260B	ND		250	ug/L	1
1,1,2-Trichloro-1,2,2-Trifluoroethane	76-13-1	8260B	ND		250	ug/L	1
1,2,4-Trichlorobenzene	120-82-1	8260B	ND		250	ug/L	1
1,1,1-Trichloroethane	71-55-6	8260B	ND		250	ug/L	1
1,1,2-Trichloroethane	79-00-5	8260B	ND		250	ug/L	1

PQL = Practical quantitation limit
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
H = Out of holding time
ND = Not detected at or above the PQL
J = Estimated result < PQL and ≥ MDL
P = The RPD between two GC columns exceeds 40%
N = Recovery is out of criteria
Where applicable, all soil sample analysis are reported on a dry weight basis unless flagged with a "W"

Volatile Organic Compounds by GC/MS

Client: **ERM NC, Inc.**
Laboratory ID: **PL12058-005**
Description: **MW-7**
Matrix: **Aqueous**
Date Sampled: **12/08/2014 1550**
Date Received: **12/12/2014**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	5030B	8260B	50	12/18/2014 0501	PMM2		63373

Parameter	CAS Number	Analytical Method	Result	Q	PQL	Units	Run
Trichloroethene	**79-01-6**	**8260B**	**2700**		**250**	**ug/L**	**1**
Trichlorofluoromethane	75-69-4	8260B	ND		250	ug/L	1
Vinyl chloride	75-01-4	8260B	ND		100	ug/L	1
Xylenes (total)	1330-20-7	8260B	ND		250	ug/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
1,2-Dichloroethane-d4		93	70-130
Bromofluorobenzene		102	70-130
Toluene-d8		95	70-130

PQL = Practical quantitation limit
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
H = Out of holding time
ND = Not detected at or above the PQL
J = Estimated result < PQL and ≥ MDL
P = The RPD between two GC columns exceeds 40%
N = Recovery is out of criteria
Where applicable, all soil sample analysis are reported on a dry weight basis unless flagged with a "W"

Volatile Organic Compounds by GC/MS

Client: **ERM NC, Inc.**
Laboratory ID: **PL12058-006**
Description: **MW-7**
Matrix: **Aqueous**
Date Sampled: **12/10/2014 1425**
Date Received: **12/12/2014**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	5030B	8260B	50	12/18/2014 0523	PMM2		63373

Parameter	CAS Number	Analytical Method	Result	Q	PQL	Units	Run
Acetone	67-64-1	8260B	ND		1000	ug/L	1
Benzene	71-43-2	8260B	ND		250	ug/L	1
Bromodichloromethane	75-27-4	8260B	ND		250	ug/L	1
Bromoform	75-25-2	8260B	ND		250	ug/L	1
Bromomethane (Methyl bromide)	74-83-9	8260B	ND		250	ug/L	1
2-Butanone (MEK)	78-93-3	8260B	ND		500	ug/L	1
Carbon disulfide	75-15-0	8260B	ND		250	ug/L	1
Carbon tetrachloride	56-23-5	8260B	ND		250	ug/L	1
Chlorobenzene	108-90-7	8260B	ND		250	ug/L	1
Chloroethane	75-00-3	8260B	ND		250	ug/L	1
Chloroform	67-66-3	8260B	ND		250	ug/L	1
Chloromethane (Methyl chloride)	74-87-3	8260B	ND		250	ug/L	1
Cyclohexane	110-82-7	8260B	ND		250	ug/L	1
1,2-Dibromo-3-chloropropane (DBCP)	96-12-8	8260B	ND		250	ug/L	1
Dibromochloromethane	124-48-1	8260B	ND		250	ug/L	1
1,2-Dibromoethane (EDB)	106-93-4	8260B	ND		250	ug/L	1
1,2-Dichlorobenzene	95-50-1	8260B	ND		250	ug/L	1
1,3-Dichlorobenzene	541-73-1	8260B	ND		250	ug/L	1
1,4-Dichlorobenzene	106-46-7	8260B	ND		250	ug/L	1
Dichlorodifluoromethane	75-71-8	8260B	ND		250	ug/L	1
1,1-Dichloroethane	75-34-3	8260B	ND		250	ug/L	1
1,2-Dichloroethane	107-06-2	8260B	ND		250	ug/L	1
1,1-Dichloroethene	75-35-4	8260B	ND		250	ug/L	1
cis-1,2-Dichloroethene	156-59-2	8260B	ND		250	ug/L	1
trans-1,2-Dichloroethene	156-60-5	8260B	ND		250	ug/L	1
1,2-Dichloropropane	78-87-5	8260B	ND		250	ug/L	1
cis-1,3-Dichloropropene	10061-01-5	8260B	ND		250	ug/L	1
trans-1,3-Dichloropropene	10061-02-6	8260B	ND		250	ug/L	1
Ethylbenzene	100-41-4	8260B	ND		250	ug/L	1
2-Hexanone	591-78-6	8260B	ND		500	ug/L	1
Isopropylbenzene	98-82-8	8260B	ND		250	ug/L	1
Methyl acetate	79-20-9	8260B	ND		250	ug/L	1
Methyl tertiary butyl ether (MTBE)	1634-04-4	8260B	ND		250	ug/L	1
4-Methyl-2-pentanone	108-10-1	8260B	ND		500	ug/L	1
Methylcyclohexane	108-87-2	8260B	ND		250	ug/L	1
Methylene chloride	75-09-2	8260B	ND		250	ug/L	1
Styrene	100-42-5	8260B	ND		250	ug/L	1
1,1,2,2-Tetrachloroethane	79-34-5	8260B	ND		250	ug/L	1
Tetrachloroethene	127-18-4	8260B	ND		250	ug/L	1
Toluene	108-88-3	8260B	ND		250	ug/L	1
1,1,2-Trichloro-1,2,2-Trifluoroethane	76-13-1	8260B	ND		250	ug/L	1
1,2,4-Trichlorobenzene	120-82-1	8260B	ND		250	ug/L	1
1,1,1-Trichloroethane	71-55-6	8260B	ND		250	ug/L	1
1,1,2-Trichloroethane	79-00-5	8260B	ND		250	ug/L	1

PQL = Practical quantitation limit
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
H = Out of holding time
ND = Not detected at or above the PQL
J = Estimated result < PQL and ≥ MDL
P = The RPD between two GC columns exceeds 40%
N = Recovery is out of criteria
Where applicable, all soil sample analysis are reported on a dry weight basis unless flagged with a "W"

Volatile Organic Compounds by GC/MS

Client: **ERM NC, Inc.**
Laboratory ID: **PL12058-006**
Description: **MW-7**
Matrix: **Aqueous**
Date Sampled: **12/10/2014 1425**
Date Received: **12/12/2014**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	5030B	8260B	50	12/18/2014 0523	PMM2		63373

Parameter	CAS Number	Analytical Method	Result	Q	PQL	Units	Run
Trichloroethene	**79-01-6**	**8260B**	**2700**		**250**	**ug/L**	**1**
Trichlorofluoromethane	75-69-4	8260B	ND		250	ug/L	1
Vinyl chloride	75-01-4	8260B	ND		100	ug/L	1
Xylenes (total)	1330-20-7	8260B	ND		250	ug/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
1,2-Dichloroethane-d4		94	70-130
Bromofluorobenzene		102	70-130
Toluene-d8		95	70-130

PQL = Practical quantitation limit
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
H = Out of holding time
ND = Not detected at or above the PQL
J = Estimated result < PQL and ≥ MDL
P = The RPD between two GC columns exceeds 40%
N = Recovery is out of criteria
Where applicable, all soil sample analysis are reported on a dry weight basis unless flagged with a "W"

Volatile Organic Compounds by GC/MS

Client: **ERM NC, Inc.**
Laboratory ID: **PL12058-007**
Description: **DW-1**
Matrix: **Aqueous**
Date Sampled: **12/08/2014 1530**
Date Received: **12/12/2014**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	5030B	8260B	1	12/18/2014 0059	PMM2		63373

Parameter	CAS Number	Analytical Method	Result	Q	PQL	Units	Run
Acetone	67-64-1	8260B	ND		20	ug/L	1
Benzene	71-43-2	8260B	ND		5.0	ug/L	1
Bromodichloromethane	75-27-4	8260B	ND		5.0	ug/L	1
Bromoform	75-25-2	8260B	ND		5.0	ug/L	1
Bromomethane (Methyl bromide)	74-83-9	8260B	ND		5.0	ug/L	1
2-Butanone (MEK)	78-93-3	8260B	ND		10	ug/L	1
Carbon disulfide	75-15-0	8260B	ND		5.0	ug/L	1
Carbon tetrachloride	56-23-5	8260B	ND		5.0	ug/L	1
Chlorobenzene	108-90-7	8260B	ND		5.0	ug/L	1
Chloroethane	75-00-3	8260B	ND		5.0	ug/L	1
Chloroform	67-66-3	8260B	ND		5.0	ug/L	1
Chloromethane (Methyl chloride)	74-87-3	8260B	ND		5.0	ug/L	1
Cyclohexane	110-82-7	8260B	ND		5.0	ug/L	1
1,2-Dibromo-3-chloropropane (DBCP)	96-12-8	8260B	ND		5.0	ug/L	1
Dibromochloromethane	124-48-1	8260B	ND		5.0	ug/L	1
1,2-Dibromoethane (EDB)	106-93-4	8260B	ND		5.0	ug/L	1
1,2-Dichlorobenzene	95-50-1	8260B	ND		5.0	ug/L	1
1,3-Dichlorobenzene	541-73-1	8260B	ND		5.0	ug/L	1
1,4-Dichlorobenzene	106-46-7	8260B	ND		5.0	ug/L	1
Dichlorodifluoromethane	75-71-8	8260B	ND		5.0	ug/L	1
1,1-Dichloroethane	75-34-3	8260B	ND		5.0	ug/L	1
1,2-Dichloroethane	107-06-2	8260B	ND		5.0	ug/L	1
1,1-Dichloroethene	75-35-4	8260B	ND		5.0	ug/L	1
cis-1,2-Dichloroethene	156-59-2	8260B	ND		5.0	ug/L	1
trans-1,2-Dichloroethene	156-60-5	8260B	ND		5.0	ug/L	1
1,2-Dichloropropane	78-87-5	8260B	ND		5.0	ug/L	1
cis-1,3-Dichloropropene	10061-01-5	8260B	ND		5.0	ug/L	1
trans-1,3-Dichloropropene	10061-02-6	8260B	ND		5.0	ug/L	1
Ethylbenzene	100-41-4	8260B	ND		5.0	ug/L	1
2-Hexanone	591-78-6	8260B	ND		10	ug/L	1
Isopropylbenzene	98-82-8	8260B	ND		5.0	ug/L	1
Methyl acetate	79-20-9	8260B	ND		5.0	ug/L	1
Methyl tertiary butyl ether (MTBE)	1634-04-4	8260B	ND		5.0	ug/L	1
4-Methyl-2-pentanone	108-10-1	8260B	ND		10	ug/L	1
Methylcyclohexane	108-87-2	8260B	ND		5.0	ug/L	1
Methylene chloride	75-09-2	8260B	ND		5.0	ug/L	1
Styrene	100-42-5	8260B	ND		5.0	ug/L	1
1,1,2,2-Tetrachloroethane	79-34-5	8260B	ND		5.0	ug/L	1
Tetrachloroethene	127-18-4	8260B	ND		5.0	ug/L	1
Toluene	108-88-3	8260B	ND		5.0	ug/L	1
1,1,2-Trichloro-1,2,2-Trifluoroethane	**76-13-1**	**8260B**	**5.1**		**5.0**	**ug/L**	**1**
1,2,4-Trichlorobenzene	120-82-1	8260B	ND		5.0	ug/L	1
1,1,1-Trichloroethane	71-55-6	8260B	ND		5.0	ug/L	1
1,1,2-Trichloroethane	79-00-5	8260B	ND		5.0	ug/L	1

PQL = Practical quantitation limit
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
H = Out of holding time
ND = Not detected at or above the PQL
J = Estimated result < PQL and ≥ MDL
P = The RPD between two GC columns exceeds 40%
N = Recovery is out of criteria
Where applicable, all soil sample analysis are reported on a dry weight basis unless flagged with a "W"

Volatile Organic Compounds by GC/MS

Client: **ERM NC, Inc.**
Laboratory ID: **PL12058-007**
Description: **DW-1**
Matrix: **Aqueous**
Date Sampled: **12/08/2014 1530**
Date Received: **12/12/2014**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	5030B	8260B	1	12/18/2014 0059	PMM2		63373

Parameter	CAS Number	Analytical Method	Result	Q	PQL	Units	Run
Trichloroethene	**79-01-6**	**8260B**	**94**		**5.0**	**ug/L**	**1**
Trichlorofluoromethane	75-69-4	8260B	ND		5.0	ug/L	1
Vinyl chloride	75-01-4	8260B	ND		2.0	ug/L	1
Xylenes (total)	1330-20-7	8260B	ND		5.0	ug/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
1,2-Dichloroethane-d4		94	70-130
Bromofluorobenzene		102	70-130
Toluene-d8		96	70-130

PQL = Practical quantitation limit
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
H = Out of holding time
ND = Not detected at or above the PQL
J = Estimated result < PQL and ≥ MDL
P = The RPD between two GC columns exceeds 40%
N = Recovery is out of criteria
Where applicable, all soil sample analysis are reported on a dry weight basis unless flagged with a "W"

Volatile Organic Compounds by GC/MS

Client: **ERM NC, Inc.**
Laboratory ID: **PL12058-008**
Description: **DW-1**
Matrix: **Aqueous**
Date Sampled: **12/10/2014 1405**
Date Received: **12/12/2014**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	5030B	8260B	1	12/18/2014 0120	PMM2		63373

Parameter	CAS Number	Analytical Method	Result	Q	PQL	Units	Run
Acetone	67-64-1	8260B	ND		20	ug/L	1
Benzene	71-43-2	8260B	ND		5.0	ug/L	1
Bromodichloromethane	75-27-4	8260B	ND		5.0	ug/L	1
Bromoform	75-25-2	8260B	ND		5.0	ug/L	1
Bromomethane (Methyl bromide)	74-83-9	8260B	ND		5.0	ug/L	1
2-Butanone (MEK)	78-93-3	8260B	ND		10	ug/L	1
Carbon disulfide	75-15-0	8260B	ND		5.0	ug/L	1
Carbon tetrachloride	56-23-5	8260B	ND		5.0	ug/L	1
Chlorobenzene	108-90-7	8260B	ND		5.0	ug/L	1
Chloroethane	75-00-3	8260B	ND		5.0	ug/L	1
Chloroform	67-66-3	8260B	ND		5.0	ug/L	1
Chloromethane (Methyl chloride)	74-87-3	8260B	ND		5.0	ug/L	1
Cyclohexane	110-82-7	8260B	ND		5.0	ug/L	1
1,2-Dibromo-3-chloropropane (DBCP)	96-12-8	8260B	ND		5.0	ug/L	1
Dibromochloromethane	124-48-1	8260B	ND		5.0	ug/L	1
1,2-Dibromoethane (EDB)	106-93-4	8260B	ND		5.0	ug/L	1
1,2-Dichlorobenzene	95-50-1	8260B	ND		5.0	ug/L	1
1,3-Dichlorobenzene	541-73-1	8260B	ND		5.0	ug/L	1
1,4-Dichlorobenzene	106-46-7	8260B	ND		5.0	ug/L	1
Dichlorodifluoromethane	75-71-8	8260B	ND		5.0	ug/L	1
1,1-Dichloroethane	75-34-3	8260B	ND		5.0	ug/L	1
1,2-Dichloroethane	107-06-2	8260B	ND		5.0	ug/L	1
1,1-Dichloroethene	75-35-4	8260B	ND		5.0	ug/L	1
cis-1,2-Dichloroethene	156-59-2	8260B	ND		5.0	ug/L	1
trans-1,2-Dichloroethene	156-60-5	8260B	ND		5.0	ug/L	1
1,2-Dichloropropane	78-87-5	8260B	ND		5.0	ug/L	1
cis-1,3-Dichloropropene	10061-01-5	8260B	ND		5.0	ug/L	1
trans-1,3-Dichloropropene	10061-02-6	8260B	ND		5.0	ug/L	1
Ethylbenzene	100-41-4	8260B	ND		5.0	ug/L	1
2-Hexanone	591-78-6	8260B	ND		10	ug/L	1
Isopropylbenzene	98-82-8	8260B	ND		5.0	ug/L	1
Methyl acetate	79-20-9	8260B	ND		5.0	ug/L	1
Methyl tertiary butyl ether (MTBE)	1634-04-4	8260B	ND		5.0	ug/L	1
4-Methyl-2-pentanone	108-10-1	8260B	ND		10	ug/L	1
Methylcyclohexane	108-87-2	8260B	ND		5.0	ug/L	1
Methylene chloride	75-09-2	8260B	ND		5.0	ug/L	1
Styrene	100-42-5	8260B	ND		5.0	ug/L	1
1,1,2,2-Tetrachloroethane	79-34-5	8260B	ND		5.0	ug/L	1
Tetrachloroethene	127-18-4	8260B	ND		5.0	ug/L	1
Toluene	108-88-3	8260B	ND		5.0	ug/L	1
1,1,2-Trichloro-1,2,2-Trifluoroethane	**76-13-1**	**8260B**	**5.2**		**5.0**	**ug/L**	**1**
1,2,4-Trichlorobenzene	120-82-1	8260B	ND		5.0	ug/L	1
1,1,1-Trichloroethane	71-55-6	8260B	ND		5.0	ug/L	1
1,1,2-Trichloroethane	79-00-5	8260B	ND		5.0	ug/L	1

PQL = Practical quantitation limit
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
H = Out of holding time
ND = Not detected at or above the PQL
J = Estimated result < PQL and ≥ MDL
P = The RPD between two GC columns exceeds 40%
N = Recovery is out of criteria
Where applicable, all soil sample analysis are reported on a dry weight basis unless flagged with a "W"

Volatile Organic Compounds by GC/MS

Client: **ERM NC, Inc.**
Laboratory ID: **PL12058-008**
Description: **DW-1**
Matrix: **Aqueous**
Date Sampled: **12/10/2014 1405**
Date Received: **12/12/2014**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	5030B	8260B	1	12/18/2014 0120	PMM2		63373

Parameter	CAS Number	Analytical Method	Result	Q	PQL	Units	Run
Trichloroethene	**79-01-6**	**8260B**	**100**		**5.0**	**ug/L**	**1**
Trichlorofluoromethane	75-69-4	8260B	ND		5.0	ug/L	1
Vinyl chloride	75-01-4	8260B	ND		2.0	ug/L	1
Xylenes (total)	1330-20-7	8260B	ND		5.0	ug/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
1,2-Dichloroethane-d4		94	70-130
Bromofluorobenzene		103	70-130
Toluene-d8		93	70-130

PQL = Practical quantitation limit
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
H = Out of holding time
ND = Not detected at or above the PQL
J = Estimated result < PQL and ≥ MDL
P = The RPD between two GC columns exceeds 40%
N = Recovery is out of criteria
Where applicable, all soil sample analysis are reported on a dry weight basis unless flagged with a "W"

Volatile Organic Compounds by GC/MS

Client: **ERM NC, Inc.**
Laboratory ID: **PL12058-009**
Description: **AS-1**
Matrix: **Aqueous**
Date Sampled: **12/08/2014 1510**
Date Received: **12/12/2014**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	5030B	8260B	5	12/18/2014 0545	PMM2		63373

Parameter	CAS Number	Analytical Method	Result	Q	PQL	Units	Run
Acetone	67-64-1	8260B	ND		100	ug/L	1
Benzene	71-43-2	8260B	ND		25	ug/L	1
Bromodichloromethane	75-27-4	8260B	ND		25	ug/L	1
Bromoform	75-25-2	8260B	ND		25	ug/L	1
Bromomethane (Methyl bromide)	74-83-9	8260B	ND		25	ug/L	1
2-Butanone (MEK)	78-93-3	8260B	ND		50	ug/L	1
Carbon disulfide	75-15-0	8260B	ND		25	ug/L	1
Carbon tetrachloride	56-23-5	8260B	ND		25	ug/L	1
Chlorobenzene	108-90-7	8260B	ND		25	ug/L	1
Chloroethane	75-00-3	8260B	ND		25	ug/L	1
Chloroform	67-66-3	8260B	ND		25	ug/L	1
Chloromethane (Methyl chloride)	74-87-3	8260B	ND		25	ug/L	1
Cyclohexane	110-82-7	8260B	ND		25	ug/L	1
1,2-Dibromo-3-chloropropane (DBCP)	96-12-8	8260B	ND		25	ug/L	1
Dibromochloromethane	124-48-1	8260B	ND		25	ug/L	1
1,2-Dibromoethane (EDB)	106-93-4	8260B	ND		25	ug/L	1
1,2-Dichlorobenzene	95-50-1	8260B	ND		25	ug/L	1
1,3-Dichlorobenzene	541-73-1	8260B	ND		25	ug/L	1
1,4-Dichlorobenzene	106-46-7	8260B	ND		25	ug/L	1
Dichlorodifluoromethane	75-71-8	8260B	ND		25	ug/L	1
1,1-Dichloroethane	75-34-3	8260B	ND		25	ug/L	1
1,2-Dichloroethane	107-06-2	8260B	ND		25	ug/L	1
1,1-Dichloroethene	75-35-4	8260B	ND		25	ug/L	1
cis-1,2-Dichloroethene	156-59-2	8260B	ND		25	ug/L	1
trans-1,2-Dichloroethene	156-60-5	8260B	ND		25	ug/L	1
1,2-Dichloropropane	78-87-5	8260B	ND		25	ug/L	1
cis-1,3-Dichloropropene	10061-01-5	8260B	ND		25	ug/L	1
trans-1,3-Dichloropropene	10061-02-6	8260B	ND		25	ug/L	1
Ethylbenzene	100-41-4	8260B	ND		25	ug/L	1
2-Hexanone	591-78-6	8260B	ND		50	ug/L	1
Isopropylbenzene	98-82-8	8260B	ND		25	ug/L	1
Methyl acetate	79-20-9	8260B	ND		25	ug/L	1
Methyl tertiary butyl ether (MTBE)	1634-04-4	8260B	ND		25	ug/L	1
4-Methyl-2-pentanone	108-10-1	8260B	ND		50	ug/L	1
Methylcyclohexane	108-87-2	8260B	ND		25	ug/L	1
Methylene chloride	75-09-2	8260B	ND		25	ug/L	1
Styrene	100-42-5	8260B	ND		25	ug/L	1
1,1,2,2-Tetrachloroethane	79-34-5	8260B	ND		25	ug/L	1
Tetrachloroethene	127-18-4	8260B	ND		25	ug/L	1
Toluene	108-88-3	8260B	ND		25	ug/L	1
1,1,2-Trichloro-1,2,2-Trifluoroethane	76-13-1	8260B	ND		25	ug/L	1
1,2,4-Trichlorobenzene	120-82-1	8260B	ND		25	ug/L	1
1,1,1-Trichloroethane	71-55-6	8260B	ND		25	ug/L	1
1,1,2-Trichloroethane	79-00-5	8260B	ND		25	ug/L	1

PQL = Practical quantitation limit
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
H = Out of holding time
ND = Not detected at or above the PQL
J = Estimated result < PQL and ≥ MDL
P = The RPD between two GC columns exceeds 40%
N = Recovery is out of criteria
Where applicable, all soil sample analysis are reported on a dry weight basis unless flagged with a "W"

Volatile Organic Compounds by GC/MS

Client: **ERM NC, Inc.**
Laboratory ID: **PL12058-009**
Description: **AS-1**
Matrix: **Aqueous**
Date Sampled: **12/08/2014 1510**
Date Received: **12/12/2014**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	5030B	8260B	5	12/18/2014 0545	PMM2		63373

Parameter	CAS Number	Analytical Method	Result	Q	PQL	Units	Run
Trichloroethene	**79-01-6**	**8260B**	**390**		**25**	**ug/L**	**1**
Trichlorofluoromethane	75-69-4	8260B	ND		25	ug/L	1
Vinyl chloride	75-01-4	8260B	ND		10	ug/L	1
Xylenes (total)	1330-20-7	8260B	ND		25	ug/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
1,2-Dichloroethane-d4		94	70-130
Bromofluorobenzene		100	70-130
Toluene-d8		95	70-130

PQL = Practical quantitation limit
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
H = Out of holding time
ND = Not detected at or above the PQL
J = Estimated result < PQL and ≥ MDL
P = The RPD between two GC columns exceeds 40%
N = Recovery is out of criteria
Where applicable, all soil sample analysis are reported on a dry weight basis unless flagged with a "W"

Volatile Organic Compounds by GC/MS

Client: **ERM NC, Inc.**
Laboratory ID: **PL12058-010**
Description: **AS-1**
Matrix: **Aqueous**
Date Sampled: **12/10/2014 1530**
Date Received: **12/12/2014**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	5030B	8260B	5	12/18/2014 0607	PMM2		63373

Parameter	CAS Number	Analytical Method	Result	Q	PQL	Units	Run
Acetone	**67-64-1**	**8260B**	**1400**		**100**	**ug/L**	**1**
Benzene	71-43-2	8260B	ND		25	ug/L	1
Bromodichloromethane	75-27-4	8260B	ND		25	ug/L	1
Bromoform	75-25-2	8260B	ND		25	ug/L	1
Bromomethane (Methyl bromide)	74-83-9	8260B	ND		25	ug/L	1
2-Butanone (MEK)	**78-93-3**	**8260B**	**810**		**50**	**ug/L**	**1**
Carbon disulfide	75-15-0	8260B	ND		25	ug/L	1
Carbon tetrachloride	56-23-5	8260B	ND		25	ug/L	1
Chlorobenzene	108-90-7	8260B	ND		25	ug/L	1
Chloroethane	75-00-3	8260B	ND		25	ug/L	1
Chloroform	67-66-3	8260B	ND		25	ug/L	1
Chloromethane (Methyl chloride)	74-87-3	8260B	ND		25	ug/L	1
Cyclohexane	110-82-7	8260B	ND		25	ug/L	1
1,2-Dibromo-3-chloropropane (DBCP)	96-12-8	8260B	ND		25	ug/L	1
Dibromochloromethane	124-48-1	8260B	ND		25	ug/L	1
1,2-Dibromoethane (EDB)	106-93-4	8260B	ND		25	ug/L	1
1,2-Dichlorobenzene	95-50-1	8260B	ND		25	ug/L	1
1,3-Dichlorobenzene	541-73-1	8260B	ND		25	ug/L	1
1,4-Dichlorobenzene	106-46-7	8260B	ND		25	ug/L	1
Dichlorodifluoromethane	75-71-8	8260B	ND		25	ug/L	1
1,1-Dichloroethane	75-34-3	8260B	ND		25	ug/L	1
1,2-Dichloroethane	107-06-2	8260B	ND		25	ug/L	1
1,1-Dichloroethene	75-35-4	8260B	ND		25	ug/L	1
cis-1,2-Dichloroethene	156-59-2	8260B	ND		25	ug/L	1
trans-1,2-Dichloroethene	156-60-5	8260B	ND		25	ug/L	1
1,2-Dichloropropane	78-87-5	8260B	ND		25	ug/L	1
cis-1,3-Dichloropropene	10061-01-5	8260B	ND		25	ug/L	1
trans-1,3-Dichloropropene	10061-02-6	8260B	ND		25	ug/L	1
Ethylbenzene	100-41-4	8260B	ND		25	ug/L	1
2-Hexanone	591-78-6	8260B	ND		50	ug/L	1
Isopropylbenzene	98-82-8	8260B	ND		25	ug/L	1
Methyl acetate	79-20-9	8260B	ND		25	ug/L	1
Methyl tertiary butyl ether (MTBE)	1634-04-4	8260B	ND		25	ug/L	1
4-Methyl-2-pentanone	108-10-1	8260B	ND		50	ug/L	1
Methylcyclohexane	108-87-2	8260B	ND		25	ug/L	1
Methylene chloride	75-09-2	8260B	ND		25	ug/L	1
Styrene	100-42-5	8260B	ND		25	ug/L	1
1,1,2,2-Tetrachloroethane	79-34-5	8260B	ND		25	ug/L	1
Tetrachloroethene	127-18-4	8260B	ND		25	ug/L	1
Toluene	108-88-3	8260B	ND		25	ug/L	1
1,1,2-Trichloro-1,2,2-Trifluoroethane	76-13-1	8260B	ND		25	ug/L	1
1,2,4-Trichlorobenzene	120-82-1	8260B	ND		25	ug/L	1
1,1,1-Trichloroethane	71-55-6	8260B	ND		25	ug/L	1
1,1,2-Trichloroethane	79-00-5	8260B	ND		25	ug/L	1

PQL = Practical quantitation limit
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
H = Out of holding time
ND = Not detected at or above the PQL
J = Estimated result < PQL and ≥ MDL
P = The RPD between two GC columns exceeds 40%
N = Recovery is out of criteria
Where applicable, all soil sample analysis are reported on a dry weight basis unless flagged with a "W"

Volatile Organic Compounds by GC/MS

Client: **ERM NC, Inc.**
Laboratory ID: **PL12058-010**
Description: **AS-1**
Matrix: **Aqueous**
Date Sampled: **12/10/2014 1530**
Date Received: **12/12/2014**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	5030B	8260B	5	12/18/2014 0607	PMM2		63373

Parameter	CAS Number	Analytical Method	Result	Q	PQL	Units	Run
Trichloroethene	**79-01-6**	**8260B**	**220**		**25**	**ug/L**	**1**
Trichlorofluoromethane	75-69-4	8260B	ND		25	ug/L	1
Vinyl chloride	75-01-4	8260B	ND		10	ug/L	1
Xylenes (total)	1330-20-7	8260B	ND		25	ug/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
1,2-Dichloroethane-d4		94	70-130
Bromofluorobenzene		103	70-130
Toluene-d8		94	70-130

PQL = Practical quantitation limit
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
H = Out of holding time
ND = Not detected at or above the PQL
J = Estimated result < PQL and ≥ MDL
P = The RPD between two GC columns exceeds 40%
N = Recovery is out of criteria
Where applicable, all soil sample analysis are reported on a dry weight basis unless flagged with a "W"

QC Summary

Volatile Organic Compounds by GC/MS - MB

Sample ID: PQ63233-001
Batch: 63233
Analytical Method: 8260B

Matrix: Aqueous
Prep Method: 5030B

Parameter	Result	Q	Dil	PQL	Units	Analysis Date
Acetone	ND		1	20	ug/L	12/16/2014 2215
Benzene	ND		1	5.0	ug/L	12/16/2014 2215
Bromodichloromethane	ND		1	5.0	ug/L	12/16/2014 2215
Bromoform	ND		1	5.0	ug/L	12/16/2014 2215
Bromomethane (Methyl bromide)	ND		1	5.0	ug/L	12/16/2014 2215
2-Butanone (MEK)	ND		1	10	ug/L	12/16/2014 2215
Carbon disulfide	ND		1	5.0	ug/L	12/16/2014 2215
Carbon tetrachloride	ND		1	5.0	ug/L	12/16/2014 2215
Chlorobenzene	ND		1	5.0	ug/L	12/16/2014 2215
Chloroethane	ND		1	5.0	ug/L	12/16/2014 2215
Chloroform	ND		1	5.0	ug/L	12/16/2014 2215
Chloromethane (Methyl chloride)	ND		1	5.0	ug/L	12/16/2014 2215
Cyclohexane	ND		1	5.0	ug/L	12/16/2014 2215
1,2-Dibromo-3-chloropropane (DBCP)	ND		1	5.0	ug/L	12/16/2014 2215
Dibromochloromethane	ND		1	5.0	ug/L	12/16/2014 2215
1,2-Dibromoethane (EDB)	ND		1	5.0	ug/L	12/16/2014 2215
1,2-Dichlorobenzene	ND		1	5.0	ug/L	12/16/2014 2215
1,4-Dichlorobenzene	ND		1	5.0	ug/L	12/16/2014 2215
1,3-Dichlorobenzene	ND		1	5.0	ug/L	12/16/2014 2215
Dichlorodifluoromethane	ND		1	5.0	ug/L	12/16/2014 2215
1,2-Dichloroethane	ND		1	5.0	ug/L	12/16/2014 2215
1,1-Dichloroethane	ND		1	5.0	ug/L	12/16/2014 2215
trans-1,2-Dichloroethene	ND		1	5.0	ug/L	12/16/2014 2215
cis-1,2-Dichloroethene	ND		1	5.0	ug/L	12/16/2014 2215
1,1-Dichloroethene	ND		1	5.0	ug/L	12/16/2014 2215
1,2-Dichloropropane	ND		1	5.0	ug/L	12/16/2014 2215
cis-1,3-Dichloropropene	ND		1	5.0	ug/L	12/16/2014 2215
trans-1,3-Dichloropropene	ND		1	5.0	ug/L	12/16/2014 2215
Ethylbenzene	ND		1	5.0	ug/L	12/16/2014 2215
2-Hexanone	ND		1	10	ug/L	12/16/2014 2215
Isopropylbenzene	ND		1	5.0	ug/L	12/16/2014 2215
Methyl acetate	ND		1	5.0	ug/L	12/16/2014 2215
Methyl tertiary butyl ether (MTBE)	ND		1	5.0	ug/L	12/16/2014 2215
4-Methyl-2-pentanone	ND		1	10	ug/L	12/16/2014 2215
Methylcyclohexane	ND		1	5.0	ug/L	12/16/2014 2215
Methylene chloride	ND		1	5.0	ug/L	12/16/2014 2215
Styrene	ND		1	5.0	ug/L	12/16/2014 2215
1,1,2,2-Tetrachloroethane	ND		1	5.0	ug/L	12/16/2014 2215
Tetrachloroethene	ND		1	5.0	ug/L	12/16/2014 2215
Toluene	ND		1	5.0	ug/L	12/16/2014 2215
1,1,2-Trichloro-1,2,2-Trifluoroethane	ND		1	5.0	ug/L	12/16/2014 2215
1,2,4-Trichlorobenzene	ND		1	5.0	ug/L	12/16/2014 2215
1,1,1-Trichloroethane	ND		1	5.0	ug/L	12/16/2014 2215
1,1,2-Trichloroethane	ND		1	5.0	ug/L	12/16/2014 2215

PQL = Practical quantitation limit
ND = Not detected at or above the PQL
P = The RPD between two GC columns exceeds 40%
J = Estimated result < PQL and ≥ MDL
N = Recovery is out of criteria
+ = RPD is out of criteria

Where applicable, all soil sample analysis are reported on a dry weight basis unless flagged with a "W"

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

Volatile Organic Compounds by GC/MS - MB

Sample ID: PQ63233-001
Batch: 63233
Analytical Method: 8260B

Matrix: Aqueous
Prep Method: 5030B

Parameter	Result	Q	Dil	PQL	Units	Analysis Date
Trichloroethene	ND		1	5.0	ug/L	12/16/2014 2215
Trichlorofluoromethane	ND		1	5.0	ug/L	12/16/2014 2215
Vinyl chloride	ND		1	2.0	ug/L	12/16/2014 2215
Xylenes (total)	ND		1	5.0	ug/L	12/16/2014 2215

Surrogate	Q	% Rec	Acceptance Limit
Bromofluorobenzene		113	70-130
1,2-Dichloroethane-d4		104	70-130
Toluene-d8		111	70-130

PQL = Practical quantitation limit
ND = Not detected at or above the PQL
P = The RPD between two GC columns exceeds 40%
J = Estimated result < PQL and ≥ MDL
N = Recovery is out of criteria
+ = RPD is out of criteria

Where applicable, all soil sample analysis are reported on a dry weight basis unless flagged with a "W"

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

Volatile Organic Compounds by GC/MS - LCS

Sample ID: PQ63233-002
Batch: 63233
Analytical Method: 8260B

Matrix: Aqueous
Prep Method: 5030B

Parameter	Spike Amount (ug/L)	Result (ug/L)	Q	Dil	% Rec	% Rec Limit	Analysis Date
Acetone	100	81		1	81	60-140	12/16/2014 2054
Benzene	50	47		1	94	70-130	12/16/2014 2054
Bromodichloromethane	50	50		1	100	70-130	12/16/2014 2054
Bromoform	50	45		1	90	70-130	12/16/2014 2054
Bromomethane (Methyl bromide)	50	52		1	103	60-140	12/16/2014 2054
2-Butanone (MEK)	100	98		1	98	60-140	12/16/2014 2054
Carbon disulfide	50	43		1	86	60-140	12/16/2014 2054
Carbon tetrachloride	50	50		1	100	70-130	12/16/2014 2054
Chlorobenzene	50	48		1	96	70-130	12/16/2014 2054
Chloroethane	50	54		1	109	42-163	12/16/2014 2054
Chloroform	50	47		1	95	70-130	12/16/2014 2054
Chloromethane (Methyl chloride)	50	52		1	104	60-140	12/16/2014 2054
Cyclohexane	50	46		1	93	70-130	12/16/2014 2054
1,2-Dibromo-3-chloropropane (DBCP)	50	43		1	86	70-130	12/16/2014 2054
Dibromochloromethane	50	52		1	105	70-130	12/16/2014 2054
1,2-Dibromoethane (EDB)	50	51		1	101	70-130	12/16/2014 2054
1,2-Dichlorobenzene	50	49		1	98	70-130	12/16/2014 2054
1,4-Dichlorobenzene	50	48		1	96	70-130	12/16/2014 2054
1,3-Dichlorobenzene	50	49		1	98	70-130	12/16/2014 2054
Dichlorodifluoromethane	50	49		1	98	60-140	12/16/2014 2054
1,2-Dichloroethane	50	48		1	97	70-130	12/16/2014 2054
1,1-Dichloroethane	50	48		1	95	70-130	12/16/2014 2054
trans-1,2-Dichloroethene	50	48		1	96	70-130	12/16/2014 2054
cis-1,2-Dichloroethene	50	49		1	97	70-130	12/16/2014 2054
1,1-Dichloroethene	50	47		1	94	70-130	12/16/2014 2054
1,2-Dichloropropane	50	48		1	96	70-130	12/16/2014 2054
cis-1,3-Dichloropropene	50	54		1	107	70-130	12/16/2014 2054
trans-1,3-Dichloropropene	50	48		1	95	70-130	12/16/2014 2054
Ethylbenzene	50	51		1	102	70-130	12/16/2014 2054
2-Hexanone	100	91		1	91	60-140	12/16/2014 2054
Isopropylbenzene	50	51		1	103	70-130	12/16/2014 2054
Methyl acetate	50	49		1	99	60-140	12/16/2014 2054
Methyl tertiary butyl ether (MTBE)	50	52		1	103	70-130	12/16/2014 2054
4-Methyl-2-pentanone	100	93		1	93	60-140	12/16/2014 2054
Methylcyclohexane	50	54		1	108	70-130	12/16/2014 2054
Methylene chloride	50	49		1	98	70-130	12/16/2014 2054
Styrene	50	52		1	105	70-130	12/16/2014 2054
1,1,2,2-Tetrachloroethane	50	49		1	99	70-130	12/16/2014 2054
Tetrachloroethene	50	51		1	102	70-130	12/16/2014 2054
Toluene	50	51		1	101	70-130	12/16/2014 2054
1,1,2-Trichloro-1,2,2-Trifluoroethane	50	50		1	99	70-130	12/16/2014 2054
1,2,4-Trichlorobenzene	50	54		1	108	70-130	12/16/2014 2054
1,1,1-Trichloroethane	50	49		1	98	70-130	12/16/2014 2054
1,1,2-Trichloroethane	50	50		1	100	70-130	12/16/2014 2054

PQL = Practical quantitation limit
ND = Not detected at or above the PQL
P = The RPD between two GC columns exceeds 40%
J = Estimated result < PQL and ≥ MDL
N = Recovery is out of criteria
+ = RPD is out of criteria

Where applicable, all soil sample analysis are reported on a dry weight basis unless flagged with a "W"

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

Volatile Organic Compounds by GC/MS - LCS

Sample ID: PQ63233-002
Batch: 63233
Analytical Method: 8260B

Matrix: Aqueous
Prep Method: 5030B

Parameter	Spike Amount (ug/L)	Result (ug/L)	Q	Dil	% Rec	% Rec Limit	Analysis Date
Trichloroethene	50	49		1	98	70-130	12/16/2014 2054
Trichlorofluoromethane	50	50		1	99	70-130	12/16/2014 2054
Vinyl chloride	50	48		1	97	70-130	12/16/2014 2054
Xylenes (total)	100	110		1	107	70-130	12/16/2014 2054

Surrogate	Q	% Rec	Acceptance Limit
Bromofluorobenzene		120	70-130
1,2-Dichloroethane-d4		101	70-130
Toluene-d8		114	70-130

PQL = Practical quantitation limit
ND = Not detected at or above the PQL
P = The RPD between two GC columns exceeds 40%
J = Estimated result < PQL and ≥ MDL
N = Recovery is out of criteria
+ = RPD is out of criteria

Where applicable, all soil sample analysis are reported on a dry weight basis unless flagged with a "W"

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

Volatile Organic Compounds by GC/MS - MS

Sample ID: PL12058-002MS
Batch: 63233
Analytical Method: 8260B
Matrix: Aqueous
Prep Method: 5030B

Parameter	Sample Amount (ug/L)	Spike Amount (ug/L)	Result (ug/L)	Q	Dil	% Rec	% Rec Limit	Analysis Date
Acetone	ND	1000	1100		10	109	60-140	12/17/2014 0555
Benzene	ND	500	550		10	111	70-130	12/17/2014 0555
Bromodichloromethane	ND	500	550		10	110	71-143	12/17/2014 0555
Bromoform	ND	500	450		10	90	65-131	12/17/2014 0555
Bromomethane (Methyl bromide)	ND	500	600		10	119	36-168	12/17/2014 0555
2-Butanone (MEK)	ND	1000	1100		10	111	60-140	12/17/2014 0555
Carbon disulfide	ND	500	460		10	91	60-140	12/17/2014 0555
Carbon tetrachloride	ND	500	560		10	112	37-166	12/17/2014 0555
Chlorobenzene	ND	500	520		10	104	78-129	12/17/2014 0555
Chloroethane	ND	500	640		10	128	60-140	12/17/2014 0555
Chloroform	ND	500	530		10	107	63-123	12/17/2014 0555
Chloromethane (Methyl chloride)	ND	500	560		10	113	20-158	12/17/2014 0555
Cyclohexane	ND	500	570		10	114	70-130	12/17/2014 0555
1,2-Dibromo-3-chloropropane (DBCP)	ND	500	470		10	95	70-130	12/17/2014 0555
Dibromochloromethane	ND	500	530		10	106	74-134	12/17/2014 0555
1,2-Dibromoethane (EDB)	ND	500	540		10	108	70-130	12/17/2014 0555
1,2-Dichlorobenzene	ND	500	520		10	105	70-130	12/17/2014 0555
1,3-Dichlorobenzene	ND	500	540		10	107	70-130	12/17/2014 0555
1,4-Dichlorobenzene	ND	500	510		10	102	70-130	12/17/2014 0555
Dichlorodifluoromethane	ND	500	550		10	110	10-158	12/17/2014 0555
1,1-Dichloroethane	ND	500	560		10	111	69-132	12/17/2014 0555
1,2-Dichloroethane	ND	500	540		10	108	70-130	12/17/2014 0555
1,1-Dichloroethene	ND	500	540		10	108	50-132	12/17/2014 0555
cis-1,2-Dichloroethene	ND	500	560		10	112	70-130	12/17/2014 0555
trans-1,2-Dichloroethene	ND	500	550		10	111	70-130	12/17/2014 0555
1,2-Dichloropropane	ND	500	570		10	114	71-126	12/17/2014 0555
cis-1,3-Dichloropropene	ND	500	570		10	114	69-130	12/17/2014 0555
trans-1,3-Dichloropropene	ND	500	480		10	96	73-131	12/17/2014 0555
Ethylbenzene	ND	500	570		10	114	70-130	12/17/2014 0555
2-Hexanone	ND	1000	1000		10	104	60-140	12/17/2014 0555
Isopropylbenzene	ND	500	550		10	111	70-130	12/17/2014 0555
Methyl acetate	ND	500	550		10	110	15-128	12/17/2014 0555
Methyl tertiary butyl ether (MTBE)	ND	500	550		10	109	70-130	12/17/2014 0555
4-Methyl-2-pentanone	ND	1000	1100		10	111	60-140	12/17/2014 0555
Methylcyclohexane	ND	500	620		10	125	70-130	12/17/2014 0555
Methylene chloride	ND	500	550		10	110	69-129	12/17/2014 0555
Styrene	ND	500	580		10	115	70-130	12/17/2014 0555
1,1,2,2-Tetrachloroethane	ND	500	540		10	109	60-155	12/17/2014 0555
Tetrachloroethene	ND	500	560		10	108	70-130	12/17/2014 0555
Toluene	ND	500	590		10	118	70-130	12/17/2014 0555
1,1,2-Trichloro-1,2,2-Trifluoroethane	ND	500	560		10	110	70-130	12/17/2014 0555
1,2,4-Trichlorobenzene	ND	500	560		10	112	70-130	12/17/2014 0555
1,1,1-Trichloroethane	ND	500	560		10	113	77-132	12/17/2014 0555
1,1,2-Trichloroethane	ND	500	530		10	105	77-132	12/17/2014 0555

PQL = Practical quantitation limit
ND = Not detected at or above the PQL
P = The RPD between two GC columns exceeds 40%
J = Estimated result < PQL and ≥ MDL
N = Recovery is out of criteria
+ = RPD is out of criteria

Where applicable, all soil sample analysis are reported on a dry weight basis unless flagged with a "W"

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

Volatile Organic Compounds by GC/MS - MS

Sample ID: PL12058-002MS
Batch: 63233
Analytical Method: 8260B

Matrix: Aqueous
Prep Method: 5030B

Parameter	Sample Amount (ug/L)	Spike Amount (ug/L)	Result (ug/L)	Q	Dil	% Rec	% Rec Limit	Analysis Date
Trichloroethene	860	500	1400		10	107	73-124	12/17/2014 0555
Trichlorofluoromethane	ND	500	570		10	114	60-140	12/17/2014 0555
Vinyl chloride	ND	500	500		10	100	29-159	12/17/2014 0555
Xylenes (total)	ND	1000	1200		10	119	70-130	12/17/2014 0555

Surrogate	Q	% Rec	Acceptance Limit
1,2-Dichloroethane-d4		103	70-130
Bromofluorobenzene		121	70-130
Toluene-d8		117	70-130

PQL = Practical quantitation limit
ND = Not detected at or above the PQL
P = The RPD between two GC columns exceeds 40%
J = Estimated result < PQL and ≥ MDL
N = Recovery is out of criteria
+ = RPD is out of criteria

Where applicable, all soil sample analysis are reported on a dry weight basis unless flagged with a "W"

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

Volatile Organic Compounds by GC/MS - MSD

Sample ID: PL12058-002MD
Batch: 63233
Analytical Method: 8260B

Matrix: Aqueous
Prep Method: 5030B

Parameter	Sample Amount (ug/L)	Spike Amount (ug/L)	Result (ug/L)	Q	Dil	% Rec	% RPD	% Rec Limit	% RPD Limit	Analysis Date
Acetone	ND	1000	1000		10	105	4.1	60-140	20	12/17/2014 0617
Benzene	ND	500	550		10	110	0.75	70-130	20	12/17/2014 0617
Bromodichloromethane	ND	500	560		10	111	0.99	71-143	20	12/17/2014 0617
Bromoform	ND	500	460		10	91	1.7	65-131	20	12/17/2014 0617
Bromomethane (Methyl bromide)	ND	500	580		10	116	2.6	36-168	20	12/17/2014 0617
2-Butanone (MEK)	ND	1000	1100		10	109	1.6	60-140	20	12/17/2014 0617
Carbon disulfide	ND	500	460		10	91	0.12	60-140	20	12/17/2014 0617
Carbon tetrachloride	ND	500	570		10	115	2.6	37-166	20	12/17/2014 0617
Chlorobenzene	ND	500	520		10	105	0.27	78-129	20	12/17/2014 0617
Chloroethane	ND	500	610		10	123	3.9	60-140	20	12/17/2014 0617
Chloroform	ND	500	540		10	108	1.3	63-123	20	12/17/2014 0617
Chloromethane (Methyl chloride)	ND	500	580		10	115	2.1	20-158	20	12/17/2014 0617
Cyclohexane	ND	500	550		10	111	3.1	70-130	20	12/17/2014 0617
1,2-Dibromo-3-chloropropane (DBCP)	ND	500	470		10	95	0.45	70-130	20	12/17/2014 0617
Dibromochloromethane	ND	500	540		10	107	1.3	74-134	20	12/17/2014 0617
1,2-Dibromoethane (EDB)	ND	500	540		10	108	0.27	70-130	20	12/17/2014 0617
1,2-Dichlorobenzene	ND	500	530		10	107	1.6	70-130	20	12/17/2014 0617
1,3-Dichlorobenzene	ND	500	530		10	106	1.1	70-130	20	12/17/2014 0617
1,4-Dichlorobenzene	ND	500	510		10	102	0.77	70-130	20	12/17/2014 0617
Dichlorodifluoromethane	ND	500	570		10	115	4.6	10-158	20	12/17/2014 0617
1,1-Dichloroethane	ND	500	540		10	108	2.8	69-132	20	12/17/2014 0617
1,2-Dichloroethane	ND	500	540		10	108	0.39	70-130	20	12/17/2014 0617
1,1-Dichloroethene	ND	500	540		10	107	0.97	50-132	20	12/17/2014 0617
cis-1,2-Dichloroethene	ND	500	560		10	112	0.15	70-130	20	12/17/2014 0617
trans-1,2-Dichloroethene	ND	500	550		10	110	0.17	70-130	20	12/17/2014 0617
1,2-Dichloropropane	ND	500	560		10	113	1.0	71-126	20	12/17/2014 0617
cis-1,3-Dichloropropene	ND	500	570		10	114	0.15	69-130	20	12/17/2014 0617
trans-1,3-Dichloropropene	ND	500	490		10	98	1.8	73-131	20	12/17/2014 0617
Ethylbenzene	ND	500	570		10	114	0.11	70-130	20	12/17/2014 0617
2-Hexanone	ND	1000	1000		10	103	0.75	60-140	20	12/17/2014 0617
Isopropylbenzene	ND	500	560		10	112	1.5	70-130	20	12/17/2014 0617
Methyl acetate	ND	500	540		10	107	2.6	15-128	20	12/17/2014 0617
Methyl tertiary butyl ether (MTBE)	ND	500	560		10	113	3.2	70-130	20	12/17/2014 0617
4-Methyl-2-pentanone	ND	1000	1100		10	109	2.3	60-140	20	12/17/2014 0617
Methylcyclohexane	ND	500	630		10	126	1.2	70-130	20	12/17/2014 0617
Methylene chloride	ND	500	550		10	110	0.00090	69-129	20	12/17/2014 0617
Styrene	ND	500	580		10	115	0.11	70-130	20	12/17/2014 0617
1,1,2,2-Tetrachloroethane	ND	500	540		10	108	0.41	60-155	20	12/17/2014 0617
Tetrachloroethene	ND	500	590		10	113	4.4	70-130	20	12/17/2014 0617
Toluene	ND	500	590		10	117	0.91	70-130	20	12/17/2014 0617
1,1,2-Trichloro-1,2,2-Trifluoroethane	ND	500	590		10	116	5.1	70-130	20	12/17/2014 0617
1,2,4-Trichlorobenzene	ND	500	570		10	115	2.6	70-130	20	12/17/2014 0617
1,1,1-Trichloroethane	ND	500	570		10	113	0.41	77-132	20	12/17/2014 0617
1,1,2-Trichloroethane	ND	500	540		10	109	3.0	77-132	20	12/17/2014 0617

PQL = Practical quantitation limit
ND = Not detected at or above the PQL
P = The RPD between two GC columns exceeds 40%
J = Estimated result < PQL and ≥ MDL
N = Recovery is out of criteria
+ = RPD is out of criteria

Where applicable, all soil sample analysis are reported on a dry weight basis unless flagged with a "W"

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

Volatile Organic Compounds by GC/MS - MSD

Sample ID: PL12058-002MD
Batch: 63233
Analytical Method: 8260B

Matrix: Aqueous
Prep Method: 5030B

Parameter	Sample Amount (ug/L)	Spike Amount (ug/L)	Result (ug/L)	Q	Dil	% Rec	% RPD	% Rec Limit	% RPD Limit	Analysis Date
Trichloroethene	860	500	1400		10	106	0.30	73-124	20	12/17/2014 0617
Trichlorofluoromethane	ND	500	570		10	114	0.27	60-140	20	12/17/2014 0617
Vinyl chloride	ND	500	540		10	107	7.2	29-159	20	12/17/2014 0617
Xylenes (total)	ND	1000	1200		10	120	0.93	70-130	20	12/17/2014 0617

Surrogate	Q	% Rec	Acceptance Limit
1,2-Dichloroethane-d4		104	70-130
Bromofluorobenzene		123	70-130
Toluene-d8		120	70-130

PQL = Practical quantitation limit
ND = Not detected at or above the PQL
P = The RPD between two GC columns exceeds 40%
J = Estimated result < PQL and ≥ MDL
N = Recovery is out of criteria
+ = RPD is out of criteria

Where applicable, all soil sample analysis are reported on a dry weight basis unless flagged with a "W"

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

Volatile Organic Compounds by GC/MS - MB

Sample ID: PQ63373-001
Batch: 63373
Analytical Method: 8260B

Matrix: Aqueous
Prep Method: 5030B

Parameter	Result	Q	Dil	PQL	Units	Analysis Date
Acetone	ND		1	20	ug/L	12/17/2014 2236
Benzene	ND		1	5.0	ug/L	12/17/2014 2236
Bromodichloromethane	ND		1	5.0	ug/L	12/17/2014 2236
Bromoform	ND		1	5.0	ug/L	12/17/2014 2236
Bromomethane (Methyl bromide)	ND		1	5.0	ug/L	12/17/2014 2236
2-Butanone (MEK)	ND		1	10	ug/L	12/17/2014 2236
Carbon disulfide	ND		1	5.0	ug/L	12/17/2014 2236
Carbon tetrachloride	ND		1	5.0	ug/L	12/17/2014 2236
Chlorobenzene	ND		1	5.0	ug/L	12/17/2014 2236
Chloroethane	ND		1	5.0	ug/L	12/17/2014 2236
Chloroform	ND		1	5.0	ug/L	12/17/2014 2236
Chloromethane (Methyl chloride)	ND		1	5.0	ug/L	12/17/2014 2236
Cyclohexane	ND		1	5.0	ug/L	12/17/2014 2236
1,2-Dibromo-3-chloropropane (DBCP)	ND		1	5.0	ug/L	12/17/2014 2236
Dibromochloromethane	ND		1	5.0	ug/L	12/17/2014 2236
1,2-Dibromoethane (EDB)	ND		1	5.0	ug/L	12/17/2014 2236
1,4-Dichlorobenzene	ND		1	5.0	ug/L	12/17/2014 2236
1,3-Dichlorobenzene	ND		1	5.0	ug/L	12/17/2014 2236
1,2-Dichlorobenzene	ND		1	5.0	ug/L	12/17/2014 2236
Dichlorodifluoromethane	ND		1	5.0	ug/L	12/17/2014 2236
1,2-Dichloroethane	ND		1	5.0	ug/L	12/17/2014 2236
1,1-Dichloroethane	ND		1	5.0	ug/L	12/17/2014 2236
trans-1,2-Dichloroethene	ND		1	5.0	ug/L	12/17/2014 2236
cis-1,2-Dichloroethene	ND		1	5.0	ug/L	12/17/2014 2236
1,1-Dichloroethene	ND		1	5.0	ug/L	12/17/2014 2236
1,2-Dichloropropane	ND		1	5.0	ug/L	12/17/2014 2236
trans-1,3-Dichloropropene	ND		1	5.0	ug/L	12/17/2014 2236
cis-1,3-Dichloropropene	ND		1	5.0	ug/L	12/17/2014 2236
Ethylbenzene	ND		1	5.0	ug/L	12/17/2014 2236
2-Hexanone	ND		1	10	ug/L	12/17/2014 2236
Isopropylbenzene	ND		1	5.0	ug/L	12/17/2014 2236
Methyl acetate	ND		1	5.0	ug/L	12/17/2014 2236
Methyl tertiary butyl ether (MTBE)	ND		1	5.0	ug/L	12/17/2014 2236
4-Methyl-2-pentanone	ND		1	10	ug/L	12/17/2014 2236
Methylcyclohexane	ND		1	5.0	ug/L	12/17/2014 2236
Methylene chloride	ND		1	5.0	ug/L	12/17/2014 2236
Styrene	ND		1	5.0	ug/L	12/17/2014 2236
1,1,2,2-Tetrachloroethane	ND		1	5.0	ug/L	12/17/2014 2236
Tetrachloroethene	ND		1	5.0	ug/L	12/17/2014 2236
Toluene	ND		1	5.0	ug/L	12/17/2014 2236
1,1,2-Trichloro-1,2,2-Trifluoroethane	ND		1	5.0	ug/L	12/17/2014 2236
1,2,4-Trichlorobenzene	ND		1	5.0	ug/L	12/17/2014 2236
1,1,2-Trichloroethane	ND		1	5.0	ug/L	12/17/2014 2236
1,1,1-Trichloroethane	ND		1	5.0	ug/L	12/17/2014 2236

PQL = Practical quantitation limit
ND = Not detected at or above the PQL
P = The RPD between two GC columns exceeds 40%
J = Estimated result < PQL and ≥ MDL
N = Recovery is out of criteria
+ = RPD is out of criteria

Where applicable, all soil sample analysis are reported on a dry weight basis unless flagged with a "W"

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

Volatile Organic Compounds by GC/MS - MB

Sample ID: PQ63373-001
Batch: 63373
Analytical Method: 8260B

Matrix: Aqueous
Prep Method: 5030B

Parameter	Result	Q	Dil	PQL	Units	Analysis Date
Trichloroethene	ND		1	5.0	ug/L	12/17/2014 2236
Trichlorofluoromethane	ND		1	5.0	ug/L	12/17/2014 2236
Vinyl chloride	ND		1	2.0	ug/L	12/17/2014 2236
Xylenes (total)	ND		1	5.0	ug/L	12/17/2014 2236

Surrogate	Q	% Rec	Acceptance Limit
Bromofluorobenzene		105	70-130
1,2-Dichloroethane-d4		98	70-130
Toluene-d8		98	70-130

PQL = Practical quantitation limit
ND = Not detected at or above the PQL
P = The RPD between two GC columns exceeds 40%
J = Estimated result < PQL and ≥ MDL
N = Recovery is out of criteria
+ = RPD is out of criteria

Where applicable, all soil sample analysis are reported on a dry weight basis unless flagged with a "W"

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

Volatile Organic Compounds by GC/MS - LCS

Sample ID: PQ63373-002
Batch: 63373
Analytical Method: 8260B
Matrix: Aqueous
Prep Method: 5030B

Parameter	Spike Amount (ug/L)	Result (ug/L)	Q	Dil	% Rec	% Rec Limit	Analysis Date
Acetone	100	78		1	78	60-140	12/17/2014 2137
Benzene	50	48		1	96	70-130	12/17/2014 2137
Bromodichloromethane	50	49		1	99	70-130	12/17/2014 2137
Bromoform	50	49		1	97	70-130	12/17/2014 2137
Bromomethane (Methyl bromide)	50	57		1	115	60-140	12/17/2014 2137
2-Butanone (MEK)	100	88		1	88	60-140	12/17/2014 2137
Carbon disulfide	50	47		1	94	60-140	12/17/2014 2137
Carbon tetrachloride	50	50		1	99	70-130	12/17/2014 2137
Chlorobenzene	50	48		1	97	70-130	12/17/2014 2137
Chloroethane	50	56		1	113	42-163	12/17/2014 2137
Chloroform	50	47		1	93	70-130	12/17/2014 2137
Chloromethane (Methyl chloride)	50	64		1	127	60-140	12/17/2014 2137
Cyclohexane	50	47		1	93	70-130	12/17/2014 2137
1,2-Dibromo-3-chloropropane (DBCP)	50	47		1	94	70-130	12/17/2014 2137
Dibromochloromethane	50	52		1	104	70-130	12/17/2014 2137
1,2-Dibromoethane (EDB)	50	47		1	95	70-130	12/17/2014 2137
1,4-Dichlorobenzene	50	48		1	96	70-130	12/17/2014 2137
1,3-Dichlorobenzene	50	49		1	99	70-130	12/17/2014 2137
1,2-Dichlorobenzene	50	48		1	95	70-130	12/17/2014 2137
Dichlorodifluoromethane	50	65		1	130	60-140	12/17/2014 2137
1,2-Dichloroethane	50	46		1	92	70-130	12/17/2014 2137
1,1-Dichloroethane	50	47		1	93	70-130	12/17/2014 2137
trans-1,2-Dichloroethene	50	48		1	96	70-130	12/17/2014 2137
cis-1,2-Dichloroethene	50	47		1	94	70-130	12/17/2014 2137
1,1-Dichloroethene	50	48		1	96	70-130	12/17/2014 2137
1,2-Dichloropropane	50	48		1	96	70-130	12/17/2014 2137
trans-1,3-Dichloropropene	50	49		1	99	70-130	12/17/2014 2137
cis-1,3-Dichloropropene	50	49		1	98	70-130	12/17/2014 2137
Ethylbenzene	50	49		1	97	70-130	12/17/2014 2137
2-Hexanone	100	96		1	96	60-140	12/17/2014 2137
Isopropylbenzene	50	47		1	95	70-130	12/17/2014 2137
Methyl acetate	50	45		1	90	60-140	12/17/2014 2137
Methyl tertiary butyl ether (MTBE)	50	47		1	94	70-130	12/17/2014 2137
4-Methyl-2-pentanone	100	92		1	92	60-140	12/17/2014 2137
Methylcyclohexane	50	53		1	106	70-130	12/17/2014 2137
Methylene chloride	50	46		1	91	70-130	12/17/2014 2137
Styrene	50	51		1	103	70-130	12/17/2014 2137
1,1,2,2-Tetrachloroethane	50	45		1	90	70-130	12/17/2014 2137
Tetrachloroethene	50	50		1	99	70-130	12/17/2014 2137
Toluene	50	49		1	98	70-130	12/17/2014 2137
1,1,2-Trichloro-1,2,2-Trifluoroethane	50	52		1	105	70-130	12/17/2014 2137
1,2,4-Trichlorobenzene	50	48		1	97	70-130	12/17/2014 2137
1,1,2-Trichloroethane	50	47		1	94	70-130	12/17/2014 2137
1,1,1-Trichloroethane	50	48		1	96	70-130	12/17/2014 2137

PQL = Practical quantitation limit
P = The RPD between two GC columns exceeds 40%
N = Recovery is out of criteria
ND = Not detected at or above the PQL
J = Estimated result < PQL and ≥ MDL
+ = RPD is out of criteria
Where applicable, all soil sample analysis are reported on a dry weight basis unless flagged with a "W"

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

Volatile Organic Compounds by GC/MS - LCS

Sample ID: PQ63373-002
Batch: 63373
Analytical Method: 8260B

Matrix: Aqueous
Prep Method: 5030B

Parameter	Spike Amount (ug/L)	Result (ug/L)	Q	Dil	% Rec	% Rec Limit	Analysis Date
Trichloroethene	50	49		1	98	70-130	12/17/2014 2137
Trichlorofluoromethane	50	56		1	112	70-130	12/17/2014 2137
Vinyl chloride	50	57		1	115	70-130	12/17/2014 2137
Xylenes (total)	100	98		1	98	70-130	12/17/2014 2137

Surrogate	Q	% Rec	Acceptance Limit
Bromofluorobenzene		106	70-130
1,2-Dichloroethane-d4		90	70-130
Toluene-d8		98	70-130

PQL = Practical quantitation limit
ND = Not detected at or above the PQL
P = The RPD between two GC columns exceeds 40%
J = Estimated result < PQL and ≥ MDL
N = Recovery is out of criteria
+ = RPD is out of criteria

Where applicable, all soil sample analysis are reported on a dry weight basis unless flagged with a "W"

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

SHEALY ENVIRONMENTAL SERVICES, INC.

SHEALY **Chain of Custody Record**

SHEALY ENVIRONMENTAL SERVICES, INC.
106 Vantage Point Drive • West Columbia, SC 29172
Telephone No. 803-791-9700 Fax No. 803-791-9111
www.shealylab.com

Number 42826

Client	ERM NC, Inc
Address	15720 Brixham Hill Ave Ste 120
City	Charlotte
State	NC
Zip Code	28277
Project Name	ECI - Elon
Project No.	
P.O. No.	
Report to Contact	Ed.Hollifield@erm.com
Sampler's Signature	X
Printed Name	Thomas Fisher
Telephone No. / E-mail	704-541-8345
Quote No.	
Analysis (Attach list if more space is needed)	
Page	1 of 1
	PL12058

Sample ID / Description (Containers for each sample may be combined on one line.)	Date	Time	Grab/Comp	Matrix: Aqueous	Solid	Non-Aqueous	No of Containers by Preservative Type: Unpres	H2SO4	HNO3	HCl	NaOH	ZnOAc Kit		VOC									Remarks / Cooler I.D.
OB-1B	12/8/14	1430	G	X						X				X									
OB-1B	12/10/14	1445	G	X						X				X									
OB-2B	12/8/14	1450	G	X						X				X									
OB-2B	12/10/14	1505	G	X						X				X									
MW-7	12/8/14	1550	G	X						X				X									
MW-7	12/10/14	1425	G	X						X				X									
DW-1	12/8/14	1530	G	X						X				X									
DW-1	12/10/14	1405	G	X						X				X									
AS-1	12/8/14	1510	G	X						X				X									
AS-1	12/10/14	1530	G	X						X				X									

Turn Around Time Required (Prior lab approval required for expedited TAT.) X Standard ☐ Rush (Specify)

Sample Disposal ☐ Return to Client X Disposal by Lab

Possible Hazard Identification X Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison ☐ Unknown

QC Requirements (Specify)

	Date	Time		Date	Time
1. Relinquished by	12/11/14	1900	1. Received by Leann Allen / Shealy Office	12.11.14	1900
2. Relinquished by Leann Allen / Shealy Office	12.12.14	855	2. Received by Nick Chapman	12.12.14	855
3. Relinquished by Nick Chapman	12.12.14	1645	3. Received by	Date	Time
4. Relinquished by	Date	Time	4. Laboratory received by	12/12/14	1645

Note: All samples are retained for four weeks from receipt unless other arrangements are made.

LAB USE ONLY
Received on ice (Circle) Yes No Ice Pack
Receipt Temp. 1.3 °C

DISTRIBUTION: WHITE & YELLOW-Return to laboratory with Sample(s); PINK-Field/Client Copy

Document Number: F-AD-133 Effective Date: 08-01-2014

SHEALY ENVIRONMENTAL SERVICES, INC.

Shealy Environmental Services, Inc.
Document Number: F-AD-016
Revision Number: 16

Page 1 of 1
Replaces Date: 07/15/14
Effective Date: 11/07/14

Sample Receipt Checklist (SRC)

Client: ERM Cooler Inspected by/date: MGM / 12/12/14 Lot #: PL12058

Means of receipt: ☑ SESI ☐ Client ☐ UPS ☐ FedEx ☐ Airborne Exp ☐ Other

Yes ☐	No ☑		1. Were custody seals present on the cooler?
Yes ☐	No ☐	NA ☑	2. If custody seals were present, were they intact and unbroken?

Cooler ID/Original temperature upon receipt/Derived (corrected) temperature upon receipt:
1.7/1.3 °C ___/___/___ °C ___/___/___ °C ___/___/___ °C
Method: ☑ Temperature Blank ☐ Against Bottles IR Gun ID: #4 IR Gun Correction Factor: 0.1 °C
Method of coolant: ☑ Wet Ice ☐ Blue Ice ☐ Dry Ice ☐ None

Yes ☐	No ☐	NA ☑	3. If temperature of any cooler exceeded 6.0°C, was Project Manager notified? PM notified by SRC, phone, note (circle one), other:_____. (For coolers received via commercial courier, PMs are to be notified immediately.)
Yes ☐	No ☐	NA ☑	4. Is the commercial courier's packing slip attached to this form?
Yes ☐	No ☑		5. Were proper custody procedures (relinquished/received) followed?
Yes ☐	No ☐	NA ☑	5a Were samples relinquished by client to commercial courier?
Yes ☑	No ☐		6. Were sample IDs listed on the COC?
Yes ☑	No ☐		7. Were sample IDs listed on all sample containers?
Yes ☑	No ☐		8. Was collection date & time listed on the COC?
Yes ☑	No ☐		9. Was collection date & time listed on all sample containers?
Yes ☑	No ☐		10. Did all container label information (ID, date, time) agree with the COC?
Yes ☑	No ☐		11. Were tests to be performed listed on the COC?
Yes ☑	No ☐		12. Did all samples arrive in the proper containers for each test?
Yes ☑	No ☐		13. Did all containers arrive in good condition (unbroken, lids on, etc.)?
Yes ☑	No ☐		14. Was adequate sample volume available?
Yes ☑	No ☐		15. Were all samples received within ½ the holding time or 48 hours, whichever comes first?
Yes ☐	No ☑		16. Were any samples containers missing?
Yes ☐	No ☑		17. Were there any excess samples not listed on COC?
Yes ☐	No ☑	NA ☐	18. Were bubbles present >"pea-size" (¼"or 6mm in diameter) in any VOA vials?
Yes ☐	No ☐	NA ☑	19. Were all metals/O&G/HEM/nutrient samples received at a pH of <2?
Yes ☐	No ☐	NA ☑	20. Were all cyanide and/or sulfide samples received at a pH >12?
Yes ☐	No ☐	NA ☑	21. Were all applicable NH3/TKN/cyanide/phenol (<0.2mg/L) samples free of residual chlorine?
Yes ☐	No ☐	NA ☑	22. Were collection temperatures documented on the COC for NC samples?
Yes ☐	No ☐	NA ☑	23. Were client remarks/requests (i.e. requested dilutions, MS/MSD designations, etc…) correctly transcribed from the COC into the comment section in LIMS?
Yes ☐	No ☑		24. Was the quote number used taken from the container label?

Sample Preservation (Must be completed for any sample(s) incorrectly preserved or with headspace.)

Sample(s)_____were received incorrectly preserved and were adjusted accordingly in sample receiving with _____(H_2SO_4,HNO_3,HCl,NaOH) using SR # _____.

Sample(s) _____were received with bubbles >6 mm in diameter.

Sample(s)_____were received with TRC >0.2 mg/L (If #21 is No)

SC Drinking Water Project Sample(s) pH verified to be > 2 by _____ Date: _____
Sample(s) _____ were not received at a pH of <2 and were adjusted accordingly using SR#_____

Sample labels applied by: MGM Verified by: MGM Date: 12/12/14

Comments:

APPENDIX E
Low Flow Sample Collection Sheets

WATER MATRIX SAMPLING

FIELD DATA FORM

ERM

Site Name: ECI CLON Job #: _____

Purpose of sampling: _____

Sample Type: Circle one - **(Monitor Well, Soil vapor well, Observation wel, Air sparge; other)** _____

Sample ID: DW-1

Date:

Sampling Personnel: Thomas Fisher

Weather Conditions: Sunny, Partly Cloudy, Cloudy; Other_____

Time:

Well Type: Above grade, At grade **Surface Completion** **Well Tag Present:** Yes, No

Well Locked: Yes, No **Lock Present:** Yes, No **Well ID info. on Tag:** Yes, No

Well Bolted: Yes, No **Well Cap:** Yes, No **Well Cap Condition:** Good, Replace, Other;_____

Well Pad Condition: Good, Cracked, Replace, Other:_____ **Well Location:** Grass, Asphalt, Concrete, Woods, Other;_____

Additional Comments:

Total Depth of Well (T.D.): **Screen Length:** 5, 10, 15, 20 feet-other:

Depth to Water (D.T.W): (1) 36.62 **Well Diameter:** 2, 4 Inches-other:

Field Parameters measured with: YSI 556/ Hanna Turb. **Casing Type:** PVC, Steel other:

Purge Rate: mL/min **Sampling Device:** Peristaltic

Tubing Type: Polyethylene **Measuring Point:** TOC other:

Pump Intake (ft below M.P.): **Color:** **Odor:** Yes, No

Time: (min) Stabalization Criteria[2]	Volume Purged (Liters)	DTW: (feet) (see note below)[3]	Temp (°C) +/- 3%	pH (std units) +/- 0.1 unit	SpC (uS/cm) +/- 3%	DO (mg/L) +/- 10%	ORP mV +/- 10 mV	Turb NTU +/- 10%[4]	Comments: (ie unusal recharge rates, equipment malfunctions, possible sample contamination, etc.)
1515			17.10	8.73	0.131	2.83	58.9		
1520			17.04	7.91	0.120	2.62	61.2		
1525			17.38	7.36	0.119	2.51	65.3		
									1530 SAMPLE
12/10/14 →		WL = 36.71							
1350			17.66	6.52	0.142	7.56	247.5		
1355			17.53	6.54	0.124	4.94	244.1		
1400			17.43	6.48	0.123	4.24	244.9		
									1405 SAMPLE

Official Sampling Date & Time: _____

Samples Collected: Analysis Requested: Container: Preservative: Hold Time (days): Lab: Shipper

(1) - Do not measure depth to bottom of well until after purging and sampling to reduce resuspending fines that may be resting on the well bottom.
(2) - Stabilization criteria based on three most recent consecutive measurements.
(3) - Total drawdown in well to be less than 0.1 m (0.32 ft). Purging rate to be lowered as necessary to keep drawdown below 0.1 m (0.32 ft).
(4) +/- 10% when turbidity is over 10 NTUs.

WATER MATRIX SAMPLING

FIELD DATA FORM

ERM

Site Name: ECI @ ELON Job #: _____

Purpose of sampling: _____

Sample Type: Circle one - **(Monitor Well, Soil vapor well, Observation wel, Air sparge; other)** _____

Sample ID: MW-7

Date:

Sampling Personnel: Thomas Fisher

Weather Conditions: Sunny, Partly Cloudy, Cloudy; Other_____

Time:

Well Type: Above grade, At grade **Surface Completion** **Well Tag Present:** Yes, No

Well Locked: Yes, No **Lock Present:** Yes, No **Well ID info. on Tag:** Yes, No

Well Bolted: Yes, No **Well Cap:** Yes, No **Well Cap Condition:** Good, Replace, Other;_____

Well Pad Condition: Good, Cracked, Replace, Other:_____ **Well Location:** Grass, Asphalt, Concrete, Woods, Other;_____

Additional Comments:

Total Depth of Well (T.D.): **Screen Length:** 5, 10, 15, 20 feet-other:

Depth to Water (D.T.W): (1) 36.71 **Well Diameter:** 2, 4 Inches-other:

Field Parameters measured with: YSI 556/ Hanna Turb. **Casing Type:** PVC, Steel other:

Purge Rate: mL/min **Sampling Device:** Peristaltic

Tubing Type: Polyethylene **Measuring Point:** TOC other:

Pump Intake (ft below M.P.): **Color:** **Odor:** Yes, No

Time: (min) Stabalization Criteria[2]	Volume Purged (Liters)	DTW: (feet) (see note below)[3]	Temp (°C) +/- 3%	pH (std units) +/- 0.1 unit	SpC (uS/cm) +/- 3%	DO (mg/L) +/- 10%	ORP mV +/- 10 mV	Turb NTU +/- 10%[4]	Comments: (ie unusal recharge rates, equipment malfunctions, possible sample contamination, etc.)
1545			17.83	5.29	0.041	1.80	115.2		DRY, 1 VOLUME
[redacted]									
[redacted]									
									1550
12/10/14		WL = 36.52							
1410	~~17.72~~		17.72	5.15	0.045	3.59	263.3		
1415			17.79	5.04	0.041	4.44	269.7		WELL DRY
~~1420~~									
									1425 SAMPLE

Official Sampling Date & Time: _____

Samples Collected: Analysis Requested: Container: Preservative: Hold Time (days): Lab: Shipper

(1) - Do not measure depth to bottom of well until after purging and sampling to reduce resuspending fines that may be resting on the well bottom.
(2) - Stabilization criteria based on three most recent consecutive measurements.
(3) - Total drawdown in well to be less than 0.1 m (0.32 ft). Purging rate to be lowered as necessary to keep drawdown below 0.1 m (0.32 ft).
(4) +/- 10% when turbidity is over 10 NTUs.

WATER MATRIX SAMPLING

FIELD DATA FORM

ERM

Site Name: ECI Avon Job #: _____

Purpose of sampling: _____

Sample Type: Circle one - (Monitor Well, Soil vapor well, Observation wel, Air sparge; other) _____

Sample ID: AS-1

Date:

Sampling Personnel: Thomas Fisher

Weather Conditions: Sunny, Partly Cloudy, Cloudy; Other_____

Time:

Well Type: Above grade, At grade **Surface Completion** **Well Tag Present:** Yes, No

Well Locked: Yes, No **Lock Present:** Yes, No **Well ID info. on Tag:** Yes, No

Well Bolted: Yes, No **Well Cap:** Yes, No **Well Cap Condition:** Good, Replace, Other;_____

Well Pad Condition: Good, Cracked, Replace, Other:_____ **Well Location:** Grass, Asphalt, Concrete, Woods, Other;_____

Additional Comments:

Total Depth of Well (T.D.): **Screen Length:** 5, 10, 15, 20 feet-other:

Depth to Water (D.T.W): (1) 36.26 **Well Diameter:** 2, 4 Inches-other:

Field Parameters measured with: YSI 556/ Hanna Turb. **Casing Type:** PVC, Steel other:

Purge Rate: mL/min **Sampling Device:** Peristaltic

Tubing Type: Polyethylene **Measuring Point:** TOC other:

Pump Intake (ft below M.P.): **Color:** **Odor:** Yes, No

Time: (min)	Volume Purged	DTW: (feet)	Temp (°C)	pH (std units)	SpC (uS/cm)	DO (mg/L)	ORP mV	Turb NTU	Comments: (ie unusal recharge rates, equipment malfunctions, possible sample contamination, etc.)
Stabalization Criteria[2]	(Liters)	(see note below)[3]	+/- 3%	+/- 0.1 unit	+/- 3%	+/- 10%	+/- 10 mV	+/- 10%[4]	
1455			17.82	11.18	0.919	4.23	15.0		
1500			17.85	11.60	0.936	4.09	-30.7		
1505			18.17	11.59	0.985	4.33	-54.9		
									1510
12/10/14		WL=46.88							
1510			17.91	6.51	0.122	9.72	228.6		
1515			17.44	6.60	0.123	9.40	233.7		
1520			17.51	6.52	0.128	9.12	240.1		
									1530

Official Sampling Date & Time: _____

Samples Collected: Analysis Requested: Container: Preservative: Hold Time (days): Lab: Shipper

(1) - Do not measure depth to bottom of well until after purging and sampling to reduce resuspending fines that may be resting on the well bottom.
(2) - Stabilization criteria based on three most recent consecutive measurements.
(3) - Total drawdown in well to be less than 0.1 m (0.32 ft). Purging rate to be lowered as necessary to keep drawdown below 0.1 m (0.32 ft).
(4) +/- 10% when turbidity is over 10 NTUs.

WATER MATRIX SAMPLING

FIELD DATA FORM

ERM

Site Name: ECI BLDN Job #: _____

Purpose of sampling: _____

Sample Type: Circle one - **(Monitor Well, Soil vapor well, Observation wel, Air sparge; other)** _____

Sample ID: OB-1 b OB-1a

Date: 12/8/14 WATER LEVEL: DRY AT 30'

Sampling Personnel: Thomas Fisher, Tom Naumann

Weather Conditions: Sunny, Partly Cloudy, Cloudy, Other_____

Time:

Well Type: Above grade, At grade **Surface Completion** **Well Tag Present:** Yes, No

Well Locked: Yes, No **Lock Present:** Yes, No **Well ID info. on Tag:** Yes, No

Well Bolted: Yes, No **Well Cap:** Yes, No **Well Cap Condition:** Good, Replace, Other;_____

Well Pad Condition: Good, Cracked, Replace, Other:_____ **Well Location:** Grass, Asphalt, Concrete, Woods, Other;_____

Additional Comments:

Total Depth of Well (T.D.): **Screen Length:** 5, 10, 15, 20 feet-other:

Depth to Water (D.T.W): (1) 36.24 **Well Diameter:** 2, 4 Inches-other:

Field Parameters measured with: YSI 556/ Hanna Turb. **Casing Type:** PVC, Steel other:

Purge Rate: mL/min **Sampling Device:** Peristaltic

Tubing Type: Polyethylene **Measuring Point:** TOC other:

Pump Intake (ft below M.P.): **Color:** **Odor:** Yes, No

Time: (min) Stabalization Criteria[2]	Volume Purged (Liters)	DTW: (feet) (see note below)[3]	Temp (°C) +/- 3%	pH (std units) +/- 0.1 unit	SpC (uS/cm) +/- 3%	DO (mg/L) +/- 10%	ORP mV +/- 10 mV	Turb NTU +/- 10%[4]	Comments: (ie unusal recharge rates, equipment malfunctions, possible sample contamination, etc.)
1415			17.84	6.02	0.093	7.65	165.3		
1420			17.80	6.08	0.102	6.03	170.1		
1425			17.64	5.93	0.102	5.90	175.0		
									1430
12/10/14		WL =	38.86						POST PUT TEST BELOW
1430			17.72	6.13	0.090	8.07	239.5		
1435			16.98	6.02	0.090	8.15	242.1		
1440			17.84	6.02	0.090	7.83	240.3		
									1445 SAMPLE

Official Sampling Date & Time: _____

Samples Collected: Analysis Requested: Container: Preservative: Hold Time (days): Lab: Shipper

(1) - Do not measure depth to bottom of well until after purging and sampling to reduce resuspending fines that may be resting on the well bottom.
(2) - Stabilization criteria based on three most recent consecutive measurements.
(3) - Total drawdown in well to be less than 0.1 m (0.32 ft). Purging rate to be lowered as necessary to keep drawdown below 0.1 m (0.32 ft).
(4) +/- 10% when turbidity is over 10 NTUs.

WATER MATRIX SAMPLING

FIELD DATA FORM

ERM

Site Name: ECF GON Job #: _____

Purpose of sampling: _____

Sample Type: Circle one - **(Monitor Well, Soil vapor well, Observation wel, Air sparge; other)** _____

Sample ID: OB-26 OB-29

Date: WATER LEVEL: DRY AT 30'

Sampling Personnel: Thomas Fisher

Weather Conditions: Sunny, Partly Cloudy, Cloudy; Other_____

Time:

Well Type: Above grade, At grade **Surface Completion** **Well Tag Present:** Yes, No

Well Locked: Yes, No **Lock Present:** Yes, No **Well ID info. on Tag:** Yes, No

Well Bolted: Yes, No **Well Cap:** Yes, No **Well Cap Condition:** Good, Replace, Other;_____

Well Pad Condition: Good, Cracked, Replace, Other:_____ **Well Location:** Grass, Asphalt, Concrete, Woods, Other;_____

Additional Comments:

Total Depth of Well (T.D.): **Screen Length:** 5, 10, 15, 20 feet-other:

Depth to Water (D.T.W): (1) 36.24 **Well Diameter:** 2, 4 Inches-other:

Field Parameters measured with: YSI 556/ Hanna Turb. **Casing Type:** PVC, Steel other:

Purge Rate: mL/min **Sampling Device:** Peristaltic

Tubing Type: Polyethylene **Measuring Point:** TOC other:

Pump Intake (ft below M.P.): **Color:** **Odor:** Yes, No

Time: (min)	Volume Purged	DTW: (feet)	Temp (°C)	pH (std units)	SpC (uS/cm)	DO (mg/L)	ORP mV	Turb NTU	Comments: (ie unusal recharge rates, equipment malfunctions, possible sample contamination, etc.)
Stabalization Criteria[2]	(Liters)	(see note below)[3]	+/- 3%	+/- 0.1 unit	+/- 3%	+/- 10%	+/- 10 mV	+/- 10%[4]	
1435			16.73	5.95	0.115	7.18	166.1		
1440			17.04	6.16	0.104	7.29	159.8		
1445			17.58	6.20	0.103	7.71	160.4		
									1450
12/10/14		WL = 38.79							
1450			16.99	6.50	0.106	7.18	234.9		
1455			17.63	6.20	0.107	6.22	237.0		
1500			17.40	6.15	0.105	6.78	240.4		
									1505 SAMPLE

Official Sampling Date & Time: _____

Samples Collected: Analysis Requested: Container: Preservative: Hold Time (days): Lab: Shipper

(1) - Do not measure depth to bottom of well until after purging and sampling to reduce resuspending fines that may be resting on the well bottom.
(2) - Stabilization criteria based on three most recent consecutive measurements.
(3) - Total drawdown in well to be less than 0.1 m (0.32 ft). Purging rate to be lowered as necessary to keep drawdown below 0.1 m (0.32 ft).
(4) +/- 10% when turbidity is over 10 NTUs.

Appendix B
Health and Safety Plan

LEVEL 2 WARN

HEALTH AND SAFETY PLAN

GMS Project # 0235393

This Level 2 Work Activity Risk Assessment (WARN) Health & Safety Plan (HASP) is intended to provide health and safety guidelines for project field work meeting ONE OR MORE OF the following criteria:

- **Some likelihood of physical and/or chemical hazard exposure (e.g., sampling)**
- **Number of job tasks is five or greater**
- **Use of subcontractors**
- **Fieldwork is being performed on an active or abandoned mining site**
- **"High-hazard" work to be performed, including but not limited to:**
  - **Excavations and trenching**
  - **Confined Spaces**
  - **Hot Work**
  - **Subsurface Clearance *(must complete and attach Subsurface Clearance Project Plan)***
  - **Hazardous Energy Control Operations**
  - **Work at heights**
  - **Overhead Utilities/Proximity Hazards**
  - **Lifting Operations**
  - **Construction**
  - **Decommissioning, Decontamination and Demolition (DDD) Operations**
  - **Injection Well Operations**

If NONE of the above applies, an e-mail or Level 1 HASP template may be used. For more complex sites with significant client health and safety requirements, the project team may consider use of a long-form Level 3 WARN HASP.

This HASP should be developed with input from the project team, and reviewed with all ERM project personnel (including subcontractors). A signed copy of the HASP must be maintained at the project site during work and in the project files.

H&S Team review is required for the Level 2 WARN HASP. This HASP must be reviewed by the Project Manager and Partner-in-Charge (PIC) and updated as warranted to address changes in scope, hazards present, project personnel, etc. At a minimum, HASPs must be reviewed annually or if the scope of work changes. Updated HASPs should also be sent to the H&S Team and PIC for approval.

Administrative Information **This document has been developed for the sole use of ERM staff. Subcontractors and other project participants must develop their own HASP.** **This document is valid for a maximum time period of one year after initial completion. This document must be reviewed if the scope of work or nature of site hazards changes and updated as warranted.** **All on-site personnel must be appropriately trained and qualified for the planned scope of work to be performed.**	Site Name and Location: Engineered Controls Intl., Elon, NC	
	Client Contact and Phone: Jimmy McCandies 336-449-7707	
	Project Name: ECI, Elon	
	Health & Safety Plan Date: 5/13/14	Revision Number and Date: N/A
	Field Work Start Date: 5/14/14	Anticipated Field Work End Date 5/23/14
	Project Manager (*responsible for implementing the site health and safety program on this project*) Lane Dorman	Partner In Charge (*responsible for overall site health and safety performance on this project).* Thomas Wilson
	Field Safety Officer (*responsible for all health & safety activities, recordkeeping and delegation of duties to any other project team members*) Greg Kanellis Chris Means	Additional ERM personnel on site Tom Naumann
H&S Team Review	Review Date 2-12-2014 (pending SSC tasks not reviewed) Updated: 5/13/14	Signature Donald Hall
Site Setting **Include relevant background information regarding the site, such as location, size, type of facility, topography, weather, infrastructure, security, previous site use, etc. Describe nature and extent of any soil/air/water/groundwater contamination.** **Describe any other aspects of the site that may potentially affect the health, safety, or security of on-site personnel.**	Site: This active facility has a TCE plume underneath the building. Past sampling results of indoor air indicated various volatile organic compounds (VOC) (including TCE) were detected between the collective cancer risk screening values of 1.0E-06 and 1.0E-04 and within a Hazard Index of 1. TCE was detected above the collective cancer risk screening value of 1.0E-04 or above the Hazard Index of 1 at select locations during the most recent (March 2013) sampling event.	

Project Background and Scope of Work **Include list of tasks to be completed by ERM personnel during this project, and a separate list of tasks to be completed by any subcontractors at the site.** **A site-specific Job Hazard Analysis (JHA) must be completed for each task to be performed. Subcontractors must provide their own HASP. Subcontractors must provide JHAs for each task they will perform for ERM review.** **JHA template and reference/example JHAs for more common tasks can be found at:** **Americas H&S Page - JHAs**	ERM Scope of Work: **1)** ***Water sampling***: Mob to site. Set up sample equipment, purge groundwater, collect sample, repeat as necessary, and ship samples to lab for analysis. (ERM Personnel only). **2)** ***Soil borings***: Mob to site, conduct SSC process, oversee private utility locator services (Taylor, Wiseman, & Taylor), provide oversight for drilling subcontractors (SAEDACCO), collect soil samples from split-spoons, package soil samples, and ship to lab for analysis. Subcontractor(s) Scope of Work: Taylor, Wiseman, & Taylor: conduct private utility locate and mark out any subsurface utilities within the area of subsurface operations SAAEDACCO: Use DPT (Direct Push Technology) to obtain soil samples and conduct air rotary drilling to install monitor wells. .
	Subcontractor(s) to be used: / Has subcontractor been approved (PICS or other local approval)? Taylor, Wiseman, & Taylor — ☒ Y ☐ N SAEDACCO — ☐ Y ☐ N ☐ Y ☐ N ☐ Y ☐ N ☐ Y ☐ N
Site/Project General Information *** Complete and attach the appropriate Risk Assessment checklist.**	**Site Type (check all applicable boxes)** ☐ Remote Site* ☐ Inactive Facility* ☒ Hazardous waste release site (HAZWOPER) ☐ Railroad ☒ Industrial ☐ Residential ☐ Unsecured ☐ Coastal / Offshore (on or near water) ☐ Other (specify)

Safe Work Practices	Main Site Hazards (check all applicable boxes)			
Place a checkmark by applicable site hazards. **Adequate control measures for all checked hazards must be included in site-specific JHAs, which should be attached to the HASP** **** High hazard work requiring H&S team coordination (additional control measures required beyond JHA)** ***** Permit-required high hazard work, requiring safety team coordination and ERM or equivalent client-required permit to be completed** **More detailed guidance on specific safety topics can be found in the Health & Safety Guidance Documents Section on the Americas Safety Page on Minerva.**	☒ Natural Hazards (Plants, Insects Animals)	☒ Organic Chemicals	☐ Inorganic Chemicals	☐ Material Handling Equipment in Use*
	☐ Journey Management	☐ Overexertion / Fatigue	☐ Line Breaking***	☐ Extended Shifts (>14 hrs + driving)
	☐ Compressed Gas	☐ Asbestos	☒ High Noise (>85 dBA)	☐ Respirable Particles
	☐ Work at Heights > feet (1.2 m)**	☐ Extreme Weather	☐ Hand/Portable Power Tools	☐ Non-Ionizing Radiation
	☐ Use of Blasting Materials or Explosives**	☐ Confined Space Entry***	☐ ASTs/USTs	☒ Buried/Overhead Utilities and Subsurface Clearance***
	☒ Slip/Trip/Fall	☐ Forklift and Industrial Truck Use**	☐ Scissor Lift / Cherry Picker Use*	☐ Ergonomics / Manual Lifting
	☐ Scaffold Use	☐ Portable Ladders	☐ Welding or Hot Work***	☐ Construction**
	☐ Excavations and Trenching***	☐ All-Terrain Vehicle	☐ Helicopter Transportation	☐ Surface/Underground Mines
	☐ Control of Hazardous Energy***	☐ Working on or over water	☐ Working in or near surface waters (lakes/rivers)	☐ Underwater Diving**
	☐ Hazard Communication	☐ Medical Services and First Aid	☐ Airborne Contaminants	☐ Critical Lifting***
	☐ Chemical mixing and injection	☐ Unexploded Ordinance / Munitions and Explosives of Concern (UXO/MEC)**	☒ Personal Protective Equipment (PPE)	☐ Respiratory Protection
	☐ Travel to Medium/High Risk Locations**	☐ Drum Handling	☐ Protection by Armed Security Forces**	☐ Non-Standard Shifts (e.g., night work)
	☐ **Other (specify)**	☐ **Other(specify)**	☐ **Other(specify)**	☐ **Other(specify)**

Chemical Products Used or Stored Onsite	
For each chemical product identified, a Safety Data Sheet (SDS) or Chemical Safety Data Card (CSDC) must be attached to this HASP. **SDS/CSDS for many common chemicals may be found on the Americas Safety Page on Minerva.**	☒ Alconox or Liquinox* ☒ Hydrochloric acid (HCl)* ☐ Nitric acid (HNO_3)* ☐ Sodium hydroxide (NaOH)* ☐ Other (specify) ☐ Calibration gas (Methane) ☒ Calibration gas (Isobutylene) ☐ Calibration gas (Pentane) ☐ Calibration gas (4-gas mixture) ☐ Calibration gas (zero air) ☐ Other (specify) ☐ Isopropyl Alcohol* ☐ Household bleach (NaOCl)* ☐ Sulfuric acid (H_2SO_4)* ☐ Hexane ☐ Other (specify) ***NOTE: Eyewash solution must be readily available on ALL project sites where materials are used or stored that pose a risk of getting into the eyes from splashes / airborne dust/debris, etc., including sample preservatives. The eyewash unit – stationary or portable – must be large enough to provide at least 15 minutes of eye flushing.**
Chemicals of Concern **In the section to the right, check any chemicals present onsite in any media (air, soil, water), or check "No ERM exposure to these".** **These chemicals include OSHA-regulated potential occupational carcinogens (29 CFR 1910.1003-1910.1016) as well as those chemicals for which OSHA has established specific respiratory protection requirements (29 CFR 1910.134)** **If any of these chemicals are present on site, contact your safety team member for guidance. Then, describe additional protective measures to be taken for boxes checked.**	☐ Friable Asbestos ☐ 3,3'-Dichlorobenzidine ☐ Benzidine ☐ beta-Propiolactone ☐ N-Nitrosomethylamine ☐ Lead ☐ Benzene ☐ Acrylonitrile ☐ Methylenedianiline ☐ 4-Nitrobiphenyl ☒ **No ERM exposure to these** ☐ alpha-Napthylamine ☐ bis-Chloromethyl ether ☐ 4-Aminodiphenyl ☐ 2-Acetylaminoflourene ☐ Vinyl chloride ☐ Chromium (VI) ☐ Coke oven emissions ☐ Ethylene oxide ☐ 1,3-Butadiene ☐ Methyl chromoethyl ether ☐ beta-Napthylamine ☐ Ethyleneimine ☐ 4-Dimethylaminoazobenzene ☐ Inorganic arsenic ☐ Cadmium ☐ 1,2-Dibromo-3-chloropropane ☐ Formaldehyde ☐ Methylene chloride Additional measures to be taken based on associated chemical hazard(s):

The following section must be filled out completely for all chemicals (suspected or confirmed) present in site media (soil, air, water). Attach an SDS for each chemical.								
Materials Present or Suspected at Site	**Highest Reported Concentration (ug/m^3)**	**Exposure Limit (ppm)**	**IDLH Level (ppm)**	**Primary Hazards of the Material (explosive, flammable, corrosive, toxic, volatile, radioactive, biohazard, oxidizer, or other)**	**Symptoms and Effects of Acute Exposure**	**Ionization Potential (eV)**	**Respirator Cartridge Type**	**Respirator Cartridge Replacement Schedule**
PCE	77.1 ug/m^3	PEL = 100 REL = N/A TLV = 25 Other= Skin Hazard ☒	150	Toxic;	Dizziness and muscular incoordination; Skin and eye irritation; Liver and kidney damage		OV	
TCE	320 ug/m^3	PEL = 100 REL = 25 (10hr TWA) TLV = 10 Other= Skin Hazard ☒	1,000	Toxic	Irritation of eyes and skin; visual disturbance; exhaustion/ weakness; dizziness; nausea; vomiting		OV	
Acetone	680.6	PEL = 1000 REL = 250 TLV = 500 Other= Skin Hazard ☐	2,500	Highly flammable; vapor / air mixtures are explosive.	Slight eye, nose, and respiratory irritation; cough, headache, drowsiness.		OV	
2-Butanone	286	PEL = 200 REL = 200 TLV = 300 Other= Skin Hazard ☐	3,000	Highly flammable; vapor / air mixtures are explosive.	Irritation of the eyes, nose, and throat		OV	
Cyclohexane	62.1	PEL = 300 REL = 300 TLV = 100 Other= Skin Hazard ☐	1,300	Highly flammable; vapor / air mixtures are explosive	Narcosis; mild throat and eye irritation; dizziness		OV	
Toluene	133	PEL = 200 REL = 100 TLV = 20 Other= Skin Hazard ☐	500	Toxic; Vapor/air mixtures are explosive	Central nervous system depression; fatigue, headache, confusion, dizziness, muscular incoordination; irritation of eyes, mucous membranes		OV	

FOR ADDITIONAL CHEMICALS, USE THE LEVEL 2 HASP CHEMICALS TABLE ATTACHMENT.
PEL = OSHA Permissible Exposure Limit - http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=9992
REL = NIOSH Recommended Exposure Limit - http://www.cdc.gov/niosh/npg/default.html
TLV = ACGIH Threshold Limit Value (Contact your Division H&S Leader for additional information on these values).
IDLH = Immediately Dangerous to Life or Health - http://www.cdc.gov/niosh/npg/default.html

Levels of Personal Protective Equipment (PPE) Required for each Task	**Task Description**	Level of PPE			
		A	B	C	D
Primary hazard control strategies, including elimination/avoidance, engineering controls, and/or administrative controls, must be documented for all tasks on task-specific JHAs, to be included as an attachment to this HASP. PPE is considered as the "last line of defense."	Primary hazard control strategy will be to avoid the area after setting up sampling devices.	☐	☐	☐	☒
	Drill sampling - High noise: Use hearing protection.	☐	☐	☐	☒
		☐	☐	☐	☐
		☐	☐	☐	☐
Signature of the H&S Team on Page 1 of this document signifies certification of PPE Hazard Assessment.		☐	☐	☐	☐
		☐	☐	☐	☐
		☐	☐	☐	☐

Personal Protective Equipment (PPE) based on identified tasks to be performed, as outlined in Scope of Work.

Req = Required PPE for one or more tasks to be performed; required on site at all times. PPE specific to each task must be outlined in detail on task-specific JHAs.

NA = Not applicable to this project

PPE	Req	NA	PPE	Req	NA
Steel Toe Boots	☒	☐	Hard Hat	☒	☐
Long Sleeve Shirt & Long Pants	☒	☐	Safety Glasses w/ side shields	☒	☐
Outer Disposable Boots	☐	☒	Chemical/impact-resistant Goggles	☒	☐
Tyvek Suit	☐	☒	Poly-Coated Tyvek	☐	☒
Fully Encapsulated Chemical Suit	☐	☒	Full-Face Respirator	☐	☒
Hearing Protection	☒	☐	Half-Face Respirator	☐	☒
Leather Gloves	☒	☐	Inner Chemical Gloves	☐	☒
Outer Chemical Gloves	☒	☐	Other (specify) High visibility safety vest	☒	☐

Training, Medical Surveillance, and Safety Supplies

Req = Requirements are based on specific tasks performed in the field and the type of environments, chemicals or hazards encountered.

NA = Not applicable to this project

*Provides specialized training over-and-above the 40-hour HAZWOPER training necessary to serve as an on-site manager supervising employees engaged in work covered by the HAZWOPER standard at 29 CFR 1910.120

**Physical examination requirements should be discussed with WorkCare well in advance of the start of work to allow adequate time to schedule examination requirements.

Training	Req	NA	Medical Surveillance**	Req	NA
40-hr HAZWOPER; current 8-hr refresher	☒	☐	Medical Clearance	☐	☒
8 Hour HAZWOPER Supervisor*	☐	☒	Respirator Clearance and Fit Test	☐	☒
Current CPR and First Aid	☒	☐	Blood Lead and ZPP	☐	☒
MSHA 40-hr New Miner and current 8-hr refresher	☐	☒	Other (specify)	☐	☐
ERM Field Safety Officer (FSO)	☒	☐	Other (specify)	☐	☐
DDD Practice FSO/DM	☐	☒	**Supplies**	**Req**	**NA**
Subsurface Clearance (SSC)	☒	☐	First Aid Kit	☒	☐
EPA Hazardous Waste	☐	☒	Eyewash Solution (capable of 15 minutes of eye flushing)	☒	☐
Hazmat/Dangerous Goods Shipping	☐	☒	Air Horn	☐	☒
International Traveler	☐	☒	Decontamination Supplies	☐	☒
Other (specify):	☐	☐	Fire Extinguisher	☐	☒
Other (specify):	☐	☐	Potable Water	☐	☒
Other (specify):	☐	☐	Toilets	☐	☒
Other (specify):	☐	☐	Other (specify):	☐	☐

Monitoring Equipment: All monitoring equipment on site must be calibrated per manufacturer specifications (including daily bump tests) and results recorded. Under stable site conditions, measurements must be made in the breathing zone at least once every 30 minutes.				
Instrument (Check all required)	**Task**	**Instrument Reading**	**Action Guideline**	**Comments**
☐ Combustible gas indicator model:	☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5	0 to 10% LEL	Monitor. Evacuate if confined space.	N/A
		10 to 25% LEL	Potential fire or explosion hazard.	
		>25% LEL	Fire/explosion hazard. Evacuate site.	
☐ Oxygen meter model:	☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5	>23.5% Oxygen	Fire hazard. Evacuate site.	N/A
		23.5 to 19.5% Oxygen	Normal oxygen levels.	
		<19.5% Oxygen	Oxygen deficient conditions. Evacuate site.	
☐ Radiation survey meter model:	☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5	Normal background	Proceed with normal operations.	Annual exposure not to exceed 1250 mrem per quarter. Background reading must be taken in area known to be free of radiation sources.
		Three times background	Notify Radiation Safety Officer.	
		>Three times background	Radiological hazard. Evacuate site.	
☒ Photoionization detector model: ☐ 11.7 eV ☒ 10.6 eV ☐ 10.2 eV ☐ 9.8 eV ☐ _____ eV Level A-D PPE Requirements	☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5	Any response below 5 ppm, sustained for 1 minute	Level "D" is acceptable up to the action level. For response above established background level(s), appropriate level PPE requirements must be met.	The action level for upgrading the level of protection is typically one-half of the lowest published exposure limit identified for the potential COCs at the site. For COCs with extremely low exposure limits (e.g., < 5 ppm), contact your Division H&S Leader or for guidance on action levels. Respirator selection should be based on the Assigned Protection Factor (APF) and the Maximum Use Concentration (MUC). To determine the appropriate respirator selection, the following contaminant information must be known: • Permissible Exposure Limit (PEL) or other published Exposure Limit (note that the lowest published exposure guideline should be used to establish action levels) • Short-term Exposure Limit • Ceiling Limit • Peak Limit • Any other exposure limit for the hazardous substance Contact your Division H&S Leader or Project Health and Safety Consultant for assistance in defining the APF and MUC, as necessary, as well as any time upgrading of respiratory protection is required based on established action levels.
		5 ppm to 100 ppm, sustained for 1 minute	Level "C" is acceptable as appropriate.	
		Greater than 100 ppm above background, sustained for 1 minute	Stop work. Tasks requiring Level B or Level A PPE are not anticipated during this project. If Level B or Level A PPE is needed, as determined by the FSO and/or the PM, the Division H&S Leader will be notified and the HASP will be revised.	

Instrument (Check all required)	Task	Instrument Reading	Action Guideline	Comments
☐ Flame ionization detector model:	☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5	Any response above background to _____ ppm above background, sustained for 1 minute	Level "D" is acceptable up to the action level. For response above established background level(s), appropriate level PPE requirements must be met.	The action level for upgrading the level of protection is one-half of the lowest published exposure limit identified for the potential COCs at the site. Respirator selection should be based on the Assigned Protection Factor (APF) and the Maximum Use Concentration (MUC). To determine the appropriate respirator selection, the following contaminant information must be known: • Permissible Exposure Limit (PEL) or other published Exposure Limit • Short-term Exposure Limit • Ceiling Limit • Peak Limit • Any other exposure limit for the hazardous substance Contact your Division H&S Leader or Project Health and Safety Consultant for assistance in defining the APF and MUC, as necessary.
		_____ ppm above background to _____ ppm above background, sustained for 1 minute	Level "C" is acceptable as appropriate.	
		Greater than _____ ppm above background, sustained for 1 minute	Stop work. Tasks requiring Level B or Level A PPE are not anticipated during this project. If Level B or Level A PPE is needed, as determined by the FSO and/or the Project Health and Safety Consultant, the Division H&S Leader will be notified and the HASP will be revised.	
☐ Detector tube models:	☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5	Specify:	Specify:	
☐ Other (specify):	☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5	Specify:	Specify:	

Work Zones **If exclusion zones are necessary because of chemical and/or equipment hazards. Describe the set-up of these zones. Include landmarks, dimensions as necessary, equipment vs. personnel decontamination zones**	Exclusion Zone: Cordon off area with cones / caution tape as needed.
	Contamination Reduction Zone: N/A
	Support Zone: N/A
Site Access/Control **Describe procedures for limiting unauthorized entry to the work zone(s). Are there any security requirements?**	Access Control Procedures: Per property owner's protocols.
Decontamination Procedures **Describe procedures for decontamination of personnel and equipment.**	Personnel: Wash hands after sampling.
	Equipment: Sink, soap, water.

Emergency Response Planning	ALL WORK-RELATED INCIDENTS MUST BE REPORTED. FOR ALL MEDICAL EMERGENCIES, CALL 911 OR THE LOCAL EMERGENCY NUMBER.
In the pre-work briefing and daily tailgate safety meetings, all onsite employees will be trained in the provisions of emergency response planning, site communication systems, and site evacuation routes. Note that clients may have their own procedures which may need to be followed. **Signal a site emergency or medical emergency with three blasts of a loud horn (car horn, fog horn, or similar device).** **To complete this section, attach a hospital route map to the HASP.**	**For ALL non-emergency incidents resulting in injury or illness, you must:** • Give appropriate first aid care to the injured or ill individual and secure the scene. • Immediately notify the Project Manager and/or Partner-in-Charge. • Immediately call WorkCare Incident Intervention at (888) 449-7787 (available 24 hours/7 days per week) (US only). • Clients may have their own procedures which we may need to follow. • Enter the event into the ECS within 24 hours. **In the event of an emergency that necessitates evacuation of the work task area or the site as a whole, the following procedures shall occur:** • The ERM FSO will contact all nearby personnel using the onsite communications system to advise of the emergency. • Personnel will proceed along site roads to a safe distance upwind from the hazard source. • Personnel will remain in that area until the site safety contact or other authorized individual provides further instruction. **In the event of a severe spill or leak, site personnel will follow the procedures listed below:** • Evacuate the affected area and relocate personnel to an upwind location. • Inform the ERM FSO, an ERM office, and a site representative immediately. • Locate the source of the spill or leak, and stop the source if it is safe to do so and appropriately trained personnel are onsite to do so. • Begin containment and recovery of spilled or leaked materials. • Notify appropriate local, state, and federal agencies after obtaining client consent to do so. **In the event of severe weather, site personnel will follow the procedures listed below:** • Site work shall not be conducted during severe weather, including high winds and lightning. • In the event of severe weather, stop work, lower any equipment (drill rigs), and evacuate the affected area.

Client Specific Emergency Response	Contributing factors initiating emergency response (process, material, weather)
In the event of an emergency, client specific emergency response procedures may take precedent over ERM established procedures.	Lights and/or sounds associated with evacuation
	Drill requirements for contractors on-site
While engaging in field related activities on an active client site, measures they have in place to signal either emergency response or evacuation need to be reviewed and documented.	Initial and alternative muster points
	Map associated with evacuation
	Specific evacuation procedures
Once completed, this summary, along with evacuation map(s), should be discussed with all visitors, subcontractors and others subject to HASP review upon site visit.	How does contractor account for all site visitors
	PPE and Spill Kit requirements (if emergency response is spill related)

Emergency Contacts	Name	Location	Phone	Cell Phone
Hospital (attach map)	Alamance Regional Medical Center	1240 Huffman Mill Rd, Burlington, NC	336-228-0254	
Police	Burlington Police Administration	276 W Front St., Burlington, NC	336-229-3540	
Fire	Whitsett Fire Department	809 North Carolina 61	336-449-7811	
Project Manager	Lane Dorman	Raleigh, NC	919-233-4501	770-364-9002
Field Manager (if not PM)	Greg Kanellis	Raleigh, NC	919-233-4501	919-745-7197
Field Safety Officer (if not PM)	Greg Kanellis	Raleigh, NC	919-233-4501	919-745-7197
Division H&S Contact	Millard Griffin	Atlanta, GA	678-486-2700	678-294-8658
Alternate H&S Contact	Don Hall	Atlanta, GA	678-486-2700	704-472-3727
Americas Region H&S Contact	Mark Hickey	Denver, CO	720-200-7172	720-625-2869
Incident Intervention (US Only)	WorkCare	NA	888-449-7787	NA
SSC Experienced Person	Tom Naumann	Raleigh	919-233-4501	404-483-3093
Subcontractor Safety Contact(s)	N/A			
Client Site Contact	Jimmy McCandies	Elon	336-449-7707	336-380-5645

Acknowledgement	***I have read, understood, and agree with the information set forth in this Health & Safety Plan, and will follow guidance in the plan and in the ERM North America Health and Safety manual. I understand the training and medical monitoring requirements for conducting activities covered by this WARN HASP and have met these requirements.*** ***ERM has prepared this plan solely for the purpose of protecting the health and safety of ERM employees. Subcontractors, visitors, and others at the site are required to follow provisions in this document at a minimum, but must refer to their organization's health and safety program for their protection.***		
Printed Name	Signature	Organization	Date

Approval Signatures **Signatures in this section indicate the signing employee will comply with and enforce this WARN HASP, as well as procedures and guidelines established in the ERM NA H&S. Signatures in this section also indicate that any subcontractors performing work under contract to ERM have met the minimum safety standards in the ERM Subcontractor Prequalification Process.**	Project Manager Lane Dorman	Date: 5/13/2014
	Partner in Charge Thomas Wilson	Date:

Check all appropriate documents to be attached to this HASP.	
	☒ Site-specific JHAs for all tasks (including subcontractors) ☒ SDS/CSDC for all chemicals brought to site and all chemicals suspected/confirmed in site media ☒ SSC Project Plan ☒ Map of Route to Hospital/Emergency Services ☐ High-Hazard Work Procedures: Type: ☐ High-Hazard Work Permits: Type(s): ☐ Facility site map(s) ☒ Tailgate Safety Meeting Forms ☐ Air Monitoring and Equipment Calibration Forms ☐ SOS (See-Own-Share) Field Cards ☐ Emergency Drill Forms ☐ OFP Contractor Leaflet ☐ Risk Assessment Checklists ☐ Health & Safety Guidance Documents: List: ☐ Client specific requirements ☐ Travel Risk Assessment (TRA) ☐ PLAN Risk Assessment ☐ Field Audit Forms ☐ PM H&S Checklist ☒ Vehicle Safety Checklist ☐ IH Sampling Data Sheet ☐ Other (specify): ☐ Other (specify):

See It – Own It – Share It	Stop Work Authority
It means that: • **We know that we have a responsibility to look out for each other, to intervene when necessary, to be proactive and to help keep safety issues from becoming problems.** • **We also look out for ourselves. If we recognize that a situation is unsafe, we are expected to stop what we're doing, reassess the situation and consult with others if necessary before proceeding safely.** • **We assign no blame to anyone who raises safety issues.** • **We strive to learn lessons from the large and small events that are part of our daily experience.**	**It is ERM policy that all ERM and ERM Subcontractor employees have the authority, without fear of reprimand or retaliation to:** • **Immediately stop any work activity that presents a danger to the site team or the public.** • **Get involved, question and rectify any situation or work activity that is identified as not being in compliance with the HASP or with broader ERM health and safety policies.** • **Report any unsafe acts or conditions to supervision or, preferably, intervene to safely correct such acts or conditions themselves.**

Revision Log	Date	By	Notes
	2/11/2013	S Perkins / M Griffin	Merged standard / intrusive L2 formats into single document. Revisions to include full HAZWOPER compliance, DDD practice applicability, and user feedback.
	5/2013	M. Griffin	Added additional user feedback.

ATTACHMENTS

JHA
Job Hazard Analysis

Project Number:	0235369	Project / Client Name:	ECI
Project Manager:	Lane Dorman	Location:	Whitsett, NC
Partner-in-Charge:	Thomas Wilson	Date and Revision Number:	5/13/2014

SPECIFIC TASK:	**Drive to site, groundwater sampling, Utility Locate and DPT boring oversight**

Minimum Required PPE for Entire Task:	☑ Hard Hat ☑ Safety-Toe Shoes ☑ Hearing Protection ☐ Goggles ☐ Face Shield ☐ Respirator <enter type and cartridge type> ☐ Other (specify): <enter additional PPE here> ☑ Safety Glasses ☑ Reflective Vest ☑ Gloves Nitrile/cut resistant gloves ☐ PPE clothing		
Additional Task-Step Specific PPE: (as indicated below under Controls)	Level D	Equipment / Tools Required:	peristaltic pump & tubing, YSI 556 or equiv, turbidimeter
Training Required for this Task:	SSC EP, 40hr HAZWOPER,	Permits Required for this Task:	SSC
Forms Associated with This Task:	SSC, Daily Tailgate Meeting form, Vehicle Safety Checklist		

JHA Developed / Reviewed By:			JHA Review In Field
Name / Job Title:	Name / Job Title:	Name / Job Title:	Field Safety Officer (FSO) to ensure all personnel performing this task have reviewed JHA and agree to follow it. Site-specific changes to this JHA have been made as warranted based on this review. **FSO Signature/Date:**
Greg Kanellis (Engineer / SSC EP) - FSO			
Tom Naumann - Alt. FSO			

Task Steps[1]		Potential Hazards & Consequences[2]		select	Likelihood	Severity	RISK	Controls to Eliminate or Reduce Risks[3]	
1	Vehicle Operation	1a	Vehicle collision-injury and property damage	multiple	2	3	6	1a	Driving Alertness, defensive driving and keeping space cushion
2	Groundwater sample collection	3a	Cut from Glass containers	H&S	2	3	6		Cut resistant gloves under nitrile
		3b	contact with laboratory supplied preservative or contaminated groundwater	H&S	2	3	6		Ensure that nitrile gloves are worn, safety glasses
3	General Drilling Oversight	4a	Struck by flying debris, elevated noise levels	H&S	2	2	4		Keep away from drilling operations. Wear hearing protection when rig is operating.
		4b	Struck by vehicle or Geoprobe	H&S	2	3	6		In addition to proper PPE, wear safety vest. Setup workzone away from traffic when able to do so.
									Setup exclusion zone with cones and caution tape. Keep clear of Geoprobe when in motion.
									Notify plant manager of presence. Determine shipping/delivery schedule for borings near loading dock.
4	Well Sampling	5a	Opening flushmount monitor well / pinch points	H&S	2	2	4		Proper PPE, (Leather or cut resistant gloves)
		5b	Repetition of movement	H&S	2	2	4		Take Breaks, use proper task technique (don't overexert yourself), stretch prior to beginning work
		5c	Lifting / back injury	H&S	2	3	6		Use proper lifting technique (use legs and not the back)
5	Work in Hot Climates	6a	Heat stress / dehydration	H&S	3	2	6		Take water breaks and seek shade where possible. Limit work days or shift work hours as necessary.
		6b	Sun burn	H&S	3	2	6		Wear sunscreen and reapply as necessary. Wear a brimmed hat or hard hat to limit exposure.

Task Steps[1]		Potential Hazards & Consequences[2]		select	Likelihood	Severity	RISK	Controls to Eliminate or Reduce Risks[3]	

ONE JHA PER TASK. SUBCONTRACTORS MUST PROVIDE THEIR OWN JHAS. JHAS SHOULD BE WRITTEN IN PLAIN LANGUAGE AND SHOULD BE NO MORE THAN 2-3 PAGES IN LENGTH.
INSERT ADDITIONAL ROWS AS NEEDED ABOVE (MUST MANUALLY COPY AND PASTE FORMULA IN COLUMN H). ROW HEIGHTS MAY NEED TO BE MANUALLY EXPANDED TO VIEW ALL TEXT.
LEAVE SEVERAL BLANK OVERSIZED ROWS TO ALLOW HANDWRITTEN FIELD ADDITIONS. CAN ALSO DELETE UNNEEDED ROWS TO FIT PAGE(S).

1. Each task consists of a set of steps. List and number all the steps in the sequence they are performed. Specify the equipment or other details.
2. List potential health & safety hazards and consequences - ONE PER ROW - and select "H&S" from the drop-down list. Then list any potential security, environmental, and/or property loss impacts - ONE PER ROW - and select the corresponding code(s) from the drop-down list. Use numbers and letters for each hazard/impact listed (1a, 1b, etc). Hazards should be described in terms of their specific origin and negative consequences (e.g., instead of "moving equipment", write "injury from getting struck by forklift").
3. Describe the specific actions or procedures that will be implemented to eliminate or reduce each hazard. Be clear, concise, and specific. Use objective, observable, and quantified terms (e.g., instead of "use good body positioning," write "don't bend at waist or reach above head"). Use numbers and letters corresponding to listed hazards.
4. Select the likelihood of occurrence and severity of each hazard, AFTER implementation of the planned control measures (use the Risk Matrix as a guide). The corresponding risk rating will then be automatically calculated [RISK = Likelihood x Severity].

A risk rating shaded red indicates that work cannot continue without additional control measures and approval of Partner-in-Charge.

WAYS TO ELIMINATE OR REDUCE RISKS (IN ORDER OF PREFERENCE):

ELIMINATE / AVOID --> SUBSTITUTE / MODIFY --> ISOLATE --> ENGINEER / SAFEGUARD --> TRAINING AND PROCEDURES --> WARNING AND ALERT MECHANISMS --> PPE

ERM Air Monitoring Documentation Form

1. Project Information

Name/Location	
Project Number	
Date/Time	

2. Instrument Information

Type	
Brand	
Model	

3. Calibration Details (use one form per instrument per day)

Type	Calibration Gas Value	Measured Result	Correction Factor (CF) Needed?[1] (Yes/No)
Fresh Air	NA		NA
Zero Gas			NA
Span Gas #1:			
Span Gas #2:			
Span Gas #3:			
Span Gas #4:			

4. Monitoring Results

Time	Contaminant	Location	Result	CF (if needed)	Adjusted Result (Result x CF)

ERM Air Monitoring Documentation Form

Time	Contaminant	Location	Result	CF (if needed)	Adjusted Result (Result x CF)

5. Completion[2]

Name	
Signature	

6. Notes

1. Correction factors (CF) may be needed for instrumentation where the span gas used is different from the chemical of concern (COC) being evaluated. Many air monitors, such as photoionization detectors (PIDs), are broadband instruments which will respond to all gases which the detector will ionize. Because the instrument will respond differently to the span gas than the COC, a CF can be applied to adjust the reading, producing a result more indicative of actual COC concentrations.

   The CF for a compound is developed under laboratory conditions by the manufacturer and is the ratio of the instrument response to the calibration gas over the instrument response to the COC. Therefore, the true concentration of the COC can be obtained by multiplying the monitor response by the CF. The instrument manufacturer's documentation will provide a list of CFs where applicable.

   Note that some instrumentation is designed to adjust for CFs automatically and produce true readings. Consult instrument documentation to determine if this is a feature of your instrument.

2. Retain completed form in project files.

SCOPE

This procedure provides guidance for determining appropriate Personal Protective Equipment (PPE) to be worn at the job site, based on new tasks and chemical or physical agents identified in the field. The initial determination for proper PPE is completed as part of development of the HASP.

DEFINITIONS

None.

PROCEDURE

A. The Field Safety Officer will complete a hazard assessment of the tasks involved and identify the appropriate PPE based on the task and the chemical or physical agents involved. The written hazard assessment certification must be documented in the HASP.

B. The Field Safety Officer will communicate to employees the PPE requirements for the tasks involved.

C. The Field Safety Officer will provide PPE that properly fits the employee(s).

D. The Field Safety Officer will conduct daily site walks to verify appropriate use of PPE.

E. A H&S team member or Field Safety Officer will provide training to the employees which includes at least the following:

1. When PPE is necessary;
2. What PPE is necessary;
3. How to properly don, doff, adjust and wear PPE;
4. The limitations of the PPE; and
5. The proper care, maintenance, useful life and disposal of the PPE.

F. Re-training by the Field Safety Officer may be required if:

1. Changes at the job site make previous training obsolete.
2. Changes in the types of PPE make previous training obsolete.
3. Inadequacies in an affected employee's knowledge or use of PPE indicate the employee requires additional training.

G. Types of PPE include the following:

1. Eye and Face Protection

a. All eye and face protection must comply with ANSI Z87.1-1989.

b. Safety glasses

- Side shields must be worn when there is a hazard of flying objects.
- Prescription glasses must meet the ANSI Z87.1-1989 requirements or must have eye protection over them meeting the ANSI standard requirements.

c. Chemical goggles

d. Face shield

2. Head Protection

a. All head protection (hard hats) must comply with ANSI Z89.1-1989.

3. Foot Protection

All foot protection must comply with ANSI Z41-1991.

a. Safety-toed shoes

b. Rubber boots or rubber safety-toed boots

4. Hand Protection

Hand protection must be selected based on the performance characteristics of the hand protection relative to the task(s) to be performed, conditions present, duration of use and the hazards and potential hazards identified. A member of the H&S team must verify and document selection of appropriate chemical resistant gloves.

a. Work gloves, such as leather or cotton

b. Chemical gloves, such as nitrile, neoprene, Viton, butyl rubber

c. Cut-resistant gloves, such as Kevlar

5. Hearing Protection

a. Ear plugs

b. Ear muffs

6. Respiratory Protection (Refer to SOP – 9)

7. Other PPE

a. Disposable Coveralls

b. Fire Resistant Clothing

REFERENCES

Regulatory References

- 29 CFR 1910.132, Personal Protective Equipment, General Requirements
- 29 CFR 1910.133, Eye and Face Protection
- 29 CFR 1910.135, Head Protection

- 29 CFR 1910.136, Foot Protection
- 29 CFR 1910.138, Hand Protection

Technical References

- ANSI Z87.1-1989, American National Standard Practice for Occupational and Educational Eye and Face Protection
- ANSI Z89.1-1989, American National Standard for Personal Protection – Protective headwear for Industrial Workers – Requirements
- ANSI Z41-1991, American National Standard for Personal Protection – Protective Footwear

Procedural References

- SWP Respiratory Protection

REVISION LOG

DATE	REV. #	APV'D	COMMENTS
12/31/07	0	ELG	Issued for use
1/12/2011	1	RLE	Renumbered, integrated with ERM H&S program, removed references to RCM

SCOPE

This procedure provides guidance for determining appropriate means for handling natural hazards that may be encountered while conducting fieldwork.

DEFINITIONS

None.

PROCEDURE

Potential exposure to natural hazards during performance of projects performed in the outdoor environment can range from minimal to substantial. The hazards discussed in this document may be present on any outdoor project and should be guarded against. Infrequent hard freezes may allow insects and snakes to be active all year round in some parts of the United States. Refer to Attachments 1 through 3 for photos and more thorough descriptions of the more common natural hazards, which might be encountered.

A. Identify type of natural hazard present.

B. When natural hazards (such as poisonous plants, feral animals, insects and snakes) are encountered, back away and evaluate the situation.

C. Develop a plan which may include any of the following:

1. Remove the natural hazard if it can be done safely.
2. Avoid the natural hazard if it cannot be removed. Additionally, use appropriate PPE or outer clothing for protection from the hazard. Refer to SWP for Personal Protective Equipment.
3. Get assistance in removing or working around the natural hazard. In some instances, this may require professional help from animal control or an insect expert.

D. In the event there is contact with the natural hazard, if it appears to be a life threatening situation, such as anaphylactic shock or a snake bite, seek medical attention immediately.

POISONOUS PLANTS

1. Poison ivy is in the form of a vine, while oak and sumac are bush-like.
2. All produce a delayed allergic hypersensitivity.
3. The plant tissues have an oleoresin, which is active in live, dead, and dried parts and may be carried through dust, contaminated articles, and the hair of animals.
4. Symptoms usually occur 24 to 48 hours after exposure resulting in burning or stinging, and weeping and/or crusted blisters.
5. The best antidote for poisonous plants is recognition and avoidance.
6. Should exposure to any of these plants occur, notify the Field Safety Officer and wash the affected area with a mild soap and water, but do not scrub the area.

TICKS

1. Ticks attach to their host's skin and intravenously feed on its blood creating an opportunity for disease transmission.
2. Covering exposed areas of the body and the use of tick repellent are two ways to prevent tick bites.
3. Periodically during the workday employees should inspect themselves for the presence of ticks. A thorough inspection should be performed at the end of the workday.
4. Notify the Field Safety Officer of any tick bites as soon as possible, medical attention may be required.

SPIDERS

1. Black Widow
   a. The black widow is a common venomous spider found in vacant rodent burrows, under stones, logs and long grass, and in hollow stumps and brush piles.
   b. If disturbed, they typically will retreat to a corner of their web but can be induced to bite only if pressed against the skin.
   c. Notify the Field Safety Officer if bitten, because neurotoxins are injected, it is important to seek immediate medical attention.

2. Brown Recluse
   a. The brown recluse or Fiddle Back Spider is another common venomous spider.
   b. It hides in dark niches and corners, where it may spin a poorly organized, irregular web.
   c. It is shy and will try to run from a threatening situation but will bite if cornered.
   d. Check boots and protective clothing for spiders prior to putting them.
   e. The bite of the brown recluse is usually painless until 3 to 8 hours later when it may become red, swollen, and tender. Notify the Field Safety Officer if bitten.
   f. Prompt medical attention can reduce the extent of ulceration and alleviate other complications that may develop.

FIRE ANTS

1. One sure sign of the presence of fire ants is their conical mounds, which are a result of the digging of their chambers.
2. The sting of a fire ant results in localized reddening of the bite area, accompanied by sharp burning sensations.
3. The first ant sting releases a chemical substance that triggers other ants of the colony to sting.
4. Anyone seeing fire ant mounds present at the work site should notify the Field Safety Officer, who will then notify the rest of the crew so the mounds may be avoided if possible.

CHIGGERS

1. Chiggers, also known as “red-bugs” or “harvest mites”, are the immature stages of a tiny red mite.
2. They inhabit areas of tall grass, associated with low, wet spots, ponds and stream banks, wild berry patches, and forest underbrush.
3. The larvae attach themselves to the clothing of people or to the fur of passing animals.
4. Wear loose-fitting clothing (if possible) when working outdoors. Apply a repellent containing DEET (N,N-diethyl-meta-toluamide), to shoes, socks, and trousers before entering chigger-infested areas. Caution: some individuals may be sensitive to DEET – always read and follow label directions

5. Vehicles should be frequently vacuumed to reduce the number of chiggers that may have been deposited.
6. Flowers of sulfur is another repellant of chiggers. Sulfur may be more benign to use than DEET on some body parts. Avoid breathing dust during application.
7. Shower or bathe at the end of each workday to ensure chiggers are removed.

FLYING INSECTS

1. Flying insects such as mosquitoes, wasps, hornets, and bees may be encountered while site activities occur.
2. Wear long-sleeved clothes and long pants treated with repellent. Do not treat unexposed skin. Use the repellent according to the manufacturer's recommendations provided on the container.
3. Personnel should report flu-like symptoms to the Field Safety Officer, medical attention may be needed.

SNAKES

1. The most effective way to prevent snakebites is to avoid snakes.
2. Personnel should avoid walking in high grass and underbrush.
3. Visual inspection of work areas should be performed prior to activities taking place.
4. The use of leather boots and long pants will be required, since more than half of all bites are on the lower part of the leg.
5. No attempts at killing snakes should be made; many people are bitten in such an attempt.
6. If a snake bites someone, notify the Field Safety Officer and seek medical services.

ALLIGATORS

1. Never approach an alligator. Always stay at least 30 yards away. Never wade or swim in areas that could contain large alligators.
2. Do not dump food or scraps into or near the water. This can attract alligators.
3. Always be aware of your surroundings and use caution and common sense.
4. If at any time personnel observe alligators at the site they will immediately inform the Field Safety Officer, who will then notify the rest of the employees and local wildlife personnel.

FERAL ANIMALS

1. Feral animals such as rats or other wildlife may be encountered during fieldwork.
2. If an animal is diseased, injured or tending a nest, they may become aggressive.
3. Notify the Field Safety Officer if feral animals are at the site, who will then notify the rest of the employees and local wildlife personnel.

ATTACHMENTS

Attachment 1, Poisonous Plants
Attachment 2, Insects
Attachment 3, Snakes
Attachment 4, Other Natural Hazards

REFERENCES

Regulatory References

None

Technical References

None

Procedural References

SWP Personal Protective Equipment

REVISION LOG

DATE	REV. #	APV'D	COMMENTS
12/31/07	0	ELG	Issued for use
1/12/2011	1	RLE	Renumbered, integrated with ERM H&S program, removed references to RCM
7-30-12	1	DH	Last sentence corrected

Attachment 1

Poisonous Plants

Most species of poison ivy, oak, and sumac have three leaflets; hence, the saying, "Leaves of three, let it be." These plants vary significantly in appearance in different regions of the country, but in most species the flower and fruit structures arise in the angle between the leaf and the twig, the flowers are greenish in spring, and the plant's mature fruit is off-white or pale yellow-green.

Several varieties, including two species each of poison ivy, poison oak, and poison sumac and six subspecies of poison ivy (*Toxicodendron radicans*), are found in the United States. Poison ivy (see figure A below) generally grows east of the Rocky Mountains and poison oak in the West. Both poison ivy and poison sumac are found along the Gulf Coast. Poison oak prefers swampy areas in the Southeast.

Figures A1, A2: Courtesy of Lisa A. Gamer, MD; figure A3: staff photo; figure A4: Janet Robidoux

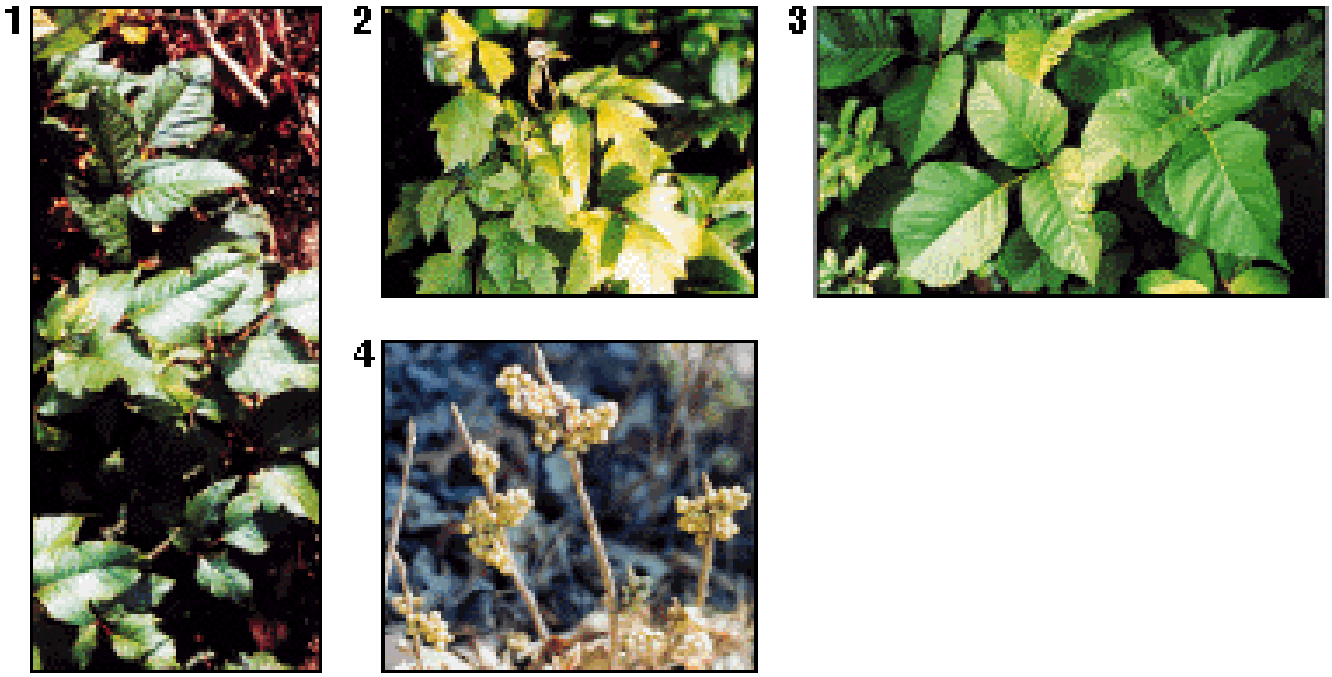


Figure A. Poison ivy (Toxicodendron radicans) can grow as a shrub or vine, but all varieties are characterized by glossy leaves that grow in clusters of three leaflets. The varieties shown here are found in Texas (1,2) and Minnesota (3). The off-white or pale yellow-green berries of poison ivy (4) often remain on the plant through the winter.

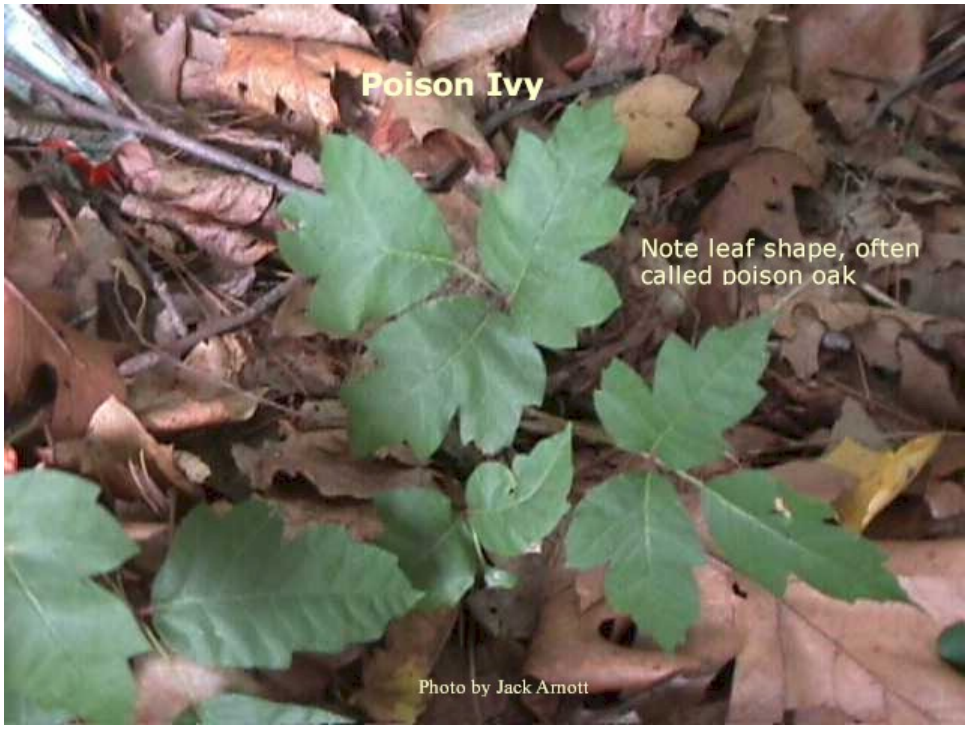
Poison Ivy

A climbing vine with three serrated-edge, pointed leaves grows in the East, Midwest and South. In the northern and western states, poison ivy grows as a non-climbing shrub.

The appearance of these plants is variable. Leaves are alternate and normally consist of three leaflets with the stalk of the central leaflet being longer than those of the other two are but can be found with five or even seven leaflets. The leaflets are two to four inches long, dull or glossy green with pointed tips. The middle leaflet is generally larger than the two laterals. The edges of the leaflets may be toothed, lobed, or smooth. Virginia Creeper (*Parthenocissus quinquefolia*) is non-poisonous vine with five leaflets that is often mistaken for poison ivy.

Poison ivy can be a shrub or a woody vine. Yellowish-green flowers occur in compact clusters in leaf axils, in June or July followed by waxy, gray-white berries about three-sixteenths of an inch in diameter in late summer.

Virginia Creeper
Parthenocissus quinquefolia
Poison Ivy
Toxicodendron radicans
Photo by Jack Arnott


Poison Ivy
Note leaf shape, often called poison oak
Photo by Jack Arnott

Poison Oak

Poison oak also has three leaves. It grows in the sandy soil of the Southeast as a small shrub. In the western United States poison oak is a very large plant that grows as a standing shrub or climbing vine. Eastern poison oak has the most "oak-looking" leaves of any of the species. It usually has multi-lobed leaves, no aerial roots on the stems, and fuzzy fruits and leaves. It loves sandy soils. Western poison oak is found only along the Pacific coast and into the mountains and it usually has aerial roots extending from the main stem.

Poison Sumac

A shrub or bush with two rows of 7-13 leaflets, most common in the peat bogs of the Northern United States and in swampy Southern regions of the country. A water loving swamp shrub (dendritic) or bush with two rows of 7-13 leaflets; growing from 6 to 20 feet in height, the Poison Sumac is found in the east from Quebec to Florida and westward along the coast to far west Texas between Shelby and Hardin counties.

Listed below are recommended actions to take to reduce the potential exposure to poisonous plant:

- Determine what types of poisonous plants may be present at the specific site.
- Use repellant sprays and coatings.
- Use netting or long sleeves with cuffs and long pants.
- Regularly inspect skin.
- Maintain a first aid kit on hand.

Attachment 2
Insects

Chiggers

Chiggers, also known as "red-bugs" or "harvest mites", are the immature stages of a tiny red mite. They inhabit areas of tall grass, associated with low, wet spots, ponds and stream banks, wild berry patches, and forest underbrush. The larvae attach themselves to the clothing of people or to the fur of passing animals. Before settling down to feed, chiggers move to a constriction, such as sock tops, waistbands, or armpits. Feeding chiggers inject a salivary fluid, which dissolves the host's cells, and then they suck up the liquefied tissue. Within a few hours, small, reddish, intensely itching welts appear. These bites may continue to itch for several days up to two weeks after the chigger is dislodged. Following are suggestions that should provide some protection from chiggers:

- Stay out of areas where chiggers are likely to be present including wood lots, pastures, roadside ditches, or other areas with tall grasses and weeds. Chiggers are especially common in moist low-lying areas.
- Wear loose-fitting clothing (if possible) when working outdoors. Vehicles should be frequently vacuumed to reduce the number of chiggers that may have been deposited.
- Apply a repellent containing DEET to shoes, socks, and trousers before entering chigger-infested areas. Caution: some individuals may be sensitive to DEET – always read and follow label directions.
- Another repellant of chiggers is flowers of sulfur. Flowers of sulfur is powdered elemental sulfur available at a drug store or pharmacy as an over-the-counter preparation. It has a slight, rotten egg smell. Areas on the body that have tight clothing up against them such as socks, waistbands, etc. may be dusted with sulfur powder. Surveyors and other field personnel state that they fill a sock with sulfur and are able to dust these areas efficiently.

Sulfur may be more benign to use than DEET on some body parts. Avoid breathing dust during application.

- Immediately after possible exposure to chiggers, take a bath, thoroughly scrubbing the body with hot soapy water. This will kill or dislodge many of the chiggers. The clothes that were worn when the bite(s) occurred should be placed in a plastic bag for temporary storage until they can be laundered.
- When bites begin to itch, one course of treatment is to apply rubbing alcohol, followed by one of the nonprescription local anesthetics. A baking soda paste, calamine lotion, or product such as "After-Bite" also will help reduce discomfort. Avoid scratching bites since this only increases irritation and may lead to a secondary infection of the bite.

Ticks

Ticks are vectors of many different diseases including Rocky Mountain spotted fever, Q fever, tularemia, Colorado tick fever, and Lyme disease. They attach to their host's skin and intravenously feed on its blood creating an opportunity for disease transmission. Covering exposed areas of the body and the use of tick repellent are two ways to prevent tick bites. Periodically during the workday employees will inspect themselves for the presence of ticks. If a tick is discovered, the following procedure should be used to remove it:

- Do not try to detach a tick with your bare fingers; bacteria from a crushed tick may be able to penetrate even unbroken skin. Fine-tipped tweezers should be used.
- Grip the tick as close to your skin as possible and gently pull it straight away from you until it releases its hold.
- Do not twist the tick as you pull and do not squeeze its bloated body. That may actually inject bacteria into your skin.
- Thoroughly wash your hands and the bite area with soap and water. Then apply an antiseptic to the bite area.
- Save the tick in a small container with the date, the body location of the bite, and where you think the tick came from.
- Notify the FSO of any tick bites as soon as possible.

Recently, Lyme disease has been the most prevalent type of disease transmitted by ticks in the United States.

Spiders

A common venomous spider is the Black Widow. The adult female is glossy black with short, almost microscopic hairs and a crimson hourglass marking on the underside of the abdomen. They are found in dark corners of barns, stables, garages and piles of boxes and crates. They have also been known to reside in vacant rodent burrows, under stones, logs and long grass, and in hollow stumps and brush piles. Generally, Black Widows are not aggressive and usually can be induced to bite only if pressed against the skin. If disturbed, they typically will retreat to a corner of their web. However, these spiders are more aggressive if they are protecting an egg sac. After a bite, a dull numbing pain in the affected extremity occurs. In addition, pain and some muscular rigidity in the abdomen or the shoulder, back, and chest may occur. The bite may also produce headache, dizziness, skin rash, nausea, vomiting, anxiety and weakness, and increased skin temperature over the affected area may be observed. Ice may be placed over the bite to reduce the pain. Bites are rarely fatal to adults, but because the black widow spider injects neurotoxins, it is important to seek immediate medical attention.

Another venomous spider common in the southern United States is the Brown Recluse or Fiddle Back Spider. The Brown Recluse is about 1/4 to 1/2 inches in body length (most adults are about the size of a United States dime to a US quarter with legs extended). Coloration ranges from tan to dark brown, with the abdomen often darker than the rest of the body. The feature that most distinguishes the brown recluse from many other harmless spiders is a

somewhat darker violin-shaped marking on top of the leg-bearing section of the body. The neck of the violin "silhouette" points towards the rear (abdomen) of the spider. The brown recluse roams at night seeking its prey. During the day, it hides in dark niches and corners, where it may spin a poorly organized, irregular web. Eggs are deposited in 1/2 inch long off-white silken egg sacs, often appearing flattened beneath and convex above. It is shy and will try to run from a threatening situation but will bite if cornered. People are sometimes bitten while they are asleep because they roll onto a brown recluse spider while it is hunting in the bed. More often the victim is bitten while putting on a shoe or piece of clothing that a spider has selected for its daytime hiding place. The bite of the brown recluse is usually painless until 3 to 8 hours later when it may become red, swollen, and tender. Later the area around the bite site may develop into an ulcerous sore from 1/2 to 10 inches in diameter. Healing often requires a month or longer, and the victim may be left with a deep scar. Prompt medical attention can reduce the extent of ulceration and alleviate other complications that may develop. It should be noted that not all brown recluse bites result in ulcerations or scarring.[1]

Fire Ants

Fire ants are approximately 1/4-inch long and live in underground chambers that typically contain over 1,000 ants. One sure sign of the presence of fire ants is their conical mounds, which are a result of the digging of their chambers. The sting of a fire ant results in localized reddening of the bite area, accompanied by sharp burning sensations. The first ant sting releases a chemical substance that triggers other ants of the colony to sting. Anyone seeing fire ant mounds present at the work site should notify the SSHO, who will then notify the rest of the crew so the mounds may be avoided if possible.

Flying Insects

Flying insects such as mosquitoes, wasps, hornets, and bees may be encountered while site activities occur. Section 3.4.4 discusses problems associated with them. Mosquitoes can be the vectors for diseases such as the West Nile Virus and Saint Louis Encephalitis, reports of which appear in the media periodically. Avoiding mosquito bites is the best way to avoid potential exposure to mosquito-borne disease. Apply insect repellant containing DEET (N,N-diethyl-meta-toluamide), wear long-sleeved clothes and long pants treated with repellent and stay indoors during peak mosquito feeding hours (dusk until dawn) to further reduce your risk.

There is currently no vaccine to protect humans against Saint Louis Encephalitis or West Nile Virus. Individuals at project sites can reduce their risk from being infected with West Nile Virus by taking the following actions to protect against mosquito bites:

- Review the hazards of West Nile Virus periodically in morning safety meetings.
- Increase protective measures when working at dawn, dusk, and in the early evening.
- Reduce the area of exposed skin when working outdoors. Long-sleeved shirts with sleeves rolled down are recommended. Understand that mosquitoes may bite through thin clothing, so personnel should evaluate the actual Level D clothing worn, for example, heavy, long

sleeve work shirts and heavy dungarees/jeans may be indicated. Activity at projects where disposable coverall use (i.e., Tyvek®) is specified, further reduces the risk of mosquito bites.

- For activities where only Level D PPE is specified, consider using disposable coveralls when working in wooded, highly vegetated, or swampy areas.
- Use an insect repellent containing approximately 30 percent DEET. In concentrations greater than 35 percent, DEET provides no additional protection. Use the repellent according to the manufacturer's directions provided on the container. Use just enough repellent to cover exposed skin and clothing. Do not treat unexposed skin. Frequent reapplication or saturation is unnecessary for effectiveness. Avoid prolonged and excessive use of DEET.
- When additional protection against mosquitoes is necessary, commercially prepared "clothing and gear" insect repellants containing 0.5 percent permethrin may be used. These repellants, such as Repel Permanone™ are available in the sporting goods departments at major retailers. Clothing and gear insect repellants are not for use on skin. Use the repellent according to the manufacturer's recommendations provided on the container.
- After returning from outdoor field activities, wash treated skin with soap and water.
- Personnel should report flu-like symptoms to the FSO.

West Nile Virus

The Centers for Disease Control and Prevention report that human illness from West Nile virus is rare, even in areas where the virus has been reported. The chance that any one person is going to become ill from a mosquito bite is low. West Nile virus is spread by the bite of an infected mosquito, and can infect people, horses, many types of birds, and some other animals. Most people who become infected with West Nile virus will have either no symptoms or only mild ones. On rare occasions, West Nile virus infection can result in a severe and sometimes fatal illness known as West Nile encephalitis (an inflammation of the brain). The risk of severe disease is higher for persons 50 years of age and older. There is no evidence to suggest that West Nile virus can be spread from person to person or from animal to person.

Saint Louis Encephalitis

The Centers for Disease Control and Prevention report mild infections occur without apparent symptoms other than fever with headache. More severe infection is marked by headache, high fever, neck stiffness, stupor, disorientation, coma, tremors, occasional convulsions (especially in infants) and spastic paralysis. There is no evidence to suggest that Saint Louis encephalitis can be spread from person to person or from animal to person.

Table 1

Flying Insect Information

Organism	Description	Habitat	Problem	Severity	Protection
Hornet	One inch long with some body hair. Abdomen is mostly black.	Round, paper like nest hanging from trees, shrubs, or under eaves of buildings.	One nest may contain up to 100,000 hornets that will attack in force at the slightest provocation.	Severe pain, allergic reactions similar to bees.	Do not come near or disturb nest. If a hornet investigates you, do not move.
Mosquito	Small, dark, fragile body with transparent wings. From 1/8 to 1/4 inch long.	Where water is available for breeding.	Bites and sucks blood. Itching and swelling result.	Can transmit encephalitis and other diseases. Scratching causes secondary infections.	Use plenty of insect repellant and wear gloves. Stay in windy areas.
Wasp	Very thin waist. Color can be black, yellow or orange with stripes.	Underground nest. Paper-like honeycomb nest in abandoned buildings hollow trees, etc.	Stings. Some species will attack if you get too close to the nest.	Severe pain, allergic reactions similar to bees. Can be fatal.	Avoid Nest. Do not swat at them.
Bee	Generally have yellow and black stripes and two pair of wings.	Hollow logs, underground nest, old buildings,	Stings when annoyed. Leaves venom sac in victim.	If person is allergic, nausea, shock, constriction of the airway can result. Death may result.	Be careful and watch where you walk. Cover exposed skin. Avoid areas where bees are swarming. Avoid wearing sweet fragrances and bright clothing. Move slowly or stand still when bees are swarming about you.

Attachment 3
Snakes

Copperhead

Coral

Cottonmouth

Diamondback Rattlesnake

Water Moccasin

The most effective way to prevent snakebites is to avoid snakes in the first place. Personnel should avoid walking at night or in high grass and underbrush. Visual inspection of work areas should be performed prior to activities taking place. The use of leather boots and long pants will be required, since more than half of all bites are on the lower part of the leg. No attempts at killing snakes should be made; many people are bitten in such an attempt.

If a snake bites someone, the following treatment should be initiated:

- Keep patient calm
- Notify emergency medical services
- Wash the wound and keep the affected body part still
- Apply direct pressure to site of bite if bleeding is extreme
- Keep the affected area lower than the heart
- Carry a victim who must be transported, or have him/her walk slowly
- Transport to closest medical facility

Attachment 4
Other Natural Hazards

Alligators

Alligators live in nearly all Louisiana parishes but are most common in the major river drainage basins and large lakes in the southern portion of the state. Most attacks involve animals over six feet long. Alligators become more active in the beginning of March, peaking in May, which is their mating season. Females will nest in June - July, and the eggs will hatch in August and September. Even a small amount of impounded water may contain a large alligator. Twilight and night are prime times for alligator attacks. Never approach an alligator. Always stay at least 30 yards away. Never wade or swim in areas that could contain large alligators. Do not dump food or scraps into or near the water. This can attract alligators. Always be aware of your surroundings and use caution and common sense. If at any time personnel observe alligators at the site they will immediately inform the SSO, who will then notify the rest of the crew and local wildlife personnel.

Feral Animals

Feral animals such as rats or other wildlife may be encountered during fieldwork. Typically, feral animals are as afraid or more afraid of humans and when encountered will run away from human contact. However, if an animal is diseased, injured or tending a nest, they may become aggressive. The most common disease encountered with feral animals is rabies. Signs of a rabies-infected animal include:

- Changes in an animal's behavior;
- General sickness;
- Difficulty swallowing;
- An increase in drool or saliva;
- Wild animals that appear abnormally tame or sick;
- Animals that may bite at everything if excited;
- Difficulty moving or paralysis; and
- Death.

Animals in the early stage of rabies may not have any signs, although they can still infect you if they bite you. The incubation period is the time from the animal bite to when signs appear. In rabies, it is usually 1-3 months. However, it can last as long as several years. Once the virus reaches the brain or spinal cord, signs of the disease appear. **In the event an animal is encountered on the site, do not approach it.** If it exhibits one or more of the signs listed above, call local wildlife personnel to get assistance.

SCOPE

This procedure provides work practices to minimize the impact of heat stress caused by exposure to hot environments or working conditions.

DEFINITIONS

- **Acclimatization –** The ability to adjust to hot working conditions. This adjustment to heat, under normal circumstances, usually takes about 5 to 7 days, during which time the body will undergo a series of changes that will make continued exposure to heat more endurable.

- **Heat Index –** An accurate measure of how hot it really feels when relative humidity (RH) is added to the actual air temperature.

PROCEDURE

A. The Field Safety Officer will implement techniques for preventing heat stress-related health issues. Prevention techniques include:

1. Track the weather forecast for the job site and use forecasted information to plan daily activities. Forecasts may be obtained from:
   - www.nws.nooa.gov
   - National Weather Service Phone Numbers
   - Weather Channel TV Network

2. Provide access to shade as close as feasible to work areas, with adequate ventilation, and permit access by employees at all times. If the temperature does not exceed 85° F, provide access to shade upon request. The interior of a vehicle may not be used to provide shade unless the vehicle is air-conditioned and the air conditioner is on.
3. In situations where provision of shade is not safe or feasible, use alternative cooling measures that provide equivalent protection.
4. Schedule physically demanding and strenuous tasks, or tasks requiring full-body chemical protection, for early in the day, if possible.
5. Drink at least 6-8 ounces of cool water every 60 minutes for the entire work shift.
6. Review with employees during morning tailgate meetings the importance of drinking water and not waiting until they are thirsty, the number and schedule of water and rest breaks, the signs and symptoms of heat illness, and emergency response procedures in the HASP. When the temperature exceeds or is expected to exceed 90° F, encourage employees throughout the work shift to drink water and use shade for breaks and as needed to prevent overheating.
7. During a heat wave or heat spike (e.g., a sudden increase in daytime temperature of 9° F or more), the work day will be cut short, will be rescheduled (e.g.,

conducted at night or during cooler hours), or if possible cease for the day. If schedule modifications are not possible and workers have to work during a heat wave, increase the number of water and rest breaks, supervise workers to ensure that they stop work and take breaks, and observe closely all workers for signs and symptoms of heat illness.

8. Closely supervise employees during heat waves and when starting a new job, to ensure adequate acclimatization.
9. Use the buddy system and look for signs of heat stress. Any employee with signs of heat stress must immediately proceed to a shaded area. Signs and symptoms for various heat stress disorders and recommended first aid are listed in the following table.

Disorder	*Symptoms*	*Cause*	*Prevention/First Aid*
Heat Rash or Prickly Heat	♦ Rash ♦ Itching	♦ Hot, humid conditions ♦ Sweat doesn't evaporate easily ♦ Sweat ducts become clogged	♦ Ointments ♦ Keep skin clean and dry ♦ Good daily personal hygiene
Heat Cramps	♦ Sudden onset of muscle cramps usually in legs or arms ♦ Hot, moist skin ♦ Normal pulse ♦ Normal or slightly elevated temperature	♦ Loss of water (sweating) ♦ Loss of electrolytes ♦ Replacing water but not electrolytes	♦ Move into shade ♦ Loosen clothing ♦ Drink tepid electrolyte drinks or water ♦ Seek medical assistance if conditions persist
Heat Exhaustion	♦ Pale, clammy skin ♦ Profuse perspiration ♦ Thirst from dehydration ♦ Weakness ♦ Headache ♦ Nausea ♦ Loss of coordination	♦ Overexertion ♦ Excessive loss of water and electrolytes	♦ Move into shade ♦ Remove PPE ♦ Loosen street clothing ♦ Cool by applying damp cool compresses or ice packs ♦ Drink tepid electrolyte drinks or water ♦ Summon medical assistance
Heat Stroke	♦ Elevated temperature (>103F) ♦ Flushed, hot, dry skin ♦ Absence of sweating ♦ Delirious ♦ Rapid pulse ♦ Nausea ♦ Headache ♦ Dizziness ♦ Unconsciousness	♦ Failure of body's cooling (sweating) mechanism	♦ Summon medical assistance ♦ Move to shade ♦ Remove PPE ♦ Loosen street clothing ♦ Cool by fanning or applying damp compress or ice packs

10. The Field Safety Officer must verify that a work-rest cycle based on the heat index is implemented for site workers as applicable. Refer to the following three tables. To use the chart, read the temperature at the left and humidity across the top, the heat index is where the two intersect. For example, with a temperature of 96 and a humidity of 50%, the Heat Index is 108. Determine what the associated risk level is, based on the heat index. Use the risk level and heat index to determine the appropriate work-rest cycle.

Heat Index Chart

Relative Humidity (%)														
Temperature (F)		**40**	**45**	**50**	**55**	**60**	**65**	**70**	**75**	**80**	**85**	**90**	**95**	**100**
	110	136												
	108	130	137											
	106	124	130	137										
	104	119	124	131	137									
	102	114	119	124	130	137								
	100	109	114	118	124	129	136							
	98	105	109	113	117	123	128	134						
	96	101	104	108	112	116	121	126	132					
	94	97	100	102	106	110	114	119	124	129	136			
	92	94	96	99	101	105	108	112	116	121	126	131		
	90	91	93	95	97	100	103	106	109	113	117	122	127	132
	88	88	89	91	93	95	98	100	103	106	110	113	117	121
	86	85	87	88	89	91	93	95	97	100	102	106	108	112
	84	83	84	85	86	88	89	90	92	94	96	98	100	103
	82	81	82	83	84	84	85	86	88	89	90	91	93	95
	80	80	80	81	81	82	82	83	84	84	85	86	86	87

Heat Index Risk Level and Associated Health Effects

Heat Index	***Associated Risk***
>130	*Extreme Danger* Heat stroke highly likely with continued exposure
105-130	*Danger* Heat exhaustion and heat cramps likely and heat stroke possible with prolonged exposure and/or physical activity
90-105	*Extreme Caution* Heat cramps and heat exhaustion possible with prolonged exposure and/or physical activity
80-90	*Caution* Fatigue possible with prolonged exposure and/or physical activity

NOTES:

- Heat Index values were devised for shady, light wind conditions. Exposure to full sun may increase these values by up to 15°.
- Heat Index values were devised for the general public wearing typical lightweight summer clothing. Acclimatized workers may be able to work under conditions with a slightly higher Heat Index.
- The use of personal protective equipment, including clothing increases the heat stress load on the body.

The work-rest cycle outlined below should be implemented based on the professional judgment of the Field Safety Officer and/or the Project Health and Safety Consultant. Workers must drink 8 ounces of cool water at each break.

Heat Index	*Risk Level*	*Work-Rest Cycle*
> 130	Extreme Danger	15 minute break every 30 minutes
105-130	Danger	15 minute break every 60 minutes
90-105	Extreme Caution	15 minute break every 90 minutes
80-90	Caution	15 minute break every 120 minutes

B. The Field Safety Officer and the Project and/or Construction Manager will observe workers to verify compliance with and effectiveness of prevention techniques.

C. When an employee displays possible signs or symptoms of heat illness, the Field Safety Officer will check the sick employee and determine whether resting in the shade and drinking cool water will suffice or if emergency service providers will need to be called. WorkCare Incident Intervention (888-449-7787) should also be contacted to provide guidance on appropriate care. Do not leave a sick worker alone in the shade, as he or she can take a turn for the worse!

D. Call emergency service providers per procedures outlined in HASP if an employee displays signs or symptoms of heat illness (loss of consciousness, incoherent speech, convulsions, red and hot face), does not look OK or does not get better after drinking cool water and resting in the shade. While the ambulance is in route, initiate/continue first aid (cool the worker: place in the shade, remove excess layers of clothing, place ice pack in the armpits and join area and fan the victim). Do not let a sick worker leave the site, as they can get lost or die (when not being transported by ambulance and treatment has not been started by paramedics) before reaching a hospital!

E. In the event a heat stress related incident occurs, the Field Safety Officer will report the incident following guidelines in the HASP.

F. Supervisors will be trained on these written procedures prior to being assigned to supervise other workers. Employees will be trained on these procedures via review of the site HASP and through participation in daily site tailgate meetings.

REFERENCES

Regulatory References
Heat Illness Prevention Standard – Title 8 California Code of Regulations Section 3395

Technical References

- NOAA – National Weather Service, Heat Index, Measure of How Hot it Feels

Procedural References
None

REVISION LOG

DATE	REV. #	APV'D	COMMENTS
12/31/07	0	ELG	Issued for use
1/12/2011	1	RLE	Renumbered, integrated with ERM H&S program, removed references to RCM
8/3/2011	1	RLE	Revised to incorporate CA Heat Illness Prevention Standard

International Chemical Safety Cards

METHYL ETHYL KETONE

ICSC: 0179

Ethyl methyl ketone
2-Butanone
MEK
Methyl acetone
C_4H_8O / $CH_3COCH_2CH_3$
Molecular mass: 72.1

ICSC # 0179
CAS # 78-93-3
RTECS # EL6475000
UN # 1193
EC # 606-002-00-3
March 25, 1998 Validated

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Highly flammable.	NO open flames, NO sparks, and NO smoking.	Powder, AFFF, foam, carbon dioxide.
EXPLOSION	Vapour/air mixtures are explosive.	Closed system, ventilation, explosion-proof electrical equipment and lighting. Do NOT use compressed air for filling, discharging, or handling. Use non-sparking handtools.	In case of fire: keep drums, etc., cool by spraying with water.
EXPOSURE			
•INHALATION	Cough. Dizziness. Drowsiness. Headache. Nausea. Vomiting.	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Refer for medical attention.
•SKIN		Protective gloves.	Remove contaminated clothes. Rinse skin with plenty of water or shower.
•EYES	Redness. Pain.	Safety goggles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION	Unconsciousness. (Furthersee Inhalation).	Do not eat, drink, or smoke during work.	Rinse mouth. Give plenty of water to drink. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Collect leaking and spilled liquid in sealable containers as far as possible.	Fireproof. Separated from strong oxidants, strong acids. Cool. Well	Note: 6

Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT wash away into sewer. Personal protection: self-contained breathing apparatus.	closed.	F symbol Xi symbol R: 11-36-66-67 S: 2-9-16 UN Hazard Class: 3 UN Packing Group: II

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0179

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

METHYL ETHYL KETONE

ICSC: 0179

I M P O R T A N T D A T A	**PHYSICAL STATE; APPEARANCE:** COLOURLESS LIQUID , WITH CHARACTERISTIC ODOUR. **PHYSICAL DANGERS:** The vapour is heavier than air and may travel along the ground; distant ignition possible. **CHEMICAL DANGERS:** Reacts violently withstrong oxidants andinorganic acids causing fire and explosion hazard. Attacks some plastic. **OCCUPATIONAL EXPOSURE LIMITS:** TLV: 200 ppm as TWA; 300 ppm as STEL; BEI issued; (ACGIH 2004). MAK: 200 ppm, 600 mg/m³; H; Peak limitation category: I(1); Pregnancy risk group: C; (DFG 2004). OSHA PEL†: TWA 200 ppm (590 mg/m^3) NIOSH REL: TWA 200 ppm (590 mg/m^3) ST 300 ppm (885 mg/m^3) NIOSH IDLH: 3000 ppm See: 78933	**ROUTES OF EXPOSURE:** The substance can be absorbed into the body by inhalation and by ingestion. **INHALATION RISK:** A harmful contamination of the air can be reached rather quickly on evaporation of this substance at 20°C. **EFFECTS OF SHORT-TERM EXPOSURE:** The substance is irritating to the eyes and the respiratory tract . The substance may cause effects on the central nervous system. Exposure far above the OEL may result in unconsciousness. **EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:** The liquid defats the skin. Animal tests show that this substance possibly causes toxic effects upon human reproduction.
PHYSICAL PROPERTIES	Boiling point: 80°C Melting point: -86°C Relative density (water = 1): 0.8 Solubility in water, g/100 ml at 20°C: 29 Vapour pressure, kPa at 20°C: 10.5 Relative vapour density (air = 1): 2.41	Relative density of the vapour/air-mixture at 20°C (air = 1): 1.1 Flash point: -9°C (c.c.) Auto-ignition temperature: 505°C Explosive limits, vol% in air: 1.8-11.5 Octanol/water partition coefficient as log Pow: 0.29
ENVIRONMENTAL DATA		

N O T E S

The odour warning when the exposure limit value is exceeded is insufficient. Card has been partly updated in October 2004. See sections Occupational Exposure Limits, EU classification, Emergency Response.

Transport Emergency Card: TEC (R)-30S1193

NFPA Code: H1; F3; R0.

ADDITIONAL INFORMATION

ICSC: 0179 **METHYL ETHYL KETONE**

(C) IPCS, CEC, 1994

IMPORTANT LEGAL NOTICE:	Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

ACETONE

ICSC: 0087

2-Propanone
Dimethyl ketone
Methyl ketone
C_3H_6O / CH_3COCH_3
Molecular mass: 58.1

ICSC # 0087
CAS # 67-64-1
RTECS # AL3150000
UN # 1090
EC # 606-001-00-8
April 22, 1994 Validated
Fi, review at IHE: 10/09/89

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Highly flammable.	NO open flames, NO sparks, and NO smoking.	Powder, alcohol-resistant foam, water in large amounts, carbon dioxide.
EXPLOSION	Vapour/air mixtures are explosive.	Closed system, ventilation, explosion-proof electrical equipment and lighting. Do NOT use compressed air for filling, discharging, or handling.	In case of fire: keep drums, etc., cool by spraying with water.
EXPOSURE			
•INHALATION	Sore throat. Cough. Confusion. Headache. Dizziness. Drowsiness. Unconsciousness.	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Refer for medical attention.
•SKIN	Dry skin.	Protective gloves.	Remove contaminated clothes. Rinse skin with plenty of water or shower.
•EYES	Redness. Pain. Blurred vision. Possible corneal damage.	Safety spectacles or face shield . Contact lenses should not be worn.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION	Nausea. Vomiting. (Further see Inhalation).	Do not eat, drink, or smoke during work.	Rinse mouth. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Personal protection: self-contained breathing apparatus. Ventilation.	Fireproof. Separated from strong oxidants. Store in an area without	F symbol

Collect leaking liquid in sealable containers. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT wash away into sewer. Then wash away with plenty of water.	drain or sewer access.	Xi symbol R: 11-36-66-67 S: 2-9-16-26 UN Hazard Class: 3 UN Packing Group: II

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0087

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

ACETONE

ICSC: 0087

IMPORTANT DATA

PHYSICAL STATE; APPEARANCE:
COLOURLESS LIQUID , WITH CHARACTERISTIC ODOUR.

PHYSICAL DANGERS:
The vapour is heavier than air and may travel along the ground; distant ignition possible.

CHEMICAL DANGERS:
The substance can form explosive peroxides on contact with strong oxidants such as acetic acid, nitric acid, hydrogen peroxide. Reacts with chloroform and bromoform under basic conditions, causing fire and explosion hazard. Attacks plastic.

OCCUPATIONAL EXPOSURE LIMITS:
TLV: 500 ppm as TWA, 750 ppm as STEL; A4 (not classifiable as a human carcinogen); BEI issued; (ACGIH 2004).
MAK: 500 ppm 1200 mg/m³
Peak limitation category: I(2); Pregnancy risk group: D;
(DFG 2006).
OSHA PEL†: TWA 1000 ppm (2400 mg/m^3)
NIOSH REL: TWA 250 ppm (590 mg/m^3)
NIOSH IDLH: 2500 ppm 10%LEL See: 67641

ROUTES OF EXPOSURE:
The substance can be absorbed into the body by inhalation and through the skin.

INHALATION RISK:
A harmful contamination of the air can be reached rather quickly on evaporation of this substance at 20°C; on spraying or dispersing, however, much faster.

EFFECTS OF SHORT-TERM EXPOSURE:
The vapour irritates the eyes and the respiratory tract. The substance may cause effects on the central nervous system , liver , kidneys and gastrointestinal tract .

EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:
Repeated or prolonged contact with skin may cause dermatitis. The substance may have effects on the blood and bone marrow .

PHYSICAL PROPERTIES

Boiling point: 56°C
Melting point: -95°C
Relative density (water = 1): 0.8
Solubility in water:
miscible
Vapour pressure, kPa at 20°C: 24

Relative vapour density (air = 1): 2.0
Relative density of the vapour/air-mixture at 20°C (air = 1): 1.2
Flash point: -18°C c.c.
Auto-ignition temperature: 465°C
Explosive limits, vol% in air: 2.2-13
Octanol/water partition coefficient as log Pow: -0.24

ENVIRONMENTAL DATA	

N O T E S

Use of alcoholic beverages enhances the harmful effect.

Transport Emergency Card: TEC (R)-30S1090

NFPA Code: H 1; F 3; R 0;
Card has been partially updated in July 2007: see Occupational Exposure Limits.
Card has been partially updated in January 2008: see Storage.

ADDITIONAL INFORMATION

ICSC: 0087 **ACETONE**

(C) IPCS, CEC, 1994

IMPORTANT LEGAL NOTICE:	Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

CYCLOHEXANE

ICSC: 0242

Hexahydrobenzene
Hexamethylene
Hexanaphthene
C_6H_{12}
Molecular mass: 84.2

ICSC # 0242
CAS # 110-82-7
RTECS # GU6300000
UN # 1145
EC # 601-017-00-1
April 10, 2008 Validated

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Highly flammable.	NO open flames, NO sparks, and NO smoking.	Water spray, alcohol-resistant foam , carbon dioxide , powder .
EXPLOSION	Vapour/air mixtures are explosive. Heating will cause rise in pressure with risk of bursting.	Closed system, ventilation, explosion-proof electrical equipment and lighting. Do NOT use compressed air for filling, discharging, or handling. Use non-sparking handtools. Prevent build-up of electrostatic charges (e.g., by grounding).	In case of fire: keep drums, etc., cool by spraying with water.
EXPOSURE			
•INHALATION	Cough. Dizziness. Drowsiness. Headache. Nausea.	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. ected at peer review 2008 - not toxic
•SKIN	Redness.	Protective gloves.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
•EYES	Redness.	Safety goggles or eye protection in combination with breathing protection. .	Rinse with plenty of water (remove contact lenses if easily possible).
•INGESTION	Abdominal pain. Nausea. Vomiting. (Further see Inhalation).	Do not eat, drink, or smoke during work.	Rinse mouth. Do NOT induce vomiting. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Evacuate danger area! Consult an expert! Remove all ignition sources.	Fireproof. Provision to contain effluent from fire extinguishing.	Note: 4

Personal protection: self-contained breathing apparatus. Do NOT let this chemical enter the environment. Ventilation. Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT wash away into sewer.	Separated from strong oxidants, Store in an area without drain or sewer access.	F symbol Xn symbol N symbol R: 11-38-65-67-50/53 S: 2-9-16-25-33-60-61-62 UN Hazard Class: 3 UN Packing Group: II Signal: Danger Flame-Excl mark-Health haz-Enviro Highly flammable liquid and vapour May be fatal if swallowed and enters airways Causes eye irritation Causes mild skin irritation May cause drowsiness or dizziness Very toxic to aquatic life Very toxic to aquatic life with long lasting effects

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0242

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

CYCLOHEXANE

ICSC: 0242

IMPORTANT DATA

PHYSICAL STATE; APPEARANCE:
COLOURLESS LIQUID , WITH CHARACTERISTIC ODOUR.

PHYSICAL DANGERS:
The vapour is heavier than air and may travel along the ground; distant ignition possible. As a result of flow, agitation, etc., electrostatic charges can be generated.

CHEMICAL DANGERS:
Heating may cause violent combustion or explosion. Reacts with strong oxidants.

OCCUPATIONAL EXPOSURE LIMITS:
TLV: 100 ppm as TWA; (ACGIH 2007).
EU OEL: 200 ppm, 700 mg/m³ as TWA (EU 2006).
OSHA PEL: TWA 300 ppm (1050 mg/m^3)
NIOSH REL: TWA 300 ppm (1050 mg/m^3)
NIOSH IDLH: 1300 ppm 10%LEL See: 110827

ROUTES OF EXPOSURE:

INHALATION RISK:
A harmful contamination of the air can be reached rather quickly on evaporation of this substance at 20°C.

EFFECTS OF SHORT-TERM EXPOSURE:
The substance is mildly irritating to the eyes, the skin and the respiratory tract . If this liquid is swallowed, aspiration into the lungs may result in chemical pneumonitis. Exposure far above the OEL could cause lowering of consciousness.

EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:
The liquid defats the skin. Repeated or prolonged contact with skin may cause dermatitis.

PHYSICAL PROPERTIES	Boiling point: 81°C Melting point: 7°C Relative density (water = 1): 0.8 Solubility in water, g/100 ml at 25°C: 0.0058 (very poor) Vapour pressure, kPa at 20°C: 10.3 Relative vapour density (air = 1): 2.9	Relative density of the vapour/air-mixture at 20°C (air = 1): 1.2 Flash point: -18°C c.c. Auto-ignition temperature: 260°C Explosive limits, vol% in air: 1.3-8.4 Octanol/water partition coefficient as log Pow: 3.4 Viscosity, mm²/s at 26 °C: 1.26x10-6
ENVIRONMENTAL DATA	The substance is very toxic to aquatic organisms. The substance may cause long-term effects in the aquatic environment. It is strongly advised that this substance does not enter the environment.	

N O T E S

The odour warning when the exposure limit value is exceeded is insufficient.

Transport Emergency Card: TEC (R)-30S1145 or 30GF1-I+II
NFPA Code: H 1; F 3; R 0;

ADDITIONAL INFORMATION

ICSC: 0242 **CYCLOHEXANE**

(C) IPCS, CEC, 1994

IMPORTANT LEGAL NOTICE:	Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

HYDROGEN CHLORIDE

ICSC: 0163

Anhydrous hydrogen chloride
Hydrochloric acid, anhydrous
HCl
Molecular mass: 36.5
(cylinder)

ICSC # 0163
CAS # 7647-01-0
RTECS # MW4025000
UN # 1050
EC # 017-002-00-2
October 04, 2000 Validated

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Not combustible.		In case of fire in the surroundings: use appropriate extinguishing media.
EXPLOSION			In case of fire: keep cylinder cool by spraying with water.
EXPOSURE		AVOID ALL CONTACT!	IN ALL CASES CONSULT A DOCTOR!
•INHALATION	Corrosive. Burning sensation. Cough. Laboured breathing. Shortness of breath. Sore throat. Symptoms may be delayed (see Notes).	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Half-upright position. Artificial respiration may be needed. Refer for medical attention.
•SKIN	ON CONTACT WITH LIQUID: FROSTBITE. Corrosive. Serious skin burns. Pain.	Cold-insulating gloves. Protective clothing.	First rinse with plenty of water, then remove contaminated clothes and rinse again. Refer for medical attention.
•EYES	Corrosive. Pain. Blurred vision. Severe deep burns.	Safety goggles or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION			

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Evacuate danger area! Consult an expert! Ventilation. Remove gas with fine water spray. Personal protection:	Separated from combustible and reducing substances, strong oxidants, strong bases, metals . Keep in a well-	T symbol C symbol

complete protective clothing including self-contained breathing apparatus.	ventilated room. Cool. Dry.	R: 23-35 S: 1/2-9-26-36/37/39-45 UN Hazard Class: 2.3 UN Subsidiary Risks: 8

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0163

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

HYDROGEN CHLORIDE

ICSC: 0163

IMPORTANT DATA

PHYSICAL STATE; APPEARANCE:
COLOURLESS COMPRESSED LIQUEFIED GAS , WITH PUNGENT ODOUR.

PHYSICAL DANGERS:
The gas is heavier than air.

CHEMICAL DANGERS:
The solution in water is a strong acid, it reacts violently with bases and is corrosive. Reacts violently with oxidants forming toxic gas (chlorine - see ICSC 0126). Attacks many metals in the presence of water forming flammable/explosive gas (hydrogen - see ICSC0001).

OCCUPATIONAL EXPOSURE LIMITS:
TLV: 2 ppm; (Ceiling value); A4 (not classifiable as a human carcinogen); (ACGIH 2004).
MAK: 2 ppm, 3.0 mg/m³;
Peak limitation category: I(2); Pregnancy risk group: C;
(DFG 2004).
OSHA PEL: C 5 ppm (7 mg/m^3)
NIOSH REL: C 5 ppm (7 mg/m^3)
NIOSH IDLH: 50 ppm See: 7647010

ROUTES OF EXPOSURE:
The substance can be absorbed into the body by inhalation.

INHALATION RISK:
A harmful concentration of this gas in the air will be reached very quickly on loss of containment.

EFFECTS OF SHORT-TERM EXPOSURE:
Rapid evaporation of the liquid may cause frostbite. The substance is corrosive to the eyes, the skin and the respiratory tract. Inhalation of high concentrations of the gas may cause pneumonitis and lung oedema, resulting in reactive airways dysfunction syndrome (RADS) (see Notes). The effects may be delayed. Medical observation is indicated.

EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:
The substance may have effects on the lungs , resulting in chronic bronchitis. The substance may have effects on the teeth, resulting in erosion.

PHYSICAL PROPERTIES

Boiling point: -85°C
Melting point: -114°C
Density: 1.00045 g/l (gas)

Solubility in water, g/100 ml at 30°C: 67
Relative vapour density (air = 1): 1.3
Octanol/water partition coefficient as log Pow: 0.25

ENVIRONMENTAL DATA

NOTES

The applying occupational exposure limit value should not be exceeded during any part of the working exposure. The symptoms of lung oedema often do not become manifest until a few hours have passed and they are aggravated by

physical effort. Rest and medical observation are therefore essential. Immediate administration of an appropriate inhalation therapy by a doctor or a person authorized by him/her, should be considered. Do NOT spray water on leaking cylinder (to prevent corrosion of cylinder). Turn leaking cylinder with the leak up to prevent escape of gas in liquid state. Other UN numbers: 2186 (refridgerated liquid) hazard class: 2.3; subsidiary hazard: 8; 1789 (hydrochloric acid) hazard class: 8, pack group II or III. Aqueous solutions may contain up to 38% hydrogen chloride. Card has been partly updated in April 2005. See sections Occupational Exposure Limits, Emergency Response.

Transport Emergency Card: TEC (R)-20S1050

NFPA Code: H 3; F 0; R 1;

ADDITIONAL INFORMATION

ICSC: 0163 **HYDROGEN CHLORIDE**

(C) IPCS, CEC, 1994

IMPORTANT LEGAL NOTICE:	Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

TETRACHLOROETHYLENE

ICSC: 0076

1,1,2,2-Tetrachloroethylene
Perchloroethylene
Tetrachloroethene
C_2Cl_4 / $Cl_2C{=}CCl_2$
Molecular mass: 165.8

ICSC # 0076
CAS # 127-18-4
RTECS # KX3850000
UN # 1897
EC # 602-028-00-4
April 13, 2000 Validated

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Not combustible. Gives off irritating or toxic fumes (or gases) in a fire.		In case of fire in the surroundings: use appropriate extinguishing media.
EXPLOSION			
EXPOSURE		STRICT HYGIENE! PREVENT GENERATION OF MISTS!	
•INHALATION	Dizziness. Drowsiness. Headache. Nausea. Weakness. Unconsciousness.	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Artificial respiration may be needed. Refer for medical attention.
•SKIN	Dry skin. Redness.	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
•EYES	Redness. Pain.	Safety goggles , face shield .	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION	Abdominal pain. (Further see Inhalation).	Do not eat, drink, or smoke during work.	Rinse mouth. Do NOT induce vomiting. Give plenty of water to drink. Rest.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Ventilation. Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent and	Separated from metals ,(see Chemical Dangers), food and feedstuffs . Keep in the dark. Ventilation along the floor.	Do not transport with food and feedstuffs. Marine pollutant. Xn symbol

remove to safe place. Do NOT let this chemical enter the environment. Personal protection: filter respirator for organic gases and vapours.		N symbol R: 40-51/53 S: (2-)23-36/37-61 UN Hazard Class: 6.1 UN Packing Group: III

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0076

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

TETRACHLOROETHYLENE

ICSC: 0076

IMPORTANT DATA

PHYSICAL STATE; APPEARANCE:
COLOURLESS LIQUID , WITH CHARACTERISTIC ODOUR.

PHYSICAL DANGERS:
The vapour is heavier than air.

CHEMICAL DANGERS:
On contact with hot surfaces or flames this substance decomposes forming toxic and corrosive fumes (hydrogen chloride, phosgene, chlorine). The substance decomposes slowly on contact with moisture producing trichloroacetic acid and hydrochloric acid. Reacts with metals such as aluminium, lithium, barium, beryllium.

OCCUPATIONAL EXPOSURE LIMITS:
TLV: 25 ppm as TWA, 100 ppm as STEL; A3 (confirmed animal carcinogen with unknown relevance to humans); BEI issued; (ACGIH 2004).
MAK: skin absorption (H);
Carcinogen category: 3B;
(DFG 2004).
OSHA PEL†: TWA 100 ppm C 200 ppm 300 ppm (5-minute maximum peak in any 3-hours)
NIOSH REL: Ca Minimize workplace exposure concentrations. See Appendix A
NIOSH IDLH: Ca 150 ppm See: 127184

ROUTES OF EXPOSURE:
The substance can be absorbed into the body by inhalation and by ingestion.

INHALATION RISK:
A harmful contamination of the air will be reached rather slowly on evaporation of this substance at 20°C.

EFFECTS OF SHORT-TERM EXPOSURE:
The substance is irritating to the eyes , the skin and the respiratory tract . If this liquid is swallowed, aspiration into the lungs may result in chemical pneumonitis. The substance may cause effects on the central nervous system. Exposure at high levels may result in unconsciousness.

EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:
Repeated or prolonged contact with skin may cause dermatitis. The substance may have effects on the liver and kidneys. This substance is probably carcinogenic to humans.

PHYSICAL PROPERTIES

Boiling point: 121°C
Melting point: -22°C
Relative density (water = 1): 1.6
Solubility in water, g/100 ml at 20°C: 0.015

Vapour pressure, kPa at 20°C: 1.9
Relative vapour density (air = 1): 5.8
Relative density of the vapour/air-mixture at 20°C (air = 1): 1.09
Octanol/water partition coefficient as log Pow: 2.9

ENVIRONMENTAL DATA	The substance is toxic to aquatic organisms. The substance may cause long-term effects in the aquatic environment.

N O T E S

Depending on the degree of exposure, periodic medical examination is suggested. The odour warning when the exposure limit value is exceeded is insufficient. Do NOT use in the vicinity of a fire or a hot surface, or during welding. An added stabilizer or inhibitor can influence the toxicological properties of this substance, consult an expert. Card has been partly updated in April 2005. See section Occupational Exposure Limits.

Transport Emergency Card: TEC (R)-61S1897

NFPA Code: H2; F0; R0;

ADDITIONAL INFORMATION

ICSC: 0076 **TETRACHLOROETHYLENE**

(C) IPCS, CEC, 1994

IMPORTANT LEGAL NOTICE:	Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

TOLUENE

ICSC: 0078

Methylbenzene
Toluol
Phenylmethane
$C_6H_5CH_3$ / C_7H_8
Molecular mass: 92.1

ICSC # 0078
CAS # 108-88-3
RTECS # XS5250000
UN # 1294
EC # 601-021-00-3
October 10, 2002 Validated

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Highly flammable.	NO open flames, NO sparks, and NO smoking.	Powder, AFFF, foam, carbon dioxide.
EXPLOSION	Vapour/air mixtures are explosive.	Closed system, ventilation, explosion-proof electrical equipment and lighting. Prevent build-up of electrostatic charges (e.g., by grounding). Do NOT use compressed air for filling, discharging, or handling. Use non-sparking handtools.	In case of fire: keep drums, etc., cool by spraying with water.
EXPOSURE		STRICT HYGIENE! AVOID EXPOSURE OF (PREGNANT) WOMEN!	
•INHALATION	Cough. Sore throat. Dizziness. Drowsiness. Headache. Nausea. Unconsciousness.	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Refer for medical attention.
•SKIN	Dry skin. Redness.	Protective gloves.	Remove contaminated clothes. Rinse and then wash skin with water and soap. Refer for medical attention.
•EYES	Redness. Pain.	Safety goggles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION	Burning sensation. Abdominal pain. (Further see Inhalation).	Do not eat, drink, or smoke during work.	Rinse mouth. Do NOT induce vomiting. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Evacuate danger area in large spill! Consult an expert in large spill! Remove all ignition sources. Ventilation. Collect leaking liquid in sealable containers. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT wash away into sewer. Do NOT let this chemical enter the environment. Personal protection: self-contained breathing apparatus in large spill.	Fireproof. Separated from strong oxidants.	F symbol Xn symbol R: 11-38-48/20-63-65-67 S: 2-36/37-46-62 UN Hazard Class: 3 UN Packing Group: II

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0078

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

TOLUENE

ICSC: 0078

IMPORTANT DATA

PHYSICAL STATE; APPEARANCE:
COLOURLESS LIQUID , WITH CHARACTERISTIC ODOUR.

PHYSICAL DANGERS:
The vapour mixes well with air, explosive mixtures are formed easily. As a result of flow, agitation, etc., electrostatic charges can be generated.

CHEMICAL DANGERS:
Reacts violently with strong oxidants causing fire and explosion hazard.

OCCUPATIONAL EXPOSURE LIMITS:
TLV: 50 ppm as TWA; (skin); A4; BEI issued; (ACGIH 2004).
MAK:
Pregnancy risk group: C;
(DFG 2004).
EU OEL: 192 mg/m³ 50 ppm as TWA 384 mg/m³ 100 ppm as STEL (skin) (EU 2006).
OSHA PEL†: TWA 200 ppm C 300 ppm 500 ppm (10-minute maximum peak)
NIOSH REL: TWA 100 ppm (375 mg/m^3) ST 150 ppm (560 mg/m^3)
NIOSH IDLH: 500 ppm See: 108883

ROUTES OF EXPOSURE:
The substance can be absorbed into the body by inhalation, through the skin and by ingestion.

INHALATION RISK:
A harmful contamination of the air can be reached rather quickly on evaporation of this substance at 20°C.

EFFECTS OF SHORT-TERM EXPOSURE:
The substance is irritating to the eyes and the respiratory tract . The substance may cause effects on the central nervous system . If this liquid is swallowed, aspiration into the lungs may result in chemical pneumonitis. Exposure at high levels may result in cardiac dysrhythmia and unconsciousness.

EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:
The liquid defats the skin. The substance may have effects on the central nervous system . Exposure to the substance may enhance hearing damage caused by exposure to noise. Animal tests show that this substance possibly causes toxicity to human reproduction or development.

PHYSICAL PROPERTIES		
	Boiling point: 111°C Melting point: -95°C	Relative density of the vapour/air-mixture at 20°C (air = 1): 1.01

	Relative density (water = 1): 0.87 Solubility in water: none Vapour pressure, kPa at 25°C: 3.8 Relative vapour density (air = 1): 3.1	Flash point: 4°C c.c. Auto-ignition temperature: 480°C Explosive limits, vol% in air: 1.1-7.1 Octanol/water partition coefficient as log Pow: 2.69
ENVIRONMENTAL DATA	The substance is toxic to aquatic organisms.	

N O T E S

Depending on the degree of exposure, periodic medical examination is suggested. Use of alcoholic beverages enhances the harmful effect. Card has been partly updated in October 2006: see section Occupational Exposure Limits.

Transport Emergency Card: TEC (R)-30S1294

NFPA Code: H 2; F 3; R 0;

ADDITIONAL INFORMATION

ICSC: 0078 **TOLUENE**

(C) IPCS, CEC, 1994

IMPORTANT LEGAL NOTICE:	Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

TRICHLOROETHYLENE

ICSC: 0081

1,1,2-Trichloroethylene
Trichloroethene
Ethylene trichloride
Acetylene trichloride
C_2HCl_3 / $ClCH{=}CCl_2$
Molecular mass: 131.4

ICSC # 0081
CAS # 79-01-6
RTECS # KX4550000
UN # 1710
EC # 602-027-00-9
April 10, 2000 Validated

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Combustible under specific conditions. See Notes.		In case of fire in the surroundings: all extinguishing agents allowed.
EXPLOSION		Prevent build-up of electrostatic charges (e.g., by grounding).	In case of fire: keep drums, etc., cool by spraying with water.
EXPOSURE		PREVENT GENERATION OF MISTS! STRICT HYGIENE!	
•INHALATION	Dizziness. Drowsiness. Headache. Weakness. Nausea. Unconsciousness.	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Artificial respiration may be needed. Refer for medical attention.
•SKIN	Dry skin. Redness.	Protective gloves.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
•EYES	Redness. Pain.	Safety spectacles, or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION	Abdominal pain. (Further see Inhalation).	Do not eat, drink, or smoke during work.	Rinse mouth. Do NOT induce vomiting. Give one or two glasses of water to drink. Rest.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Ventilation. Personal protection: filter respirator for organic gases and vapours adapted to the airborne	Separated from metals (see Chemical Dangers), strong bases, food and feedstuffs . Dry. Keep in the dark.	Do not transport with food and feedstuffs. Marine pollutant.

concentration of the substance. Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT let this chemical enter the environment.	Ventilation along the floor. Store in an area without drain or sewer access.	T symbol R: 45-36/38-52/53-67 S: 53-45-61 UN Hazard Class: 6.1 UN Packing Group: III

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0081

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

TRICHLOROETHYLENE

ICSC: 0081

IMPORTANT DATA

PHYSICAL STATE; APPEARANCE:
COLOURLESS LIQUID , WITH CHARACTERISTIC ODOUR.

PHYSICAL DANGERS:
The vapour is heavier than air. As a result of flow, agitation, etc., electrostatic charges can be generated.

CHEMICAL DANGERS:
On contact with hot surfaces or flames this substance decomposes forming toxic and corrosive fumes (phosgene , hydrogen chloride). The substance decomposes on contact with strong alkali producing dichloroacetylene , which increases fire hazard. Reacts violently with metal powders such as magnesium, aluminium, titanium, and barium. Slowly decomposed by light in presence of moisture, with formation of corrosive hydrochloric acid.

OCCUPATIONAL EXPOSURE LIMITS:
TLV: 50 ppm as TWA; 100 ppm as STEL; A5; BEI issued; (ACGIH 2004).
MAK:
Carcinogen category: 1; Germ cell mutagen group: 3B;
(DFG 2007).
OSHA PEL†: TWA 100 ppm C 200 ppm 300 ppm (5-minute maximum peak in any 2 hours)
NIOSH REL: Ca See Appendix A See Appendix C
NIOSH IDLH: Ca 1000 ppm See: 79016

ROUTES OF EXPOSURE:
The substance can be absorbed into the body by inhalation and by ingestion.

INHALATION RISK:
A harmful contamination of the air can be reached rather quickly on evaporation of this substance at 20°C.

EFFECTS OF SHORT-TERM EXPOSURE:
The substance is irritating to the eyes and the skin . Swallowing the liquid may cause aspiration into the lungs with the risk of chemical pneumonitis. The substance may cause effects on the central nervous system , resulting in respiratory failure . Exposure could cause lowering of consciousness.

EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:
Repeated or prolonged contact with skin may cause dermatitis. The substance may have effects on the central nervous system , resulting in loss of memory. The substance may have effects on the liver and kidneys (see Notes). This substance is probably carcinogenic to humans.

PHYSICAL PROPERTIES

Boiling point: 87°C
Melting point: -73°C

Relative density of the vapour/air-mixture at 20°C (air = 1): 1.3

	Relative density (water = 1): 1.5 Solubility in water, g/100 ml at 20°C: 0.1 Vapour pressure, kPa at 20°C: 7.8 Relative vapour density (air = 1): 4.5	Auto-ignition temperature: 410°C Explosive limits, vol% in air: 8-10.5 Octanol/water partition coefficient as log Pow: 2.42 Electrical conductivity: 800pS/m
ENVIRONMENTAL DATA	The substance is harmful to aquatic organisms. The substance may cause long-term effects in the aquatic environment.	

N O T E S

Combustible vapour/air mixtures difficult to ignite, may be developed under certain conditions. Use of alcoholic beverages enhances the harmful effect. Depending on the degree of exposure, periodic medical examination is suggested. The odour warning when the exposure limit value is exceeded is insufficient. Do NOT use in the vicinity of a fire or a hot surface, or during welding. An added stabilizer or inhibitor can influence the toxicological properties of this substance, consult an expert.

Transport Emergency Card: TEC (R)-61S1710

NFPA Code: H2; F1; R0;

Card has been partially updated in October 2004: see Occupational Exposure Limits, EU Classification, Emergency Response.

Card has been partially updated in April 2010: see Occupational Exposure Limits, Ingestion First Aid, Storage.

ADDITIONAL INFORMATION

ICSC: 0081 **TRICHLOROETHYLENE**

(C) IPCS, CEC, 1994

IMPORTANT LEGAL NOTICE:	Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

LIQUINOX MSDS

Section 1 : MANUFACTURER INFORMATION

Supplier: Same as manufacturer.

Manufacturer: Alconox, Inc.
30 Glenn St.
Suite 309
White Plains, NY 10603.

Manufacturer emergency phone number: 800-255-3924.
813-248-0585 (outside of the United States).

Manufacturer: Alconox, Inc.
30 Glenn St.
Suite 309
White Plains, NY 10603.

Supplier MSDS date: 2005/02/24

D.O.T. Classification: Not regulated.

Section 2 : HAZARDOUS INGREDIENTS

C.A.S.	CONCENTRATION %	Ingredient Name	T.L.V.	LD/50	LC/50
25155-30-0	10-30	SODIUM DODECYLBENZENESULFONATE	NOT AVAILABLE	438 MG/KG RAT ORAL 1330 MG/KG MOUSE ORAL	NOT AVAILABLE

Section 3 : PHYSICAL / CHEMICAL CHARACTERISTICS

Physical state: Liquid.

Appearance & odor: Odourless.
Pale yellow.

Odor threshold (ppm): Not available.

Vapour pressure (mmHg): @ 20°C (68°F).
17

Vapour density (air=1): >1

Volatiles (%)

By volume: Not available.

Evaporation rate (butyl acetate = 1): < 1.

Boiling point (°C):	100 (212F)
Freezing point (°C):	Not available.
pH:	8.5
Specific gravity @ 20 °C:	(water = 1). 1.083
Solubility in water (%):	Complete.
Coefficient of water\oil dist.:	Not available.
VOC:	None

Section 4 : FIRE AND EXPLOSION HAZARD DATA

Flammability:	Not flammable.
Conditions of flammability:	Surrounding fire.
Extinguishing media:	Carbon dioxide, dry chemical, foam. Water Water fog.
Special procedures:	Self-contained breathing apparatus required. Firefighters should wear the usual protective gear. Use water spray to cool fire exposed containers.
Auto-ignition temperature:	Not available.
Flash point (°C), method:	None
Lower flammability limit (% vol):	Not applicable.
Upper flammability limit (% vol):	Not applicable.

Not available.

Sensitivity to mechanical impact:	Not available.
Hazardous combustion products:	Oxides of carbon (COx). Hydrocarbons.
Rate of burning:	Not available.
Explosive power:	Containers may rupture if exposed to heat or fire.

Section 5 : REACTIVITY DATA

Chemical stability:	Product is stable under normal handling and storage conditions.
Conditions of instability:	Extreme temperatures.
Hazardous polymerization:	Will not occur.
Incompatible substances:	Strong acids. Strong oxidizing agents.
Hazardous decomposition products:	See hazardous combustion products.

Section 6 : HEALTH HAZARD DATA

Route of entry: Skin contact, eye contact, inhalation and ingestion.

Effects of Acute Exposure

Eye contact: May cause irritation.

Skin contact: Prolonged and repeated contact may cause irritation.

Inhalation: May cause headache and nausea.

Ingestion: May cause vomiting and diarrhea.
May cause gastric distress.

Effects of chronic exposure: See effects of acute exposure.

LD50 of product, species & route: > 5000 mg/kg rat oral.

LC50 of product, species & route: Not available.

Exposure limit of material: Not available.

Sensitization to product: Not available.

Carcinogenic effects: Not listed as a carcinogen.

Reproductive effects: Not available.

Teratogenicity: Not available.

Mutagenicity: Not available.

Synergistic materials: Not available.

Medical conditions aggravated by exposure: Not available.

First Aid

Skin contact: Remove contaminated clothing.
Wash thoroughly with soap and water.
Seek medical attention if irritation persists.

Eye contact: Check for and remove contact lenses.
Flush eyes with clear, running water for 15 minutes while holding eyelids open: if irritation persists, consult a physician.

Inhalation: Remove victim to fresh air.
If irritation persists, seek medical attention.

Ingestion: Do not induce vomiting, seek medical attention.
Dilute with two glasses of water.
Never give anything by mouth to an unconscious person.

Section 7 : PRECAUTIONS FOR SAFE HANDLING AND USE

Leak/Spill: Contain the spill.
Prevent entry into drains, sewers, and other waterways.
Wear appropriate protective equipment.
Small amounts may be flushed to sewer with water.
Soak up with an absorbent material.
Place in appropriate container for disposal.
Notify the appropriate authorities as required.

Waste disposal: In accordance with local and federal regulations.

Handling procedures and equipment: Protect against physical damage.
Avoid breathing vapors/mists.
Wear personal protective equipment appropriate to task.

Wash thoroughly after handling.
Keep out of reach of children.
Avoid contact with skin, eyes and clothing.
Avoid extreme temperatures.
Launder contaminated clothing prior to reuse.

Storage requirements: Store away from incompatible materials.
Keep containers closed when not in use.

Section 8 : CONTROL MEASURES

Precautionary Measures

Gloves/Type:

Wear appropriate gloves.

Respiratory/Type: None required under normal use.

Eye/Type:

Safety glasses recommended.

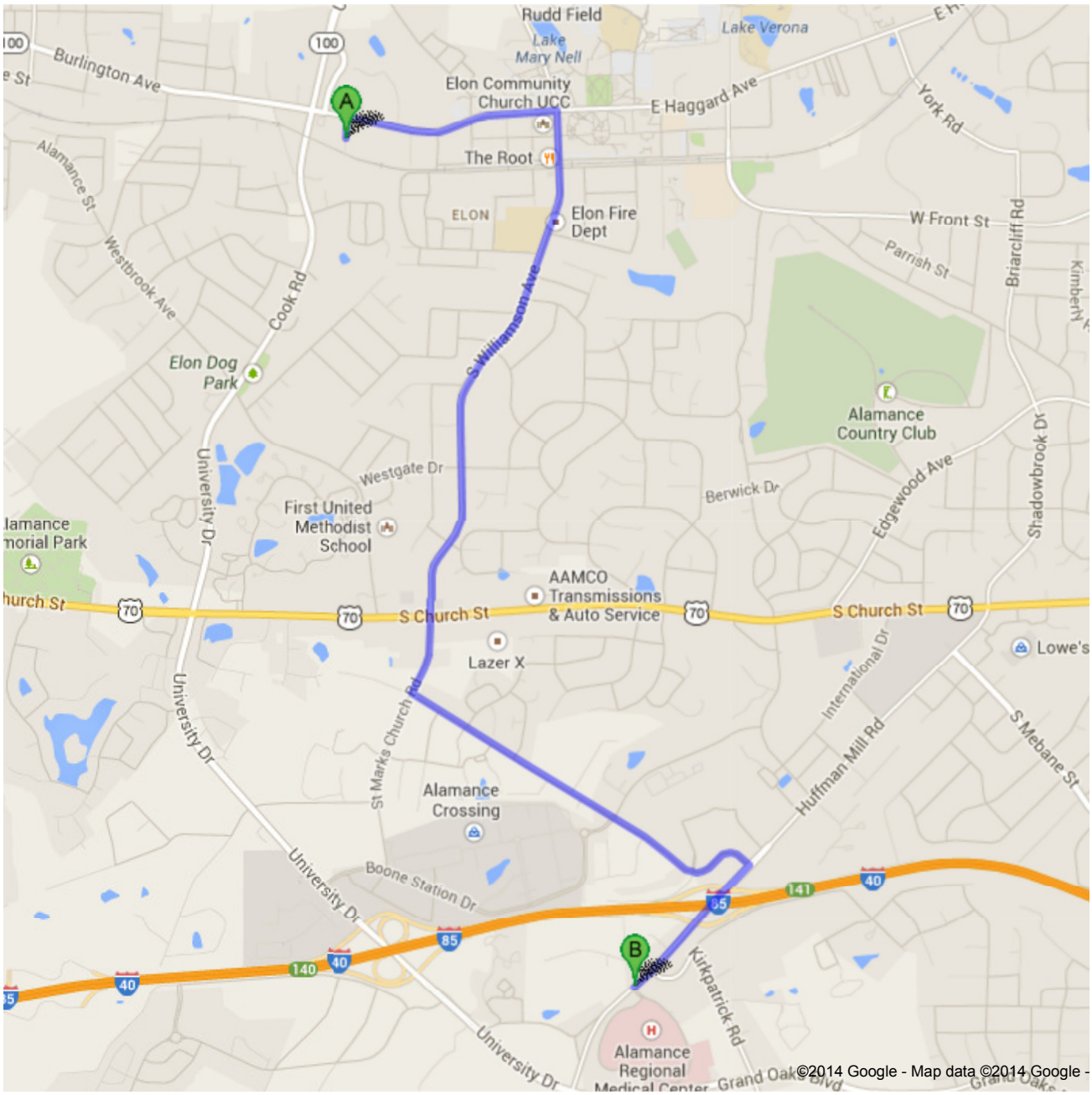
Footwear/Type: Safety shoes per local regulations.

Clothing/Type: As required to prevent skin contact.

Other/Type: Eye wash facility should be in close proximity.
Emergency shower should be in close proximity.

Ventilation requirements: Local exhaust at points of emission.

Directions to 1240 Huffman Mill Rd, Burlington, NC 27215
4.4 mi – about **10 mins**



100 Rego Dr, Elon, NC 27244

	1. Head **north** on **Rego Dr** toward **W Haggard Ave**	go 367 ft total 367 ft
	2. Turn right onto **W Haggard Ave** About 2 mins	go 0.7 mi total 0.7 mi
	3. Turn right onto **N Williamson Ave** About 3 mins	go 1.7 mi total 2.4 mi
	4. Continue onto **State Rd 1301/St Marks Church Rd**	go 0.3 mi total 2.7 mi
	5. Turn left onto **State Rd 1308/Garden Rd** Continue to follow Garden Rd About 3 mins	go 1.2 mi total 3.9 mi
	6. Turn right onto **Huffman Mill Rd** Destination will be on the left About 1 min	go 0.5 mi total 4.4 mi

1240 Huffman Mill Rd, Burlington, NC 27215

These directions are for planning purposes only. You may find that construction projects, traffic, weather, or other events may cause conditions to differ from the map results, and you should plan your route accordingly. You must obey all signs or notices regarding your route.

Map data ©2014 Google

Directions weren't right? Please find your route on maps.google.com and click "Report a problem" at the bottom left.