COMPLIANCE STATUS REPORT
(REVISED MAY 31, 2017) &
PROGRESS REPORT

FOUNTAIN OAKS SHOPPING CENTER
4920 Roswell Road, NE
Sandy Springs, Fulton County, Georgia 37347

HSI No. 10807

Prepared for:
LONG ISLAND ASSOCIATES, LTD. and assigns
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May 31, 2017

MEI Project No. 16577

Professional Certification

This report has been prepared by Marion Environmental Inc. under the supervision of the Professionals whose seals and signatures appear hereon. The findings, recommendations, specifications, or professional opinions are presented within the limits prescribed by the client, after being prepared in accordance with generally accepted professional practice. No other warranty is expressed or implied.

Philip A. Lutin, P.E.	Steve Wild, P.E., P.G.
Project Coordinator	Georgia Professional Engineer #40859
Tennessee Professional Engineer #7342	Georgia Professional Geologist #1360

STATEMENT OF FINDINGS

The Fountain Oaks Shopping Center (FOSC), 4920 Roswell Road NE, Sandy Springs, Fulton County, Georgia (the subject site) is currently listed on the Georgia Hazardous Site Inventory (HSI) as HSI No. 10807. The Subject site and two associated properties currently are regulated under the auspices of the Georgia Voluntary Remediation Program (VRP). These three properties are:

1. Fountain Oaks Shopping Center (subject site), 4920 Roswell Rd NE, Sandy Springs, GA 30342 Fulton County Assessor Parcel No 17 009300061319.

2. 115 West Belle Isle Road (FOSC Outparcel), Sandy Springs, Georgia 30342 Fulton County Assessor Parcel No 17 009300021073.

3. Long Island Terrace property (undeveloped), Sandy Springs, Georgia 30342 Fulton County Assessor Parcel No 17 009300060881.

The extent of on-site and off-site soil, groundwater and soil vapor contaminants of concern (COC) impacts and potential exposure risks have been thoroughly delineated over the course of multiple investigations conducted from 2005 to 2015 by Marion Environmental, Inc. (MEI) and others.

A soil remediation project conducted by others on the FOSC out-parcel in 2007-2008 removed all on-site soils exceeding approved Risk Reduction Standards (RRS). A vapor intrusion (VI) mitigation system was installed by others beneath the north tenant wing of the FOSC and operated for approximately two and a half years, from December 2008 to May 2011. Exposure risks associated with former on-site soil and soil vapor impacts were successfully mitigated.

The FOSC site was originally placed on the HSI because of soil contamination from a release of tetrachloroethene (PCE) and 14 associated contaminants of concern (COCs). As documented in multiple reports prepared by others, and summarized herein, soil on the FOSC site complies with approved Types 1, 3, and/or 4 Risk Reduction Standards (RRS). Since the soil contamination that caused the FOSC site to be listed on the HSI has been remediated to within approved RRS levels, the site is eligible for de-listing from the HSI.

The most recent, March 2015 groundwater analytical results indicated that COC concentrations exceed applicable RRS at 14 on-site monitoring wells. These COCs and 14 exceedance locations are as follows:

- Benzene (MWs-20, 21 & 28)
- cDCE (MWs-2, 4, 16, 20 & 28)
- PCE (MWs-2, 3, 5, 9, 13S, 14, 16, 20, 22, 23 & 28)
- TCE (MWS-2, 4, 6, 16, 20 & 28)
- VC (MWs-16 & 28)

Additionally, USEPA vapor intrusion screening level (VISL) calculations using the March 2015 groundwater sampling event indicate the *potential* presence of VI risks at five monitoring wells for PCE (MW-2 & MW-22), TCE (MW-2, MW-4 & MW-16) and benzene (MW-28). The former on-site dryclean (DC) operation is responsible for the potential VI risk from PCE & TCE at MW-2 and MW-4, while the off-site sources are responsible for the potential VI risk at the other three monitoring wells. However, results from soil vapor sampling, indoor air sampling, and vapor modeling using the US EPA VISL calculator and the Johnson & Ettinger (J&E) model provide multiple lines of evidence to support the conclusion that the vapor intrusion pathway does not pose a risk to current or future commercial receptors and that the site is compliant with vapor risk requirements under HSRA and the VRP for delisting.

There are no *off-site* soil or groundwater impacts in excess of applicable Type 1/Type 2 RRS.

The conceptual site model (CSM) of the FOSC subject location is of a site where:

- Release sources and substances released have been well defined.
- The lateral and vertical extent and magnitude of soil contamination on-site and potential exposure risks have been well defined through exhaustive subsurface investigations.
- Soil contamination on-site in excess of approved RRS has been removed.
- The lateral and vertical extent and magnitude of groundwater contamination on and off-site and associated exposure risks have been well defined.
- Groundwater flow and subsurface contaminant migration patterns in soil and groundwater are/were significantly affected by the pre-development topography.
- The groundwater contaminant plume, although in excess of RRS in several locations, is stable and rapidly attenuating.
- Groundwater fate & transport modeling has demonstrated that:
    - There was a *potential* risk of PCE in the on-site groundwater plume migrating to discharge into surface water at levels exceeding Georgia In Stream standards on the undeveloped Long Island Terrace property. However:
        - A surface water sample collected from the stream on the Long Island Terrace property on May 3, 2017 did not contain any chlorinated VOCs.
        - Hence, groundwater to surface water migration is an incomplete exposure pathway.
    - On-site groundwater RRS exceedances are not a significant health risk to hypothetical off-site residential receptors 1,000 ft downgradient.
    - The contaminant plume is stable, and is not anticipated to migrate downgradient beyond current dimensions.
- Potential on-site vapor intrusion (VI) impacts modeled using the US EPA VISL calculator suggested there was a *potential* VI risk associated with PCE, TCE and benzene at five on-site wells. However:
    - Modeling conducted by both MEI and Amec Foster Wheeler (AFW) using the Johnson & Ettinger (J&E) model and site-specific data collected by others (including soil vapor and indoor air sampling) support the conclusion that risks suggested with the VISL are overestimates.
    - The VI modeling results described herein support the conclusion that the site is compliant with vapor risk requirements under HSRA and the VRP for delisting.
- Vapor intrusion (VI) impacts for existing on-site commercial worker receptors have been:
    - Assessed through soil vapor sampling, a soil vapor survey, indoor air sampling, VI modeling, and soil gas sampling; and
    - Mitigated through operation of an on-site VI mitigation system.

- Potential dense non-aqueous phase liquid (DNAPL), i.e., “free product” was investigated and determined not to be present beneath the site.
- There are no soil, groundwater, or vapor intrusion (VI) impacts in excess of RRS/risk-based levels on off-site properties.

The overall FOSC conceptual site model (CSM) is a site that has been thoroughly investigated, the potential human health and environmental risks have been evaluated and the site complies with applicable RRS for soil. Groundwater in excess of RRS on-site is not a human health or environmental risk due to incomplete exposure pathways, and a plume that is rapidly attenuating.

On-site exposure domains for this CSM include those areas of the site where:

- Groundwater COC concentrations exceed applicable RRS for the incomplete, but *potentially complete* groundwater ingestion pathway.
- VISL screening calculations indicated that *potential* VI risks exceed target levels.

There is no off-site exposure domain because:

- The FOSC site is a non-drinking water source.
- There are no off-site groundwater COC concentrations exceeding applicable RRS
- The groundwater contaminant plume is naturally attenuating at a rapid rate
- Fate & transport modeling suggests that the groundwater contaminant (PCE) migration to surface water on the Long Island Terrace property was a potential concern.
    - However, the surface water sample collected from the stream on May 3, 2017 shows that groundwater migration to surface water discharge is an incomplete exposure pathway.
- Groundwater fate & transport modeling demonstrates a lack of risk for off-site groundwater ingestion by hypothetical residential receptors 1,000 feet downgradient from the site.

No soil remediation, and thus no remediation plan, is necessary for on or off-site soil, because:

- The extent of soil on-site contamination was exhaustively delineated
- On-site soil exceeding RRS was removed during the 2007-2008 soil remediation project
- Remaining in-situ concentrations of COCs in on-site soil below RRS have been exhaustively demonstrated through collection of excavation verification samples and borings/monitoring wells installed by MEI
- No COCs in excess of applicable RRS have been detected in off-site soils.

The excavation of approximately 3,831 tons of contaminated soil from the release source area and immediate downgradient area in 2007-2008 removed a significant secondary source of groundwater contamination via the soil-to-groundwater leaching pathway. As a result, groundwater COC concentrations in on-site release source and downgradient areas and have been rapidly attenuating as have associated exposure risk levels.

MEI requests closure of all downgradient and cross-gradient wells associated with the former on-site release, for the following reasons:

- The contaminated soil that would have acted as an ongoing secondary source of groundwater contamination (via soil to groundwater leaching) has been removed,
- The groundwater contaminant plume is rapidly attenuating, and
- There are no off-site, downgradient groundwater impacts in excess of applicable RRS.

Therefore, MEI requests abandonment of the following 13 wells.

1. MW-2
2. MW-4
3. MW-9
4. MW-17
5. MW-26
6. MW-27
7. MW-3
8. MW-13D
9. MW-13S
10. MW-29
11. MW-30
12. MW-31
13. MW-3

No expansion of existing facilities is planned for the immediate future and no engineering controls are necessary for mitigation of VI risks in existing buildings.

Institutional controls, including deed notices and restrictive covenants prohibiting groundwater use are proposed to help mitigate potential exposure risks from on-site groundwater exceeding applicable RRS and potential VI concerns.

Draft uniform environmental covenants (UECs) for the FOSC, 115 West Belle Isle Road and Long Island Terrace properties are included in this CSR. The specific language of both covenants includes groundwater use prohibitions.

The following four required generic milestones have either already been completed or should be considered to have been completed with the submittal of this updated CSR and Progress Report:

1. Horizontal delineation of the release and associated COCs on property accessible at the time of enrollment;
2. Horizontal delineation of the release and associated COCs on property inaccessible at the time of enrollment;
3. Update CSM to include vertical delineation, finalize the remediation plan and provide a preliminary cost estimate for implementation of remediation and associated continuing actions; and
4. Submit the compliance status report (CSR) required under the VRP, including requisite certifications.

CERTIFICATION OF COMPLIANCE

I certify under penalty of law that this report and all attachments were prepared under my direction in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Based on my review of the findings of this report, and my review of the findings of reports prepared by others on file at the Georgia Department of Natural Resources, Environmental Protection Division (EPD), Hazardous Site Response Program (HSRP), with respect to the *soil* risk reduction standards (RRSs) of the Rules for Hazardous Site Response, Rule 391-3-19-.07, I have determined that the soil at this site is in compliance with the approved Type 1, 3, and/or 4 Risk Reduction Standards.

Based on my review of the findings of this report with respect to the risk reduction standards (RRSs) of the Rules for Hazardous Site Response, Rule 391-3-19.07, I have determined that groundwater at this site is *not* in compliance with Type 3 and/or Type 4 risk reduction standards.

(Signature)

Fletcher Bright for LIA

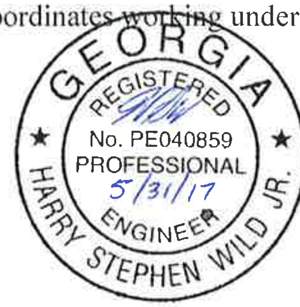
(Typed Name)

(Title)

Fletcher Bright Company
537 Market Street, Suite 400
Chattanooga, TN 37402
(423) 755-8830

GROUNDWATER SCIENTIST STATEMENT

I certify that I am a qualified groundwater scientist who has a bachelors and masters degree in Geology as well as a bachelor's degree in Chemical Engineering. I have sufficient training and experience in groundwater hydrology and related fields (as demonstrated by state registration and completion of accredited university courses) that enables me to make sound professional judgments regarding groundwater monitoring as well as contaminant fate and transport. I further certify that this Compliance Status Report and Progress Report as well as accompanying documents for the Fountain Oaks Shopping Center at 4920 Roswell Road, and two associated properties in Sandy Springs, Fulton County, Georgia, except where noted otherwise, were prepared by me and appropriately qualified colleagues and subordinates working under my direction.



(Signature)

Steve Wild, P.E., P.G.
MARION ENVIRONMENTAL, INC.

Georgia Professional Engineer #40859
Georgia Professional Geologist #1360

Georgia Stamp or Seal

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LIST OF ACRONYMS AND ABBREVIATIONS

BGS	Below Ground Surface
COC	Chemical/Contaminant of Concern
cDCE	cis-1,2-dichloroethene
DC	Dry Cleaner
DCE	Dichloroethene
DNR	Georgia Department of Natural Resources
DP	Direct Push (i.e., “Geoprobe) borings
EPA	Environmental Protection Agency
EPD	[Georgia] Environmental Protection Division
ESA	Environmental Site Assessment
FOSC	Fountain Oaks Shopping Center
HSRA	[Georgia] Hazardous Site Response Act
HSRP	Hazardous Site Response Program
MEI	Marion Environmental, Incorporated
:g/kg	micrograms per kilogram (equivalent to ppb)
:g/L	micrograms per Liter (equivalent to ppb)
MCL	[Drinking Water] Maximum Contaminant Level
mg/kg	milligrams per kilogram (equivalent to ppm)
mg/L	milligrams per Liter (equivalent to ppm)
msl	mean sea level
MW	Monitor Well
NC	Notification Concentration
PCE	Tetrachloroethene (Perchloroethene)
POE	Point of Exposure
ppb	parts per billion
ppm	parts per million
RRS	Risk Reduction Standards
RRFM	Roswell Road Food Mart
TCE	Trichloroethene
tDCE	trans-1,2-dichloroethene
UC	United Consulting
USRIF	U.S. Retail Income Fund VIII-D
UST	Underground Storage Tank
VC	Vinyl Chloride
VI	Vapor Intrusion
VIA	Vapor Intrusion Assessment
VOC	Volatile Organic Compound
VRP	Voluntary Remediation Program

1.0 INTRODUCTION

The Fountain Oaks Shopping Center (FOSC), 4920 Roswell Road NE, Sandy Springs, Fulton County, Georgia (the subject site) site is currently listed on the Georgia Hazardous Site Inventory (HSI) as HSI No. 10807. Through participation in the Georgia Voluntary Remediation Program (VRP), the responsible party (responsible for on-site groundwater impacts and off-site impacts) and current property owners seek to have the three subject properties de-listed from the HSI.

1.1. Applicability and Site Qualifications

Long Island Associates (LIA) is a responsible party, as defined by the Georgia Hazardous Site Response Act (HSRA), for groundwater contamination beneath property located at 4920 Roswell Road in Sandy Springs, Fulton County, Georgia (the subject property). The subject property also includes two associated parcels, one located at 115 West Belle Isle Drive (0.25 acre) and an undeveloped parcel on Long Island Terrace (0.74 acre).

LIA previously submitting a VRP Application for the subject properties under the Georgia Voluntary Remediation Program Act (VRPA) pursuant to Official Code of Georgia Annotated (O.C.G.A.) § 12-8-100, et seq. The properties were accepted into the VRP on November 30, 2016.

According to O.C.G.A. § 12-8-105, in order to be considered a “qualifying property,” a property must be listed on the Hazardous Site Inventory (HSI), meet the criteria of the Georgia Hazardous Site Reuse and Redevelopment Act (“the Brownfields Act”), or have a release of regulated substances to the environment. The subject property was first listed on the HSI on July 15, 2005 as the Fountain Oaks Shopping Center (FOSC), 4920 Roswell Road NE, HSI Site Number 10807.

An adjacent property at 4980 Roswell Road NE, occupied by Chastain Cleaners, was sub-listed as part of HSI 10807 on October 3, 2008. However, the Chastain Cleaners site was not included in the VRP application since it is an off-site dry cleaning solvent release source (as discussed subsequently in **Section 2.3** herein) whose release migrated onto the FOSC site.

Under O.C.G.A. § 12-8-105, in order to qualify for entry into the VRP, the property could not be subject to any of the following limitations:

1. It cannot be listed on the federal National Priorities List (“the NPL” or “Superfund” list).
2. It cannot be currently undergoing response activities required by an Order of the Regional Administration of the U.S. Environmental Protection Agency (EPA).
3. It shall not be a facility that is required to have a permit under the Georgia Hazardous Waste Management Act.
4. It shall not violate the terms and conditions under which the Georgia Environmental Protection Division (EPD) operates and administers remedial programs by delegation or similar authorization from the U.S. EPA.
5. It shall not have any lien filed under the Hazardous Waste Management Act or the Georgia Underground Storage Tank Management Act.

None of the limiting criteria listed in items 1 through 5 above apply to the subject properties. Therefore, the FOSC site is a “qualifying property” under the VRP.

According to O.C.G.A. § 12-8-106, the following criteria must be met in order for the Participant to meet the qualifications of the VRP:

1. The Participant must be the owner of the property or have express permission to enter another’s property to perform corrective action, including, to the extent applicable, implementing controls for the site pursuant to written lease, license, order, or indenture.
2. The Participant must not be in violation of any order, judgment, statute, rule, or regulation subject to the enforcement authority of the Director.
3. The Participant must meet other such criteria as may be established by the Georgia Department of Natural Resources (DNR) Board.

Since the Participant meets all of the criteria stated above, the Participant is qualified under the VRP. The owner of the property is as follows:

AMREIT Fountain Oaks LP
8 Greenway Plaza, Suite 1000
Houston, TX 77046
Telephone: (713) 850 1400

The Applicant requested entry into the VRP with the express consent of the current property owner, AMREIT Fountain Oaks, LP.

The three properties that were the subject of the VRP application were (**Figure 2 in Appendix A**):

1. Fountain Oaks Shopping Center (subject site)
   4920 Roswell Rd NE, Sandy Springs, GA 30342
   Fulton County Assessor Parcel No 17 009300061319. Area: 13.5 acres.

2. 115 West Belle Isle Road, Sandy Springs, Georgia 30342
   Fulton County Assessor Parcel No 17 009300021073. Area: 0.2571 acres.

3. Long Island Terrace property (undeveloped), Sandy Springs, Georgia 30342
   Fulton County Assessor Parcel No 17 009300060881. Area: 0.74 acres.

1.2. Site Location & Description

The VRP application was prepared to obtain entry into the Georgia VRP for the Fountain Oaks Shopping Center (FOSC) site, 4920 Roswell Road NE, Sandy Springs, Fulton County, Georgia (**Figures 1 & 2** in **Appendix A**). The FOSC site is Georgia Hazardous Site Index (HSI) Site Number 10807. Former dry cleaning (DC) operations at the FOSC resulted in the release of compounds to the environment that are regulated under the Georgia Hazardous Site Response Act.

Additionally, two off-site, upgradient sources have released regulated constituents into groundwater that has migrated onto the FOSC site. Chlorinated solvent constituents have been identified in groundwater on the Chastain Cleaners property, located northeast of the site, directly across W. Belle Isle Road. Gasoline constituents have been identified in groundwater on the Roswell Road Food Mart property, located adjacent to the northeast corner of the site. Similar constituents have been detected in groundwater on the FOSC subject site immediately downgradient of these off-site sources. Refer to **Section 2.3** for further discussion.

The FOSC site encompasses approximately 13.5 acres and contains a retail shopping center with a Kroger grocery store as well as service and retail shops (**Figure 2**). Three buildings are located on the FOSC subject property. The largest of the buildings is located on the western half of the property, and consists of three contiguous structures; a north wing and south wing separated by a Kroger grocery store. Both the north and south wings of that building contain multiple commercial, retail, and professional tenant spaces.

The north wing contains five tenant spaces. The south wing is a two-story structure comprised of multiple tenant spaces. The next smaller building on the property is also a two-story, multiple-tenant structure located on the southern portion of the FOSC subject site. The third building on the property is a freestanding petroleum UST facility/fuel station located centrally on the easternmost side as shown on **Figure 2 in Appendix A**.

2.0 PREVIOUS INVESTIGATIONS & REMEDIAL ACTIONS

2.1 Overview - Previous Investigations & Remedial Actions

Records obtained from the Georgia Department of Natural Resources, Environmental Protection Division (EPD) and other sources show that the site was developed into the current retail shopping center in 1987 by Long Island Associates, Ltd. Dry cleaning (DC) operations were conducted in the northernmost tenant bay under the business ownership of several different entities for approximately 20 years from November 1987 until approximately March 2007. LIA sold the FOSC to U.S. Retail Income Fund VIII-D (USRIF) in December 2003. Hence, DC operations were conducted on site during both LIA’s and USRIF’s ownership of the property.

Former on-site DC ownership details are documented in multiple reports on file with the EPD HSRP. Previous work conducted at the site includes soil and groundwater investigations, a soil remediation project, vapor intrusion assessments, a soil vapor survey, indoor air testing and groundwater monitoring. All of this work is detailed in documents previously submitted to and are on file with the EPD HSRP. All previous investigation & remediation work is briefly described herein, and is summarized in **Table 1** as follows, which includes the document, date and pages where the work is described in detail.

A release of chlorinated solvents and other chlorinated volatile organic compounds (CVOCs) associated with on-site DC operations was discovered in March 2005 during a Phase II Environmental Site Assessment conducted by Keramida Environmental, Inc. The presence of CVOC contamination in on-site soil was reported to EPD on May 31, 2005. The exact date of the release of the dry cleaning solvent tetrachloroethene (PCE, also known as perchloroethylene or "perc") is unknown, but clearly occurred sometime between 1987 and 2005.

Following initial discovery of the release in March 2005, multiple soil and groundwater investigations were conducted by between March 2005 and June 2007 by Keramida Environmental and United Consulting (UC). These investigations determined the extent of soil contamination on site in excess of calculated Risk Reduction Standards (RRS) and the magnitude of groundwater contamination in multiple locations on site.

The results of these 2005-2007 investigations indicated that there were three release sources for on-site soil and/or groundwater contamination from both DC solvents and petroleum hydrocarbons (see discussion in **Section 2.3**):

1. A former on-site DC tenant bay,
2. An off-site, upgradient DC operation (Chastain Cleaners), and
3. An off-site, upgradient petroleum underground storage tank (UST) facility, (CITGO/Roswell Road Food Mart).

The methods, results and conclusions of the previous investigations conducted by others are documented in multiple reports on file with the EPD HSRP, the most recent being MEI's 2015 CSR & VRP Application. The list of COCs detected during these soil investigations is discussed in **Section 2.4** herein.

Following delineation of the lateral and vertical extent of on-site soil contamination in excess of RRS, a soil remediation project was conducted by USRIF between November 2007 and May 2008. That project resulted in the removal of 3,830.53 tons of impacted soil and the collection and analysis of 213 soil verification/confirmation samples, and 146 split verification/ confirmation samples.

TABLE 1 - Summary of Previous Investigation, Remediation, & Mitigation Activities

Investigation/ Report Date	Entity/Consultant/Contractor Performing Investigation/Remediation	Investigation/Remediation Summary	Document on file at EPD where work described/documented, Document Date, Location within Document
1992	U.S. EPA	Emergency removal of abandoned drums. Drums not associated with on-site drycleaner. No soil or groundwater sampling conducted	UC PPCAP, 28-NOV-05, Page 4
29-Oct-03	National Assessment Corp.	Phase I ESA. No Phase II ESA recommended	UC PPCAP, 28-NOV-05, Page 4
14-Mar-05	Prof. Svc. Industries, Inc.	Phase I ESA. Phase II ESA recommended	UC PPCAP, 28-NOV-05, Pages 4-5
30-Mar-05	Keramida Environmental Inc. (Keramida)	Phase II ESA. Eleven borings installed inside & outside drycleaner bay. Soil contaminated with PCE at 0.014 to 34.8 ppm discovered	UC PPCAP, 28-NOV-05, Page 5
29-Apr-05	Keramida	Installation of 4 monitoring wells (MWs) (MW-1 to MW-4). Groundwater PCE, TCE and cDCE contamination discovered.	UC PPCAP, 28-NOV-05, Page 5
May-June 2005	United Consulting	PPCAP Investigation. Installation of 23 direct push (DP) soil borings and 3 monitoring wells (MWs) (MW-5 to MW-11). Collection of 59 soil and 7 groundwater samples.	UC PPCAP, 28-NOV-05, Page 5-9 & 38-42, Tables 1 & 2
21-Feb-08	United Consulting	Vapor Intrusion Assessment & Mitigation Design	UC VIA & Mitigation Design Rpt, 21-FEB-2008
Nov. 2006 - June 2007	United Consulting	PPCSR Investigation. Installation of 49 DP borings. Installation of 5 MWs (MW-8 to MW-12). Field screen soil every 2 ft. Analyze one soil sample per boring. Define areas where soil corrective action necessary.	UC PPCSR, 10-JUN-08, Pages 13-21, Tables 1 & 2
Nov. 2007 - May 2008	United Consulting/ Greenleaf Environmental	Soil remediation project. Removal of 3,830.53 tons of impacted soil. Collection & analysis of 213 soil verification/confirmation samples and 146 split verification/confirmation samples (by MEI).	UC PPCSR, 10-JUN-08, Pages 34-45, Tables 7 & 8
11-Dec-07	Marion Environmental Inc.	Preliminary Corrective Action Plan (PCAP). Proposed soil vapor survey of site to identify impacted areas. Groundwater investigation proposed to follow soil vapor survey. Calculation of Risk Reduction Standards (RRS) proposed.	MEI PCAP, 11-Dec-07
May 2008 - May 2009	Marion Environmental Inc.	PCAP/CSR GW Investigation. Installation of 22 MWs (MW-13S to MW-33). Define extent of groundwater contamination on and off-site. Confirm no off-site soil impacts.	MEI CSR, 14-JAN-10, Pages 26-51, Tables 1-4
25-Aug-08	Marion Environmental Inc./ Atlantic Environmental Inc.	Off-Site indoor residential air sampling. Sample results confirm no impacts to off-site indoor air quality.	MEI CSR, 14-JAN-10, Pages 59-61, Appendix G
Sep-08	Marion Environmental Inc./ W.L. Gore & Assoc.	Soil vapor survey. Survey indentifies three distinct commingled plumes originating from one on-site and two off-site release sources.	MEI CSR, 14-JAN-10, Pages 51-58, Appendix F
Dec-2008	United Consulting	Installation of vapor intrusion mitigation system (VIMS) incl: passive soil vapor barrier in former DC tenant bay, passive sub-slab depressurization system beneath former DC tenant bay, installation of eight north-south horizontal borings beneath entire northern wing of FOSC center manifolded to regenerative blower.	UC Vapor Mitigation System Implementation Rpt, 3-JUN-2009
May-2011	United Consulting	Shut down and abandon vapor intrustion mitigation system in accordance with VI mitigation, sampling and modeling showing no existing impacts or potential VI impacts in excess of 1E-05 carcinogenic or HQ=1 non-carcinogenic health effects.	UC Vapor System Sampling and Modeling for Closure Rpt, 25-FEB-2011. UC Vapor Intrusion Mitigation System (VIMS) Closure Report, 26-MAY-2011. EPD Approval Ltr 8-AUG-2011
Jun-2013	Property Solutions	Phase II ESA. Indoor air & soil gas sampling. Groundwater sampling.	3-JUN-13 Prop. Solutions Report (MEI CSR, 31-MAY-15, Appendix H)
Mar-2015	Marion Environmental Inc.	Groundwater sampling event. Site-wide comprehensive sampling all wells. Document significant natural attenuation of groundwater contamination. Updated RRS calculated.	MEI GW Monitoring Rpt., 14-MAY-15
Dec-2015	Marion Environmental Inc.	Compliance Status Report and application for entry into Voluntary Remediation Program.	MEI CSR & VRP Application, 11-DEC-15

The results of the soil remediation and verification sampling indicated that all impacted soil in excess of calculated RRS was successfully removed from the site. This work is documented in UC's June 8, 2010 Prospective Purchaser Compliance Status Report (PPCSR).

The potential presence of dense non-aqueous phase liquid (DNAPL) or "free product" was evaluated by UC using procedures in EPA guidance documents during investigatory phases of soil impact assessment and during excavation/verification sampling. Although PCE concentrations slightly exceeded 1 % of the solubility limit in some groundwater samples, other potential DNAPL indicators were not present. Therefore, based on the results of extensive testing and observations, DNAPL was not considered present in soil or groundwater. This work is documented in UC's June 8, 2010 Prospective Purchaser Compliance Status Report (PPCSR).

Following the soil remediation project, UC installed a vapor intrusion mitigation system (VIMS) beneath the former DC tenant bay and the north tenant wing of the FOSC site. This system consisted of a passive vapor barrier and sub slab depressurization system installed beneath the former DC facility and an active vapor mitigation system was installed beneath the remaining units in the north FOSC wing. The VIMS was operated for approximately two and a half years, from December 2008 to May 2011.

EPD authorized shutdown of the VIMS system after soil gas sampling results and VI modeling results both indicated that there were no VI risks present in excess of target levels. The system was shut down, decommissioned and the shallow vapor monitoring wells abandoned in May 2011. This VI mitigation and monitoring work is documented in three reports prepared by UC:

- Vapor Intrusion Assessment and Mitigation Design Report (21-FEB-2008)
- Vapor Intrusion Mitigation System Implementation Report (3-JUN-2009), and
- Vapor System Sampling and Modeling for Closure Report (25-FEB-2011)

MEI initiated investigations of the full on- and off-site extent of groundwater contamination and the extent of off-site soil and groundwater contamination after completion of the soil remediation project. Twenty-three monitoring wells were installed on- and off-site between May 2008 and May 2009. Collection and analysis of soil and groundwater samples confirmed that the full extent, depth and magnitude of the groundwater contaminant plume were defined by these investigations. Soil analytical results from samples collected during the groundwater investigation confirmed that there are no off-site soil impacts associated with the former on-site DC release source. This work is documented in MEI's January 14, 2010 CSR, previously submitted to and on file with the HSRP.

The locations of groundwater monitoring wells installed by MEI are shown on **Figure 3 in Appendix A**. Groundwater analytical results showing only those compounds detected in groundwater during the most recent, March 2015 groundwater sampling event are tabulated in **Table 2 in Appendix B**. A discussion of COCs detected in groundwater during any previous sampling event in comparison to only those COCs detected during the most recent, March 2015 sampling event is contained in **Section 2.4** herein.

An investigation of nearby off-site, indoor residential air quality at 79 West Belle Isle Road, located immediately west of FOSC was conducted by Industrial Hygiene consultants Atlantic Environmental Inc. (AEI) in August 2008, under subcontract to MEI. The results of this study confirmed that there were no impacts to off-site indoor residential air quality associated with vapor intrusion of contaminants released from former on-site DC operations.

Since the 2008 indoor air sampling event, during which no DC vapors were detected, recent groundwater analytical results (March 2015) show that contaminant concentrations have declined in the nearest upgradient well (MW-13S) by an average of 93.6%. This remarkable reduction in upgradient groundwater contaminant concentrations is evidence of significantly reduced off-site vapor intrusion risk for the neighboring property. The 2008 indoor air sampling work is documented in AEI's report, included as Appendix G MEI's January 14, 2010 CSR.

A soil vapor survey on the northern portion of the FOSC site and adjacent off-site areas was conducted by MEI in September 2008. One hundred and twenty-four (124) W.L. Gore & Associates (now Amplified Geochemical Imaging LLC) Gore-Sorber® soil vapor absorption modules were deployed on the northern portion of the FOSC site. These modules were installed outside of structures at an approximate 50-foot-by-50-foot grid shown on the figures included within Gore's report to MEI, which is included as Appendix F of MEI's January 14, 2010 CSR.

The results of this soil vapor survey identified three distinct contaminant plumes commingled on the FOSC site. These three plumes originated from one on-site source (the former DC operations) and from two off-site sources (Chastain Cleaners and the CITGO/Roswell Road Food Mart ("CITGO/RRFM").

As stated previously, all of the above prior work detailed herein was described in MEI's January 14, 2010 CSR. On March 9, 2015, the EPD HSRP issued a review letter for the CSR.

The EPD noted in their March 9, 2015 letter that the CSR had certified that the site did not comply with Risk Reduction Standards (RRS) and that monitored natural attenuation (MNA) had been recommended by MEI as the groundwater remediation method. Further, the EPD directed LIA to perform the following activities:

1. Conduct a site-wide comprehensive groundwater monitoring event.
2. Construct specific geologic cross-sections.
3. Evaluate the vapor intrusion pathway using up-to-date groundwater analytical results.
4. Calculate updated Risk Reduction Standards (RRS) based on current toxicity values.

In response to the EPD's letter, MEI conducted a comprehensive groundwater monitoring event in March 2015. Groundwater samples were collected from all 29 existing wells and analyzed for VOC concentrations. The methods and results of this sampling event were documented in MEI's Groundwater Monitoring Report dated May 14, 2015, on file with the EPD HSRP.

Groundwater analytical results from the March 2015 sampling event show that 13 compounds were present in on-site groundwater, while five compounds were detected in off-site groundwater (**Table 2**). Comparison of the March 2015 groundwater sampling results with those of the previous 2008 or 2009 event at each well generally indicate significant reductions in PCE, TCE and cDCE across the site, with few exceptions. At 12 wells surrounding and downgradient from the former on-site drycleaner (MWs-2, 3, 4, 9, 13S, 14, 18, 19, 26, 27 and 30), PCE declined by an average of approximately 74%, TCE by approximately 49% and cDCE by approximately 19% between 2008/2009 and 2015.

Comparison of the March 2015 and previous groundwater analytical data showed clearly that COC concentrations in the on-site source area and downgradient areas declined sharply from 2008/2009 levels due to natural attenuation. Hence, there is ample evidence that removal of the secondary source material (the impacted soil) followed by rapid natural attenuation has proven to be an effective remedy for cleanup of groundwater impacted by former on-site DC operations.

Vapor intrusion screening for the groundwater volatilization to indoor air inhalation pathway for a commercial worker was performed utilizing the U.S. EPA Vapor Intrusion Screening Level (VISL – Version 3.3.1, updated May 2014) calculator. The VISL "Groundwater Concentration to Indoor Air Concentration" (GWC-IAC) calculator indicated that three compounds, PCE, TCE and benzene, are present in on-site groundwater at concentrations capable of exceeding indoor air inhalation targets.

The VISL calculator indicated that two compounds, TCE and benzene, potentially exceed the 1E-05 carcinogenic risk for commercial workers via the indoor air inhalation pathway. Similarly, the calculator suggested two compounds, PCE and TCE, potentially exceed the toxicity effects hazard quotient (HQ) of 1.0 for commercial workers. Hence the VISL-calculated target concentrations of PCE, TCE and benzene, the five locations at which these targets are exceeded, and the groundwater concentrations of these three VOCs are:

Compound	VISL Target Conc.	Exceedance Locations (MAR-2015 Concentration)		
PCE	240 µg/L	MW-2 (775 µg/L)	MW-22 (520 µg/L)	
TCE	22 µg/L	MW-2 (71.5 µg/L)	MW-4 (120 µg/L)	MW-16 (35 µg/L)
Benzene	69 µg/L	MW-28 (135 µg/L)		

The groundwater contamination exceeding the VISL groundwater target concentrations at monitoring wells MW-16, MW-22 and MW-28 was released from the off-site release sources, Chastain Cleaners and the CITGO/RRFM. Therefore, the release from the former on-site drycleaner appears only to have affected the VISL target exceedances at source area wells MW-2 and MW-4.

Updated groundwater Risk Reduction Standards (RRS) were calculated using current U.S. EPA toxicity values. The results of these calculations were detailed in the May 14, 2015 Groundwater Monitoring Report.

2.2 On-Site Petroleum UST Facility

An on-site petroleum UST facility containing three fiberglass double-walled tanks was installed at the FOSC in November 2005. This on-site UST facility is not the source of petroleum-contaminated groundwater on the FOSC site as evidenced by the following:

- There are no records of a release from this facility (Facility ID No. 10001030) in Georgia EPD, UST Management Program (USTMP) records.
- There is an USTMP record of a confirmed release from the Roswell Road Food Mart (CITGO/RRFM), 4968 Roswell Rd, Facility ID No. 9000005, on May 2, 1989, as well as USTMP records of multiple "suspected releases" on the following dates:
    - 09/24/1997
    - 05/13/1998
    - 06/05/1998
    - 07/13/1999
    - 04/16/2001
    - 05/14/2001
    - 02/26/2002
    - 10/26/2011
- The most recent investigation at the CITGO/RRFM in 1997 confirmed the presence of the petroleum VOCs benzene, toluene, ethylbenzene and xylenes (BTEX) in groundwater on the property (see discussion in **Section 2.3**).
- Groundwater contamination from benzene and methyl tert-butyl ether (MTBE) was detected in samples collected from MW-5, downgradient from the CITGO/RRFM, in April and June 2005, prior to installation of the on-site UST facility in November 2005.
- MTBE is associated with the on-site groundwater petroleum contamination (**Table 2**)
    - MTBE is an oxygenate (oxygen-containing compound) used in U.S. gasoline at low levels as an octane enhancer since 1979, and at higher levels in 1992-2005 to fulfill oxygenate requirements for reformulated gasoline (RFG) set by Congress in the 1990 Clean Air Act Amendments.

- According to EPA data, MTBE has not been used in significant quantities in RFG (non-compliance) areas since 2005. A similar decrease in MTBE use was also observed in conventional gasoline areas (Kinner, 2001) and (http://archive.epa.gov/mtbe/web/html/faq.html).
- Therefore it is unlikely that gasoline stored in the modern USTs installed in November 2005 at the on-site fuel station ever contained MTBE.
- MTBE is very soluble in groundwater (approximately 50,000 mg/L); approximately 30 times more soluble, and significantly less volatile, than are the petroleum hydrocarbon constituents of gasoline.
- MTBE does not readily sorb to soil, rock surfaces, or organic carbon in soil because of its high solubility. In contrast, the BTEX compounds (benzene, toluene, ethylbenzene, xylenes) are retarded relative to groundwater velocity because they sorb to soil/rock surfaces and organic carbon in soil. Hence, MTBE moves faster and further in groundwater than the BTEX compounds.
- Because of its high solubility and lack of retardation, MTBE tends to form "halo" of groundwater contamination along the leading edge of a groundwater gasoline contaminant plume, where the released gasoline contained MTBE. This is exactly the situation in the petroleum contaminant plume at FOSC (see Figure 21 in MEI's 2015 CSR & **Table 2** herein).

- Groundwater contaminated with benzene and MTBE is present at wells MW-5, MW-20 and MW-21, hydraulically *upgradient* from the on-site Kroger fuel station. The March 12, 2015 sample from MW-21, approximately 100 feet upgradient from the on-site fuel station, contained 2,500 μg/L of MTBE.
- The 2008 soil vapor survey map for BTEX indicates an area of concentrated BTEX vapor (a vapor "hot spot") north of, and hydraulically upgradient from the on-site fuel station.

Hence, the on-site Kroger fuel station is not the source of petroleum hydrocarbons detected in on-site groundwater. The petroleum release source is clearly the off-site CITGO/RRFM facility.

2.3 Source Area Summary

There are three release source areas associated with soil and/or groundwater contamination on the FOSC site: one on-site source, and two off-site sources. These three release sources are:

On-Site Source: Former Dry Cleaning Operation
Fountain Oaks Shopping Center
4920 Roswell Road NE, Sandy Springs, GA 30342
Parcel ID No. 17 00930006131
HSI Site No. 10807

Property Owner Information:
AMREIT Fountain Oaks LP
8 Greenway Plaza, Suite 1000, Houston, TX 77046

Off-Site Source: Active Dry Cleaning Operation
Chastain Cleaners
4980 Roswell Road NE, Sandy Springs, Georgia 30342
Parcel ID No. 17 009300021826

Property Owner Information:
Give Us Inc
740 Woodscape Trail, Johns Creek, GA 30022
Roswell, Georgia 30022

Off-Site Source: Active Petroleum UST Facility
Roswell Road Food Mart
4968 Roswell Road NE, Sandy Springs, Georgia 30342
Parcel ID No. 17 -009300021842
UST Facility ID No. 09000005

Property Owner Information:
The Rock It Inc
P O Box 19695, Atlanta, GA 30325

Chastain Cleaners and Roswell Road Food Mart (RRFM) are both directly upgradient of the FOSC subject site, based on the directions of groundwater flow as shown on **Figure 4 in Appendix A**. Groundwater contaminant plumes originating on each of these properties have migrated onto the FOSC subject site.

Chastain Cleaners is sub-listed on the HSI with FOSC as HSI No. 10807. The most recent investigation at Chastain Cleaners in 2009 confirmed chlorinated volatile organic compounds (CVOCS) in groundwater, including PCE, TCE, cDCE and VC. Based on groundwater flow directions, distances from impacted off-site wells to the former dry cleaners at FOSC, and the documented presence of CVOCs in groundwater on this upgradient property, CVOCs were released from the Chastain Cleaners property and migrated onto the FOSC subject site.

The Roswell Road Food Mart site (RRFM, formerly EZ Serve gas station) was granted "No Further Action" (NFA) status for a confirmed petroleum release by the Georgia EPD UST Management Program in 1998. The most recent investigation at RRFM in 1997 confirmed the presence of gasoline VOCs benzene, toluene, ethylbenzene and xylenes (BTEX) in groundwater on the property. Based on groundwater flow directions, the documented presence of petroleum compounds in groundwater on the upgradient RRFM parcel, and the lack of any documented release from the UST facility on the FOSC property (see **Section 2.2**), the release of BTEX that migrated onto the FOSC subject site originated on the RRFM property.

2.4 Chemicals/Contaminants of Concern

Multiple potential chemicals of concern (COC) have been detected during previous soil and groundwater investigations. The CSR prepared by MEI, dated January 14, 2010, presented the potential COCs detected in groundwater. The PPCAP prepared by UC dated November 28, 2005, also presented multiple potential COCs for soil. The combined list of potential COCs from these two documents include:

1. acetone
2. benzene
3. 2-butanone (aka methyl ethyl ketone, MEK)
4. n-butylbenzene
5. sec-butylbenzene
6. carbon disulfide (CD)
7. chlorobenzene
8. chloroform
9. cyclohexane
10. 1,2-dichloroethane (1,2-DCA)
11. cis-1,2-dichloroethene (cDCE)
12. diisopropyl ether
13. ethylbenzene

14. isopropylbenzene (cumene)
15. methyl cyclohexane
16. 4-methyl-2-pentanone (aka methyl isobutyl ketone, MIBK)
17. methyl-tertiary butyl ether (MTBE)
18. n-propylbenzene
19. tetrachloroethene (PCE)
20. toluene
21. trichloroethene (TCE)
22. 1,2,3-trimethylbenzene (1,2,3-TMB)
23. 1,2,4- trimethylbenzene (1,2,4-TMB)
24. 1,3,5- trimethylbenzene (1,3,5-TMB)
25. vinyl chloride (VC)
26. xylenes

One additional previously undetected PCE/TCE degradation daughter compound, trans-1,2-dichloroethene (tDCE), was reported to be present in on-site groundwater for the first time in March 2015.

Of the 27 total *potential* COCs, the following nine compounds are not listed in EPD Rules, Chapter 391-3-19, Appendix I, *Regulated Substances and Soil Concentrations That Trigger Notification* and are therefore not regulated under the HSRP:

1. n-butylbenzene
2. sec-butylbenzene
3. diisopropyl ether
4. methyl cyclohexane
5. methyl-tertiary butyl ether (MTBE)
6. n-propylbenzene
7. 1,2,3-trimethylbenzene (1,2,3-TMB)
8. 1,2,4- trimethylbenzene (1,2,4-TMB)
9. 1,3,5- trimethylbenzene (1,3,5-TMB)

Chlorobenzene was only detected in two soil samples from a single location, directly beneath the former location of a DC machine in boring I-DP-2 at 1 foot (0.0065 mg/kg) and 9 feet (0.0078 mg/kg) below ground surface (BGS). The HSRP notification concentration (NC) for chlorobenzene is 4.18 mg/kg, while the final approved Type 3 RRS is 10 mg/kg. Soil was excavated to a depth of 13 to 16 feet BGS in this area. No soil verification sample from this area or any other soil or groundwater sample collected on site contained any chlorobenzene. Hence, chlorobenzene is not a COC.

Additionally, the following seven compounds were either only detected in groundwater at a single location during a single sampling event, or were not detected in groundwater during the most recent, March 2015 sampling event. Justification for elimination of these compounds from consideration as COCs is presented below. The seven compounds not detected in groundwater during the March 2015 groundwater sampling event that should be eliminated from consideration as COCs are:

1. 1,2-dichloroethane (1,2-DCA) (detected once at MW-28, 3 µg/L, 5/20/2009)
2. cyclohexane (detected once at MW-5, 12 µg/L, 4/20/2006)
3. ethylbenzene (last detected at MW-19, 1.4 µg/L, 5/21/2009)
4. methyl cyclohexane (only detected at MW-5, 6.5 µg/L, 4/20/06 & 6.7 µg/L, 11/1/06)
5. 4-methyl-2-pentanone (MIBK) (detected once at MW-25, 16 µg/L, 5/22/2009)
6. toluene (last detected at MW-19, 11 µg/L, 5/21/2009)
7. xylenes (last detected at MW-5, 20 µg/L, 5/20/2009 & MW-19, 24 µg/L, 5/21/2009)

Hence, for the purposes of this VRP application, the 10 COCs are:

1. acetone
2. benzene
3. chloroform
4. cis-1,2-dichloroethene (cDCE)
5. trans-1,2-dichloroethene (tDCE)
6. isopropylbenzene (cumene)
7. methyl ethyl ketone (MEK) or (2-butanone)
8. tetrachloroethene (PCE)

9. trichloroethene (TCE)
10. vinyl chloride (VC)

2.5 Existing Regulatory Framework

The FOSC site is currently regulated by the Georgia Voluntary Remediation Program (VRP) as authorized by the Georgia Voluntary Remediation Program Act (VRPA) pursuant to Official Code of Georgia Annotated (O.C.G.A.) § 12-8-100, et seq.

As stated in **Section 2.1** previously, DC operations were conducted on site under the ownership of both the original developer of the property (LIA) and the subsequent purchaser (USRIF). The magnitude and extent of contamination documented during initial subsurface investigations in 2005 suggested groundwater contamination originated during LIA's ownership of the property. Since DC operations had continued under USRIF's subsequent ownership, on-going contribution to on-site soil contamination could not be ruled out.

Subsequently, investigation and remediation of groundwater contamination was delegated to the original developer of the property (LIA), while investigation and remediation of soil contamination and potential DNAPL impacts were delegated to the purchaser (USRIF). USRIF subsequently voluntarily investigated and remediated on-site soil impacts and investigated potential DNAPL. LIA was responsible for the investigation and remediation (if necessary) of on-site groundwater and off-site soil and groundwater impacts. Investigation and remediation of both soil and groundwater impacts on and off site have been regulated under the HSRP to date.

Additionally, the property was granted a limitation of liability (LOL) by the EPD in a letter dated March 6, 2006 pursuant to the 2005 Amendment (Georgia Senate Bill 277) to O.C.G.A. Section §12-8-200 et seq. of the Hazardous Site Reuse and Redevelopment Act ("the Georgia Brownfields Act"). EPD determined that the property owner at that time, U.S. Retail Income Fund VIII-D (USRIF), was eligible to receive a LOL for preexisting releases that occurred prior to December 31, 2003, subject to a number of specific conditions outlined in the approval letter. The Georgia Brownfield Program Summary Table (https://epd.georgia.gov/brownfield#links) shows that the FOSC site is on the list of Brownfield properties, with [soil] cleanup completed 18-JUL-08, with restricted, non-residential land use, and Type 3 and 4 RRS applicable.

2.6 Risk Reduction Standards

2.6.1 Soil Risk Reduction Standards

Soil Risk Reduction Standards (RRS) were calculated by UC on behalf of USRIF, the party voluntarily performing investigation and remediation of on-site soil contamination under the auspices of the Georgia Brownfields Program. Type 3 and 4 RRS were calculated for multiple COCs in soil and subsequently approved by EPD. Type 1, default RRS were reported to have been provided by the EPD in a letter dated May 10, 2007. Hence, Type 1 default, Type 3 and/or Type 4 RRS for on-site soil were calculated for following 14 compounds (UC PPCSR, 10-JUN-08, Table 5):

1. acetone
2. carbon disulfide (CD)
3. chlorobenzene
4. cumene (isopropylbenzene)
5. 1,1-dichloroethene (1,1-DCE)
6. cis-1,2-dichloroethene (cDCE)
7. trans-1,2-dichloroethene (tDCE)
8. ethylbenzene
9. 4-methyl-2-pentanone (methyl isobutyl ketone) (MIBK)
10. tetrachloroethene (PCE)
11. toluene
12. trichloroethene (TCE)
13. xylenes
14. vinyl chloride (VC)

Two additional, previously undetected compounds, benzene and 2-butanone (a.k.a., methyl ethyl ketone or “MEK”), were found to be present in on-site soil during MEI’s 2008-2009 subsurface investigations. Type 4 commercial RRS were calculated by MEI for these two compounds using USEPA Risk Assessment Guidance for Superfund (RAGS), Part B, Equation 6 (carcinogenic health effects) and Equation 7 (non-carcinogenic effects) (USEPA, 1991). As requested by EPD, MEI re-calculated soil volatilization factor (VF) inputs into RRS calculations using the most recent, May 2016, physical parameters from the US EPA Regional Screening Levels (RSLs) table, online at: https://www.epa.gov/sites/production/files/2016-06/documents/params_sl_table_01run_may2016.pdf. The updated soil VFs are tabulated in **Table 9 in Appendix B**.

Type 1 and 2 RRS for off-site residential soil calculated by MEI are summarized in **Tables 12 & 14 in Appendix B**. Soil to groundwater leaching calculations used in determining the Type 2 residential RRS are included as **Tables C1 – C9 in Appendix B**.

Comparison of both the previously approved and calculated RRS to verification sample analytical data collected during the 2007-2008 soil remediation project indicate that all impacted soil exceeding applicable RRS was successfully removed from the site. Analytical data from MEI's 2008-2009 subsurface investigation confirmed that no COCs were present in on-site soil in excess of applicable RRS. A Certification of Compliance verifying the compliance of on-site soil with all applicable RRS is included on page viii of this CSR.

2.6.2 Groundwater Risk Reduction Standards

Updated groundwater RRS were calculated using current U.S. EPA toxicity values. Updated toxicity values were obtained from the U.S. EPA Regional Screening Level (RSL) calculator website. Additional guidance was obtained from the U.S. EPA Region 4 Human Health Risk Assessment Supplemental Guidance and from the Georgia EPD HSRP.

MEI calculated Type 2 RRS for off-site residential land use for both potential carcinogenic and non-carcinogenic effects and both resident adult and child receptors. Likewise, MEI calculated Type 4 RRS for on-site commercial land use for carcinogenic and non-carcinogenic effects for a commercial worker.

In accordance with EPD Rules, the highest of the Type 1 default RRS, or the calculated Type 2 RRS is the final RRS for the residential use scenario. Similarly, the higher of either the Type 3 default or calculated site-specific Type 4 RRS is the final RRS for commercial usage.

Comparison of the RRS values with March 2015 groundwater concentrations show off-site groundwater is within applicable Type 1/Type 2 RRS. The results of the Type 3/Type 4 RRS evaluation indicate that five compounds are present in on-site groundwater in excess of the RRS for commercial use. The five compounds reported to be present in groundwater during the March 2015 sampling event in excess of Type 3/Type 4 commercial RRS values are:

- benzene
- cis-1,2-dichloroethylene (cDCE)
- tetrachloroethene (PCE)
- trichloroethene (TCE)
- vinyl chloride (VC)

Comparison of the Type 3/Type 4 commercial RRS to the March 2015 groundwater analytical data indicate exceedance of the RRS at 14 monitoring wells on the FOSC site. Groundwater isoconcentration contour/plume delineation maps for the five COCs present in on-site groundwater in excess of applicable RRS are presented as **Figures 7-11 in Appendix A**.

As previously noted, there are three sources of groundwater contamination on the FOSC site: the former on-site drycleaner, an off-site drycleaner (Chastain Cleaners) and an off-site gas station (CITGO/RRFM). The two off-site release sources are responsible for the majority of Type 3/Type 4 RRS exceedances (**Figures 7-11; Table 20**).

The former on-site drycleaner release resulted in RRS exceedances at only seven monitoring wells on the FOSC site: MW-2, MW-3, MW-4, MW-9, MW-13S, MW-14 and MW-27 (**Table 2**). Therefore, because of the release from former on-site DC operations, the site does not comply with Type 3/Type 4 RRS for groundwater at seven monitoring wells. A Certification of Compliance verifying the non-compliance of on-site groundwater with applicable RRS is included on page viii of this CSR.

3.0 CONCEPTUAL SITE MODEL (CSM)

3.1 Conceptual Site Model - Overview

The overall conceptual site model (CSM) of the FOSC subject location is of a site where:

- The release sources, one on-site and two off-site, and substances released into the environment on and surrounding the FOSC site have been well defined.
- The lateral and vertical extent and magnitude of soil contamination on-site and potential human health risks associated with the former DC operation were well defined through a series of exhaustive subsurface investigations.
- Soil contamination on-site in excess of applicable RRS was successfully removed via a 2007-2008 soil remediation/excavation project.
- The lateral and vertical extent and magnitude of groundwater contamination on and off-site, and associated human health risks, were defined through during a thorough 2008-2009 investigation.
- Groundwater flow, and subsurface contaminant migration patterns in soil and groundwater, are/were significantly affected by the pre-development topography.
- The groundwater contaminant plume, although in excess of RRS at several locations, is stable and naturally attenuating at a rapid rate due to removal of the contaminated source area soils/secondary source material.
- Potential vapor intrusion (VI) impacts for both on-site commercial receptors and off-site residential receptors:
  - Have been assessed through soil vapor sampling, a soil vapor survey, indoor air sampling, and VI modeling.
  - Have been mitigated through operation of an on-site VI mitigation system.
- Potential on-site VI impacts/residual soil gas COC concentrations are currently well below applicable risk-based levels.
  - Detections of constituents in six indoor air samples taken in 2013 did not exceed applicable standards in the EPA OSWER Vapor Intrusion Screening Level (VISL) Calculator using a Target Risk Concentration of 1.00E-05.
- The potential presence of DNAPL was investigated. DNAPL was determined not to be present on or beneath the site.

- There are no soil, groundwater, or vapor intrusion (VI) impacts in excess of RRS/risk-based levels on off-site properties.

Hence, the overall CSM of the FOSC site is of a site that:

- Has been thoroughly investigated,
- The potential human health and environmental risks evaluated, and
- Complies with applicable RRS for soil and vapor intrusion.

Groundwater in excess of RRS on-site is not a human health or environmental risk due to incomplete exposure pathways, and a plume that is rapidly attenuating. Detailed descriptions of the individual components of the CSM outlined above are presented in the following sections of this document.

3.2 Geologic and Hydrogeologic Setting

The FOSC site is located within the Piedmont Physiographic Province of Georgia, which is composed of hard igneous and metamorphic rocks derived from the recrystallization of ancient (300 to 600 million year old) sediments. In this type of geologic setting, the direction of groundwater flow is anticipated generally to conform to topographic slope or to that of nearby surface water. The water table is generally 30 to 100 feet below the ground surface on hilltops and hillsides, but is at or near the ground surface in stream valleys and draws.

Data obtained at the FOSC site are demonstrative of this regional groundwater flow system. The groundwater is flowing principally in the soil above bedrock and to a lesser degree through the bedrock system. In some areas, the rock surface extends above the groundwater table.

3.2.1 Topography and Drainage

The surface relief of the Piedmont is characterized by relatively low, rolling hills with heights above sea level between 200 feet (50 m) and 800 to 1,000 feet (250 m to 300 m). Based on the U.S. Geological Survey (USGS) 7.5-minute Sandy Springs, Georgia topographic quadrangle map (1955, photo-revised 1983) pre-development elevations at the FOSC site ranged from approximately 1,010 ft msl to approximately 1,030 ft msl. The elevations on and immediately surrounding the FOSC site range from approximately 960 to 990 ft msl, as determined by surveyed surface elevations at each of the 22 monitor wells installed by MEI in 2008-2009,

A historic topographic map, dated 1928 (**Figure 5**), shows the FOSC site in an area of gently rolling hills with elevations of approximately 990 feet above mean sea level (ft msl) to 1,040 ft msl. Two small valleys traversed the FOSC site in a general northeast to southwest orientation. One valley small was located on the northern portion of the site, originating in the approximate area of the off-site Chastain Cleaners facility and traversing the site to the southwest, beneath the location of the former on-site DC tenant bay.

The second small valley was shown on the southern portion of the FOSC site. The two previously existing small valleys were apparently filled for the construction of the FOSC development. The unfilled remnants of these two small valleys are still present west and southwest of the FOSC site, as shown on the 2014 USGS Sandy Springs topographic map (**Figure 5**).

The 2014 USGS topographic map (**Figure 1**) shows the eastern portion of the site sloping westward, and then leveling to the west. Surface water flow at the FOSC site and immediate vicinity generally flows west and southwest.

3.2.2 Geology - Soil/Unconsolidated Residuum

Soil samples collected and logged during the multiple subsurface investigations performed at the site indicate that there is approximately 1-22 feet of fill material overlaying residual native soils on site. The fill soils generally consisted of silts with varying amounts of clay, fine sand, mica, weathered mica schist (saprolite), and less-weathered rock fragments.

Residual soil/unconsolidated residuum was encountered below the fill materials, above competent bedrock. The residual soils were generally classified as silts and fine sand with varying amounts of clay, mica, and weathered rock fragments.

As noted previously, fill materials are present near land surface across the majority of the FOSC site with thicknesses ranging from approximately one to twenty-two feet. The in-filling of the site is suggested by the presence of two small valleys shown on 1927-1930 topographic maps geo-referenced to current Atlanta-area street maps, with the approximately boundary of the FOSC site and structures overlain (**Figure 5**) (http://disc.library.emory.edu/atlantamaps/atlanta-1927-30-topographic-maps-with-open-street-map-overlay/) . Hence, consistent with the previously existing topography, fill thickness generally thickens from east to west

3.2.3 Bedrock Geology

As stated herein in **Section 3.2.3**, according to the Georgia Geological Survey publication "Geology of the Greater Atlanta Area" (Bulletin 96, 1984), the rocks underlying the FOSC site are undifferentiated, ductally sheared rocks of the Brevard fault zone. According to the Georgia Geological Survey publication "Geologic Map of Georgia" (1979, Atlanta Area, North 4 East 2) rocks beneath the site are "button mica schist," a type of high-grade metamorphic rock.

The mica schist rock type mapped by the Georgia Geological Survey was confirmed to be present beneath the FOSC site during rock drilling conducted by MEI in 2008 to 2009, as shown in MEI's January 14, 2010 CSR. Further, the mica schist beneath the site was found to be interfingered with more highly metamorphosed gneiss and amphibolite. Depth to competent bedrock at the FOSC site varies from approximately 40 to 65 feet below surface grade (BGS).

3.3 CSM - Soil/Residuum

As noted previously, there is approximately 1-22 feet of fill material overlaying residual native soils on site. The in-filling of two small valleys formerly at the FOSC was necessary to level and develop the site into its current, relatively level configuration. The original, pre-development topographic surface has played a significant role in the migration of contaminants released from the former on-site DC source and the two off-site sources. The original topography of the site is shown on a 1927-1930 topographic map with the approximately boundary of the FOSC site and associated structures overlain (**Figure 15**).

3.3.1 Delineation of COC Concentrations

The extent of on-site soil contamination was delineated through previous investigations conducted initially by Keramida Environmental and through subsequent exhaustive soil boring and sampling conducted by UC. During the course of these previous soil investigations, the following activities were performed to delineate the lateral and vertical extent of soil contamination on site:

1. Keramida (Phase II ESA, March 30, 2005) installation of 11 soil borings, including:
    a. Seven borings between 18 and 30 ft deep (four converted to monitoring wells).
    b. Four shallow borings within the former DC tenant bay.
    c. Collection and analysis of 18 soil samples for VOC concentrations.
    d. PCE present in 16 of 18 samples at 0.014 to 34.8 mg/kg.
2. UC (PPCAP, 28-NOV-05):
    a. Installation of 18 direct push borings.
    b. Installation of 8 groundwater monitoring wells.
    c. Collection and analysis of 63 soil samples for VOCs concentrations
    d. PCE present in 25 of 63 soil samples at concentrations up to 380 mg/kg
    .
3. UC extent of contamination investigation (PPCSR, 10-JUN-08):
    a. Installation of 49 direct push (DP) environmental assessment borings, (EAB-1 - EAB-49), to assess extent of PCE in soil for remedial actions.
    b. Installation of two hand-auger borings (HA-1 & HA-2) inside coin dealer & restaurant tenant spaces to assess the extent of PCE under these facilities for remedial actions;
    c. Collection and field screening of soil samples every two feet from DP borings.
    d. Selection of two to three soil samples from each DP & hand auger boring for analytical testing for PCE concentrations.
    e. PCE present in 97 of 106 samples collected.
    f. PCE present in excess of NCs in 56 samples.
    g. PCE present in excess of approved Type 4 RRS (1.18 mg/kg) in 35 samples.

Additionally, following the soil remediation project (**Sections 2.1 and 3.2.2**), MEI installed 22 monitoring wells and 4 DP borings, and collected and analyzed 33 soil samples during our 2008-

2009 PCAP/CSR investigation. Analysis of these soil samples indicated that on-site concentrations of PCE (the principle COC) ranged from below detection limits (BDL) to 300 micrograms per kilogram (μg/kg). Additionally, during MEI's 2008-2009 investigation, no soil sample collected from an off-site boring contained any COCs in excess of default, Type 1 RRS.

Hence, through the installation of approximately 106 borings and collection and analysis of approximately 220 soil samples, the extent of soil contamination on the FOSC site was well defined. Consequently, the potential human health risks associated with on-site soil contamination, reflected in RRS exceedances, was also well defined prior to initiation of the 2007-2008 soil remediation project. An isoconcentration contour map showing the delineated extent of PCE in soil was provided as Figure 4 in UC's 10-JUN-2008 PPCSR.

3.3.2 Soil Remediation

A soil remediation/excavation project was conducted in the area surrounding and within the former on-site DC tenant bay. Prior to excavating the contaminated soil, the lateral and vertical extent of impacts exceeding the Type 4 RRS for PCE, the principle COC, was defined through the installation of 49 environmental assessment borings and collection and analysis of 106 soil samples (see discussion in **Section 3.3.1**).

Prior to commencement of the corrective actions, PCE was the only constituent detected in soil above the Type 4 RRS. PCE was therefore the primary COC driving soil corrective action.

Remedial operations included excavation and disposal of impacted soils with COC concentrations exceeding the approved 1.18 mg/kg Type 4 RRS for PCE. Excavation began in November 2007 and concluded in May 2008.

Analytical testing of initial verification samples indicated the presence of COCs in approximately 1-5% of excavated areas at concentrations greater than the approved RRS. Re-excavation was then conducted in these areas with subsequent follow-up verification sampling. This process continued until the results of the verification sampling demonstrated that the soils remaining in place complied with the approved RRS.

During excavation of Areas 5 and 6 undercutting the adjacent tenant space restaurant, an approximate 3-foot diameter cylindrical excavation was observed directly below the spread footing for the south wall of the former DC facility. The origin of the cylindrical excavation was likely a former test boring for a caisson foundation. This cylindrical excavation/preferential pathway (Area EA 6A) was remediated by over drilling with a 6-foot diameter auger to a depth of 31 ft BGS, at which point competent rock was encountered.

Through the soil remediation process:

- Five stages of excavation, follow-up verification sampling and subsequent overexcavation were conducted at some locations.
- Approximately 3,830 tons of impacted soils were removed
- A preferential vertical pathway to groundwater was discovered directly beneath the former DC tenant bay.
- Collection and analysis of 213 soil verification samples indicated that all soil in excess of RRS was successfully removed.
- Collection and analysis of 146 split verification samples provided separate confirmation that all soil in excess of RRS was successfully removed.

The results of the soil remediation verification sampling therefore confirm successful removal of all impacted soil in excess of calculated RRS. This work is documented in UC's June 8, 2010 Prospective Purchaser Compliance Status Report (PPCSR).

Hence, the on-site soil portion of the CSM is of formerly contaminated soil that has been remediated and therefore does not pose a significant human health or environmental risk.

3.3.3 Magnitude and Extent of Remaining COC Concentrations

The results of soil verification sample analyses collected during the soil remediation project indicate that the following are the maximum concentrations of the principle COCs remaining in on-site soil:

Compound	Approx. Max. Residual	Type 4 RRS
• Benzene	0.016 mg/kg	53.1 mg/kg
• PCE	1.1 mg/kg	1.18 mg/kg
• TCE	0.18 mg/kg	0.7 mg/kg
• cDCE	0.2 mg/kg	1.84 mg/kg
• VC	Not Detected	0.2 mg/kg

These remaining COC concentrations in soil are all below applicable RRS.

3.4 CSM - Groundwater

3.4.1 Groundwater Flow Directions, Gradients and Velocity

Groundwater elevation data were used to construct potentiometric map for the FOSC site for the most recent, March 10, 2015 groundwater sampling event (**Figure 4 in Appendix A**). Based on the potentiometric map included as **Figure 4**, groundwater flow on site is complex, with a groundwater flow divide. This groundwater divide and groundwater flow clearly mimics the pre-development topography at the site, as evidence by an overlay of the March 10, 2015 groundwater potentiometric surface with the 1928 topographic map of the site (**Figure 5**).

As shown on **Figure 4**, Groundwater flows toward the southwest to west-southwest on the northern portion of the property, including the on-site release source area. Groundwater beneath the southern portion of the property flows toward the south to south-southwest (**Figure 4**).

The groundwater hydraulic gradient in the source area generally varies from approximately 0.01 to 0.05 feet/foot (ft/ft), with an average of approximately 0.03 ft/ft. As shown on **Figure 4**, the direction of groundwater flow is generally from the north-northeast toward the south-southwest.

According to a previous hydrogeological assessment, described by UC in their November 28, 2005 PPCAP, the overall porosity of the residuum beneath the site is approximately 0.22, while the effective porosity is approximately 0.20. Additionally, the hydraulic conductivity of unconsolidated residuum beneath the site is reported to vary between approximately 2.29E-05 centimeters per second (cm/s) and approximately 2.64E-04 cm/s, with a geometric mean of approximately 7.78E-05 cm/s.

Groundwater flow velocity (Darcy velocity) was calculated using the site-specific data above and the Darcy Equation:

$$v = K * i / n$$

Where:

K = hydraulic conductivity = 7.78E-05 cm/s = 80.4 ft/yr

i = hydraulic gradient (dimensionless slope) ≈ 0.03 (average value)

n = porosity ≈ 0.2 (20% porosity) estimated for residuum.

Therefore,

v = (80.4 ft/yr)(0.03)/0.2

v = 12 ft/yr = approximate average groundwater flow velocity.

Hence, the average groundwater flow velocity is approximately 12 ft/yr, with a flow direction toward the west-southwest near the former on-site DC release source area, and a south-southwesterly flow direction beneath the southern portion of the site.

3.4.2 Water Resources

3.4.2.1 Drinking Water Supplies

The City of Atlanta's water supply and treatment system is owned and operated by the City of Atlanta Department of Watershed Management (DWM). The geographic area served by the City of Atlanta water treatment and distribution system covers an area greater than 650 square miles and includes the City of Sandy Springs (www.atlantaga.gov/modules/showdocument.aspx?documentid=2831). Additional public water supplies in the area are operated by the Dekalb County Department of Watershed Management (DWM) (http://dekalbwatershed.com/Chattahoochee.htm)

The intakes for these two municipal water supplies are located the following distances from the FOSC site:

- Atlanta DWM – Atlanta – Fulton County Water Treatment Plant 12.6 miles
- Atlanta DWM – Chattahoochee Water Treatment Plant 6.1 miles
- Atlanta DWM – Hemphill Water Treatment Plant 7.0 miles
- Dekalb County DWM – Chattahoochee Raw Water Transmission Main 6.9 miles

A search of U.S. Geological Survey records of wells in Georgia (http://waterdata.usgs.gov/ga/nwis/inventory) indicates that there are no water supply wells located within a two-mile radius of the FOSC site. Specifically, there are no records of any water supply wells within a four-mile-by-four-mile latitude and longitude defined "box" centered on the FOSC site. Hence, groundwater impacts on the FOSC site are not a potential threat to public or private water supplies.

3.4.2.2 Surface Water

The 2014 USGS Sandy Springs topographic quadrangle map (**Figure 1**) shows that the nearest downgradient surface water stream is an unnamed tributary to Nancy Creek located approximately 1,200 feet southwest of the on-site groundwater contaminant plume.

The 1928 USGS topographic map (**Figure 55**) shows two intermittent streams/drainage conveyances in the two pre-development valleys within the footprint of the FOSC site. Subsequent USGS Sandy Springs quadrangle topographic maps from 1955, 1968, 1973 and 1983 do not indicate the presence of these streams within the two valleys. The FOSC site was originally developed in 1987, at which time the valleys were filled in, and the northernmost of the two intermittent streams / drainage conveyances shown on the 1928 topo map was apparently channelized into a culvert.

The culvert discharges on the undeveloped Long Island Terrace property, into a drainage conveyance near the base of the fill material, within the valley shown on the 1928 topographic map (**Figure 5**). The discharge location of the culvert is also shown on **Figures 2-11 in Appendix A.**

MEI collected a grab sample of the water exiting the culvert on May 3, 2017 as directed in EPD’s Comment Letter of November 30, 2016, Item #6. This sample was collected in accordance with EPA Region 4 Science & Environmental Support Division (SESD) “Quality System & Technical Procedures” – “Surface Water Sampling” operating procedures. The sample was immediately placed on ice after collection and was shipped under chain of custody protocols to Environmental Science Laboratory in Mount Juliet, Tennessee. The sample was analyzed for VOCs concentrations by EPA Method 8260B. Analytical results from this surface water sample are contained in **Appendix G.**

The results of this analysis show that there were no chlorinated hydrocarbons or VOCs were present in the sample. The analytical results indicate that for five compounds (acetone, acrolein, dichlorodifluoromethane, 2,2-dichloropropane, and trichlorofluoromethane), the batch quality control (QC) was outside the laboratory QC range for precision or accuracy. Only one of these compounds, acetone, is a COC and also a common laboratory artifact, but was not detected in the sample. Therefore, the surface water analytical results confirm that there is no evidence that the subsurface contaminant plume originating from the former onsite DC operation impacted the channelized surface water runoff within the culvert.

Since the downgradient extent of the groundwater contaminant plume has been defined, and the surface water sample did indicate the presence of any chlorinated hydrocarbons, the FOSC site is not a potential threat to underlying conveyances or downgradient surface water bodies.

3.4.3 Groundwater Contaminant Plumes

3.4.3.1 Plume Delineation

The groundwater contaminant plume was delineated through the installation of 33 monitoring wells between 2005 and 2009 and through the collection and analysis of 163 groundwater samples from these wells between 2005 and 2015. The results of both the 2008/2009 and 2015 groundwater sampling events indicate that the lateral and vertical extent of groundwater contamination has been defined.

The results of the March 2015 groundwater sampling event indicate that there are 14 locations on site (listed below) where groundwater exceeds applicable Type 3/Type 4 RRS for one of five COCs (**Table 20 and Figure 7-11**). These COCs and on-site exceedance locations are:

- Benzene (MWs-20, 21 & 28)
- cDCE (MWs-2, 4, 16, 20 & 28)
- PCE (MWs-2, 3, 5, 9, 13S, 14, 16, 20, 22, 23 & 28)
- TCE (MWS-2, 4, 6, 16, 20 & 28)
- VC (MWs-16 & 28)

The March 2015 groundwater sampling results also indicate that there are no off-site groundwater COC concentrations in excess of applicable Type 1/Type 2 RRS (**Tables 2 & 18**). The 22 μg/L of PCE reported in March 2015 at monitoring well MW-13S, adjacent to the western property boundary, suggests the possibility that off-site groundwater may be impacted above the 11 μg/L Type 1/Type 2 residential RRS. However, at two wells located farther downgradient, MW-30 and MW-31, the March 2015 PCE concentrations were 10 μg/L and <1 μg/L (i.e., "BDL") respectively. Hence the downgradient extent of the plume is defined west of and downgradient from the former on-site release source area.

A groundwater quality map showing analytical results of the March 2015 groundwater sampling event in comparison to previous (2008/2009) analytical results at each well is included as **Figure 6**. Groundwater isoconcentration contour/plume delineation maps for the five COCs present in on-site groundwater in excess of applicable Type 3/Type 4 Commercial RRS are presented as **Figures 7-11 in Appendix A**.

3.4.3.2 Qualifying Delineation Criteria

The Georgia VRP Act (O.C.G.A. §12-8-100 et seq.) defines five potential criteria that may be used as satisfactory evidence of the delineation of the horizontal and vertical extent of soil or groundwater contamination. These five criteria are (O.C.G.A. §12-8-108):

1. Concentrations from an appropriate number of samples that are representative of local ambient or anthropogenic background conditions not affected by the subject site release;
2. Soil concentrations less than those concentrations that require notification under standards (i.e., notification concentrations or "NCs");
3. Two times the laboratory lower detection limit concentration using an applicable analytical test method recognized by the USEPA;
4. For metals in soils… [Not Applicable]
5. <u>Default, residential cleanup standards;</u>

The groundwater contaminant plume that originated from the former on-site DC source has been defined under criteria number 5 above. Specifically, COC levels are below default, Type 1 residential cleanup standards in the monitoring wells farthest downgradient to the south and southeast (MWs 7, 33 and 15), farthest downgradient to the west (within the in-filled topographic valley beneath the site) (MWs 30 & 31) and cross-gradient to the north (MW-25). Groundwater isoconcentration contour/plume delineation maps for the five COCs (benzene, cDCE, PCE, TCE and VC) in on-site groundwater in excess of Type 3/Type 4 RRS are presented as **Figures 7-11 in Appendix A**.

Collection of soil samples during multiple site investigations by MEI and others have defined the extent of soil contamination to within default, Type 1 RRS. Hence, the downgradient and cross-gradient extent of soil and groundwater contamination associated with the release from the former on-site DC operation have been delineated in accordance with applicable language in the authorizing statute. Delineation of the upgradient extent of groundwater contamination associated with the two off-site release sources, Chastain Cleaners and the CITGO/RRFM, are the responsibilities of the respective property owners and/or business operators at those two locations.

3.4.3.3 Plume Stability & Natural Attenuation

The groundwater contaminant plume associated with the former on-site DC release source is stable and naturally attenuating at a rapid rate. Comparison of the results of the most recent, March 2015 groundwater sampling event with those of the previous 2009 or 2008 event (the most recent previous event varies well to well) generally indicate significant and/or remarkable reductions in PCE, TCE and cDCE across the site, with few exceptions (**Figure 6**)

The rapid natural attenuation of groundwater contamination is illustrated on a groundwater quality map included as **Figure 6**, which shows the PCE, TCE, cDCE and VC results from the March 2015 sampling event, as well as the previous results from 2008 or 2009. As shown by the data on **Figure 6**, at 12 wells surrounding and downgradient from the former on-site drycleaner (MWs-2, 3, 4, 9, 13S, 14, 18, 19, 26, 27 and 30), PCE declined by an average of approximately 74%, TCE by approximately 49% and cDCE by approximately 19%.

These reductions in PCE, TCE and cDCE concentrations in the release source and downgradient areas show clearly that natural attenuation is occurring at a rapid pace. Remediation of the contaminated source area soils (secondary source material) has no doubt been an important contributing factor to the observed rapid natural attenuation of groundwater contamination.

Hence, the groundwater contaminant plume aspect of the CSM is of a delineated, stable plume that is rapidly attenuating.

3.4.4 Groundwater Fate & Transport/Natural Attenuation Modeling

3.4.4.1 Domenico Steady-State Fate & Transport / Natural Attenuation Model

The Domenico analytical model (Domenico, 1987) is a solution to the advection-dispersion partial-differential equation of contaminant transport in groundwater. The Domenico model is commonly used to predict downgradient groundwater contaminant concentrations along a straight-line flow path at a given distance from a release point source (USEPA, 2002; USEPA, 1996; ASTM, 1995).

The analytical solution form of the Domenico equation was programmed into a Microsoft Excel spreadsheet to perform the modeling documented herein. The model was applied to the FOSC groundwater contaminant plume to estimate downgradient COC concentrations in groundwater at a 1000-foot distance downgradient from the delineated plume boundary, as specified in the Georgia VRP Act (O.C.G.A. § 12-8-102 (b)(11)(C)). The model was also used to estimate the maximum downgradient extent of the groundwater contaminant plume for the five COCs exceeding Type 3/4 Commercial RRS in on-site groundwater.

Use of the model requires contaminant concentration data at a minimum of one source area monitoring well and one to two downgradient wells. The groundwater data must show a reasonable plume pattern typical of “point sources” (i.e., contaminant concentration is highest in the source well and gradually decreasing in downgradient wells). The model is calibrated by adjusting three model input parameters to fit groundwater concentration spatial pattern based on the spatial concentration distribution data. The model after calibration is then used to predict the horizontal plume length in groundwater.

The Domenico analytical model is based on the advection-dispersion partial-differential equation for organic contaminant transport processes in groundwater as described in Domenico and Robbins (1985). Under conditions of a steady-state, continuous source with one-dimensional groundwater velocity, three-dimensional dispersion, and a first order degradation rate constant, the analytical solution can be expressed as the following equation (Domenico 1987):

$$\frac{C_x}{C_0} = \exp\left\{ \frac{x}{2\alpha_x}\left[1-\left(1+\frac{4\lambda\alpha_x}{\upsilon}\right)^{\frac{1}{2}}\right]\right\} erf\left[\frac{Y}{4(\alpha_y x)^{\frac{1}{2}}}\right] erf\left[\frac{Z}{4(\alpha_z x)^{\frac{1}{2}}}\right]$$

Where,

C_x - contaminant concentration in a downgradient well at distance x (mg/L),

C_o - contaminant concentration in the source well (mg/L),

x - centerline distance between the source well and downgradient well (cm),

α_x, α_y & α_z - longitudinal, transverse, and vertical dispersivity (cm), respectively,

λ- degradation rate constant (day^{-1}),

v - groundwater velocity (cm/day),

Y - source width (cm),

Z - source depth (cm),

erf - error function,

exp - exponential function.

The Domenico groundwater contaminant fate & transport model assumes:

1. A source of finite width and thickness dimensions perpendicular to groundwater flow,
2. A steady state (steady or fixed concentration) source,
3. Homogeneous aquifer properties,
4. One dimensional groundwater flow,
5. First order degradation rate,
6. Contaminant concentration estimated at the centerline of the plume,
7. Molecular diffusion based on concentration gradient is neglected,
8. No retardation (e.g., sorption) in transport processes.

Understanding model assumptions is crucial for simulating transport processes of contaminants in groundwater. The inherent assumptions in the model equation make it a conservative means of estimating downgradient contaminant concentrations. Specifically, the model assumes a steady-state, fixed concentration contamination source within a rectangular area perpendicular to the direction of groundwater flow/plume migration. As documented in **Section 3.4.3.4**, groundwater contaminant concentrations in the release source area and downgradient areas are rapidly attenuating.

Hence, the steady-state (fixed concentration) assumption implicit in the model is a conservative assumption. MEI utilized the highest groundwater concentrations of benzene, cDCE, PCE, TCE and VC measured in groundwater during the March 2015 sampling event as the steady-state source area groundwater concentration (C_{source}). The source area width (W) was assumed to be approximately 32.4 feet, based on the 30-foot north-south width of the former DC tenant bay, and a composite groundwater flow direction toward the west-southwest, with a bearing of 250 degrees. Hence, the width of the former DC tenant bay perpendicular to flow (at a 90° angle to 250°, i.e., 160° or 340°) is approximately 32.4 feet, the assumed width of the source area.

The value of the source area depth was left at the default value of 200 cm, to be conservative. Source zone / mixing zone thickness was estimated at 216 cm (7.1 ft), which is the average distance between the depth at which groundwater was first encountered in borings and depth to competent bedrock/refusal.

Understanding chemical properties in relation to model assumptions also is critical in interpreting the transport model results. For example, MTBE has a low potential for sorption onto soil particles/organic carbon due to its low soil-groundwater organic carbon partition coefficient (K_{oc}) value (12 L/kg) while PCE has a relatively high K_{oc} value (94.95 L/kg) and a corresponding high retardation potential.

"Retardation" is the slower movement of a contaminant in groundwater, relative to the groundwater velocity, due to sorption of the contaminant onto soil particles and organic carbon. Thus, the speed of contaminant transport is "retarded" relative to groundwater velocity.

Therefore, the lack of retardation in the model, assumption No. 8 above, may not be a significant factor for MTBE, but suggests the model tends to overestimate downgradient concentrations of COCs with higher K_{oc} values like benzene, PCE and TCE. Hence, for these compounds, the predicted downgradient concentration is a conservative estimate.

All model input parameters consisted of one the following:

- Site-specific information contained in this report, and/or in previous reports on the FOSC site by MEI and others, as documented in **Table 1.**
- Conservative, default values published by:
  - The US EPA (Regional Screening Levels (RSL) Table, May 2016)
  - The American Society for Testing and Materials (ASTM)
    - (Standards E2081-00 & E1739-95)
  - The Georgia EPD
- Values from public or published, documented sources
  - (U.S. National Weather Service, Weidemeir, et al., 1999).

All fate and transport model input parameters, parameter values, data sources, formulas for individual/intermediate variables, conversion factors, and intermediate and final calculations are documented in **Tables 3-8 in Appendix B**.

An implicit assumption is that model input parameters are in consistent units, hence modeled linear dimensions (distances, depths, widths, etc.) are in centimeters (cm); velocities (distance/time) are in cm/day or cm/year. Concentration values were input in milligrams per liter (mg/L). Corresponding site-specific values more commonly expressed in feet, inches, ft/yr, in/yr, micrograms per liter (µg/L), etc., and corresponding conversion factors/formulas, are all given in the groundwater fate & transport modeling calculations documented in **Tables 3-8 in Appendix B**

Significant aspects of the groundwater fate and transport modeling relative to VRP regulatory compliance, derivation of natural attenuation constants, calculation of the soil-to-groundwater leaching source term and model calibration are discussed in **Sections 3.4.4.2 – 3.4.4.5** as follows. Groundwater fate and transport modeling results are discussed in **Section 3.4.4.6**, and are summarized in **Tables 3-8 in Appendix B**.

3.4.4.2 Point of Exposure, Estimation of Centerline Distance Modeled

The Domenico fate and transport model was applied to estimate downgradient COC concentrations at a 1000-foot distance downgradient from the delineated plume boundary, at the "point of exposure" (POE) as defined in the Georgia VRP Act (O.C.G.A. § 12-8-102 (b)(11)(C)).

However, EPD's November 30, 2016 "Comment Letter" reviewing MEI's December 2015 CSR, Comment #6, stated the following:

> "EPD does not agree with Section 3.4.2.2 of the December 2015 VRP and CSR, which stated that because the downgradient extent of the groundwater plume has been defined, the downgradient surface water stream would not be impacted by the constituents of concern (COC) from the subject property in the future. The nearest surface water body originates on-site along the western boundary of the subject property, as observed during EPD's October 5, 2016 site visit, not 1,200 feet southwest of the plume as stated in

> Section 3.4.2.2. Please collect a minimum of one (1) sample from the surface water and include a figure illustrating the creek as the nearest Point of Exposure (POE)."

MEI has performed several tasks in response to this comment. First, as described in **Section 3.4.2.2 "Surface Water"**, a grab sample of the water exiting the culvert on the undeveloped Long Island Terrace property was collected on May 3, 2017 and analyzed for VOC concentrations by EPA Method 8260B. The results of this analysis (**Appendix G**) indicate that there were no VOCs detected present in the sample.

Additionally, MEI modeled the fate & transport of the five compounds in on-site groundwater exceeding Type 3/4 Commercial RRS using both potential downgradient points of exposure, i.e., both the culvert outlet on the Long Island Terrace property, and a hypothetical drinking water well 1000 feet downgradient.

Figures 7 – 11 in Appendix A are groundwater isoconcentration contour/plume delineation maps showing the creek as the nearest POE for the five COCs exceeding RRS (benzene, cDCE, PCE, TCE & VC) in on-site groundwater. The fate & transport model results shown on **Figures 7 – 11** illustrate the model calculations shown on **Tables 3-8 in Appendix B**. Groundwater plume delineation maps for these five compounds showing the hypothetical 1,000 foot downgradient well as the POE are presented as **Figures 7 – 11 in Appendix A**.

One of the conditions for using the Domenico Model to simulate contaminant fate & transport is that the selected downgradient well must be along the plume centerline, at a distance specified by the user. The distances modeled, from release source to POE includes both distance from the delineated downgradient edge of the contaminant plume to the POE, as well as the distance along flow path from the release source to the delineated edge of the plume.

The on-site release source area for chlorinated COCs is the former DC tenant bay on the northern tip of the FOSC north wing (**Figure 3**). Groundwater beneath the northwest portion of the FOSC, including the release source, and adjacent off-site area flows predominantly toward the west-southwest, or on an approximate bearing of 250 degrees. The distances from the release source to the downgradient delineated plume edges for three of the four chlorinated COCs exceeding RRS (cDCE, PCE and TCE), along the 250° groundwater flow path, were estimated from the plume maps included as **Figures 7-11**.

Although the release source for benzene is the off-site CITGO/RRFM, the location of the highest groundwater benzene concentration on the FOSC site is monitoring well MW-28 (135 µg/L). Likewise, the location of the highest vinyl chloride (VC) concentration on site is also at MW-28. Hence, for purposes of modeling the fate & transport of benzene and VC in groundwater, MW-28 was assumed to be the on-site "release source area" for these two compounds. The distances from the surrogate source area (MW-28) to downgradient delineated plume edges, along the predominant groundwater flow path (250° bearing), were estimated from the benzene and VC isoconcentration / plume delineation maps (**Figures 7 & 11**). Other source area parameters, such as source width and thickness, depth to impacted soil, mixing zone thickness, etc. were assumed to remain constant at both the actual on-site release source (the former DC tenant bay) and the surrogate release source (MW-28).

The estimated distances from the on-site release source area, and surrogate benzene release source area, and the total plume centerline/groundwater fate & transport distances modeled are summarized below:

Point of Exposure – Stream on Long Island Terrace Property

COC	Distance: Source - Delin. Plume Edge	Distance: Plume Edge Pt. of Exposure	Distance, total
Benzene	50 ft (1,524 cm)	405 ft (12,344 cm)	455 ft (13,868 cm)
cDCE (N. Source Area)	70 ft (2,134 cm)	305 ft (9,296 cm)	375 ft (11,430 cm)
cDCE (S. Source Area)	50 ft (1,524 cm)	200 ft (6,096 cm)	250 ft (7,620 cm)
PCE	300 ft (9,144 cm)	75 ft (2,286 cm)	375 ft (11,430 cm)
TCE	175 ft (5,334 cm)	200 ft (6,096 cm)	375 ft (11,430 cm)
VC	47 ft (1,433 cm)	218 ft (6,645 cm)	265 ft (8,077 cm)

Point of Exposure – Hypothetical 1,000 ft Downgradient Water Well

COC	Distance: Source - Delin. Plume Edge	Distance: Plume Edge Pt. of Exposure	Distance, total
Benzene	50 ft (1,524 cm)	1,000 ft (30,480 cm)	1,160 ft (32,004 cm)
cDCE	70 ft (2,134 cm)	1000 ft (30,480 cm)	1,110 ft (32,614 cm)
PCE	300 ft (9,144 cm)	1000 ft (30,480 cm)	1,300 ft (39,624 cm)
TCE	175 ft (5,334 cm)	1000 ft (30,480 cm)	1,175 ft (35,814 cm)
VC	47 ft (1,433 cm)	1000 ft (30,480 cm)	1,070 ft (31,913 cm)

3.4.4.3 Derivation of Natural Attenuation Rate/Decay Constants

MEI utilized USEPA methods to derive site-specific attenuation/"decay" rate constants (i.e., values of lambda, λ) for use in the contaminant fate & transport modeling. These methods are described in the EPA documents "Calculation and Use of First-Order Rate Constants for Monitored Natural Attenuation Studies" (USEPA, 2002) and "Technical Protocol for Evaluating Natural Attenuation of Chlorinated Solvents in Ground Water" (USEPA, 1998). Calculated site-specific values of the attenuation rate constant, lambda (or K_{point} in USEPA, 2002) were compared to values published in Howard, et al. (1991) "Handbook of Environmental Degradation Rates."

First, MEI calculated approximate attenuation rate constants for the five COCs exceeding RRS in on-site groundwater using the measured changes in contaminant concentrations at each well from the time of peak contaminant concentration, i.e., 2008 or 2009 levels, to the most March 2015 levels with the exponential growth/decay equation:

$$\mathbf{C_t = C_o\, e^{-kt}}$$

Where:
- C_t = Concentration at time (t), i.e., 2015
- C_o = Original (peak) concentration (in 2008 or 2009)
- e = natural exponent
- k = attenuation rate constant (time^{-1})
- t = time.

The exponential decay equation was then rearranged to solve for k, the attenuation/degradation rate constant for a single COC at a single well:

$$k = \ln (C_t / C_o) / t$$

The geometric mean of attenuation rate constants were calculated for groups of wells within each of three areas: the release source area (immediately downgradient from the on-site release source), the downgradient plume (originating from the on-site release source), and wells impacted from the off-site release sources.

MEI also utilized the method for determination of the “Concentration vs. Time Attenuation Rate Constant” described in EPA (2002). This method requires a linear-linear plot of the natural log (ln) of contaminant concentration on the y-axis against elapsed time (days) on the x-axis.

An exponential regression analysis through the plotted points gives the equation of the line of best fit. If the data plot to a straight line, the degradation rate relationship is first order. The slope of this regression line is the attenuation rate constant, k_{point}.

The concentration versus time attenuation rate constant at a single monitoring well (k_{point}) is not indicative of plume trends. However, the calculation of k_{point} at multiple wells within the entire plume can be used to assess plume attenuation and trends (EPA, 2002). The geometric mean of k_{point} attenuation rate constants were calculated for groups of wells within the release source area, the downgradient plume, and wells impacted from off-site release sources.

These geometric means k_{point} values for the source area (k_{source}), downgradient plume, and off-site source groups were then compared to published values (Howard, et al., 1991). In all cases, the calculated site-specific geometric mean attenuation rate was within the published range of values.

At most contaminant release sites, the source area attenuation rate is slower than the rate in the downgradient plume. Hence, concentration profiles tend to retreat back toward the source over time. The lifecycle of the plume is thus determined by source attenuation rates, which can be predicted by concentration versus time plots for the most contaminated wells (EPA, 2002).

MEI utilized the lower, more conservative calculated geometric mean value of lambda/k_{point} (i.e., slower decay) from either the source area (k_{source}) or downgradient plume in the contaminant fate & transport modeling.

3.4.4.4 Soil to Groundwater Leaching

As stated previously, the Domenico model uses a steady-state (fixed concentration) rectangular source of fixed width and depth/thickness, oriented perpendicular to the direction of groundwater flow/plume transport. Leaching of residual soil contamination into underlying groundwater contributes to source area groundwater contaminant concentrations.

Since source area soils have been remediated, contributions to existing groundwater contamination from soil-to-groundwater leaching (C_{leach}) are relatively minor. Nonetheless, out of an abundance of caution, MEI calculated soil-to-groundwater leaching concentrations for the contaminant fate & transport modeling.

MEI utilized the highest groundwater concentrations of benzene, cDCE, PCE, TCE and VC measured in groundwater during the March 2015 sampling event, plus the calculated soil-to-groundwater leaching as the C_{source} concentration. Hence, the steady-state groundwater source area concentration is:

$$C_{source} = C_{max,\, gw} + C_{leach,\, soil}$$

Where:

C_{source} – Steady-state groundwater concentration in source zone.

$C_{max,\, gw}$ – Maximum groundwater contaminant concentration in source zone.

$C_{leach,\, soil}$ – Soil-to-groundwater leachate concentration contributing to source.

Soil to groundwater leaching calculations (**Appendix C**) were performed using the equations and methods outlined in American Society of Testing and Materials (ASTM) Standard Guide E2081 “Standard Guide for Risk-Based Corrective Action” (ASTM, 2015). Soil to groundwater leaching model input parameters, similar to the input parameters for the fate & transport modeling, were a combination of the following:

- Site-specific information contained in this report, and/or in previous reports on the FOSC site by MEI and others, as documented in **Table 1.**
- Conservative, default values published by:
  - The US EPA (Regional Screening Levels (RSL) Table, May 2016)
  - The American Society for Testing and Materials (E2081-00 & E1739-95),
  - The Georgia EPD
- Values from public or published, documented sources (U.S. National Weather Service, Weidemeir, et al., 1999)

Surface water precipitation infiltration (I) into soil was estimated as a percentage of total rainfall using the following empirical formula (Wiedemeir, et al., 1999, p. 52):

$$I = P^2 * k_i$$

Where:

I = infiltration (cm/yr)

P = annual precipitation (cm/yr)

k_i = infiltration coefficient (yr/cm)

The annual normal precipitation for Atlanta is 49.71 inches per year (126 cm/yr), according to National Weather Service, Peachtree City, Georgia on-line records (http://www.srh.noaa.gov/ffc/?n=rainfall_scorecard). The value of k_i is dependent upon soil type, with values of 0.0018 for sandy soil, 0.0009 for silty soil, and 0.00018 for clay soil (Wiedemeir, et al., 1999). Hence the empirically estimated precipitation infiltration rate is:

$$I = (126 \text{ cm/yr})^2 * (0.0009 \text{ yr/cm}) = 14.3 \text{ cm/yr} = 5.65 \text{ in/yr} =$$

Soil to groundwater leaching formulas, input parameters, parameter values, data sources, and calculation results are presented in **Tables 3-8 in Appendix B**. The results of the soil to groundwater leaching calculations are briefly summarized below.

COC	Soil - Maximum Residual Concentration	Soil to GW Leaching Concentration
Benzene	0.016 mg/L	0.0013 mg/L
cDCE	0.30 mg/L	0.11 mg/L
PCE	1.1 mg/L	0.17 mg/L
TCE	0.18 mg/L	0.043 mg/L
VC	ND – Subst. 0.0012 MDL	0.00062 mg/L

3.4.4.5 Model Calibration

The historically observed downgradient transport of PCE from the source area to downgradient wells was used to calibrate the model. PCE was used since it was the substance originally released on from the on-site former DC source.

The model was calibrated using the following site-specific values:

- Distances from the source area to downgradient wells.
- Historical groundwater PCE concentrations:
  - Source area maximum concentrations, both historical and recent
  - Downgradient well concentrations
- Groundwater velocity
- Attenuation rate constant

The farthest downgradient well from the release source where PCE has been detected is MW-30 (**Figure 9, Table 2**). Fortuitously, MW-30 is also located virtually directly hydraulically downgradient from the release source, at a distance of approximately 300 feet. This well was installed May 13, 2009 (**Table 2**) and first sampled on May 21, 2009. Source area well MW-2 (downgradient from the former DC source), which has historically contained the highest concentrations of dissolved contaminants, was sampled May 22, 2009. Hence, May 2009 is the first date on which there is groundwater plume data from both the source area and farthest downgradient well. The May 2009 PCE concentration in MW-2 was 2,900 µg/L, while the concentration at MW-30 was 42 µg/L.

The highest groundwater PCE concentrations were previously reported in groundwater closer to the DC release source, 11,000 µg/L at now-destroyed well MW-10 on 11/21/2006, approximately 60 ft downgradient from the DC tenant bay. However, no corresponding downgradient data is available for this earlier date. Hence, determining the proper initial source area groundwater concentration ($C_{max, gw}$) for model calibration was problematic, since this concentration could vary between 2,900 µg/L (the 05/2009 value for which both source and downgradient data were available) and 11,000 µg/L (the highest reported value, from 11/2006).

Estimation of a source area soil PCE concentration ($C_{max, soil}$) for estimation of the soil to groundwater leaching concentration (C_{leach}) was also challenging. The maximum pre-remediation PCE concentration in soil at a single location, at boring I-DP-2, directly beneath a former DC machine location, was 380 mg/kg. However, the geometric mean of the maximum reported PCE concentrations, where PCE was present, in 10 select pre-remediation borings in and immediately surrounding the former DC tenant bay is 6 mg/kg PCE. Hence, the PCE soil source term ($C_{max, soil}$) could vary between 6 and 380 mg/kg.

MEI therefore adopted the following approach to model calibration. Initially, values of dispersivity and attenuation rate were held constant. A 2,900 µg/L PCE concentration was assumed for $C_{max, gw}$ (05/2009 concentration at MW-2) and the soil source area term was adjusted until the PCE concentration 300 feet downgradient matched the 05/2009 42 µg/L concentration measured at MW-30. A soil source area concentration of 200 mg/kg produced the best fit.

A sensitivity analysis was then conducted for the Domenico model by varying input parameter values, one at a time, within reasonable ranges. Model outputs from various input values were compared with the "baseline" case. The sensitivity analysis results indicate that model output is sensitive to the following model input parameters:

- Longitudinal dispersivity (α_x)
- Groundwater velocity (v)
- Downgradient transport distance (x), and
- Attenuation rate constant (λ).

Since site-specific values of v, x, and λ have been calculated herein previously, but v and λ have a narrow range of values, a sensitivity analysis was performed for varying values of these parameters. The four parameters were used to calibrate the model by changing the values of these parameters to best fit the May 2009 analytical data.

3.4.4.6 Downgradient Extent of Contaminant Plume

As stated previously, the Domenico model was used to estimate the maximum downgradient extent of the groundwater contaminant plume for the five COCs exceeding Type ¾ Commercial RRS in on-site groundwater. The model input parameters utilized were identical to those listed above, with one exception.

Instead of specifying a fixed distance downgradient (x) at which point the model would calculate a concentration (C_x), a trial-and-error approach was utilized to determine the distance downgradient at which the concentration, C_x, equaled the default Type 1 RRS. This trial-and-error determination of the downgradient distance at which the concentration (C_x) equaled the default Type 1 RRS was performed using the Microsoft Excel "Goal Seek" function.

The goal seek function allows the user to specify the desired result of a formula to find the input value necessary to achieve that result. In the Goal Seek dialog box, the user specifies the cell containing the formula ("Set Cell"), the desired value for the formula to return ("To Value", in this case, C_x = Type 1 RRS) and one of the source cells that the formula is dependent upon ("By Changing Cell", in this case, the downgradient distance, x). Both of the cell specifications must be a single cell reference or name. The "To Value" must be a number. The source cell specified to change ("By Changing Cell") to obtain the desired "To Value", must contain a number, rather than a formula.

The Goal Seek command then uses a simple linear search beginning with guesses on the positive or negative side of the value in the source cell (By Changing Cell). Excel uses the initial guesses and recalculates the formula. Guesses bringing the formula result closer to the targeted result (To Value) is the direction (positive or negative) in which Goal Seek continues to guess. If neither direction appears to approach the target value, Goal Seek makes additional guesses further away from the initial source cell value. After the direction is determined, Goal Seek uses an iterative process in which the source cell value changes incrementally at varying rates until converging upon the target value.

The results of the calculations estimating the downgradient extent of the contaminant plume(s) are summarized in **Section 3.4.4.7**. The calculated downgradient extent of each of the five COCs exceeding commercial RRS on site are shown on **Figures 7-11 in Appendix A**.

3.4.4.7 Fate & Transport / Natural Attenuation Model Results

The results of the groundwater fate & transport modeling calculations are briefly summarized below.

Point of Exposure – Off-Site Stream – Long Island Terrace Property

COC	Modeled Downgradient POE Concentration	Georgia In Stream Water Quality Standard	Distance fm Source - Downgrad. POE
Benzene*1	0.83 µg/L	51 µg/L	455 ft
cDCE*2	2.68 µg/L	70 µg/L*3	375 ft
cDCE*3	3.83 µg/L	70 µg/L*3	250 ft
PCE*2	**8.03 µg/L**	3.3 µg/L	375 ft
TCE*2	1.40 µg/L	30 µg/L	375 ft
VC*3	0.24 µg/L	2 µg/L	250 ft

*Notes: *1 Modeled Source Area = Surrogate Source at MW-28*
**2 Modeled Source Area = Former Onsite Drycleaner*
**3 Modeled Source Area = Surrogate Source at MW-16*
**4 No In Stream Standard for cDCE, Drinking Water MCL/Type 1 RRS substituted*

Point of Exposure – Hypothetical 1,000 ft Downgradient Water Well

COC	Modeled Downgradient POE Concentration	Default, Type 1 RRS/ Drinking Water MCL
Benzene	0.12 µg/L	5 µg/L
cDCE	0.31 µg/L	70 µg/L
PCE	0.18 µg/L	5 µg/L
TCE	0.14 µg/L	5 µg/L
VC	0.013 µg/L	2 µg/L

The results of the contaminant fate & transport modeling calculations in **Tables 3-8** and summarized above indicate that of the five COCs exceeding RRS in on-site groundwater, only PCE poses a potential surface water contamination risk at the off-site stream POE. However, the results of the surface water sampling conducted on May 3, 2017 (discussion in **Section 3.4.2.2**, results in **Appendix G**) showed that no VOCs were present in the water within this stream. Hence, the groundwater contaminant plume does not represent a potential contamination threat to off-site surface water.

Additionally, the modeling results summarized above also show that the projected concentration at a POE 1000 ft downgradient from the delineated plume was significantly below default, Type 1 RRS/Drinking Water MCLs. Also, since there is no retardation in the Domenico model relative to groundwater velocity, the predicted downgradient PCE, TCE and benzene concentrations are conservative, maximum approximations. Therefore, the modeling results demonstrate that on-site groundwater contamination does not pose a significant risk to a hypothetical groundwater user at a downgradient point of exposure (POE) 1,000 feet from the defined plume boundary.

The calculated downgradient extent of the contaminant plume for the five COCs exceeding commercial RRS on site are shown on **Figures 7-11**. As shown on plume maps for cDCE and PCE, **Figures 8 & 9**, respectively, the calculated maximum downgradient extent of the contaminant plume for these two COCs is somewhat less than the current extent of each plume. The possible explanations for the difference between the calculated maximum downgradient extent and the current extent of the plume include:

- The groundwater source area concentration (C_{source}) utilized in the modeling calculations are the most recent, March 2015 concentrations. Past concentrations of PCE and cDCE in source area groundwater were orders of magnitude greater than at present, resulting in a larger present-day plume in comparison to the estimated extent of a future plume.
- The plume did not originally degrade as rapidly in the past, before soil/secondary source removal, as it does at present, resulting in farther downgradient COC transport in comparison to estimated future transport.

Hence, the modeling results show that the downgradient extent of PCE and cDCE are not anticipated to expand significantly beyond current plume dimensions. The modeling results therefore confirm that the plume is stable and that on-site groundwater contamination in excess of Commercial RRS does not pose a significant human health risk to potential off-site users.

3.5 CSM – Vapor Intrusion

3.5.1 Vapor Intrusion Assessments

Multiple soil vapor investigations/assessments, vapor intrusion (VI) modeling, indoor air testing and a soil vapor survey were all performed to quantify potential human health risks from the VI exposure pathway. Previous VI assessments and mitigation efforts are described in the following reports:

- Vapor Intrusion Assessment and Mitigation Design Report (UC, 21-FEB-2008),
- Vapor Intrusion Mitigation System Implementation Report (UC, 3-JUN-2009),
- Vapor System Sampling and Modeling for Closure Report (UC, 25-FEB-2011), and
- Limited Subsurface Investigation (Property Solutions, 6-JUN-2013).

Hence, the VI aspect of the CSM is of a site where potential VI issues have been well investigated and potential impacts in excess of risk-based standards have been abated. The assessment, modeling, sampling and mitigation work upon which this description is based are detailed below.

3.5.2 Vapor Intrusion Modeling

Initially, vapor intrusion modeling was performed by UC as described in their 21-FEB-2008 Vapor Intrusion Assessment and Mitigation Design Report. UC used the Johnson & Ettinger (J&E) model (U.S. EPA, 1991). This J&E modeling work performed by UC concluded:

- There was a potential for vapor intrusion into the proposed buildings from the impacted groundwater, using a target risk level of one in a million (1:1,000,000), (1E-06) for the DC and adjacent tenant spaces up to, but not including the Kroger.
  Note: EPD uses a target risk level of 1:100,000 or 1E-05.
- The health risk in excess of 1E-06 could be mitigated with the installation of a vapor venting system.
- The Kroger and tenant spaces to the south were not at risk.

A VI mitigation system (VIMS) was subsequently installed and operated by UC for approximately two years (**Section 3.5.5**). The opportunity for potential closure of the VIMS was identified by UC following a review of MEI’s January 14, 2010 CSR. UC performed revised VI modeling using the J&E model, 1E-05 target carcinogenic risk levels and site-specific parameters. Based on UC's revised model results, COCs in soil gas did not result in a carcinogenic risk exceeding risk levels of 1E-5 or non-carcinogenic toxicity effects exceeding a hazard quotient of 1.0 for potential commercial workers.

MEI initially performed VI modeling during our 2008-2009 CSR investigation (MEI CSR, 14-JAN-2010) using the J&E model to evaluate potential health effects of occupant exposure to COC vapors. MEI utilized a target risk level of 1E-05 and site specific subsurface data to calculate the acceptable groundwater concentrations associated with both carcinogenic and non-carcinogenic effects, for both residential and commercial usage. The results of MEI's J&E VI modeling indicated that no COCs were present in 2008/2009, in on or off-site groundwater at concentrations that would cause carcinogenic or non-carcinogenic risk to exceed target levels for either commercial workers on the FOSC site or for residential receptors at neighboring off-site properties.

MEI performed VI screening using the U.S. EPA's Vapor Intrusion Screening Level (VISL) calculator, version 3.5.1 (May 2016) for this CSR/Status Report. This screening was performed for the groundwater volatilization to indoor air inhalation pathway for a commercial worker. User inputs into the calculator are limited, but include target carcinogenic risk level (1E-05), groundwater temperature (17.6 °C; interpolated from U.S. EPA maps) and maximum concentrations of listed VOCs in groundwater.

The VISL "Groundwater Concentration to Indoor Air Concentration" (GWC-IAC) calculator indicated that TCE and benzene were present in groundwater at concentrations *potentially capable* of exceeding 1E-05 carcinogenic risk for commercial workers via the indoor air inhalation pathway. Similarly, the GWC-IAC calculator indicated that PCE and TCE were present in on-site groundwater at concentrations *potentially capable* of exceeding the toxicity effects hazard quotient of 1.0 for commercial workers via the indoor air inhalation pathway. Hence, the VISL screening identified three compounds, PCE, TCE and benzene, in on-site groundwater at concentrations capable of exceeding indoor air inhalation targets for carcinogenic or non-carcinogenic effects.

The VISL calculator determines groundwater "target concentrations," i.e., concentrations at which carcinogenic and/or non-carcinogenic screening levels are not exceeded. The VISL-calculated target concentrations of PCE, TCE and benzene, the locations at which these targets are exceeded, and the March 2015 groundwater concentrations of these three VOCs are tabulated below.

Compound	VISL Target Conc.	Exceedance Locations (MAR-2015 Concentration)
PCE	360 µg/L	MW-2 (775 µg/L); MW-22 (520 µg/L)
TCE	31 µg/L	MW-2 (71.5 µg/L), MW-4 (120 µg/L); MW-16 (35 µg/L)
Benzene	98 µg/L	MW-28 (135 µg/L)

The groundwater contamination exceeding the VISL groundwater target concentrations at MW-16, MW-22 and MW-28 was released from the off-site sources, Chastain Cleaners and the CITGO/RRFM. The release from the former on-site drycleaner is responsible for the VISL target exceedances of PCE and TCE at MW-2 and MW-4.

An "Additional Evaluation of the Vapor Intrusion Pathway" conducted by Amec Foster Wheeler (AFW) is included herein as **Appendix E**. AFW evaluated the vapor intrusion pathway for both soil and groundwater sources respectively using the VISL SG_IA-Calc and GW_IA-Calc modules and the J&E model. AFW's evaluation identified multiple lines of evidence to support the conclusion that the vapor intrusion pathway does not pose a risk to current or future commercial receptors and concludes:

> "In summary, indoor air sample concentrations collected in May 2013 were less than commercial indoor air VISLs with one exception, chloroform. However, estimated risk associated with chloroform is less than the HSRA target risk level of 10-5. Risk calculations were completed using the May 2013 soil vapor sampling results and the March 2015 groundwater sampling results in the SG_IA Calc and GW_IA_Calc modules of the VISL Calculator in order to estimate the indoor air concentrations and risks and hazards for detected constituents in soil vapor and groundwater. When site-specific conditions are included in the calculations, the resulting estimated cumulative hazards and risks indicate no unacceptable risk or hazards for commercial receptors potentially exposed via

> indoor air vapor emissions based on maintaining the current hard cover and current building parameters. Therefore, the site is compliant with vapor risk requirements under HSRA and the VRP for delisting."

Similarly, although the VISL modeling conducted by MEI indicates *potential* elevated VI risk at several locations, the J&E modeling results support the conclusion that risks suggested with the VISL are overestimates. Hence, based on the modeling results described herein, MEI concurs with AFW's conclusion that the site is compliant with vapor risk requirements under HSRA and the VRP for delisting.

3.5.3 Soil Vapor Survey

MEI conducted a soil vapor survey at the FOSC site in September 2008. One hundred twenty-four (124) Gore-Sorber modules were employed on an approximate 50 by 50-foot grid over the entire northern portion of the FOSC site and neighboring public rights-of-way. The methods and results of the soil vapor survey are described MEI's 14-JAN-2010 CSR and in W. L. Gore & Associates' report included as Appendix F therein**.**

Four principle COCs were chosen for soil vapor survey color contour mapping for their utility in determining the on-site extent of contamination and documenting the migration of impacted groundwater from offsite onto the FOSC site:

- Tetrachloroethene (PCE)
- Trichloroethene (TCE)
- cis-1,2-dichloroethene (cDCE)
- Benzene, toluene, ethylbenzene, and xylenes (BTEX).

PCE was detected at 92 of the 124 module locations. The maximum calculated PCE concentration on site was approximately 42,608 micrograms per cubic meter ($\mu g/m^3$), at a location approximately 50 feet north of the former on-site dry cleaner. The results of the soil vapor study indicated that the highest PCE concentrations were present around the perimeter of the former on-site dry cleaner.

A secondary area of elevated PCE concentration was located approximately 100 feet southwest of Chastain Cleaners. This area of elevated concentration was approximately 400 feet east and hydraulically upgradient of the former on site dry cleaner tenant space.

TCE was detected in 32 of 124 modules during the survey, with calculated concentrations ranging from 0.68 $\mu g/m^3$ to 460.14 $\mu g/m^3$. Maximum concentrations mirrored the results of PCE. Two areas of higher concentrations were just north of the former on-site dry cleaners and southwest of Chastain Cleaners.

Detections of cDCE were lower than PCE or TCE. cDCE was detected at 9 of the 124 module locations, in concentrations calculated to range from 0.85 $\mu g/m^3$ to 194.62 $\mu g/m^3$. Two cDCE areas of elevated concentration were identified, one hydraulically downgradient of the former on-site dry cleaner and one downgradient from Chastain Cleaners.

BTEX was detected at 91 of the 124 module locations at concentrations ranging from 0.01 $\mu g/m^3$ to 72.95 $\mu g/m^3$. The highest reported detections were located in the northeastern corner of the FOSC parking lot.

The soil vapor survey showed that there were clearly two separate sources for chlorinated solvent (CVOCs) contamination in soil gas at the FOSC site, the former on-site DC operation and Chastain Cleaners off site. The results of the soil vapor survey also showed that all significant BTEX contamination was associated with the CITGO/RRFM filling station northeast of the FOSC site.

Hence, the soil vapor survey confirmed the presence of three commingled groundwater contaminant plumes on the FOSC site from one on-site and two off-site sources.

3.5.4 Indoor Air Quality Sampling

MEI contracted with industrial hygiene consultants Atlantic Environmental, Inc. (AEI) to perform air sampling inside the residence 79 West Belle Isle Road on August 25, 2008. This work is described in MEI's 14-JAN-2010 CSR and in AEI's report to MEI included as Appendix G in the CSR**.**

Air samples were collected using SUMMA® Canisters at locations pre-defined by MEI in concert with the property owner. Ambient or "background" air sampling was also performed at two locations outside the residence.

Laboratory analytical results indicated that there were no indoor air concentrations of the DC COCs (PCE or TCE) or any daughter products (DCE and VC) in any sample. In the conclusion of their report, AEI stated, "Based on AEI's physical findings and laboratory results, no further work is necessary at this time."

Since the indoor air sampling in August 2008, groundwater concentrations of PCE, TCE and cDCE have declined precipitously (**Table 2**) at the nearest upgradient monitoring well, MW-13S. The July 2008 and March 2015 concentrations of these three compounds at this well, and the percent declines in COC concentrations, are listed as follows.

MW-13S - PCE, TCE & cDCE Groundwater Concentrations

	7-JUL-08 Avg. Conc.	10-MAR-15 Avg. Conc.	% Reduction
PCE	1,005 µg/L	22 µg/L	-97.8%
TCE	29 µg/L	1.95 µg/L	-93.3 %
cDCE	33 µg/L	3.4 µg/L	-89.7%

Since no indoor vapors were detected during sampling in 2008, and groundwater contaminant concentrations have declined in the nearest upgradient well by an average of 93.6%, the risk of off-site VI appears minuscule. Hence, in accordance with discussions with EPD HSRP personnel in a meeting of February 27, 2015, the previous indoor air sampling conducted at the residence at 79 West Belle Isle Road, in concert with the remarkable reductions in groundwater COC concentrations, are evidence that there is no VI risk for this neighboring property.

Additionally, in May 2013, Property Solutions performed a Limited Subsurface Investigation of the FOSC site, including indoor air and soil vapor sampling (copy of report in **Appendix H**). Six indoor air samples were collected over a period of 8 hours using laboratory-supplied Summa® canisters with laboratory-supplied flow regulators. Summa® canisters were placed within the Kroger store (Suite 20) and four of the suites within the north wing of the FOSC center.

From the results of this indoor air sampling, Property Solutions concluded:

> "Detections of constituents in indoor air did not exceed the Target Indoor Air Concentrations (TIAs) as provided in the EPA OSWER Vapor Intrusion Screening Level (VISL) Calculator Version 3.0 (November 2012) using a Target Risk Concentration (TCR) of 1.00E-05.
>
> Detections of constituents in indoor air did not exceed the TIAs as provided in the EPA OSWER VISL) Calculator Version 3.0 (November 2012) using a more stringent TCR of 1.00E-06, with the exception of chloroform in two samples. Indoor air sources of chloroform include the use of municipal (chlorinated) water, bleaches, and refrigerants. It is the opinion of Property Solutions that based on the results of soil gas samples, chloroform detections are likely the result of sources other than the subsurface."

Hence the results of indoor air sampling conducted in multiple FOSC commercial suites within and adjacent to the former on-site release source area confirm that the potential subsurface to indoor air exposure pathway is incomplete, and no further action appears warranted. Similarly, indoor air sampling at the nearest downgradient, off-site residence likewise confirm that the subsurface to indoor air exposure pathway is incomplete, and no further action appears warranted.

3.5.5 On-Site Vapor Mitigation System

UC installed a vapor intrusion mitigation system (VIMS) beneath the former DC tenant bay and the north tenant wing of the FOSC site. This system consisted of:

- A passive vapor barrier and sub slab depressurization system installed beneath the former DC facility. Slotted piping was placed in a gravel bed and covered with a high-density polyethylene (HDPE) below the concrete subfloor. The slotted piping was connected to a vertical riser and passive wind turbine.

- An active vapor mitigation system was installed beneath the remaining units in the north FOSC wing. A system of eight north-south slotted gas collection pipes were hydraulically jacked under these units. The eight collection pipes were manifolded together in an alternating pattern and connected to roof-mounted vacuum blowers.
- A telemetry system was installed to monitor blower operation by monitoring the vacuum pressure at both of the discharge pipes of the active VIMS on one-hour intervals.
- Monitoring ports including two sets of three 8-foot deep monitoring wells along each of the east and west sides of the building. A total of nine shallow vapor monitoring ports were installed
- The pressure monitoring of the VIMS indicated that negative pressures were generated at least 12 feet away from the collection piping, with greater negative pressure generation closer to the system. Thus, the VIMS operated as designed, depressurizing the soil beneath the tenant spaces of the north section of the FOSC.

This system was operation for approximately two and a half years, from December 2008 to May 2011. EPD authorized shutdown of the VIMS system after soil gas sampling results and VI modeling results both indicated that there were no VI risks present on site in excess of target levels. The system was shut down, decommissioned and the shallow vapor monitoring wells abandoned in May 2011. This work is documented in three reports prepared by UC:

- Vapor Intrusion Assessment and Mitigation Design Report (21-FEB-2008)
- Vapor Intrusion Mitigation System Implementation Report (3-JUN-2009), and
- Vapor System Sampling and Modeling for Closure Report (25-FEB-2011)

Hence, there are no residual VI risks from soil sources in excess of applicable target levels present on the FOSC site.

3.6 CSM – Exposure Model

The conceptual exposure model of the FOSC site is one in which, based on current and projected future property and groundwater uses, there are no immediate threats to human health or the environment in excess of applicable risk-based levels. Specifically, potential exposure sources (soil, groundwater, DNAPL & soil vapor) and pathways (ingestion, inhalation, etc.) have been thoroughly assessed, exposure risks have been quantified and excess risk has been mitigated. The details of the conceptual site exposure model are described below.

3.6.1 Current and Future Land Uses

3.6.1.1 Fountain Oaks Shopping Center (FOSC)

The principle FOSC parcel at 4920 Roswell Road NE, Parcel ID 17 009300061319, is a commercial retail shopping center and will continue to be used for commercial purposes for the foreseeable future. The site is zoned C-1, "Community Business District" by the City of Sandy Springs, as shown on the online geographic information system (GIS) zoning map (gis.sandyspringsga.gov/flexviewers/Gen_Flex/). MEI understands that no expansion of existing facilities is planned for the immediate future.

3.6.1.2 115 West Belle Isle Road – FOSC Outparcel

The small outparcel on the FOSC site at 115 West Belle Isle Road, Parcel ID 17 009300021073, is located in the parking lot immediately west of the FOSC north wing (**Figure 1**). Although the site is currently zoned R-4, "Single Family Dwelling" according to the Sandy Springs GIS website, it is also currently a parking area in a commercial development.

Hence, the property at 115 West Belle Isle Road will continue to be used for commercial purposes for the foreseeable future. The site will therefore be occupied exclusively by commercial worker and/or construction worker receptors for the foreseeable future.

3.6.1.3 Long Island Terrace – Undeveloped Property

The undeveloped property on Long Island Terrace, Parcel ID 17 009300060881, is zoned R-3 "Single Family Dwelling District" by the City of Sandy Springs. However, the property is "land-locked" with no road access and occupies a topographic basin. It is unlikely that this property will be developed for residential use given the steep slopes, uneven terrain, viewshed, and land-locked nature of the parcel. However, the property is considered "residential" and assumed to be occupied by residential receptors for exposure modeling purposes.

3.6.1.4 Off-Site Neighboring Properties

The neighboring cross gradient properties to the north of the FOSC site, and the downgradient properties to the west of FOSC are all single-family residences. These properties are likely to continue being used for residential purposes and occupied by potential residential receptors for the foreseeable future.

3.6.2 Exposure Pathways & Receptors

There are only five *potentially* complete *on-site* exposure pathways for the following potential receptors:

- Soil – Dermal Contact (construction worker receptor)
- Groundwater – Dermal Contact (construction worker receptor)
- Soil – Vapor intrusion to indoor air inhalation (commercial worker receptor)
- Groundwater - Vapor intrusion to indoor air inhalation (commercial worker receptor)
- Groundwater – Ingestion (commercial worker receptor)

Each of these potentially complete exposure pathways is addressed herein as follows.

Soil – Dermal Contact (Construction Worker Receptor)

Comparison of residual on-site and off-site soil concentrations to calculated RRS show that there are no concentrations of COCs in either on-site or off-site soil exceeding RRS. Calculation of Type 3/Type 4 RRS includes consideration of the dermal contact for a construction worker exposure pathway. The 2007-2008 soil remediation project removed all soil from the site in excess of Type 3/Type 4 RRS. Hence, this is an incomplete exposure pathway.

Groundwater – Dermal Contact (Construction Worker Receptor)

The potential dermal contact exposure pathway for a construction worker receptor is an incomplete pathway, due to the depth to groundwater on site. The average depth to groundwater across the entire FOSC site is approximately 34 feet, while average depth to groundwater surrounding the on-site release source area is approximately 36.7 feet. These depths to groundwater are well below depths that construction projects typically penetrate into the subsurface. Hence, groundwater- dermal contact for a potential construction worker receptor is an incomplete exposure pathway.

Soil – Vapor Intrusion to Indoor Air Inhalation (Commercial Worker Receptor)

As described in **Section 3.5.2**, vapor intrusion modeling conducted by UC and MEI, both before and following VI mitigation by UC, have demonstrated that there is no excess risk present on site for the Soil - VI to indoor air pathway for a commercial worker receptor.

Groundwater - Vapor Intrusion to Indoor Air Inhalation (Commercial Worker Receptor)

Vapor intrusion modeling conducted by MEI (discussed in Section 3.5.2) using the EPA VISL model suggest that there is a potential VI risk associated with PCE, TCE and benzene at five monitoring wells, listed as follow.

Compound	VISL Target Conc.	Exceedance Locations (MAR-2015 Concentration)
PCE	360 µg/L	MW-2 (775 µg/L); MW-22 (520 µg/L)
TCE	31 µg/L	MW-2 (71.5 µg/L), MW-4 (120 µg/L); MW-16 (35 µg/L)
Benzene	98 µg/L	MW-28 (135 µg/L)

An “Additional Evaluation of the Vapor Intrusion Pathway” conducted by Amec Foster Wheeler (AFW) included herein as **Appendix E** concluded (see discussion in **Section 3.5.2**):

> “When site-specific conditions are included in the [VI] calculations, the resulting estimated cumulative hazards and risks indicate no unacceptable risk or hazards for commercial receptors potentially exposed via indoor air vapor emissions based on maintaining the current hard cover and current building parameters. Therefore, the site is compliant with vapor risk requirements under HSRA and the VRP for delisting.”

MEI likewise performed follow-up VI modeling using the U.S. EPA Johnson & Ettinger (J&E) vapor intrusion model and site-specific data. The results of these calculations **show** that no groundwater concentrations of COCs exceed the calculated J&E “final indoor exposure groundwater concentrations.”

Therefore, although the VISL modeling conducted by MEI indicates *potential* elevated VI risk at several locations, the J&E modeling results support the conclusion that risks suggested with the

VISL are overestimates. Hence, based on the modeling results described herein, MEI concurs with AFW's conclusion that the site is compliant with vapor risk requirements under HSRA and the VRP for delisting.

Groundwater – Ingestion (Commercial Worker Receptor)

As described in **Section 3.4.2.1**, there are no drinking water supply sources within a two-mile radius of the site. The FOSC site is a non-drinking water site. Hence, the potential exposure pathway, groundwater ingestion by commercial worker receptor is an incomplete pathway.

3.6.3 Exposure Domains

As defined in the Georgia VRP Act (§ O.C.G.A. 12-8-102), "exposure domains" are the contaminated geographical areas of a site that can result in exposure to a particular receptor via a specified exposure pathway. Specifically:

- The soil exposure domain for surficial contact with site soils is the area impacted by COCs from the ground surface down to a depth of two feet BGS.
- The soil exposure domain for exposure of construction workers is the impacted area of soils from the ground surface down to the depth of construction; and
- The soil exposure domain for protection of groundwater at an established point of exposure is the impacted area of site soils from the ground surface down to the uppermost groundwater zone.

The on-site exposure domains for this CSM include those areas of the site where:

- Groundwater COC concentrations exceed applicable RRS for the incomplete, but *potentially complete* groundwater ingestion pathway (**Tables 19 & 20**). These COCs and 14 on-site exceedance locations are:
    - Benzene (MWs-20, 21 & 28)
    - cDCE (MWs-2, 4, 16, 20 & 28)
    - PCE (MWs-2, 3, 5, 9, 13S, 14, 16, 20, 22, 23 & 28)
    - TCE (MWS-2, 4, 6, 16, 20 & 28)
    - VC (MWs-16 & 28)
    - Benzene (MWs-20, 21 & 28)

- VISL screening calculations indicate that there are *potential* VI risks exceeding target levels at five monitoring wells (MW-2, MW-4, MW-16, MW-22 & MW-28).

The only *potential* off-site exposure domain would be a limited area of groundwater contamination immediately adjacent to the FOSC site for the incomplete groundwater ingestion pathway for a potential residential receptor. Hence, there is no off-site exposure domain because:

- The FOSC site is a non-drinking water site (see **Section 3.4.2.1**)
- There are no off-site groundwater COC concentrations exceeding applicable RRS (see **Section 3.4.3.2**)
- The groundwater contaminant plume is naturally attenuating at a relatively rapid rate (see **Section 3.4.3.4**.).
- Groundwater contaminant fate & transport modeling suggests that PCE could impact the surface water stream point of compliance on the undeveloped Long Island Terrace property adjacent to the FOSC site, at levels exceeding the Georgia In Stream Standard.
    - However, a surface water sample collected from this stream on May 3, 2017 did not contain any detectible VOCs. Hence, this potential exposure domain is associated with an incomplete exposure pathway.
- Groundwater contaminant fate & transport modeling demonstrates a lack of risk for off-site groundwater ingestion by hypothetical remote residential receptors 1,000 feet from the contaminant plume.

The use of engineering and institutional controls to mitigate *potential* on-site exposure risks associated with the incomplete exposure pathways is described in **Section 4.0** as follows.

4.0 VOLUNTARY REMEDIATION PLAN

4.1. Voluntary Remediation Plan - Soil

No soil remediation, and thus no remediation plan, is necessary for on- or off-site soil because:

- The extent of soil on-site contamination was exhaustively delineated (see **Section 3.3.1**),
- On-site soil exceeding approved RRS was removed during the 2007-2008 soil remediation project (see **Section 3.3.2**),

- The remaining in-situ concentrations of COCs in on-site soil was exhaustively demonstrated through collection of verification samples and borings/monitoring wells installed by MEI (see **Section 3.3.3**), and
- No COCs in excess of applicable RRS have been detected in off-site soils (see **Section 3.3.1**)

<u>Soil</u> at the FOSC site <u>is in compliance with all applicable/EPD-approved RRS</u>, as certified in the report Certification of Compliance on page viii herein. Since the site was initially listed on the HSI for a release of tetrachloroethene (PCE) to soil, and on-site soil has been remediated and is now in compliance with applicable RRS, the FOSC site is eligible for de-listing from the HSI.

4.2. Voluntary Remediation Plan – Groundwater

As noted in **Section 3.6.3**, there are two potential exposure domains on the FOSC site and one off site:

- On-site areas where groundwater COC concentrations exceed applicable RRS for the incomplete, but *potentially complete* groundwater ingestion pathway,
- On-site areas where VISL screening calculations indicated *potential* VI risks exceeding target levels, and
- The off-site stream where fate & transport modeling suggests PCE levels could exceed the Georgia In Stream Standard,
    - Surface water sampling results show that this is an incomplete exposure pathway.

4.2.1. Secondary Source Removal & Natural Attenuation

The excavation of approximately 3,831 tons of contaminated soil from the release source area and immediate downgradient area in 2007-2008 (see **Sections 2.1 an d 3.3.2**) removed this significant secondary source of groundwater contamination via the soil-to-groundwater leaching pathway. As a result, groundwater COC concentrations in both the on-site release source and downgradient areas have been rapidly attenuating (see **Section 3.4.3.4**) and associated exposure risk levels have been rapidly declining. Therefore, no additional active remediation efforts appear to be required for remediation of groundwater contamination.

4.2.2. Monitoring Well Abandonment

EPD personnel gave tentative verbal approval to abandon several wells in a meeting on February 27, 2015, including (**Figure 3**):

- MW-4
- MW-9
- MW-26
- MW-27

MEI requests closure of all downgradient and cross-gradient wells associated with the former on-site release, for the following reasons:

- The contaminated soil that would have acted as an ongoing secondary source of groundwater contamination (via soil to groundwater leaching) has been removed,
- The groundwater contaminant plume is rapidly attenuating, and
- There are no off-site, downgradient groundwater impacts in excess of applicable RRS.

Therefore, MEI requests abandonment of the following wells.

1. MW-2
2. MW-4
3. MW-9
4. MW-17
5. MW-26
6. MW-27
7. MW-3
8. MW-13D
9. MW-13S
10. MW-29
11. MW-30
12. MW-31
13. MW-32

4.3. Engineering Controls

MEI understands that no expansion of existing facilities is planned for the immediate future. Engineering controls are not necessary for the exposure domains on site, i.e., locations where groundwater exceeds Type 3/Type 4 RRS, and locations where the VISL calculator suggests VI risks are potentially present. Controls are unnecessary due to the following:

- J&E model results indicate that the VISL exposure calculations are overestimates.
- Indoor air sampling results conducted during a Limited Subsurface Investigation in 2013

(**Appendix H**) confirm that the potential subsurface to indoor air exposure pathway is incomplete.

- All of the areas where VISL indicates potential indoor air exposure risks are unoccupied paved parking areas, and will remain so for the foreseeable future.

4.4. Institutional Controls

MEI proposes the use of institutional controls, specifically, deed notices and restrictive covenants, to mitigate potential exposure risks from on-site groundwater exceeding applicable RRS.

4.4.1. Restrictive Covenants

Restrictive environmental covenants are proposed between the property owner(s) and EPD as a means of mitigating potential exposure to groundwater exceeding RRS. Draft Uniform Environmental Covenants for FOSC & 115 West Belle Isle Road properties and the undeveloped Long Island Terrace property are contained herein in **Appendix D.** The specific language of each covenant includes a prohibition on the use of groundwater beneath the site.

5.0 PROGRESS REPORT

Since submittal of the VRP Application and CSR in December 2015, the following events have transpired regarding the FOSC site:

- No expansion of existing facilities is planned for the immediate future.
- MEI collected a water sample from the stream on the undeveloped Long Island Terrace property on May 3, 2017.
    - This sample was analyzed for VOCs by EPA Method 8260B.
    - The results of the analysis showed that no chlorinated VOCs were present in in the sample.
    - The absence of chlorinated VOCs in the sample confirms that groundwater migration to surface water discharge is an incomplete exposure pathway.
- AFW conducted an “Additional Evaluation of the Vapor Intrusion Pathway” to address comments raised by EPD in its November 30, 2016 letter regarding vapor modeling.

No other significant activities related to the environmental or regulatory status of the site have been performed since submittal of the December 2015 CSR & VRP Application.

6.0 MILESTONE SCHEDULE

As listed on the VRP application form, the following four required generic milestones must be included in this initial application:

1. Within 12 months of enrollment (into the VRP):
    a. Horizontal delineation of the release and associated COCs on property where access is available at the time of enrollment;
2. Within 24 months of enrollment:
    a. Horizontal delineation of the release and associated constituents of concern extending onto property for which access was not available at the time of enrollment;
3. Within 30 months of enrollment:
    a. Update the site CSM to include vertical delineation, finalize the remediation plan and provide a preliminary cost estimate for implementation of remediation and associated continuing actions; and
4. Within 60 months after enrollment,
    a. Submit the compliance status report (CSR) required under the VRP, including requisite certifications.

Please note that all of item numbers 1, 2 and 3 above have been completed and this information submitted to EPD. Item number 4 should be considered completed upon submittal of this updated CSR. A milestone schedule Gantt chart is included as **Appendix F**.

7.0 SUMMARY & CONCLUSIONS

The Fountain Oaks Shopping Center (FOSC), 4920 Roswell Road NE, Sandy Springs, Fulton County, Georgia (the subject site) is currently listed on the Georgia Hazardous Site Inventory (HSI) as HSI No. 10807. The Subject site and two associated properties currently are regulated under the auspices of the Georgia Voluntary Remediation Program (VRP). These three properties are:

1. Fountain Oaks Shopping Center (subject site), 4920 Roswell Rd NE, Sandy Springs, GA 30342 Fulton County Assessor Parcel No 17 009300061319.

2. 115 West Belle Isle Road (FOSC Outparcel), Sandy Springs, Georgia 30342 Fulton County Assessor Parcel No 17 009300021073.

3. Long Island Terrace property (undeveloped), Sandy Springs, Georgia 30342 Fulton County Assessor Parcel No 17 009300060881.

The extent of on-site and off-site soil, groundwater and soil vapor contaminants of concern (COC) impacts and potential exposure risks have been thoroughly delineated over the course of multiple investigations conducted from 2005 to 2015 by Marion Environmental, Inc. (MEI) and others.

A soil remediation project conducted by others on the FOSC out-parcel in 2007-2008 removed all on-site soils exceeding approved Risk Reduction Standards (RRS). A vapor intrusion (VI) mitigation system was installed by others beneath the north tenant wing of the FOSC and operated for approximately two and a half years, from December 2008 to May 2011. Exposure risks associated with former on-site soil and soil vapor impacts were successfully mitigated.

The FOSC site was originally placed on the HSI because of soil contamination from a release of tetrachloroethene (PCE) and 14 associated contaminants of concern (COCs). As documented in multiple reports prepared by others, and summarized herein, soil on the FOSC site complies with approved Types 1, 3, and/or 4 Risk Reduction Standards (RRS). Since the soil contamination that caused the FOSC site to be listed on the HSI has been remediated to within approved RRS levels, the site is eligible for de-listing from the HSI.

The most recent, March 2015 groundwater analytical results indicated that COC concentrations exceed applicable RRS at 14 on-site monitoring wells. These COCs and 14 exceedance locations are as follows:

- Benzene (MWs-20, 21 & 28)
- cDCE (MWs-2, 4, 16, 20 & 28)
- PCE (MWs-2, 3, 5, 9, 13S, 14, 16, 20, 22, 23 & 28)
- TCE (MWS-2, 4, 6, 16, 20 & 28)
- VC (MWs-16 & 28)

Additionally, USEPA vapor intrusion screening level (VISL) calculations using the March 2015 groundwater sampling event indicate the *potential* presence of VI risks at five monitoring wells for PCE (MW-2 & MW-22), TCE (MW-2, MW-4 & MW-16) and benzene (MW-28). The former on-site dryclean (DC) operation is responsible for the potential VI risk from PCE & TCE at MW-2 and MW-4, while the off-site sources are responsible for the potential VI risk at the other three monitoring wells.

However, results from soil vapor & indoor air sampling, and vapor modeling using the VISL calculator and J&E model provide multiple lines of evidence supporting the conclusion that the vapor intrusion pathway does not pose a risk to current or future commercial receptors. Hence, the site is compliant with vapor risk requirements under HSRA and the VRP for delisting.

There are no *off-site* soil or groundwater impacts in excess of applicable Type 1/Type 2 RRS.

The conceptual site model (CSM) of the FOSC subject location is of a site where:

- Release sources and substances released have been well defined.
- The lateral and vertical extent and magnitude of soil contamination on-site and potential exposure risks have been well defined through exhaustive subsurface investigations.
- Soil contamination on-site in excess of approved RRS has been removed.
- The lateral and vertical extent and magnitude of groundwater contamination on and off-site and associated exposure risks have been well defined.

- Groundwater flow and subsurface contaminant migration patterns in soil and groundwater are/were significantly affected by the pre-development topography.
- The groundwater contaminant plume, although in excess of RRS in several locations, is stable and rapidly attenuating.
- Groundwater fate & transport modeling has demonstrated that:
    - There was a *potential* risk of PCE in the on-site groundwater plume migrating to discharge into surface water at levels exceeding Georgia In Stream standards on the undeveloped Long Island Terrace property. However:
        - A surface water sample collected from the stream on the Long Island Terrace property on May 3, 2017 did not contain any chlorinated VOCs.
        - Hence, groundwater to surface water migration is an incomplete exposure pathway.
    - On-site groundwater RRS exceedances are not a significant health risk to hypothetical off-site residential receptors 1,000 ft downgradient.
    - The contaminant plume is stable, and is not anticipated to migrate downgradient beyond current dimensions.
- Potential on-site vapor intrusion (VI) impacts modeled using the US EPA VISL calculator suggested that there was a *potential* VI risk associated with PCE, TCE and benzene at five on-site wells.
    - Modeling conducted by both MEI and Amec Foster Wheeler (AFW) using the Johnson & Ettinger (J&E) model and site-specific data (including soil vapor and indoor air sampling) support the conclusion that risks suggested with the VISL are overestimates.
    - The VI modeling results described herein support the conclusion that the site is compliant with vapor risk requirements under HSRA and the VRP for delisting.
- Vapor intrusion (VI) impacts for existing on-site commercial worker receptors have been:
    - Assessed through soil vapor sampling, a soil vapor survey, indoor air sampling, VI modeling, and soil gas sampling; and
    - Mitigated through operation of an on-site VI mitigation system.
- Potential dense non-aqueous phase liquid (DNAPL), i.e., “free product” was investigated and determined not to be present beneath the site.

- There are no soil, groundwater, or vapor intrusion (VI) impacts in excess of RRS/risk-based levels on off-site properties.

The overall FOSC conceptual site model (CSM) is a site that has been thoroughly investigated, the potential human health and environmental risks have been evaluated and the site complies with applicable RRS for soil. Groundwater in excess of RRS on-site is not a human health or environmental risk due to incomplete exposure pathways, and a plume that is rapidly attenuating.

On-site exposure domains for this CSM include those areas of the site where:

- Groundwater COC concentrations exceed applicable RRS for the incomplete, but *potentially complete* groundwater ingestion pathway.
- VISL screening calculations indicated that *potential* VI risks exceed target levels.

There is no off-site exposure domain because:

- The FOSC site is a non-drinking water source.
- There are no off-site groundwater COC concentrations exceeding applicable RRS
- The groundwater contaminant plume is naturally attenuating at a rapid rate
- Fate & transport modeling suggests that the groundwater contaminant (PCE) migration to surface water on the Long Island Terrace property was a potential concern.
    - However, the surface water sample collected from the stream on May 3, 2017 shows that groundwater migration to surface water discharge is an incomplete exposure pathway.
- Groundwater fate & transport modeling demonstrates a lack of risk for off-site groundwater ingestion by hypothetical residential receptors 1,000 feet downgradient from the site.

No soil remediation, and thus no remediation plan, is necessary for on or off-site soil, because:

- The extent of soil on-site contamination was exhaustively delineated
- On-site soil exceeding RRS was removed during the 2007-2008 soil remediation project
- Remaining in-situ concentrations of COCs in on-site soil below RRS have been exhaustively demonstrated through collection of excavation verification samples and

borings/monitoring wells installed by MEI

- No COCs in excess of applicable RRS have been detected in off-site soils.

The excavation of approximately 3,831 tons of contaminated soil from the release source area and immediate downgradient area in 2007-2008 removed a significant secondary source of groundwater contamination via the soil-to-groundwater leaching pathway. As a result, groundwater COC concentrations in on-site release source and downgradient areas and have been rapidly attenuating as have associated exposure risk levels.

MEI requests closure of all downgradient and cross-gradient wells associated with the former on-site release, for the following reasons:

- The contaminated soil that would have acted as an ongoing secondary source of groundwater contamination (via soil to groundwater leaching) has been removed,
- The groundwater contaminant plume is rapidly attenuating, and
- There are no off-site, downgradient groundwater impacts in excess of applicable RRS.

Therefore, MEI requests abandonment of the following 13 wells.

1. MW-2
2. MW-4
3. MW-9
4. MW-17
5. MW-26
6. MW-27
7. MW-3
8. MW-13D
9. MW-13S
10. MW-29
11. MW-30
12. MW-31
13. MW-32

No expansion of existing facilities is planned for the immediate future and no engineering controls are necessary for mitigation of VI risks in existing buildings.

Institutional controls, including deed notices and restrictive covenants prohibiting groundwater use are proposed to help mitigate potential exposure risks from on-site groundwater exceeding applicable RRS and potential VI concerns.

Draft uniform environmental covenants (UECs) for the FOSC site and Long Island Terrace property are included in this CSR. The specific language of both covenants includes groundwater use prohibitions.

The following four required generic milestones have either already been completed or should be considered to have been completed with the submittal of this updated CSR and Progress Report:

1. Horizontal delineation of the release and associated COCs on property accessible at the time of enrollment;
2. Horizontal delineation of the release and associated COCs on property inaccessible at the time of enrollment;
3. Update CSM to include vertical delineation, finalize the remediation plan and provide a preliminary cost estimate for implementation of remediation and associated continuing actions; and
4. Submit the compliance status report (CSR) required under the VRP, including requisite certifications.

8.0 REFERENCES

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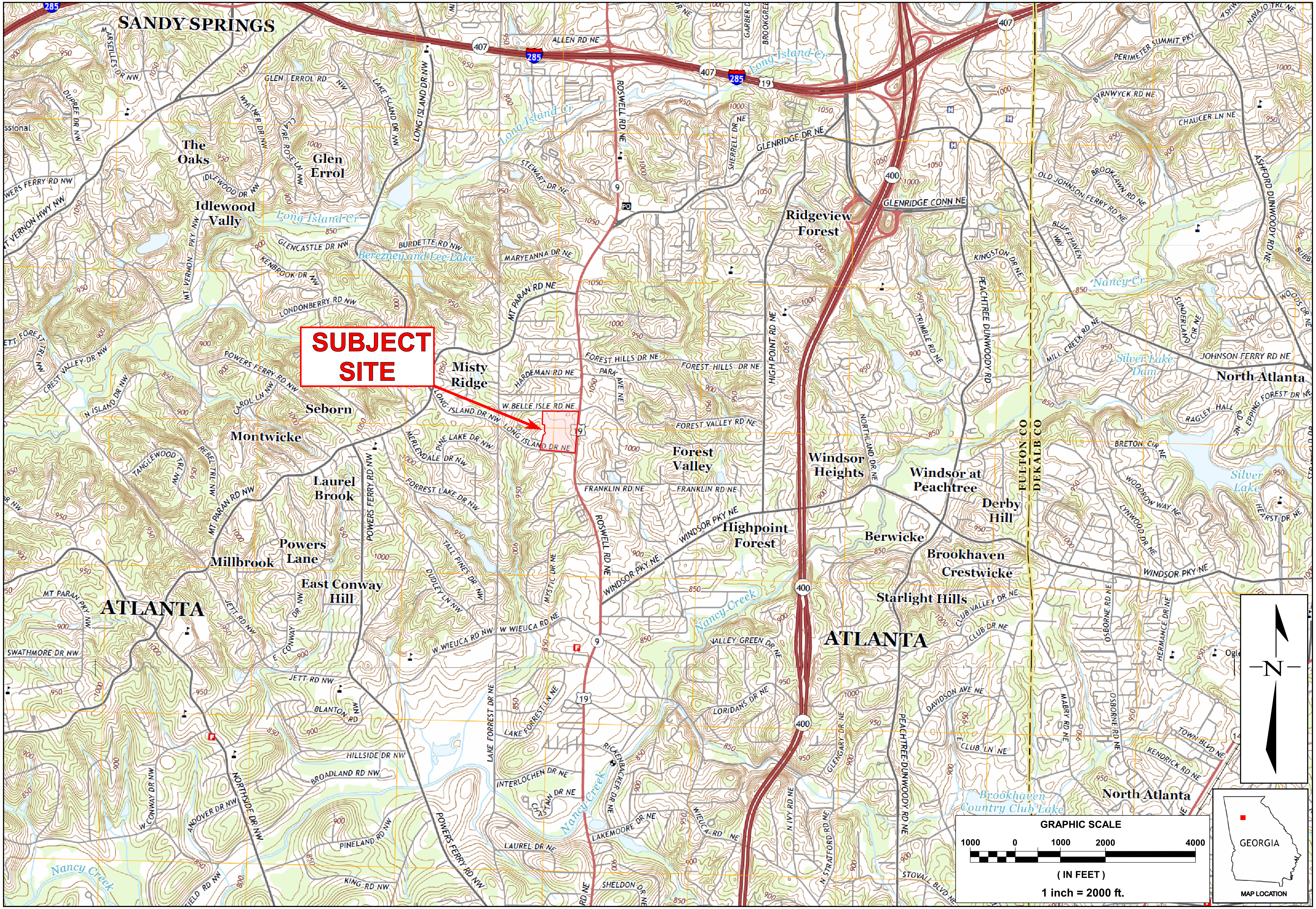
Appendix A

Figures



TOPOGRAPHIC SITE VICINITY MAP

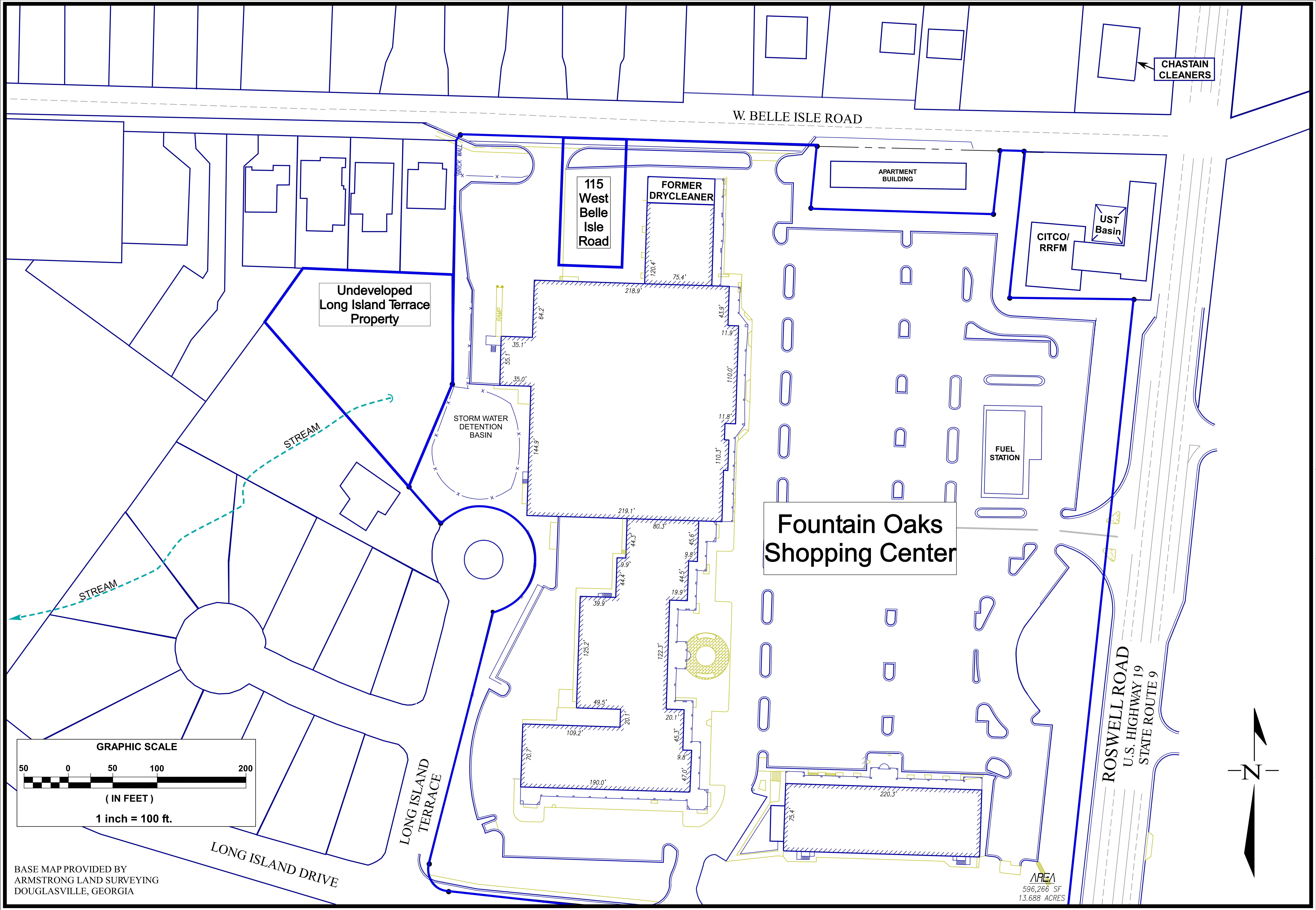
FOUNTAIN OAKS SHOPPING CENTER
4920 ROSWELL ROAD, SANDY SPRINGS, GA

PROJECT: 15513	FACILITY: HSI No. 10807	DATE REVISED: 11/30/15
DATE:	SCALE: Ref. Scale Bar	APPROVED:

MARION ENVIRONMENTAL, INC.
115 PARMENAS LANE
CHATTANOOGA, TN
423-499-4919
www.marionenv.com

MEI

FIGURE 1



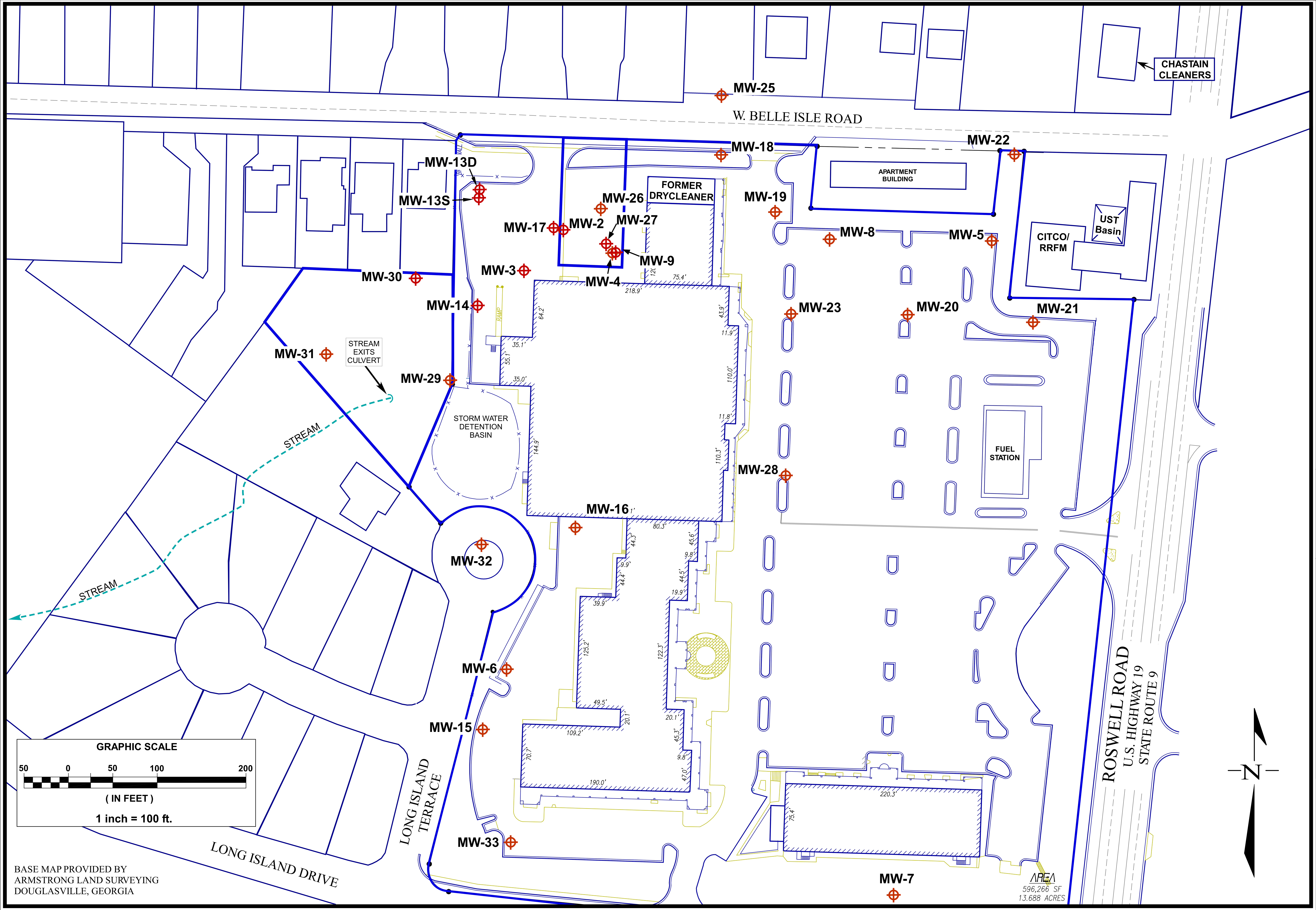
SITE MAP

FOUNTAIN OAKS SHOPPING CENTER
4920 ROSWELL ROAD, SANDY SPRINGS, GA

PROJECT: 16577	FACILITY: HSI No. 10807	DATE REVISED: 05/02/2017
DATE: 09/30/15	SCALE: 1" = 100'	APPROVED:

MARION ENVIRONMENTAL, INC.
115 PARMENAS LANE
CHATTANOOGA, TN
423-499-4919
www.marionenv.com

FIGURE 2



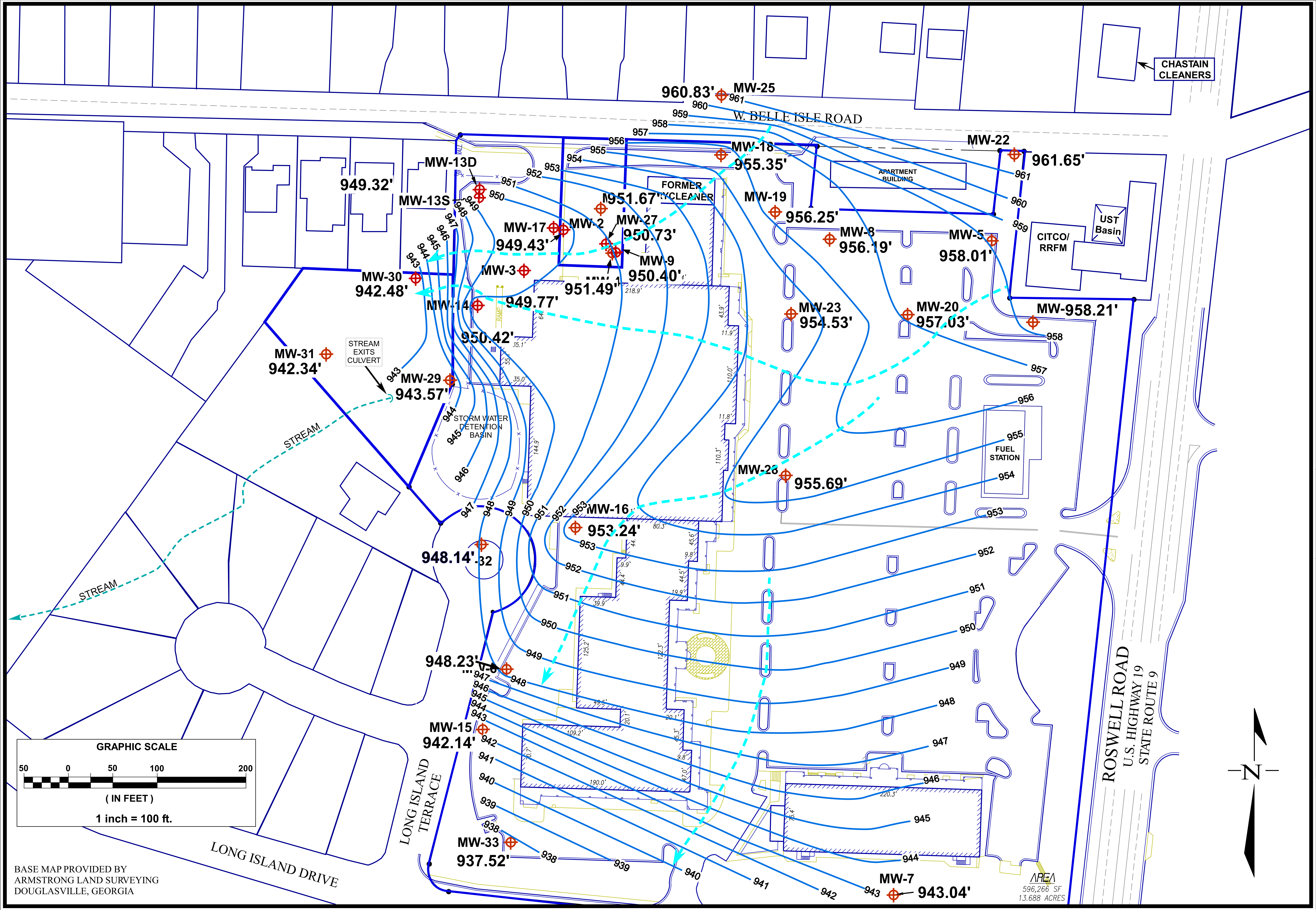
MONITORING WELL &
SURFACE WATER LOCATION MAP

FOUNTAIN OAKS SHOPPING CENTER
4920 ROSWELL ROAD, SANDY SPRINGS, GA

PROJECT: 16577	FACILITY: HSI No. 10807
DATE REVISED: 05/02/2017	DATE: 09/30/15
SCALE: 1" = 100'	APPROVED:

MARION ENVIRONMENTAL, INC.
115 PARMENAS LANE
CHATTANOOGA, TN
423-499-4919
www.marionenv.com

FIGURE 3



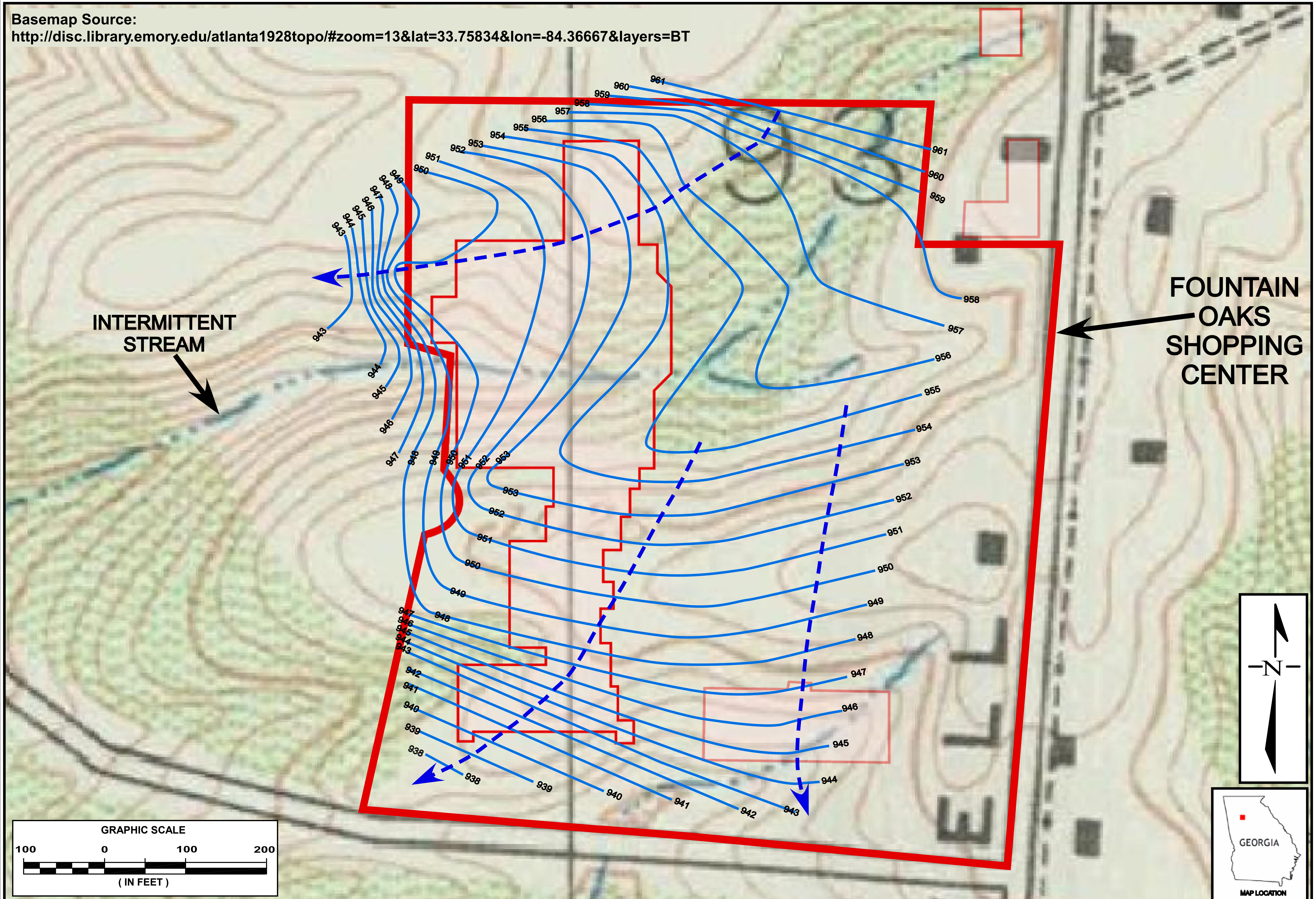
GROUNDWATER POTENTIOMETRIC SURFACE
10-MARCH-2015

FOUNTAIN OAKS SHOPPING CENTER
4920 ROSWELL ROAD, SANDY SPRINGS, GA

PROJECT: 16577	FACILITY: HSI No. 10807
DATE REVISED: 05/02/2017	
DATE: 09/30/15	SCALE: 1" = 100'
APPROVED:	

MARION ENVIRONMENTAL, INC.
115 PARMENAS LANE
CHATTANOOGA, TN
423-499-4919
www.marionenv.com

FIGURE 4



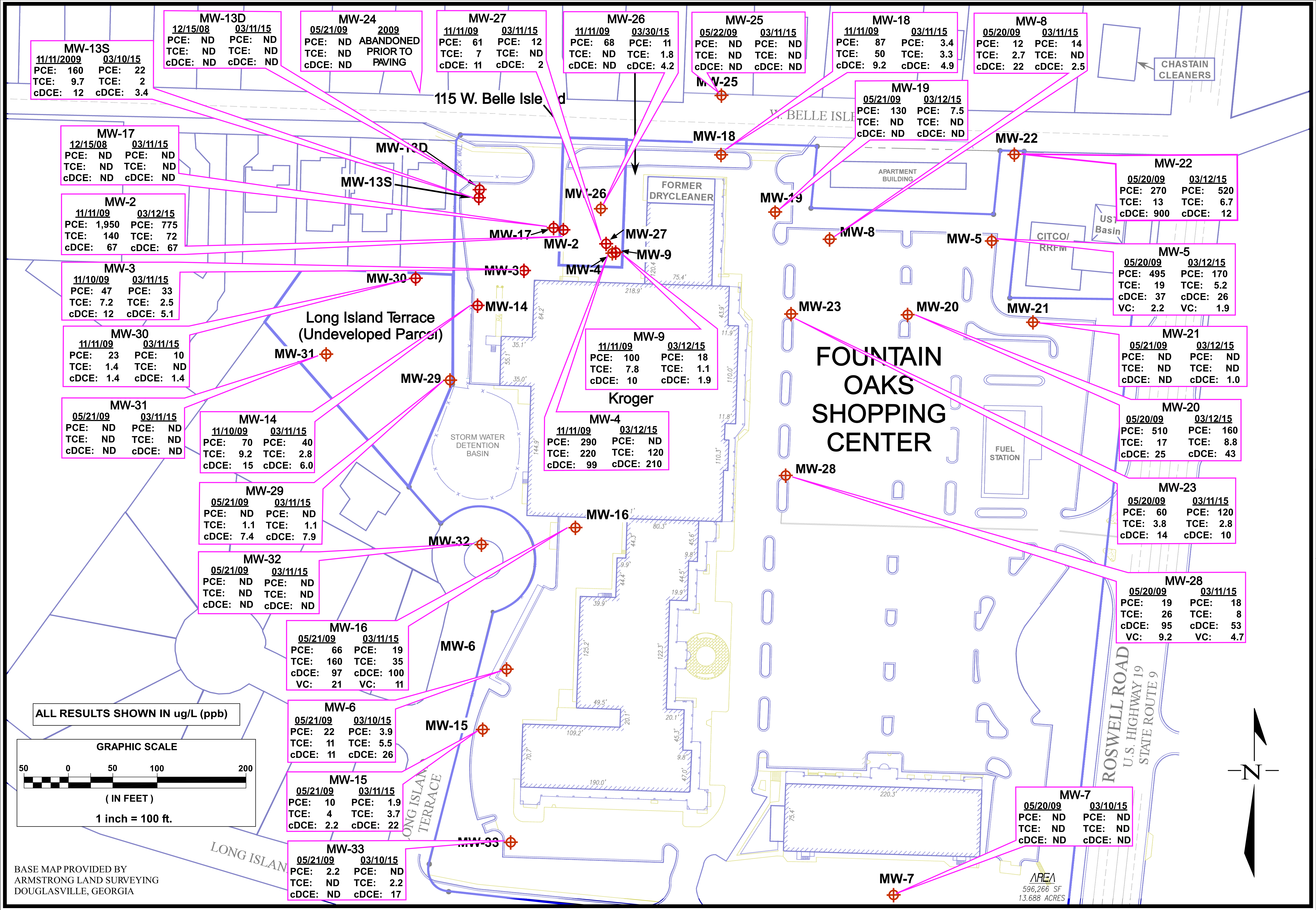
1928 TOPOGRAPHIC MAP WITH 10-MARCH-2015 POTENTIOMETRIS SURFACE OVERLAY

FOUNTAIN OAKS SHOPPING CENTER
4920 ROSWELL ROAD, SANDY SPRINGS, GA

PROJECT: 16577	FACILITY: HSI No. 10807
DATE REVISED: 05/12/17	DATE:
SCALE: Ref. Scale Bar	APPROVED:

MARION ENVIRONMENTAL, INC.
115 PARMENAS LANE
CHATTANOOGA, TN
423-499-4919
www.marionenv.com

FIGURE 5



GROUNDWATER QUALITY MAP
MARCH 2015 & MOST RECENT PREVIOUS RESULTS

FOUNTAIN OAKS SHOPPING CENTER
4920 ROSWELL ROAD, SANDY SPRINGS, GA

PROJECT: 16577

FACILITY: HSI No. 10807

DATE REVISED: 05/12/17

DATE: 03/31/2015

SCALE: 1" = 100'

APPROVED:

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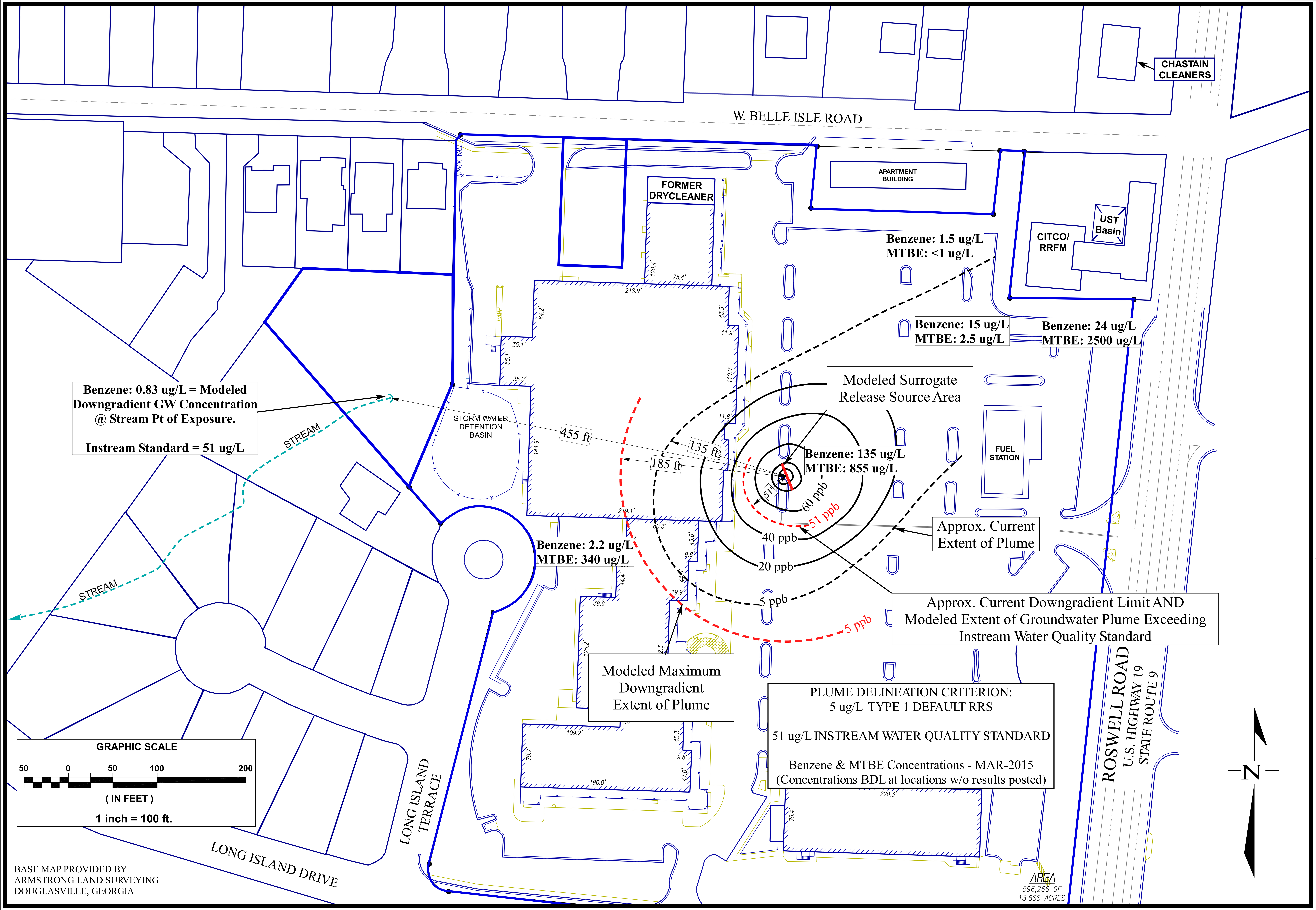
FIGURE 6



BENZENE PLUME DELINEATION & MODELING RESULTS MAP

FOUNTAIN OAKS SHOPPING CENTER
4920 ROSWELL ROAD, SANDY SPRINGS, GA

PROJECT: 16577	DATE: 09/30/15
FACILITY: HSI No. 10807	SCALE: 1" = 100'
DATE REVISED: 05/02/2017	APPROVED:

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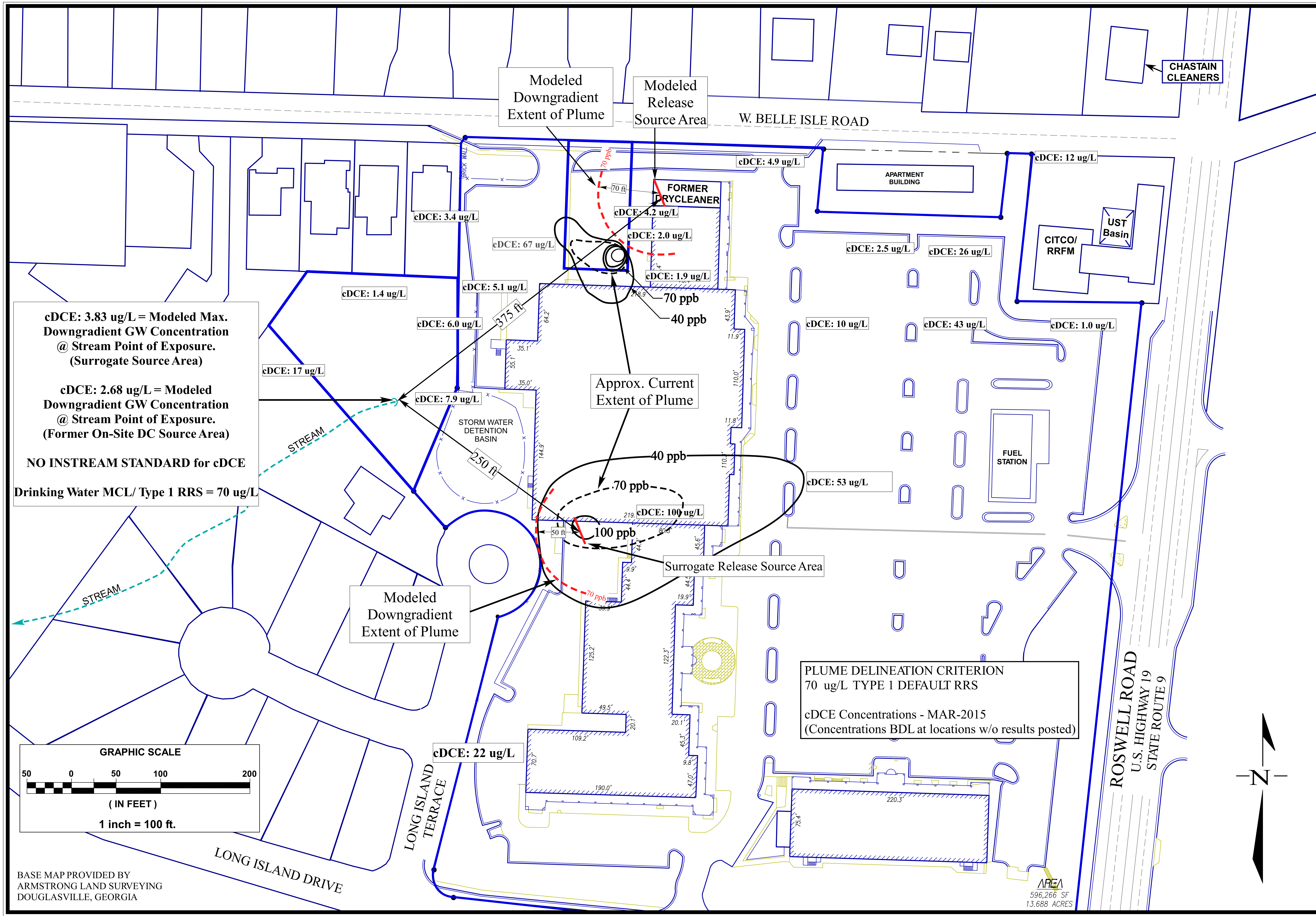
FIGURE 7



cis-1,2-DICHLOROETHENE (cDCE) PLUME DELINEATION & MODELING RESULTS MAP

FOUNTAIN OAKS SHOPPING CENTER
4920 ROSWELL ROAD, SANDY SPRINGS, GA

PROJECT:	16577
FACILITY:	HSI No. 10807
DATE REVISED:	05/02/2017
DATE:	09/30/15
SCALE:	1" = 100'
APPROVED:	

MARION ENVIRONMENTAL, INC.
115 PARMENAS LANE
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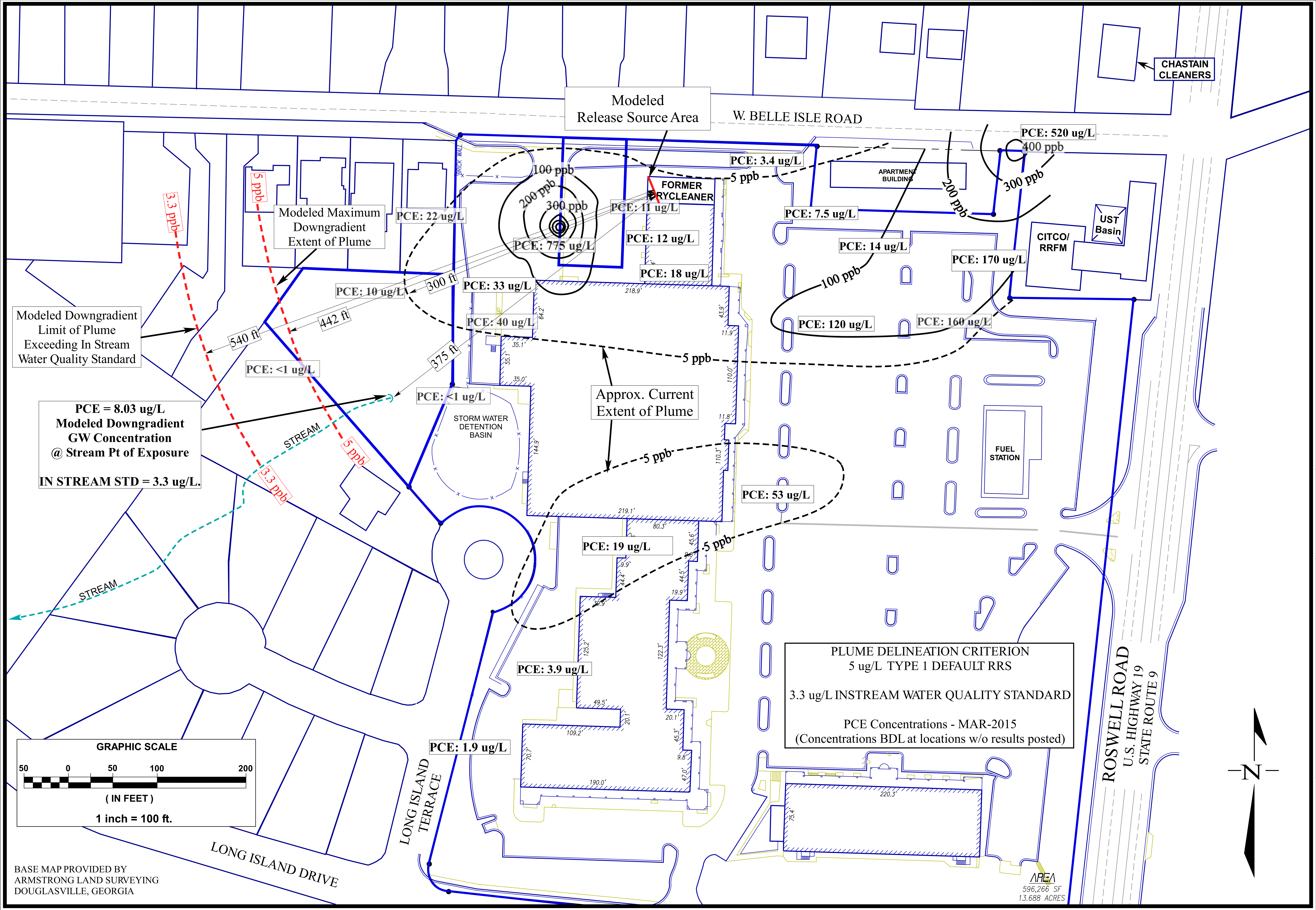
MEI

FIGURE 8



TETRACHLOROETHYLENE (PCE)
PLUME DELINEATION &
MODELING RESULTS MAP

FOUNTAIN OAKS SHOPPING CENTER
4920 ROSWELL ROAD, SANDY SPRINGS, GA

PROJECT: 16577	FACILITY: HSI No. 10807
DATE REVISED: 05/02/2017	
DATE: 09/30/15	SCALE: 1" = 100'
APPROVED:	

MARION ENVIRONMENTAL, INC.
115 PARMENAS LANE
CHATTANOOGA, TN
423-499-4919
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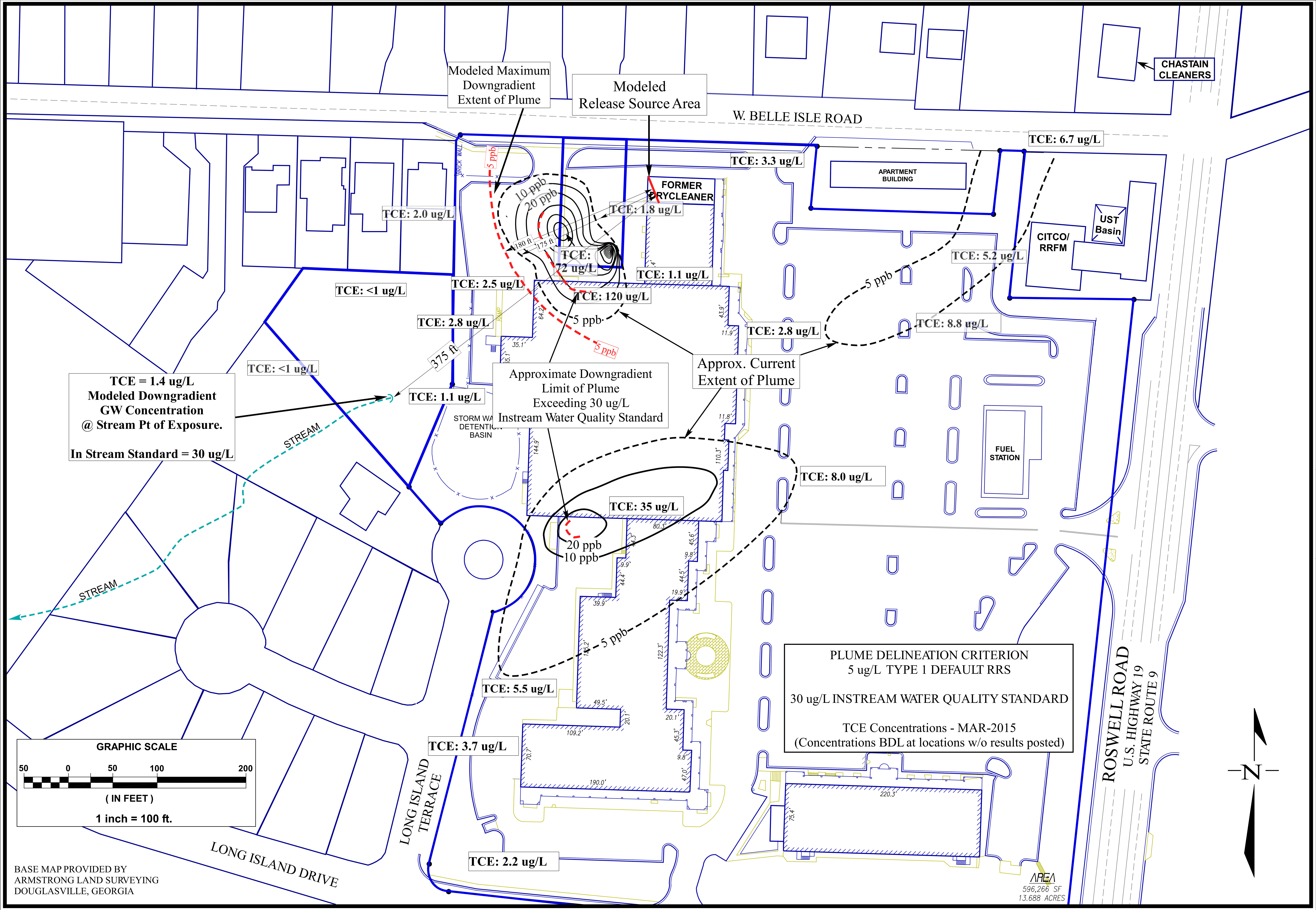
FIGURE 9



TRICHLOROETHYLENE (TCE)
PLUME DELINEATION &
MODELING RESULTS MAP

FOUNTAIN OAKS SHOPPING CENTER
4920 ROSWELL ROAD, SANDY SPRINGS, GA

PROJECT: 16577
FACILITY: HSI No. 10807
DATE REVISED: 05/02/2017
DATE: 09/30/15
SCALE: 1" = 100'
APPROVED:

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115 PARMENAS LANE
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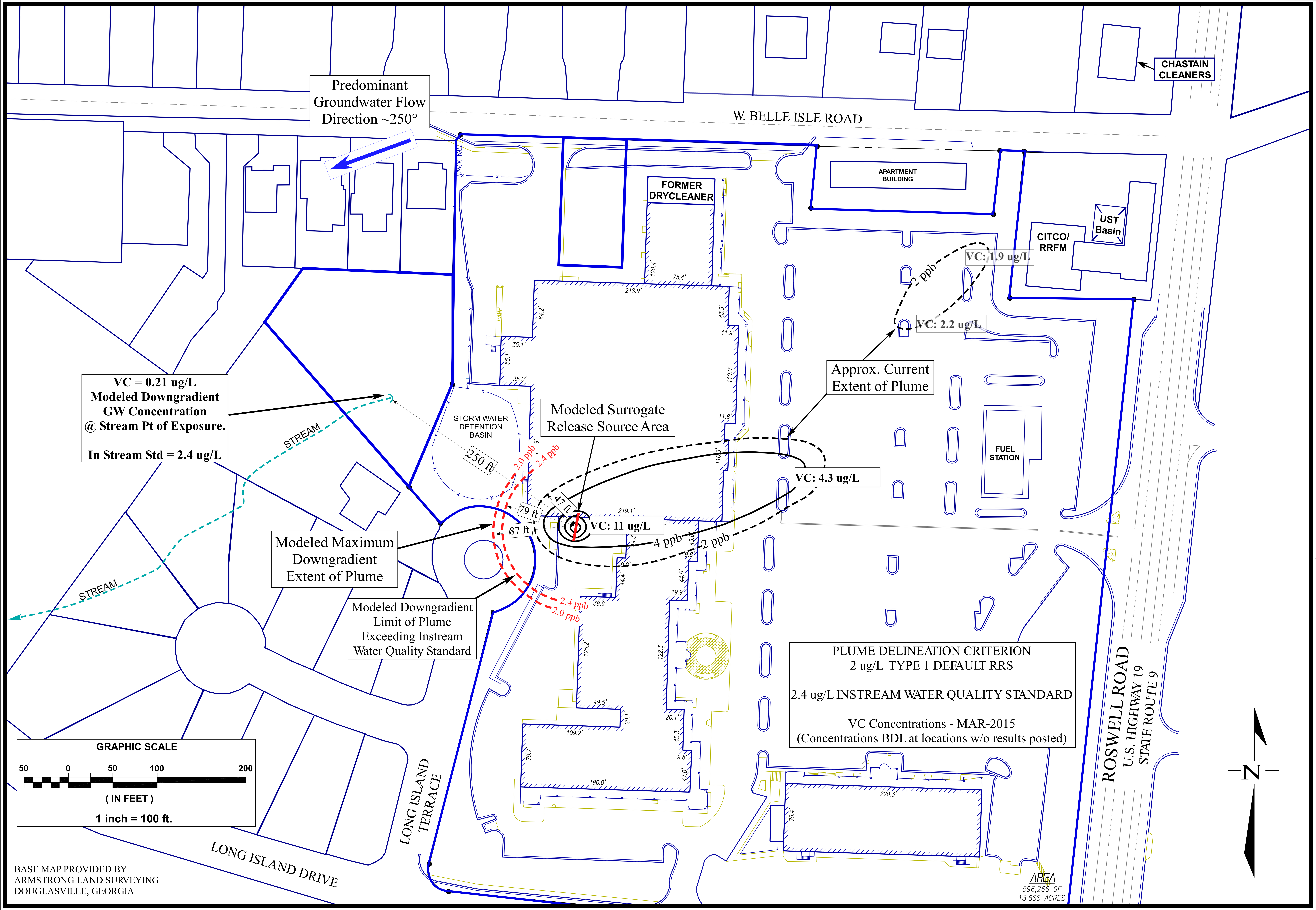
FIGURE 10



VINYL CHLORIDE (VC) PLUME DELINEATION & MODELING RESULTS MAP

FOUNTAIN OAKS SHOPPING CENTER
4920 ROSWELL ROAD, SANDY SPRINGS, GA

PROJECT: 16577	DATE: 09/30/15
FACILITY: HSI No. 10807	SCALE: 1" = 100'
DATE REVISED: 05/02/2017	APPROVED:

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FIGURE 11

Appendix B

Tables

TABLE 2
Fountain Oaks Shopping Center
Groundwater Analytical Results - VOCs Detected - March 2015 Sampling Event
(All concentration units in micrograms per liter (µg/L))

Well ID	Date	Acetone	Benzene	sec-Butylbenzene	Chloroform	Cumene (Isopropylbenzene)	cis-1,2-Dichloroethene (cDCE)	trans-1,2-Dichloroethene (tDCE)	Di-isopropyl ether	Methyl Ethyl Ketone (MEK) (2-Butanone)	Methyl tert. Butyl Ether (MTBE)	Tetrachloroethene (PCE)	Trichloroethene (TCE)	Vinyl chloride (VC)
MW-2	3/12/2015	<50	<1	<1	**5.6**	<1	**65**	<1	<1	<10	**1.0**	**740**	**70**	<1
(Dup.)	3/12/2015	<50	<1	<1	**6.1**	<1	**68**	<1	<1	<10	<1	**810**	**73**	<1
MW-3	3/11/2015	<50	<1	<1	**10**	<1	**5.1**	<1	<1	<10	**1.0**	**33**	**2.5**	<1
MW-4	3/12/2015	<50	<1	<1	<5	<1	**210**	**1.2**	<1	<10	<1	<10	**120**	<1
MW-5	3/12/2015	<50	**1.5**	<1	<5	<1	**26**	<1	<1	<10	<1	**170**	**5.2**	**1.9**
MW-6	3/10/2015	<50	<1	<1	<5	<1	**26**	<1	**1.7**	<10	**45**	**3.9**	**5.5**	<1
MW-7	3/10/2015	<50	<1	<1	<5	<1	<1	<1	<1	<10	<1	<1	<1	<1
MW-8	3/11/2015	<50	<1	<1	**11**	<1	**2.5**	<1	<1	<50	<1	**14**	<1	<1
MW-9	3/12/2015	<50	<1	<1	**14**	<1	**1.9**	<1	<1	<10	<1	**18**	**1.1**	<1
MW-13D	3/11/2015	**89**	<1	<1	<5	<1	<1	<1	<1	**11**	<1	<1	<1	<1
MW-13S	3/10/2015	<50	<1	<1	**12**	<1	**3.0**	<1	<1	<10	<1	**21**	**1.8**	<1
(Dup.)	3/10/2015	<50	<1	<1	**11**	<1	**3.7**	<1	<1	<10	<1	**23**	**2.1**	<1
MW-14	3/11/2015	<50	<1	<1	**9.7**	<1	**6.0**	<1	<1	<10	<1	**40**	**2.8**	<1
MW-15	3/11/2015	<50	<1	<1	<5	<1	**22**	<1	<1	<10	<1	**1.9**	**3.7**	<1
MW-16	3/11/2015	**54**	**2.2**	<1	<5	<1	**100**	<1	**5.7**	<10	**340**	**19**	**35**	**11**
MW-17	3/11/2015	<50	<1	<1	<5	<1	<1	<1	<1	<10	<1	<1	<1	<1
MW-18	3/11/2015	<50	<1	<1	<5	<1	**4.9**	<1	<1	<1	<1	**3.4**	**3.3**	<1
MW-19	3/12/2015	<50	<1	<1	**11**	<1	<1	<1	<1	<10	<1	**7.5**	<1	<1
MW-20	3/12/2015	<50	**15**	<1	<5	<1	**43**	<1	<1	<10	**2.5**	**160**	**8.8**	**2.2**
MW-21	3/12/2015	<50	**24**	<1	<5	<1	**1.0**	<1	**46**	<10	**2500**	<1	<1	<1
MW-22	3/12/2015	<50	<1	<1	**8.9**	<1	**12**	<1	<1	<10	<1	**520**	**6.7**	<1
MW-23	3/11/2015	<50	<1	<1	**5.6**	<1	**10**	<1	<1	<10	<1	**120**	**2.8**	<1
MW-25	3/11/2015	<50	<1	<10	<5	<1	<1	<1	<1	<10	<1	<1	<1	<1
MW-26	3/30/2015	<50	<1	<10	<5	<1	**4.2**	<1	<1	<10	<1	**11**	**1.8**	<1
MW-27	3/11/2015	<50	<1	<1	**12**	<1	**2.0**	<1	<1	<10	<1	**12**	<1	<1
MW-28	3/11/2015	**86**	**130**	**1.5**	<5	**2.6**	**48**	<1	**11**	<10	**820**	**16**	**7.0**	**3.9**
(Dup.)	3/11/2015	<50	**140**	**1.9**	<5	**3.2**	**58**	<1	**12**	<10	**890**	**20**	**8.9**	**4.7**
MW-29	3/11/2015	<50	<1	<10	<5	<1	**7.9**	<1	**1.0**	<10	**15**	<1	**1.1**	<1
MW-30	3/11/2015	<50	<1	<10	<5	<1	**1.4**	<1	<1	<10	<1	**10**	<1	<1
MW-31	3/11/2015	<50	<1	<10	<5	<1	<1	<1	<1	<10	<1	<1	<1	<1
MW-32	3/11/2015	<50	<1	<10	<5	<1	<1	<1	<1	<10	**1.9**	<1	<1	<1
MW-33	3/10/2015	<50	<1	<10	<5	<1	**17**	<1	<1	<10	**3.3**	<1	**2.2**	<1

NOTES: (1) Well #'s 1, 10, 11 & 12 abandoned/destroyed during 2007-2008 soil remediation. Well #24 abandoned/destroyed during 2009 road paving.
(2) The "less than" symbol (<) indicates that the analyte was not detected above the given numerical method detection limit (MDL).

Table 3
Domenico Fate & Transport/Attenutaion Model & Soil to Groundwater Leaching Calculations
Benzene
Modeled Point of Exposure - Off-Site Stream
Fountain Oaks Shopping Center

Variable	Variable Definition	Value	Formula	Units	Parameter Type	Data Source
Soil to Ground Water Leaching						
W	Width of Source	32.4		ft	Site-specific	MEI CSR, 2015, Sect. 3.4.4.4.1
W	Width of Source	**988**	$W_{cm} = W_{ft}$ * 30.48 cm/ft	cm	Site-specific	
P	Avg. Annual Precipitation	**49.71**		in/yr	Site-specific	Natl. Weather Svc, Peachtree City
P	Avg. Annual Precipitation	**126**	$P_{cm} = P_{in}$ * 2.54 cm/in	cm/yr	Calculated	
k_i	Infiltration Factor	**0.0009**		dimensionless	Specific to Silty Soil	Weidemeier, et al., 1999, p. 52
I	Infiltration Rate	**14.3**	$I = P^2$*0.009	cm/year	Calculated	
δ_{gw}	GW Mixing Zone Thickness	**7.1**		ft	Site-specific	MEI CSR, 12-2015, Table 2
δ_{gw}	GW Mixing Zone Thickness	**216**	$\delta_{gw,\ cm} = \delta_{gw,\ ft}$ * 30.48 cm/ft	cm	Site-specific	
K_{sat}	Hydraulic conductivity (saturated)	**7.78E-05**		cm/sec	Site-specific	UC PPCAP, Pg 23
K_{sat}	Hydraulic conductivity (saturated)	**6.72E+00**	$K_{sat,(cm/day)} = K_{sat,(cm/s)}$* 86,400 sec/day	cm/day		
i	Groundwater Hydraulic Gradient	**0.03**	i = Δhead/Δdistance (along flow path)	cm/cm	Site-specific, Avg.	MEI CSR, 05-2017, Figs 6&7
U_{gw}	GW Darcy velocity	**73.61**	$U_{gw} = K_{sat}$ * i	cm/year	Calculated	ASTM E2081-00 (2015)
DAF	Dilution Attenuation Factor	**2.124**	DAF = 1 + (U_{gw}*δ_{gw})/(I*W)	dimensionless	Calculated	ASTM E2081-00 (2015)
K_{oc}	Soil Organic Carbon-Water Partition Coefficient	**146**		cm^3-W/g-C	Compound-Specific	EPA RSL Table, 2015
f_{oc}	Fractional Org. Carbon	**3.58%**		%	Site-specific	UC PPCAP, Table 1
K_d	Soil-Water Partition/Sorption Coeff.	**5.2268**	$K_d = K_{oc}$ * f_{oc}	g-W/g-soil	Calculated	ASTM E2081-00 (2015)
ρ_s	Soil Bulk Density	**1.80**		g-S/cm^3-S	Site-specific	UC PPCAP, Table 1
Θ_w	Soil Volumetric Water Content	**0.258**		cm^3-W/cm^3-S	Site-specific	UC PPCAP, Table 1
Θ_a	Soil Volumetric Air Content	**0.26**		cm^3-A/cm^3-S	default	ASTM E2081-00 (2015)
H'	Henry's Law Constant	**0.23**		dimensionless	Compound-Specific	EPA RSL Table, 2015
K_{sw}	Soil to Leachate Partition Coeff.	**5.403**	$K_{sw} = [\Theta_w + (K_d*\rho_s) + (H_{eff} * \Theta_a)] / \rho_s$	mg/L-wtr/mg/kg-soil	Calculated	ASTM E2081-00 (2015)
LF_{sw}	Leaching Factor - Soil to Groundwater	**0.087**	$LF_{sw} = 1/(K_{sw}$ * DAF)	ppm/ppm	Calculated	ASTM E2081-00 (2015)
$C_{max,\ soil}$	Max soil concentration on-site	**0.016**		mg/kg	Site-specific	MEI CSR, 2015, Tables 7, 8 & 22
C_{leach}	Conc. in GW by leaching	**1.4E-03**	$C_{leach} = C_{max,\ soil}$ * LF_{sw}	mg/L	Calculated	ASTM E2081-00 (2015)
Domenico Ground Water Solute Transport Model						
$C_{max,gw}$	Max GW concentration on-site	**135**		μg/L	Site-specific	MEI CSR, 05-2017, Tbl 2
$C_{max,gw}$	Max GW concentration on-site	**0.135**		mg/L	Site-specific	
$C_{source,\ gw}$	Steady State GW concentration in source zone	**0.136**	$C_{source,\ gw} = C_{max,\ gw} + C_{leach}$	mg/L	Calculated	Calculated
x_{del}	Distance: Source to Downgrad. Delineated Edge of Plume	**50**		ft	Site & Compound-specific	MEI CSR, 05-2017, Figs. 10-14
x_{del}	Distance: Source to Downgrad. Delineated Edge of Plume	**1,524**	$x_{del,\ cm} = x_{del,\ ft}$ * 30.48 cm/ft	cm	Site & Compound-specific	
x_{POE}	Dist: Downgrad. Edge Delineated Plume to Pt. of Exposure	**405**		ft	Site & Compound-specific	MEI CSR, 05-2017, Figs. 10-14
x_{POE}	Dist: Downgrad. Edge Delineated Plume to Pt. of Exposure	**12,344**	$x_{POE,\ cm} = x_{POE,\ ft}$ * 30.48 cm/ft	cm	Site & Compound-specific	
x_{total}	Distance - Total to Potential Receptor	**455**		ft	Calculated	
x_{total}	Distance - Total to Potential Receptor	**13,868**	$x_{total,\ cm} = x_{total,\ ft}$ * 30.48 cm/ft	cm	Calculated	
λ	Degradation rate const.	**0.00067**		day^{-1}	Geo. Mean of Site Specific	MEI CSR, 12-2015, Table 11
α_x	Longitudinal Dispersivity	**1386.84**	$\alpha_x = x_{total}$ * 0.1	cm	Calculated	ASTM E 1739
α_y	Transverse Dispersivity	**462.28**	$\alpha_y = \alpha_x / 3$	cm	Calculated	ASTM E 1739
α_z	Vertical Dispersivity	**69.342**	$\alpha_z = \alpha_x / 20$	cm	Calculated	ASTM E 1739
u	Specific Discharge	**285.29**	u = (K_{sat} * i) / Θ_w	cm/day	Calculated	ASTM E2081-00 (2015)
W	Source width (Horiz.)	**32.4**		ft	Site-specific	MEI CSR, 12-2015, Sec. 3.4.4.1
W	Source width (Horiz.)	**988**	$W_{cm} = W_{ft}$ * 30.48 cm/ft	cm	Calculated	
S_d	Source thickness (Vertical)	**200**		cm	Default	EPA RSL Table, 2015
Domenico Steady-State Transport/Attenuation Equation: **C(x) = Csource * {exp [x_{total}/(2 * α_x)*(1-sqrt(1+(4*λ*α_x/u)))] * [erf (W/(4*sqrt(αy * x_{total})))] * [erf (S_d/(4*sqrt(α_z * x_{total})))]}**						ASTM E 1739, EPA 2002
Intermed. calc.	Domenico - exponential term	-3.246E-02	(x_{total}/(2 * α_x)*(1-sqrt(1+(4*λ*α_x/u)))	dimensionless	Calculated	Calculated
Intermed. calc.	exp (exponential term)	9.681E-01	exp (exponential term)	dimensionless	Calculated	Calculated
Intermed. calc.	(1st term) - error function (erf) to be calc.	9.751E-02	(W/(4*sqrt(α_y * x_{total})))	dimensionless	Calculated	Calculated
Intermed. calc.	(2nd term) - error function (erf) to be calc.	5.099E-02	(S_d/(4*sqrt(α_z * x_{total})))	dimensionless	Calculated	Calculated
Intermed. calc.	erf (1st term)=	0.109677	erf (W/(4*sqrt(α_y * x_{total})))	dimensionless	Calculated	Calculated
Intermed. calc.	erf (2nd term)=	0.057483	erf (S_d/(4*sqrt(α_z * x_{total})))	dimensionless	Calculated	Calculated
Intermed. calc.	erf(1st Term) * erf (2nd Term}	6.305E-03		dimensionless	Calculated	Calculated
Intermed. calc.	Domenico Results {parenthetical term}	**6.103E-03**	{exp [exp. term] * [erf (1st term)] * [erf (2nd term)]}	dimensionless	Calculated	Calculated
C(x) =	**Downgradient Point of Exposure Concentration**	**8.3E-04**	$C_{(x)} = C_{source,\ gw}$ * {Domenico Eqn.}	**mg/L**	**Calculated**	**Calculated**
C(x) =	**Downgradient Point of Exposure Concentration**	**0.83**	$C_{(x)} = C_{source,\ gw}$ * {Domenico Eqn.}	**μg/L**	**Calculated**	**Calculated**
In Stream Standard	**Georgia In Stream Water Quaity Standard**	**51**		**μg/L**	**Default**	**EPD Rule 391-3-.03(5)(e)(iv)**

Table 4
Domenico Fate & Transport/Attenutaion Model & Soil to Groundwater Leaching Calculations
cis-1,2-Dichloroethene (cDCE) - On-Site Drycleaner Release Source
Modeled Point of Exposure - Off-Site Stream
Fountain Oaks Shopping Center

Variable	Variable Definition	Value	Formula	Units	Parameter Type	Data Source
Soil to Ground Water Leaching						
W	Width of Source	32.4		ft	Site-specific	MEI CSR, 2015, Sect. 3.4.4.4.1
W	Width of Source	**988**	$W_{cm} = W_{ft}$ * 30.48 cm/ft	cm	Site-specific	
P	Avg. Annual Precipitation	**49.71**		in/yr	Site-specific	Natl. Weather Svc, Peachtree City
P	Avg. Annual Precipitation	**126**	$P_{cm} = P_{in}$ * 2.54 cm/in	cm/yr	Calculated	
k_i	Infiltration Factor/Coefficient	**0.0009**		dimensionless	Specific to Silty Soil	Weidemeier, et al., 1999, p. 52
I	Infiltration Rate	**14.3**	$I = P^2 * 0.009$	cm/year	Calculated	
δ_{gw}	GW Mixing Zone Thickness	**7.1**		ft	Site-specific	MEI CSR, 12-2015, Table 2
δ_{gw}	GW Mixing Zone Thickness	**216**	$\delta_{gw, cm} = \delta_{gw, ft}$ * 30.48 cm/ft	cm	Site-specific	
K_{sat}	Hydraulic conductivity (saturated)	**7.78E-05**		cm/sec	Site-specific	UC PPCAP, Pg 23
K_{sat}	Hydraulic conductivity (saturated)	**6.72E+00**	$K_{sat,(cm/day)} = K_{sat,(cm/s)}$ * 86,400 sec/day	cm/day		
i	Groundwater Hydraulic Gradient	**0.03**	i = Δhead/Δdistance (along flow path)	cm/cm	Site-specific, Avg.	MEI CSR, 05-2017, Figs 6&7
U_{gw}	GW Darcy velocity	**73.61**	$U_{gw} = K_{sat}$ * i	cm/year	Calculated	ASTM E2081-00 (2015)
DAF	Dilution Attenuation Factor	**2.124**	DAF = 1 + $(U_{gw}*\delta_{gw})/(I*W)$	dimensionless	Calculated	ASTM E2081-00 (2015)
K_{oc}	Soil Organic Carbon-Water Partition Coefficient	**39.6**		cm^3-W/g-C	Compound-Specific	EPA RSL Table, 2015
f_{oc}	Fractional Org. Carbon	**3.58%**		%	Site-specific	UC PPCAP, Table 1
K_d	Soil-Water Partition/Sorption Coeff.	**1.41768**	$K_d = K_{oc} * f_{oc}$	g-W/g-soil	Calculated	ASTM E2081-00 (2015)
ρ_s	Soil Bulk Density	**1.80**		g-S/cm^3-S	Site-specific	UC PPCAP, Table 1
Θ_w	Soil Volumetric Water Content	**0.258**		cm^3-W/cm^3-S	Site-specific	UC PPCAP, Table 1
Θ_a	Soil Volumetric Air Content	**0.26**		cm^3-A/cm^3-S	default	ASTM E2081-00 (2015)
H'	Henry's Law Constant	**0.17**		dimensionless	Compound-Specific	EPA RSL Table, 2015
K_{sw}	Soil to Leachate Partition Coeff.	**1.585**	$K_{sw} = [\Theta_w + (K_d*\rho_s) + (H_{eff} * \Theta_a)] / \rho_s$	mg/L-wtr/mg/kg-soil	Calculated	ASTM E2081-00 (2015)
LF_{sw}	Leaching Factor - Soil to Groundwater	**0.297**	$LF_{sw} = 1/(K_{sw}$ * DAF)	ppm/ppm	Calculated	ASTM E2081-00 (2015)
$C_{max, soil}$	Max soil concentration on-site	**0.3**		mg/kg	Site-specific	MEI CSR, 2015, Tables 7, 8 & 22
$\mathbf{C_{leach}}$	Conc. in GW by leaching	**8.9E-02**		mg/L	Calculated	ASTM E2081-00 (2015)
Domenico Ground Water Solute Transport Model						
$C_{max,gw}$	Max GW concentration on-site	**210**		µg/L	Site-specific	MEI CSR, 05-2017, Tbl 2
$C_{max,gw}$	Max GW concentration on-site	**0.210**		mg/L	Site-specific	
$\mathbf{C_{source, gw}}$	Steady State GW concentration in source zone	**0.299**	$C_{source, gw} = C_{max, gw} + C_{leach}$	mg/L	Calculated	Calculated
x_{del}	Distance: Source to Downgrad. Delineated Edge of Plume	**70**		ft	Site & Compound-specific	MEI CSR, 05-2017, Figs. 10-14
x_{del}	Distance: Source to Downgrad. Delineated Edge of Plume	**2,134**	$x_{del, cm} = x_{del, ft}$ * 30.48 cm/ft	cm	Site & Compound-specific	
x_{POE}	Dist: Downgrad. Edge Delineated Plume to Pt. of Exposure	**305**		ft	Site & Compound-specific	MEI CSR, 05-2017, Figs. 10-14
x_{POE}	Dist: Downgrad. Edge Delineated Plume to Pt. of Exposure	**9,296**	$x_{POE, cm} = x_{POE, ft}$ * 30.48 cm/ft	cm	Site & Compound-specific	
x_{total}	Distance - Total to Potential Receptor	**375**		ft	Site-specific	
x_{total}	Distance - Total to Potential Receptor	**11,430**	$x_{total, cm} = x_{total, ft}$ * 30.48 cm/ft	cm	Site-specific	
λ	Degradation rate const.	**0.0008**		day^{-1}	Geo. Mean of Site Specific	MEI CSR, 12-2015, Table 11
α_x	Longitudinal Dispersivity	**1143**	$\alpha_x = x_{total}$ * 0.1	cm	Calculated	ASTM E 1739
α_y	Transverse Dispersivity	**381**	$\alpha_y = \alpha_x / 3$	cm	Calculated	ASTM E 1739
α_z	Vertical Dispersivity	**57.15**	$\alpha_z = \alpha_x / 20$	cm	Calculated	ASTM E 1739
u	Specific Discharge	**285.29**	$u = (K_{sat} * i) / \Theta_w$	cm/day	Calculated	ASTM E2081-00 (2015)
W	Source width (Horiz.)	**32.4**		ft	Site-specific	MEI CSR, 12-2015, Sec. 3.4.4.1
W	Source width (Horiz.)	**988**	$W_{cm} = W_{ft}$ * 30.48 cm/ft	cm	Calculated	
S_d	Source thickness (Vertical)	**200**		cm	Default	EPA RSL Table, 2015
Domenico Steady-State Transport/Attenuation Equation: **C(x) = Csource * {exp [x_{total}/(2 * α_x)*(1-sqrt(1+(4*λ*α_x/u)))] * [erf (W/(4*sqrt(αy * x_{total})))] * [erf (S_d/(4*sqrt(α_z * x_{total})))]}**						ASTM E 1739, EPA 2002
Intermed. calc.	Domenico - exponential term	-3.195E-02	$(x_{total}/(2 * \alpha_x)*(1-sqrt(1+(4*\lambda*\alpha_x/u)))$	dimensionless	Calculated	Calculated
Intermed. calc.	exp (exponential term)	9.686E-01	exp (exponential term)	dimensionless	Calculated	Calculated
Intermed. calc.	(1st term) - error function (erf) to be calc.	1.183E-01	$(W/(4*sqrt(\alpha_y * x_{total})))$	dimensionless	Calculated	Calculated
Intermed. calc.	(2nd term) - error function (erf) to be calc.	6.186E-02	$(S_d/(4*sqrt(\alpha_z * x_{total})))$	dimensionless	Calculated	Calculated
Intermed. calc.	erf (1st term)=	0.132876	erf $(W/(4*sqrt(\alpha_y * x_{total})))$	dimensionless	Calculated	Calculated
Intermed. calc.	erf (2nd term)=	0.069717	erf $(S_d/(4*sqrt(\alpha_z * x_{total})))$	dimensionless	Calculated	Calculated
Intermed. calc.	erf(1st Term) * erf (2nd Term}	9.264E-03		dimensionless	Calculated	Calculated
Intermed. calc.	Domenico Results {parenthetical term}	**8.972E-03**	{exp [exp. term] * [erf (1st term)] * [erf (2nd term)]}	dimensionless	Calculated	Calculated
C(x) =	**Downgradient Point of Exposure Concentration**	**2.7E-03**	$C_{(x)} = C_{source, gw}$ * {Domenico Eqn.}	**mg/L**	**Calculated**	**Calculated**
C(x) =	**Downgradient Point of Exposure Concentration**	**2.68**	$C_{(x)} = C_{source, gw}$ * {Domenico Eqn.}	**µg/L**	**Calculated**	**Calculated**
Type 1 RRS	**Residential RRS/ Drinking Water MCL**	**70**		**µg/L**	**Default**	**EPD Rule 391-5-.18(2)(b)**

Table 5
Domenico Fate & Transport/Attenutaion Model & Soil to Groundwater Leaching Calculations
cis-1,2-Dichloroethene (cDCE) - Surrogate Release Source
Modeled Point of Exposure - Off-Site Stream
Fountain Oaks Shopping Center

Variable	Variable Definition	Value	Formula	Units	Parameter Type	Data Source
			Soil to Ground Water Leaching			
W	Width of Source	32.4		ft	Site-specific	MEI CSR, 2015, Sect. 3.4.4.4.1
W	Width of Source	**988**	$W_{cm} = W_{ft} * 30.48$ cm/ft	cm	Site-specific	
P	Avg. Annual Precipitation	**49.71**		in/yr	Site-specific	Natl. Weather Svc, Peachtree City
P	Avg. Annual Precipitation	**126**	$P_{cm} = P_{in} * 2.54$ cm/in	cm/yr	Calculated	
k_i	Infiltration Factor/Coefficient	**0.0009**		dimensionless	Specific to Silty Soil	Weidemeier, et al., 1999, p. 52
I	Infiltration Rate	**14.3**	$I = P^2*0.009$	cm/year	Calculated	
δ_{gw}	GW Mixing Zone Thickness	**7.1**		ft	Site-specific	MEI CSR, 12-2015, Table 2
δ_{gw}	GW Mixing Zone Thickness	**216**	$\delta_{gw, cm} = \delta_{gw, ft} * 30.48$ cm/ft	cm	Site-specific	
K_{sat}	Hydraulic conductivity (saturated)	**7.78E-05**		cm/sec	Site-specific	UC PPCAP, Pg 23
K_{sat}	Hydraulic conductivity (saturated)	**6.72E+00**	$K_{sat,(cm/day)} = K_{sat,(cm/s)} * 86,400$ sec/day	cm/day		
i	Groundwater Hydraulic Gradient	**0.03**	$i = \Delta head/\Delta distance$ (along flow path)	cm/cm	Site-specific, Avg.	MEI CSR, 05-2017, Figs 6&7
U_{gw}	GW Darcy velocity	**73.61**	$U_{gw} = K_{sat} * i$	cm/year	Calculated	ASTM E2081-00 (2015)
DAF	Dilution Attenuation Factor	**2.124**	$DAF = 1 + (U_{gw}*\delta_{gw})/(I*W)$	dimensionless	Calculated	ASTM E2081-00 (2015)
K_{oc}	Soil Organic Carbon-Water Partition Coefficient	**39.6**		cm^3-W/g-C	Compound-Specific	EPA RSL Table, 2015
f_{oc}	Fractional Org. Carbon	**3.58%**		%	Site-specific	UC PPCAP, Table 1
K_d	Soil-Water Partition/Sorption Coeff.	**1.41768**	$K_d = K_{oc} * f_{oc}$	g-W/g-soil	Calculated	ASTM E2081-00 (2015)
ρ_s	Soil Bulk Density	**1.80**		g-S/cm^3-S	Site-specific	UC PPCAP, Table 1
Θ_w	Soil Volumetric Water Content	**0.258**		cm^3-W/cm^3-S	Site-specific	UC PPCAP, Table 1
Θ_a	Soil Volumetric Air Content	**0.26**		cm^3-A/cm^3-S	default	ASTM E2081-00 (2015)
H'	Henry's Law Constant	**0.17**		dimensionless	Compound-Specific	EPA RSL Table, 2015
K_{sw}	Soil to Leachate Partition Coeff.	**1.585**	$K_{sw} = [\Theta_w + (K_d*\rho_s) + (H_{eff} * \Theta_a)] / \rho_s$	mg/L-wtr/mg/kg-soil	Calculated	ASTM E2081-00 (2015)
LF_{sw}	Leaching Factor - Soil to Groundwater	**0.297**	$LF_{sw} = 1/(K_{sw} * DAF)$	ppm/ppm	Calculated	ASTM E2081-00 (2015)
$C_{max, soil}$	Max soil concentration on-site	**0.3**		mg/kg	Site-specific	MEI CSR, 2015, Tables 7, 8 & 22
$\mathbf{C_{leach}}$	Conc. in GW by leaching	**8.9E-02**		mg/L	Calculated	ASTM E2081-00 (2015)
			Domenico Ground Water Solute Transport Model			
$C_{max,gw}$	Max GW concentration on-site	**100**		µg/L	Site-specific	MEI CSR, 05-2017, Tbl 2
$C_{max,gw}$	Max GW concentration on-site	**0.100**		mg/L	Site-specific	
$\mathbf{C_{source, gw}}$	Steady State GW concentration in source zone	**0.189**	$C_{source, gw} = C_{max, gw} + C_{leach}$	mg/L	Calculated	Calculated
x_{del}	Distance: Source to Downgrad. Delineated Edge of Plume	**50**		ft	Site & Compound-specific	MEI CSR, 05-2017, Figs. 10-14
x_{del}	Distance: Source to Downgrad. Delineated Edge of Plume	**1,524**	$x_{del, cm} = x_{del, ft} * 30.48$ cm/ft	cm	Site & Compound-specific	
x_{POE}	Dist: Downgrad. Edge Delineated Plume to Pt. of Exposure	**200**		ft	Site & Compound-specific	MEI CSR, 05-2017, Figs. 10-14
x_{POE}	Dist: Downgrad. Edge Delineated Plume to Pt. of Exposure	**6,096**	$x_{POE, cm} = x_{POE, ft} * 30.48$ cm/ft	cm	Site & Compound-specific	
x_{total}	Distance - Total to Potential Receptor	**250**		ft	Site-specific	
x_{total}	Distance - Total to Potential Receptor	**7,620**	$x_{total, cm} = x_{total, ft} * 30.48$ cm/ft	cm	Site-specific	
λ	Degradation rate const.	**0.0008**		day^{-1}	Geo. Mean of Site Specific	MEI CSR, 12-2015, Table 11
α_x	Longitudinal Dispersivity	**762**	$\alpha_x = x_{total} * 0.1$	cm	Calculated	ASTM E 1739
α_y	Transverse Dispersivity	**254**	$\alpha_y = \alpha_x / 3$	cm	Calculated	ASTM E 1739
α_z	Vertical Dispersivity	**38.1**	$\alpha_z = \alpha_x / 20$	cm	Calculated	ASTM E 1739
u	Specific Discharge	**285.29**	$u = (K_{sat} * i) / \Theta_w$	cm/day	Calculated	ASTM E2081-00 (2015)
W	Source width (Horiz.)	**32.4**		ft	Site-specific	MEI CSR, 12-2015, Sec. 3.4.4.1
W	Source width (Horiz.)	**988**	$W_{cm} = W_{ft} * 30.48$ cm/ft	cm	Calculated	
S_d	Source thickness (Vertical)	**200**		cm	Default	EPA RSL Table, 2015
Domenico Steady-State Transport/Attenuation Equation: **$C(x) = Csource * \{exp [x_{total}/(2 * \alpha_x)*(1-sqrt(1+(4*\lambda*\alpha_x/u)))] * [erf (W/(4*sqrt(\alpha y * x_{total})))] * [erf (S_d/(4*sqrt(\alpha_z * x_{total})))]\}$**						ASTM E 1739, EPA 2002
Intermed. calc.	Domenico - exponential term	-2.132E-02	$(x_{total}/(2 * \alpha_x)*(1-sqrt(1+(4*\lambda*\alpha_x/u)))$	dimensionless	Calculated	Calculated
Intermed. calc.	exp (exponential term)	9.789E-01	exp (exponential term)	dimensionless	Calculated	Calculated
Intermed. calc.	(1st term) - error function (erf) to be calc.	1.775E-01	$(W/(4*sqrt(\alpha_y * x_{total})))$	dimensionless	Calculated	Calculated
Intermed. calc.	(2nd term) - error function (erf) to be calc.	9.280E-02	$(S_d/(4*sqrt(\alpha_z * x_{total})))$	dimensionless	Calculated	Calculated
Intermed. calc.	erf (1st term)=	0.198162	$erf (W/(4*sqrt(\alpha_y * x_{total})))$	dimensionless	Calculated	Calculated
Intermed. calc.	erf (2nd term)=	0.104409	$erf (S_d/(4*sqrt(\alpha_z * x_{total})))$	dimensionless	Calculated	Calculated
Intermed. calc.	erf(1st Term) * erf (2nd Term)	2.069E-02		dimensionless	Calculated	Calculated
Intermed. calc.	Domenico Results {parenthetical term}	**2.025E-02**	{exp [exp. term] * [erf (1st term)] * [erf (2nd term)]}	dimensionless	Calculated	Calculated
C(x) =	**Downgradient Point of Exposure Concentration**	**3.8E-03**	$C_{(x)} = C_{source, gw} *$ {Domenico Eqn.}	**mg/L**	**Calculated**	**Calculated**
C(x) =	**Downgradient Point of Exposure Concentration**	**3.83**	$C_{(x)} = C_{source, gw} *$ {Domenico Eqn.}	**µg/L**	**Calculated**	**Calculated**
Type 1 RRS	**Residential RRS/ Drinking Water MCL**	**70**		**µg/L**	**Default**	**EPD Rule 391-5-.18(2)(b)**

Table 6
Domenico Fate & Transport/Attenutaion Model & Soil to Groundwater Leaching Calculations
Tetrachloroethene
Modeled Point of Exposure - Off-Site Stream
Fountain Oaks Shopping Center

Variable	Variable Definition	Value	Formula	Units	Parameter Type	Data Source
Soil to Ground Water Leaching						
W	Width of Source	**32.4**		ft	Site-specific	MEI CSR, 2015, Sect. 3.4.4.4.1
W	Width of Source	**988**	$W_{cm} = W_{ft}$ * 30.48 cm/ft	cm	Site-specific	
P	Avg. Annual Precipitation	**49.71**		in/yr	Site-specific	Natl. Weather Svc, Peachtree City
P	Avg. Annual Precipitation	**126**	$P_{cm} = P_{in}$ * 2.54 cm/in	cm/yr	Calculated	
k_i	Infiltration Factor	**0.0009**		dimensionless	Specific to Silty Soil	Weidemeier, et al., 1999, p. 52
I	Infiltration Rate	**14.3**	$I = P^2$*0.009	cm/year	Calculated	
δ_{gw}	GW Mixing Zone Thickness	**7.1**		ft	Site-specific	MEI CSR, 12-2015, Table 2
δ_{gw}	GW Mixing Zone Thickness	**216**	$\delta_{gw,\ cm} = \delta_{gw,\ ft}$ * 30.48 cm/ft	cm	Site-specific	
K_{sat}	Hydraulic conductivity (saturated)	**7.78E-05**		cm/sec	Site-specific	UC PPCAP, Pg 23
K_{sat}	Hydraulic conductivity (saturated)	**6.72E+00**	$K_{sat,(cm/day)} = K_{sat,(cm/s)}$* 86,400 sec/day	cm/day		
i	Groundwater Hydraulic Gradient	**0.03**	i = Δhead/Δdistance (along flow path)	cm/cm	Site-specific, Avg.	MEI CSR, 05-2017, Figs 6&7
U_{gw}	GW Darcy velocity	**73.61**	$U_{gw} = K_{sat}$ * i	cm/year	Calculated	ASTM E2081-00 (2015)
DAF	Dilution Attenuation Factor	**2.124**	DAF = 1 + $(U_{gw}*\delta_{gw})$/(I*W)	dimensionless	Calculated	ASTM E2081-00 (2015)
K_{oc}	Soil Organic Carbon-Water Partition Coefficient	**94.94**		cm^3-W/g-C	Compound-Specific	EPA RSL Table, 2015
f_{oc}	Fractional Org. Carbon	**3.58%**		%	Site-specific	UC PPCAP, Table 1
K_d	Soil-Water Partition/Sorption Coeff.	**3.398852**	$K_d = K_{oc} * f_{oc}$	g-W/g-soil	Calculated	ASTM E2081-00 (2015)
ρ_s	Soil Bulk Density	**1.80**		g-S/cm^3-S	Site-specific	UC PPCAP, Table 1
Θ_w	Soil Volumetric Water Content	**0.258**		cm^3-W/cm^3-S	Site-specific	UC PPCAP, Table 1
Θ_a	Soil Volumetric Air Content	**0.26**		cm^3-A/cm^3-S	default	ASTM E2081-00 (2015)
H'	Henry's Law Constant	**0.724**		dimensionless	Compound-Specific	EPA RSL Table, 2015
K_{sw}	Soil to Leachate Partition Coeff.	**3.647**	$K_{sw} = [\Theta_w + (K_d*\rho_s) + (H_{eff} * \Theta_a)] / \rho_s$	mg/L-wtr/mg/kg-soil	Calculated	ASTM E2081-00 (2015)
LF_{sw}	Leaching Factor - Soil to Groundwater	**0.129**	$LF_{sw} = 1/(K_{sw}$ * DAF)	ppm/ppm	Calculated	ASTM E2081-00 (2015)
$C_{max,\ soil}$	Max soil concentration on-site	**1.1**		mg/kg	Site-specific	MEI CSR, 2015, Tables 7, 8 & 22
C_{leach}	Conc. in GW by leaching	**1.4E-01**	$C_{leach} = C_{max,\ soil} * LF_{sw}$	mg/L	Calculated	ASTM E2081-00 (2015)
Domenico Ground Water Solute Transport Model						
$C_{max,gw}$	Max GW concentration on-site	**775**		µg/L	Site-specific	MEI CSR, 05-2017, Tbl 2
$C_{max,gw}$	Max GW concentration on-site	**0.775**		mg/L	Site-specific	
$C_{source,\ gw}$	Steady State GW concentration in source zone	**0.917**	$C_{source,\ gw} = C_{max,\ gw} + C_{leach}$	mg/L	Calculated	Calculated
x_{del}	Distance: Source to Downgrad. Delineated Edge of Plume	**300**		ft	Site & Compound-specific	MEI CSR, 05-2017, Figs. 10-14
x_{del}	Distance: Source to Downgrad. Delineated Edge of Plume	**9,144**	$x_{del,\ cm} = x_{del,\ ft}$ * 30.48 cm/ft	cm	Site & Compound-specific	
x_{POE}	Dist: Downgrad. Edge Delineated Plume to Pt. of Exposure	**75**		ft	Site & Compound-specific	MEI CSR, 05-2017, Figs. 10-14
x_{POE}	Dist: Downgrad. Edge Delineated Plume to Pt. of Exposure	**2,286**	$x_{POE,\ cm} = x_{POE,\ ft}$ * 30.48 cm/ft	cm	Site & Compound-specific	
x_{total}	Distance - Total to Potential Receptor	**375**		ft	Site-specific	
x_{total}	Distance - Total to Potential Receptor	**11,430**	$x_{total,\ cm} = x_{total,\ ft}$ * 30.48 cm/ft	cm	Site-specific	
λ	Degradation rate const.	**0.0014**		day^{-1}	Geo. Mean of Site Specific	MEI CSR, 12-2015, Table 11
α_x	Longitudinal Dispersivity	**1143**	$\alpha_x = x_{total}$ * 0.1	cm	Calculated	ASTM E 1739
α_y	Transverse Dispersivity	**381**	$\alpha_y = \alpha_x / 3$	cm	Calculated	ASTM E 1739
α_z	Vertical Dispersivity	**57.15**	$\alpha_z = \alpha_x / 20$	cm	Calculated	ASTM E 1739
u	Specific Discharge	**285.29**	u = $(K_{sat}$ * i) / Θ_w	cm/day	Calculated	ASTM E2081-00 (2015)
W	Source width (Horiz.)	**32.4**		ft	Site-specific	MEI CSR, 12-2015, Sec. 3.4.4.1
W	Source width (Horiz.)	**988**	$W_{cm} = W_{ft}$ * 30.48 cm/ft	cm	Calculated	
S_d	Source thickness (Vertical)	**200**		cm	Default	EPA RSL Table, 2015
Domenico Steady-State Transport/Attenuation Equation: **C(x) = Csource * {exp [x_{total}/(2 * α_x)*(1-sqrt(1+(4*λ*α_x/u)))] * [erf (W/(4*sqrt(αy * x_{total})))] * [erf (S_d/(4*sqrt(α_z * x_{total})))]}**						ASTM E 1739, EPA 2002
Intermed. calc.	Domenico - exponential term	-5.578E-02	$(x_{total}/(2 * \alpha_x)$*(1-sqrt(1+(4*λ*$\alpha_x$/u)))	dimensionless	Calculated	Calculated
Intermed. calc.	exp (exponential term)	9.457E-01	exp (exponential term)	dimensionless	Calculated	Calculated
Intermed. calc.	(1st term) - error function (erf) to be calc.	1.183E-01	(W/(4*sqrt(α_y * x_{total})))	dimensionless	Calculated	Calculated
Intermed. calc.	(2nd term) - error function (erf) to be calc.	6.186E-02	(S_d/(4*sqrt(α_z * x_{total})))	dimensionless	Calculated	Calculated
Intermed. calc.	erf (1st term)=	0.132876	erf (W/(4*sqrt(α_y * x_{total})))	dimensionless	Calculated	Calculated
Intermed. calc.	erf (2nd term)=	0.069717	erf (S_d/(4*sqrt(α_z * x_{total})))	dimensionless	Calculated	Calculated
Intermed. calc.	erf(1st Term) * erf (2nd Term}	9.264E-03		dimensionless	Calculated	Calculated
Intermed. calc.	Domenico Results {parenthetical term}	**8.761E-03**	{exp [exp. term] * [erf (1st term)] * [erf (2nd term)]}	dimensionless	Calculated	Calculated
C(x) =	**Downgradient Point of Exposure Concentration**	**8.0E-03**	$C_{(x)} = C_{source,\ gw}$ * {Domenico Eqn.}	**mg/L**	**Calculated**	**Calculated**
C(x) =	**Downgradient Point of Exposure Concentration**	**8.03**	$C_{(x)} = C_{source,\ gw}$ * {Domenico Eqn.}	**µg/L**	**Calculated**	**Calculated**
In Stream Standard	**Georgia In Stream Water Quaity Standard**	**3.3**		**µg/L**	**Default**	**EPD Rule 391-3-.03(5)(e)(iv)**

Table 7
Domenico Fate & Transport/Attenutaion Model & Soil to Groundwater Leaching Calculations
Trichloroethene
Modeled Point of Exposure - Off-Site Stream
Fountain Oaks Shopping Center

Variable	Variable Definition	Value	Formula	Units	Parameter Type	Data Source
Soil to Ground Water Leaching						
W	Width of Source	**32.4**		ft	Site-specific	MEI CSR, 2015, Sect. 3.4.4.4.1
W	Width of Source	**988**	$W_{cm} = W_{ft}$ * 30.48 cm/ft	cm	Site-specific	
P	Avg. Annual Precipitation	**49.71**		in/yr	Site-specific	Natl. Weather Svc, Peachtree City
P	Avg. Annual Precipitation	**126**	$P_{cm} = P_{in}$ * 2.54 cm/in	cm/yr	Calculated	
k_i	Infiltration Factor	**0.0009**		dimensionless	Specific to Silty Soil	Weidemeier, et al., 1999, p. 52
I	Infiltration Rate	**14.3**	$I = P^2$*0.009	cm/year	Calculated	
δ_{gw}	GW Mixing Zone Thickness	**7.1**		ft	Site-specific	MEI CSR, 12-2015, Table 2
δ_{gw}	GW Mixing Zone Thickness	**216**	$\delta_{gw, cm} = \delta_{gw, ft}$ * 30.48 cm/ft	cm	Site-specific	
K_{sat}	Hydraulic conductivity (saturated)	**7.78E-05**		cm/sec	Site-specific	UC PPCAP, Pg 23
K_{sat}	Hydraulic conductivity (saturated)	**6.72E+00**	$K_{sat,(cm/day)} = K_{sat,(cm/s)}$* 86,400 sec/day	cm/day		
i	Groundwater Hydraulic Gradient	**0.03**	i = Δhead/Δdistance (along flow path)	cm/cm	Site-specific, Avg.	MEI CSR, 05-2017, Figs 6&7
U_{gw}	GW Darcy velocity	**73.61**	$U_{gw} = K_{sat}$ * i	cm/year	Calculated	ASTM E2081-00 (2015)
DAF	Dilution Attenuation Factor	**2.124**	DAF = 1 + (U_{gw}*δ_{gw})/(I*W)	dimensionless	Calculated	ASTM E2081-00 (2015)
K_{oc}	Soil Organic Carbon-Water Partition Coefficient	**60.7**		cm^3-W/g-C	Compound-Specific	EPA RSL Table, 2015
f_{oc}	Fractional Org. Carbon	**3.58%**		%	Site-specific	UC PPCAP, Table 1
K_d	Soil-Water Partition/Sorption Coeff.	**2.17306**	$K_d = K_{oc}$ * f_{oc}	g-W/g-soil	Calculated	ASTM E2081-00 (2015)
ρ_s	Soil Bulk Density	**1.80**		g-S/cm^3-S	Site-specific	UC PPCAP, Table 1
Θ_w	Soil Volumetric Water Content	**0.258**		cm^3-W/cm^3-S	Site-specific	UC PPCAP, Table 1
Θ_a	Soil Volumetric Air Content	**0.26**		cm^3-A/cm^3-S	default	ASTM E2081-00 (2015)
H'	Henry's Law Constant	**0.403**		dimensionless	Compound-Specific	EPA RSL Table, 2015
K_{sw}	Soil to Leachate Partition Coeff.	**2.375**	K_{sw} = [Θ_w + (K_d*ρ_s) + (H_{eff} * Θ_a)] / ρ_s	mg/L-wtr/mg/kg-soil	Calculated	ASTM E2081-00 (2015)
LF_{sw}	Leaching Factor - Soil to Groundwater	**0.198**	LF_{sw} = 1/(K_{sw} * DAF)	ppm/ppm	Calculated	ASTM E2081-00 (2015)
$C_{max, soil}$	Max soil concentration on-site	**0.18**		mg/kg	Site-specific	MEI CSR, 2015, Tables 7, 8 & 22
C_{leach}	Conc. in GW by leaching	**3.6E-02**	$C_{leach} = C_{max, soil}$ * LF_{sw}	mg/L	Calculated	ASTM E2081-00 (2015)
Domenico Ground Water Solute Transport Model						
$C_{max,gw}$	Max GW concentration on-site	**120**		µg/L	Site-specific	MEI CSR, 05-2017, Tbl 2
$C_{max,gw}$	Max GW concentration on-site	**0.120**		mg/L	Site-specific	
$C_{source, gw}$	Steady State GW concentration in source zone	**0.156**	$C_{source, gw} = C_{max, gw} + C_{leach}$	mg/L	Calculated	Calculated
x_{del}	Distance: Source to Downgrad. Delineated Edge of Plume	**175**		ft	Site & Compound-specific	MEI CSR, 05-2017, Figs. 10-14
x_{del}	Distance: Source to Downgrad. Delineated Edge of Plume	**5,334**	$x_{del, cm} = x_{del, ft}$ * 30.48 cm/ft	cm	Site & Compound-specific	
x_{POE}	Dist: Downgrad. Edge Delineated Plume to Pt. of Exposure	**200**		ft	Site & Compound-specific	MEI CSR, 05-2017, Figs. 10-14
x_{POE}	Dist: Downgrad. Edge Delineated Plume to Pt. of Exposure	**6,096**	$x_{POE, cm} = x_{POE, ft}$ * 30.48 cm/ft	cm	Site & Compound-specific	
x_{total}	Distance - Total to Potential Receptor	**375**		ft	Site-specific	
x_{total}	Distance - Total to Potential Receptor	**11,430**	$x_{total, cm} = x_{total, ft}$ * 30.48 cm/ft	cm	Site-specific	
λ	Degradation rate const.	**0.00066**		day^{-1}	Geo. Mean of Site Specific	MEI CSR, 12-2015, Table 11
α_x	Longitudinal Dispersivity	**1143**	$\alpha_x = x_{total}$ * 0.1	cm	Calculated	ASTM E 1739
α_y	Transverse Dispersivity	**381**	$\alpha_y = \alpha_x / 3$	cm	Calculated	ASTM E 1739
α_z	Vertical Dispersivity	**57.15**	$\alpha_z = \alpha_x / 20$	cm	Calculated	ASTM E 1739
u	Specific Discharge	**285.29**	u = (K_{sat} * i) / Θ_w	cm/day	Calculated	ASTM E2081-00 (2015)
W	Source width (Horiz.)	**32.4**		ft	Site-specific	MEI CSR, 12-2015, Sec. 3.4.4.1
W	Source width (Horiz.)	**988**	$W_{cm} = W_{ft}$ * 30.48 cm/ft	cm	Calculated	
S_d	Source thickness (Vertical)	**200**		cm	Default	EPA RSL Table, 2015
Domenico Steady-State Transport/Attenuation Equation: **C(x) = Csource * {exp [x_{total}/(2 * α_x)*(1-sqrt(1+(4*λ*α_x/u)))] * [erf (W/(4*sqrt(αy * x_{total})))] * [erf (S_d/(4*sqrt(α_z * x_{total})))]}**						ASTM E 1739, EPA 2002
Intermed. calc.	Domenico - exponential term	-2.637E-02	(x_{total}/(2 * α_x)*(1-sqrt(1+(4*λ*α_x/u)))	dimensionless	Calculated	Calculated
Intermed. calc.	exp (exponential term)	9.740E-01	exp (exponential term)	dimensionless	Calculated	Calculated
Intermed. calc.	(1st term) - error function (erf) to be calc.	1.183E-01	(W/(4*sqrt(α_y * x_{total})))	dimensionless	Calculated	Calculated
Intermed. calc.	(2nd term) - error function (erf) to be calc.	6.186E-02	(S_d/(4*sqrt(α_z * x_{total})))	dimensionless	Calculated	Calculated
Intermed. calc.	erf (1st term)=	0.132876	erf (W/(4*sqrt(α_y * x_{total})))	dimensionless	Calculated	Calculated
Intermed. calc.	erf (2nd term)=	0.069717	erf (S_d/(4*sqrt(α_z * x_{total})))	dimensionless	Calculated	Calculated
Intermed. calc.	erf(1st Term) * erf (2nd Term}	9.264E-03		dimensionless	Calculated	Calculated
Intermed. calc.	Domenico Results {parenthetical term}	**9.023E-03**	{exp [exp. term] * [erf (1st term)] * [erf (2nd term)]}	dimensionless	Calculated	Calculated
C(x) =	**Downgradient Point of Exposure Concentration**	**1.40E-03**	$C_{(x)} = C_{source, gw}$ * {Domenico Eqn.}	**mg/L**	**Calculated**	**Calculated**
C(x) =	**Downgradient Point of Exposure Concentration**	**1.40**	$C_{(x)} = C_{source, gw}$ * {Domenico Eqn.}	**µg/L**	**Calculated**	**Calculated**
In Stream Standard	**Georgia In Stream Water Quaity Standard**	**30**		**µg/L**	**Default**	**EPD Rule 391-3-.03(5)(e)(iv)**

Table 8
Domenico Fate & Transport/Attenutaion Model & Soil to Groundwater Leaching Calculations
Vinyl Chloride
Modeled Point of Exposure - Off-Site Stream
Fountain Oaks Shopping Center

Variable	Variable Definition	Value	Formula	Units	Parameter Type	Data Source
			Soil to Ground Water Leaching			
W	Width of Source	**32.4**		ft	Site-specific	MEI CSR, 2015, Sect. 3.4.4.4.1
W	Width of Source	**988**	$W_{cm} = W_{ft}$ * 30.48 cm/ft	cm	Site-specific	
P	Avg. Annual Precipitation	**49.71**		in/yr	Site-specific	Natl. Weather Svc, Peachtree City
P	Avg. Annual Precipitation	**126**	$P_{cm} = P_{in}$ * 2.54 cm/in	cm/yr	Calculated	
k_i	Infiltration Factor	**0.0009**		dimensionless	Specific to Silty Soil	Weidemeier, et al., 1999, p. 52
I	Infiltration Rate	**14.3**	$I = P^2$*0.009	cm/year	Calculated	
δ_{gw}	GW Mixing Zone Thickness	**7.1**		ft	Site-specific	MEI CSR, 12-2015, Table 2
δ_{gw}	GW Mixing Zone Thickness	**216**	$\delta_{gw, cm} = \delta_{gw, ft}$ * 30.48 cm/ft	cm	Site-specific	
K_{sat}	Hydraulic conductivity (saturated)	**7.78E-05**		cm/sec	Site-specific	UC PPCAP, Pg 23
K_{sat}	Hydraulic conductivity (saturated)	**6.72E+00**	$K_{sat,(cm/day)} = K_{sat,(cm/s)}$* 86,400 sec/day	cm/day		
i	Groundwater Hydraulic Gradient	**0.03**	i = Δhead/Δdistance (along flow path)	cm/cm	Site-specific, Avg.	MEI CSR, 05-2017, Figs 6&7
U_{gw}	GW Darcy velocity	**73.61**	$U_{gw} = K_{sat}$ * i	cm/year	Calculated	ASTM E2081-00 (2015)
DAF	Dilution Attenuation Factor	**2.124**	DAF = 1 + (U_{gw}*δ_{gw})/(I*W)	dimensionless	Calculated	ASTM E2081-00 (2015)
K_{oc}	Soil Organic Carbon-Water Partition Coefficient	**21.73**		cm^3-W/g-C	Compound-Specific	EPA RSL Table, 2015
f_{oc}	Fractional Org. Carbon	**3.58%**		%	Site-specific	UC PPCAP, Table 1
K_d	Soil-Water Partition/Sorption Coeff.	**0.777934**	$K_d = K_{oc}$ * f_{oc}	g-W/g-soil	Calculated	ASTM E2081-00 (2015)
ρ_s	Soil Bulk Density	**1.80**		g-S/cm^3-S	Site-specific	UC PPCAP, Table 1
Θ_w	Soil Volumetric Water Content	**0.258**		cm^3-W/cm^3-S	Site-specific	UC PPCAP, Table 1
Θ_a	Soil Volumetric Air Content	**0.26**		cm^3-A/cm^3-S	default	ASTM E2081-00 (2015)
H'	Henry's Law Constant	**1.14**		dimensionless	Compound-Specific	EPA RSL Table, 2015
K_{sw}	Soil to Leachate Partition Coeff.	**1.085**	K_{sw} = [Θ_w + (K_d*ρ_s) + (H_{eff} * Θ_a)] / ρ_s	mg/L-wtr/mg/kg-soil	Calculated	ASTM E2081-00 (2015)
LF_{sw}	Leaching Factor - Soil to Groundwater	**0.434**	LF_{sw} = 1/(K_{sw} * DAF)	ppm/ppm	Calculated	ASTM E2081-00 (2015)
$C_{max, soil}$	Max soil concentration on-site	**0.0012**	NOT DETECTED - Subst. MDL	mg/kg	Site-specific	MEI CSR, 2015, Tables 7, 8 & 22
C_{leach}	Conc. in GW by leaching	**5.2E-04**	$C_{leach} = C_{max, soil}$ * LF_{sw}	mg/L	Calculated	ASTM E2081-00 (2015)
			Domenico Ground Water Solute Transport Model			
$C_{max,gw}$	Max GW concentration on-site	**11**		µg/L	Site-specific	MEI CSR, 05-2017, Tbl 2
$C_{max,gw}$	Max GW concentration on-site	**0.011**		mg/L	Site-specific	
$C_{source, gw}$	Steady State GW concentration in source zone	**0.012**	$C_{source, gw} = C_{max, gw} + C_{leach}$	mg/L	Calculated	Calculated
x_{del}	Distance: Source to Downgrad. Delineated Edge of Plume	**45**		ft	Site & Compound-specific	MEI CSR, 05-2017, Figs. 10-14
x_{del}	Distance: Source to Downgrad. Delineated Edge of Plume	**1,372**	$x_{del, cm} = x_{del, ft}$ * 30.48 cm/ft	cm	Site & Compound-specific	
x_{POE}	Dist: Downgrad. Edge Delineated Plume to Pt. of Exposure	**205**		ft	Site & Compound-specific	MEI CSR, 05-2017, Figs. 10-14
x_{POE}	Dist: Downgrad. Edge Delineated Plume to Pt. of Exposure	**6,248**	$x_{POE, cm} = x_{POE, ft}$ * 30.48 cm/ft	cm	Site & Compound-specific	
x_{total}	Distance - Total to Potential Receptor	**250**		ft	Site-specific	
x_{total}	Distance - Total to Potential Receptor	**7,620**	$x_{total, cm} = x_{total, ft}$ * 30.48 cm/ft	cm	Site-specific	
λ	Degradation rate const.	**0.00032**		day^{-1}	Geo. Mean of Site Specific	MEI CSR, 12-2015, Table 11
α_x	Longitudinal Dispersivity	**762**	$\alpha_x = x_{total}$ * 0.1	cm	Calculated	ASTM E 1739
α_y	Transverse Dispersivity	**254**	$\alpha_y = \alpha_x$ / 3	cm	Calculated	ASTM E 1739
α_z	Vertical Dispersivity	**38.1**	$\alpha_z = \alpha_x$ / 20	cm	Calculated	ASTM E 1739
u	Specific Discharge	**285.29**	u = (K_{sat} * i) / Θ_w	cm/day	Calculated	ASTM E2081-00 (2015)
W	Source width (Horiz.)	**32.4**		ft	Site-specific	MEI CSR, 12-2015, Sec. 3.4.4.1
W	Source width (Horiz.)	**988**	$W_{cm} = W_{ft}$ * 30.48 cm/ft	cm	Calculated	
S_d	Source thickness (Vertical)	**200**		cm	Default	EPA RSL Table, 2015
Domenico Steady-State Transport/Attenuation Equation: **C(x) = Csource * {exp [x_{total}/(2 * α_x)*(1-sqrt(1+(4*λ*α_x/u)))] * [erf (W/(4*sqrt(αy * x_{total})))] * [erf (S_d/(4*sqrt(α_z * x_{total})))]}**						ASTM E 1739, EPA 2002
Intermed. calc.	Domenico - exponential term	-8.540E-03	(x_{total}/(2 * α_x)*(1-sqrt(1+(4*λ*α_x/u)))	dimensionless	Calculated	Calculated
Intermed. calc.	exp (exponential term)	9.915E-01	exp (exponential term)	dimensionless	Calculated	Calculated
Intermed. calc.	(1st term) - error function (erf) to be calc.	1.775E-01	(W/(4*sqrt(α_y * x_{total})))	dimensionless	Calculated	Calculated
Intermed. calc.	(2nd term) - error function (erf) to be calc.	9.280E-02	(S_d/(4*sqrt(α_z * x_{total})))	dimensionless	Calculated	Calculated
Intermed. calc.	erf (1st term)=	0.198162	erf (W/(4*sqrt(α_y * x_{total})))	dimensionless	Calculated	Calculated
Intermed. calc.	erf (2nd term)=	0.104409	erf (S_d/(4*sqrt(α_z * x_{total})))	dimensionless	Calculated	Calculated
Intermed. calc.	erf(1st Term) * erf (2nd Term}	2.069E-02		dimensionless	Calculated	Calculated
Intermed. calc.	Domenico Results {parenthetical term}	**2.051E-02**	{exp [exp. term] * [erf (1st term)] * [erf (2nd term)]}	dimensionless	Calculated	Calculated
C(x) =	**Downgradient Point of Exposure Concentration**	**2.4E-04**	$C_{(x)} = C_{source, gw}$ * {Domenico Eqn.}	**mg/L**	**Calculated**	**Calculated**
C(x) =	**Downgradient Point of Exposure Concentration**	**0.236**	$C_{(x)} = C_{source, gw}$ * {Domenico Eqn.}	**µg/L**	**Calculated**	**Calculated**
In Stream Standard	**Georgia In Stream Water Quaity Standard**	**2**		**µg/L**	**Default**	**EPD Rule 391-3-.03(5)(e)(iv)**

TABLE 9
Fountain Oaks Shopping Center
Soil Volatilization Factor Calculations

Variable	Variable Definition	Value	Units	Parameter Type	Data Source	Volatilization Factor Formula
LS	Length of Side - Contam. Area	45	m	Defaults	EPD Rule 391-3-19, App. III	$VF = [(LS * V * DH) / A] * [(\pi * \alpha * T)^{1/2} / (2 * D_{ei} * E * K_{as} * 1E\text{-}03\ kg/g)]$
V	Wind Speed in Mixing Zone	2.25	m/s	Defaults	EPD Rule 391-3-19, App. III	
DH	Diffusion Height	2	m	Defaults	EPD Rule 391-3-19, App. III	
A	Area of Contamination	0.5	acre	Defaults	EPD Rule 391-3-19, App. III	
A	Area of Contamination	2.02E+07	cm^2	Defaults	EPD Rule 391-3-19, App. III	
T	Exposure Interval	25	year	Defaults	EPD Rule 391-3-19, App. III	
T	Exposure Interval	7.89E+08	seconds	Defaults	EPD Rule 391-3-19, App. III	
ρ_s	Soil Dry Solids Density	2.65	g/cm^3	Defaults	EPD Rule 391-3-19, App. III	
f_{oc}	Fractional Org. Carbon	0.0200	dimensionless	Defaults	EPD Rule 391-3-19, App. III	
E	Porosity - Total Soil	0.35	dimensionless	Defaults	EPD Rule 391-3-19, App. III	

Analyte	Henry's Law Constant	Diffusivity in Air	Diffusivity - Effective	Soil Organic Carbon-Water Partition Coefficient	Soil-Water Partition/ Sorption Coeff.	Soil-Air Partition Coefficient	Alpha (α)	Volatilization Factor (VF)
	H (atm-m^3/mol)	D_{ia} (cm^2/s)	$D_{ei} = D_i * E^{0.33}$ (cm^2/s)	K_{oc} (L/kg)	$K_d = K_{oc} * f_{oc}$ (g-W/g-soil)	$K_{as} = H / K_d * 41$ (g-soil/cm^3-air)	$\alpha = \{(D_{ei}*E) / [(E+(\rho_s)(1-E))/K_{as}]\}$ (cm/s)	m^3/kg
Acetone	3.5E-05	1.1E-01	7.5E-02	2.4E+00	4.7E-02	3.0E-02	3.8E-04	6.1E+03
Benzene	5.6E-03	9.0E-02	6.3E-02	1.5E+02	2.9E+00	7.9E-02	8.4E-04	4.1E+03
Chloroform	3.7E-03	7.7E-02	5.4E-02	3.2E+01	6.4E-01	2.4E-01	2.2E-03	2.6E+03
Cumene	1.2E-02	6.0E-02	4.3E-02	7.0E+02	1.4E+01	3.5E-02	2.5E-04	7.5E+03
Dichloroethylene, 1,2-cis-	4.1E-03	8.8E-02	6.3E-02	4.0E+01	7.9E-01	2.1E-01	2.2E-03	2.5E+03
Dichloroethylene, 1,2-trans-	9.4E-03	8.8E-02	6.2E-02	4.0E+01	7.9E-01	4.9E-01	5.1E-03	1.7E+03
Methyl Ethyl Ketone (MEK) (2-Butanone)	5.7E-05	9.1E-02	6.5E-02	4.5E+00	9.0E-02	2.6E-02	2.8E-04	7.1E+03
Tetrachloroethylene	1.8E-02	5.0E-02	3.6E-02	9.5E+01	1.9E+00	3.9E-01	2.3E-03	2.5E+03
Trichloroethylene	9.9E-03	6.9E-02	4.9E-02	6.1E+01	1.2E+00	3.3E-01	2.7E-03	2.3E+03
Vinyl Chloride	2.8E-02	1.1E-01	7.6E-02	2.2E+01	4.3E-01	2.6E+00	3.4E-02	6.5E+02

Notes:

(1) Volatilization Factors (VFs) calculated using formulas and constant values as specified in EPD Rule 391-3-19, Appendix III

TABLE 10

Risk Reduction Standards - Exposure Parameter Values

Fountain Oaks Shopping Center

Variable	Value
Target cancer risk (TR) - unitless	1.0E-05
Target hazard quotient (THQ) - unitless	1
Averaging time for carcinogens, resident adult ($AT_{c, ar}$) - years	70
Averaging time for carcinogens, resident child ($AT_{c, cr}$) - years	70
Averaging time for carcinogens, commercial ($AT_{c, c}$) - years	70
Averaging time for noncarcinogens, resident adult ($AT_{nc, ar}$) - years	30
Averaging time for noncarcinogens, resident child ($AT_{nc, cr}$) - years	6
Averaging time for noncarcinogens, commercial ($AT_{nc, c}$) - years	25
Averaging time - days/year	365
Body Weight - adult (BW_a) - kg	70
Body Weight - children 1-6 yr (BW_c) - kg	15
Exposure frequency (EF), residential - days/yr	350
Exposure frequency (EF), commercial - days/yr	250
Exposure duration, resident adult (ED_{ar}) - years	30
Exposure duration, resident child (ED_{cr}) - years	6
Exposure duration, commercial (ED_c) - years	25
Exposure Time (ET) hours/day	24
Ingestion Rate, Soil, residential ($IR_{soil, r}$) - mg/day	114
Ingestion Rate, Soil, commercial ($IR_{soil, c}$) - mg/day	50
Ingestion Rate, Water - resident adult (IRW_{cr}) - L/day	2
Ingestion Rate, Water - resident child (IRW_{cr}) - L/day	1
Ingestion Rate, Water - commercial (IRW_c) - L/day	1
Inhalation Rate, resident adult ($IR_{air, ar}$) - m3/day	15
Inhalation Rate, resident child ($IR_{air, cr}$) - m3/day	15
Inhalation Rate, Commercial ($IR_{air, c}$) - m3/day	20
Inhalation Rate, Commercial ($IR_{air, c}$) - m3/day	20
Particulate Emission Factor (PEF) - mg/kg	4.63E+09
Volatilization factor of Andelman (K) - L/m3	0.5

TABLE 11

Risk Reduction Standards - Chemical-Specific Parameter Values
Fountain Oaks Shopping Center

Chemical	CAS Number	Ingestion Cancer Slope Factor SFo (mg/kg-day)-1	Inhalation Unit Risk (ug/m^3)-1	Inhalation Cancer Slope Factor SFi (mg/kg-day)-1	Oral Chronic Reference Dose RfDo (mg/kg-day)	Inhalation Chronic Reference Concentration RfC (mg/m^3)	Inhalation Chronic Reference Dose RfDi (mg/kg-day)	Soil to Air Volatilization Factor - VF (m^3/kg)
Acetone	67-64-1	-	-	-	9.0E-01	3.1E+01	8.8E+00	6.1E+03
Benzene	71-43-2	5.5E-02	7.8E-06	2.7E-02	4.0E-03	3.0E-02	8.6E-03	4.1E+03
Chloroform	67-66-3	3.1E-02	2.3E-05	8.1E-02	1.0E-02	9.8E-02	2.8E-02	2.6E+03
Cumene (Isopropylbenzene)	98-82-8	-	-	-	1.0E-01	4.0E-01	1.1E-01	7.5E+03
Dichloroethylene, 1,2-cis- (cDCE)	156-59-2	-	-	-	2.0E-03	-	-	2.5E+03
Dichloroethylene, 1,2-trans- (tDCE)	156-60-5	-	-	-	2.0E-02	-	-	1.7E+03
Methyl Ethyl Ketone (MEK) (2-Butanone)	78-93-3	-	-	-	6.0E-01	5.0E+00	1.4E+00	7.1E+03
Tetrachloroethylene (PCE)	127-18-4	2.1E-03	2.6E-07	9.1E-04	6.0E-03	4.0E-02	1.1E-02	2.5E+03
Trichloroethylene (TCE)	79-01-6	4.6E-02	4.1E-06	1.4E-02	5.0E-04	2.0E-03	5.7E-04	2.3E+03
Vinyl Chloride (VC)	75-01-4	7.2E-01	4.4E-06	1.5E-02	3.0E-03	1.0E-01	2.9E-02	6.5E+02

Notes: (1) Chemical-specific values obtained from most recent US EPA Regional Screening Level (RSL) "Chemical Specific Parameters" table, updated May 2016.
Online at: https://www.epa.gov/sites/production/files/2016-06/documents/params_sl_table_01run_may2016.pdf

Table 12 - Soil - Type 1 & Type 2 RRS Selection Summary

1	2	3	4	5	6	7	8	9	10	11	12	13	14
					Calculated RAGS Eqn Results - Residential - Potential Type 1 or 2 RRS								
Compound	**Soil Notification Concentration (NC) (EPD Rule 391-3-19, App. I)** (mg/kg)	**Groundwater Criteria (EPD Rule 391-3-19, App. III, Table 1)** (mg/L)	**Groundwater Criterion x 100** (mg/L)	**Higher of Groundwater Criterion * 100 or Soil NC (Higher of Columns 2 or 4)** (mg/kg)	**RAGS EQN 6 ADULT TR=1.0E-5** (mg/kg)	**RAGS EQN 6 CHILD TR=1.0E-5** (mg/kg)	**RAGS EQN 7 ADULT HQ=1** (mg/kg)	**RAGS EQN 7 CHILD HQ=1** (mg/kg)	**Soil: Type 1 RRS[1] (Least of Columns 5-9)** **(mg/kg)**	**Type 1 RRS Note**	**Soil to GW Leaching Concentration - Causing GW to Exceed Type 1 or 2 RRS[2]** (mg/L)	**Soil: Type 2 RRS[1] (Least of Columns 6-9 or 12)** **(mg/kg)**	**Type 2 RRS Note**
acetone	2.74	4	400	400	-	-	1.8E+05	3.1E+04	**4.0E+02**	GW*100	3.7E+01	**3.7E+01**	Soil to GW Leaching
benzene	0.02	0.005	0.5	0.5	1.6E+01	1.7E+01	1.6E+02	3.3E+01	**5.0E-01**	GW*100	5.8E-01	**5.0E-01**	Soil to GW Leaching
chloroform	0.68	0.08	8	8	3.6E+00	3.8E+00	3.3E+02	6.8E+01	**3.6E+00**	RAGS Eqn 6 Adult - c	2.1E+00	**2.1E+00**	Soil to GW Leaching
cumene (isopropylbenzene)	21.88	Not Listed	-	21.88	-	-	3.9E+03	8.1E+02	**2.2E+01**	Soil NC	1.0E+02	**2.2E+01**	Soil NC
cis-1,2-dichloroethene (cDCE)	0.53	0.070	7	7	-	-	-	-	**7.0E+00**	GW*100	2.2E+00	**2.2E+00**	Soil to GW Leaching
trans-1,2-dichloroethene (tDCE)	0.53	0.1	10	10	-	-	-	-	**1.0E+01**	GW*100	3.2E+00	**3.2E+00**	Soil to GW Leaching
methyl ethyl ketone (MEK)	0.79	2	200	200	-	-	4.4E+04	8.7E+03	**2.0E+02**	GW*100	1.4E+01	**1.4E+01**	Soil to GW Leaching
tetrachloroethene (PCE)	0.18	0.005	0.5	0.5	3.0E+02	3.1E+02	1.3E+02	2.8E+01	**5.0E-01**	GW*100	1.4E+00	**5.0E-01**	GW Criterion *100
trichloroethene (TCE)	0.13	0.005	0.5	0.5	1.7E+01	1.8E+01	6.3E+00	1.3E+00	**5.0E-01**	GW*100	2.4E-01	**2.4E-01**	Soil to GW Leaching
vinyl chloride (VC)	0.04	0.002	0.2	0.2	3.9E+00	3.7E+00	8.7E+01	1.8E+01	**2.0E-01**	GW*100	3.4E-02	**3.4E-02**	Soil to GW Leaching

(1) Indicates RRS calculated by MEI (Using RAGS Equations 6 & 7 with up-to-date toxicity information). Eqn 6 & 7 input values utilized are listed in tables in this VRP Application Addendum.

(2) Soil to Groundwater Leaching calculations for Type 2 Soil RRS calculated using Dilution Factor Model & default "Dilution Attenuation Factor" (DAF) of 20 per EPA Document 9355.4-23 "Soil Screening Guidance: User's Guide" 2nd Ed., Equation 11

(3) RRS Notes indicate criterion by which final RRS was selected. "c" = carcinogenic, "nc" = non-carcinogenic, "GW*100" = Groundwater criterion times 100, "Soil NC" = Soil Notification Concentration
"Soil to GW Leaching" = soil concentration that would cause groundwater to exceed higher of Type 3 or Type 4 groundwater RRS

Table 13 - Soil - Type 3 & 4 RRS Selection Summary

1	2	3	4	5	6	7	8	9	10	11	12		13	14	15
					Calculated RAGS Equation Results - Residential - Potential Type 3 & 4 RRS										
Compound	**Soil Notification Concentration (NC) (EPD Rule 391-3-19, App. I)** (mg/kg)	**Groundwater Criteria (EPD Rule 391-3-19, App. III, Table 1)** (mg/L)	**Type 3 RRS ALL SOIL Higher of GW Criterion * 100 OR Soil NC** (mg/kg)	**Type 3 RRS ALL SOIL Note[4]**	**RAGS EQN 6 COMMERCIAL TR=1.0E-5** (mg/kg)	**RAGS EQN 7 COMMERCIAL HQ=1** (mg/kg)	**Type 3 RRS[1] SHALLOW SOIL (SOIL ≤2 ft DEEP) (Least of Columns 4, 6 &7)** **(mg/kg)**	**Type 3 RRS SHALLOW SOIL Note[4]**	**Previously Approved Type 3 RRS[3]** **(mg/kg)**	**Soil to Gw Leaching Concentration Causing GW to Exceed Type 3 or Type 4 RRS[2]** (mg/kg)	**Soil Type 4 RRS[1] ALL SOIL (Least of Columns 3, 4 or 8)** **(mg/kg)**	**Soil Type 4 RRS[1] SHALLOW SOIL (Least of Columns 3, 4 or 8)** **(mg/kg)**	**Type 4 RRS Note[4]**	**Previously Approved Type 4 RRS[3]** (mg/kg)	**Final Type 3 or 4 Commercial RRS** (mg/kg)
acetone	2.74	4	**4.0E+02**	GW*100		2.4E+05	**4.0E+02**	GW*100	**4.0E+02**	2.2E+00	**2.2E+00**	**2.2E+00**	Soil to GW Leaching	NA	**4.0E+02**
benzene	0.02	0.005	**5.0E-01**	GW*100	2.1E+01	1.8E+02	**5.0E-01**	GW*100	NA	5.8E-01	**5.8E-01**	**5.8E-01**	Soil to GW Leaching	NA	**5.8E-01**
chloroform	0.68	0.08	**8.0E+00**	GW*101	4.6E+00	3.6E+02	**4.6E+00**	RAGS Eqn 6 - c	NA	2.1E+00	**2.1E+00**	**2.1E+00**	Soil to GW Leaching	NA	**4.6E+00**
cumene (isopropylbenzene)	21.88	Not Listed	**2.2E+01**	Soil NC		4.3E+03	**2.2E+01**	Soil NC	NA	1.1E+01	**1.1E+01**	**1.1E+01**	Soil to GW Leaching	NA	**2.2E+01**
cis-1,2-dichloroethene (cDCE)	0.53	0.070	**7.0E+00**	GW*100			**7.0E+00**	GW*100	NA	2.4E-01	2.4E-01	2.4E-01	Soil to GW Leaching	**1.84E+00**	**7.0E+00**
trans-1,2-dichloroethene (tDCE)	0.53	0.1	**1.0E+01**	GW*100			**1.0E+01**	GW*100	NA	3.4E-01	**3.4E-01**	**3.4E-01**	Soil to GW Leaching	NA	**1.0E+01**
methyl ethyl ketone (MEK)	0.79	2	**2.0E+02**	GW*100		5.0E+04	**2.0E+02**	GW*100	NA	1.5E+00	**1.5E+00**	**1.5E+00**	Soil to GW Leaching	NA	**2.0E+02**
tetrachloroethene (PCE)	0.18	0.005	**5.0E-01**	GW*100	3.8E+02	1.4E+02	**5.0E-01**	GW*100	NA	1.5E-01	1.5E-01	1.5E-01	Soil to GW Leaching	**1.18E+00**	**1.18E+00**
trichloroethene (TCE)	0.13	0.005	**5.0E-01**	GW*100	2.2E+01	6.7E+00	**5.0E-01**	GW*100	NA	2.6E-02	2.6E-02	2.6E-02	Soil to GW Leaching	**7.0E-01**	**7.0E-01**
vinyl chloride (VC)	0.04	0.002	**2.0E-01**	GW*100	5.6E+00	9.4E+01	**2.0E-01**	GW*100	NA	6.5E-02	**6.8E-03**	**6.8E-03**	Soil to GW Leaching	NA	**2.0E-01**

(1) Indicates RRS calculated by MEI (Using RAGS Equations 6 & 7 with up-to-date toxicity information). Eqn 6 & 7 input values utilized are listed in tables in this VRP Application Addendum.

(2) Soil to Groundwater Leaching calculations for Type 2 Soil RRS calculated using Dilution Factor Model & default "Dilution Attenuation Factor" (DAF) of 20 per EPA Document 9355.4-23 "Soil Screening Guidance: User's Guide" 2nd Ed., Equation 11

(3) RRS calculated by UC and reported to have been previously approved by EPD (UC PPCAP, 28-NOV-05, Table 5; UC CSR 10-JUN-08, Table 5)

(4) RRS Notes indicate criterion by which final RRS was selected. "c" = carcinogenic, "nc" = non-carcinogenic, "GW*100" = Groundwater criterion times 100,
"Soil to GW Leaching" = soil concentration that would cause groundwater to exceed higher of Type 3 or Type 4 RRS

Table 14 - SOIL - Type 1 & Type 2 Residential RRS vs. Off Site Residual Concentrations

Compound	Soil - Type 1 RRS [1] DELINEATION CRITERIA (mg/kg)	Previously Approved Type 1 RRS[2] (mg/kg)	Soil: Type 2 RRS[1] (mg/kg)	FINAL RESIDENTIAL RRS (mg/kg)	Off-Site Maximum Soil Concentration [3] (mg/kg)	Final Residential Type 1/2 RRS Exceeded Off-Site?
acetone	4.0E+02	-	3.7E+01	**4.0E+02**	0.081	NO
benzene	5.0E-01	-	5.0E-01	**5.0E-01**	ND	NO
chloroform	3.6E+00	-	2.1E+00	**3.6E+00**	ND	NO
cumene (isopropylbenzene)	2.2E+01	-	2.2E+01	**2.2E+01**	ND	NO
cis-1,2-dichloroethene (cDCE)	7.0E+00	-	2.2E+00	**7.0E+00**	ND	NO
trans-1,2-dichloroethene (tDCE)	1.0E+01	1.0E+01	3.2E+00	**1.0E+01**	ND	NO
methyl ethyl ketone (MEK)	2.0E+02	-	1.4E+01	**2.0E+02**	ND	NO
tetrachloroethene (PCE)	5.0E-01	-	5.0E-01	**5.0E-01**	ND	NO
trichloroethene (TCE)	5.0E-01	-	2.4E-01	**5.0E-01**	ND	NO
vinyl chloride (VC)	2.0E-01	2.0E-01	3.4E-02	**2.0E-01**	ND	NO

(1) Indicates RRS calculated by MEI (Using RAGS Equations 6 & 7 with up-to-date toxicity information).
Eqn 6 & 7 input values utilized are listed in tables in this VRP Application Addendum.

(2) Indicates RRS calculated by UC and reported to have been previously approved by EPD
(UC PPCAP, 28-NOV-05, Table 5; UC CSR 10-JUN-08, Table 5)

(3) Soil analytical information taken from UC PPCSR, Table 7 - "Soil Verification Analytical Testing Summary" and
Table 8 "Marion Split Verification Sample Test Results" and from MEI 10-JAN-10 CSR, Table 3 "Soil Analytical Results"

"ND" means "not detected"

Table 15 - Soil - Type 3 & 4 Commercial RRS vs On-Site Residual Concentrations

Compound	Soil - Type 1 RRS [1] DELINEATION CRITERIA (mg/kg)	Soil - Calculated Type 3 RRS SHALLOW SOIL[1] (mg/kg)	Previously Approved Type 3 RRS [2] (mg/kg)	Soil - Calculated Type 4 RRS [1] (mg/kg)	Previously Approved Type 4 RRS [3] (mg/kg)	Final Commercial RRS (Highest of Prev. Approved or Calculated) (mg/kg)	On-Site Maximum Residual Soil Concentration [3] (mg/kg)	Type 3/4 Commercial RRS Exceeded ON-Site? (Calc. Herein OR Prev. Approved)
acetone	4.0E+02	**4.0E+02**	**4.0E+02**	**2.2E+00**	NA	**4.0E+02**	0.29	NO
benzene	5.0E-01	**5.0E-01**	NA	**5.8E-01**	NA	**5.8E-01**	0.016	NO
chloroform	3.6E+00	**4.6E+00**	NA	**2.1E+00**	NA	**4.6E+00**	0.011	NO
cumene (isopropylbenzene)	2.2E+01	**2.2E+01**	NA	**1.1E+01**	NA	**2.2E+01**	ND	NO
cis-1,2-dichloroethene (cDCE)	7.0E+00	**7.0E+00**	NA	**2.4E-01**	**1.84E+00**	**7.0E+00**	0.3	NO
trans-1,2-dichloroethene (tDCE)	1.0E+01	**1.0E+01**	NA	**3.4E-01**	NA	**1.0E+01**	ND	NO
methyl ethyl ketone (MEK)	2.0E+02	**2.0E+02**	NA	**1.5E+00**	NA	**2.0E+02**	0.12	NO
tetrachloroethene (PCE)	5.0E-01	**5.0E-01**	NA	**1.5E-01**	**1.18E+00**	**1.18E+00**	1.1	NO
trichloroethene (TCE)	5.0E-01	**5.0E-01**	NA	**2.6E-02**	**7.0E-01**	**7.0E-01**	0.18	NO
vinyl chloride (VC)	2.0E-01	**2.0E-01**	NA	**6.8E-03**	NA	**2.0E-01**	ND	NO

[1] Indicates RRS calculated by MEI (Using RAGS Equations 6 & 7 with up-to-date toxicity information).
Eqn 6 & 7 input values utilized are listed in Tables 10 & 11 in this VRP Application Addendum.

[2] RRS calculated by UC and reported to have been previously approved by EPD (UC PPCAP, 28-NOV-05, Table 5; UC CSR 10-JUN-08, Table 5)

[3] Soil analytical information taken from UC PPCSR, Table 7 - "Soil Verification Analytical Testing Summary" and
Table 8 "Marion Split Verification Sample Test Results" and from MEI 10-JAN-10 CSR, Table 3 "Soil Analytical Results"

"ND" means "not detected"

Table 16 - Groundwater - Type 1 & Type 2 Residential RRS Selection Summary

Compound	Type 1 RRS Groundwater (mg/L)	Type 1 Groundwater RRS Note[(1)]	Calculated RAGS Eqn Results - Residential - Potential Type 2				Type 2 RRS Groundwater[(1)] (mg/L)	Type 2 RRS Note	Final Residential RRS (mg/L)	Residen-tial RRS Note
			RAGS EQN 1 ADULT TR=1.0E-5 (mg/L)	RAGS EQN 1 CHILD TR=1.0E-5 (mg/L)	RAGS EQN 2 ADULT HQ=1 (mg/L)	RAGS EQN 2 CHILD HQ=1 (mg/L)				
acetone	**4.0E+00**	GW Criterion	--	--	2.4E+01	8.0E+00	**8.0E+00**	nc	**8.0E+00**	nc
benzene	**5.0E-03**	GW Criterion	5.4E-03	7.0E-03	5.3E-02	1.4E-02	**5.4E-03**	c	**5.4E-03**	c
chloroform	**8.0E-02**	GW Criterion	2.6E-03	2.9E-03	1.6E-01	4.2E-02	**2.6E-03**	c	**8.0E-02**	GW Criterion
cumene (isopropylbenzene)	**1.0E-03**	Detection Limit	--	--	8.5E-01	2.1E-01	**2.1E-01**	nc	**2.1E-01**	nc
cis-1,2-dichloroethene (cDCE)	**7.0E-02**	GW Criterion	--	--	--	--	**7.0E-02**	GW Criterion	**7.0E-02**	GW Criterion
trans-1,2-dichloroethene (tDCE)	**1.0E-01**	GW Criterion	--	--	--	--	**1.0E-01**	GW Criterion	**1.0E-01**	GW Criterion
methyl ethyl ketone (MEK)	**2.0E+00**	GW Criterion	--	--	8.5E+00	2.3E+00	**2.3E+00**	nc	**2.3E+00**	nc
tetrachloroethene (PCE)	**5.0E-03**	GW Criterion	1.5E-01	2.0E-01	7.4E-02	1.9E-02	**1.9E-02**	nc	**1.9E-02**	nc
trichloroethene (TCE)	**5.0E-03**	GW Criterion	8.5E-03	1.2E-02	4.3E-03	1.0E-03	**1.0E-03**	nc	**5.0E-03**	GW Criterion
vinyl chloride (VC)	**2.0E-03**	GW Criterion	1.1E-03	2.2E-03	7.9E-02	2.6E-02	**1.1E-03**	c	**2.0E-03**	GW Criterion

(1) RRS Notes indicate criterion by which RRS was selected. "c" = carcinogenic, "nc" = non-carcinogenic, "GW Criterion" = EPD Groundwater criterion, "Detection Limit" = Laboratory Method Detection Limit.
(2) Indicates RRS calculated by MEI using RAGS Equations 1 & 2 with up-to-date toxicity information.

Table 17 - Groundwater - Type 3 & Type 4 Commercial RRS Selection Summary

Compound	Type 3 RRS Groundwater (mg/L)	Type 3 Groundwater RRS Note	Calculated RAGS Eqn Results - Residential - Potential Type 2 RRS[1] RAGS EQN 1 COMMERCIAL TR=1.0E-5 (mg/L)	RAGS EQN 2 COMMERCIAL HQ=1 (mg/L)	Type 4 RRS Groundwater (mg/L)	Type 4 RRS Note[2]	Final Commercial RRS (mg/L)	Final Commercial RRS Note[2]
acetone	**4.0E+00**	GW Criterion	--	4.6E+01	**4.6E+01**	nc	**4.6E+01**	nc
benzene	**5.0E-03**	GW Criterion	8.7E-03	7.2E-02	**8.7E-03**	C	**8.7E-03**	C
chloroform	**8.0E-02**	GW Criterion	3.4E-03	2.2E-01	**3.4E-03**	c	**8.0E-02**	GW Criterion
cumene (isopropylbenzene)	**1.0E-03**	Detection Limit	--	1.0E+00	**1.0E+00**	nc	**1.0E+00**	nc
cis-1,2-dichloroethene (cDCE)	**7.0E-02**	GW Criterion	--	--	**7.0E-02**	GW Criterion	**7.0E-02**	GW Criterion
trans-1,2-dichloroethene (tDCE)	**1.0E-01**	GW Criterion	--	--	**1.0E-01**	GW Criterion	**1.0E-01**	GW Criterion
methyl ethyl ketone (MEK)	**2.0E+00**	GW Criterion	--	1.2E+01	**1.2E+01**	nc	**1.2E+01**	nc
tetrachloroethene (PCE)	**5.0E-03**	GW Criterion	2.6E-01	9.8E-02	**9.8E-02**	nc	**9.8E-02**	nc
trichloroethene (TCE)	**5.0E-03**	GW Criterion	1.5E-02	5.2E-03	**5.2E-03**	nc	**5.2E-03**	nc
vinyl chloride (VC)	**2.0E-03**	GW Criterion	3.3E-03	1.5E-01	**3.3E-03**	c	**3.3E-03**	c

(1) Indicates RRS calculated by MEI using RAGS Equations 1 & 2 with up-to-date toxicity information.
(2) RRS Notes indicate criterion by which RRS was selected. "c" = carcinogenic, "nc" = non-carcinogenic, "GW Criterion" = EPD Groundwater criterion, "Detection Limit" = Laboratory Method Detection Limit.

Table 18 - Groundwater - Type 1 & Type 2 Residential RRS vs. Residual Concentrations Off Site

Compound	Groundwater Type 1 RRS [1] (mg/L)	Groundwater Type 2 RRS[1] (mg/L)	Groundwater: Final Residential RRS[1] (mg/L)	Groundwater Residential RRS Note	Groundwater Concentration Off-Site Maximum[2] (mg/L)	Residential RRS Exceeded Off-Site?
acetone	4.0E+00	8.0E+00	**8.0E+00**	Type 2	<0.050	NO
benzene	5.0E-03	5.4E-03	**5.4E-03**	Type 2	<0.001	NO
chloroform	8.0E-02	2.6E-03	**8.0E-02**	Type 1	<0.005	NO
cumene (isopropylbenzene)	1.0E-03	2.1E-01	**2.1E-01**	Type 2	<0.001	NO
cis-1,2-dichloroethene (cDCE)	7.0E-02	7.0E-02	**7.0E-02**	Type 1	**0.0079**	NO
trans-1,2-dichloroethene (tDCE)	1.0E-01	1.0E-01	**1.0E-01**	Type 1	<0.001	NO
methyl ethyl ketone (MEK)	2.0E+00	2.3E+00	**2.3E+00**	Type 2	<0.010	NO
tetrachloroethene (PCE)	5.0E-03	1.9E-02	**1.9E-02**	Type 2	**0.010**	NO
trichloroethene (TCE)	5.0E-03	1.0E-03	**5.0E-03**	Type 1	**0.0011**	NO
vinyl chloride (VC)	2.0E-03	1.1E-03	**2.0E-03**	Type 1	<0.001	NO

(1) Indicates RRS calculated by MEI (Using RAGS Equations 1 & 2 with up-to-date toxicity information).

(2) Groundwater analytical data from March 2015 groundwater sampling event, summarized Table 2.

Table 19 - Groundwater - Type 3 & 4 Commercial RRS vs. Maximum COC Concentrations On-Site

Compound	Groundwater Type 3 RRS [(1)] (mg/L)	Groundwater Type 4 RRS [(1)] (mg/L)	Groundwater: Final Commercial RRS[(1)] (mg/L)	Groundwater Commercial RRS Note	Groundwater Concentration On-Site Maximum Residual[(2)] (mg/L)	Commercial RRS Exceeded ON-Site?
acetone	4.0E+00	4.6E+01	**4.6E+01**	Type 4	0.089	NO
benzene	5.0E-03	8.7E-03	**8.7E-03**	Type 4	0.140	**YES**
chloroform	8.0E-02	3.4E-03	**8.0E-02**	Type 3	0.014	NO
cumene (isopropylbenzene)	1.0E-03	1.0E+00	**1.0E+00**	Type 4	0.0032	NO
cis-1,2-dichloroethene (cDCE)	7.0E-02	7.0E-02	**7.0E-02**	Type 4	0.210	**YES**
trans-1,2-dichloroethene (tDCE)	1.0E-01	1.0E-01	**1.0E-01**	Type 4	0.0012	NO
methyl ethyl ketone (MEK)	2.0E+00	1.2E+01	**1.2E+01**	Type 4	0.011	NO
tetrachloroethene (PCE)	5.0E-03	9.8E-02	**9.8E-02**	Type 4	0.810	**YES**
trichloroethene (TCE)	5.0E-03	5.2E-03	**5.2E-03**	Type 4	0.120	**YES**
vinyl chloride (VC)	2.0E-03	3.3E-03	**3.3E-03**	Type 4	0.011	**YES**

(1) Indicates RRS calculated by MEI (Using RAGS Equations 1 & 2 with up-to-date toxicity information).

(2) Groundwater analytical data from March 2015 groundwater sampling event summarized in Table 2.

TABLE 20
Commercial Risk Reduction Standards - Groundwater - Exceedance Locations & Release Sources
Fountain Oaks Shopping Center

COCs in On-Site Groundwater	Final Commercial RRS (mg/L)	Final Commercial RRS (µg/L)	Commercial RRS Note	Release Sources for RRS Exceedances at Individual Wells					
				Former On-Site Drycleaner		Off-Site Drycleaner		Off-Site Gas Station	
				Well ID	March-2015 Concentration (µg/L)	Well ID	March-2015 Concentration (µg/L)	Well ID	March-2015 Concentration (µg/L)
Acetone	**4.60E+01**	**46,000**	Type 4 RRS	No groundwater exceedences on site					
Benzene	**0.0087**	**8.7**	Type 4 RRS					MW-20	15
								MW-21	24
								MW-28	135
Chloroform	**0.080**	**80**	Type 3 RRS	No groundwater exceedences on site					
Cumene (Isopropylbenzene)	**1.0**	**1,000**	Type 3 RRS	No groundwater exceedences on site					
Dichloroethylene, 1,2-cis- (cDCE)	**0.070**	**70**	Type 3 & 4	MW-4	210	MW-16	100		
Dichloroethylene, 1,2-trans- (tDCE)	**0.1**	**100**	Type 3 & 4	No groundwater exceedences on site					
Methyl Ethyl Ketone (MEK)	**12**	**12,000**	Type 4	No groundwater exceedences on site					
Tetrachloroethylene (PCE)	**0.098**	**98**	Type 4	MW-2	775	MW-5	170		
						MW-20	160		
						MW-22	520		
						MW-23	120		
Trichloroethylene (TCE)	**0.0052**	**5.2**	Type 4	MW-2	71.5	MW-6	5.5		
				MW-4	120	MW-16	35		
						MW-20	8.8		
						MW-28	7.95		
Vinyl Chloride (VC)	**0.0033**	**3.3**	Type 4			MW-16	11		
						MW-28	4.3		

Appendix C

Soil to Groundwater Leaching Calculations

Table C1
Soil to Groundwater Leaching Calculations - Type 2 RRS
Benzene - Fountain Oaks Shopping Center

Variable	Variable Definition	Value	Formula	Units	Parameter Type	Data Source
Soil to Ground Water Leaching*						
W	Width of Source	32.4		ft	Site-specific	MEI CSR, 12-2015, Sect. 3.4.4.4.1
W	Width of Source	**988**	$W_{cm} = W_{ft}$ * 30.48 cm/ft	cm	Site-specific	
P	Avg. Annual Precipitation	**49.71**		in/yr	Site-specific	Natl. Weather Svc, Peachtree City
P	Avg. Annual Precipitation	**126**	$P_{cm} = P_{in}$ * 2.54 cm/in	cm/yr	Calculated	
k_i	Infiltration Factor	**0.0009**		dimensionless	Specific to Silty Soil	Weidemeier, et al., 1999, p. 52
I	Infiltration Rate	**14.3**	$I = P^2$*0.009	cm/year	Calculated	
δ_{gw}	GW Mixing Zone Thickness	**7.1**		ft	Site-specific	MEI CSR, 12-2015, Table 2
δ_{gw}	GW Mixing Zone Thickness	**216**	$\delta_{gw,\ cm} = \delta_{gw,\ ft}$ * 30.48 cm/ft	cm	Site-specific	
K_{sat}	Hydraulic conductivity (saturated)	**7.78E-05**		cm/sec	Site-specific	UC PPCAP, Pg 23
K_{sat}	Hydraulic conductivity (saturated)	**6.72E+00**	$K_{sat,(cm/day)} = K_{sat,(cm/s)}$* 86,400 sec/day	cm/day		
i	Groundwater Hydraulic Gradient	**0.03**	i = Δhead/Δdistance (along flow path)	cm/cm	Site-specific, Avg.	MEI CSR, 12-2015, Figure 17
U_{gw}	GW Darcy velocity	**73.61**	$U_{gw} = K_{sat}$ * i	cm/year	Calculated	ASTM E2081-00 (2015)
DAF	Dilution Attenutation Factor	**2.124**	DAF = 1 + $(U_{gw}*\delta_{gw})/(I*W)$	dimensionless	Calculated	ASTM E2081-00 (2015)
DAF	Dilution Attenutation Factor	**20**	DAF = 20	dimensionless	Default	
K_{oc}	Soil Organic Carbon-Water Partition Coefficient	**2.364**		cm^3-W/g-C	Compound-Specific	EPA RSL Table, 2015
f_{oc}	Fractional Org. Carbon	**3.58%**		%	Site-specific	UC PPCAP, Table 1
K_d	Soil-Water Partition/Sorption Coeff.	**8.46E-02**	$K_d = K_{oc} * f_{oc}$	g-W/g-soil	Calculated	ASTM E2081-00 (2015)
ρ_s	Soil Bulk Density	**1.80**		g-S/cm^3-S	Site-specific	UC PPCAP, Table 1
ρ_b	Soil Particle Density	**2.65**		g-S/cm^3-S	Default	EPD Rule 391-3-19 App. III, Table 3
Θ_w	Soil Volumetric Water Content	**0.258**		cm^3-W/cm^3-S	Site-specific	UC PPCAP, Table 1
Θ_a	Soil Volumetric Air Content	**0.26**		cm^3-A/cm^3-S	default	ASTM E2081-00 (2015)
H'	Henry's Law Constant	**1.43E-03**		dimensionless	Compound-Specific	EPA RSL Table, 2015
K_{sw}	Soil to Leachate Partition Coeff.	**0.228**	$K_{sw} = [\Theta_w + (K_d*\rho_s) + (H_{eff} * \Theta_a)] / \rho_s$	mg/L-wtr/mg/kg-soil	Calculated	ASTM E2081-00 (2015)
LF_{sw}	Leaching Factor - Soil to Groundwater	**0.219**	$LF_{sw} = 1/(K_{sw}$ * DAF)	ppm/ppm	Calculated	ASTM E2081-00 (2015)
$C_{max,\ soil}$	Max soil concentration on-site	**0.016**		mg/kg	Site-specific	MEI CSR, 12-2015, Tables 7, 8 & 22
$\mathbf{C_{target,\ Soil}}$	**Soil Conc. Causing Leachate to Exceed Higher of Type 1 or 2 GW RRS**	**3.7E+01**		**mg/kg**		
$C_{RRS\ 1,2\text{-}GW}$	Higher of Type 1 or Type 2 RRS: GROUNDWATER	8.0E+00		mg/L		
C_{leach}	Conc. in GW by leaching	**8.0E+00**	$C_{leach} = C_{target,\ soil} * LF_{sw}$	mg/L	Calculated	ASTM E2081-00 (2015)
$C_{target,\ GW}$ - C_{leach}		**0.0E+00**	$C_{target,\ GW}$ - C_{leach}			

*Soil to Groundwater Leaching calculations performed in accordance with procedures and equations detailed in US EPA Publication 9355.4-24 "Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites" and ASTM Standard E2081-00 (2015), "Standard Guide for Risk-Based Corrective Action", Section X3.9 and Table X3.4

Table C2
Soil to Groundwater Leaching Calculations - Type 2 RRS
Benzene - Fountain Oaks Shopping Center

Variable	Variable Definition	Value	Formula	Units	Parameter Type	Data Source
Soil to Ground Water Leaching*						
W	Width of Source	**32.4**		ft	Site-specific	MEI CSR, 12-2015, Sect. 3.4.4.4.1
W	Width of Source	**988**	$W_{cm} = W_{ft}$ * 30.48 cm/ft	cm	Site-specific	
P	Avg. Annual Precipitation	**49.71**		in/yr	Site-specific	Natl. Weather Svc, Peachtree City
P	Avg. Annual Precipitation	**126**	$P_{cm} = P_{in}$ * 2.54 cm/in	cm/yr	Calculated	
k_i	Infiltration Factor	**0.0009**		dimensionless	Specific to Silty Soil	Weidemeier, et al., 1999, p. 52
I	Infiltration Rate	**14.3**	$I = P^2$*0.009	cm/year	Calculated	
δ_{gw}	GW Mixing Zone Thickness	**7.1**		ft	Site-specific	MEI CSR, 12-2015, Table 2
δ_{gw}	GW Mixing Zone Thickness	**216**	$\delta_{gw, cm} = \delta_{gw, ft}$ * 30.48 cm/ft	cm	Site-specific	
K_{sat}	Hydraulic conductivity (saturated)	**7.78E-05**		cm/sec	Site-specific	UC PPCAP, Pg 23
K_{sat}	Hydraulic conductivity (saturated)	**6.72E+00**	$K_{sat,(cm/day)} = K_{sat,(cm/s)}$* 86,400 sec/day	cm/day		
i	Groundwater Hydraulic Gradient	**0.03**	i = Δhead/Δdistance (along flow path)	cm/cm	Site-specific, Avg.	MEI CSR, 12-2015, Figure 17
U_{gw}	GW Darcy velocity	**73.61**	$U_{gw} = K_{sat}$ * i	cm/year	Calculated	ASTM E2081-00 (2015)
DAF	Dilution Attenuation Factor	**2.124**	DAF = 1 + (U_{gw}*δ_{gw})/(I*W)	dimensionless	Calculated	ASTM E2081-00 (2015)
DAF	Dilution Attenuation Factor	**20**	DAF = 20	dimensionless	Default	
K_{oc}	Soil Organic Carbon-Water Partition Coefficient	**145.8**		cm^3-W/g-C	Compound-Specific	EPA RSL Table, 2015
f_{oc}	Fractional Org. Carbon	**3.58%**		%	Site-specific	UC PPCAP, Table 1
K_d	Soil-Water Partition/Sorption Coeff.	**5.22E+00**	$K_d = K_{oc}$ * f_{oc}	g-W/g-soil	Calculated	ASTM E2081-00 (2015)
ρ_s	Soil Bulk Density	**1.80**		g-S/cm^3-S	Site-specific	UC PPCAP, Table 1
ρ_b	Soil Particle Density	**2.65**		g-S/cm^3-S	Default	EPD Rule 391-3-19 App. III, Table 3
Θ_w	Soil Volumetric Water Content	**0.258**		cm^3-W/cm^3-S	Site-specific	UC PPCAP, Table 1
Θ_a	Soil Volumetric Air Content	**0.26**		cm^3-A/cm^3-S	default	ASTM E2081-00 (2015)
H'	Henry's Law Constant	**0.23**		dimensionless	Compound-Specific	EPA RSL Table, 2015
K_{sw}	Soil to Leachate Partition Coeff.	**5.396**	$K_{sw} = [\Theta_w + (K_d*\rho_s) + (H_{eff} * \Theta_a)] / \rho_s$	mg/L-wtr/mg/kg-soil	Calculated	ASTM E2081-00 (2015)
LF_{sw}	Leaching Factor - Soil to Groundwater	**0.009**	$LF_{sw} = 1/(K_{sw}$ * DAF)	ppm/ppm	Calculated	ASTM E2081-00 (2015)
$C_{max, soil}$	Max soil concentration on-site	**0.016**		mg/kg	Site-specific	MEI CSR, 12-2015, Tables 7, 8 & 22
$C_{target, Soil}$	**Soil Conc. Causing Leachate to Exceed Higher of Type 1 or 2 GW RRS**	**5.8E-01**		**mg/kg**		
$C_{RRS\ 1,2\text{-}GW}$	Higher of Type 1 or Type 2 RRS: GROUNDWATER	5.4E-03		mg/L		
C_{leach}	Conc. in GW by leaching	**5.4E-03**	$C_{leach} = C_{target, soil}$ * LF_{sw}	mg/L	Calculated	ASTM E2081-00 (2015)
$C_{target, GW}$ - C_{leach}		**0.0E+00**	$C_{target, GW}$ - C_{leach}			

*Soil to Groundwater Leaching calculations performed in accordance with procedures and equations detailed in US EPA Publication 9355.4-24 "Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites" and ASTM Standard E2081-00 (2015), "Standard Guide for Risk-Based Corrective Action", Section X3.9 and Table X3.4

Table C3
Soil to Groundwater Leaching Calculations - Type 2 RRS
Chloroform - Fountain Oaks Shopping Center

Variable	Variable Definition	Value	Formula	Units	Parameter Type	Data Source
Soil to Ground Water Leaching*						
W	Width of Source	32.4		ft	Site-specific	MEI CSR, 12-2015, Sect. 3.4.4.4.1
W	Width of Source	**988**	$W_{cm} = W_{ft}$ * 30.48 cm/ft	cm	Site-specific	
P	Avg. Annual Precipitation	**49.71**		in/yr	Site-specific	Natl. Weather Svc, Peachtree City
P	Avg. Annual Precipitation	**126**	$P_{cm} = P_{in}$ * 2.54 cm/in	cm/yr	Calculated	
k_i	Infiltration Factor/Coefficient	**0.0009**		dimensionless	Specific to Silty Soil	Weidemeier, et al., 1999, p. 52
I	Infiltration Rate	**14.3**	$I = P^2$*0.009	cm/year	Calculated	
δ_{gw}	GW Mixing Zone Thickness	**7.1**		ft	Site-specific	MEI CSR, 12-2015, Table 2
δ_{gw}	GW Mixing Zone Thickness	**216**	$\delta_{gw,\ cm} = \delta_{gw,\ ft}$ * 30.48 cm/ft	cm	Site-specific	
K_{sat}	Hydraulic conductivity (saturated)	**7.78E-05**		cm/sec	Site-specific	UC PPCAP, Pg 23
K_{sat}	Hydraulic conductivity (saturated)	**6.72E+00**	$K_{sat,(cm/day)} = K_{sat,(cm/s)}$* 86,400 sec/day	cm/day		
i	Groundwater Hydraulic Gradient	**0.03**	i = Δhead/Δdistance (along flow path)	cm/cm	Site-specific, Avg.	MEI CSR, 12-2015, Figure 17
U_{gw}	GW Darcy velocity	**73.61**	$U_{gw} = K_{sat}$ * i	cm/year	Calculated	ASTM E2081-00 (2015)
DAF	Dilution Attenutation Factor	**2.124**	DAF = 1 + (U_{gw}*δ_{gw})/(I*W)	dimensionless	Calculated	ASTM E2081-00 (2015)
DAF	Dilution Attenutation Factor	**20**	DAF = 20	dimensionless	Default	
K_{oc}	Soil Organic Carbon-Water Partition Coefficient	**31.82**		cm^3-W/g-C	Compound-Specific	EPA RSL Table, 2015
f_{oc}	Fractional Org. Carbon	**3.58%**		%	Site-specific	UC PPCAP, Table 1
K_d	Soil-Water Partition/Sorption Coeff.	**1.14E+00**	$K_d = K_{oc}$ * f_{oc}	g-W/g-soil	Calculated	ASTM E2081-00 (2015)
ρ_s	Soil Bulk Density	**1.80**		g-S/cm^3-S	Site-specific	UC PPCAP, Table 1
ρ_b	Soil Particle Density	**2.65**		g-S/cm^3-S	Default	EPD Rule 391-3-19 App. III, Table 3
Θ_w	Soil Volumetric Water Content	**0.258**		cm^3-W/cm^3-S	Site-specific	UC PPCAP, Table 1
Θ_a	Soil Volumetric Air Content	**0.26**		cm^3-A/cm^3-S	default	ASTM E2081-00 (2015)
H'	Henry's Law Constant	**0.15**		dimensionless	Compound-Specific	EPA RSL Table, 2015
K_{sw}	Soil to Leachate Partition Coeff.	**1.304**	$K_{sw} = [\Theta_w + (K_d$*$\rho_s) + (H_{eff}$ * $\Theta_a)] / \rho_s$	mg/L-wtr/mg/kg-soil	Calculated	ASTM E2081-00 (2015)
LF_{sw}	Leaching Factor - Soil to Groundwater	**0.038**	$LF_{sw} = 1/(K_{sw}$ * DAF)	ppm/ppm	Calculated	ASTM E2081-00 (2015)
$C_{max,\ soil}$	Max soil concentration on-site	**0.3**		mg/kg	Site-specific	MEI CSR, 2015, Tables 7, 8 & 22
$\mathbf{C_{target,\ Soil}}$	**Soil Conc. Causing Leachate to Exceed Higher of Type 1 or 2 GW RRS**	**2.09E+00**		**mg/kg**		
$C_{RRS\ 1,2\text{-}GW}$	Higher of Type 1 or Type 2 RRS: GROUNDWATER	8.00E-02		mg/L		
C_{leach}	Conc. in GW by leaching	**8.0E-02**		mg/L	Calculated	ASTM E2081-00 (2015)
$C_{target,\ GW} - C_{leach}$		**0.0E+00**	$C_{target,\ GW} - C_{leach}$			

*Soil to Groundwater Leaching calculations performed in accordance with procedures and equations detailed in US EPA Publication 9355.4-23 "Soil Screening Guidance: User's Guide" and ASTM Standard E2081-00 (2015), "Standard Guide for Risk-Based Corrective Action", Section X3.9 and Table X3.4

Table C4
Soil to Groundwater Leaching Calculations - Type 2 RRS
Cumene (Isopropylbenzene) - Fountain Oaks Shopping Center

Variable	Variable Definition	Value	Formula	Units	Parameter Type	Data Source
Soil to Ground Water Leaching*						
W	Width of Source	32.4		ft	Site-specific	MEI CSR, 12-2015, Sect. 3.4.4.4.1
W	Width of Source	**988**	$W_{cm} = W_{ft} * 30.48$ cm/ft	cm	Site-specific	
P	Avg. Annual Precipitation	**49.71**		in/yr	Site-specific	Natl. Weather Svc, Peachtree City
P	Avg. Annual Precipitation	**126**	$P_{cm} = P_{in} * 2.54$ cm/in	cm/yr	Calculated	
k_i	Infiltration Factor/Coefficient	**0.0009**		dimensionless	Specific to Silty Soil	Weidemeier, et al., 1999, p. 52
I	Infiltration Rate	**14.3**	$I = P^2 * 0.009$	cm/year	Calculated	
δ_{gw}	GW Mixing Zone Thickness	**7.1**		ft	Site-specific	MEI CSR, 12-2015, Table 2
δ_{gw}	GW Mixing Zone Thickness	**216**	$\delta_{gw,\,cm} = \delta_{gw,\,ft} * 30.48$ cm/ft	cm	Site-specific	
K_{sat}	Hydraulic conductivity (saturated)	**7.78E-05**		cm/sec	Site-specific	UC PPCAP, Pg 23
K_{sat}	Hydraulic conductivity (saturated)	**6.72E+00**	$K_{sat,(cm/day)} = K_{sat,(cm/s)} * 86{,}400$ sec/day	cm/day		
i	Groundwater Hydraulic Gradient	**0.03**	i = Δhead/Δdistance (along flow path)	cm/cm	Site-specific, Avg.	MEI CSR, 12-2015, Figure 17
U_{gw}	GW Darcy velocity	**73.61**	$U_{gw} = K_{sat} * i$	cm/year	Calculated	ASTM E2081-00 (2015)
DAF	Dilution Attenuation Factor	**2.124**	$DAF = 1 + (U_{gw} * \delta_{gw})/(I * W)$	dimensionless	Calculated	ASTM E2081-00 (2015)
DAF	Dilution Attenuation Factor	**20**	DAF = 20	dimensionless	Default	
K_{oc}	Soil Organic Carbon-Water Partition Coefficient	**697.8**		cm^3-W/g-C	Compound-Specific	EPA RSL Table, 2015
f_{oc}	Fractional Org. Carbon	**3.58%**		%	Site-specific	UC PPCAP, Table 1
K_d	Soil-Water Partition/Sorption Coeff.	**2.50E+01**	$K_d = K_{oc} * f_{oc}$	g-W/g-soil	Calculated	ASTM E2081-00 (2015)
ρ_s	Soil Bulk Density	**1.80**		g-S/cm^3-S	Site-specific	UC PPCAP, Table 1
ρ_b	Soil Particle Density	**2.65**		g-S/cm^3-S	Default	EPD Rule 391-3-19 App. III, Table 3
Θ_w	Soil Volumetric Water Content	**0.258**		cm^3-W/cm^3-S	Site-specific	UC PPCAP, Table 1
Θ_a	Soil Volumetric Air Content	**0.26**		cm^3-A/cm^3-S	default	ASTM E2081-00 (2015)
H'	Henry's Law Constant	**0.47**		dimensionless	Compound-Specific	EPA RSL Table, 2015
K_{sw}	Soil to Leachate Partition Coeff.	**25.192**	$K_{sw} = [\Theta_w + (K_d * \rho_s) + (H_{eff} * \Theta_a)] / \rho_s$	mg/L-wtr/mg/kg-soil	Calculated	ASTM E2081-00 (2015)
LF_{sw}	Leaching Factor - Soil to Groundwater	**0.002**	$LF_{sw} = 1/(K_{sw} * DAF)$	ppm/ppm	Calculated	ASTM E2081-00 (2015)
$C_{max,\,soil}$	Max soil concentration on-site	**0**	Not Detected	mg/kg	Site-specific	MEI CSR, 12-2015, Tables 7, 8 & 22
$\mathbf{C_{target,\,Soil}}$	**Soil Conc. Causing Leachate to Exceed Higher of Type 1 or 2 GW RRS**	**1.0E+02**		**mg/kg**		
$C_{RRS\ 1,2\text{-}GW}$	Higher of Type 1 or Type 2 RRS: GROUNDWATER	2.1E-01		mg/L		
C_{leach}	Conc. in GW by leaching	**2.1E-01**	$C_{leach} = C_{target,\,soil} * LF_{sw}$	mg/L	Calculated	ASTM E2081-00 (2015)
$C_{target,\,GW}$ - C_{leach}		**0.0E+00**	$C_{target,\,GW}$ - C_{leach}			

*Soil to Groundwater Leaching calculations performed in accordance with procedures and equations detailed in US EPA Publication 9355.4-24 "Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites" and ASTM Standard E2081-00 (2015), "Standard Guide for Risk-Based Corrective Action", Section X3.9 and Table X3.4

Table C5
Soil to Groundwater Leaching Calculations - Type 2 RRS
cis-1,2-Dichloroethene (cDCE) - Fountain Oaks Shopping Center

Variable	Variable Definition	Value	Formula	Units	Parameter Type	Data Source
Soil to Ground Water Leaching*						
W	Width of Source	32.4		ft	Site-specific	MEI CSR, 12-2015, Sect. 3.4.4.4.1
W	Width of Source	**988**	$W_{cm} = W_{ft}$ * 30.48 cm/ft	cm	Site-specific	
P	Avg. Annual Precipitation	**49.71**		in/yr	Site-specific	Natl. Weather Svc, Peachtree City
P	Avg. Annual Precipitation	**126**	$P_{cm} = P_{in}$ * 2.54 cm/in	cm/yr	Calculated	
k_i	Infiltration Factor/Coefficient	**0.0009**		dimensionless	Specific to Silty Soil	Weidemeier, et al., 1999, p. 52
I	Infiltration Rate	**14.3**	$I = P^2 * 0.009$	cm/year	Calculated	
δ_{gw}	GW Mixing Zone Thickness	**7.1**		ft	Site-specific	MEI CSR, 12-2015, Table 2
δ_{gw}	GW Mixing Zone Thickness	**216**	$\delta_{gw, cm} = \delta_{gw, ft}$ * 30.48 cm/ft	cm	Site-specific	
K_{sat}	Hydraulic conductivity (saturated)	**7.78E-05**		cm/sec	Site-specific	UC PPCAP, Pg 23
K_{sat}	Hydraulic conductivity (saturated)	**6.72E+00**	$K_{sat,(cm/day)} = K_{sat,(cm/s)}$ * 86,400 sec/day	cm/day		
i	Groundwater Hydraulic Gradient	**0.03**	i = Δhead/Δdistance (along flow path)	cm/cm	Site-specific, Avg.	MEI CSR, 12-2015, Figure 17
U_{gw}	GW Darcy velocity	**73.61**	$U_{gw} = K_{sat} * i$	cm/year	Calculated	ASTM E2081-00 (2015)
DAF	Dilution Attenuation Factor	**2.124**	$DAF = 1 + (U_{gw} * \delta_{gw})/(I * W)$	dimensionless	Calculated	ASTM E2081-00 (2015)
DAF	Dilution Attenuation Factor	**20**	DAF = 20	dimensionless	Default	
K_{oc}	Soil Organic Carbon-Water Partition Coefficient	**39.6**		cm^3-W/g-C	Compound-Specific	EPA RSL Table, 2015
f_{oc}	Fractional Org. Carbon	**3.58%**		%	Site-specific	UC PPCAP, Table 1
K_d	Soil-Water Partition/Sorption Coeff.	**1.42E+00**	$K_d = K_{oc} * f_{oc}$	g-W/g-soil	Calculated	ASTM E2081-00 (2015)
ρ_s	Soil Bulk Density	**1.80**		g-S/cm^3-S	Site-specific	UC PPCAP, Table 1
ρ_b	Soil Particle Density	**2.65**		g-S/cm^3-S	Default	EPD Rule 391-3-19 App. III, Table 3
Θ_w	Soil Volumetric Water Content	**0.258**		cm^3-W/cm^3-S	Site-specific	UC PPCAP, Table 1
Θ_a	Soil Volumetric Air Content	**0.26**		cm^3-A/cm^3-S	default	ASTM E2081-00 (2015)
H'	Henry's Law Constant	**0.17**		dimensionless	Compound-Specific	EPA RSL Table, 2015
K_{sw}	Soil to Leachate Partition Coeff.	**1.585**	$K_{sw} = [\Theta_w + (K_d * \rho_s) + (H_{eff} * \Theta_a)] / \rho_s$	mg/L-wtr/mg/kg-soil	Calculated	ASTM E2081-00 (2015)
LF_{sw}	Leaching Factor - Soil to Groundwater	**0.032**	$LF_{sw} = 1/(K_{sw} * DAF)$	ppm/ppm	Calculated	ASTM E2081-00 (2015)
$C_{max, soil}$	Max soil concentration on-site	**0.3**		mg/kg	Site-specific	MEI CSR, 12-2015, Tables 7, 8 & 22
$C_{target, Soil}$	**Soil Conc. Causing Leachate to Exceed Higher of Type 1 or 2 GW RRS**	**2.2E+00**		**mg/kg**		
$C_{RRS\ 1,2\text{-}GW}$	Higher of Type 1 or Type 2 RRS: GROUNDWATER	7.0E-02		mg/L		
C_{leach}	Conc. in GW by leaching	**7.0E-02**	$C_{leach} = C_{target, soil} * LF_{sw}$	mg/L	Calculated	ASTM E2081-00 (2015)
$C_{target, GW} - C_{leach}$		**0.0E+00**	$C_{target, GW} - C_{leach}$			

*Soil to Groundwater Leaching calculations performed in accordance with procedures and equations detailed in US EPA Publication 9355.4-24 "Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites" and ASTM Standard E2081-00 (2015), "Standard Guide for Risk-Based Corrective Action", Section X3.9 and Table X3.4

Table C6
Soil to Groundwater Leaching Calculations - Type 2 RRS
trans-1,2-Dichloroethene (cDCE) - Fountain Oaks Shopping Center

Variable	Variable Definition	Value	Formula	Units	Parameter Type	Data Source
Soil to Ground Water Leaching*						
W	Width of Source	32.4		ft	Site-specific	MEI CSR, 12-2015, Sect. 3.4.4.4.1
W	Width of Source	**988**	$W_{cm} = W_{ft} * 30.48$ cm/ft	cm	Site-specific	
P	Avg. Annual Precipitation	**49.71**		in/yr	Site-specific	Natl. Weather Svc, Peachtree City
P	Avg. Annual Precipitation	**126**	$P_{cm} = P_{in} * 2.54$ cm/in	cm/yr	Calculated	
k_i	Infiltration Factor/Coefficient	**0.0009**		dimensionless	Specific to Silty Soil	Weidemeier, et al., 1999, p. 52
I	Infiltration Rate	**14.3**	$I = P^2 * 0.009$	cm/year	Calculated	
δ_{gw}	GW Mixing Zone Thickness	**7.1**		ft	Site-specific	MEI CSR, 12-2015, Table 2
δ_{gw}	GW Mixing Zone Thickness	**216**	$\delta_{gw, cm} = \delta_{gw, ft} * 30.48$ cm/ft	cm	Site-specific	
K_{sat}	Hydraulic conductivity (saturated)	**7.78E-05**		cm/sec	Site-specific	UC PPCAP, Pg 23
K_{sat}	Hydraulic conductivity (saturated)	**6.72E+00**	$K_{sat,(cm/day)} = K_{sat,(cm/s)} * 86{,}400$ sec/day	cm/day		
i	Groundwater Hydraulic Gradient	**0.03**	i = Δhead/Δdistance (along flow path)	cm/cm	Site-specific, Avg.	MEI CSR, 12-2015, Figure 17
U_{gw}	GW Darcy velocity	**73.61**	$U_{gw} = K_{sat} * i$	cm/year	Calculated	ASTM E2081-00 (2015)
DAF	Dilution Attenuation Factor	**2.124**	$DAF = 1 + (U_{gw} * \delta_{gw})/(I * W)$	dimensionless	Calculated	ASTM E2081-00 (2015)
DAF	Dilution Attenuation Factor	**20**	DAF = 20	dimensionless	Default	
K_{oc}	Soil Organic Carbon-Water Partition Coefficient	**39.6**		cm^3-W/g-C	Compound-Specific	EPA RSL Table, 2015
f_{oc}	Fractional Org. Carbon	**3.58%**		%	Site-specific	UC PPCAP, Table 1
K_d	Soil-Water Partition/Sorption Coeff.	**1.42E+00**	$K_d = K_{oc} * f_{oc}$	g-W/g-soil	Calculated	ASTM E2081-00 (2015)
ρ_s	Soil Bulk Density	**1.80**		g-S/cm^3-S	Site-specific	UC PPCAP, Table 1
ρ_b	Soil Particle Density	**2.65**		g-S/cm^3-S	Default	EPD Rule 391-3-19 App. III, Table 3
Θ_w	Soil Volumetric Water Content	**0.258**		cm^3-W/cm^3-S	Site-specific	UC PPCAP, Table 1
Θ_a	Soil Volumetric Air Content	**0.26**		cm^3-A/cm^3-S	default	ASTM E2081-00 (2015)
H'	Henry's Law Constant	**0.38**		dimensionless	Compound-Specific	EPA RSL Table, 2015
K_{sw}	Soil to Leachate Partition Coeff.	**1.616**	$K_{sw} = [\Theta_w + (K_d * \rho_s) + (H_{eff} * \Theta_a)] / \rho_s$	mg/L-wtr/mg/kg-soil	Calculated	ASTM E2081-00 (2015)
LF_{sw}	Leaching Factor - Soil to Groundwater	**0.031**	$LF_{sw} = 1/(K_{sw} * DAF)$	ppm/ppm	Calculated	ASTM E2081-00 (2015)
$C_{max, soil}$	Max soil concentration on-site	**0.3**		mg/kg	Site-specific	MEI CSR, 12-2015, Tables 7, 8 & 22
$\mathbf{C_{target, Soil}}$	**Soil Conc. Causing Leachate to Exceed Higher of Type 1 or 2 GW RRS**	**3.2E+00**		**mg/kg**		
$C_{RRS\ 1,2\text{-}GW}$	Higher of Type 1 or Type 2 RRS: GROUNDWATER	1.0E-01		mg/L		
C_{leach}	Conc. in GW by leaching	**1.0E-01**	$C_{leach} = C_{target, soil} * LF_{sw}$	mg/L	Calculated	ASTM E2081-00 (2015)
$C_{target, GW} - C_{leach}$		**0.0E+00**	$C_{target, GW} - C_{leach}$			

*Soil to Groundwater Leaching calculations performed in accordance with procedures and equations detailed in US EPA Publication 9355.4-24 "Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites" and ASTM Standard E2081-00 (2015), "Standard Guide for Risk-Based Corrective Action", Section X3.9 and Table X3.4

Table C7
Soil to Groundwater Leaching Calculations - Type 2 RRS
cis-1,2-Dichloroethene (cDCE) - Fountain Oaks Shopping Center

Variable	Variable Definition	Value	Formula	Units	Parameter Type	Data Source
Soil to Ground Water Leaching*						
W	Width of Source	32.4		ft	Site-specific	MEI CSR, 12-2015, Sect. 3.4.4.4.1
W	Width of Source	**988**	$W_{cm} = W_{ft}$ * 30.48 cm/ft	cm	Site-specific	
P	Avg. Annual Precipitation	**49.71**		in/yr	Site-specific	Natl. Weather Svc, Peachtree City
P	Avg. Annual Precipitation	**126**	$P_{cm} = P_{in}$ * 2.54 cm/in	cm/yr	Calculated	
k_i	Infiltration Factor/Coefficient	**0.0009**		dimensionless	Specific to Silty Soil	Weidemeier, et al., 1999, p. 52
I	Infiltration Rate	**14.3**	$I = P^2 * 0.009$	cm/year	Calculated	
δ_{gw}	GW Mixing Zone Thickness	**7.1**		ft	Site-specific	MEI CSR, 12-2015, Table 2
δ_{gw}	GW Mixing Zone Thickness	**216**	$\delta_{gw, cm} = \delta_{gw, ft}$ * 30.48 cm/ft	cm	Site-specific	
K_{sat}	Hydraulic conductivity (saturated)	**7.78E-05**		cm/sec	Site-specific	UC PPCAP, Pg 23
K_{sat}	Hydraulic conductivity (saturated)	**6.72E+00**	$K_{sat,(cm/day)} = K_{sat,(cm/s)}$ * 86,400 sec/day	cm/day		
i	Groundwater Hydraulic Gradient	**0.03**	i = Δhead/Δdistance (along flow path)	cm/cm	Site-specific, Avg.	MEI CSR, 12-2015, Figure 17
U_{gw}	GW Darcy velocity	**73.61**	$U_{gw} = K_{sat} * i$	cm/year	Calculated	ASTM E2081-00 (2015)
DAF	Dilution Attenuation Factor	**2.124**	$DAF = 1 + (U_{gw}*\delta_{gw})/(I*W)$	dimensionless	Calculated	ASTM E2081-00 (2015)
DAF	Dilution Attenuation Factor	**20**	DAF = 20	dimensionless	Default	
K_{oc}	Soil Organic Carbon-Water Partition Coefficient	**4.51**		cm^3-W/g-C	Compound-Specific	EPA RSL Table, 2015
f_{oc}	Fractional Org. Carbon	**3.58%**		%	Site-specific	UC PPCAP, Table 1
K_d	Soil-Water Partition/Sorption Coeff.	**1.61E-01**	$K_d = K_{oc} * f_{oc}$	g-W/g-soil	Calculated	ASTM E2081-00 (2015)
ρ_s	Soil Bulk Density	**1.80**		g-S/cm^3-S	Site-specific	UC PPCAP, Table 1
ρ_b	Soil Particle Density	**2.65**		g-S/cm^3-S	Default	EPD Rule 391-3-19 App. III, Table 3
Θ_w	Soil Volumetric Water Content	**0.258**		cm^3-W/cm^3-S	Site-specific	UC PPCAP, Table 1
Θ_a	Soil Volumetric Air Content	**0.26**		cm^3-A/cm^3-S	default	ASTM E2081-00 (2015)
H'	Henry's Law Constant	**2.33E-03**		dimensionless	Compound-Specific	EPA RSL Table, 2015
K_{sw}	Soil to Leachate Partition Coeff.	**0.305**	$K_{sw} = [\Theta_w + (K_d*\rho_s) + (H_{eff} * \Theta_a)] / \rho_s$	mg/L-wtr/mg/kg-soil	Calculated	ASTM E2081-00 (2015)
LF_{sw}	Leaching Factor - Soil to Groundwater	**0.164**	$LF_{sw} = 1/(K_{sw} * DAF)$	ppm/ppm	Calculated	ASTM E2081-00 (2015)
$C_{max, soil}$	Max soil concentration on-site	**0.3**		mg/kg	Site-specific	MEI CSR, 12-2015, Tables 7, 8 & 22
$\mathbf{C_{target, Soil}}$	**Soil Conc. Causing Leachate to Exceed Higher of Type 1 or 2 GW RRS**	**1.4E+01**		**mg/kg**		
$C_{RRS\ 1,2\text{-}GW}$	Higher of Type 1 or Type 2 RRS: GROUNDWATER	2.3E+00		mg/L		
C_{leach}	Conc. in GW by leaching	**2.3E+00**	$C_{leach} = C_{target, soil} * LF_{sw}$	mg/L	Calculated	ASTM E2081-00 (2015)
$C_{target, GW}$ - C_{leach}		**0.0E+00**	$C_{target, GW}$ - C_{leach}			

*Soil to Groundwater Leaching calculations performed in accordance with procedures and equations detailed in US EPA Publication 9355.4-24 "Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites" and ASTM Standard E2081-00 (2015), "Standard Guide for Risk-Based Corrective Action", Section X3.9 and Table X3.4

Table C8
Soil to Groundwater Leaching Calculations - Type 2 RRS
Tetrachloroethene - Fountain Oaks Shopping Center

Variable	Variable Definition	Value	Formula	Units	Parameter Type	Data Source
Soil to Ground Water Leaching*						
W	Width of Source	32.4		ft	Site-specific	MEI CSR, 12-2015, Sect. 3.4.4.4.1
W	Width of Source	**988**	$W_{cm} = W_{ft}$ * 30.48 cm/ft	cm	Site-specific	
P	Avg. Annual Precipitation	**49.71**		in/yr	Site-specific	Natl. Weather Svc, Peachtree City
P	Avg. Annual Precipitation	**126**	$P_{cm} = P_{in}$ * 2.54 cm/in	cm/yr	Calculated	
k_i	Infiltration Factor	**0.0009**		dimensionless	Specific to Silty Soil	Weidemeier, et al., 1999, p. 52
I	Infiltration Rate	**14.3**	$I = P^2$*0.009	cm/year	Calculated	
δ_{gw}	GW Mixing Zone Thickness	**7.1**		ft	Site-specific	MEI CSR, 12-2015, Table 2
δ_{gw}	GW Mixing Zone Thickness	**216**	$\delta_{gw, cm} = \delta_{gw, ft}$ * 30.48 cm/ft	cm	Site-specific	
K_{sat}	Hydraulic conductivity (saturated)	**7.78E-05**		cm/sec	Site-specific	UC PPCAP, Pg 23
K_{sat}	Hydraulic conductivity (saturated)	**6.72E+00**	$K_{sat,(cm/day)} = K_{sat,(cm/s)}$* 86,400 sec/day	cm/day		
i	Groundwater Hydraulic Gradient	**0.03**	i = Δhead/Δdistance (along flow path)	cm/cm	Site-specific, Avg.	MEI CSR, 12-2015, Figure 17
U_{gw}	GW Darcy velocity	**73.61**	$U_{gw} = K_{sat}$ * i	cm/year	Calculated	ASTM E2081-00 (2015)
DAF	Dilution Attenuation Factor	**2.124**	$DAF = 1 + (U_{gw}*\delta_{gw})/(I*W)$	dimensionless	Calculated	ASTM E2081-00 (2015)
DAF	Dilution Attenuation Factor	**20**	DAF = 20	dimensionless	Default	
K_{oc}	Soil Organic Carbon-Water Partition Coefficient	**94.94**		cm^3-W/g-C	Compound-Specific	EPA RSL Table, 2015
f_{oc}	Fractional Org. Carbon	**3.58%**		%	Site-specific	UC PPCAP, Table 1
K_d	Soil-Water Partition/Sorption Coeff.	**3.40E+00**	$K_d = K_{oc} * f_{oc}$	g-W/g-soil	Calculated	ASTM E2081-00 (2015)
ρ_s	Soil Bulk Density	**1.80**		g-S/cm^3-S	Site-specific	UC PPCAP, Table 1
ρ_b	Soil Particle Density	**2.65**		g-S/cm^3-S	Default	EPD Rule 391-3-19 App. III, Table 3
Θ_w	Soil Volumetric Water Content	**0.258**		cm^3-W/cm^3-S	Site-specific	UC PPCAP, Table 1
Θ_a	Soil Volumetric Air Content	**0.26**		cm^3-A/cm^3-S	default	ASTM E2081-00 (2015)
H'	Henry's Law Constant	**0.724**		dimensionless	Compound-Specific	EPA RSL Table, 2015
K_{sw}	Soil to Leachate Partition Coeff.	**3.647**	$K_{sw} = [\Theta_w + (K_d*\rho_s) + (H_{eff} * \Theta_a)] / \rho_s$	mg/L-wtr/mg/kg-soil	Calculated	ASTM E2081-00 (2015)
LF_{sw}	Leaching Factor - Soil to Groundwater	**0.014**	$LF_{sw} = 1/(K_{sw} * DAF)$	ppm/ppm	Calculated	ASTM E2081-00 (2015)
$C_{max, soil}$	Max soil concentration on-site	**1.1**		mg/kg	Site-specific	MEI CSR, 12-2015, Tables 7, 8 & 22
$\mathbf{C_{target, Soil}}$	**Soil Conc. Causing Leachate to Exceed Higher of Type 1 or 2 GW RRS**	**1.4E+00**		**mg/kg**		
$C_{RRS\ 1,2\text{-}GW}$	Higher of Type 1 or Type 2 RRS: GROUNDWATER	1.9E-02		mg/L		
C_{leach}	Conc. in GW by leaching	**1.9E-02**	$C_{leach} = C_{target, soil} * LF_{sw}$	mg/L	Calculated	ASTM E2081-00 (2015)
$C_{target, GW}$ - C_{leach}		**0.0E+00**	$C_{target, GW}$ - C_{leach}			

*Soil to Groundwater Leaching calculations performed in accordance with procedures and equations detailed in US EPA Publication 9355.4-24 "Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites" and ASTM Standard E2081-00 (2015), "Standard Guide for Risk-Based Corrective Action", Section X3.9 and Table X3.4

Table C9
Soil to Groundwater Leaching Calculations - Type 2 RRS
Trichloroethene - Fountain Oaks Shopping Center

Variable	Variable Definition	Value	Formula	Units	Parameter Type	Data Source
Soil to Ground Water Leaching*						
W	Width of Source	32.4		ft	Site-specific	MEI CSR, 12-2015, Sect. 3.4.4.4.1
W	Width of Source	**988**	$W_{cm} = W_{ft}$ * 30.48 cm/ft	cm	Site-specific	
P	Avg. Annual Precipitation	**49.71**		in/yr	Site-specific	Natl. Weather Svc, Peachtree City
P	Avg. Annual Precipitation	**126**	$P_{cm} = P_{in}$ * 2.54 cm/in	cm/yr	Calculated	
k_i	Infiltration Factor	**0.0009**		dimensionless	Specific to Silty Soil	Weidemeier, et al., 1999, p. 52
I	Infiltration Rate	**14.3**	$I = P^2 * 0.009$	cm/year	Calculated	
δ_{gw}	GW Mixing Zone Thickness	**7.1**		ft	Site-specific	MEI CSR, 12-2015, Table 2
δ_{gw}	GW Mixing Zone Thickness	**216**	$\delta_{gw, cm} = \delta_{gw, ft}$ * 30.48 cm/ft	cm	Site-specific	
K_{sat}	Hydraulic conductivity (saturated)	**7.78E-05**		cm/sec	Site-specific	UC PPCAP, Pg 23
K_{sat}	Hydraulic conductivity (saturated)	**6.72E+00**	$K_{sat,(cm/day)} = K_{sat,(cm/s)}$ * 86,400 sec/day	cm/day		
i	Groundwater Hydraulic Gradient	**0.03**	i = Δhead/Δdistance (along flow path)	cm/cm	Site-specific, Avg.	MEI CSR, 12-2015, Figure 17
U_{gw}	GW Darcy velocity	**73.61**	$U_{gw} = K_{sat} * i$	cm/year	Calculated	ASTM E2081-00 (2015)
DAF	Dilution Attenuation Factor	**2.124**	$DAF = 1 + (U_{gw} * \delta_{gw})/(I * W)$	dimensionless	Calculated	ASTM E2081-00 (2015)
DAF	Dilution Attenuation Factor	**20**	DAF = 20	dimensionless	Default	
K_{oc}	Soil Organic Carbon-Water Partition Coefficient	**60.7**		cm^3-W/g-C	Compound-Specific	EPA RSL Table, 2015
f_{oc}	Fractional Org. Carbon	**3.58%**		%	Site-specific	UC PPCAP, Table 1
K_d	Soil-Water Partition/Sorption Coeff.	**2.17E+00**	$K_d = K_{oc} * f_{oc}$	g-W/g-soil	Calculated	ASTM E2081-00 (2015)
ρ_s	Soil Bulk Density	**1.80**		g-S/cm^3-S	Site-specific	UC PPCAP, Table 1
ρ_b	Soil Particle Density	**2.65**		g-S/cm^3-S	Default	EPD Rule 391-3-19 App. III, Table 3
Θ_w	Soil Volumetric Water Content	**0.258**		cm^3-W/cm^3-S	Site-specific	UC PPCAP, Table 1
Θ_a	Soil Volumetric Air Content	**0.26**		cm^3-A/cm^3-S	default	ASTM E2081-00 (2015)
H'	Henry's Law Constant	**0.403**		dimensionless	Compound-Specific	EPA RSL Table, 2015
K_{sw}	Soil to Leachate Partition Coeff.	**2.375**	$K_{sw} = [\Theta_w + (K_d * \rho_s) + (H_{eff} * \Theta_a)] / \rho_s$	mg/L-wtr/mg/kg-soil	Calculated	ASTM E2081-00 (2015)
LF_{sw}	Leaching Factor - Soil to Groundwater	**0.021**	$LF_{sw} = 1/(K_{sw} * DAF)$	ppm/ppm	Calculated	ASTM E2081-00 (2015)
$C_{max, soil}$	Max soil concentration on-site	**0.18**		mg/kg	Site-specific	MEI CSR, 12-2015, Tables 7, 8 & 22
$\mathbf{C_{target, Soil}}$	**Soil Conc. Causing Leachate to Exceed Higher of Type 1 or 2 GW RRS**	**2.4E-01**		**mg/kg**		
$C_{RRS\ 1,2\text{-}GW}$	Higher of Type 1 or Type 2 RRS: GROUNDWATER	5.0E-03		mg/L		
C_{leach}	Conc. in GW by leaching	**5.0E-03**	$C_{leach} = C_{target, soil} * LF_{sw}$	mg/L	Calculated	ASTM E2081-00 (2015)
$C_{target, GW} - C_{leach}$		**0.0E+00**	$C_{target, GW} - C_{leach}$			

*Soil to Groundwater Leaching calculations performed in accordance with procedures and equations detailed in US EPA Publication 9355.4-24 "Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites" and ASTM Standard E2081-00 (2015), "Standard Guide for Risk-Based Corrective Action", Section X3.9 and Table X3.4

Table C10
Soil to Groundwater Leaching Calculations - Type 2 RRS
Vinyl Chloride - Fountain Oaks Shopping Center

Variable	Variable Definition	Value	Formula	Units	Parameter Type	Data Source
Soil to Ground Water Leaching*						
W	Width of Source	32.4		ft	Site-specific	MEI CSR, 12-2015, Sect. 3.4.4.4.1
W	Width of Source	**988**	$W_{cm} = W_{ft} * 30.48$ cm/ft	cm	Site-specific	
P	Avg. Annual Precipitation	**49.71**		in/yr	Site-specific	Natl. Weather Svc, Peachtree City
P	Avg. Annual Precipitation	**126**	$P_{cm} = P_{in} * 2.54$ cm/in	cm/yr	Calculated	
k_i	Infiltration Factor	**0.0009**		dimensionless	Specific to Silty Soil	Weidemeier, et al., 1999, p. 52
I	Infiltration Rate	**14.3**	$I = P^2*0.009$	cm/year	Calculated	
δ_{gw}	GW Mixing Zone Thickness	**7.1**		ft	Site-specific	MEI CSR, 12-2015, Table 2
δ_{gw}	GW Mixing Zone Thickness	**216**	$\delta_{gw, cm} = \delta_{gw, ft} * 30.48$ cm/ft	cm	Site-specific	
K_{sat}	Hydraulic conductivity (saturated)	**7.78E-05**		cm/sec	Site-specific	UC PPCAP, Pg 23
K_{sat}	Hydraulic conductivity (saturated)	**6.72E+00**	$K_{sat,(cm/day)} = K_{sat,(cm/s)}* 86{,}400$ sec/day	cm/day		
i	Groundwater Hydraulic Gradient	**0.03**	i = Δhead/Δdistance (along flow path)	cm/cm	Site-specific, Avg.	MEI CSR, 12-2015, Figure 17
U_{gw}	GW Darcy velocity	**73.61**	$U_{gw} = K_{sat} * i$	cm/year	Calculated	ASTM E2081-00 (2015)
DAF	Dilution Attenuation Factor	**2.124**	$DAF = 1 + (U_{gw}*\delta_{gw})/(I*W)$	dimensionless	Calculated	ASTM E2081-00 (2015)
DAF	Dilution Attenuation Factor	**20**	DAF = 20	dimensionless	Default	
K_{oc}	Soil Organic Carbon-Water Partition Coefficient	**21.73**		cm^3-W/g-C	Compound-Specific	EPA RSL Table, 2015
f_{oc}	Fractional Org. Carbon	**3.58%**		%	Site-specific	UC PPCAP, Table 1
K_d	Soil-Water Partition/Sorption Coeff.	**7.78E-01**	$K_d = K_{oc} * f_{oc}$	g-W/g-soil	Calculated	ASTM E2081-00 (2015)
ρ_s	Soil Bulk Density	**1.80**		g-S/cm^3-S	Site-specific	UC PPCAP, Table 1
ρ_b	Soil Particle Density	**2.65**		g-S/cm^3-S	Default	EPD Rule 391-3-19 App. III, Table 3
Θ_w	Soil Volumetric Water Content	**0.258**		cm^3-W/cm^3-S	Site-specific	UC PPCAP, Table 1
Θ_a	Soil Volumetric Air Content	**0.26**		cm^3-A/cm^3-S	default	ASTM E2081-00 (2015)
H'	Henry's Law Constant	**1.14**		dimensionless	Compound-Specific	EPA RSL Table, 2015
K_{sw}	Soil to Leachate Partition Coeff.	**1.085**	$K_{sw} = [\Theta_w + (K_d*\rho_s) + (H_{eff} * \Theta_a)] / \rho_s$	mg/L-wtr/mg/kg-soil	Calculated	ASTM E2081-00 (2015)
LF_{sw}	Leaching Factor - Soil to Groundwater	**0.046**	$LF_{sw} = 1/(K_{sw} * DAF)$	ppm/ppm	Calculated	ASTM E2081-00 (2015)
$C_{max, soil}$	Max soil concentration on-site	**0**	Not Detected	mg/kg	Site-specific	MEI CSR, 12-2015, Tables 7, 8 & 22
$C_{target, Soil}$	**Soil Conc. Causing Leachate to Exceed Higher of Type 1 or 2 GW RRS**	3.4E-02		**mg/kg**		
$C_{RRS\ 1,2\text{-}GW}$	Higher of Type 1 or Type 2 RRS: GROUNDWATER	2.0E-03		mg/L		
C_{leach}	Conc. in GW by leaching	**1.6E-03**	$C_{leach} = C_{target, soil} * LF_{sw}$	mg/L	Calculated	ASTM E2081-00 (2015)
$C_{target, GW} - C_{leach}$		**4.5E-04**	$C_{target, GW} - C_{leach}$			

*Soil to Groundwater Leaching calculations performed in accordance with procedures and equations detailed in US EPA Publication 9355.4-24 "Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites" and ASTM Standard E2081-00 (2015), "Standard Guide for Risk-Based Corrective Action", Section X3.9 and Table X3.4

Table C11
Soil to Groundwater Leaching Calculations - Type 4 RRS
Benzene - Fountain Oaks Shopping Center

Variable	Variable Definition	Value	Formula	Units	Parameter Type	Data Source
Soil to Ground Water Leaching*						
W	Width of Source	32.4		ft	Site-specific	MEI CSR, 2015, Sect. 3.4.4.4.1
W	Width of Source	**988**	$W_{cm} = W_{ft}$ * 30.48 cm/ft	cm	Site-specific	
P	Avg. Annual Precipitation	**49.71**		in/yr	Site-specific	Natl. Weather Svc, Peachtree City
P	Avg. Annual Precipitation	**126**	$P_{cm} = P_{in}$ * 2.54 cm/in	cm/yr	Calculated	
k_i	Infiltration Factor	**0.0009**		dimensionless	Specific to Silty Soil	Weidemeier, et al., 1999, p. 52
I	Infiltration Rate	**14.3**	$I = P^2$*0.009	cm/year	Calculated	
δ_{gw}	GW Mixing Zone Thickness	**7.1**		ft	Site-specific	MEI CSR, 12-2015, Table 2
δ_{gw}	GW Mixing Zone Thickness	**216**	$\delta_{gw, cm} = \delta_{gw, ft}$ * 30.48 cm/ft	cm	Site-specific	
K_{sat}	Hydraulic conductivity (saturated)	**7.78E-05**		cm/sec	Site-specific	UC PPCAP, Pg 23
K_{sat}	Hydraulic conductivity (saturated)	**6.72E+00**	$K_{sat,(cm/day)} = K_{sat,(cm/s)}$* 86,400 sec/day	cm/day		
i	Groundwater Hydraulic Gradient	**0.03**	i = Δhead/Δdistance (along flow path)	cm/cm	Site-specific, Avg.	MEI CSR, 12-2015, Figure 17
U_{gw}	GW Darcy velocity	**73.61**	$U_{gw} = K_{sat}$ * i	cm/year	Calculated	ASTM E2081-00 (2015)
DAF	Dilution Attenuation Factor	**2.124**	DAF = 1 + (U_{gw}*δ_{gw})/(I*W)	dimensionless	Calculated	ASTM E2081-00 (2015)
K_{oc}	Soil Organic Carbon-Water Partition Coefficient	**2.364**		cm^3-W/g-C	Compound-Specific	EPA RSL Table, 2015
f_{oc}	Fractional Org. Carbon	**3.58%**		%	Site-specific	UC PPCAP, Table 1
K_d	Soil-Water Partition/Sorption Coeff.	**0.0846312**	$K_d = K_{oc}$ * f_{oc}	g-W/g-soil	Calculated	ASTM E2081-00 (2015)
ρ_s	Soil Bulk Density	**1.80**		g-S/cm^3-S	Site-specific	UC PPCAP, Table 1
Θ_w	Soil Volumetric Water Content	**0.258**		cm^3-W/cm^3-S	Site-specific	UC PPCAP, Table 1
Θ_a	Soil Volumetric Air Content	**0.26**		cm^3-A/cm^3-S	default	ASTM E2081-00 (2015)
H'	Henry's Law Constant	**1.43E-03**		dimensionless	Compound-Specific	EPA RSL Table, 2015
K_{sw}	Soil to Leachate Partition Coeff.	**0.228**	$K_{sw} = [\Theta_w + (K_d*\rho_s) + (H_{eff} * \Theta_a)] / \rho_s$	mg/L-wtr/mg/kg-soil	Calculated	ASTM E2081-00 (2015)
LF_{sw}	Leaching Factor - Soil to Groundwater	**2.063**	$LF_{sw} = 1/(K_{sw}$ * DAF)	ppm/ppm	Calculated	ASTM E2081-00 (2015)
$C_{max, soil}$	Max soil concentration on-site	**0.016**		mg/kg	Site-specific	MEI CSR, 2015, Tables 7, 8 & 22
$\mathbf{C_{target, Soil}}$	**Soil Conc. Causing Leachate to Exceed Higher of Type 1 or 2 GW RRS**	**2.2E+01**				
$C_{RRS\ 1,2\text{-}GW}$	Higher of Type 3 or Type 4 RRS: GROUNDWATER	4.6E+01				
C_{leach}	Conc. in GW by leaching	**4.6E+01**	$C_{leach} = C_{max, soil}$ * LF_{sw}	mg/L	Calculated	ASTM E2081-00 (2015)
$C_{target, GW}$ - C_{leach}		**0.00E+00**	$C_{target, GW}$ - C_{leach}			

*Soil to Groundwater Leaching calculations performed in accordance with procedures and equations detailed in US EPA Publication 9355.4-24 "Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites" and ASTM Standard E2081-00 (2015), "Standard Guide for Risk-Based Corrective Action", Section X3.9 and Table X3.4

Table C12
Soil to Groundwater Leaching Calculations - Type 4 RRS
Benzene - Fountain Oaks Shopping Center

Variable	Variable Definition	Value	Formula	Units	Parameter Type	Data Source
Soil to Ground Water Leaching*						
W	Width of Source	32.4		ft	Site-specific	MEI CSR, 2015, Sect. 3.4.4.4.1
W	Width of Source	**988**	$W_{cm} = W_{ft}$ * 30.48 cm/ft	cm	Site-specific	
P	Avg. Annual Precipitation	**49.71**		in/yr	Site-specific	Natl. Weather Svc, Peachtree City
P	Avg. Annual Precipitation	**126**	$P_{cm} = P_{in}$ * 2.54 cm/in	cm/yr	Calculated	
k_i	Infiltration Factor	**0.0009**		dimensionless	Specific to Silty Soil	Weidemeier, et al., 1999, p. 52
I	Infiltration Rate	**14.3**	$I = P^2$*0.009	cm/year	Calculated	
δ_{gw}	GW Mixing Zone Thickness	**7.1**		ft	Site-specific	MEI CSR, 12-2015, Table 2
δ_{gw}	GW Mixing Zone Thickness	**216**	$\delta_{gw, cm} = \delta_{gw, ft}$ * 30.48 cm/ft	cm	Site-specific	
K_{sat}	Hydraulic conductivity (saturated)	**7.78E-05**		cm/sec	Site-specific	UC PPCAP, Pg 23
K_{sat}	Hydraulic conductivity (saturated)	**6.72E+00**	$K_{sat,(cm/day)} = K_{sat,(cm/s)}$* 86,400 sec/day	cm/day		
i	Groundwater Hydraulic Gradient	**0.03**	i = Δhead/Δdistance (along flow path)	cm/cm	Site-specific, Avg.	MEI CSR, 12-2015, Figure 17
U_{gw}	GW Darcy velocity	**73.61**	$U_{gw} = K_{sat}$ * i	cm/year	Calculated	ASTM E2081-00 (2015)
DAF	Dilution Attenuation Factor	**2.124**	DAF = 1 + (U_{gw}*δ_{gw})/(I*W)	dimensionless	Calculated	ASTM E2081-00 (2015)
K_{oc}	Soil Organic Carbon-Water Partition Coefficient	**145.8**		cm^3-W/g-C	Compound-Specific	EPA RSL Table, 2015
f_{oc}	Fractional Org. Carbon	**3.58%**		%	Site-specific	UC PPCAP, Table 1
K_d	Soil-Water Partition/Sorption Coeff.	**5.21964**	$K_d = K_{oc}$ * f_{oc}	g-W/g-soil	Calculated	ASTM E2081-00 (2015)
ρ_s	Soil Bulk Density	**1.80**		g-S/cm^3-S	Site-specific	UC PPCAP, Table 1
Θ_w	Soil Volumetric Water Content	**0.258**		cm^3-W/cm^3-S	Site-specific	UC PPCAP, Table 1
Θ_a	Soil Volumetric Air Content	**0.26**		cm^3-A/cm^3-S	default	ASTM E2081-00 (2015)
H'	Henry's Law Constant	**0.23**		dimensionless	Compound-Specific	EPA RSL Table, 2015
K_{sw}	Soil to Leachate Partition Coeff.	**5.396**	$K_{sw} = [\Theta_w + (K_d*\rho_s) + (H_{eff} * \Theta_a)] / \rho_s$	mg/L-wtr/mg/kg-soil	Calculated	ASTM E2081-00 (2015)
LF_{sw}	Leaching Factor - Soil to Groundwater	**0.087**	$LF_{sw} = 1/(K_{sw}$ * DAF)	ppm/ppm	Calculated	ASTM E2081-00 (2015)
$C_{max, soil}$	Max soil concentration on-site	**0.016**		mg/kg	Site-specific	MEI CSR, 2015, Tables 7, 8 & 22
$C_{target, Soil}$	Soil Conc. Causing Leachate to Exceed Higher of Type 1 or 2 GW RRS	**1.0E-01**				
$C_{RRS\ 1,2\text{-}GW}$	Higher of Type 3 or Type 4 RRS: GROUNDWATER	8.7E-03				
C_{leach}	Conc. in GW by leaching	**8.7E-03**	$C_{leach} = C_{max, soil}$ * LF_{sw}	mg/L	Calculated	ASTM E2081-00 (2015)
$C_{target, GW}$ - C_{leach}		**0.0E+00**	$C_{target, GW}$ - C_{leach}			

*Soil to Groundwater Leaching calculations performed in accordance with procedures and equations detailed in US EPA Publication 9355.4-24 "Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites" and ASTM Standard E2081-00 (2015), "Standard Guide for Risk-Based Corrective Action", Section X3.9 and Table X3.4

Table C13
Soil to Groundwater Leaching Calculations - Type 4 RRS
Chloroform - Fountain Oaks Shopping Center

Variable	Variable Definition	Value	Formula	Units	Parameter Type	Data Source
Soil to Ground Water Leaching*						
W	Width of Source	32.4		ft	Site-specific	MEI CSR, 2015, Sect. 3.4.4.4.1
W	Width of Source	**988**	$W_{cm} = W_{ft}$ * 30.48 cm/ft	cm	Site-specific	
P	Avg. Annual Precipitation	**49.71**		in/yr	Site-specific	Natl. Weather Svc, Peachtree City
P	Avg. Annual Precipitation	**126**	$P_{cm} = P_{in}$ * 2.54 cm/in	cm/yr	Calculated	
k_i	Infiltration Factor/Coefficient	**0.0009**		dimensionless	Specific to Silty Soil	Weidemeier, et al., 1999, p. 52
I	Infiltration Rate	**14.3**	$I = P^2 * 0.009$	cm/year	Calculated	
δ_{gw}	GW Mixing Zone Thickness	**7.1**		ft	Site-specific	MEI CSR, 12-2015, Table 2
δ_{gw}	GW Mixing Zone Thickness	**216**	$\delta_{gw, cm} = \delta_{gw, ft}$ * 30.48 cm/ft	cm	Site-specific	
K_{sat}	Hydraulic conductivity (saturated)	**7.78E-05**		cm/sec	Site-specific	UC PPCAP, Pg 23
K_{sat}	Hydraulic conductivity (saturated)	**6.72E+00**	$K_{sat,(cm/day)} = K_{sat,(cm/s)}$* 86,400 sec/day	cm/day		
i	Groundwater Hydraulic Gradient	**0.03**	i = Δhead/Δdistance (along flow path)	cm/cm	Site-specific, Avg.	MEI CSR, 12-2015, Figure 17
U_{gw}	GW Darcy velocity	**73.61**	$U_{gw} = K_{sat}$ * i	cm/year	Calculated	ASTM E2081-00 (2015)
DAF	Dilution Attenuation Factor	**2.124**	$DAF = 1 + (U_{gw} * \delta_{gw})/(I * W)$	dimensionless	Calculated	ASTM E2081-00 (2015)
K_{oc}	Soil Organic Carbon-Water Partition Coefficient	**31.82**		cm^3-W/g-C	Compound-Specific	EPA RSL Table, 2015
f_{oc}	Fractional Org. Carbon	**3.58%**		%	Site-specific	UC PPCAP, Table 1
K_d	Soil-Water Partition/Sorption Coeff.	**1.139156**	$K_d = K_{oc} * f_{oc}$	g-W/g-soil	Calculated	ASTM E2081-00 (2015)
ρ_s	Soil Bulk Density	**1.80**		g-S/cm^3-S	Site-specific	UC PPCAP, Table 1
Θ_w	Soil Volumetric Water Content	**0.258**		cm^3-W/cm^3-S	Site-specific	UC PPCAP, Table 1
Θ_a	Soil Volumetric Air Content	**0.26**		cm^3-A/cm^3-S	default	ASTM E2081-00 (2015)
H'	Henry's Law Constant	**0.15**		dimensionless	Compound-Specific	EPA RSL Table, 2015
K_{sw}	Soil to Leachate Partition Coeff.	**1.304**	$K_{sw} = [\Theta_w + (K_d * \rho_s) + (H_{eff} * \Theta_a)] / \rho_s$	mg/L-wtr/mg/kg-soil	Calculated	ASTM E2081-00 (2015)
LF_{sw}	Leaching Factor - Soil to Groundwater	**0.361**	$LF_{sw} = 1/(K_{sw} * DAF)$	ppm/ppm	Calculated	ASTM E2081-00 (2015)
$C_{max, soil}$	Max soil concentration on-site	**0.3**		mg/kg	Site-specific	MEI CSR, 2015, Tables 7, 8 & 22
$\mathbf{C_{target, Soil}}$	Soil Conc. Causing Leachate to Exceed Higher of Type 1 or 2 GW RRS	**2.2E-01**				
$C_{RRS\ 1,2\text{-}GW}$	Higher of Type 3 or Type 4 RRS: GROUNDWATER	8.0E-02				
C_{leach}	Conc. in GW by leaching	**8.0E-02**		mg/L	Calculated	ASTM E2081-00 (2015)
$C_{target, GW} - C_{leach}$		**0.0E+00**	$C_{target, GW} - C_{leach}$			

*Soil to Groundwater Leaching calculations performed in accordance with procedures and equations detailed in US EPA Publication 9355.4-24 "Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites" and ASTM Standard E2081-00 (2015), "Standard Guide for Risk-Based Corrective Action", Section X3.9 and Table X3.4

Table C14
Soil to Groundwater Leaching Calculations - Type 4 RRS
Cumene (Isopropylbenzene) - Fountain Oaks Shopping Center

Variable	Variable Definition	Value	Formula	Units	Parameter Type	Data Source
Soil to Ground Water Leaching*						
W	Width of Source	**32.4**		ft	Site-specific	MEI CSR, 2015, Sect. 3.4.4.4.1
W	Width of Source	**988**	$W_{cm} = W_{ft}$ * 30.48 cm/ft	cm	Site-specific	
P	Avg. Annual Precipitation	**49.71**		in/yr	Site-specific	Natl. Weather Svc, Peachtree City
P	Avg. Annual Precipitation	**126**	$P_{cm} = P_{in}$ * 2.54 cm/in	cm/yr	Calculated	
k_i	Infiltration Factor/Coefficient	**0.0009**		dimensionless	Specific to Silty Soil	Weidemeier, et al., 1999, p. 52
I	Infiltration Rate	**14.3**	$I = P^2 * 0.009$	cm/year	Calculated	
δ_{gw}	GW Mixing Zone Thickness	**7.1**		ft	Site-specific	MEI CSR, 12-2015, Table 2
δ_{gw}	GW Mixing Zone Thickness	**216**	$\delta_{gw, cm} = \delta_{gw, ft}$ * 30.48 cm/ft	cm	Site-specific	
K_{sat}	Hydraulic conductivity (saturated)	**7.78E-05**		cm/sec	Site-specific	UC PPCAP, Pg 23
K_{sat}	Hydraulic conductivity (saturated)	**6.72E+00**	$K_{sat,(cm/day)} = K_{sat,(cm/s)}$ * 86,400 sec/day	cm/day		
i	Groundwater Hydraulic Gradient	**0.03**	$i = \Delta$head/Δdistance (along flow path)	cm/cm	Site-specific, Avg.	MEI CSR, 12-2015, Figure 17
U_{gw}	GW Darcy velocity	**73.61**	$U_{gw} = K_{sat} * i$	cm/year	Calculated	ASTM E2081-00 (2015)
DAF	Dilution Attenuation Factor	**2.124**	$DAF = 1 + (U_{gw} * \delta_{gw})/(I * W)$	dimensionless	Calculated	ASTM E2081-00 (2015)
K_{oc}	Soil Organic Carbon-Water Partition Coefficient	**697.8**		cm^3-W/g-C	Compound-Specific	EPA RSL Table, 2015
f_{oc}	Fractional Org. Carbon	**3.58%**		%	Site-specific	UC PPCAP, Table 1
K_d	Soil-Water Partition/Sorption Coeff.	**24.98124**	$K_d = K_{oc} * f_{oc}$	g-W/g-soil	Calculated	ASTM E2081-00 (2015)
ρ_s	Soil Bulk Density	**1.80**		g-S/cm^3-S	Site-specific	UC PPCAP, Table 1
Θ_w	Soil Volumetric Water Content	**0.258**		cm^3-W/cm^3-S	Site-specific	UC PPCAP, Table 1
Θ_a	Soil Volumetric Air Content	**0.26**		cm^3-A/cm^3-S	default	ASTM E2081-00 (2015)
H'	Henry's Law Constant	**0.47**		dimensionless	Compound-Specific	EPA RSL Table, 2015
K_{sw}	Soil to Leachate Partition Coeff.	**25.192**	$K_{sw} = [\Theta_w + (K_d * \rho_s) + (H_{eff} * \Theta_a)] / \rho_s$	mg/L-wtr/mg/kg-soil	Calculated	ASTM E2081-00 (2015)
LF_{sw}	Leaching Factor - Soil to Groundwater	**0.019**	$LF_{sw} = 1/(K_{sw} * DAF)$	ppm/ppm	Calculated	ASTM E2081-00 (2015)
$C_{max, soil}$	Max soil concentration on-site	**0.3**		mg/kg	Site-specific	MEI CSR, 2015, Tables 7, 8 & 22
$\mathbf{C_{target, Soil}}$	Soil Conc. Causing Leachate to Exceed Higher of Type 1 or 2 GW RRS	**1.1E+01**				
$C_{RRS\ 1,2\text{-}GW}$	Higher of Type 3 or Type 4 RRS: GROUNDWATER	2.1E-01				
C_{leach}	Conc. in GW by leaching	**2.1E-01**		mg/L	Calculated	ASTM E2081-00 (2015)
$C_{target, GW} - C_{leach}$		**0.0E+00**	$C_{target, GW} - C_{leach}$			

*Soil to Groundwater Leaching calculations performed in accordance with procedures and equations detailed in US EPA Publication 9355.4-24 "Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites" and ASTM Standard E2081-00 (2015), "Standard Guide for Risk-Based Corrective Action", Section X3.9 and Table X3.4

Table C15
Soil to Groundwater Leaching Calculations - Type 4 RRS
cis-1,2-Dichloroethene (cDCE) - Fountain Oaks Shopping Center

Variable	Variable Definition	Value	Formula	Units	Parameter Type	Data Source
Soil to Ground Water Leaching*						
W	Width of Source	**32.4**		ft	Site-specific	MEI CSR, 2015, Sect. 3.4.4.4.1
W	Width of Source	**988**	$W_{cm} = W_{ft}$ * 30.48 cm/ft	cm	Site-specific	
P	Avg. Annual Precipitation	**49.71**		in/yr	Site-specific	Natl. Weather Svc, Peachtree City
P	Avg. Annual Precipitation	**126**	$P_{cm} = P_{in}$ * 2.54 cm/in	cm/yr	Calculated	
k_i	Infiltration Factor/Coefficient	**0.0009**		dimensionless	Specific to Silty Soil	Weidemeier, et al., 1999, p. 52
I	Infiltration Rate	**14.3**	$I = P^2$*0.009	cm/year	Calculated	
δ_{gw}	GW Mixing Zone Thickness	**7.1**		ft	Site-specific	MEI CSR, 12-2015, Table 2
δ_{gw}	GW Mixing Zone Thickness	**216**	$\delta_{gw, cm} = \delta_{gw, ft}$ * 30.48 cm/ft	cm	Site-specific	
K_{sat}	Hydraulic conductivity (saturated)	**7.78E-05**		cm/sec	Site-specific	UC PPCAP, Pg 23
K_{sat}	Hydraulic conductivity (saturated)	**6.72E+00**	$K_{sat,(cm/day)} = K_{sat,(cm/s)}$* 86,400 sec/day	cm/day		
i	Groundwater Hydraulic Gradient	**0.03**	i = Δhead/Δdistance (along flow path)	cm/cm	Site-specific, Avg.	MEI CSR, 12-2015, Figure 17
U_{gw}	GW Darcy velocity	**73.61**	$U_{gw} = K_{sat}$ * i	cm/year	Calculated	ASTM E2081-00 (2015)
DAF	Dilution Attenuation Factor	**2.124**	DAF = 1 + (U_{gw}*δ_{gw})/(I*W)	dimensionless	Calculated	ASTM E2081-00 (2015)
K_{oc}	Soil Organic Carbon-Water Partition Coefficient	**39.6**		cm^3-W/g-C	Compound-Specific	EPA RSL Table, 2015
f_{oc}	Fractional Org. Carbon	**3.58%**		%	Site-specific	UC PPCAP, Table 1
K_d	Soil-Water Partition/Sorption Coeff.	**1.41768**	$K_d = K_{oc}$ * f_{oc}	g-W/g-soil	Calculated	ASTM E2081-00 (2015)
ρ_s	Soil Bulk Density	**1.80**		g-S/cm^3-S	Site-specific	UC PPCAP, Table 1
Θ_w	Soil Volumetric Water Content	**0.258**		cm^3-W/cm^3-S	Site-specific	UC PPCAP, Table 1
Θ_a	Soil Volumetric Air Content	**0.26**		cm^3-A/cm^3-S	default	ASTM E2081-00 (2015)
H'	Henry's Law Constant	**0.17**		dimensionless	Compound-Specific	EPA RSL Table, 2015
K_{sw}	Soil to Leachate Partition Coeff.	**1.585**	$K_{sw} = [\Theta_w + (K_d*\rho_s) + (H_{eff} * \Theta_a)] / \rho_s$	mg/L-wtr/mg/kg-soil	Calculated	ASTM E2081-00 (2015)
LF_{sw}	Leaching Factor - Soil to Groundwater	**0.297**	$LF_{sw} = 1/(K_{sw}$ * DAF)	ppm/ppm	Calculated	ASTM E2081-00 (2015)
$C_{max, soil}$	Max soil concentration on-site	**0.3**		mg/kg	Site-specific	MEI CSR, 2015, Tables 7, 8 & 22
$\mathbf{C_{target, Soil}}$	Soil Conc. Causing Leachate to Exceed Higher of Type 1 or 2 GW RRS	**2.4E-01**				
$C_{RRS\ 1,2\text{-}GW}$	Higher of Type 3 or Type 4 RRS: GROUNDWATER	7.0E-02				
C_{leach}	Conc. in GW by leaching	**7.0E-02**		mg/L	Calculated	ASTM E2081-00 (2015)
$C_{target, GW} - C_{leach}$		**0.0E+00**	$C_{target, GW} - C_{leach}$			

*Soil to Groundwater Leaching calculations performed in accordance with procedures and equations detailed in US EPA Publication 9355.4-24 "Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites" and ASTM Standard E2081-00 (2015), "Standard Guide for Risk-Based Corrective Action", Section X3.9 and Table X3.4

Table C16
Soil to Groundwater Leaching Calculations - Type 4 RRS
trans-1,2-Dichloroethene (cDCE) - Fountain Oaks Shopping Center

Variable	Variable Definition	Value	Formula	Units	Parameter Type	Data Source
Soil to Ground Water Leaching*						
W	Width of Source	32.4		ft	Site-specific	MEI CSR, 2015, Sect. 3.4.4.4.1
W	Width of Source	**988**	$W_{cm} = W_{ft}$ * 30.48 cm/ft	cm	Site-specific	
P	Avg. Annual Precipitation	**49.71**		in/yr	Site-specific	Natl. Weather Svc, Peachtree City
P	Avg. Annual Precipitation	**126**	$P_{cm} = P_{in}$ * 2.54 cm/in	cm/yr	Calculated	
k_i	Infiltration Factor/Coefficient	**0.0009**		dimensionless	Specific to Silty Soil	Weidemeier, et al., 1999, p. 52
I	Infiltration Rate	**14.3**	$I = P^2*0.009$	cm/year	Calculated	
δ_{gw}	GW Mixing Zone Thickness	**7.1**		ft	Site-specific	MEI CSR, 12-2015, Table 2
δ_{gw}	GW Mixing Zone Thickness	**216**	$\delta_{gw,\ cm} = \delta_{gw,\ ft}$ * 30.48 cm/ft	cm	Site-specific	
K_{sat}	Hydraulic conductivity (saturated)	**7.78E-05**		cm/sec	Site-specific	UC PPCAP, Pg 23
K_{sat}	Hydraulic conductivity (saturated)	**6.72E+00**	$K_{sat,(cm/day)} = K_{sat,(cm/s)}$* 86,400 sec/day	cm/day		
i	Groundwater Hydraulic Gradient	**0.03**	i = Δhead/Δdistance (along flow path)	cm/cm	Site-specific, Avg.	MEI CSR, 12-2015, Figure 17
U_{gw}	GW Darcy velocity	**73.61**	$U_{gw} = K_{sat}$ * i	cm/year	Calculated	ASTM E2081-00 (2015)
DAF	Dilution Attenuation Factor	**2.124**	$DAF = 1 + (U_{gw}*\delta_{gw})/(I*W)$	dimensionless	Calculated	ASTM E2081-00 (2015)
K_{oc}	Soil Organic Carbon-Water Partition Coefficient	**39.6**		cm^3-W/g-C	Compound-Specific	EPA RSL Table, 2015
f_{oc}	Fractional Org. Carbon	**3.58%**		%	Site-specific	UC PPCAP, Table 1
K_d	Soil-Water Partition/Sorption Coeff.	**1.41768**	$K_d = K_{oc} * f_{oc}$	g-W/g-soil	Calculated	ASTM E2081-00 (2015)
ρ_s	Soil Bulk Density	**1.80**		g-S/cm^3-S	Site-specific	UC PPCAP, Table 1
Θ_w	Soil Volumetric Water Content	**0.258**		cm^3-W/cm^3-S	Site-specific	UC PPCAP, Table 1
Θ_a	Soil Volumetric Air Content	**0.26**		cm^3-A/cm^3-S	default	ASTM E2081-00 (2015)
H'	Henry's Law Constant	**0.38**		dimensionless	Compound-Specific	EPA RSL Table, 2015
K_{sw}	Soil to Leachate Partition Coeff.	**1.616**	$K_{sw} = [\Theta_w + (K_d*\rho_s) + (H_{eff} * \Theta_a)] / \rho_s$	mg/L-wtr/mg/kg-soil	Calculated	ASTM E2081-00 (2015)
LF_{sw}	Leaching Factor - Soil to Groundwater	**0.291**	$LF_{sw} = 1/(K_{sw} * DAF)$	ppm/ppm	Calculated	ASTM E2081-00 (2015)
$C_{max,\ soil}$	Max soil concentration on-site	**0.3**		mg/kg	Site-specific	MEI CSR, 2015, Tables 7, 8 & 22
$C_{target,\ Soil}$	Soil Conc. Causing Leachate to Exceed Higher of Type 1 or 2 GW RRS	**3.4E-01**				
$C_{RRS\ 1,2\text{-}GW}$	Higher of Type 3 or Type 4 RRS: GROUNDWATER	1.0E-01				
C_{leach}	Conc. in GW by leaching	**1.0E-01**		mg/L	Calculated	ASTM E2081-00 (2015)
$C_{target,\ GW} - C_{leach}$		**1.0E-04**	$C_{target,\ GW} - C_{leach}$			

*Soil to Groundwater Leaching calculations performed in accordance with procedures and equations detailed in US EPA Publication 9355.4-24 "Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites" and ASTM Standard E2081-00 (2015), "Standard Guide for Risk-Based Corrective Action", Section X3.9 and Table X3.4

Table C17
Soil to Groundwater Leaching Calculations - Type 4 RRS
cis-1,2-Dichloroethene (cDCE) - Fountain Oaks Shopping Center

Variable	Variable Definition	Value	Formula	Units	Parameter Type	Data Source
Soil to Ground Water Leaching*						
W	Width of Source	**32.4**		ft	Site-specific	MEI CSR, 2015, Sect. 3.4.4.4.1
W	Width of Source	**988**	$W_{cm} = W_{ft}$ * 30.48 cm/ft	cm	Site-specific	
P	Avg. Annual Precipitation	**49.71**		in/yr	Site-specific	Natl. Weather Svc, Peachtree City
P	Avg. Annual Precipitation	**126**	$P_{cm} = P_{in}$ * 2.54 cm/in	cm/yr	Calculated	
k_i	Infiltration Factor/Coefficient	**0.0009**		dimensionless	Specific to Silty Soil	Weidemeier, et al., 1999, p. 52
I	Infiltration Rate	**14.3**	$I = P^2 * 0.009$	cm/year	Calculated	
δ_{gw}	GW Mixing Zone Thickness	**7.1**		ft	Site-specific	MEI CSR, 12-2015, Table 2
δ_{gw}	GW Mixing Zone Thickness	**216**	$\delta_{gw,\,cm} = \delta_{gw,\,ft}$ * 30.48 cm/ft	cm	Site-specific	
K_{sat}	Hydraulic conductivity (saturated)	**7.78E-05**		cm/sec	Site-specific	UC PPCAP, Pg 23
K_{sat}	Hydraulic conductivity (saturated)	**6.72E+00**	$K_{sat,(cm/day)} = K_{sat,(cm/s)}$ * 86,400 sec/day	cm/day		
i	Groundwater Hydraulic Gradient	**0.03**	i = Δhead/Δdistance (along flow path)	cm/cm	Site-specific, Avg.	MEI CSR, 12-2015, Figure 17
U_{gw}	GW Darcy velocity	**73.61**	$U_{gw} = K_{sat} * i$	cm/year	Calculated	ASTM E2081-00 (2015)
DAF	Dilution Attenuation Factor	**2.124**	$DAF = 1 + (U_{gw} * \delta_{gw})/(I * W)$	dimensionless	Calculated	ASTM E2081-00 (2015)
K_{oc}	Soil Organic Carbon-Water Partition Coefficient	**4.51**		cm^3-W/g-C	Compound-Specific	EPA RSL Table, 2015
f_{oc}	Fractional Org. Carbon	**3.58%**		%	Site-specific	UC PPCAP, Table 1
K_d	Soil-Water Partition/Sorption Coeff.	**0.161458**	$K_d = K_{oc} * f_{oc}$	g-W/g-soil	Calculated	ASTM E2081-00 (2015)
ρ_s	Soil Bulk Density	**1.80**		g-S/cm^3-S	Site-specific	UC PPCAP, Table 1
Θ_w	Soil Volumetric Water Content	**0.258**		cm^3-W/cm^3-S	Site-specific	UC PPCAP, Table 1
Θ_a	Soil Volumetric Air Content	**0.26**		cm^3-A/cm^3-S	default	ASTM E2081-00 (2015)
H'	Henry's Law Constant	**2.33E-03**		dimensionless	Compound-Specific	EPA RSL Table, 2015
K_{sw}	Soil to Leachate Partition Coeff.	**0.305**	$K_{sw} = [\Theta_w + (K_d * \rho_s) + (H_{eff} * \Theta_a)] / \rho_s$	mg/L-wtr/mg/kg-soil	Calculated	ASTM E2081-00 (2015)
LF_{sw}	Leaching Factor - Soil to Groundwater	**1.543**	$LF_{sw} = 1/(K_{sw} * DAF)$	ppm/ppm	Calculated	ASTM E2081-00 (2015)
$C_{max,\,soil}$	Max soil concentration on-site	**0.3**		mg/kg	Site-specific	MEI CSR, 2015, Tables 7, 8 & 22
$C_{target,\,Soil}$	Soil Conc. Causing Leachate to Exceed Higher of Type 1 or 2 GW RRS	**1.5E+00**				
$C_{RRS\ 1,2\text{-}GW}$	Higher of Type 3 or Type 4 RRS: GROUNDWATER	2.3E+00				
C_{leach}	Conc. in GW by leaching	**2.3E+00**		mg/L	Calculated	ASTM E2081-00 (2015)
$C_{target,\,GW} - C_{leach}$		**0.0E+00**	$C_{target,\,GW} - C_{leach}$			

*Soil to Groundwater Leaching calculations performed in accordance with procedures and equations detailed in US EPA Publication 9355.4-24 "Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites" and ASTM Standard E2081-00 (2015), "Standard Guide for Risk-Based Corrective Action", Section X3.9 and Table X3.4

Table C18
Soil to Groundwater Leaching Calculations - Type 4 RRS
Tetrachloroethene - Fountain Oaks Shopping Center

Variable	Variable Definition	Value	Formula	Units	Parameter Type	Data Source
Soil to Ground Water Leaching*						
W	Width of Source	32.4		ft	Site-specific	MEI CSR, 2015, Sect. 3.4.4.4.1
W	Width of Source	988	$W_{cm} = W_{ft} * 30.48$ cm/ft	cm	Site-specific	
P	Avg. Annual Precipitation	49.71		in/yr	Site-specific	Natl. Weather Svc, Peachtree City
P	Avg. Annual Precipitation	126	$P_{cm} = P_{in} * 2.54$ cm/in	cm/yr	Calculated	
k_i	Infiltration Factor	0.0009		dimensionless	Specific to Silty Soil	Weidemeier, et al., 1999, p. 52
I	Infiltration Rate	14.3	$I = P^2 * 0.009$	cm/year	Calculated	
δ_{gw}	GW Mixing Zone Thickness	7.1		ft	Site-specific	MEI CSR, 12-2015, Table 2
δ_{gw}	GW Mixing Zone Thickness	216	$\delta_{gw, cm} = \delta_{gw, ft} * 30.48$ cm/ft	cm	Site-specific	
K_{sat}	Hydraulic conductivity (saturated)	7.78E-05		cm/sec	Site-specific	UC PPCAP, Pg 23
K_{sat}	Hydraulic conductivity (saturated)	6.72E+00	$K_{sat,(cm/day)} = K_{sat,(cm/s)} * 86{,}400$ sec/day	cm/day		
i	Groundwater Hydraulic Gradient	0.03	i = Δhead/Δdistance (along flow path)	cm/cm	Site-specific, Avg.	MEI CSR, 12-2015, Figure 17
U_{gw}	GW Darcy velocity	73.61	$U_{gw} = K_{sat} * i$	cm/year	Calculated	ASTM E2081-00 (2015)
DAF	Dilution Attenuation Factor	2.124	$DAF = 1 + (U_{gw} * \delta_{gw})/(I * W)$	dimensionless	Calculated	ASTM E2081-00 (2015)
K_{oc}	Soil Organic Carbon-Water Partition Coefficient	94.94		cm^3-W/g-C	Compound-Specific	EPA RSL Table, 2015
f_{oc}	Fractional Org. Carbon	3.58%		%	Site-specific	UC PPCAP, Table 1
K_d	Soil-Water Partition/Sorption Coeff.	3.398852	$K_d = K_{oc} * f_{oc}$	g-W/g-soil	Calculated	ASTM E2081-00 (2015)
ρ_s	Soil Bulk Density	1.80		g-S/cm^3-S	Site-specific	UC PPCAP, Table 1
Θ_w	Soil Volumetric Water Content	0.258		cm^3-W/cm^3-S	Site-specific	UC PPCAP, Table 1
Θ_a	Soil Volumetric Air Content	0.26		cm^3-A/cm^3-S	default	ASTM E2081-00 (2015)
H'	Henry's Law Constant	0.724		dimensionless	Compound-Specific	EPA RSL Table, 2015
K_{sw}	Soil to Leachate Partition Coeff.	3.647	$K_{sw} = [\Theta_w + (K_d * \rho_s) + (H_{eff} * \Theta_a)] / \rho_s$	mg/L-wtr/mg/kg-soil	Calculated	ASTM E2081-00 (2015)
LF_{sw}	Leaching Factor - Soil to Groundwater	0.129	$LF_{sw} = 1/(K_{sw} * DAF)$	ppm/ppm	Calculated	ASTM E2081-00 (2015)
$C_{max, soil}$	Max soil concentration on-site	1.1		mg/kg	Site-specific	MEI CSR, 2015, Tables 7, 8 & 22
$\mathbf{C_{target, Soil}}$	Soil Conc. Causing Leachate to Exceed Higher of Type 1 or 2 GW RRS	1.5E-01				
$C_{RRS\ 1,2\text{-}GW}$	Higher of Type 3 or Type 4 RRS: GROUNDWATER	1.9E-02				
C_{leach}	Conc. in GW by leaching	1.9E-02	$C_{leach} = C_{max, soil} * LF_{sw}$	mg/L	Calculated	ASTM E2081-00 (2015)
$C_{target, GW} - C_{leach}$		0.0E+00	$C_{target, GW} - C_{leach}$			

*Soil to Groundwater Leaching calculations performed in accordance with procedures and equations detailed in US EPA Publication 9355.4-24 "Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites" and ASTM Standard E2081-00 (2015), "Standard Guide for Risk-Based Corrective Action", Section X3.9 and Table X3.4

Table C19
Soil to Groundwater Leaching Calculations - Type 4 RRS
Trichloroethene - Fountain Oaks Shopping Center

Variable	Variable Definition	Value	Formula	Units	Parameter Type	Data Source
Soil to Ground Water Leaching*						
W	Width of Source	**32.4**		ft	Site-specific	MEI CSR, 2015, Sect. 3.4.4.4.1
W	Width of Source	**988**	$W_{cm} = W_{ft}$ * 30.48 cm/ft	cm	Site-specific	
P	Avg. Annual Precipitation	**49.71**		in/yr	Site-specific	Natl. Weather Svc, Peachtree City
P	Avg. Annual Precipitation	**126**	$P_{cm} = P_{in}$ * 2.54 cm/in	cm/yr	Calculated	
k_i	Infiltration Factor	**0.0009**		dimensionless	Specific to Silty Soil	Weidemeier, et al., 1999, p. 52
I	Infiltration Rate	**14.3**	$I = P^2$*0.009	cm/year	Calculated	
δ_{gw}	GW Mixing Zone Thickness	**7.1**		ft	Site-specific	MEI CSR, 12-2015, Table 2
δ_{gw}	GW Mixing Zone Thickness	**216**	$\delta_{gw, cm} = \delta_{gw, ft}$ * 30.48 cm/ft	cm	Site-specific	
K_{sat}	Hydraulic conductivity (saturated)	**7.78E-05**		cm/sec	Site-specific	UC PPCAP, Pg 23
K_{sat}	Hydraulic conductivity (saturated)	**6.72E+00**	$K_{sat,(cm/day)} = K_{sat,(cm/s)}$* 86,400 sec/day	cm/day		
i	Groundwater Hydraulic Gradient	**0.03**	i = Δhead/Δdistance (along flow path)	cm/cm	Site-specific, Avg.	MEI CSR, 12-2015, Figure 17
U_{gw}	GW Darcy velocity	**73.61**	$U_{gw} = K_{sat}$ * i	cm/year	Calculated	ASTM E2081-00 (2015)
DAF	Dilution Attenuation Factor	**2.124**	DAF = 1 + (U_{gw}*δ_{gw})/(I*W)	dimensionless	Calculated	ASTM E2081-00 (2015)
K_{oc}	Soil Organic Carbon-Water Partition Coefficient	**60.7**		cm^3-W/g-C	Compound-Specific	EPA RSL Table, 2015
f_{oc}	Fractional Org. Carbon	**3.58%**		%	Site-specific	UC PPCAP, Table 1
K_d	Soil-Water Partition/Sorption Coeff.	**2.17306**	$K_d = K_{oc}$ * f_{oc}	g-W/g-soil	Calculated	ASTM E2081-00 (2015)
ρ_s	Soil Bulk Density	**1.80**		g-S/cm^3-S	Site-specific	UC PPCAP, Table 1
Θ_w	Soil Volumetric Water Content	**0.258**		cm^3-W/cm^3-S	Site-specific	UC PPCAP, Table 1
Θ_a	Soil Volumetric Air Content	**0.26**		cm^3-A/cm^3-S	default	ASTM E2081-00 (2015)
H'	Henry's Law Constant	**0.403**		dimensionless	Compound-Specific	EPA RSL Table, 2015
K_{sw}	Soil to Leachate Partition Coeff.	**2.375**	$K_{sw} = [\Theta_w + (K_d*\rho_s) + (H_{eff} * \Theta_a)] / \rho_s$	mg/L-wtr/mg/kg-soil	Calculated	ASTM E2081-00 (2015)
LF_{sw}	Leaching Factor - Soil to Groundwater	**0.198**	$LF_{sw} = 1/(K_{sw}$ * DAF)	ppm/ppm	Calculated	ASTM E2081-00 (2015)
$C_{max, soil}$	Max soil concentration on-site	**0.18**		mg/kg	Site-specific	MEI CSR, 2015, Tables 7, 8 & 22
$C_{target, Soil}$	Soil Conc. Causing Leachate to Exceed Higher of Type 1 or 2 GW RRS	**2.6E-02**				
$C_{RRS\ 1,2\text{-}GW}$	Higher of Type 3 or Type 4 RRS: GROUNDWATER	5.0E-03				
C_{leach}	Conc. in GW by leaching	**5.2E-03**	$C_{leach} = C_{max, soil}$ * LF_{sw}	mg/L	Calculated	ASTM E2081-00 (2015)
$C_{target, GW} - C_{leach}$		**-2.0E-04**	$C_{target, GW} - C_{leach}$			

*Soil to Groundwater Leaching calculations performed in accordance with procedures and equations detailed in US EPA Publication 9355.4-24 "Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites" and ASTM Standard E2081-00 (2015), "Standard Guide for Risk-Based Corrective Action", Section X3.9 and Table X3.4

Table C20
Soil to Groundwater Leaching Calculations - Type 4 RRS
Vinyl Chloride - Fountain Oaks Shopping Center

Variable	Variable Definition	Value	Formula	Units	Parameter Type	Data Source
Soil to Ground Water Leaching*						
W	Width of Source	32.4		ft	Site-specific	MEI CSR, 2015, Sect. 3.4.4.4.1
W	Width of Source	**988**	$W_{cm} = W_{ft}$ * 30.48 cm/ft	cm	Site-specific	
P	Avg. Annual Precipitation	**49.71**		in/yr	Site-specific	Natl. Weather Svc, Peachtree City
P	Avg. Annual Precipitation	**126**	$P_{cm} = P_{in}$ * 2.54 cm/in	cm/yr	Calculated	
k_i	Infiltration Factor	**0.0009**		dimensionless	Specific to Silty Soil	Weidemeier, et al., 1999, p. 52
I	Infiltration Rate	**14.3**	$I = P^2 * 0.009$	cm/year	Calculated	
δ_{gw}	GW Mixing Zone Thickness	**7.1**		ft	Site-specific	MEI CSR, 12-2015, Table 2
δ_{gw}	GW Mixing Zone Thickness	**216**	$\delta_{gw,\,cm} = \delta_{gw,\,ft}$ * 30.48 cm/ft	cm	Site-specific	
K_{sat}	Hydraulic conductivity (saturated)	**7.78E-05**		cm/sec	Site-specific	UC PPCAP, Pg 23
K_{sat}	Hydraulic conductivity (saturated)	**6.72E+00**	$K_{sat,(cm/day)} = K_{sat,(cm/s)}$ * 86,400 sec/day	cm/day		
i	Groundwater Hydraulic Gradient	**0.03**	i = Δhead/Δdistance (along flow path)	cm/cm	Site-specific, Avg.	MEI CSR, 12-2015, Figure 17
U_{gw}	GW Darcy velocity	**73.61**	$U_{gw} = K_{sat}$ * i	cm/year	Calculated	ASTM E2081-00 (2015)
DAF	Dilution Attenuation Factor	**2.124**	$DAF = 1 + (U_{gw} * \delta_{gw})/(I*W)$	dimensionless	Calculated	ASTM E2081-00 (2015)
K_{oc}	Soil Organic Carbon-Water Partition Coefficient	**21.73**		cm^3-W/g-C	Compound-Specific	EPA RSL Table, 2015
f_{oc}	Fractional Org. Carbon	**3.58%**		%	Site-specific	UC PPCAP, Table 1
K_d	Soil-Water Partition/Sorption Coeff.	**0.777934**	$K_d = K_{oc} * f_{oc}$	g-W/g-soil	Calculated	ASTM E2081-00 (2015)
ρ_s	Soil Bulk Density	**1.80**		g-S/cm^3-S	Site-specific	UC PPCAP, Table 1
Θ_w	Soil Volumetric Water Content	**0.258**		cm^3-W/cm^3-S	Site-specific	UC PPCAP, Table 1
Θ_a	Soil Volumetric Air Content	**0.26**		cm^3-A/cm^3-S	default	ASTM E2081-00 (2015)
H'	Henry's Law Constant	**1.14**		dimensionless	Compound-Specific	EPA RSL Table, 2015
K_{sw}	Soil to Leachate Partition Coeff.	**1.085**	$K_{sw} = [\Theta_w + (K_d*\rho_s) + (H_{eff} * \Theta_a)] / \rho_s$	mg/L-wtr/mg/kg-soil	Calculated	ASTM E2081-00 (2015)
LF_{sw}	Leaching Factor - Soil to Groundwater	**0.434**	$LF_{sw} = 1/(K_{sw} * DAF)$	ppm/ppm	Calculated	ASTM E2081-00 (2015)
$C_{max,\,soil}$	Max soil concentration on-site	**0.0012**	NOT DETECTED - Subst. MDL	mg/kg	Site-specific	MEI CSR, 2015, Tables 7, 8 & 22
$\mathbf{C_{target,\,Soil}}$	Soil Conc. Causing Leachate to Exceed Higher of Type 1 or 2 GW RRS	**6.8E-03**				
$C_{RRS\ 1,2\text{-}GW}$	Higher of Type 3 or Type 4 RRS: GROUNDWATER	2.0E-03				
C_{leach}	Conc. in GW by leaching	**2.9E-03**	$C_{leach} = C_{max,\,soil} * LF_{sw}$	mg/L	Calculated	ASTM E2081-00 (2015)
$C_{target,\,GW} - C_{leach}$		**-9.378E-04**	$C_{target,\,GW} - C_{leach}$			

*Soil to Groundwater Leaching calculations performed in accordance with procedures and equations detailed in US EPA Publication 9355.4-24 "Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites" and ASTM Standard E2081-00 (2015), "Standard Guide for Risk-Based Corrective Action", Section X3.9 and Table X3.4

Appendix D

Draft Uniform Environmental Covenants

After Recording Return to:

Gerald L. Pouncey, Esq.
Morris, Manning & Martin LLP
1600 Atlanta Financial Center
3343 Peachtree Road NE
Atlanta, GA 30326

Environmental Covenant

This instrument is an Environmental Covenant executed pursuant to the Georgia Uniform Environmental Covenants Act, O.C.G.A. § 44-16-1 *et seq*, for the property identified below (hereinafter the "Property") as part of an environmental response project to address regulated substances released into the environment. This Environmental Covenant restricts the use of groundwater on the Property to prevent humans from coming into contact with regulated substances.

Fee Owner of Property/Grantor:	AMREIT Fountain Oaks, LP 1221 Main Street Suite #1000 Columbia, SC 29201
Grantee/Holder:	AMREIT Fountain Oaks, LP 1221 Main Street Suite #1000 Columbia, SC 29201
Grantee/Entity with express power to enforce:	State of Georgia Department of Natural Resources Environmental Protection Division (hereinafter, "EPD") 2 Martin Luther King Jr. Drive, SE Suite 1152 East Tower Atlanta, GA 30334
Parties with interest in the Property:	AMREIT Fountain Oaks, LP 1221 Main Street Suite #1000 Columbia, SC 29201

Property:

The property subject to this Environmental Covenant is the Fountain Oaks Shopping Center located at 4920 Roswell Road and 115 W. Belle Isle Road in Atlanta, Fulton County, Georgia (hereinafter "Property"). A complete legal description of the Property is attached as Exhibit A. A map of the Property is attached as Exhibit B.

The Property is approximately 13.77 acres and consists of the following tax parcels, which are subject to this Environmental Covenant:

17 009300061319
17 009300021073

Name and Location of Administrative Record:

The administrative record for the environmental response project is identified as HSI File 10807. This record is available for review at the following location:

Georgia Environmental Protection Division
Response and Remediation Program
2 MLK Jr. Drive, SE, Suite 1054 East Tower
Atlanta, GA 30334
M-F 8:00 AM to 4:30 PM excluding state holidays

Description of Contamination and Corrective Action:

This Property was previously listed on the state's hazardous site inventory and was designated as needing corrective action due to the presence of hazardous wastes, hazardous constituents, or hazardous substances regulated under state law. Contact the property owner or the Georgia Environmental Protection Division for further information concerning this Property. This notice is provided in compliance with the Georgia Hazardous Site Response Act.

This Declaration of Covenant is made pursuant to the Georgia Uniform Environmental Covenants Act, O.C.G.A. § 44-16-1 *et seq*. by AMREIT Fountain Oaks, LP, its successors and assigns, and the State of Georgia, Department of Natural Resources, Environmental Protection Division (hereinafter "EPD"), its successors and assigns. This Environmental Covenant is required in accordance with the approved Voluntary Remediation Program Application and Compliance Status Report and the documented release of acetone, benzene, chloroform, tetrachloroethylene, trichloroethylene, cis-1,2 dichloroethylene, trans-1,2-dichloroethene, methyl ethyl ketone, and vinyl chloride on the Property. These are "regulated substances" as defined under the Georgia Hazardous Site Response Act, O.C.G.A. § 12-8-90 *et seq.*, and the rules promulgated thereunder (hereinafter "HSRA" and "Rules", respectively). The Corrective Action consisted of soil excavation and institutional controls including the restriction of groundwater use to protect human health and the environment.

Grantor, AMREIT Fountain Oaks, LP, hereby binds Grantor, its successors and assigns to the activity and use restriction(s) for the Property identified herein and grants such other rights under this Environmental Covenant in favor of AMREIT Fountain Oaks, LP and EPD. EPD shall have full right of enforcement of the rights conveyed under this Environmental Covenant pursuant to HSRA, O.C.G.A. § 12-8-90 *et seq*., and the rules promulgated thereunder. Failure to timely enforce compliance with this Environmental Covenant or the use or activity limitations contained herein by any person shall not bar subsequent enforcement by such person and shall not be deemed a waiver of the person's right to take action to enforce any non-compliance. Nothing in this Environmental Covenant shall restrict EPD from exercising any authority under applicable law.

AMREIT Fountain Oaks, LP makes the following declaration as to limitations, restrictions, and uses to which the Property may be put and specifies that such declarations shall constitute covenants to run with the land, pursuant to O.C.G.A. § 44-16-5(a); is perpetual, unless modified or terminated pursuant to the terms of this Covenant pursuant to O.C.G.A. § 44-16-9 and 10; and shall be binding on all parties and all persons claiming under them, including all current and future owners of any portion of or interest in the Property (hereinafter "Owner"). Should a transfer or sale of the Property occur before such time as this Environmental Covenant has been amended or revoked then said Environmental Covenant shall be binding on the transferee(s) or purchaser(s).

The Environmental Covenant shall inure to the benefit of AMREIT Fountain Oaks, LP and EPD and their respective successors and assigns and shall be enforceable by the Director or his agents or assigns or AMREIT Fountain Oaks, LP or its successors and assigns, and other party(ies) as provided for in O.C.G.A. § 44-16-11 in a court of competent jurisdiction.

Activity and/or Use Limitation

Groundwater Use Limitation. The use or extraction of groundwater beneath the Property for drinking water or other potable uses shall be prohibited. The use or extraction of groundwater for any other purpose besides site characterization is prohibited unless conducted under a plan approved in writing by EPD.

General Provisions

Notice of Limitation in Future Conveyances. Each instrument hereafter conveying an interest in the Property subject to this Environmental Covenant shall contain a notice of the activity and use limitation set forth in this Environmental Covenant and shall provide the recorded location of the Environmental Covenant.

Access. Grantor shall provide reasonable access to Grantee/Holder or its assigns to verify compliance with established activity and/or use limitations identified herein.

Effective Date. The effective date of this Environmental Covenant shall be the date upon which the fully executed Environmental Covenant has been recorded in accordance with OCGA § 44-16-8(a).

Benefit. This Environmental Covenant shall inure to the benefit of Grantee/Holder, EPD, and their respective successors and assigns and shall be enforceable by the Director or his agents or assigns, Grantee/Holder or its successors and assigns, and other party(ies) as provided for in O.C.G.A. § 44-16-11 in a court of competent jurisdiction.

Termination or Modification. This Environmental Covenant shall remain in full force and effect in accordance with O.C.G.A. § 44-16-5, unless and until the Director determines that the Property is in compliance with the Type 1 or 2 Risk Reduction Standards, as defined in Section 391-3-19-.07 of the Georgia Rules of Hazardous Site Response, whereupon the Environmental Covenant may be amended or terminated, as appropriate, in accordance with O.C.G.A. § 44-16-1 *et seq*.

Severability. If any provision of this Environmental Covenant is found to be unenforceable in any respect, the validity, legality, and enforceability of the remaining provisions shall not in any way be affected or impaired.

Warranty. Grantor hereby represents and warrants to the other signatories hereto that the Grantor has the power and authority to enter into this Environmental Covenant, to grant the rights and interests herein provided, and to carry out all obligations hereunder and in accordance with O.C.G.A. § 44-16-1 *et seq*.

No EPD Interest in Property Created. This Environmental Covenant does not in any way create any interest by EPD in the Property that is subject to the Environmental Covenant. Furthermore, the act of approving this Environmental Covenant does not in any way create any interest by EPD in the Property in accordance with O.C.G.A. § 44-16-3(b).

Representations and Warranties.

Grantor hereby represents and warrants to the other signatories hereto:

a) That the Grantor has the power and authority to enter into this Environmental Covenant, to grant the rights and interests herein provided and to carry out all obligations hereunder;
b) That the Grantor is the sole owner of the Property and holds fee simple title which is free, clear and unencumbered;
c) That the Grantor has identified all other parties that hold any interest (e.g., encumbrance) in the Property and notified such parties of the Grantor's intention to enter into this Environmental Covenant;
d) That this Environmental Covenant will not materially violate, contravene, or constitute a material default under any other agreement, document or instrument to which Grantor is a party, by which Grantor may be bound or affected;
e) That the Grantor has served each of the people or entities referenced in O.C.G.A. § 44-16-7(a) with an identical copy of this Environmental Covenant in accordance with O.C.G.A. § 44-16-7(a).
f) That this Environmental Covenant will not materially violate or contravene any zoning law or other law regulating use of the Property; and
g) That this Environmental Covenant does not authorize a use of the Property that is otherwise prohibited by a recorded instrument that has priority over the Environmental Covenant.

Notices.

Any document or communication required to be sent pursuant to the terms of this Environmental Covenant shall be sent to the following persons:

Georgia Environmental Protection Division
Branch Chief

Land Protection Branch
2 Martin Luther King Jr. Drive SE
Suite 1054 East Tower
Atlanta, GA 30334

AMREIT Fountain Oaks, LP
1221 Main Street
Suite #1000
Columbia, SC 29201

Grantor has caused this Environmental Covenant to be executed pursuant to The Georgia Uniform Environmental Covenants Act, on the _______day of ______________, 2016.

Signed, sealed, and delivered in the presence of:	**For the Grantor:**
Unofficial Witness (*Signature*)	Name of Grantor (*Print*)
Unofficial Witness Name (*Print*)	(Seal) Grantor's Authorized Representative (*Signature*)
Unofficial Witness Address (*Print*)	Authorized Representative Name (*Print*)
Notary Public (*Signature*)	Title of Authorized Representative (*Print*)
My Commission Expires:________________	Dated:________________ (NOTARY SEAL)

Signed, sealed, and delivered in the presence of:

____
Unofficial Witness (*Signature*)

____
Unofficial Witness Name (*Print*)

____

____
Unofficial Witness Address (*Print*)

____
Notary Public (*Signature*)

My Commission Expires:______________

For the State of Georgia
Environmental Protection Division:

____________________________________ (Seal)
(*Signature*)

Richard E. Dunn
Director

Dated:_________________________
(NOTARY SEAL)

After Recording Return to:

Georgia Environmental Protection Division
Response and Remediation Program
2 Martin Luther King, Jr. Drive, SE
Suite 1462 East
Atlanta, Georgia 30334

Environmental Covenant

This instrument is an Environmental Covenant executed pursuant to the Georgia Uniform Environmental Covenants Act, OCGA § 44-16-1, *et seq.* This Environmental Covenant subjects the Property identified below to the activity and/or use limitations specified in this document. The effective date of this Environmental Covenant shall be the date upon which the fully executed Environmental Covenant has been recorded in accordance with OCGA § 44-16-8(a).

Fee Owner of Property/Grantor:
Fletcher Bright Partners I, Ltd.
537 Market Street
Suite 400
Chattanooga, TN 37402

Grantee/Holder:
Fletcher Bright Partners I, Ltd.
537 Market Street
Suite 400
Chattanooga, TN 37402

Grantee/Entity with express power to enforce:
State of Georgia
Department of Natural Resources
Environmental Protection Division
2 Martin Luther King Jr. Drive, SE
Suite 1152 East Tower
Atlanta, GA 30334

Parties with interest in the Property:
Fletcher Bright Partners I, Ltd.
537 Market Street
Suite 400
Chattanooga, TN 37402

Property:

The property subject to this Environmental Covenant is the undeveloped Long Island Terrace parcel (hereinafter “Property”), located on Long Island Terrace in Sandy Springs, Fulton County, Georgia. This tract of land was conveyed on December 31, 2003 from Fletcher Bright, Fletcher Bright Company, and Michael O. Savage (d/b/a Long Island Associates) to Long Island Associates, Ltd recorded in Deed Book 36860, Page 594, Fulton County Records. The area is located in Land Lot 93 of the 17th District of Fulton County, Georgia. Vacant residential property, 0.74 acres. A complete legal description of the area is attached as Exhibit A and a map of the area is attached as Exhibit B.

Tax Parcel Number(s):

17 009300060881 of Fulton County, Georgia

Name and Location of Administrative Records:

The corrective action at the Property that is the subject of this Environmental Covenant is described in the following document[s]:

- Prospective Purcahser Compliance Status Report, 10-JUN-2008
- Preliminary Corrective Action Plan, 11-Dec-2007
- Compliance Status Report, 14-JAN-2010
- Groundwater Monitoring Report, 14-MAY-2015
- Compliance Status Report & Voluntary Remediation Program Application, 11-DEC-2015
- Compliance Status Report & Progress Report, 30-MAY-2017

These documents are available at the following locations:

Georgia Environmental Protection Division
Response and Remediation Program
2 MLK Jr. Drive, SE, Suite 1462 East Tower
Atlanta, GA 30334
M-F 8:00 AM to 4:30 PM excluding state holidays

Description of Contamination and Corrective Action:

This Property has been listed on the state's hazardous site inventory and has been designated as needing corrective action due to the presence of hazardous wastes, hazardous constituents, or hazardous substances regulated under state law. Contact the property owner or the Georgia Environmental Protection Division for further information concerning this Property. This notice is provided in compliance with the Georgia Hazardous Site Response Act.

This Declaration of Covenant is made pursuant to the Georgia Uniform Environmental Covenants Act, O.C.G.A. § 44-16-1 *et seq*. by Fletcher Bright Partners I, Ltd, its successors and assigns, and the State of Georgia, Department of Natural Resources, Environmental Protection Division (hereinafter "EPD"), its successors and assigns. This Environmental Covenant is required in accordance with the approved Voluntary Remediation Program Application and Voluntary Remediation Program application and the documented release of tetrachloroethylene with associated compounds trichloroethene (TCE), and cis-1,2-dichloroethene (cDCE) occurred on the Property. These are "regulated substances" as defined under the Georgia Hazardous Site Response Act, O.C.G.A. § 12-8-90 *et seq.*, and the rules promulgated thereunder (hereinafter "HSRA" and "Rules", respectively). The proposed Corrective Action consisted of soil excavation/ secondary source removal on the neighboring release source property and institutional controls consisting of the restriction of groundwater to non-drinking water uses to protect human health and the environment.

Grantor, Fletcher Bright Partners I, Ltd., hereby binds Grantor, its successors and assigns to the activity and use restriction(s) for the Property identified herein and grants such other rights under this Environmental Covenant in favor of the Fletcher Bright Partners I, Ltd. and EPD. EPD shall have full right of enforcement of the rights conveyed under this Environmental Covenant pursuant to HSRA, O.C.G.A. § 12-8-90 *et seq*., and the rules promulgated thereunder. Failure to timely enforce compliance with this Environmental Covenant or the use or activity limitations contained herein by any person shall not bar subsequent enforcement by such person and shall not be deemed a waiver of the person's right to take action to enforce any non-compliance. Nothing in this Environmental Covenant shall restrict EPD from excising any authority under applicable law.

Fletcher Bright Partners I, Ltd. makes the following declaration as to limitations, restrictions, and uses to which the Property may be put and specifies that such declarations shall constitute covenants to run with the land, pursuant to O.C.G.A. § 44-16-5(a); is perpetual, unless modified or terminated pursuant to the terms of this Covenant pursuant to O.C.G.A. § 44-16-9; and shall be binding on all parties and all persons claiming under them, including all current and future owners of any portion of or interest in the Property (hereinafter "Owner"). Should a transfer or sale of the Property occur before such time as this Environmental Covenant has been amended or revoked then said Environmental Covenant shall be binding on the transferee(s) or purchaser(s).

The Environmental Covenant shall inure to the benefit of <name of Holder>, EPD, <name of Grantor> and their respective successors and assigns and shall be enforceable by the Director or his agents or assigns, <name of Holder> or its successors and assigns, <name of Grantor> or its successors and assigns, and other party(ies) as provided for in O.C.G.A. § 44-16-11 in a court of competent jurisdiction.

Activity and/or Use Limitation(s)

Groundwater Use Limitation. The use or extraction of groundwater beneath the Property for drinking water or for any other potable uses shall be prohibited. The use or extraction of groundwater for any other purposes besides site characterization is prohibited unless conducted under a plan approved in writing by EPD.

General Provisions

Notice of Limitation in Future Conveyances. Each instrument hereafter conveying an interest in the Property subject to this Environmental Covenant shall contain a notice of the activity and use limitations set forth in this Environmental Covenant and shall provide the recorded location of the Environmental Covenant.

Access. Grantor shall provide reasonable access to Grantee/Holder or its assigns to verify compliance with established activity and/or use limitations identified herein.

Effective Date. The effective date of this Environmental Covenant shall be the date upon which the fully executed Environmental Covenant has been recorded in accordance with OCGA § 44-16-8(a).

Benefit. This Environmental Covenant shall inure to the benefit of Grantee/Holder, EPD, and their respective successors and assigns and shall be enforceable by the Director or his agents or assigns, Grantee/Holder or its successors and assigns, and other party(ies) as provided for in O.C.G.A. § 44- 16-11 in a court of competent jurisdiction.

Termination or Modification. The Environmental Covenant shall remain in full force and effect in accordance with O.C.G.A. § 44-5-60, unless and until the Director determines that the Property is in compliance with the Type 1 or 2 Risk Reduction Standards, as defined in Georgia Rules of Hazardous Site Response, whereupon the Environmental Covenant may be amended or revoked in accordance with O.C.G.A. § 44-16-1 *et seq*.

Severability. If any provision of this Environmental Covenant is found to be unenforceable in any respect, the validity, legality, and enforceability of the remaining provisions shall not in any way be affected or impaired.

Warranty. Grantor hereby represents and warrants to the other signatories hereto that the Grantor has the power and authority to enter into this Environmental Covenant, to grant the rights and interests herein provided, and to carry out all obligations hereunder and in accordance with O.C.G.A. § 44-16-1 et seq.

No Property Interest Created in EPD. This Environmental Covenant does not in any way create any interest by EPD in the Property that is subject to the Environmental Covenant. Furthermore, the act of approving this Environmental Covenant does not in any way create any interest by EPD in the Property in accordance with O.C.G.A. § 44-16-3(b).

Representations and Warranties.

Grantor hereby represents and warrants to the other signatories hereto:

a) That the Grantor has the power and authority to enter into this Environmental Covenant, to grant the rights and interests herein provided and to carry out all obligations hereunder;
b) That the Grantor is the sole owner of the Property and holds fee simple title which is free, clear and unencumbered;
c) That the Grantor has identified all other parties that hold any interest (e.g., encumbrance) in the Property and notified such parties of the Grantor's intention to enter into this Environmental Covenant;
d) That this Environmental Covenant will not materially violate, contravene, or constitute a material default under any other agreement, document or instrument to which Grantor is a party, by which Grantor may be bound or affected;
e) That the Grantor has served each of the people or entities referenced in Activity 10 above with an identical copy of this Environmental Covenant in accordance with O.C.G.A. § 44-16-4(d).
f) That this Environmental Covenant will not materially violate or contravene any zoning law or other law regulating use of the Property; and
g) That this Environmental Covenant does not authorize a use of the Property that is otherwise prohibited by a recorded instrument that has priority over the Environmental Covenant.

Notices.

Any document or communication required to be sent pursuant to the terms of this Environmental Covenant shall be sent to the following persons:

Georgia Environmental Protection Division
Branch Chief
Land Protection Branch
2 Martin Luther King Jr. Drive SE
Suite 1154 East Tower
Atlanta, GA 30334

Fletcher Bright Partners I, Ltd.
537 Market Street
Suite 400
Chattanooga, TN 37402

Grantor has caused this Environmental Covenant to be executed pursuant to The Georgia Uniform Environmental Covenants Act, on the _____ day of _____________, 2017.

Signed, sealed, and delivered in the presence of:

For the Grantor:

________________________________	________________________________
Unofficial Witness (*Signature)*	Name of Grantor (*Print)*
________________________________	________________________________
Unofficial Witness Name (*Print)*	Grantor's Authorized Representative (Seal) (*Signature)*
________________________________	________________________________
________________________________	Authorized Representative Name *(Print)*
Unofficial Witness Address *(Print)*	________________________________
	Title of Authorized Representative *(Print)*
________________________________	
Notary Public (Signature)	Dated: ________________________
My Commission Expires__________________	

Signed, sealed, and delivered in the presence of:

For the State of Georgia
Environmental Protection Division

____
Unofficial Witness (*Signature)*

____
Unofficial Witness Name (*Print)*

____________________________________ (Seal)
(Signature)

Richard E. Dunn
Director

____

____
Unofficial Witness Address *(Print)*

____
Notary Public (Signature)

Dated: ________________________
(NOTARY SEAL)

My Commission Expires__________________

Exhibit A
Legal Description

Exhibit B
Map

Appendix E

Evaluation of Vapor Intrusion Pathway

May 12, 2017

Mr. Jim McKenney, P.E.
EDENS Limited Partnership
7200 Wisconsin Avenue, Suite 400
Bethesda, MD 20814

Phone: (803) 269-8913
Email: JMcKenney@edens.com

Subject: Additional Evaluation of Vapor Intrusion Pathway
Fountain Oaks Shopping Center
4920 Roswell Road, NE
Sandy Springs, Georgia
Amec Foster Wheeler Project No. 6121-15-0100

Dear Mr. McKenney

Amec Foster Wheeler Environment & Infrastructure, Inc. (Amec Foster Wheeler) respectfully submits the attached evaluation of vapor risk in response to comments by the Environmental Protection Division (EPD) based on its review of a Compliance Status Report (CSR) and Voluntary Remediation Program Application (VRPA) prepared by Marion Environmental.

Based on the attached documentation, the site is in compliance with vapor risk requirements under HSRA and the VRP for delisting. Amec Foster Wheeler appreciates the opportunity to be of service on this project. If you have any questions, please contact Amec Foster Wheeler at 404-873-4761.

Sincerely,

Amec Foster Wheeler Environment & Infrastructure, Inc.

Laura M. Smith
Laura M. Smith, RHSP
Associate Scientist

Charles T. Ferry
Charles T. Ferry, P.E.
Senior Principal Engineer

Amec Foster Wheeler Environment & Infrastructure, Inc.
2677 Buford Highway NE, Atlanta, Georgia 30324
Tel: (404) 873 4761
Fax: (404) 817 0175
www.amecfw.com

Attachments: Data Tables 1-4
VISL Tables 5-7
Appendix A Tables A-1 – A-5
Figure 20 (from Marion Environmental)

cc. Mr. Gerald Pouncey, Morris, Manning & Martin, LLP

ADDITIONAL EVALUATION OF THE VAPOR INTRUSION PATHWAY

Background

The potential sources for vapor intrusion from the subsurface at the Fountain Oaks Shopping Center (FOSC) have been thoroughly investigated and defined. The extent of volatile organic compounds (VOCs) have previously been characterized using indoor air, soil vapor, soil, and groundwater sampling, and three potential sources identified: a former dry cleaner that was located on the northern portion of the FOSC, another dry cleaner (Chastain Cleaners) located to the northeast and off-site with migration of constituents of potential concern (COPCs) onto the FOSC property, and a former gas station that was located on the eastern portion of the FOSC. Thus, COPCs include VOCs associated with dry cleaning and petroleum-based fuels.

Soil excavations have been completed and soil exceeding risk reduction standards (RRS) have been removed. In 2008, a vapor intrusion mitigation system (VISM) was installed and was in operation until late 2011. To evaluate the post-remediation conditions, a focused site investigation was completed for soil gas and indoor air in May 2013. Sub-slab and near-slab soil gas samples were collected from six locations using laboratory-supplied Summa® canisters within and adjacent to the northern portion of the shopping center buildings. In addition, six indoor air sampling canisters (laboratory-supplied Summa® canisters) were placed within the Kroger store and four of the suites to the north of Kroger for indoor air sampling (Property Solutions, 2013). Canister samples were analyzed by Method TO-15. A summary of these data, which are used as lines of evidence in the vapor intrusion risk evaluation, are provided in Table 1 and Table 2 (attached).

In March 2015, remaining groundwater monitoring wells were sampled for COPCs. These data were presented in the December 2015 Compliance Status Report and VRP Application (Marion Environmental Inc., 2015). Figure 20 from that report is presented for reference herein. Additionally, the March 2015 groundwater analytical results are presented in Appendix A, Table A-1 (attached). In the December 2015 CSR and VRP Application, these data were used to address the potential of vapor intrusion in the USEPA's Johnson and Ettinger Model (J&E Model, USEPA, 2004). Per current USEPA guidance, quantitative fate and transport modeling is a valuable tool in the evaluation of current and future human health risk from vapor intrusion (USEPA, 2015a). The results of the J&E Modeling additionally support a conclusion that the potential for vapor intrusion on the north portion of FOSC had been substantially reduced and the residual concentrations in groundwater would not pose a risk to current and future site receptors.

In November 2016, EPD provided comments that indicated that the J&E Model results would not be accepted as a line of evidence to demonstrate that vapor intrusion risks are in the acceptable range. The same comment requested that the Vapor Intrusion Screening Level (VISL) calculator should be used to evaluate risk for this pathway. Although current USEPA guidance (USEPA, 2015) supports the continuing use of the J&E Model, an alternative risk evaluation has been completed using VISL. In addition, per EPD's comments, the groundwater concentrations associated with the northeastern portion of the FOSC have also been evaluated. The groundwater monitoring wells within each area have been evaluated and wells with positive detections for the COPCs of interest are included in the estimation of the exposure point concentrations (EPCs). The grouping of the monitoring wells is indicated by color coding in Appendix A, Table A-1. When there are four or more detections of a COPC, USEPA's ProUCL software version 5.1 (USEPA, 2015b) has been used to calculate representative EPCs.

This approach is consistent with guidance for risk assessment issued by USEPA Region 4 (USEPA, 2014) and the Georgia VRP. The EPCs used to address risk for groundwater are listed in Table 3 (FOSC north portion) and Table 4 (northeastern portion that includes off-site source concentrations and petroleum-related COPCs). The calculated ProUCL EPCs are presented in Appendix A.

Risk Characterization – Vapor Intrusion Modeling

The SG_IA-Calc module of the May 2016 VISL Calculator was used to estimate risks and hazards associated with indoor air concentrations from residual soil vapor impacts from groundwater for the north portion of the FOSC. The maximum detected soil vapor concentrations detected in May 2013 for constituents exceeding commercial sub-slab VISLs were used in the calculations. Two constituents, benzene and tetrachloroethene, had maximum reported concentrations that exceeded the VISLs based on a target risk of 10^{-6} and hazard index of 0.1 (Table 1). These two compounds were carried forward to the SG_IA risk calculations. Table 5 shows the cumulative risks and hazards estimated using the VISL calculator and soil vapor concentrations. Incremental cancer risk was estimated at 3×10^{-6} and the hazard index at 0.2. Estimated risks are less than the HSRA target risk level of 1×10^{-5}; the hazard index is less than the HSRA target HI of 1. This first line of evidence supports the conclusion that the vapor intrusion pathway does not pose a risk to current or future commercial receptors because soil vapor exposures do not exceed the risk goals set forth in HSRA.

Table 2 summarizes the results of the indoor air sampling event completed in May 2013. The maximum reported detections for the site COPCs plus other detected constituents that were not detected in soil vapor or in groundwater were compared to commercial indoor air VISLs. The VISLs were based on a target risk of 10^{-6} and target hazard index of 0.1. One of the constituents, chloroform, had a maximum concentration of 1.1 $\mu g/m^3$ that exceeded the screening VISL of 0.53 $\mu g/m^3$. Under a commercial scenario, the maximum concentration of chloroform would be associated with an estimated risk of 2.1×10^{-6}. This estimated risk is less than the HSRA target risk level of 1×10^{-5}. In addition, chloroform is commonly found in ambient air and is associated with chlorinated water and may not be due to vapor intrusion from groundwater. This second line of evidence supports the conclusion that the vapor intrusion pathway does not pose a risk to current or future commercial receptors.

The GW_IA-Calc module of the May 2016 VISL was used to estimate risks and hazards associated with indoor air concentrations from residual groundwater impacts for the north portion of the FOSC. The COPCs and EPCs are summarized on Table 3 and the estimated risks and hazards are shown on Table 6. Incremental cancer risk was estimated at 8×10^{-6} and the hazard index at 2. Estimated risks are less than the HSRA target risk level of 1×10^{-5}; the hazard index is slightly greater than the HSRA target HI of 1. The HI is primarily associated with trichloroethene (TCE). Please note that calculations completed with the J&E Model indicate a much higher degree of attenuation between groundwater and the building foundations. The higher degree of attenuation was supported by the depth to groundwater (27 to 33 feet below ground surface) and the 2013 soil vapor results discussed above. If the attenuation factor in the VISL were adjusted to 0.005, which is allowed under USEPA guidance, the resulting VISL calculator HI would be equal to 1 and the north portion of the FOSC would equal the HSRA target HI. Based on these site-specific considerations, the third line of evidence also supports the conclusion that the vapor intrusion pathway does not pose a risk to current or future commercial receptors.

The GW_IA-Calc module of the May 2016 VISL was used to estimate risks and hazards associated with indoor air concentrations from residual groundwater impacts for the northeastern and eastern portion of the FOSC. These concentrations are associated with an off-site dry cleaning site and a former gas station. The COPCs and EPCs are summarized on Table 4 and the estimated risks and hazards are shown on Table 7. Incremental cancer risk was estimated at 6 x 10^{-6} and the hazard index at 0.7. Estimated risks are less than the HSRA target risk level of 1 x 10^{-5}; the hazard index is less than the HSRA target HI of 1. This line of evidence supports the conclusion that the vapor intrusion pathway does not pose a risk to current or future commercial receptors located on the northeastern and eastern portion of the FOSC.

This approach assumes the structure of a building is located above the subsurface impacts and volatile emissions will enter through the floor slab and does not incorporate dispersion, dilution, or bioattenuation. However, in actuality, the concentrations of volatile compounds may naturally attenuate over time. In fact, concentrations at the FOSC monitoring wells exhibit a downward trend in concentrations with time (Figure 20 attached). This approach also assumes an infinite subsurface contamination source, while the distribution across the site is not homogeneous. In general, the assumptions used to estimate indoor air exposures and risks would tend to overestimate indoor air concentrations. The results obtained with the J&E Model also support the conclusion that risk and hazards calculated with the VISL are overestimates.

In summary, indoor air sample concentrations collected in May 2013 were less than commercial indoor air VISLs with one exception, chloroform. However, estimated risk associated with chloroform is less than the HSRA target risk level of 10^{-5}. Risk calculations were completed using the May 2013 soil vapor sampling results and the March 2015 groundwater sampling results in the SG_IA Calc and GW_IA_Calc modules of the VISL Calculator in order to estimate the indoor air concentrations and risks and hazards for detected constituents in soil vapor and groundwater. When site-specific conditions are included in the calculations, the resulting estimated cumulative hazards and risks indicate no unacceptable risk or hazards for commercial receptors potentially exposed via indoor air vapor emissions based on maintaining the current hard cover and current building parameters. Therefore, the site is compliant with vapor risk requirements under HSRA and the VRP for delisting.

References

Marion Environmental Inc., 2015. Compliance Status Report and Voluntary Remediation Program Application, Fountain Oaks Shopping Center, December 2015.

Property Solutions Inc., 2013. Limited Subsurface Investigation of Shoppes at Fountain Oaks, Atlanta, Fulton County, Georgia. June 6, 2013.

USEPA, 2004. Johnson and Ettinger Model and User's Guide for Evaluating Subsurface Vapor Intrusion into Buildings, Office of Emergency and Remedial Response, February 2004.

USEPA, 2014. Region 4 Human Health Risk Assessment Supplemental Guidance, January 2014.

USEPA, 2015a. OSWER Technical Guide for Assessing and Mitigating the Vapor Intrusion Pathway from Subsurface Vapor Sources to Indoor Air, OSWER Publication 9200.2-154, June 2015.

USEPA, 2015b. ProUCL Version 5.1, Statistical Software for Environmental Applications for Data Sets with and without Non-Detect Observation, October 2015.

USEPA, 2016. Vapor Intrusion Screening Level (VISL) Calculator Version 3.5.1 (May 2016 RSLs).

TABLES

Table 1
Fountain Oaks Dry Cleaning Site - Fountain Oaks Shopping Center
Summa Cannister Soil Gas Data Summary- 2013

Parameter	**May 2013 Maximum Reported Concentration, ug/m^3 (a)**	**Soil Gas VISL (Target Risk of 10^{-6} and Hazard Index of 0.1), ug/m^3 (b)**
1,2,4-Trimethylbenzene	34	880
1,3,5-Trimethylbenzene	11	880 (c)
2-Butanone	43	73000
4-Ethyltoluene	10	NA
Acetone	250	450000
Benzene	140	52
Carbon disulfide	8.0	10000
Chlorobenzene	20	730
Chloroform	8.6	18
Dichlorodifluoromethane	31	1500
Ethylbenzene	32	160
Methyl isobutyl ketone	36	44000
Tetrachloroethene	1200	580
Toluene	170	73000
Trichloroethene	7.2	29
Trichlorofluoromethane	58	NA
Xylenes	91	1500

ug/m^3 = micrograms per cubic meter
NA Screening level not available
(a) Limited Subsurface Investigation of Shoppes at Fountain Oaks, Property Solutions Inc., June 2013
(b) Commercial Soil Gas Vapor Intrusion Screening Level (VISL), USEPA, May 2016
(c) 1,2,4-Trimethylbenzene used as a surrogate
Bolded parameter had maximum reported concentrations greater than the VISL.
Compounds in italics were not detected in groundwater.

Prepared by: LMS 5/2/17
Checked by: LWC 5/4/17

Table 2
Fountain Oaks Dry Cleaning Site - Fountain Oaks Shopping Center
Indoor Air Data Summary- 2013

Parameter	May 2013 Maximum Reported Concentration, ug/m^3 (a)	Indoor Air VISL (Target Risk of 10^{-6} and Hazard Index of 0.1), ug/m^3 (b)
1,2,4-Trimethylbenzene	0.73	26
1,3,5-Trimethylbenzene	<0.5	26 (c)
2-Butanone	3.6	2200
4-Ethyltoluene	<0.5	NA
Acetone	250	14000
Benzene	1.0	1.6
Carbon disulfide	3.0	310
Carbon tetrachloride	0.59	2.0
Chlorobenzene	<0.47	22
Chloromethane	1.6	39
Chloroform	1.1	0.53
Dichlorodifluoromethane	3.4	44
Ethylbenzene	0.92	4.9
Methyl isobutyl ketone	<0.83	1300
Methylene chloride	0.72	260
Styrene	2.0	440
Tetrachloroethene	3.1	18
Toluene	4.5	2200
1,1,1-Trichloroethane	3.1	2200
Trichloroethene	<0.55	0.88
Trichlorofluoromethane	23	NA
1,1,2-Trichlorotrifluoroethane	16	13000
Xylenes	2.6	44

ug/m^3 = micrograms per cubic meter
ND Not Detected in Indoor Air
NA Screening level not available
(a) Limited Subsurface Investigation of Shoppes at Fountain Oaks, Property Solutions Inc., June 2013
(b) Commercial Indoor Air Screening Level (VISL), USEPA, May 2016
(c) 1,2,4-Trimethylbenzene used as a surrogate
Bolded parameter had maximum reported concentrations greater than the VISL.
Compounds in italics were not detected in groundwater.

Prepared by: LMS 5/2/17
Checked by: LWC 5/4/17

Table 3
Fountain Oaks Dry Cleaning Site - Fountain Oaks Shopping Center
Groundwater Data Summary- March 2015

Parameter	Frequency of Detection	Maximum Reported Concentration, ug/L (a)	Exposure Point Concentration	Basis
Chloroform	6/10	14	10.5	95% KM (t) UCL
cis 1,2-Dichloroethene	10/10	210	NA	
trans 1,2-Dichloroethene	1/10	1.2	NA	
Di-isopropyl ether	1/10	1	1	Maximum
Methyl tert butyl ether	3/10	15	15	Maximum
Tetrachloroethene	8/10	810	447	95% KM (Chebyshev) UCL
Trichloroethene	8/10	120	104	97.5% KM (Chebyshev) UCL

Source: Compliance Status Report and Voluntary Remediation Program Application, Fountain Oaks Shopping Center, Marion Environmental Inc., December 2015
(a) Table 9 Data for wells within plume with detections of COPCs: MW-2, MW-3, MW-4, MW-9, MW-13S, MW-14, MW-26, MW-27, MW-29, and MW-30
NA No inhalation toxicity data available for this constituent.
% percent
UCL Upper Confidence Limit of the Arithmetic Mean
KM Kaplan Meier
UCLs calculated using ProUCL Version 5.1

Prepared by: LMS 12/29/16
Checked by: LWC 12/30/16

Table 4
Northeastern Area (Chastain Cleaners Source) - Fountain Oaks Shopping Center
Groundwater Data Summary- March 2015

Parameter	Frequency of Detection	Maximum Reported Concentration, ug/L (a)	Exposure Point Concentration, ug/L	Basis
Acetone	2/13	86	86	Maximum
Benzene	5/13	140	48.7	95% Hall's Bootstrap
sec-Butylbenzene	1/13	1.9	NA	
Chloroform	4/13	11	7.56	95% KM (t) UCL
Cumene	1/13	3.2	3.2	Maximum
cis 1,2-Dichloroethene	12/13	100	NA	
Di-isopropyl ether	4/13	46	12.6	95% KM (t) UCL
Methyl tert butyl ether	6/13	2500	661	95% KM (t) UCL
Tetrachloroethene	11/13	520	282	95% KM Adj Gamma UCL
Trichloroethene	10/13	35	16.4	95% KM Adj Gamma UCL
Vinyl chloride	4/13	11	3.77	95% KM (t) UCL

Source: Compliance Status Report and Voluntary Remediation Program Application, Fountain Oaks Shopping Center, Marion Environmental Inc., December 2015
(a) Table 9 Data for wells within plume with detections of COPCs: MW-5, MW-6, MW-8, MW-15, MW-16, MW-18, MW-19, MW-20, MW-21, MW-22, MW-23, MW-28, and MW-33
NA No inhalation toxicity data available for this constituent.
% percent
UCL Upper Confidence Limit of the Arithmetic Mean
KM Kaplan Meier
Adj Adjusted
UCLs calculated using ProUCL Version 5.1

Prepared by: LMS 12/29/16
Checked by: LWC 12/30/16

TABLE 5

Soil Gas Investigation - Fountain Oaks Former Dry Cleaning Area
EPA-OLEM VAPOR INTRUSION ASSESSMENT
Sub-slab or Exterior Soil Gas Concentration to Indoor Air Concentration (SGC-IAC) Calculator Version 3.5.1 (May 2016 RSLs)

Parameter	Symbol	Value	Instructions
Exposure Scenario	Scenario	Commercial	Select residential or commercial scenario from pull down list
Target Risk for Carcinogens	TCR_SG	1.00E-05	Enter target risk for carcinogens (for comparison to the calculated VI carcinogenic risk in column F)
Target Hazard Quotient for Non-Carcinogens	THQ_SG	1	Enter target hazard quotient for non-carcinogens (for comparison to the calculated VI hazard in column G)

CAS	Chemical Name	Site Sub-slab or Exterior Soil Gas Concentration Csg (ug/m^3)	Calculated Indoor Air Concentration Cia (ug/m^3)	VI Carcinogenic Risk CR	VI Hazard HQ	Inhalation Unit Risk IUR (ug/m^3)$^{-1}$	IUR Source*	Reference Concentration RfC (mg/m^3)	RFC Source*	Mutagenic Indicator i
71-43-2	Benzene	1.4E+02	4.20E+00	2.7E-06	3E-02	7.80E-06	I	3.00E-02	I	
127-18-4	Tetrachloroethylene	1.2E+03	3.60E+01	7.6E-07	2E-01	2.60E-07	I	4.00E-02	I	
			Totals (Risk & HI)	**3.E-06**	**0.2**					

Notes:

(1) **Inhalation Pathway Exposure Parameters (RME):**

Exposure Scenario	Units	Residential Symbol	Residential Value	Commercial Symbol	Commercial Value	Selected (based on scenario) Symbol	Selected Value
Averaging time for carcinogens	(yrs)	ATc_R_SG	70	ATc_C_SG	70	ATc_SG	70
Averaging time for non-carcinogens	(yrs)	ATnc_R_SG	26	ATnc_C_SG	25	ATnc_SG	25
Exposure duration	(yrs)	ED_R_SG	26	ED_C_SG	25	ED_SG	25
Exposure frequency	(days/yr)	EF_R_SG	350	EF_C_SG	250	EF_SG	250
Exposure time	(hr/day)	ET_R_SG	24	ET_C_SG	8	ET_SG	8

(2) **Generic Attenuation Factors:**

	Units	Residential Symbol	Residential Value	Commercial Symbol	Commercial Value	Selected (based on scenario) Symbol	Selected Value
Groundwater	(-)	AFgw_R_SG	0.001	AFgw_C_SG	0.001	AFgw_SG	0.001
Sub-Slab and Exterior Soil Gas	(-)	AFss_R_SG	0.03	AFss_C_SG	0.03	AFss_SG	0.03

(3) **Formulas**

Cia, target = MIN(Cia,c; Cia,nc)
Cia,c (ug/m3) = TCR x ATc x (365 days/yr) x (24 hrs/day) / (ED x EF x ET x IUR)
Cia,nc (ug/m3) = THQ x ATnc x (365 days/yr) x (24 hrs/day) x RfC x (1000 ug/mg) / (ED x EF x ET)

(4) **Special Case Chemicals**

Residential Symbol	Residential Value	Commercial Symbol	Commercial Value	Selected (based on scenario) Symbol	Selected Value
mIURTCE_R_SG	1.00E-06	mIURTCE_C_SG	0.00E+00	mIURTCE_SG	0.00E+00
IURTCE_R_SG	3.10E-06	IURTCE_C_SG	4.10E-06	IURTCE_SG	4.10E-06

Mutagenic Chemicals — The exposure durations and age-dependent adjustment factors for mutagenic-mode-of-action are listed in the table below:

Note: This section applies to trichloroethylene and other mutagenic chemicals, but not to vinyl chloride.

Age Cohort	Exposure Duration	Age-dependent adjustment factor
0 - 2 years	2	10
2 - 6 years	4	3
6 - 16 years	10	3
16 - 26 years	10	1

Mutagenic-mode-of-action (MMOA) adjustment factor 25 This factor is used in the equations for mutagenic chemicals.

Notation:
I = IRIS: EPA Integrated Risk Information System (IRIS). Available online at: http://www.epa.gov/iris/subst/index.html
P = PPRTV. EPA Provisional Peer Reviewed Toxicity Values (PPRTVs). Available online at: http://hhpprtv.ornl.gov/pprtv.shtml
A = Agency for Toxic Substances and Disease Registry (ATSDR) Minimum Risk Levels (MRLs). Available online at: http://www.atsdr.cdc.gov/mrls/index.html
CA = California Environmental Protection Agency/Office of Environmental Health Hazard Assessment assessments. Available online at: http://www.oehha.ca.gov/risk/ChemicalDB/index.asp
H = HEAST. EPA Superfund Health Effects Assessment Summary Tables (HEAST) database. Available online at: http://epa-heast.ornl.gov/heast.shtml
S = See RSL User Guide, Section 5
X = PPRTV Appendix
Mut = Chemical acts according to the mutagenic-mode-of-action, special exposure parameters apply (see footnote (4) above).
VC = Special exposure equation for vinyl chloride applies (see Navigation Guide for equation).
TCE = Special mutagenic and non-mutagenic IURs for trichloroethylene apply (see footnote (4) above).
Yellow highlighting indicates site-specific parameters that may be edited by the user.
Blue highlighting indicates exposure factors that are based on Risk Assessment Guidance for Superfund (RAGS) or EPA vapor intrusion guidance, which generally should not be change
Pink highlighting indicates VI carcinogenic risk greater than the target risk for carcinogens (TCR) or VI Hazard greater than or equal to the target hazard quotient for non-carcinogens (THQ).

TABLE 6

Groundwater Concentrations on North Side (Fountain Oaks Former Dry Cleaning Site)
EPA-OLEM VAPOR INTRUSION ASSESSMENT
Groundwater Concentration to Indoor Air Concentration (GWC-IAC) Calculator Version 3.5.1 (May 2016 RSLs)

Parameter	Symbol	Value	Instructions
Exposure Scenario	Scenario	Commercial	Select residential or commercial scenario from pull down list
Target Risk for Carcinogens	TCR	1.00E-05	Enter target risk for carcinogens (for comparison to the calculated VI carcinogenic risk in column F)
Target Hazard Quotient for Non-Carcinogens	THQ	1	Enter target hazard quotient for non-carcinogens (for comparison to the calculated VI hazard in column G)
Average Groundwater Temperature (°C)	Tgw	17.8	Enter average of the stabilized groundwater temperature to correct Henry's Law Constant for groundwater target concentrations

CAS	Chemical Name	Site Groundwater Concentration Cgw (ug/L)	Calculated Indoor Air Concentration Cia (ug/m^3)	VI Carcinogenic Risk CR	VI Hazard HQ	Inhalation Unit Risk IUR (ug/m^3)$^{-1}$	IUR Source*	Reference Concentration RfC (mg/m^3)	RFC Source*	Mutagenic Indicator i
67-66-3	Chloroform	1.1E+01	1.15E+00	1.1E-06	1.3E-03	2.30E-05	I	9.80E-02	A	
108-20-3	Diisopropyl Ether	1.0E+00	1.05E-01	No IUR	1.7E-05			7.00E-01	P	
1634-04-4	Methyl tert-Butyl Ether (MTBE)	1.5E+01	2.66E-01	2.8E-09	1.0E-05	2.60E-07	CA	3.00E+00	I	
127-18-4	Tetrachloroethylene	4.5E+02	2.18E+02	2.3E-06	6.2E-01	2.60E-07	I	4.00E-02	I	
79-01-6	Trichloroethylene	1.0E+02	2.94E+01	4.9E-06	**1.7E+00**	see note	I	2.00E-03	I	TCE
		Total (Risk & HI):		**8.E-06**	**2**					

Notes:

(1) **Inhalation Pathway Exposure Parameters (RME):**

Exposure Scenario	Units	Residential Symbol	Residential Value	Commercial Symbol	Commercial Value	Selected (based on scenario) Symbol	Selected Value
Averaging time for carcinogens	(yrs)	ATc_R_GW	70	ATc_C_GW	70	ATc_GW	70
Averaging time for non-carcinogens	(yrs)	ATnc_R_GW	26	ATnc_C_GW	25	Atnc_GW	25
Exposure duration	(yrs)	ED_R_GW	26	ED_C_GW	25	ED_GW	25
Exposure frequency	(days/yr)	EF_R_GW	350	EF_C_GW	250	EF_GW	250
Exposure time	(hr/day)	ET_R_GW	24	ET_C_GW	4	ET_GW	4

(2) **Generic Attenuation Factors:**

Source Medium of Vapors	Units	Residential Symbol	Residential Value	Commercial Symbol	Commercial Value	Selected (based on scenario) Symbol	Selected Value
Groundwater	(-)	AFgw_R_GW	0.001	AFgw_C_GW	0.001	AFgw_GW	0.001
Sub-Slab and Exterior Soil Gas	(-)	AFss_R_GW	0.03	AFss_C_GW	0.03	AFss_GW	0.03

(3) **Formulas**

Cia, target = MIN(Cia,c; Cia,nc)
Cia,c (ug/m3) = TCR x ATc x (365 days/yr) x (24 hrs/day) / (ED x EF x ET x IUR)
Cia,nc (ug/m3) = THQ x ATnc x (365 days/yr) x (24 hrs/day) x RfC x (1000 ug/mg) / (ED x EF x ET)

(4) **Special Case Chemicals**

	Residential Symbol	Residential Value	Commercial Symbol	Commercial Value	Selected (based on scenario) Symbol	Selected Value
Trichloroethylene	mIURTCE_R_GW	1.00E-06	IIURTCE_C_GW	0.00E+00	mIURTCE_GW	0.00E+00
	IURTCE_R_GW	3.10E-06	IURTCE_C_GW	4.10E-06	IURTCE_GW	4.10E-06

Mutagenic Chemicals — The exposure durations and age-dependent adjustment factors for mutagenic-mode-of-action are listed in the table below:

Note: This section applies to trichloroethylene and other mutagenic chemicals, but not to vinyl chloride.

Age Cohort	Exposure Duration	Age-dependent adjustment factor
0 - 2 years	2	10
2 - 6 years	4	3
6 - 16 years	10	3
16 - 26 years	10	1

Mutagenic-mode-of-action (MMOA) adjustment factor 25 This factor is used in the equations for mutagenic chemicals.

Vinyl Chloride — See the Navigation Guide equation for Cia,c for vinyl chloride.

Notation:

I = IRIS: EPA Integrated Risk Information System (IRIS). Available online at: http://www.epa.gov/iris/subst/index.html
P = PPRTV. EPA Provisional Peer Reviewed Toxicity Values (PPRTVs). Available online at: http://hhpprtv.ornl.gov/pprtv.shtml
A = Agency for Toxic Substances and Disease Registry (ATSDR) Minimum Risk Levels (MRLs). Available online at: http://www.atsdr.cdc.gov/mrls/index.html
CA = California Environmental Protection Agency/Office of Environmental Health Hazard Assessment assessments. Available online at: http://www.oehha.ca.gov/risk/ChemicalDB/index.asp
H = HEAST. EPA Superfund Health Effects Assessment Summary Tables (HEAST) database. Available online at: http://epa-heast.ornl.gov/heast.shtml
S = See RSL User Guide, Section 5
X = PPRTV Appendix
Mut = Chemical acts according to the mutagenic-mode-of-action, special exposure parameters apply (see footnote (4) above).
VC = Special exposure equation for vinyl chloride applies (see Navigation Guide for equation).
TCE = Special mutagenic and non-mutagenic IURs for trichloroethylene apply (see footnote (4) above).
Yellow highlighting indicates site-specific parameters that may be edited by the user.
Blue highlighting indicates exposure factors that are based on Risk Assessment Guidance for Superfund (RAGS) or EPA vapor intrusion guidance, which generally should not be changed.
Pink highlighting indicates VI carcinogenic risk greater than the target risk for carcinogens (TCR) or VI Hazard greater than or equal to the target hazard quotient for non-carcinogens (THQ).

TABLE 7

Groundwater Concentrations from Northeastern Area (Chastain Cleaners Source)
EPA-OLEM VAPOR INTRUSION ASSESSMENT
Groundwater Concentration to Indoor Air Concentration (GWC-IAC) Calculator Version 3.5.1 (May 2016 RSLs)

Parameter	Symbol	Value	Instructions
Exposure Scenario	Scenario	Commercial	Select residential or commercial scenario from pull down list
Target Risk for Carcinogens	TCR	1.00E-05	Enter target risk for carcinogens (for comparison to the calculated VI carcinogenic risk in column F)
Target Hazard Quotient for Non-Carcinogens	THQ	1	Enter target hazard quotient for non-carcinogens (for comparison to the calculated VI hazard in column G)
Average Groundwater Temperature (^oC)	Tgw	17.8	Enter average of the stabilized groundwater temperature to correct Henry's Law Constant for groundwater target concentrations

CAS	Chemical Name	Site Groundwater Concentration Cgw (ug/L)	Calculated Indoor Air Concentration Cia (ug/m^3)	VI Carcinogenic Risk CR	VI Hazard HQ	Inhalation Unit Risk IUR (ug/m^3)$^{-1}$	IUR Source*	Reference Concentration RfC (mg/m^3)	RFC Source*	Mutagenic Indicator i
67-64-1	Acetone	8.6E+01	9.01E-02	No IUR	3.3E-07			3.10E+01	A	
71-43-2	Benzene	4.9E+01	7.90E+00	2.5E-06	3.0E-02	7.80E-06	I	3.00E-02	I	
67-66-3	Chloroform	7.6E+00	8.30E-01	7.8E-07	9.7E-04	2.30E-05	I	9.80E-02	A	
98-82-8	Cumene	3.2E+00	8.91E-01	No IUR	2.5E-04			4.00E-01	I	
108-20-3	Diisopropyl Ether	1.3E+01	1.32E+00	No IUR	2.2E-04			7.00E-01	P	
1634-04-4	Methyl tert-Butyl Ether (MTBE)	6.6E+02	1.17E+01	1.2E-07	4.5E-04	2.60E-07	CA	3.00E+00	I	
127-18-4	Tetrachloroethylene	2.8E+02	1.37E+02	1.5E-06	3.9E-01	2.60E-07	I	4.00E-02	I	
79-01-6	Trichloroethylene	1.6E+01	4.64E+00	7.8E-07	2.6E-01	see note	I	2.00E-03	I	TCE
75-01-4	Vinyl Chloride	3.8E+00	3.49E+00	6.3E-07	4.0E-03	4.40E-06	I	1.00E-01	I	VC
		Total (Risk & HI):		**6.E-06**	**0.7**					

Notes:

(1) **Inhalation Pathway Exposure Parameters (RME):**

Exposure Scenario	Units	Residential Symbol	Residential Value	Commercial Symbol	Commercial Value	Selected (based on scenario) Symbol	Selected Value
Averaging time for carcinogens	(yrs)	ATc_R_GW	70	ATc_C_GW	70	ATc_GW	70
Averaging time for non-carcinogens	(yrs)	ATnc_R_GW	26	ATnc_C_GW	25	Atnc_GW	25
Exposure duration	(yrs)	ED_R_GW	26	ED_C_GW	25	ED_GW	25
Exposure frequency	(days/yr)	EF_R_GW	350	EF_C_GW	250	EF_GW	250
Exposure time	(hr/day)	ET_R_GW	24	ET_C_GW	4	ET_GW	4

(2) **Generic Attenuation Factors:**

Source Medium of Vapors	Units	Residential Symbol	Residential Value	Commercial Symbol	Commercial Value	Selected (based on scenario) Symbol	Selected Value
Groundwater	(-)	AFgw_R_GW	0.001	AFgw_C_GW	0.001	AFgw_GW	0.001
Sub-Slab and Exterior Soil Gas	(-)	AFss_R_GW	0.03	AFss_C_GW	0.03	AFss_GW	0.03

(3) **Formulas**

Cia, target = MIN(Cia,c; Cia,nc)
Cia,c (ug/m3) = TCR x ATc x (365 days/yr) x (24 hrs/day) / (ED x EF x ET x IUR)
Cia,nc (ug/m3) = THQ x ATnc x (365 days/yr) x (24 hrs/day) x RfC x (1000 ug/mg) / (ED x EF x ET)

(4) **Special Case Chemicals**

Trichloroethylene	Residential Symbol	Residential Value	Commercial Symbol	Commercial Value	Selected (based on scenario) Symbol	Selected Value
	mIURTCE_R_GW	1.00E-06	mIURTCE_C_GW	0.00E+00	mIURTCE_GW	0.00E+00
	IURTCE_R_GW	3.10E-06	IURTCE_C_GW	4.10E-06	IURTCE_GW	4.10E-06

Mutagenic Chemicals — The exposure durations and age-dependent adjustment factors for mutagenic-mode-of-action are listed in the table below:

Note: This section applies to trichloroethylene and other mutagenic chemicals, but not to vinyl chloride.

Age Cohort	Exposure Duration	Age-dependent adjustment factor
0 - 2 years	2	10
2 - 6 years	4	3
6 - 16 years	10	3
16 - 26 years	10	1

Mutagenic-mode-of-action (MMOA) adjustment factor 25 This factor is used in the equations for mutagenic chemicals.

Vinyl Chloride — See the Navigation Guide equation for Cia,c for vinyl chloride.

Notation:

I = IRIS: EPA Integrated Risk Information System (IRIS). Available online at http://www.epa.gov/iris/subst/index.html
P = PPRTV. EPA Provisional Peer Reviewed Toxicity Values (PPRTVs). Available online at http://hhpprtv.ornl.gov/pprtv.shtml
A = Agency for Toxic Substances and Disease Registry (ATSDR) Minimum Risk Levels (MRLs). Available online at http://www.atsdr.cdc.gov/mrls/index.html
CA = California Environmental Protection Agency/Office of Environmental Health Hazard Assessment assessments. Available online at: http://www.oehha.ca.gov/risk/ChemicalDB/index.asp
H = HEAST. EPA Superfund Health Effects Assessment Summary Tables (HEAST) database. Available online at: http://epa-heast.ornl.gov/heast.shtml
S = See RSL User Guide, Section 5
X = PPRTV Appendix
Mut = Chemical acts according to the mutagenic-mode-of-action, special exposure parameters apply (see footnote (4) above).
VC = Special exposure equation for vinyl chloride applies (see Navigation Guide for equation).
TCE = Special mutagenic and non-mutagenic IURs for trichloroethylene apply (see footnote (4) above).
Yellow highlighting indicates site-specific parameters that may be edited by the user
Blue highlighting indicates exposure factors that are based on Risk Assessment Guidance for Superfund (RAGS) or EPA vapor intrusion guidance, which generally should not be changed.
Pink highlighting indicates VI carcinogenic risk greater than the target risk for carcinogens (TCR) or VI Hazard greater than or equal to the target hazard quotient for non-carcinogens (THQ).

FIGURE 20

GROUNDWATER QUALITY MAP
MARCH 2015 & MOST RECENT PREVIOUS RESULTS
FOUNTAIN OAKS SHOPPING CENTER
4920 ROSWELL ROAD, SANDY SPRINGS, GA
PROJECT: 15513
FACILITY: HSI No. 10807
SCALE: 1" = 100'
DATE REVISED: 10/19/15
APPROVED:
MARION ENVIRONMENTAL, INC.
115 PARMENAS LANE
CHATTANOOGA, TN
423-499-4919
www.marionenv.com
MEI
FIGURE 20
ALL RESULTS SHOWN IN ug/L (ppb)
1 inch = 100 ft.
(IN FEET)
50 0 50 100 200
BASE MAP PROVIDED BY
ARMSTRONG LAND SURVEYING
DOUGLASVILLE, GEORGIA
115 W. Belle Isle Rd
W. BELLE ISLE ROAD
ROSWELL ROAD
U.S. HIGHWAY 19
STATE ROUTE 9
LONG ISLAND TERRACE
Long Island Terrace
(Undeveloped Parcel)
FORMER DRYCLEANER
CHASTAIN CLEANERS
APARTMENT BUILDING
CITCO/ RRFM
UST Basin
STORM WATER DETENTION BASIN
FUEL STATION
AREA 596,266 SF 13.688 ACRES
MW-13S 11/11/2009: PCE: 160 TCE: 9.7 cDCE: 12; 03/10/15: PCE: 22 TCE: 2 cDCE: 3.4
MW-13D 12/15/08: PCE: ND TCE: ND cDCE: ND; 03/11/15: PCE: ND TCE: ND cDCE: ND
MW-24 05/21/09: PCE: ND TCE: ND cDCE: ND; 2009: ABANDONED PRIOR TO PAVING
MW-27 11/11/09: PCE: 61 TCE: 7 cDCE: 11; 03/11/15: PCE: 12 TCE: ND cDCE: 2
MW-26 11/11/09: PCE: 68 TCE: ND cDCE: ND; 03/30/15: PCE: 11 TCE: 1.8 cDCE: 4.2
MW-25 05/22/09: PCE: ND TCE: ND cDCE: ND; 03/11/15: PCE: ND TCE: ND cDCE: ND
MW-18 11/11/09: PCE: 87 TCE: 50 cDCE: 9.2; 03/11/15: PCE: 3.4 TCE: 3.3 cDCE: 4.9
MW-8 05/20/09: PCE: 12 TCE: 2.7 cDCE: 22; 03/11/15: PCE: 14 TCE: ND cDCE: 2.5
MW-19 05/21/09: PCE: 130 TCE: ND cDCE: ND; 03/12/15: PCE: 7.5 TCE: ND cDCE: ND
MW-17 12/15/08: PCE: ND TCE: ND cDCE: ND; 03/11/15: PCE: ND TCE: ND cDCE: ND
MW-2 11/11/09: PCE: 1,950 TCE: 140 cDCE: 67; 03/12/15: PCE: 775 TCE: 72 cDCE: 67
MW-3 11/10/09: PCE: 47 TCE: 7.2 cDCE: 12; 03/11/15: PCE: 33 TCE: 2.5 cDCE: 5.1
MW-30 11/11/09: PCE: 23 TCE: 1.4 cDCE: 1.4; 03/11/15: PCE: 10 TCE: ND cDCE: 1.4
MW-31 05/21/09: PCE: ND TCE: ND cDCE: ND; 03/11/15: PCE: ND TCE: ND cDCE: ND
MW-14 11/10/09: PCE: 70 TCE: 9.2 cDCE: 15; 03/11/15: PCE: 40 TCE: 2.8 cDCE: 6.0
MW-29 05/21/09: PCE: ND TCE: 1.1 cDCE: 7.4; 03/11/15: PCE: ND TCE: 1.1 cDCE: 7.9
MW-32 05/21/09: PCE: ND TCE: ND cDCE: ND; 03/11/15: PCE: ND TCE: ND cDCE: ND
MW-16 05/21/09: PCE: 66 TCE: 160 cDCE: 97 VC: 21; 03/11/15: PCE: 19 TCE: 35 cDCE: 100 VC: 11
MW-6 05/21/09: PCE: 22 TCE: 11 cDCE: 11; 03/10/15: PCE: 3.9 TCE: 5.5 cDCE: 26
MW-15 05/21/09: PCE: 10 TCE: 4 cDCE: 2.2; 03/11/15: PCE: 1.9 TCE: 3.7 cDCE: 22
MW-33 05/21/09: PCE: 2.2 TCE: ND cDCE: ND; 03/10/15: PCE: ND TCE: 2.2 cDCE: 17
MW-9 11/11/09: PCE: 100 TCE: 7.8 cDCE: 10; 03/12/15: PCE: 18 TCE: 1.1 cDCE: 1.9
MW-4 11/11/09: PCE: 290 TCE: 220 cDCE: 99; 03/12/15: PCE: ND TCE: 120 cDCE: 210
MW-22 05/20/09: PCE: 270 TCE: 13 cDCE: 900; 03/12/15: PCE: 520 TCE: 6.7 cDCE: 12
MW-5 05/20/09: PCE: 495 TCE: 19 cDCE: 37 VC: 2.2; 03/12/15: PCE: 170 TCE: 5.2 cDCE: 26 VC: 1.9
MW-21 05/21/09: PCE: ND TCE: ND cDCE: ND; 03/12/15: PCE: ND TCE: ND cDCE: 1.0
MW-20 05/20/09: PCE: 510 TCE: 17 cDCE: 25; 03/12/15: PCE: 160 TCE: 8.8 cDCE: 43
MW-23 05/20/09: PCE: 60 TCE: 3.8 cDCE: 14; 03/11/15: PCE: 120 TCE: 2.8 cDCE: 10
MW-28 05/20/09: PCE: 19 TCE: 26 cDCE: 95 VC: 9.2; 03/11/15: PCE: 18 TCE: 8 cDCE: 53 VC: 4.7
MW-7 05/20/09: PCE: ND TCE: ND cDCE: ND; 03/10/15: PCE: ND TCE: ND cDCE: ND

APPENDIX A

GROUNDWATER DATA

PROUCL INPUTS AND OUTPUTS

Table A-1
Fountain Oaks Shopping Center
Groundwater Analytical Results - March 2015
(Originally Table 9 from the December 2015 CSR and VRP Application)

Well ID	Date	Acetone	Benzene	sec-Butylbenzene	Chloroform	Cumene (Isopropylbenzene)	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Di-isopropyl ether	Methyl Ethyl Ketone (2-Butanone)	Methyl tert Butyl Ether	Tetrachloroethene	Trichloroethene	Vinyl chloride
MW-2	3/12/2015	<50	<1	<1	**5.6**	<1	**65**	<1	<1	<10	**1.0**	**740**	**70**	<1
(Dup.)	3/12/2015	<50	<1	<1	**6.1**	<1	**68**	<1	<1	<10	<1	**810**	**73**	<1
MW-3	3/11/2015	<50	<1	<1	**10**	<1	**5.1**	<1	<1	<10	**1.0**	**33**	**2.5**	<1
MW-4	3/12/2015	<50	<1	<1	<5	<1	**210**	**1.2**	<1	<10	<1	<10	**120**	<1
MW-5	3/12/2015	<50	**1.5**	<1	<5	<1	**26**	<1	<1	<10	<1	**170**	**5.2**	**1.9**
MW-6	3/10/2015	<50	<1	<1	<5	<1	**26**	<1	**1.7**	<10	**45**	**3.9**	**5.5**	<1
MW-7	3/10/2015	<50	<1	<1	<5	<1	<1	<1	<1	<10	<1	<1	<1	<1
MW-8	3/11/2015	<50	<1	<1	**11**	<1	**2.5**	<1	<1	<50	<1	**14**	<1	<1
MW-9	3/12/2015	<50	<1	<1	**14**	<1	**1.9**	<1	<1	<10	<1	**18**	**1.1**	<1
MW-13D	3/11/2015	**89**	<1	<1	<5	<1	<1	<1	<1	**11**	<1	<1	<1	<1
MW-13S	3/10/2015	<50	<1	<1	**12**	<1	**3.0**	<1	<1	<10	<1	**21**	**1.8**	<1
(Dup.)	3/10/2015	<50	<1	<1	**11**	<1	**3.7**	<1	<1	<10	<1	**23**	**2.1**	<1
MW-14	3/11/2015	<50	<1	<1	**9.7**	<1	**6.0**	<1	<1	<10	<1	**40**	**2.8**	<1
MW-15	3/11/2015	<50	<1	<1	<5	<1	**22**	<1	<1	<10	<1	**1.9**	**3.7**	<1
MW-16	3/11/2015	**54**	**2.2**	<1	<5	<1	**100**	<1	**5.7**	<10	**340**	**19**	**35**	**11**
MW-17	3/11/2015	<50	<1	<1	<5	<1	<1	<1	<1	<10	<1	<1	<1	<1
MW-18	3/11/2015	<50	<1	<1	<5	<1	**4.9**	<1	<1	<1	<1	**3.4**	**3.3**	<1
MW-19	3/12/2015	<50	<1	<1	**11**	<1	<1	<1	<1	<10	<1	**7.5**	<1	<1
MW-20	3/12/2015	<50	**15**	<1	<5	<1	**43**	<1	<1	<10	**2.5**	**160**	**8.8**	**2.2**
MW-21	3/12/2015	<50	**24**	<1	<5	<1	**1.0**	<1	**46**	<10	**2500**	<1	<1	<1
MW-22	3/12/2015	<50	<1	<1	**8.9**	<1	**12**	<1	<1	<10	<1	**520**	**6.7**	<1
MW-23	3/11/2015	<50	<1	<1	**5.6**	<1	**10**	<1	<1	<10	<1	**120**	**2.8**	<1
MW-25	3/11/2015	<50	<1	<10	<5	<1	<1	<1	<1	<10	<1	<1	<1	<1
MW-26	3/30/2015	<50	<1	<10	<5	<1	**4.2**	<1	<1	<10	<1	**11**	**1.8**	<1
MW-27	3/11/2015	<50	<1	<1	**12**	<1	**2.0**	<1	<1	<10	<1	**12**	<1	<1
MW-28	3/11/2015	**86**	**130**	**1.5**	<5	**2.6**	**48**	<1	**11**	<10	**820**	**16**	**7.0**	**3.9**
(Dup.)	3/11/2015	<50	**140**	**1.9**	<5	**3.2**	**58**	<1	**12**	<10	**890**	**20**	**8.9**	**4.7**
MW-29	3/11/2015	<50	<1	<10	<5	<1	**7.9**	<1	**1.0**	<10	**15**	<1	**1.1**	<1
MW-30	3/11/2015	<50	<1	<10	<5	<1	**1.4**	<1	<1	<10	<1	**10**	<1	<1
MW-31	3/11/2015	<50	<1	<10	<5	<1	<1	<1	<1	<10	<1	<1	<1	<1
MW-32	3/11/2015	<50	<1	<10	<5	<1	<1	<1	<1	<10	**1.9**	<1	<1	<1
MW-33	3/10/2015	<50	<1	<10	<5	<1	**17**	<1	<1	<10	**3.3**	<1	**2.2**	<1

NOTES: (1) Well #'s 1, 10, 11 & 12 abandoned/destroyed during 2007-2008 soil remediation. Well #24 abandoned/destroyed during 2009 road paving. (2) The "less than" symbol (<) indicates that the analyte was not detected above the given numerical method detection limit (MDL).

Monitoring wells within Northeastern Area (upgradient source) with detections of COPCs: MW-5, MW-6, MW-8, MW-15, MW-16, MW-18, MW-19, MW-20, MW-21, MW-22, MW-23, MW-28, and MW-33

Monitoring wells within Fountain Oaks Dry Cleaning Area with detections of COPCs: MW-2, MW-3, MW-4, MW-9, MW-13S, MW-14, MW-26, MW-27, MW-29, and MW-30

Table A-2
Groundwater Analytical Data for ProUCL
Fountain Oaks Dry Cleaning Site

Well ID	Chloroform	D_Chloroform	PCE	D_PCE	TCE	D_TCE
MW-2	6.1	1	810	1	73	1
MW-3	10	1	33	1	2.5	1
MW-4	5	0	10	0	120	1
MW-9	14	1	18	1	1.1	1
MW-13S	12	1	23	1	2.1	1
MW-14	9.7	1	40	1	2.8	1
MW-26	5	0	11	1	1.8	1
MW-27	12	1	12	1	1	0
MW-29	5	0	1	0	1.1	1
MW-30	5	0	10	1	1	0

Prepared by: LMS 12/29/16
Checked by: LWC 12/30/16

Table A-3
Fountain Oaks Dry Cleaning Site
ProUCL Statistics

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/29/2016 1:48:50 PM
From File	Table 9 GW 2015 Data_b.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operation	2000

Chloroform

General Statistics			
Total Number of Observations	10	Number of Distinct Observations	6
Number of Detects	6	Number of Non-Detects	4
Number of Distinct Detects	5	Number of Distinct Non-Detects	1
Minimum Detect	6.1	Minimum Non-Detect	5
Maximum Detect	14	Maximum Non-Detect	5
Variance Detects	7.379	Percent Non-Detects	40%
Mean Detects	10.63	SD Detects	2.716
Median Detects	11	CV Detects	0.255
Skewness Detects	-0.763	Kurtosis Detects	0.933
Mean of Logged Detects	2.332	SD of Logged Detects	0.29
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.944	Shapiro Wilk GOF Test	
5% Shapiro Wilk Critical Value	0.788	Detected Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.199	Lilliefors GOF Test	
5% Lilliefors Critical Value	0.325	Detected Data appear Normal at 5% Significance Level	
Detected Data appear Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	8.38	KM Standard Error of Mean	1.165
KM SD	3.362	95% KM (BCA) UCL	10.1
95% KM (t) UCL	10.52	95% KM (Percentile Bootstrap) UCL	10.17
95% KM (z) UCL	10.3	95% KM Bootstrap t UCL	10.24
90% KM Chebyshev UCL	11.87	95% KM Chebyshev UCL	13.46
97.5% KM Chebyshev UCL	15.65	99% KM Chebyshev UCL	19.97
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.38	Anderson-Darling GOF Test	
5% A-D Critical Value	0.698	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.225	Kolmogorov-Smirnov GOF	
5% K-S Critical Value	0.332	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	15.78	k star (bias corrected MLE)	8.002
Theta hat (MLE)	0.674	Theta star (bias corrected MLE)	1.329
nu hat (MLE)	189.4	nu star (bias corrected)	96.03
Mean (detects)	10.63		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	2.458	Mean	8.104
Maximum	14	Median	7.9
SD	3.936	CV	0.486
k hat (MLE)	4.032	k star (bias corrected MLE)	2.889
Theta hat (MLE)	2.01	Theta star (bias corrected MLE)	2.805
nu hat (MLE)	80.64	nu star (bias corrected)	57.78
Adjusted Level of Significance (β)	0.0267		
Approximate Chi Square Value (57.78, α)	41.31	Adjusted Chi Square Value (57.78, β)	38.9
95% Gamma Approximate UCL (use when n>=50)	11.34	95% Gamma Adjusted UCL (use when n<50)	12.04

Prepared by: LMS 12/29/16
Checked by: LWC 12/30/16

Table A-3
Fountain Oaks Dry Cleaning Site
ProUCL Statistics

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	8.38	SD (KM)	3.362
Variance (KM)	11.31	SE of Mean (KM)	1.165
k hat (KM)	6.211	k star (KM)	4.415
nu hat (KM)	124.2	nu star (KM)	88.29
theta hat (KM)	1.349	theta star (KM)	1.898
80% gamma percentile (KM)	11.42	90% gamma percentile (KM)	13.72
95% gamma percentile (KM)	15.83	99% gamma percentile (KM)	20.31

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (88.29, α)	67.63	Adjusted Chi Square Value (88.29, β)	64.5
95% Gamma Approximate KM-UCL (use when n>=	10.94	95% Gamma Adjusted KM-UCL (use when n<50)	11.47

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.886	Shapiro Wilk GOF Test
5% Shapiro Wilk Critical Value	0.788	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.252	Lilliefors GOF Test
5% Lilliefors Critical Value	0.325	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	8.385	Mean in Log Scale	2.038
SD in Original Scale	3.583	SD in Log Scale	0.452
95% t UCL (assumes normality of ROS data)	10.46	95% Percentile Bootstrap UCL	10.13
95% BCA Bootstrap UCL	10.23	95% Bootstrap t UCL	10.56
95% H-UCL (Log ROS)	11.76		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	2.043	KM Geo Mean	7.713
KM SD (logged)	0.409	95% Critical H Value (KM-Log)	2.1
KM Standard Error of Mean (logged)	0.142	95% H-UCL (KM -Log)	11.17
KM SD (logged)	0.409	95% Critical H Value (KM-Log)	2.1
KM Standard Error of Mean (logged)	0.142		

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	7.38	Mean in Log Scale	1.766
SD in Original Scale	4.663	SD in Log Scale	0.762
95% t UCL (Assumes normality)	10.08	95% H-Stat UCL	15.29

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics
Detected Data appear Normal Distributed at 5% Significance Level

Suggested UCL to Use
95% KM (t) UCL **10.52**

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

PCE

General Statistics

Total Number of Observations	10	Number of Distinct Observations	9
Number of Detects	8	Number of Non-Detects	2
Number of Distinct Detects	8	Number of Distinct Non-Detects	2
Minimum Detect	10	Minimum Non-Detect	1
Maximum Detect	810	Maximum Non-Detect	10
Variance Detects	77932	Percent Non-Detects	20%
Mean Detects	119.6	SD Detects	279.2
Median Detects	20.5	CV Detects	2.334
Skewness Detects	2.82	Kurtosis Detects	7.964
Mean of Logged Detects	3.387	SD of Logged Detects	1.431

Normal GOF Test on Detects Only

Prepared by: LMS 12/29/16
Checked by: LWC 12/30/16

Table A-3
Fountain Oaks Dry Cleaning Site
ProUCL Statistics

Shapiro Wilk Test Statistic	0.453	Shapiro Wilk GOF Test	
5% Shapiro Wilk Critical Value	0.818	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.487	Lilliefors GOF Test	
5% Lilliefors Critical Value	0.283	Detected Data Not Normal at 5% Significance Level	
Detected Data Not Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	95.9	KM Standard Error of Mean	80.57
KM SD	238.3	95% KM (BCA) UCL	257.2
95% KM (t) UCL	243.6	95% KM (Percentile Bootstrap) UCL	252.8
95% KM (z) UCL	228.4	95% KM Bootstrap t UCL	2257
90% KM Chebyshev UCL	337.6	95% KM Chebyshev UCL	447.1
97.5% KM Chebyshev UCL	599.1	99% KM Chebyshev UCL	897.6
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	1.55	Anderson-Darling GOF Test	
5% A-D Critical Value	0.769	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.42	Kolmogorov-Smirnov GOF	
5% K-S Critical Value	0.311	Detected Data Not Gamma Distributed at 5% Significance Level	
Detected Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	0.46	k star (bias corrected MLE)	0.371
Theta hat (MLE)	259.8	Theta star (bias corrected MLE)	322.4
nu hat (MLE)	7.366	nu star (bias corrected)	5.937
Mean (detects)	119.6		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	95.7
Maximum	810	Median	15
SD	251.3	CV	2.626
k hat (MLE)	0.255	k star (bias corrected MLE)	0.245
Theta hat (MLE)	374.9	Theta star (bias corrected MLE)	390
nu hat (MLE)	5.106	nu star (bias corrected)	4.907
Adjusted Level of Significance (β)	0.0267		
Approximate Chi Square Value (4.91, α)	1.11	Adjusted Chi Square Value (4.91, β)	0.832
95% Gamma Approximate UCL (use when n>=50)	423.2	95% Gamma Adjusted UCL (use when n<50)	564.7
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	95.9	SD (KM)	238.3
Variance (KM)	56804	SE of Mean (KM)	80.57
k hat (KM)	0.162	k star (KM)	0.18
nu hat (KM)	3.238	nu star (KM)	3.6
theta hat (KM)	592.3	theta star (KM)	532.8
80% gamma percentile (KM)	119	90% gamma percentile (KM)	289.2
95% gamma percentile (KM)	507.3	99% gamma percentile (KM)	1119
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (3.60, α)	0.57	Adjusted Chi Square Value (3.60, β)	0.401
95% Gamma Approximate KM-UCL (use when n>=	605.3	95% Gamma Adjusted KM-UCL (use when n<50)	860.3
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.74	Shapiro Wilk GOF Test	
5% Shapiro Wilk Critical Value	0.818	Detected Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.291	Lilliefors GOF Test	
5% Lilliefors Critical Value	0.283	Detected Data Not Lognormal at 5% Significance Level	
Detected Data Not Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	95.96	Mean in Log Scale	2.765
SD in Original Scale	251.2	SD in Log Scale	1.82
95% t UCL (assumes normality of ROS data)	241.6	95% Percentile Bootstrap UCL	253.2
95% BCA Bootstrap UCL	334.7	95% Bootstrap t UCL	2277

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95% H-UCL (Log ROS)	1689		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	2.709	KM Geo Mean	15.02
KM SD (logged)	1.808	95% Critical H Value (KM-Log)	4.933
KM Standard Error of Mean (logged)	0.611	95% H-UCL (KM -Log)	1506
KM SD (logged)	1.808	95% Critical H Value (KM-Log)	4.933
KM Standard Error of Mean (logged)	0.611		

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	96.25	Mean in Log Scale	2.801
SD in Original Scale	251.1	SD in Log Scale	1.847
95% t UCL (Assumes normality)	241.8	95% H-Stat UCL	2003

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics
Data do not follow a Discernible Distribution at 5% Significance Level

Suggested UCL to Use
95% KM (Chebyshev) UCL **447.1**

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

TCE

General Statistics

Total Number of Observations	10	Number of Distinct Observations	8
Number of Detects	8	Number of Non-Detects	2
Number of Distinct Detects	7	Number of Distinct Non-Detects	1
Minimum Detect	1.1	Minimum Non-Detect	1
Maximum Detect	120	Maximum Non-Detect	1
Variance Detects	2076	Percent Non-Detects	20%
Mean Detects	25.55	SD Detects	45.56
Median Detects	2.3	CV Detects	1.783
Skewness Detects	1.752	Kurtosis Detects	1.985
Mean of Logged Detects	1.568	SD of Logged Detects	1.87

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.62	Shapiro Wilk GOF Test
5% Shapiro Wilk Critical Value	0.818	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.441	Lilliefors GOF Test
5% Lilliefors Critical Value	0.283	Detected Data Not Normal at 5% Significance Level

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	20.64	KM Standard Error of Mean	13.31
KM SD	39.36	95% KM (BCA) UCL	44.65
95% KM (t) UCL	45.03	95% KM (Percentile Bootstrap) UCL	44.24
95% KM (z) UCL	42.53	95% KM Bootstrap t UCL	1163
90% KM Chebyshev UCL	60.56	95% KM Chebyshev UCL	78.65
97.5% KM Chebyshev UCL	103.7	99% KM Chebyshev UCL	153

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	1.32	Anderson-Darling GOF Test
5% A-D Critical Value	0.781	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.428	Kolmogorov-Smirnov GOF
5% K-S Critical Value	0.313	Detected Data Not Gamma Distributed at 5% Significance Level

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.394	k star (bias corrected MLE)	0.33
Theta hat (MLE)	64.79	Theta star (bias corrected MLE)	77.47
nu hat (MLE)	6.309	nu star (bias corrected)	5.277
Mean (detects)	25.55		

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Checked by: LWC 12/30/16

Table A-3
Fountain Oaks Dry Cleaning Site
ProUCL Statistics

Gamma ROS Statistics using Imputed Non-Detects
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)
For such situations, GROS method may yield incorrect values of UCLs and BTVs
This is especially true when the sample size is small.
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	20.44
Maximum	120	Median	1.95
SD	41.6	CV	2.035
k hat (MLE)	0.263	k star (bias corrected MLE)	0.25
Theta hat (MLE)	77.86	Theta star (bias corrected MLE)	81.62
nu hat (MLE)	5.251	nu star (bias corrected)	5.009
Adjusted Level of Significance (β)	0.0267		
Approximate Chi Square Value (5.01, α)	1.156	Adjusted Chi Square Value (5.01, β)	0.87
95% Gamma Approximate UCL (use when n>=50)	88.55	95% Gamma Adjusted UCL (use when n<50)	117.7

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	20.64	SD (KM)	39.36
Variance (KM)	1550	SE of Mean (KM)	13.31
k hat (KM)	0.275	k star (KM)	0.259
nu hat (KM)	5.499	nu star (KM)	5.182
theta hat (KM)	75.07	theta star (KM)	79.65
80% gamma percentile (KM)	30.35	90% gamma percentile (KM)	61.78
95% gamma percentile (KM)	98.84	99% gamma percentile (KM)	197

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (5.18, α)	1.237	Adjusted Chi Square Value (5.18, β)	0.937
95% Gamma Approximate KM-UCL (use when n>=	86.44	95% Gamma Adjusted KM-UCL (use when n<50)	114.1

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.739	Shapiro Wilk GOF Test	
5% Shapiro Wilk Critical Value	0.818	Detected Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.363	Lilliefors GOF Test	
5% Lilliefors Critical Value	0.283	Detected Data Not Lognormal at 5% Significance Level	

Detected Data Not Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	20.46	Mean in Log Scale	0.725
SD in Original Scale	41.59	SD in Log Scale	2.437
95% t UCL (assumes normality of ROS data)	44.57	95% Percentile Bootstrap UCL	44.14
95% BCA Bootstrap UCL	51.22	95% Bootstrap t UCL	889.5
95% H-UCL (Log ROS)	7676		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	1.254	KM Geo Mean	3.506
KM SD (logged)	1.685	95% Critical H Value (KM-Log)	4.641
KM Standard Error of Mean (logged)	0.57	95% H-UCL (KM -Log)	196.8
KM SD (logged)	1.685	95% Critical H Value (KM-Log)	4.641
KM Standard Error of Mean (logged)	0.57		

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	20.54	Mean in Log Scale	1.116
SD in Original Scale	41.55	SD in Log Scale	1.905
95% t UCL (Assumes normality)	44.62	95% H-Stat UCL	497.5

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics
Data do not follow a Discernible Distribution at 5% Significance Level

Suggested UCL to Use
975% KM (Chebyshev) UCL **103.7**

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Prepared by: LMS 12/29/16
Checked by: LWC 12/30/16

Table A-4
Groundwater Analytical Data for ProUCL
Northeastern Portion Fountain Oaks Shopping Center

Well ID	Benzene	D_Benzene	Chloroform	D_Chloroform	Di-isoproyl ether	D_Di-isoproyl ether	MTBE	D_MTBE	PCE	D_PCE	TCE	D_TCE	VC	D_VC
MW-5	1.5	1	5	0	1	0	1	0	170	1	5.2	1	1.9	1
MW-6	1	0	5	0	1.7	1	45	1	3.9	1	5.5	1	1	0
MW-8	1	0	11	1	1	0	1	0	14	1	1	0	1	0
MW-15	1	0	5	0	1	0	1	0	1.9	1	3.7	1	1	0
MW-16	2.2	1	5	0	5.7	1	340	1	19	1	35	1	11	1
MW-18	1	0	5	0	1	0	1	0	3.4	1	3.3	1	1	0
MW-19	1	0	11	1	1	0	1	0	7.5	1	1	0	1	0
MW-20	15	1	5	0	1	0	2.5	1	160	1	8.8	1	2.2	1
MW-21	24	1	5	0	46	1	2500	1	1	0	1	0	1	0
MW-22	1	0	8.9	1	1	0	1	0	520	1	6.7	1	1	0
MW-23	1	0	5.6	1	1	0	1	0	120	1	2.8	1	1	0
MW-28	140	1	5	0	12	1	890	1	20	1	8.9	1	4.7	1
MW-33	1	0	5	0	1	0	3.3	1	1	0	2.2	1	1	0

Prepared by: LMS 12/29/16
Checked by: LWC 12/30/16

Table A-5
Northeastern Portion
ProUCL Statistics

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/29/2016 12:22:21 PM
From File	Table 9 GW 2015 Data_c.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operation	2000

Benzene

General Statistics			
Total Number of Observations	13	Number of Distinct Observations	6
Number of Detects	5	Number of Non-Detects	8
Number of Distinct Detects	5	Number of Distinct Non-Detects	1
Minimum Detect	1.5	Minimum Non-Detect	1
Maximum Detect	140	Maximum Non-Detect	1
Variance Detects	3433	Percent Non-Detects	61.54%
Mean Detects	36.54	SD Detects	58.59
Median Detects	15	CV Detects	1.604
Skewness Detects	2.096	Kurtosis Detects	4.485
Mean of Logged Detects	2.404	SD of Logged Detects	1.853
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.69	Shapiro Wilk GOF Test	
5% Shapiro Wilk Critical Value	0.762	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.385	Lilliefors GOF Test	
5% Lilliefors Critical Value	0.343	Detected Data Not Normal at 5% Significance Level	
Detected Data Not Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	14.67	KM Standard Error of Mean	11.42
KM SD	36.81	95% KM (BCA) UCL	36.11
95% KM (t) UCL	35.02	95% KM (Percentile Bootstrap) UCL	34.96
95% KM (z) UCL	33.45	95% KM Bootstrap t UCL	98.24
90% KM Chebyshev UCL	48.92	95% KM Chebyshev UCL	64.43
97.5% KM Chebyshev UCL	85.96	99% KM Chebyshev UCL	128.3
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.351	Anderson-Darling GOF Test	
5% A-D Critical Value	0.71	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.225	Kolmogorov-Smirnov GOF	
5% K-S Critical Value	0.371	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	0.528	k star (bias corrected MLE)	0.344
Theta hat (MLE)	69.26	Theta star (bias corrected MLE)	106.1
nu hat (MLE)	5.276	nu star (bias corrected)	3.444
Mean (detects)	36.54		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	14.06
Maximum	140	Median	0.01
SD	38.56	CV	2.742
k hat (MLE)	0.166	k star (bias corrected MLE)	0.179
Theta hat (MLE)	84.56	Theta star (bias corrected MLE)	78.46
nu hat (MLE)	4.323	nu star (bias corrected)	4.659
Adjusted Level of Significance (β)	0.0301		
Approximate Chi Square Value (4.66, α)	0.998	Adjusted Chi Square Value (4.66, β)	0.783
95% Gamma Approximate UCL (use when n>=50)	65.64	95% Gamma Adjusted UCL (use when n<50)	83.71
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	14.67	SD (KM)	36.81
Variance (KM)	1355	SE of Mean (KM)	11.42
k hat (KM)	0.159	k star (KM)	0.173
nu hat (KM)	4.128	nu star (KM)	4.509
theta hat (KM)	92.39	theta star (KM)	84.59
80% gamma percentile (KM)	17.77	90% gamma percentile (KM)	44.14
95% gamma percentile (KM)	78.28	99% gamma percentile (KM)	174.6
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (4.51, α)	0.932	Adjusted Chi Square Value (4.51, β)	0.727
95% Gamma Approximate KM-UCL (use when n>=	70.93	95% Gamma Adjusted KM-UCL (use when n<50)	90.97

Lognormal GOF Test on Detected Observations Only

Prepared by: LMS 12/29/16
Checked by: LWC 12/30/16

Shapiro Wilk Test Statistic	0.939	Shapiro Wilk GOF Test	
5% Shapiro Wilk Critical Value	0.762	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.208	Lilliefors GOF Test	
5% Lilliefors Critical Value	0.343	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	14.1	Mean in Log Scale	-1.652
SD in Original Scale	38.54	SD in Log Scale	3.951
95% t UCL (assumes normality of ROS data)	33.15	95% Percentile Bootstrap UCL	32.97
95% BCA Bootstrap UCL	46.82	95% Bootstrap t UCL	132.1
95% H-UCL (Log ROS)	13966591		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	0.925	KM Geo Mean	2.521
KM SD (logged)	1.557	95% Critical H Value (KM-Log)	3.889
KM Standard Error of Mean (logged)	0.483	95% H-UCL (KM -Log)	48.68
KM SD (logged)	1.557	95% Critical H Value (KM-Log)	3.889
KM Standard Error of Mean (logged)	0.483		

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	14.36	Mean in Log Scale	0.498
SD in Original Scale	38.44	SD in Log Scale	1.899
95% t UCL (Assumes normality)	33.36	95% H-Stat UCL	121.2

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics
Detected Data appear Gamma Distributed at 5% Significance Level

Suggested UCL to Use

95% KM Bootstrap t UCL	95.73	**95% Hall's Bootstrap**	**48.68**

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Chloroform

General Statistics

Total Number of Observations	13	Number of Distinct Observations	4
Number of Detects	4	Number of Non-Detects	9
Number of Distinct Detects	3	Number of Distinct Non-Detects	1
Minimum Detect	5.6	Minimum Non-Detect	5
Maximum Detect	11	Maximum Non-Detect	5
Variance Detects	6.503	Percent Non-Detects	69.23%
Mean Detects	9.125	SD Detects	2.55
Median Detects	9.95	CV Detects	0.279
Skewness Detects	-1.231	Kurtosis Detects	0.621
Mean of Logged Detects	2.176	SD of Logged Detects	0.318

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.846	Shapiro Wilk GOF Test	
5% Shapiro Wilk Critical Value	0.748	Detected Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.269	Lilliefors GOF Test	
5% Lilliefors Critical Value	0.375	Detected Data appear Normal at 5% Significance Level	
Detected Data appear Normal at 5% Significance Level			

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	6.269	KM Standard Error of Mean	0.725
KM SD	2.264	95% KM (BCA) UCL	N/A
95% KM (t) UCL	7.561	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	7.462	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	8.444	95% KM Chebyshev UCL	9.43
97.5% KM Chebyshev UCL	10.8	99% KM Chebyshev UCL	13.48

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.489	Anderson-Darling GOF Test	
5% A-D Critical Value	0.657	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.294	Kolmogorov-Smirnov GOF	
5% K-S Critical Value	0.395	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			

Gamma Statistics on Detected Data Only

k hat (MLE)	14.51	k star (bias corrected MLE)	3.793
Theta hat (MLE)	0.629	Theta star (bias corrected MLE)	2.406
nu hat (MLE)	116	nu star (bias corrected)	30.34
Mean (detects)	9.125		

Gamma ROS Statistics using Imputed Non-Detects

Prepared by: LMS 12/29/16
Checked by: LWC 12/30/16

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)
For such situations, GROS method may yield incorrect values of UCLs and BTVs
This is especially true when the sample size is small.
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	4.057
Maximum	11	Median	3.113
SD	4.035	CV	0.995
k hat (MLE)	0.45	k star (bias corrected MLE)	0.398
Theta hat (MLE)	9.014	Theta star (bias corrected MLE)	10.21
nu hat (MLE)	11.7	nu star (bias corrected)	10.34
Adjusted Level of Significance (β)	0.0301		
Approximate Chi Square Value (10.34, α)	4.153	Adjusted Chi Square Value (10.34, β)	3.611
95% Gamma Approximate UCL (use when n>=50)	10.1	95% Gamma Adjusted UCL (use when n<50)	N/A

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	6.269	SD (KM)	2.264
Variance (KM)	5.125	SE of Mean (KM)	0.725
k hat (KM)	7.669	k star (KM)	5.95
nu hat (KM)	199.4	nu star (KM)	154.7
theta hat (KM)	0.818	theta star (KM)	1.054
80% gamma percentile (KM)	8.268	90% gamma percentile (KM)	9.705
95% gamma percentile (KM)	11.01	99% gamma percentile (KM)	13.73

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (154.71, α)	127	Adjusted Chi Square Value (154.71, β)	123.4
95% Gamma Approximate KM-UCL (use when n>=	7.64	95% Gamma Adjusted KM-UCL (use when n<50)	7.861

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.821	Shapiro Wilk GOF Test
5% Shapiro Wilk Critical Value	0.748	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.262	Lilliefors GOF Test
5% Lilliefors Critical Value	0.375	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	4.961	Mean in Log Scale	1.402
SD in Original Scale	3.314	SD in Log Scale	0.661
95% t UCL (assumes normality of ROS data)	6.6	95% Percentile Bootstrap UCL	6.527
95% BCA Bootstrap UCL	6.612	95% Bootstrap t UCL	7.087
95% H-UCL (Log ROS)	7.862		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	1.784	KM Geo Mean	5.953
KM SD (logged)	0.303	95% Critical H Value (KM-Log)	1.912
KM Standard Error of Mean (logged)	0.097	95% H-UCL (KM -Log)	7.366
KM SD (logged)	0.303	95% Critical H Value (KM-Log)	1.912
KM Standard Error of Mean (logged)	0.097		

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	4.538	Mean in Log Scale	1.304
SD in Original Scale	3.428	SD in Log Scale	0.626
95% t UCL (Assumes normality)	6.233	95% H-Stat UCL	6.751

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics
Detected Data appear Normal Distributed at 5% Significance Level

Suggested UCL to Use
95% KM (t) UCL **7.561**

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Di-isoproyl ether

General Statistics

Total Number of Observations	13	Number of Distinct Observations	5
Number of Detects	4	Number of Non-Detects	9
Number of Distinct Detects	4	Number of Distinct Non-Detects	1
Minimum Detect	1.7	Minimum Non-Detect	1
Maximum Detect	46	Maximum Non-Detect	1
Variance Detects	408.7	Percent Non-Detects	69.23%
Mean Detects	16.35	SD Detects	20.22
Median Detects	8.85	CV Detects	1.236
Skewness Detects	1.745	Kurtosis Detects	3.106
Mean of Logged Detects	2.146	SD of Logged Detects	1.381

Prepared by: LMS 12/29/16
Checked by: LWC 12/30/16

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.809	Shapiro Wilk GOF Test	
5% Shapiro Wilk Critical Value	0.748	Detected Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.335	Lilliefors GOF Test	
5% Lilliefors Critical Value	0.375	Detected Data appear Normal at 5% Significance Level	

Detected Data appear Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	5.723	KM Standard Error of Mean	3.85
KM SD	12.02	95% KM (BCA) UCL	N/A
95% KM (t) UCL	12.58	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	12.06	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	17.27	95% KM Chebyshev UCL	22.5
97.5% KM Chebyshev UCL	29.77	99% KM Chebyshev UCL	44.03

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.25	Anderson-Darling GOF Test	
5% A-D Critical Value	0.668	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.217	Kolmogorov-Smirnov GOF	
5% K-S Critical Value	0.403	Detected data appear Gamma Distributed at 5% Significance Level	

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.902	k star (bias corrected MLE)	0.392
Theta hat (MLE)	18.13	Theta star (bias corrected MLE)	41.7
nu hat (MLE)	7.215	nu star (bias corrected)	3.137
Mean (detects)	16.35		

Gamma ROS Statistics using Imputed Non-Detects
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)
For such situations, GROS method may yield incorrect values of UCLs and BTVs
This is especially true when the sample size is small.
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	5.038
Maximum	46	Median	0.01
SD	12.8	CV	2.54
k hat (MLE)	0.18	k star (bias corrected MLE)	0.19
Theta hat (MLE)	27.92	Theta star (bias corrected MLE)	26.51
nu hat (MLE)	4.69	nu star (bias corrected)	4.941
Adjusted Level of Significance (β)	0.0301		
Approximate Chi Square Value (4.94, α)	1.125	Adjusted Chi Square Value (4.94, β)	0.891
95% Gamma Approximate UCL (use when n>=50)	22.12	95% Gamma Adjusted UCL (use when n<50)	N/A

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	5.723	SD (KM)	12.02
Variance (KM)	144.5	SE of Mean (KM)	3.85
k hat (KM)	0.227	k star (KM)	0.226
nu hat (KM)	5.893	nu star (KM)	5.867
theta hat (KM)	25.25	theta star (KM)	25.36
80% gamma percentile (KM)	7.986	90% gamma percentile (KM)	17.27
95% gamma percentile (KM)	28.54	99% gamma percentile (KM)	58.97

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (5.87, α)	1.572	Adjusted Chi Square Value (5.87, β)	1.278
95% Gamma Approximate KM-UCL (use when n>=	21.36	95% Gamma Adjusted KM-UCL (use when n<50)	26.27

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	1	Shapiro Wilk GOF Test	
5% Shapiro Wilk Critical Value	0.748	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.153	Lilliefors GOF Test	
5% Lilliefors Critical Value	0.375	Detected Data appear Lognormal at 5% Significance Level	

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	5.112	Mean in Log Scale	-1.803
SD in Original Scale	12.77	SD in Log Scale	3.344
95% t UCL (assumes normality of ROS data)	11.42	95% Percentile Bootstrap UCL	11.69
95% BCA Bootstrap UCL	15.26	95% Bootstrap t UCL	41.08
95% H-UCL (Log ROS)	74211		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	0.66	KM Geo Mean	1.935
KM SD (logged)	1.192	95% Critical H Value (KM-Log)	3.192
KM Standard Error of Mean (logged)	0.382	95% H-UCL (KM -Log)	11.81
KM SD (logged)	1.192	95% Critical H Value (KM-Log)	3.192
KM Standard Error of Mean (logged)	0.382		

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	5.377	Mean in Log Scale	0.18

Prepared by: LMS 12/29/16
Checked by: LWC 12/30/16

SD in Original Scale	12.65	SD in Log Scale	1.529
95% t UCL (Assumes normality)	11.63	95% H-Stat UCL	20.95

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics
Detected Data appear Normal Distributed at 5% Significance Level

Suggested UCL to Use

95% KM (t) UCL	**12.58**

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

MTBE

General Statistics

Total Number of Observations	13	Number of Distinct Observations	7
Number of Detects	6	Number of Non-Detects	7
Number of Distinct Detects	6	Number of Distinct Non-Detects	1
Minimum Detect	2.5	Minimum Non-Detect	1
Maximum Detect	2500	Maximum Non-Detect	1
Variance Detects	955467	Percent Non-Detects	53.85%
Mean Detects	630.1	SD Detects	977.5
Median Detects	192.5	CV Detects	1.551
Skewness Detects	1.875	Kurtosis Detects	3.46
Mean of Logged Detects	4.394	SD of Logged Detects	2.907

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.74	Shapiro Wilk GOF Test
5% Shapiro Wilk Critical Value	0.788	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.283	Lilliefors GOF Test
5% Lilliefors Critical Value	0.325	Detected Data appear Normal at 5% Significance Level

Detected Data appear Approximate Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	291.4	KM Standard Error of Mean	207.4
KM SD	682.5	95% KM (BCA) UCL	607.6
95% KM (t) UCL	661	95% KM (Percentile Bootstrap) UCL	630
95% KM (z) UCL	632.5	95% KM Bootstrap t UCL	2166
90% KM Chebyshev UCL	913.5	95% KM Chebyshev UCL	1195
97.5% KM Chebyshev UCL	1586	99% KM Chebyshev UCL	2355

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.276	Anderson-Darling GOF Test
5% A-D Critical Value	0.762	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.197	Kolmogorov-Smirnov GOF
5% K-S Critical Value	0.356	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.331	k star (bias corrected MLE)	0.276
Theta hat (MLE)	1906	Theta star (bias corrected MLE)	2279
nu hat (MLE)	3.968	nu star (bias corrected)	3.317
Mean (detects)	630.1		

Gamma ROS Statistics using Imputed Non-Detects
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)
For such situations, GROS method may yield incorrect values of UCLs and BTVs
This is especially true when the sample size is small.
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	290.8
Maximum	2500	Median	0.01
SD	710.6	CV	2.443
k hat (MLE)	0.128	k star (bias corrected MLE)	0.15
Theta hat (MLE)	2267	Theta star (bias corrected MLE)	1939
nu hat (MLE)	3.336	nu star (bias corrected)	3.899
Adjusted Level of Significance (β)	0.0301		
Approximate Chi Square Value (3.90, α)	0.682	Adjusted Chi Square Value (3.90, β)	0.519
95% Gamma Approximate UCL (use when n>=50)	1662	95% Gamma Adjusted UCL (use when n<50)	2185

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	291.4	SD (KM)	682.5
Variance (KM)	465854	SE of Mean (KM)	207.4
k hat (KM)	0.182	k star (KM)	0.191
nu hat (KM)	4.738	nu star (KM)	4.978
theta hat (KM)	1599	theta star (KM)	1522
80% gamma percentile (KM)	374.9	90% gamma percentile (KM)	880.7
95% gamma percentile (KM)	1518	99% gamma percentile (KM)	3286

Prepared by: LMS 12/29/16
Checked by: LWC 12/30/16

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (4.98, α)	1.142	Adjusted Chi Square Value (4.98, β)	0.905
95% Gamma Approximate KM-UCL (use when n>=	1270	95% Gamma Adjusted KM-UCL (use when n<50)	1602

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.907	Shapiro Wilk GOF Test	
5% Shapiro Wilk Critical Value	0.788	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.198	Lilliefors GOF Test	
5% Lilliefors Critical Value	0.325	Detected Data appear Lognormal at 5% Significance Level	

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	290.9	Mean in Log Scale	-0.474
SD in Original Scale	710.6	SD in Log Scale	5.49
95% t UCL (assumes normality of ROS data)	642.2	95% Percentile Bootstrap UCL	629.7
95% BCA Bootstrap UCL	906.6	95% Bootstrap t UCL	2264
95% H-UCL (Log ROS)	8.03E+14		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	2.028	KM Geo Mean	7.597
KM SD (logged)	2.837	95% Critical H Value (KM-Log)	6.592
KM Standard Error of Mean (logged)	0.862	95% H-UCL (KM -Log)	93858
KM SD (logged)	2.837	95% Critical H Value (KM-Log)	6.592
KM Standard Error of Mean (logged)	0.862		

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	291.1	Mean in Log Scale	1.655
SD in Original Scale	710.5	SD in Log Scale	3.238
95% t UCL (Assumes normality)	642.3	95% H-Stat UCL	1064210

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics
Detected Data appear Approximate Normal Distributed at 5% Significance Level

Suggested UCL to Use

95% KM (t) UCL	**661**

When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test
When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

PCE

General Statistics

Total Number of Observations	13	Number of Distinct Observations	12
Number of Detects	11	Number of Non-Detects	2
Number of Distinct Detects	11	Number of Distinct Non-Detects	1
Minimum Detect	1.9	Minimum Non-Detect	1
Maximum Detect	520	Maximum Non-Detect	1
Variance Detects	24207	Percent Non-Detects	15.38%
Mean Detects	94.52	SD Detects	155.6
Median Detects	19	CV Detects	1.646
Skewness Detects	2.383	Kurtosis Detects	6.219
Mean of Logged Detects	3.188	SD of Logged Detects	1.865

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.652	Shapiro Wilk GOF Test	
5% Shapiro Wilk Critical Value	0.85	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.32	Lilliefors GOF Test	
5% Lilliefors Critical Value	0.251	Detected Data Not Normal at 5% Significance Level	

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	80.13	KM Standard Error of Mean	40.89
KM SD	140.6	95% KM (BCA) UCL	151.5
95% KM (t) UCL	153	95% KM (Percentile Bootstrap) UCL	150.1
95% KM (z) UCL	147.4	95% KM Bootstrap t UCL	232.7
90% KM Chebyshev UCL	202.8	95% KM Chebyshev UCL	258.4
97.5% KM Chebyshev UCL	335.5	99% KM Chebyshev UCL	487

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.587	Anderson-Darling GOF Test	
5% A-D Critical Value	0.787	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.267	Kolmogorov-Smirnov GOF	
5% K-S Critical Value	0.27	Detected data appear Gamma Distributed at 5% Significance Level	

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.471	k star (bias corrected MLE)	0.403
Theta hat (MLE)	200.6	Theta star (bias corrected MLE)	234.3
nu hat (MLE)	10.37	nu star (bias corrected)	8.874
Mean (detects)	94.52		

Gamma ROS Statistics using Imputed Non-Detects
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)
For such situations, GROS method may yield incorrect values of UCLs and BTVs
This is especially true when the sample size is small.
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	79.98
Maximum	520	Median	14
SD	146.4	CV	1.83
k hat (MLE)	0.29	k star (bias corrected MLE)	0.274
Theta hat (MLE)	275.9	Theta star (bias corrected MLE)	291.6
nu hat (MLE)	7.536	nu star (bias corrected)	7.131
Adjusted Level of Significance (β)	0.0301		
Approximate Chi Square Value (7.13, α)	2.242	Adjusted Chi Square Value (7.13, β)	1.873
95% Gamma Approximate UCL (use when n>=50)	254.3	95% Gamma Adjusted UCL (use when n<50)	304.5

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	80.13	SD (KM)	140.6
Variance (KM)	19759	SE of Mean (KM)	40.89
k hat (KM)	0.325	k star (KM)	0.301
nu hat (KM)	8.449	nu star (KM)	7.832
theta hat (KM)	246.6	theta star (KM)	266
80% gamma percentile (KM)	123	90% gamma percentile (KM)	236.2
95% gamma percentile (KM)	366.1	99% gamma percentile (KM)	703.4

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (7.83, α)	2.638	Adjusted Chi Square Value (7.83, β)	2.229
95% Gamma Approximate KM-UCL (use when n>=	237.9	**95% Gamma Adjusted KM-UCL (use when n<50**	**281.6**

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.935	Shapiro Wilk GOF Test	
5% Shapiro Wilk Critical Value	0.85	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.178	Lilliefors GOF Test	
5% Lilliefors Critical Value	0.251	Detected Data appear Lognormal at 5% Significance Level	

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	80.02	Mean in Log Scale	2.5
SD in Original Scale	146.4	SD in Log Scale	2.4
95% t UCL (assumes normality of ROS data)	152.4	95% Percentile Bootstrap UCL	149.1
95% BCA Bootstrap UCL	188.2	95% Bootstrap t UCL	233.6
95% H-UCL (Log ROS)	10997		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	2.698	KM Geo Mean	14.85
KM SD (logged)	1.999	95% Critical H Value (KM-Log)	4.804
KM Standard Error of Mean (logged)	0.582	95% H-UCL (KM -Log)	1753
KM SD (logged)	1.999	95% Critical H Value (KM-Log)	4.804
KM Standard Error of Mean (logged)	0.582		

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	80.05	Mean in Log Scale	2.591
SD in Original Scale	146.4	SD in Log Scale	2.241
95% t UCL (Assumes normality)	152.4	95% H-Stat UCL	5175

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics
Detected Data appear Gamma Distributed at 5% Significance Level

Suggested UCL to Use

95% KM Bootstrap t UCL	265.7	95% Hall's Bootstrap	1753

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

TCE

General Statistics

Total Number of Observations	13	Number of Distinct Observations	11
Number of Detects	10	Number of Non-Detects	3

Prepared by: LMS 12/29/16
Checked by: LWC 12/30/16

Table A-5
Northeastern Portion
ProUCL Statistics

Number of Distinct Detects	10	Number of Distinct Non-Detects	1
Minimum Detect	2.2	Minimum Non-Detect	1
Maximum Detect	35	Maximum Non-Detect	1
Variance Detects	94.12	Percent Non-Detects	23.08%
Mean Detects	8.21	SD Detects	9.701
Median Detects	5.35	CV Detects	1.182
Skewness Detects	2.828	Kurtosis Detects	8.434
Mean of Logged Detects	1.749	SD of Logged Detects	0.79

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.592	Shapiro Wilk GOF Test	
5% Shapiro Wilk Critical Value	0.842	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.372	Lilliefors GOF Test	
5% Lilliefors Critical Value	0.262	Detected Data Not Normal at 5% Significance Level	

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	6.546	KM Standard Error of Mean	2.521
KM SD	8.625	95% KM (BCA) UCL	11.37
95% KM (t) UCL	11.04	95% KM (Percentile Bootstrap) UCL	10.97
95% KM (z) UCL	10.69	95% KM Bootstrap t UCL	18.36
90% KM Chebyshev UCL	14.11	95% KM Chebyshev UCL	17.54
97.5% KM Chebyshev UCL	22.29	99% KM Chebyshev UCL	31.63

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.78	Anderson-Darling GOF Test	
5% A-D Critical Value	0.739	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.255	Kolmogorov-Smirnov GOF	
5% K-S Critical Value	0.271	Detected data appear Gamma Distributed at 5% Significance Level	

Detected data follow Appr. Gamma Distribution at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	1.55	k star (bias corrected MLE)	1.151
Theta hat (MLE)	5.298	Theta star (bias corrected MLE)	7.131
nu hat (MLE)	30.99	nu star (bias corrected)	23.03
Mean (detects)	8.21		

Gamma ROS Statistics using Imputed Non-Detects
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)
For such situations, GROS method may yield incorrect values of UCLs and BTVs
This is especially true when the sample size is small.
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	6.318
Maximum	35	Median	3.7
SD	9.139	CV	1.447
k hat (MLE)	0.419	k star (bias corrected MLE)	0.373
Theta hat (MLE)	15.09	Theta star (bias corrected MLE)	16.92
nu hat (MLE)	10.88	nu star (bias corrected)	9.705
Adjusted Level of Significance (β)	0.0301		
Approximate Chi Square Value (9.71, α)	3.758	Adjusted Chi Square Value (9.71, β)	3.249
95% Gamma Approximate UCL (use when n>=50)	16.31	95% Gamma Adjusted UCL (use when n<50)	18.87

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	6.546	SD (KM)	8.625
Variance (KM)	74.39	SE of Mean (KM)	2.521
k hat (KM)	0.576	k star (KM)	0.494
nu hat (KM)	14.98	nu star (KM)	12.85
theta hat (KM)	11.36	theta star (KM)	13.24
80% gamma percentile (KM)	10.75	90% gamma percentile (KM)	17.75
95% gamma percentile (KM)	25.25	99% gamma percentile (KM)	43.7

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (12.85, α)	5.795	Adjusted Chi Square Value (12.85, β)	5.135
95% Gamma Approximate KM-UCL (use when n>=5(	14.52	95% Gamma Adjusted KM-UCL (use when n<50)	16.39

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.905	Shapiro Wilk GOF Test	
5% Shapiro Wilk Critical Value	0.842	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.19	Lilliefors GOF Test	
5% Lilliefors Critical Value	0.262	Detected Data appear Lognormal at 5% Significance Level	

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	6.525	Mean in Log Scale	1.313
SD in Original Scale	8.992	SD in Log Scale	1.085
95% t UCL (assumes normality of ROS data)	10.97	95% Percentile Bootstrap UCL	10.87
95% BCA Bootstrap UCL	13.4	95% Bootstrap t UCL	18.46
95% H-UCL (Log ROS)	17.13		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

Prepared by: LMS 12/29/16
Checked by: LWC 12/30/16

KM Mean (logged)	1.346	KM Geo Mean	3.84
KM SD (logged)	0.987	95% Critical H Value (KM-Log)	2.826
KM Standard Error of Mean (logged)	0.289	95% H-UCL (KM -Log)	13.99
KM SD (logged)	0.987	95% Critical H Value (KM-Log)	2.826
KM Standard Error of Mean (logged)	0.289		

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	6.431	Mean in Log Scale	1.186
SD in Original Scale	9.056	SD in Log Scale	1.271
95% t UCL (Assumes normality)	10.91	95% H-Stat UCL	24.98

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics
Detected Data appear Approximate Gamma Distributed at 5% Significance Level

Suggested UCL to Use

95% KM Adjusted Gamma UCL	**16.39**	95% GROS Adjusted Gamma UCL	18.87

When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test
When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

VC

General Statistics

Total Number of Observations	13	Number of Distinct Observations	5
Number of Detects	4	Number of Non-Detects	9
Number of Distinct Detects	4	Number of Distinct Non-Detects	1
Minimum Detect	1.9	Minimum Non-Detect	1
Maximum Detect	11	Maximum Non-Detect	1
Variance Detects	17.84	Percent Non-Detects	69.23%
Mean Detects	4.95	SD Detects	4.224
Median Detects	3.45	CV Detects	0.853
Skewness Detects	1.524	Kurtosis Detects	2.031
Mean of Logged Detects	1.344	SD of Logged Detects	0.807

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.832	Shapiro Wilk GOF Test	
5% Shapiro Wilk Critical Value	0.748	Detected Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.274	Lilliefors GOF Test	
5% Lilliefors Critical Value	0.375	Detected Data appear Normal at 5% Significance Level	

Detected Data appear Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	2.215	KM Standard Error of Mean	0.874
KM SD	2.728	95% KM (BCA) UCL	N/A
95% KM (t) UCL	3.772	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	3.652	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	4.836	95% KM Chebyshev UCL	6.023
97.5% KM Chebyshev UCL	7.671	99% KM Chebyshev UCL	10.91

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.377	Anderson-Darling GOF Test	
5% A-D Critical Value	0.66	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.286	Kolmogorov-Smirnov GOF	
5% K-S Critical Value	0.398	Detected data appear Gamma Distributed at 5% Significance Level	

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	2.109	k star (bias corrected MLE)	0.694
Theta hat (MLE)	2.347	Theta star (bias corrected MLE)	7.134
nu hat (MLE)	16.87	nu star (bias corrected)	5.551
Mean (detects)	4.95		

Gamma ROS Statistics using Imputed Non-Detects
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)
For such situations, GROS method may yield incorrect values of UCLs and BTVs
This is especially true when the sample size is small.
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	1.53
Maximum	11	Median	0.01
SD	3.177	CV	2.076
k hat (MLE)	0.226	k star (bias corrected MLE)	0.225
Theta hat (MLE)	6.781	Theta star (bias corrected MLE)	6.804
nu hat (MLE)	5.867	nu star (bias corrected)	5.846

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Checked by: LWC 12/30/16

Adjusted Level of Significance (β)	0.0301		
Approximate Chi Square Value (5.85, α)	1.562	Adjusted Chi Square Value (5.85, β)	1.269
95% Gamma Approximate UCL (use when n>=50)	5.727	95% Gamma Adjusted UCL (use when n<50)	N/A
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	2.215	SD (KM)	2.728
Variance (KM)	7.441	SE of Mean (KM)	0.874
k hat (KM)	0.66	k star (KM)	0.559
nu hat (KM)	17.15	nu star (KM)	14.52
theta hat (KM)	3.359	theta star (KM)	3.966
80% gamma percentile (KM)	3.65	90% gamma percentile (KM)	5.854
95% gamma percentile (KM)	8.179	99% gamma percentile (KM)	13.84
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (14.52, α)	6.932	Adjusted Chi Square Value (14.52, β)	6.199
95% Gamma Approximate KM-UCL (use when n>=	4.642	95% Gamma Adjusted KM-UCL (use when n<50)	5.191
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.911	Shapiro Wilk GOF Test	
5% Shapiro Wilk Critical Value	0.748	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.254	Lilliefors GOF Test	
5% Lilliefors Critical Value	0.375	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	1.694	Mean in Log Scale	-0.953
SD in Original Scale	3.099	SD in Log Scale	1.945
95% t UCL (assumes normality of ROS data)	3.226	95% Percentile Bootstrap UCL	3.188
95% BCA Bootstrap UCL	3.918	95% Bootstrap t UCL	6.771
95% H-UCL (Log ROS)	35.15		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	0.414	KM Geo Mean	1.512
KM SD (logged)	0.731	95% Critical H Value (KM-Log)	2.416
KM Standard Error of Mean (logged)	0.234	95% H-UCL (KM -Log)	3.291
KM SD (logged)	0.731	95% Critical H Value (KM-Log)	2.416
KM Standard Error of Mean (logged)	0.234		
DL/2 Statistics			
DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	1.869	Mean in Log Scale	-0.0664
SD in Original Scale	3.005	SD in Log Scale	1.059
95% t UCL (Assumes normality)	3.355	95% H-Stat UCL	4.036
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Normal Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	**3.772**		

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Prepared by: LMS 12/29/16
Checked by: LWC 12/30/16

Appendix F

Milestone Schedule
Gantt Chart

Milestone Schedule Gantt Chart

TASK	Time to Accomplish Task (Months from Acceptance by EPD)									
	0-6	6 - 12	12 - 18	18 - 24	24 - 30	30 - 36	36 - 42	42 - 48	48 - 54	54 - 60
Abandon 13 Monitor Wells										
Horizontal Delineation of Release Site - COMPLETED										
Horizontal Delineation of Release Off Site- COMPLETED										
Update CSM - COMPLETED										
Submit Compliance Status Reoprt (CSR) - COMPLETED										

Appendix G

Laboratory Analytical Results – Surface Water Sample

ANALYTICAL REPORT

May 12, 2017

Marion Environmental Inc.

Sample Delivery Group:	L906951
Samples Received:	05/04/2017
Project Number:	15513
Description:	FOSC
Report To:	Steve Wild
	115 Parmenas Lane
	Chattanooga, TN 37405

Entire Report Reviewed By:

Chris McCord
Technical Service Representative

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

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SW-01 L906951-01 GW			Collected by	Collected date/time	Received date/time
			J Barrett	05/03/17 09:30	05/04/17 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Volatile Organic Compounds (GC/MS) by Method 8260B	WG977676	1	05/09/17 02:22	05/09/17 02:22	BMB

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

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

Chris McCord
Technical Service Representative

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

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Acetone	ND	J4	0.0500	1	05/09/2017 02:22	WG977676
Acrolein	ND	J4	0.0500	1	05/09/2017 02:22	WG977676
Acrylonitrile	ND		0.0100	1	05/09/2017 02:22	WG977676
Benzene	ND		0.00100	1	05/09/2017 02:22	WG977676
Bromobenzene	ND		0.00100	1	05/09/2017 02:22	WG977676
Bromodichloromethane	ND		0.00100	1	05/09/2017 02:22	WG977676
Bromoform	ND		0.00100	1	05/09/2017 02:22	WG977676
Bromomethane	ND		0.00500	1	05/09/2017 02:22	WG977676
n-Butylbenzene	ND		0.00100	1	05/09/2017 02:22	WG977676
sec-Butylbenzene	ND		0.00100	1	05/09/2017 02:22	WG977676
tert-Butylbenzene	ND		0.00100	1	05/09/2017 02:22	WG977676
Carbon tetrachloride	ND		0.00100	1	05/09/2017 02:22	WG977676
Chlorobenzene	ND		0.00100	1	05/09/2017 02:22	WG977676
Chlorodibromomethane	ND		0.00100	1	05/09/2017 02:22	WG977676
Chloroethane	ND		0.00500	1	05/09/2017 02:22	WG977676
Chloroform	ND		0.00500	1	05/09/2017 02:22	WG977676
Chloromethane	ND		0.00250	1	05/09/2017 02:22	WG977676
2-Chlorotoluene	ND		0.00100	1	05/09/2017 02:22	WG977676
4-Chlorotoluene	ND		0.00100	1	05/09/2017 02:22	WG977676
1,2-Dibromo-3-Chloropropane	ND		0.00500	1	05/09/2017 02:22	WG977676
1,2-Dibromoethane	ND		0.00100	1	05/09/2017 02:22	WG977676
Dibromomethane	ND		0.00100	1	05/09/2017 02:22	WG977676
1,2-Dichlorobenzene	ND		0.00100	1	05/09/2017 02:22	WG977676
1,3-Dichlorobenzene	ND		0.00100	1	05/09/2017 02:22	WG977676
1,4-Dichlorobenzene	ND		0.00100	1	05/09/2017 02:22	WG977676
Dichlorodifluoromethane	ND	J3	0.00500	1	05/09/2017 02:22	WG977676
1,1-Dichloroethane	ND		0.00100	1	05/09/2017 02:22	WG977676
1,2-Dichloroethane	ND		0.00100	1	05/09/2017 02:22	WG977676
1,1-Dichloroethene	ND		0.00100	1	05/09/2017 02:22	WG977676
cis-1,2-Dichloroethene	ND		0.00100	1	05/09/2017 02:22	WG977676
trans-1,2-Dichloroethene	ND		0.00100	1	05/09/2017 02:22	WG977676
1,2-Dichloropropane	ND		0.00100	1	05/09/2017 02:22	WG977676
1,1-Dichloropropene	ND		0.00100	1	05/09/2017 02:22	WG977676
1,3-Dichloropropane	ND		0.00100	1	05/09/2017 02:22	WG977676
cis-1,3-Dichloropropene	ND		0.00100	1	05/09/2017 02:22	WG977676
trans-1,3-Dichloropropene	ND		0.00100	1	05/09/2017 02:22	WG977676
2,2-Dichloropropane	ND	J3	0.00100	1	05/09/2017 02:22	WG977676
Di-isopropyl ether	ND		0.00100	1	05/09/2017 02:22	WG977676
Ethylbenzene	ND		0.00100	1	05/09/2017 02:22	WG977676
Hexachloro-1,3-butadiene	ND		0.00100	1	05/09/2017 02:22	WG977676
Isopropylbenzene	ND		0.00100	1	05/09/2017 02:22	WG977676
p-Isopropyltoluene	ND		0.00100	1	05/09/2017 02:22	WG977676
2-Butanone (MEK)	ND		0.0100	1	05/09/2017 02:22	WG977676
Methylene Chloride	ND		0.00500	1	05/09/2017 02:22	WG977676
4-Methyl-2-pentanone (MIBK)	ND		0.0100	1	05/09/2017 02:22	WG977676
Methyl tert-butyl ether	ND		0.00100	1	05/09/2017 02:22	WG977676
Naphthalene	ND		0.00500	1	05/09/2017 02:22	WG977676
n-Propylbenzene	ND		0.00100	1	05/09/2017 02:22	WG977676
Styrene	ND		0.00100	1	05/09/2017 02:22	WG977676
1,1,1,2-Tetrachloroethane	ND		0.00100	1	05/09/2017 02:22	WG977676
1,1,2,2-Tetrachloroethane	ND		0.00100	1	05/09/2017 02:22	WG977676
1,1,2-Trichlorotrifluoroethane	ND		0.00100	1	05/09/2017 02:22	WG977676
Tetrachloroethene	ND		0.00100	1	05/09/2017 02:22	WG977676
Toluene	ND		0.00100	1	05/09/2017 02:22	WG977676
1,2,3-Trichlorobenzene	ND		0.00100	1	05/09/2017 02:22	WG977676
1,2,4-Trichlorobenzene	ND		0.00100	1	05/09/2017 02:22	WG977676

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
1,1,1-Trichloroethane	ND		0.00100	1	05/09/2017 02:22	WG977676
1,1,2-Trichloroethane	ND		0.00100	1	05/09/2017 02:22	WG977676
Trichloroethene	ND		0.00100	1	05/09/2017 02:22	WG977676
Trichlorofluoromethane	ND	J3	0.00500	1	05/09/2017 02:22	WG977676
1,2,3-Trichloropropane	ND		0.00250	1	05/09/2017 02:22	WG977676
1,2,4-Trimethylbenzene	ND		0.00100	1	05/09/2017 02:22	WG977676
1,2,3-Trimethylbenzene	ND		0.00100	1	05/09/2017 02:22	WG977676
1,3,5-Trimethylbenzene	ND		0.00100	1	05/09/2017 02:22	WG977676
Vinyl chloride	ND		0.00100	1	05/09/2017 02:22	WG977676
Xylenes, Total	ND		0.00300	1	05/09/2017 02:22	WG977676
(S) Toluene-d8	*99.6*		*80.0-120*		*05/09/2017 02:22*	WG977676
(S) Dibromofluoromethane	*93.9*		*76.0-123*		*05/09/2017 02:22*	WG977676
(S) 4-Bromofluorobenzene	*113*		*80.0-120*		*05/09/2017 02:22*	WG977676

Method Blank (MB)

(MB) R3217457-2 05/08/17 21:47

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Acetone	U		0.0100	0.0500
Acrolein	U		0.00887	0.0500
Acrylonitrile	U		0.00187	0.0100
Benzene	U		0.000331	0.00100
Bromobenzene	U		0.000352	0.00100
Bromodichloromethane	U		0.000380	0.00100
Bromoform	U		0.000469	0.00100
Bromomethane	U		0.000866	0.00500
n-Butylbenzene	U		0.000361	0.00100
sec-Butylbenzene	U		0.000365	0.00100
tert-Butylbenzene	U		0.000399	0.00100
Carbon tetrachloride	U		0.000379	0.00100
Chlorobenzene	U		0.000348	0.00100
Chlorodibromomethane	U		0.000327	0.00100
Chloroethane	U		0.000453	0.00500
Chloroform	U		0.000324	0.00500
Chloromethane	U		0.000276	0.00250
2-Chlorotoluene	U		0.000375	0.00100
4-Chlorotoluene	U		0.000351	0.00100
1,2-Dibromo-3-Chloropropane	U		0.00133	0.00500
1,2-Dibromoethane	U		0.000381	0.00100
Dibromomethane	U		0.000346	0.00100
1,2-Dichlorobenzene	U		0.000349	0.00100
1,3-Dichlorobenzene	U		0.000220	0.00100
1,4-Dichlorobenzene	U		0.000274	0.00100
Dichlorodifluoromethane	U		0.000551	0.00500
1,1-Dichloroethane	U		0.000259	0.00100
1,2-Dichloroethane	U		0.000361	0.00100
1,1-Dichloroethene	U		0.000398	0.00100
cis-1,2-Dichloroethene	0.000989	J	0.000260	0.00100
trans-1,2-Dichloroethene	U		0.000396	0.00100
1,2-Dichloropropane	U		0.000306	0.00100
1,1-Dichloropropene	U		0.000352	0.00100
1,3-Dichloropropane	U		0.000366	0.00100
cis-1,3-Dichloropropene	U		0.000418	0.00100
trans-1,3-Dichloropropene	U		0.000419	0.00100
2,2-Dichloropropane	U		0.000321	0.00100
Di-isopropyl ether	U		0.000320	0.00100
Ethylbenzene	U		0.000384	0.00100
Hexachloro-1,3-butadiene	U		0.000256	0.00100

Method Blank (MB)

(MB) R3217457-2 05/08/17 21:47

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Isopropylbenzene	U		0.000326	0.00100
p-Isopropyltoluene	U		0.000350	0.00100
2-Butanone (MEK)	U		0.00393	0.0100
Methylene Chloride	U		0.00100	0.00500
4-Methyl-2-pentanone (MIBK)	U		0.00214	0.0100
Methyl tert-butyl ether	U		0.000367	0.00100
Naphthalene	U		0.00100	0.00500
n-Propylbenzene	U		0.000349	0.00100
Styrene	U		0.000307	0.00100
1,1,1,2-Tetrachloroethane	U		0.000385	0.00100
1,1,2,2-Tetrachloroethane	U		0.000130	0.00100
Tetrachloroethene	U		0.000372	0.00100
Toluene	U		0.000412	0.00100
1,1,2-Trichlorotrifluoroethane	U		0.000303	0.00100
1,2,3-Trichlorobenzene	U		0.000230	0.00100
1,2,4-Trichlorobenzene	U		0.000355	0.00100
1,1,1-Trichloroethane	U		0.000319	0.00100
1,1,2-Trichloroethane	U		0.000383	0.00100
Trichloroethene	U		0.000398	0.00100
Trichlorofluoromethane	U		0.00120	0.00500
1,2,3-Trichloropropane	U		0.000807	0.00250
1,2,3-Trimethylbenzene	U		0.000321	0.00100
1,2,4-Trimethylbenzene	U		0.000373	0.00100
1,3,5-Trimethylbenzene	U		0.000387	0.00100
Vinyl chloride	U		0.000259	0.00100
Xylenes, Total	U		0.00106	0.00300
(S) Toluene-d8	*103*			*80.0-120*
(S) Dibromofluoromethane	*93.2*			*76.0-123*
(S) 4-Bromofluorobenzene	*107*			*80.0-120*

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

(LCS) R3217457-1 05/08/17 20:55 • (LCSD) R3217457-3 05/08/17 22:04

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Acetone	0.125	0.191	0.223	153	178	10.0-160		J4	15.1	23
Acrolein	0.125	0.571	0.513	457	411	10.0-160	E J4	E J4	10.6	20
Acrylonitrile	0.125	0.101	0.0969	80.7	77.5	60.0-142			4.04	20
Benzene	0.0250	0.0199	0.0210	79.7	84.1	69.0-123			5.40	20

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

(LCS) R3217457-1 05/08/17 20:55 • (LCSD) R3217457-3 05/08/17 22:04

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Bromobenzene	0.0250	0.0221	0.0237	88.5	94.6	79.0-120			6.72	20
Bromodichloromethane	0.0250	0.0210	0.0212	84.2	84.7	76.0-120			0.570	20
Bromoform	0.0250	0.0251	0.0257	100	103	67.0-132			2.43	20
Bromomethane	0.0250	0.0254	0.0264	102	106	18.0-160			3.74	20
n-Butylbenzene	0.0250	0.0221	0.0252	88.5	101	72.0-126			12.9	20
sec-Butylbenzene	0.0250	0.0246	0.0267	98.6	107	74.0-121			8.06	20
tert-Butylbenzene	0.0250	0.0254	0.0273	102	109	75.0-122			7.13	20
Carbon tetrachloride	0.0250	0.0210	0.0218	84.1	87.3	63.0-122			3.70	20
Chlorobenzene	0.0250	0.0255	0.0269	102	108	79.0-121			5.45	20
Chlorodibromomethane	0.0250	0.0233	0.0249	93.1	99.8	75.0-125			6.85	20
Chloroethane	0.0250	0.0201	0.0211	80.4	84.5	47.0-152			4.97	20
Chloroform	0.0250	0.0204	0.0221	81.7	88.4	72.0-121			7.89	20
Chloromethane	0.0250	0.0214	0.0222	85.6	88.6	48.0-139			3.47	20
2-Chlorotoluene	0.0250	0.0246	0.0259	98.3	104	74.0-122			5.32	20
4-Chlorotoluene	0.0250	0.0241	0.0260	96.3	104	79.0-120			7.57	20
1,2-Dibromo-3-Chloropropane	0.0250	0.0200	0.0200	80.1	79.9	64.0-127			0.250	20
1,2-Dibromoethane	0.0250	0.0247	0.0251	98.9	100	77.0-123			1.37	20
Dibromomethane	0.0250	0.0227	0.0225	90.9	90.2	78.0-120			0.830	20
1,2-Dichlorobenzene	0.0250	0.0235	0.0245	93.8	98.0	80.0-120			4.33	20
1,3-Dichlorobenzene	0.0250	0.0258	0.0277	103	111	72.0-123			7.08	20
1,4-Dichlorobenzene	0.0250	0.0227	0.0247	91.0	98.6	77.0-120			8.07	20
Dichlorodifluoromethane	0.0250	0.0207	0.0297	82.8	119	49.0-155		J3	35.6	20
1,1-Dichloroethane	0.0250	0.0196	0.0204	78.4	81.5	70.0-126			3.81	20
1,2-Dichloroethane	0.0250	0.0203	0.0201	81.3	80.2	67.0-126			1.27	20
1,1-Dichloroethene	0.0250	0.0201	0.0210	80.5	84.0	64.0-129			4.29	20
cis-1,2-Dichloroethene	0.0250	0.0222	0.0226	89.0	90.3	73.0-120			1.49	20
trans-1,2-Dichloroethene	0.0250	0.0204	0.0208	81.4	83.0	71.0-121			1.93	20
1,2-Dichloropropane	0.0250	0.0215	0.0212	86.0	84.8	75.0-125			1.39	20
1,1-Dichloropropene	0.0250	0.0205	0.0214	81.9	85.8	71.0-129			4.57	20
1,3-Dichloropropane	0.0250	0.0246	0.0253	98.2	101	80.0-121			3.08	20
cis-1,3-Dichloropropene	0.0250	0.0209	0.0217	83.6	86.7	79.0-123			3.63	20
trans-1,3-Dichloropropene	0.0250	0.0213	0.0220	85.4	88.1	74.0-127			3.20	20
2,2-Dichloropropane	0.0250	0.0170	0.0215	68.0	86.2	60.0-125		J3	23.5	20
Di-isopropyl ether	0.0250	0.0179	0.0179	71.6	71.4	59.0-133			0.200	20
Ethylbenzene	0.0250	0.0258	0.0277	103	111	77.0-120			7.12	20
Hexachloro-1,3-butadiene	0.0250	0.0227	0.0257	90.9	103	64.0-131			12.1	20
Isopropylbenzene	0.0250	0.0236	0.0257	94.4	103	75.0-120			8.42	20
p-Isopropyltoluene	0.0250	0.0259	0.0282	104	113	74.0-126			8.48	20
2-Butanone (MEK)	0.125	0.136	0.153	109	122	37.0-158			12.0	20
Methylene Chloride	0.0250	0.0210	0.0207	84.0	82.9	66.0-121			1.33	20

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

(LCS) R3217457-1 05/08/17 20:55 • (LCSD) R3217457-3 05/08/17 22:04

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
4-Methyl-2-pentanone (MIBK)	0.125	0.118	0.113	94.5	90.3	59.0-143			4.55	20
Methyl tert-butyl ether	0.0250	0.0202	0.0205	81.0	82.1	64.0-123			1.42	20
Naphthalene	0.0250	0.0178	0.0174	71.4	69.6	62.0-128			2.54	20
n-Propylbenzene	0.0250	0.0247	0.0265	98.7	106	79.0-120			7.14	20
Styrene	0.0250	0.0247	0.0261	98.8	104	78.0-124			5.60	20
1,1,1,2-Tetrachloroethane	0.0250	0.0248	0.0262	99.0	105	75.0-122			5.60	20
1,1,2,2-Tetrachloroethane	0.0250	0.0246	0.0268	98.5	107	71.0-122			8.54	20
Tetrachloroethene	0.0250	0.0291	0.0309	116	124	70.0-127			6.07	20
Toluene	0.0250	0.0221	0.0227	88.3	90.7	77.0-120			2.69	20
1,1,2-Trichlorotrifluoroethane	0.0250	0.0236	0.0252	94.5	101	61.0-136			6.45	20
1,2,3-Trichlorobenzene	0.0250	0.0214	0.0213	85.6	85.3	61.0-133			0.340	20
1,2,4-Trichlorobenzene	0.0250	0.0187	0.0198	74.8	79.3	69.0-129			5.96	20
1,1,1-Trichloroethane	0.0250	0.0204	0.0215	81.7	86.0	68.0-122			5.13	20
1,1,2-Trichloroethane	0.0250	0.0261	0.0278	104	111	78.0-120			6.40	20
Trichloroethene	0.0250	0.0270	0.0249	108	99.6	78.0-120			8.07	20
Trichlorofluoromethane	0.0250	0.0188	0.0246	75.4	98.6	56.0-137		J3	26.7	20
1,2,3-Trichloropropane	0.0250	0.0260	0.0267	104	107	72.0-124			2.83	20
1,2,3-Trimethylbenzene	0.0250	0.0216	0.0232	86.5	92.7	75.0-120			6.86	20
1,2,4-Trimethylbenzene	0.0250	0.0241	0.0255	96.4	102	75.0-120			5.61	20
1,3,5-Trimethylbenzene	0.0250	0.0246	0.0261	98.2	105	75.0-120			6.19	20
Vinyl chloride	0.0250	0.0220	0.0242	87.9	97.0	64.0-133			9.80	20
Xylenes, Total	0.0750	0.0735	0.0793	98.0	106	77.0-120			7.59	20
(S) Toluene-d8				*102*	*102*	*80.0-120*				
(S) Dibromofluoromethane				*90.9*	*92.8*	*76.0-123*				
(S) 4-Bromofluorobenzene				*104*	*107*	*80.0-120*				

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

Abbreviations and Definitions

SDG	Sample Delivery Group.
MDL	Method Detection Limit.
RDL	Reported Detection Limit.
ND	Not detected at the Reporting Limit (or MDL where applicable).
U	Not detected at the Reporting Limit (or MDL where applicable).
RPD	Relative Percent Difference.
(S)	Surrogate (Surrogate Standard) - Analytes added to every blank, sample, Laboratory Control Sample/Duplicate and Matrix Spike/Duplicate; used to evaluate analytical efficiency by measuring recovery. Surrogates are not expected to be detected in all environmental media.
Rec.	Recovery.

Qualifier	Description
E	The analyte concentration exceeds the upper limit of the calibration range of the instrument established by the initial calibration (ICAL).
J	The identification of the analyte is acceptable; the reported value is an estimate.
J3	The associated batch QC was outside the established quality control range for precision.
J4	The associated batch QC was outside the established quality control range for accuracy.

ESC Lab Sciences is the only environmental laboratory accredited/certified to support your work nationwide from one location. One phone call, one point of contact, one laboratory. No other lab is as accessible or prepared to handle your needs throughout the country. Our capacity and capability from our single location laboratory is comparable to the collective totals of the network laboratories in our industry. The most significant benefit to our "one location" design is the design of our laboratory campus. The model is conducive to accelerated productivity, decreasing turn-around time, and preventing cross contamination, thus protecting sample integrity. Our focus on premium quality and prompt service allows us to be **YOUR LAB OF CHOICE.**
* Not all certifications held by the laboratory are applicable to the results reported in the attached report.

State Accreditations

Alabama	40660	Nevada	TN-03-2002-34
Alaska	UST-080	New Hampshire	2975
Arizona	AZ0612	New Jersey–NELAP	TN002
Arkansas	88-0469	New Mexico	TN00003
California	01157CA	New York	11742
Colorado	TN00003	North Carolina	Env375
Conneticut	PH-0197	North Carolina [1]	DW21704
Florida	E87487	North Carolina [2]	41
Georgia	NELAP	North Dakota	R-140
Georgia [1]	923	Ohio–VAP	CL0069
Idaho	TN00003	Oklahoma	9915
Illinois	200008	Oregon	TN200002
Indiana	C-TN-01	Pennsylvania	68-02979
Iowa	364	Rhode Island	221
Kansas	E-10277	South Carolina	84004
Kentucky [1]	90010	South Dakota	n/a
Kentucky [2]	16	Tennessee [1,4]	2006
Louisiana	AI30792	Texas	T 104704245-07-TX
Maine	TN0002	Texas [5]	LAB0152
Maryland	324	Utah	6157585858
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	109
Minnesota	047-999-395	Washington	C1915
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	9980939910
Montana	CERT0086	Wyoming	A2LA
Nebraska	NE-OS-15-05		

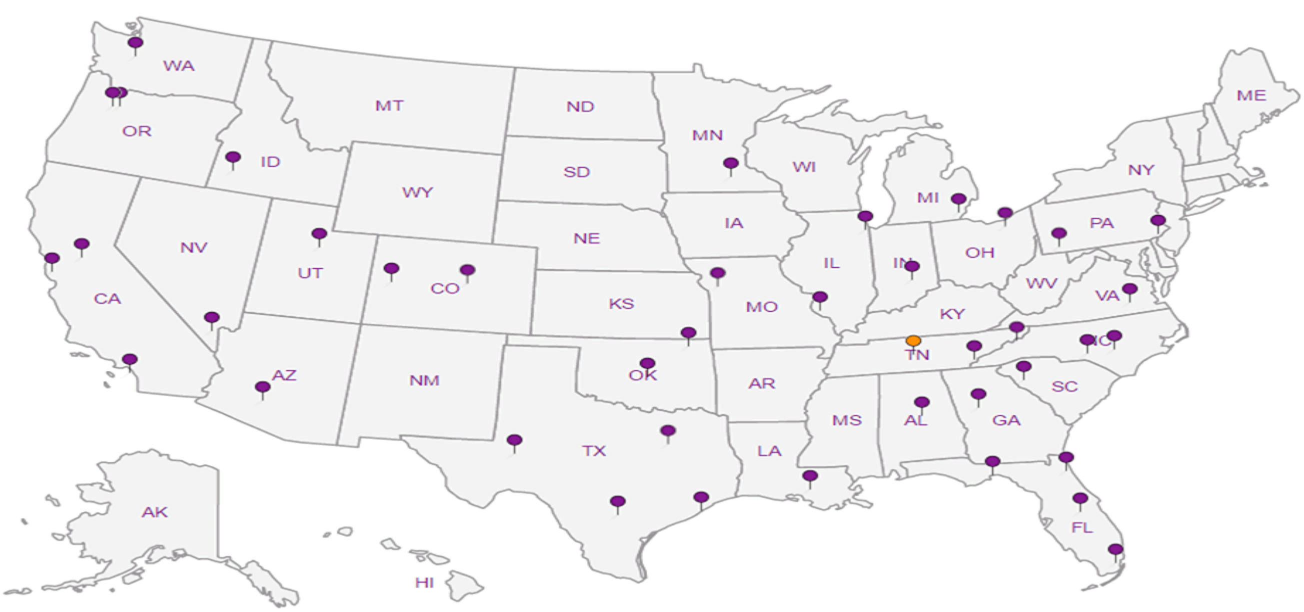
Third Party & Federal Accreditations

A2LA – ISO 17025	1461.01	AIHA-LAP,LLC	100789
A2LA – ISO 17025 [5]	1461.02	DOD	1461.01
Canada	1461.01	USDA	S-67674
EPA–Crypto	TN00003		

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

Our Locations

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



Company Name/Address:	Billing Information:	Analysis/Container/Preservative	Chain of Custody Page ___ of ___
Marion Environmental Inc. 115 Parmenas Lane Chattanooga,TN 37405	Sue Hartline 115 Parmenas Lane Chattanooga,TN 37405	8260 VOC	ESC LAB SCIENCES 12065 Lebanon Road Mt. Juliet, TN 37122 Phone: (800) 767-5859 Phone: (615) 758-5858 Fax: (615) 758-5859

Report to: STEVE HILD

Email to:

Project Description: FUSC

City/State Collected: SANDY SPRINGS GA

Phone: (423) 499-4919

FAX: (423) 892-5122

Client Project #: 15513

ESC Key:

B125

Collected by: (print) J BARCUSTS

Site/Facility ID#:

P.O.#:

Collected by (signature):

Immediately Packed on Ice N___ Y X

Rush? (Lab MUST Be Notified)
___ Same Day.......200%
___ Next Day........100%
___ Two Day.........50%
___ Three Day.......25%

Date Results Needed:
Email? __No__Yes
FAX? __No__Yes

CoCode **MARENV** (lab use only)

Template/Prelogin 190695L

Shipped Via:

Sample ID	Comp/Grab	Matrix*	Depth	Date	Time	No. of Cntrs	8260 VOC								Remarks/Contaminant	Sample # (lab only)
SW-01	G	OT		5/3/17	0930	2	X									-01

*Matrix: SS - Soil/Solid GW - Groundwater WW - WasteWater DW - Drinking Water OT - Other SURFACE WATER

pH ________ Temp ________

Remarks:

Flow ________ Other ________

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Samples returned via: ☐ UPS ☐ FedEx ☐ Courier ☐ ______		Condition: (lab use only) OK
	5/3/17	1430				
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature) 7061 6679 2493	Temp: 1.9M	Bottles Received: 2+TB	CoC Seals Intact ✓ Y __ N __ NA
Relinquished by: (Signature)	Date:	Time:	Received for lab by: (Signature) Marina Malone	Date: 5-4-17	Time: 0845	pH Checked: NCF:

ESC LAB SCIENCES
Cooler Receipt Form

Client: MARENV	SDG#	L906951	
Cooler Received/Opened On: 5/4/17	Temperature:	1.9	
Received By: Marina Malone			
Signature: Marina Malone			

Receipt Check List	**NP**	**Yes**	**No**
COC Seal Present / Intact?		✓	
COC Signed / Accurate?		✓	
Bottles arrive intact?		✓	
Correct bottles used?		✓	
Sufficient volume sent?		✓	
If Applicable		✓	
VOA Zero headspace?			
Preservation Correct / Checked?			

Appendix H

2013
Limited Subsurface Investigation Report

Property Solutions INC.
Environmental & Engineering Consulting
1270 Winchester Parkway • Suite 202 • Smyrna, Georgia 30080 • 770-434-1997 • Fax 770-434-1773

LIMITED SUBSURFACE INVESTIGATION

of

Shoppes at Fountain Oaks
4920 Roswell Road, NE
Atlanta, Fulton County, Georgia 37347

Prepared for:

AmREIT
8 Greenway Plaza, Suite 1000
Houston, Texas 77046

Prepared by:

Property Solutions Incorporated
1270 Winchester Parkway, Suite 202
Smyrna, Georgia 30080

June 6, 2013

Property Solutions Project No. 2031813

Property Solutions INC.
Environmental & Engineering Consulting
1270 Winchester Parkway • Suite 202 • Smyrna, Georgia 30080 • 770-434-1997 • Fax 770-434-1773

LIMITED SUBSURFACE INVESTIGATION

of

Shoppes at Fountain Oaks
4920 Roswell Road, NE
Atlanta, Fulton County, Georgia 30342

Prepared for:

AmREIT
8 Greenway Plaza, Suite 1000
Houston, Texas 77046

Prepared by:

Property Solutions Incorporated
1270 Winchester Parkway, Suite 202
Smyrna, Georgia, 30080

Dated: June 6, 2013

Property Solutions Project No. 2031813

For:
Thomas Lawrence, PG
Environmental Consultant

Brant Teets
Senior Project Manager

For:
Kevin J. Billings, P.E.
Senior Vice President

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SECTION **PAGE**

20131813

EXECUTIVE SUMMARY

Property Solutions Incorporated (Property Solutions) has conducted a Limited Subsurface Investigation (SI) of the Shoppes at Fountain Oaks located at 4920 Roswell Road, NE in Atlanta, Fulton County, Georgia, 37347 (subject property) at the request of AmREIT.

The Phase II SI was performed based on the findings and recommendations presented in the Draft Phase I Environmental Assessment (EA) report dated May 10, 2013 and current regulatory status of the property. Our Draft Phase I EA Report and subsequent information identified the following Areas of Concern (AOCs):

- **Area of Concern 1: HSI Site 10807**
  The subject property is listed on the HSI database as Site No. 10807 for a known release of Tetrachloroethene (PCE) in soil at levels exceeding the reportable quantity, resulting from dry cleaners that previously operated on the site from approximately 1987 until 2007. Impacted soils have reportedly been excavated and removed from the site. Groundwater contamination remains at the subject property. The current subsurface conditions at the subject property are unknown, since no assessment activities have been conducted since 2009. The most recent groundwater sampling results available (November 2009) indicate a peak concentration of 1,900 micrograms/liter (µg/L) of the chlorinated solvent PCE in the northwest portion of the subject property. Results from the prior sampling event (May 2009) indicate a peak concentration of 2,900 µg/L at the same location. The Risk Reduction Standard (RRS) for PCE that would likely be used to obtain regulatory closure is 5 µg/L. Off-site migration of chlorinated solvents has been identified west of the subject property, in the vicinity of a residential area. A plan for continuing assessment and/or remediation has not been submitted to the state by the Responsible party (RP).

  In addition to the on-site sources of subsurface impact, two off-site sources are suspected as contributors to the plume. An upgradient dry cleaner is suspected as contributing to chlorinated solvent impact at the subject property. Previous assessments have also detected petroleum constituents in the subsurface, which has been potentially attributed to the northeast adjoining Citgo gas station.

  A vapor intrusion mitigation system was previously operated on the subject property for slightly over one year prior to being decommissioned with the approval of the Georgia Environmental Protection Division (GA EPD).

- **Area of Concern 2: Kroger Fuel Center**
  A Kroger Fuel Center currently operates on the subject property. The facility currently operates two gasoline-containing underground storage tanks (USTs) (20,000 gallons and 8,000 gallons). The tanks were reportedly installed in 2005 and are double-walled. The operation of a gas station with petroleum-containing USTs and a dispenser system is a recognized environmental condition. It should be noted that there are no reported releases in connection with this facility, and in the event of a release, Kroger would be

the RP for assessment or remediation activities.

Property Solutions was contracted by AmREIT to evaluate the presence/absence of potential subsurface concerns as they relate to the AOCs and to evaluate the need for additional investigation activities as warranted and was not intended for submittal to the State of Georgia. The main goal of this investigation was to address potential vapor intrusion and current groundwater conditions in relation to AOC-1.

Groundwater: On May 15 and May 17, 2013, groundwater samples were collected from 18 of the existing monitoring wells on the subject property. The wells were purged of three well volumes (or until dry) before sampling using a submersible pump or disposable Teflon bailer. Groundwater samples were then collected using a disposable Teflon bailer and submitted under chain-of-custody to a Georgia-certified laboratory for analysis for volatile organic compounds (VOCs) by USEPA SW846 Method 8260.

Soil Gas/Indoor Air: On May 16, 2013, sub-slab and near-slab soil gas samples were collected from six locations using laboratory-supplied Summa® canisters within and adjacent to the northern portion of the shopping center buildings. A helium tracer test on each sub-slab soil gas sampling location was performed to ensure a proper seal from ambient air entering the sub-slab sampling point. Six indoor air sampling canisters (laboratory-supplied Summa® canisters) were also placed within the Kroger store and four of the suites to the north of Kroger for indoor air sampling. The Summa® canisters containing the air samples were submitted under chain-of-custody to H&P Mobile Chemistry Inc. (H&P), a National Environmental Laboratory Conference (NELAC) accredited laboratory for VOC analysis by USEPA Method TO-15.

This Limited SI was performed to determine the potential presence/absence of subsurface contamination at the subject property as it relates to the environmental concerns identified.

- **Area of Concern One (AOC-1) – HSI Site 10807**

Current groundwater impact as shown by well sampling does not show significant variation from documented historic conditions as provided in the November 2010 CSR. There are three constituents of concern in on-site groundwater related to the former on-site dry cleaners that exceed their applicable RRS: Tetrachloroethene (PCE), Trichloroethene (TCE) and Vinyl chloride (VC). Only PCE in groundwater at one off-site location, MW-30, exceeded the applicable Type 1 RRS of 5 µg/L. Additionally, benzene and MTBE were detected above the applicable RRS in wells near the northeastern portion of the subject property. Also of note is that MTBE was detected above the RRS in MW-16, located on the western portion of the subject property, south of Kroger. MTBE exceeding the RRS and low level petroleum constituents have historically been detected at this location. The source of the apparent petroleum impact in this area is unclear. Low level MTBE (below the RRS) was also detected in the groundwater sample from MW-29, located off-site, immediately adjacent the western property boundary, west of Kroger.

Peak concentrations of PCE in groundwater were detected at 2,470 µg/L in MW-2, which was an increase from the November 2009 result of 1,900 µg/L.

PCE concentrations detected in the groundwater sample from MW-30 (off-site near residential area to the west) decreased slightly from a concentration of 23 µg/L in November 2009 to 17.9 µg/L during the current monitoring event.

MTBE detected in the groundwater sample from MW-21 (downgradient of the off-site Citgo) increased from a concentration of 350 µg/L in May 2009 to 1,780 µg/L during the current monitoring event. This well was not sampled during the November 2009 monitoring event.

Soil Gas: Constituents detected in analyzed soil gas (sub-slab and near-slab) included chlorinated hydrocarbons and petroleum constituents. The highest level of PCE detected was at SV-1, located outside the footprint of the building on the north end of the former dry cleaner. PCE was detected at this location at 1,200 µg/m^3. One sub-slab sample (SV-6) was collected within the footprint of the building in vacant Suite 23A. PCE was detected at 24 µg/m^3 at this location.

Indoor Air: Detections of constituents in indoor air did not exceed the Target Indoor Air Concentrations (TIAs) as provided in the EPA OSWER Vapor Intrusion Screening Level (VISL) Calculator Version 3.0 (November 2012) using a Target Risk Concentration (TCR) of 1.00E-05.

Detections of constituents in indoor air did not exceed the TIAs as provided in the EPA OSWER VISL) Calculator Version 3.0 (November 2012) using a more stringent TCR of 1.00E-06, with the exception of chloroform in two samples. Indoor air sources of chloroform include the use of municipal (chlorinated) water, bleaches, and refrigerants. It is the opinion of Property Solutions that based on the results of analysis of soil gas samples, chloroform detections likely do not originate from the subsurface.

1.0 INTRODUCTION

1.1 Purpose

Property Solutions Incorporated (Property Solutions) has conducted a Limited Subsurface Investigation (SI) of Shoppes at Fountain Oaks located at 4920 Roswell Road, NE in Atlanta, Fulton County, Georgia, (subject property) at the request of AmREIT.

The Phase II SI was performed based on the findings and recommendations presented in the Draft Phase I Environmental Assessment (EA) report dated May 10, 2013 and current regulatory status of the property. The potential environmental concerns identified in the Phase I EA included the following:

- **Area of Concern 1: HSI Site 10807**
  The subject property is listed on the HSI database as Site No. 10807 for a known release of Tetrachloroethene (PCE) in soil at levels exceeding the reportable quantity, resulting from dry cleaners that previously operated on the site from approximately 1987 until 2007. Impacted soils have reportedly been excavated and removed from the site. Groundwater contamination remains at the subject property. The current subsurface conditions at the subject property are unknown, since no assessment activities have been conducted since 2009. The most recent groundwater sampling results available (November 2009) indicate a peak concentration of 1,900 micrograms/liter (µg/L) of the chlorinated solvent PCE in the northwest portion of the subject property. Results from the prior sampling event (May 2009) indicate a peak concentration of 2,900 µg/L at the same location. The Risk Reduction Standard (RRS) for PCE that would likely be used to obtain regulatory closure is 5 µg/L. Off-site migration of chlorinated solvents has been identified west of the subject property, in the vicinity of a residential area. A plan for continuing assessment and/or remediation has not been submitted to the state by the Responsible party (RP).

  In addition to the on-site sources of subsurface impact, two off-site sources are suspected as contributors to the plume. An upgradient dry cleaner is suspected as contributing to chlorinated solvent impact at the subject property. Previous assessments have also detected petroleum constituents in the subsurface, which has been potentially attributed to the northeast adjoining Citgo gas station.

  A vapor intrusion mitigation system was previously operated on the subject property for slightly over one year prior to being decommissioned with the approval of the Georgia Environmental Protection Division (GA EPD).

- **Area of Concern 2: Kroger Fuel Center**
  A Kroger Fuel Center currently operates on the subject property. The facility currently operates two gasoline-containing underground storage tanks (USTs) (20,000 gallons and 8,000 gallons). The tanks were reportedly installed in 2005 and are double-walled. The operation of a gas station with petroleum-containing USTs and a dispenser system is a

recognized environmental condition. It should be noted that there are no reported releases in connection with this facility, and in the event of a release, Kroger would be the RP for assessment or remediation activities.

Property Solutions was contracted by AmREIT to evaluate the presence/absence of potential subsurface concerns as they relate to the AOCs and to evaluate the need for additional investigation activities as warranted and was not intended for submittal to the State of Georgia. The main goal of this investigation was to address potential vapor intrusion and current groundwater conditions in relation to AOC-1.

1.2 Scope of Work

The scope of work conducted as part of this Limited SI included evaluation of soil gas, indoor air, and groundwater conditions through the installation of sub-slab and near-slab (outside footprint of building) soil vapor sampling points, indoor air sampling, and the collection and analysis of select groundwater samples from 18 of the existing monitoring wells. The following provides a summary of the tasks performed:

1. A utility locate request was made to Utilities Protection Center, Inc. (Georgia 811) to locate and mark subsurface utilities (Ticket No. 05103-219-018).

2. A walk-through of the subject property tenant spaces in the vicinity of the units to the sampled was conducted to identify the use or storage of materials such as paints, cleaners, and degreasers that could interfere with the indoor air sampling results or potentially produce false positive analytical results.

3. Six sub-slab and near-slab soil gas samples were collected by advancing 1-inch diameter holes through the floor in select locations, dedicated Nylaflow® tubing advanced into the borehole and sealed from the surface with bentonite and soil gas collected from each sampling point via laboratory-supplied 400 milliliter (ml) Summa® canisters utilizing a laboratory-supplied stainless steel flow regulator. Sampling locations were purged of approximately 180 ml using a syringe prior to connecting the Summa® canisters.

4. Six indoor air sampling canisters were collected via laboratory-supplied 6 liter Summa® canisters with a laboratory-supplied stainless steel flow regulator. Summa® canisters were placed within the Kroger store (Suite 20) and four of the suites to the north of Kroger (Suites 21, 23A, 23B, 24). Indoor air samples were collected over a period of 8 hours.

5. The Summa® canisters containing the sub-slab/near-slab and indoor air samples were submitted under chain-of-custody to H&P Mobile Chemistry Inc. (H&P), a National Environmental Laboratory Conference (NELAC) accredited laboratory for VOC analysis by USEPA Method TO-15.

6. For the indoor air constituents identified on-site, Property Solutions used Target Indoor

Air Concentrations (TIAs) as provided in the EPA OSWER Vapor Intrusion Screening Level (VISL) Calculator Version 3.0 (November 2012) using a Target Risk Concentrations (TCRs) of 1.00E-05 and a TCR of 1.00E-06 for comparison..

7. Groundwater samples were collected from 18 of the existing monitoring wells on the subject property (wells previously installed by others). It should be noted that two wells (MW-24 and MW-31) could not be located for sampling. Prior to sampling, wells were purged of three well volumes (or until dry) using a submersible pump or disposable Teflon bailer. Purge water was containerized for disposal in 55-gallon drums. Groundwater samples were collected using a disposable Teflon bailer in laboratory-supplied containers, stored on ice, and submitted under chain-of-custody to Gulf Coast Analytical (GCAL), a Georgia-certified laboratory, for analysis.

8. The groundwater analytical results were compared to the applicable standards, which are the Type III/IV Risk Reduction Standards (RRS) provided in Chapter 391-3-19 of Georgia's Rules for Hazardous Site Response (hereafter, the "Rules"). The Rules were promulgated under authority of the Hazardous Site Response Act (HSRA) OCGA § 12-8-90 et seq. (1992), designated for the site in the 2009 Compliance Status Report (CSR) submitted to the Environmental Protection Division of the Georgia Department of Natural Resources (EPD).

1.3 Special Terms and Conditions

This Limited Phase II SI was performed in accordance with the above Scope of Work. No special terms and conditions apply

1.4 Reliance

This report has been prepared for the sole benefit of AmREIT and may not be relied upon by any other person or entity without the written authorization of Property Solutions.

2.0 BACKGROUND INFORMATION

2.1 Property Location

Property Location	
Property Name	The Shoppes at Fountain Oaks
Property Address	4920 Roswell Road NE
Property Town, County, State, Zip	Atlanta, Fulton County, Georgia 30342
Property Tax Identification	17009300061319 and 17009300021073 (Key Site Manager and Fulton County Tax Assessor)
Property Topographic Quadrangle	Sandy Springs, Georgia
Nearest Intersection	Long Island Drive and Roswell Road; W. Belle Isle Road and Roswell Road

Property Location	
Area Description	Residential and commercial area

An excerpt from the USGS 7.5-minute series topographic quadrangle map of Sandy Springs, Georgia, locating the subject property, is included in Appendix A.

2.2 Property Description

Property Information	
Property Ownership Name	Shoppes of Fountain Oaks LP (Fulton County Tax Assessor)
Date of Acquisition	December 23, 2010
Property Acreage	13.688 acres (Property Survey, Armstrong Land Surveying, Inc., dated 2003)
Property Shape	Irregular
Property Use	Retail shopping center
Number of Buildings	Two
Number of Stories	Two
Construction Date	1988 (Key Site Manager and Fulton County Tax Assessor)
Building Square Footage	160,598 square feet (Key Site Manager); 164,573 square feet (Fulton County Tax Assessor)
Basement/Slab-on-grade	Slab-on-grade
Number of Units	45
Ceiling Finishes	Acoustical ceiling tile, exposed metal
Floor Finishes	Ceramic tile, vinyl tile, concrete, wood panel floors
Wall Finishes	Painted and/or wallpapered drywall, concrete block
HVAC (Energy Source & Type of System)	Electric and natural gas fired exterior roof-mounted package units
Renovation Date	2004-2005 (Previous reports)
Renovation Description	New exterior façade, roof replacement, pylon sign upgrade and pavement overlay. Tenant improvements and tenant build outs.
Vehicular Access	Four entrance/exits drives (one drive from the south off Long Island Drive, one drive from the east off Roswell Road, and two drives from the north off of W. Belle Isle Road
Other Improvements	Pavement, landscaping and a Kroger Fuel Service center.
Property Coverage	Footprints of the subject buildings, associated parking areas, lawn areas, and landscaping

The subject property is identified as 17009300061319 and 17009300021073, according to the Fulton County Tax Assessor. A property diagram of the subject property is included in Appendix A.

2.3 Property Operations

The subject property is used as a retail and commercial shopping center with a Kroger Fuel Service center. There are two buildings – one main building which includes the Kroger store and a second smaller retail building.

At the time of the property visit, the subject property was occupied by the following tenants:

Suite/Address	Tenant	Operations	Dates
01-02	Sue Mills	School uniforms	May 2002
03-04	Yoga Spring's Yoga Studio	Yoga studio	Feb 2002
05	Vacant	Vacant	Vacant
06-07	Alexandra's Alterations	Alterations (clothing)	July 2006
08	TCBY	Food	Feb 2012
09	Soung Youn Salon	Personal care salon	June 2001
10	Vacant	Vacant	Vacant
10B	Young Cleaners	Dry Cleaning (Drop Station)	November 2010
11-12	Eye First Vision Center	Eye Doctor	May 2003
13A	Dental Associates of Atlanta	Dentist	December 2004
13B	Vacant	Vacant	Vacant
14	Café Posh	Restaurant	May 2009
15	Vacant	Vacant	Vacant
16-17	Dance Theater	Dance studio	May 2012
18	Sally Beauty Supply	Retail beauty supplies	May 2011
19	Art & Soul	Crafts	March 2012
20	Kroger #350	Grocery store and fuel center	July 1988
21	Baily's Bottle Shop	Beverage store	March 2007
22	Pizza Hut	Restaurant	November 2006
23A	Vacant	Vacant	Vacant
23B	Coins & Currency	Coin shop	March 2003
24	Moohan Martial Arts	Martial arts training	August 2011
25	Kumon Math & Reading Center	Educational training	September 2007
26-27	Gymboree	Kids play shop	September 2008
30	Bridge Club of Atlanta	Games	May 2012
31	Cuts Inc.	Barber shop	June 2000
36	Shape Medical Weight Loss Center	Weight control	November 2007

Suite/Address	Tenant	Operations	Dates
37-38	Sola Salon Studios	Personal grooming	September 2005
39	Vacant	Vacant	Vacant
40	Nail Idol	Nail salon	May 2004
41	Vacant	Vacant	Vacant
42	AF Morad Lawyer	Attorney	September 2010
43	Brightway Insurance	Insurance agent	October 2011
44	Little Busy Mandarin Academy	Education	November 2003
45A	Pig N Chick Express	Restaurant	August 2002
45B	Mail USA	Mail center	November 2001
45C	GNC	Vitamins / nutrition	June 2004
46	Jersey Subs	Restaurant	March 2001
47	Wok & Roll	Restaurant	February 2002

2.4 Property History

Based on a review of the historical sources, the subject property consisted of wooded land and residential-type structures from prior to 1938 until 1968 aerial photo which indicated commercial-type structures on the northeast portion of the subject property. These commercial-type structures were present until the construction of the current improvements in 1988.

Phase I ESAs were performed in 2003 and 2005 that recommended additional sampling. A Phase II ESA was performed in March 2005, with 11 soils borings advanced to refusal except two. The report stated that groundwater was not encountered, but does exist at approximately 40-45 feet below ground surface (bgs). A surface sample was collected from a small tributary creek (of Nancy Creek) on the southwest side of the property. PCE was detected in soil above the EPD's Notification Concentration of 0.18 mg/kg in 5 of the 18 samples submitted. The surface water results for VOCs were below laboratory detection limits (of 5 ppb for PCE). PCE was detected in the subsurface west of the cleaners to a maximum depth of 27 feet bgs.

A Prospective Purchaser Corrective Action Plan (PPCAP) for the corrective action of the soil impacts above the Type 4 RRS under HSRA was submitted in November 2005 in order to attain Limit of Liability (LoL) protection under Georgia's Hazardous Site Reuse and Redevelopment Act (Brownfield Act). The PPCAP stated that Fountain Oaks has a known release of the regulated substances PCE, trichloroethylene (TCE), cis-1,2-DCE, 4-methyl-2-pentanone, acetone, carbon disulfide, chlorobenzene, ethyl-benzene, isopropylbenzene, toluene, and xylenes. The report states that the Potential Purchaser, US Retail Income Fund VIII-D, did not cause or contribute to the pre-existing release and therefore qualified for full protection under the Brownfield Act. The soil impacts were believed to be from the former on-site cleaners (Fashion Care) that operated from 1990-2001. However, Ultimate Cleaners (which operated from 2001-2007) could not be wholly eliminated as a potential contributor to the soil releases. The CAP estimated that 912 tons of soil would need to be excavated and disposed from this property.

Potential sources for impacted groundwater included the former Fashion Care cleaners, as well as the adjacent Citgo gas station and the nearby Chastain Cleaners. The highest concentration of PCE impacts were detected in the probable former location of the drycleaner machine (in MW-2). The second highest concentration of PCE impact was detected in the MW-5, which is downgradient from the off-site Chastain Cleaners and near the Fountain Oaks property line. These two monitoring wells with the highest concentration were separated by a monitoring well that shows lower PCE concentrations, which indicatee that there may be two separate PCE plumes.

Four potential on-site source areas for soil impact were identified: the area of the existing and former dry-cleaning machines; the area of the former lint trap (previously referred to as the vault); the area northwest of the north drive through glass door; and, the area west of the rear double delivery door. Soil removal was conducted in these potential source areas from November 2007 to May 2008. The excavations were conducted in stages (a maximum of five stages and verification sampling were conducted), and a total of 3,803.53 tons of impacted soils were removed from the subject property. The observed impact to groundwater by PCE, TCE, MTBE, cis-1,2-DCE, chloroform, methyl ethyl ketone, benzene, cyclohexane, and methyl cyclohexane, did not require remediation. Remedial action for groundwater is not required of the current owners under the provisions of the Brownfield Act and LoL.

A vapor intrusion assessment was prepared in February 2008. It was based on Tier 3 modeling, which determined that in order to meet the USEPA Superfund cancer risk of one in a million, vapor intrusion mitigation measures were needed under the spaces from the former drycleaner to the Kroger space. The recommended system called for the installation of sub-grade gas collection piping under the tenant spaces to depressurize the soil beneath them. A blower was to be installed on the system and the vapor was to be vented through the roof of the former drycleaner space. Greenleaf Environmental installed a vapor intrusion mitigation system (VIMS) in 2008. The system was approved by EPD to reduce potential vapor intrusion in the one-story adjoining tenants. The system was operated for approximately one year until EPD approved the shutdown of the system.

A Compliance Status Report (CSR) was completed by MEI in January 2010 on behalf of the responsible party. The CSR stated that the upgradient and downgradient lateral extents of groundwater contamination associated with the former on-site dry cleaning operations were fully defined, and had not migrated into groundwater within bedrock. Three groundwater contaminants related to the former on-site dry cleaners exceeded their applicable Type IV RRS on site: PCE, TCE and VC. Only PCE at one off-site location, MW-30, exceeded the applicable Type 1/3 RRS of 5 μg/L. The upgradient extent of groundwater contamination associated with the two apparent off-site sources (Chastain Cleaners and the Citgo/Quickmart) were not defined, but not attributed to the site and thus were the responsibility of their owners or their tenants. Concentrations of two petroleum contaminants in on-site groundwater, benzene and MTBE, exceeded their applicable RRS. Groundwater sampling indicated that observed PCE concentrations were reported to have declined approximately 35% to 93% from the period of 2008 to the end of 2009. Since the extent of the plume had been defined and contaminant concentrations appeared to be declining, the groundwater contaminant plume appeared to be either stable or decreasing in lateral extent and magnitude, monitored natural attenuation (MNA) was proposed as the remedial strategy at the subject property since the source area soil had been remediated.

A soil vapor survey conducted September 9 – 24, 2008, indicated that PCE was present at 92 of 124 module installation locations utilized for the investigation, with a maximum PCE concentration of 42,608 µg/m3 in an area near the former on-site dry cleaner. A secondary area of elevated concentrations for PCE was located approximately 100 feet southwest of the off-site Chastain Cleaners. Significant BTEX contamination was associated with the off-site Citgo/Quikmart UST facility immediately northeast of and upgradient from the subject property. MEI concluded that the soil vapor survey confirmed that there are three commingled groundwater contaminant plumes present on the Fountain Oaks Shopping Center property, one from a former on-site source and two from current off-site sources. Residential indoor air sampling conducted on August 25, 2008 indicated that none of the common chemicals associated with dry cleaning, and detected in nearby groundwater were detected in any sample.

3.0 PHYSICAL SETTINGS

3.1 Topography/Regional Drainage

Topographic Quadrangle Name	Sandy Springs, Georgia
Property Elevation	1,015 to 1,035 feet above mean sea level
Surface Gradient	Southwest
Property Drainage	Inlets feeding detention pond
Regional Drainage	Southerly towards Nancy Creek
Closest Perennial Water body	Tributary to Sharon's Creek located approximately 0.2 miles southwest

A copy of the USGS 7.5-minute series topographic quadrangle map of Sandy Springs, Georgia, is included in Appendix A.

3.2 Soils

USDA County Soil Survey	
Information Source	Soil Survey of Fulton County, Georgia
Date of Information Source	December 1958
Soil Name	Lloyd series
Description: The Lloyd series consists of very deep, well drained, moderately permeable soils on uplands in the Southern Piedmont. The soils formed in residuum derived from intermediate and mafic, igneous and high-grade metamorphic rocks. Slopes are commonly 2 to 10 percent but range to 50 percent. Near the type location, mean annual temperature is about 61 degrees F., and mean annual precipitation is about 45 inches.	
Expected depth to bedrock	Greater than 10 feet

3.3 Underlying Formation

The site is located within the Piedmont Physiographic Province, Southern Piedmont Physiographic Province, which extends southeast of the Brevard fault zone to the Fall Line. Rocks of the Southern Piedmont consist of Proterozoic to early Paleozoic gneisses, quartzites, amphibolites, phylites, schists, and metagabbros (200-700 million years ago).

According to the Geology of the Greater Atlanta Area (Georgia Geological Survey Bulletin 96, 1984) the rocks underlying the site are undifferentiated, ductally-sheared rocks of the Brevard fault zone. According to the Geologic Map of Georgia (1979, Atlanta Area, North 4 East 2, Geologic Survey of Georgia) these rocks are button mica schist, a type of high-grade metamorphic rock. This rock type was confirmed to be present during rock drilling conducted for the PPCAP investigation. Further, the mica schist was found to be interfingered with more highly metamorphosed gneiss and amphibolite. The depth to competent rock varies from about 40 to 65 feet BGS.

3.4 Groundwater

Groundwater occurs in the pore spaces of the soil and saprolite horizons, and also within fractures of the crystalline bedrock. The transition zone between saprolite and unweathered rock is generally a preferential pathway for lateral groundwater flow. This zone typically contains a lower percentage of clay, derived from the complete weathering of micaceous minerals and feldspar, and is made more permeable by cracking associated with shrinking and swelling of minerals by hydration. In some areas, the rock surface extends above the water table.

The movement of groundwater typically follows the original surface topography, moving from hilltops and uplands to stream valleys. Groundwater at the site is first encountered at 27 to 42 feet BGS, depending on ground elevation; depth to water as measured in the monitoring well network is presented in Table 1. Groundwater elevation beneath the site, as defined by the monitoring well network, ranges from 936 feet to 962 feet NAVD (North American Vertical Datum; see Table 1). Groundwater flow direction typically follows surface topography, flowing westerly to southwesterly. A water table map is presented in Figure 3.

The occurrence and movement of deeper groundwater in the unweathered bedrock is generally restricted to fractures, because these materials have little primary porosity. The fractures are typically most numerous and have the largest openings near the top of the unweathered rock. The amount and location of groundwater in the crystalline rock varies greatly dependent on the depth, openness, and degree of connection between fractures. Depth to water ranges from 36 to 45 feet BGS; bedrock groundwater flow has not been investigated at the site. Data obtained at the site indicate that the bedrock groundwater has not been impacted by site activities.

4.0 FIELD INVESTIGATION ACTIVITIES

4.1 Field Activities

Field activities commenced on May 15, 2013, when Thomas Lawrence, Field Hydrogeologist of Property Solutions, arrived at the subject property to begin monitoring well sampling. Weather conditions at the time of the field activities consisted of sunny skies with an approximate outside air temperature of 80 degrees Fahrenheit. Twenty of the existing monitoring wells were to be sampled; however two monitoring wells (MW-24 and MW-31) could not be located. Well location and water table maps are included in Appendix A.

On May 16, Jim Fineis with Atlas Geo-Sampling, contracted by Property Solutions, conducted the soil gas and indoor air sampling for the site. Weather conditions at the time of the field activities consisted of sunny skies with an approximate outside air temperature of 82 degrees Fahrenheit. A vapor sampling point map is included in Appendix A.

4.2 Sampling Methods

4.2.1 Groundwater Sampling

Property Solutions collected groundwater samples from 18 of the existing monitoring wells (Figure 2) on the subject property (wells previously installed by others). Prior to purging, water levels were measured relative to the top of each well casing using a Solinst Model 101 electric water level tape. Groundwater level measurements and elevations for each well are presented in Table 1. Figure 3 illustrates the water table map based on groundwater elevations calculated from the water levels measured within the wells. Based on the calculated well volumes using the total depths of the wells minus the depths to water, wells were then purged of three well volumes or until dry using a stainless-steel Monsoon submersible pump or dedicated, disposable Teflon Bailer. Dedicated, disposable HDPE tubing was utilized with the pump. Purge water was containerized for disposal in 55-gallon drums. After purging, groundwater samples were collected using a dedicated, disposable Teflon bailer.

All sample-contacting equipment used during the investigation (i.e., water level meter and Monsoon pump) was cleaned with a mixture of Alconox® and distilled water and then rinsed with distilled water. Property Solutions field personnel utilized disposable nitrile gloves during sample collection and decontamination.

4.2.2 Soil Vapor Sampling

One sub-slab (Suite 23A) and five near-slab soil gas samples were collected by advancing 1-inch diameter holes through the floor in select locations (Figure 2), dedicated Nylaflow® tubing advanced into the borehole and sealed from the surface with bentonite and soil gas collected from each sampling point via laboratory-supplied 400 milliliter (ml) Summa® canisters utilizing a laboratory-supplied stainless steel flow regulator. The sampling point was purged through the tubing, removing approximately three volumes of air prior to collecting a sample. A helium tracer test was performed on each sub-slab soil gas sampling location to ensure a proper seal from ambient air entering the sub-slab sampling point. After each sample was collected, the hole was patched with concrete.

4.2.2 Soil Vapor Sampling

Six indoor air sampling canisters were collected via laboratory-supplied 6 liter Summa® canisters with a laboratory-supplied stainless steel flow regulator. Summa® canisters were placed within the Kroger store (Suite 20) and four of the suites to the north of Kroger (Suites 21, 23A, 23B, 24) (Figure 2). Indoor air samples were collected over a period of 8 hours.

4.3 Analytical Laboratory Information

Groundwater samples were poured directly into clean, laboratory-supplied 40-ml glass vials with Teflon® septa, stored on ice, and submitted under chain-of-custody to Gulf Coast Analytical Labs (GCAL), a Georgia-certified laboratory, for analysis of Volatile Organic Compounds (VOCs). As each sample was collected, the sampling containers were labeled. The label denoted the name of the subject property, the sample location, the time and date the sample was collected, any preservatives added to the sample, and the analysis required for each sample. The information from each label was transferred onto the chain of custody form provided by GCAL. One trip blank was analyzed by the laboratory for quality assurance/quality control purposes. The VOC samples were analyzed by EPA Method 8260B (SW 846 "Test Methods for Evaluating Solid Waste" Third Edition with subsequent updates).

The Summa® canisters containing the soil gas and indoor air samples were submitted under chain-of-custody to H&P Mobile Chemistry Inc. (H&P), a NELAC accredited laboratory for VOC analysis by USEPA Method TO-15.

Analytical results were provided to Property Solutions in electronic format for submittal to AmREIT. The results of the groundwater and vapor sampling are presented in Tables 2 through 4.

5.0 REGULATORY STANDARDS

For the groundwater constituents identified on-site, Property Solutions used the calculated Type III/IV RRS provided in the January 2010 CSR. The Type I Residential RRS for PCE was used for the off-site wells, as provided in the CSR. However, it should be noted that the calculated Type IV RRS for PCE, which is based on site-specific parameters, is the same as the default Type I for residential areas.

For the indoor air constituents identified on-site, Property Solutions used Target Indoor Air Concentrations (TIAs) as provided in the EPA OSWER Vapor Intrusion Screening Level (VISL) Calculator Version 3.0 (November 2012) using a Target Risk Concentrations (TCRs) of 1.00E-05 and a TCR of 1.00E-06 for comparison..

6.0 EXPLORATION RESULTS

6.1 HSI Site 10807

Groundwater: Based on the results of the groundwater sampling conducted in Area of Concern 1, the subsurface conditions in the vicinity of Area of Concern 1 can be generally described as follows:

Current groundwater impact as shown by well sampling does not show significant variation from documented historic conditions as provided in the November 2010 CSR. There are three constituents of concern in on-site groundwater related to the former on-site dry cleaners that exceed their applicable RRS: PCE, TCE and VC. Only PCE in groundwater at one off-site location, MW-30, exceeded the applicable Type 1 RRS of 5 μg/L. Additionally, benzene and MTBE were detected above the applicable RRS in wells near the northeastern portion of the subject property. Also of note is that MTBE was detected above the RRS in MW-16, located on the western portion of the subject property, south of Kroger. MTBE exceeding the RRS and low level petroleum constituents have historically been detected at this location. The source of the apparent petroleum impact in this area is unclear. Low level MTBE (below the RRS) was also detected in the groundwater sample from MW-29, located off-site, immediately adjacent the western property boundary, west of Kroger.

Peak concentrations of PCE in groundwater were detected at 2,470 μg/L in MW-2, which was an increase from the November 2009 result of 1,900 μg/L.

PCE concentrations detected in the groundwater sample from MW-30 (off-site near residential area to the west) decreased slightly from a concentration of 23 μg/L in November 2009 to 17.9 μg/L during the current monitoring event.

MTBE detected in the groundwater sample from MW-21 (downgradient of the off-site Citgo) increased from a concentration of 350 μg/L in May 2009 to 1,780 μg/L during the current monitoring event. This well was not sampled during the November 2009 monitoring event.

Analytical results, as reported by GCAL, are provided in the Table 2. The concentrations are provided in micrograms per liter (μg/L).

Soil Gas: Constituents detected in analyzed soil gas (sub-slab and near-slab) included chlorinated hydrocarbons and petroleum constituents. The highest level of PCE detected was at SV-1, located outside the footprint of the building on the north end of the former dry cleaner. PCE was detected at this location at 1,200 $\mu g/m^3$. One sub-slab sample (SV-6) was collected within the footprint of the building in vacant Suite 23A. PCE was detected at 24 $\mu g/m^3$ at this location.

Analytical results, as reported by H&P, are provided in Tables 3 and 4. The concentrations are provided in micrograms per meter (μg/m).

Indoor Air: Detections of constituents in indoor air did not exceed the Target Indoor Air Concentrations (TIAs) as provided in the EPA OSWER Vapor Intrusion Screening Level (VISL) Calculator Version 3.0 (November 2012) using a Target Risk Concentration (TCR) of 1.00E-05.

Detections of constituents in indoor air did not exceed the TIAs as provided in the EPA OSWER VISL) Calculator Version 3.0 (November 2012) using a more stringent TCR of 1.00E-06, with the exception of chloroform in two samples. Indoor air sources of chloroform include the use of municipal (chlorinated) water, bleaches, and refrigerants. It is the opinion of Property Solutions that based on the results of soil gas samples, chloroform detections are likely the result of sources other than the subsurface.

Analytical results, as reported by H&P, are provided in Tables 3 and 4. The concentrations are provided in micrograms per meter (μg/m).

7.0 CONCLUSIONS

This Limited Phase II SI was performed to determine the potential presence/absence of subsurface contamination at the subject property as it relates to the environmental concerns identified below:

Groundwater: Based on the results of the groundwater sampling conducted in Area of Concern 1, current groundwater impact as shown by well sampling does not show significant variation from documented historic conditions as provided in the November 2010 CSR. There are three constituents of concern in on-site groundwater related to the former on-site dry cleaners that exceed their applicable RRS: PCE, TCE and VC. Only PCE in groundwater at one off-site location, MW-30, exceeded the applicable Type 1 RRS of 5 μg/L. Additionally, benzene and MTBE were detected above the applicable RRS in wells near the northeastern portion of the subject property. MTBE was detected above the RRS in MW-16, located on the western portion of the subject property, south of Kroger. The source of the apparent petroleum impact in this area is unclear. Low level MTBE (below the RRS) was also detected in the groundwater sample from MW-29, located off-site, immediately adjacent the western property boundary, west of Kroger.

Peak concentrations of PCE in groundwater were detected at 2,470 μg/L in MW-2, which was an increase from the November 2009 result of 1,900 μg/L.

PCE concentrations detected in the groundwater sample from MW-30 (off-site near residential area to the west) decreased slightly from a concentration of 23 μg/L in November 2009 to 17.9 μg/L during the current monitoring event.

MTBE detected in the groundwater sample from MW-21 (downgradient of the off-site Citgo) increased from a concentration of 350 μg/L in May 2009 to 1,780 μg/L during the current monitoring event.

Soil Gas: Constituents detected in analyzed soil gas (sub-slab and near-slab) included chlorinated hydrocarbons and petroleum constituents. The highest level of PCE detected was at SV-1, located outside the footprint of the building on the north end of the former dry cleaner. PCE was detected at this location at 1,200 $\mu g/m^3$. One sub-slab sample (SV-6) was collected within the footprint of the building in vacant Suite 23A. PCE was detected at 24 $\mu g/m^3$ at this location.

Indoor Air: Detections of constituents in indoor air did not exceed the Target Indoor Air Concentrations (TIAs) as provided in the EPA OSWER Vapor Intrusion Screening Level (VISL) Calculator Version 3.0 (November 2012) using a Target Risk Concentration (TCR) of 1.00E-05.

Detections of constituents in indoor air did not exceed the TIAs as provided in the EPA OSWER VISL) Calculator Version 3.0 (November 2012) using a more stringent TCR of 1.00E-06, with the exception of chloroform in two samples. Indoor air sources of chloroform include the use of municipal (chlorinated) water, bleaches, and refrigerants. It is the opinion of Property Solutions that based on the results of soil gas samples, chloroform detections are likely the result of sources other than the subsurface.

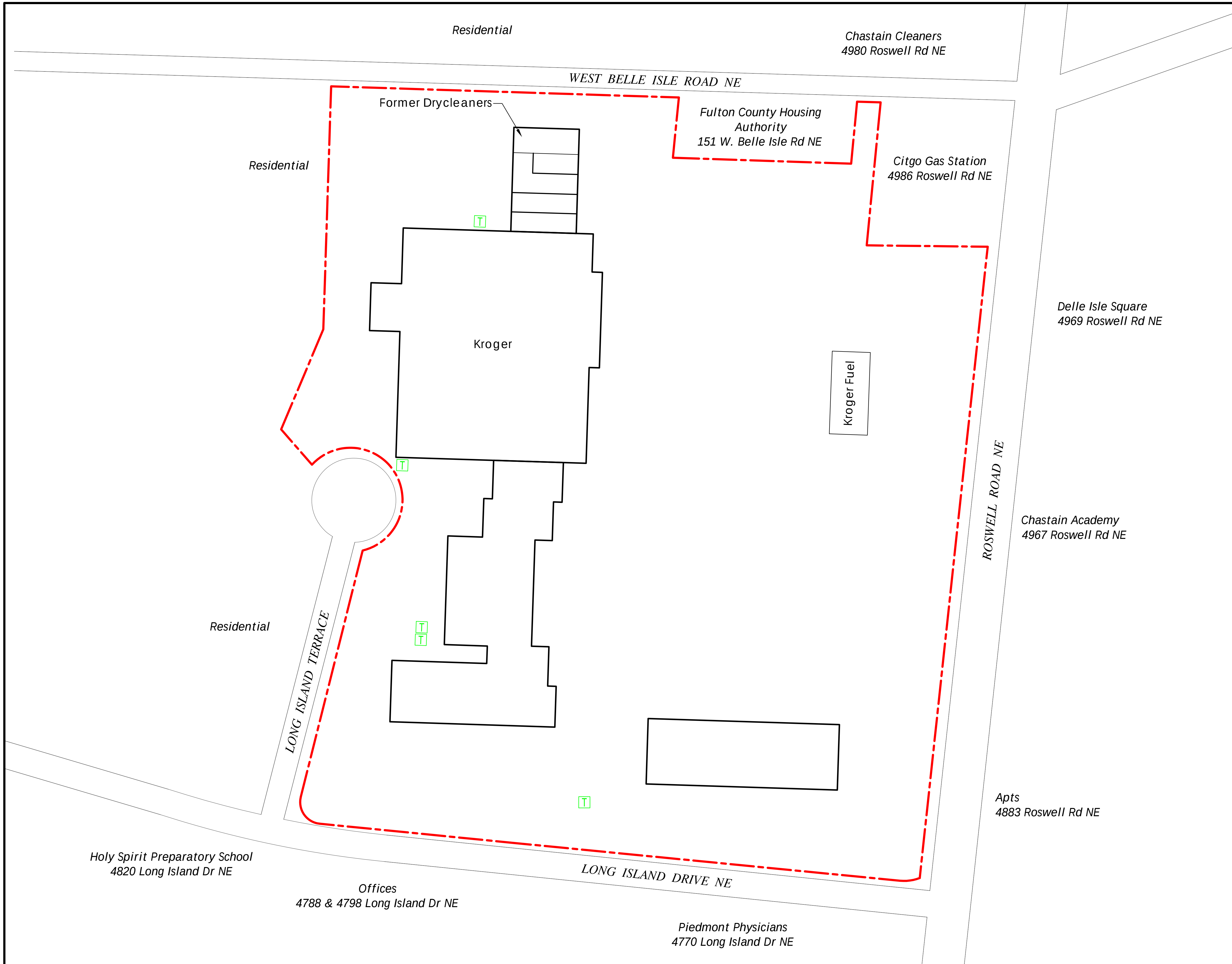
8.0 RECOMMENDATIONS

- Based on the results of indoor air sampling, it appears that the subsurface to indoor air pathway is incomplete, and no further action appears warranted based on indoor air conditions at the time of our evaluation.
- Based on the Limitation of Liability protection offered under the Brownfield Program, and the identification of a responsible party for the groundwater impacts, no further action appears warranted in connection with existing groundwater impacts.
- Based on previous remedial activities and regulatory closure in connection with soil impacts identified on the subject property, no further action appears warranted at this time in connection with previously identified impacts to soil. If additional soil contamination is identified, further action may be required.
- Property Solutions recommends obtaining information from Kroger to confirm tank integrity of the on-site USTs.

9.0 REFERENCES

1. United States Geological Survey's 7.5-minute topographic quadrangle map of Sandy Springs, Georgia.
2. United States Department of Agriculture, Soil Conservation Services' Soil Survey of Fulton County, Georgia.
3. Geologic Map of Georgia, 1979, Georgia Geological Survey.
4. Georgia Geological Survey Bulletin 96, 1984, Georgia Geological Survey

APPENDIX A
FIGURES



LEGEND

Subject Property Boundary

T Pad-Mounted Transformer

NOTE:

1. All Boundaries are Approximate.

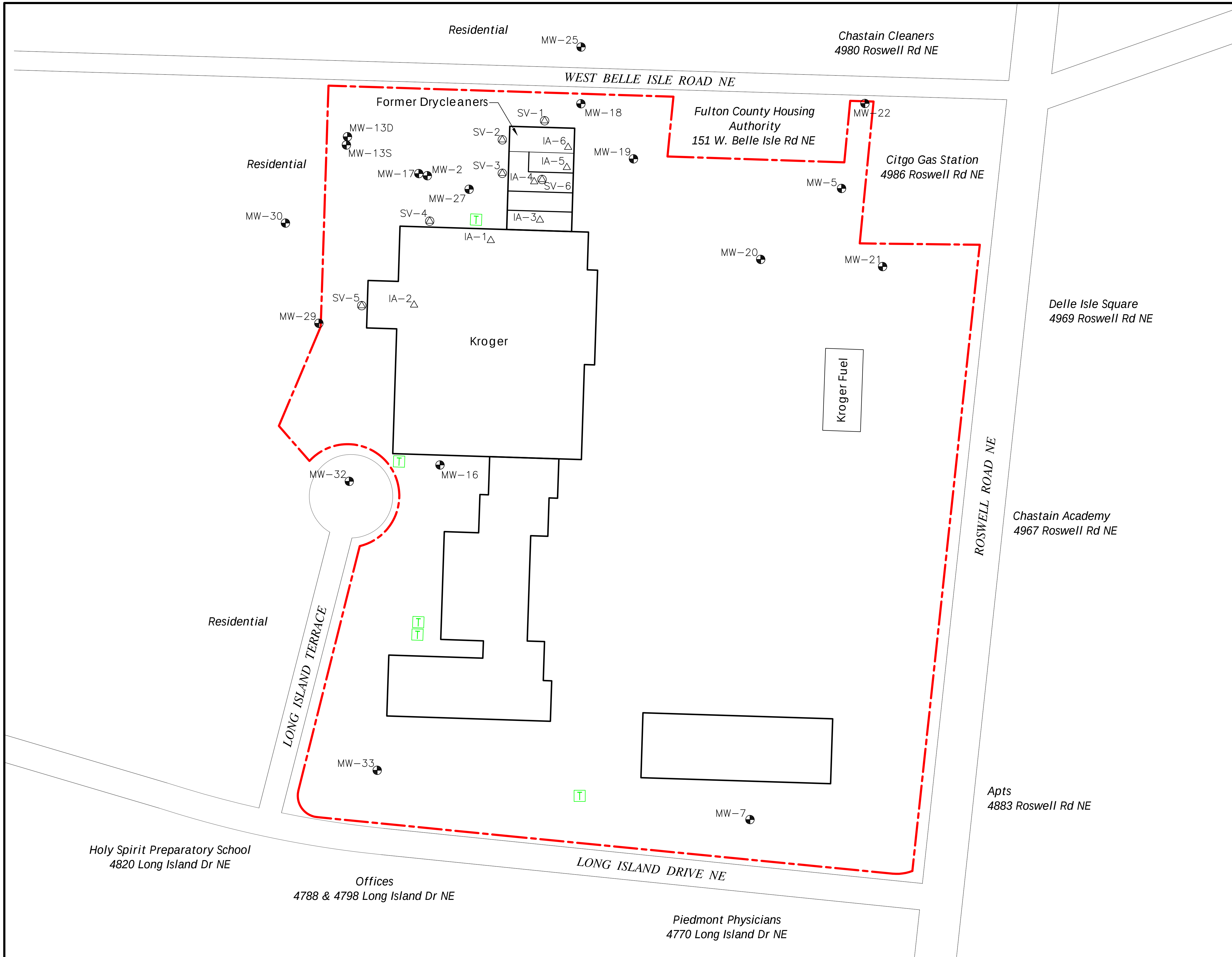
SITE DIAGRAM

Fountain Oaks
4920 Roswell Road
Atlanta, Fulton County, Georgia 30342

Drawn By: JSB	Not to Scale	Project No.: 20131813
CAD By: RJA		
CAD On: 5/9/2013		
Revised On: 6/6/2013		

Property Solutions Inc.
Environmental & Engineering Consulting
323 New Albany Road, Moorestown, NJ 08057
Phone: 856-813-3000 & Fax: 856-813-1069

File: 20131580 property diagram.dwg



LEGEND

- Subject Property Boundary
- Pad-Mounted Transformer
- Existing Monitoring Well
- Soil Vapor Sample
- Indoor Air Sample

NOTE:

1. All Boundaries are Approximate.

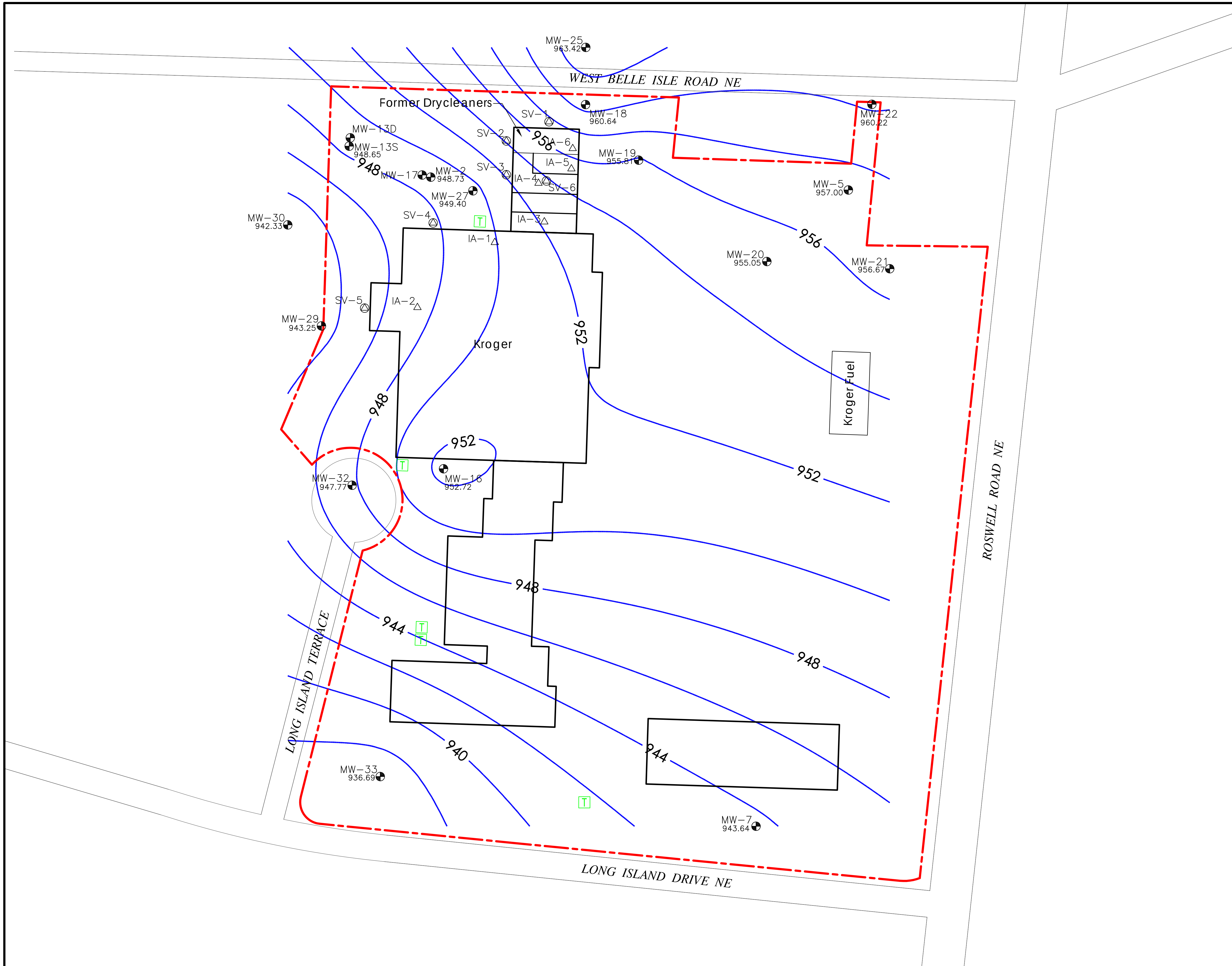
SAMPLING LOCATIONS

Fountain Oaks
4920 Roswell Road
Atlanta, Fulton County, Georgia 30342

Drawn By: JSB	Not to Scale	Project No.: 20131813
CAD By: RJA		
CAD On: 5/9/2013		
Revised On: 5/24/2013		

Property Solutions Inc.
Environmental & Engineering Consulting
323 New Albany Road, Moorestown, NJ 08057
Phone: 856-813-3000 & Fax: 856-813-1069

File: 20131580 property diagram.dwg



LEGEND

- Subject Property Boundary
- Pad-Mounted Transformer
- Existing Monitoring Well
- Soil Vapor Sample
- Indoor Air Sample
- Groundwater Contour

NOTE:

1. All Boundaries are Approximate.
2. All elevations are in feet above mean sea level (ft msl).
3. Contour interval = 2 ft msl.

GROUNDWATER CONTOUR MAP (5/17/2013)

Fountain Oaks
4920 Roswell Road
Atlanta, Fulton County, Georgia 30342

Drawn By: JSB

CAD By: RJA

CAD On: 5/9/2013

Revised On: 6/6/2013

Not to Scale

Project No.: 20131813

Property Solutions Inc.
Environmental & Engineering Consulting
323 New Albany Road, Moorestown, NJ 08057
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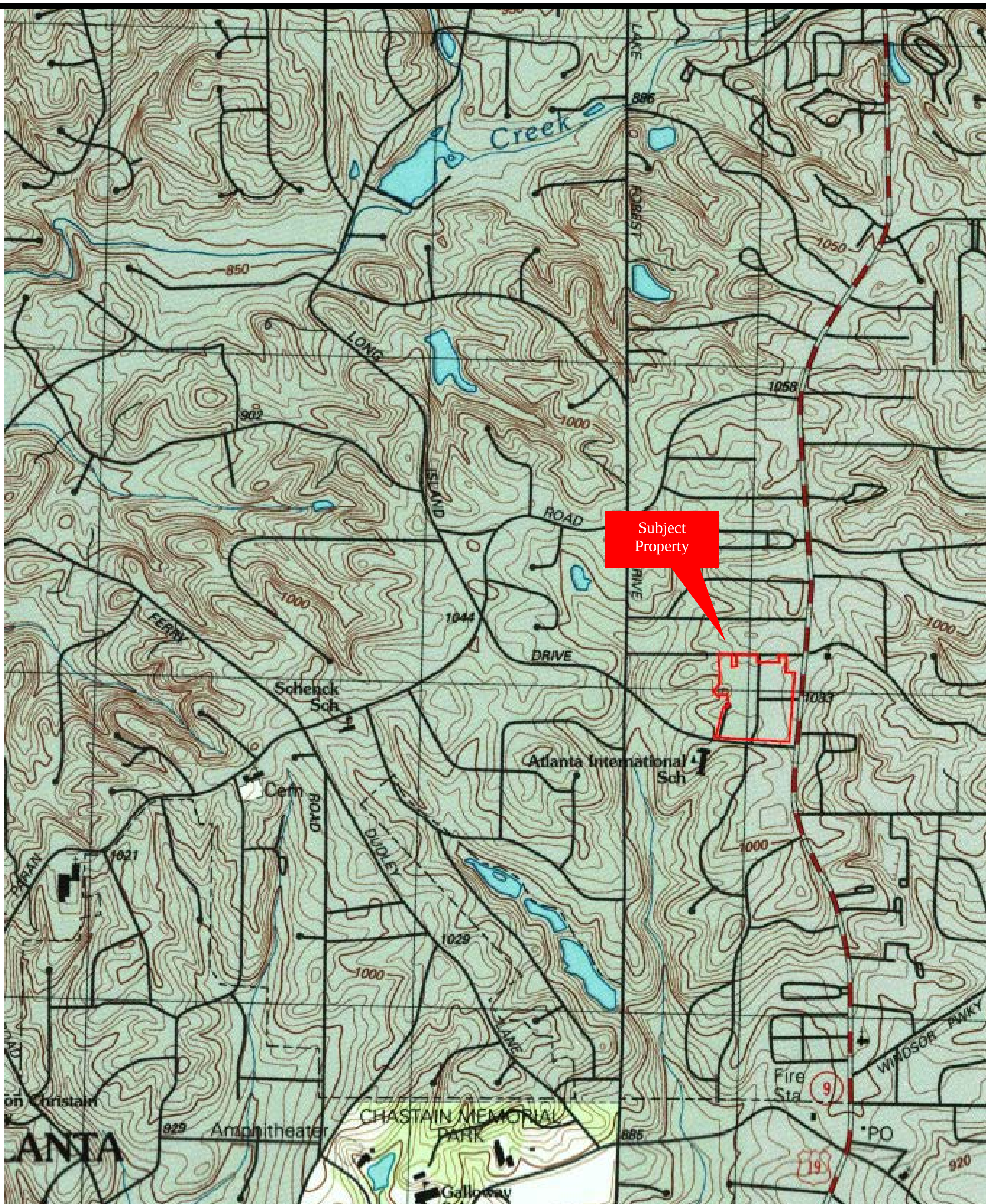
File: 20131580 property diagram.dwg



US DEPARTMENT OF THE INTERIOR GEOLOGICAL SURVEY 7.5' TOPOGRAPHIC QUADRANGLE

Property Solutions Inc.	Fountain Oaks Shopping Center 4920 Roswell Road Atlanta, GA 30342	Project No.: 20131813	N
Topo Quad Name: Sandy Springs		Property Boundaries are Approximate	

APPENDIX B
TABLES

TABLE 1
GROUNDWATER ELEVATIONS
FOUNTAIN OAKS SHOPPING CENTER
ATLANTA, GEORGIA

Well Number	*Top Of Casing Elevation (ft)*	*Total Depth (ft.)*	*Date Measured*	*Depth To Water (ft)*	*Groundwater Elevation (ft)*
MW-2	983.45	50	11/10/2009	34.26	949.19
			5/17/2013	34.72	948.73
MW-5	987.90	37.5	11/10/2009	30.94	956.96
			5/17/2013	30.90	957.00
MW-7	985.55	47	11/10/2009	40.51	945.04
			5/15/2013	41.91	943.64
MW-13S	982.35	49.5	11/10/2009	33.17	949.18
			5/17/2013	33.70	948.65
MW-13D	982.10	100	5/21/2009	30.75	951.35
			5/17/2013	35.99	946.11
MW-16	982.05	40	11/10/2009	29.31	952.74
			5/17/2013	29.33	952.72
MW-17	983.49	99	5/21/2009	52.23	931.26
			5/17/2013	41.50	941.99
MW-18	995.19	45	11/10/2009	34.25	960.94
			5/17/2013	34.55	960.64
MW-19	990.85	40	11/10/2009	34.81	956.04
			5/17/2013	35.04	955.81
MW-20	985.13	40	11/10/2009	29.91	955.22
			5/17/2013	30.08	955.05
MW-21	990.13	38	11/10/2009	33.88	956.25
			5/15/2013	33.46	956.67
MW-22	987.66	35	11/10/2009	27.41	960.25
			5/17/2013	27.44	960.22
MW-25	995.32	34	11/10/2009	38.33	956.99
			5/15/2013	31.90	963.42
MW-27	986.53	46	11/10/2009	36.34	950.19
			5/17/2013	37.13	949.40
MW-29	982.68	42	11/10/2009	37.67	945.01
			5/17/2013	39.43	943.25
MW-30	972.84	34	11/10/2009	29.65	943.19
			5/17/2013	30.51	942.33
MW-32	985.12	44	11/10/2009	35.44	949.68
			5/15/2013	37.35	947.77
MW-33	976.34	49	11/10/2009	39.53	936.81
			5/17/2013	39.65	936.69

TABLE 2
SUMMARY LIST OF DETECTIONS IN GROUNDWATER SAMPLES
FOUNTAIN OAKS SHOPPING CENTER
ATLANTA, GEORGIA

Monitoring Well	*Parameter Detected*	*Sample Date*				*RRS*
		Dec-08	*May-09*	*Nov-09*	*May-13*	
MW2	Tetrachloroethene	1,900	2,900	1,900	**2,470**	5
	Trichloroethene	120	160	120	**170**	38
MW5	Benzene	160	190	NS	**26.6**	8.7
	Tetrachloroethene	370	510	NS	**246**	5
	cis-1,2-Dichloroethene	11	38	NS	72.1	1000
MW13S	Tetrachloroethene	920	350	160	**54.1**	5
	cis-1,2-Dichloroethene	25	15	12	6.31	1000
MW13D	2-Butanone	ND	NS	NS	10.5	NA
	Acetone	280	NS	NS	54.5	NA
MW16	cis-1,2-Dichloroethene	100	97	NS	96.2	1000
	Methyl tert-butyl ether (MTBE)	1,900	960	NS	**961**	260
MW18	Tetrachloroethene	1,100	590	87	**43.5**	5
	Trichloroethene	15	24	50	34.5	38
	cis-1,2-Dichloroethene	10	43	9.2	22.5	1000
MW19	Tetrachloroethene	92	130	NS	**19.3**	5
MW20	Benzene	28	34	NS	**95.3**	8.7
	Tetrachloroethene	420	510	NS	**200**	5
	cis-1,2-Dichloroethene	6.1	25	NS	79.1	1000
MW21	Benzene	1600	1800	NS	**745**	8.7
	Methyl tert-butyl ether (MTBE)	360	350	NS	**1780**	260
MW22	Tetrachloroethene	280	270	NS	**989**	5
	Trichloroethene	15	13	NS	37.5	38
	cis-1,2-Dichloroethene	650	900	NS	83.8	1000
MW27	Tetrachloroethene	NA	190	61	**47.8**	5
	Trichloroethene	NA	14	7	5.8	38
	cis-1,2-Dichloroethene	NA	14	11	11.2	1000
MW-29	cis-1,2-Dichloroethene	NA	7.4	NS	11.8	1000
	Methyl tert-butyl ether (MTBE)	NA	4.8	NS	14.9	260
MW30	Tetrachloroethene	NA	42	23	**17.9**	5

All results in micrograms per liter (µg/L)
Bold indicates result above Risk Reduction Standard (RRS)

TABLE 3
SUMMARY LIST OF DETECTIONS IN SOIL GAS SAMPLES
FOUNTAIN OAKS SHOPPING CENTER
ATLANTA, GEORGIA

Sample ID	*Parameter Detected*	*May-13*
	Dichlorodifluoromethane	11
	Acetone	39
	Benzene	8.4
	Toluene	48
	Tetrachloroethene	1,200
	Ethylbenzene	12
	m,p-Xylene	40
	o-Xylene	13
SV-1	1,2,4-Trimethylbenzene	14
	Dichlorodifluoromethane	31
	Trichlorofluoromethane	58
	Acetone	61
	Carbon disulfide	7.0
	Benzene	37
	Trichloroethene	7.2
	4-Methyl-2-pentanone (MIBK)	14
	Toluene	110
	Tetrachloroethene	780
	Chlorobenzene	8.5
	Ethylbenzene	30
	m,p-Xylene	90
	o-Xylene	27
	4-Ethyltoluene	10
	1,3,5-Trimethylbenzene	11
SV-2	1,2,4-Trimethylbenzene	34
	Acetone	32
	Benzene	13
	Toluene	27
	Tetrachloroethene	87
	Ethylbenzene	6.9
	m,p-Xylene	25
	o-Xylene	9.1
SV-3	1,2,4-Trimethylbenzene	12
	Acetone	92
	Carbon disulfide	7.9
	Chloroform	8.6
	Benzene	140
	4-Methyl-2-pentanone (MIBK)	21
	Toluene	170
	Tetrachloroethene	180
	Chlorobenzene	20
	Ethylbenzene	32
	m,p-Xylene	91
	o-Xylene	27
	4-Ethyltoluene	5.5
	1,3,5-Trimethylbenzene	6.7
SV-4	1,2,4-Trimethylbenzene	23
	Acetone	100
	Carbon disulfide	8
	Benzene	17

TABLE 3
SUMMARY LIST OF DETECTIONS IN SOIL GAS SAMPLES
FOUNTAIN OAKS SHOPPING CENTER
ATLANTA, GEORGIA

	4-Methyl-2-pentanone (MIBK)	15
	Toluene	65
	Chlorobenzene	8.3
	Ethylbenzene	21
	m,p-Xylene	64
	o-Xylene	22
	4-Ethyltoluene	5.9
	1,3,5-Trimethylbenzene	5.8
SV-5	1,2,4-Trimethylbenzene	20
	Dichlorodifluoromethane	7.6
	Trichlorofluoromethane	19
	Acetone	250
	2-Butanone	43
	Benzene	25
	4-Methyl-2-pentanone (MIBK)	36
	Toluene	84
	Tetrachloroethene	24
	Chlorobenzene	5.7
	Ethylbenzene	26
	m,p-Xylene	79
	o-Xylene	24
	4-Ethyltoluene	9.3
	1,3,5-Trimethylbenzene	8.4
SV-6	1,2,4-Trimethylbenzene	33

All results in micrograms per cubic meter (μg/m^3)

TABLE 4
SUMMARY LIST OF DETECTIONS IN INDOOR AIR SAMPLES
FOUNTAIN OAKS SHOPPING CENTER
ATLANTA, GEORGIA

Sample ID	*Parameter Detected*	*May-13*	*Target Indoor Air Concentration (State)**	*Target Indoor Air Concentration (Federal)***
	Dichlorodifluoromethane	1.8	440	440
	Chloromethane	1.4	390	390
	Trichlorofluoromethane	7.4	3,100	3,100
	Acetone	31	140,000	140,000
	Methylene chloride	0.72	2,600	1,200
	Carbon disulfide	3.0	3,100	3,100
	2-Butanone (MEK)	3.4	22,000	22,000
	Chloroform	**0.95**	5.3	0.53
	Benzene	1.0	16	1.6
	Carbon tetrachloride	0.57	20	2.2
	Toluene	4.5	22,000	22,000
	Ethylbenzene	0.64	49	4.9
	m,p-Xylene	1.70	440	440
	Styrene	0.65	4,400	4,400
	o-Xylene	0.66	440	440
IA-1	1,2,4-Trimethylbenzene	0.73	31	31
	Dichlorodifluoromethane	2.3	440	440
	Chloromethane	1.6	390	390
	Trichlorofluoromethane	8.4	3,100	3,100
	Acetone	33	140,000	140,000
	Methylene chloride	0.60	2,600	1,200
	2-Butanone (MEK)	3.6	22,000	22,000
	Chloroform	**1.1**	5.3	0.53
	Benzene	0.95	16	1.6
	Carbon tetrachloride	0.59	20	2.2
	Toluene	3.6	22,000	22,000
	Ethylbenzene	0.50	49	4.9
	m,p-Xylene	1.3	440	440
	Styrene	0.75	4,400	4,400
	o-Xylene	0.54	440	440
IA-2	1,2,4-Trimethylbenzene	0.59	31	31
	Dichlorodifluoromethane	2.4	440	440
	Chloromethane	1.4	390	390
	Trichlorofluoromethane	13	3,100	3,100
	Acetone	26	140,000	140,000
	Methylene chloride	0.41	2,600	1,200
	Carbon disulfide	0.73	3,100	3,100
	2-Butanone (MEK)	1.9	22,000	22,000
	Benzene	0.75	16	1.6
	Carbon tetrachloride	0.40	20	2.2
	Toluene	2.2	22,000	22,000
	m,p-Xylene	1.2	440	440
IA-3	1,2,4-Trimethylbenzene	0.52	31	31
	Dichlorodifluoromethane	2.8	440	440
	Chloromethane	1.1	390	390
	Trichlorofluoromethane	16	3,100	3,100
	Acetone	29	140,000	140,000
	1,1,2-Trichlorotrifluoroethane	2.8	130,000	130,000
	Methylene chloride	0.43	2,600	1,200
	Carbon disulfide	0.48	3,100	3,100

TABLE 4
SUMMARY LIST OF DETECTIONS IN INDOOR AIR SAMPLES
FOUNTAIN OAKS SHOPPING CENTER
ATLANTA, GEORGIA

	2-Butanone (MEK)	1.8	22,000	22,000
	Chloroform	0.28	5.3	0.53
	Benzene	0.76	16	1.6
	Carbon tetrachloride	0.34	20	2.2
	Toluene	2.6	22,000	22,000
	Ethylbenzene	0.45	49	4.9
	m,p-Xylene	1.4	440	440
	Styrene	0.65	4,400	4,400
	o-Xylene	0.55	440	440
IA-4	1,2,4-Trimethylbenzene	0.55	31	31
	Dichlorodifluoromethane	3.4	440	440
	Chloromethane	1.5	390	390
	Trichlorofluoromethane	22	3,100	3,100
	Acetone	250	140,000	140,000
	1,1,2-Trichlorotrifluoroethane	16	130,000	130,000
	Methylene chloride	0.62	2,600	1,200
	2-Butanone (MEK)	2.3	22,000	22,000
	Chloroform	1.0	5.3	0.53
	1,1,1-Trichloroethane	3.1	22,000	22,000
	Benzene	0.82	16	1.6
	Carbon tetrachloride	0.43	20	2.2
	Toluene	4.0	22,000	22,000
	Tetrachloroethene	3.1	180	47
	Ethylbenzene	0.92	49	4.9
	m,p-Xylene	2.6	440	440
	Styrene	2.0	4,400	4,400
	o-Xylene	0.88	440	440
IA-5	1,2,4-Trimethylbenzene	0.51	31	31
	Dichlorodifluoromethane	3.1	440	440
	Chloromethane	1.5	390	390
	Trichlorofluoromethane	23	3,100	3,100
	Acetone	36	140,000	140,000
	1,1,2-Trichlorotrifluoroethane	1.2	130,000	130,000
	Methylene chloride	0.42	2,600	1,200
	2-Butanone (MEK)	2.0	22,000	22,000
	Chloroform	0.49	5.3	0.53
	Benzene	0.61	16	1.6
	Carbon tetrachloride	0.42	20	2.2
	Toluene	2.8	22,000	22,000
	Tetrachloroethene	1.2	180	47
	m,p-Xylene	1.2	440	440
IA-6	1,2,4-Trimethylbenzene	0.65	31	31

All results in micrograms per cubic meter ($\mu g/m^3$)

*Based on the EPA OSWER Vapor Intrusion Screening Level (VISL) Calculator Version 3.0, November 2012 RSLs for commercial properties using a Target Risk For Carcinogens (TCR) of 1.00E-05

Based on the EPA OSWER Vapor Intrusion Screening Level (VISL) Calculator Version 3.0, November 2012 RSLs for commercial properties using a Target Risk For Carcinogens (TCR) of 1.00E-06. **Bold indicates a result over this value.

APPENDIX C
PROPERTY PHOTOGRAPHS

PHOTO 1.

Project identification signage, Roswell Road.

PHOTO 2.

View of the east elevation of the large building (containing Kroger Grocery Store).

PHOTO 3.

View of the north elevation of the smaller building on left side of photo.

PHOTO 4.

View of east side of the north end of the large building. Former drycleaner was located in the northern most tenant space (currently identified in the photograph as "Martial Arts").

PHOTO 5.

Citgo Station, adjoining to the northeast.

PHOTO 6.

On-site Kroger Fuel Center

PHOTO 7.

Typical flush-mount monitoring wells on subject property.

PHOTO 8.

Western portion of subject property – MW-30 is visible in the background.

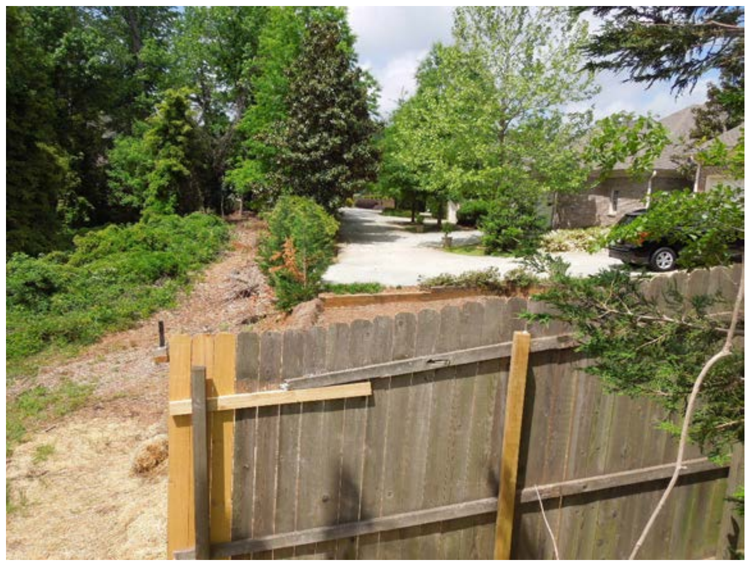


PHOTO 9.

Interior of former dry cleaner (current martial arts studio).

PHOTO 10.

Indoor air sample in former dry cleaner.

PHOTO 11.

One of the indoor air sample locations in Kroger store.

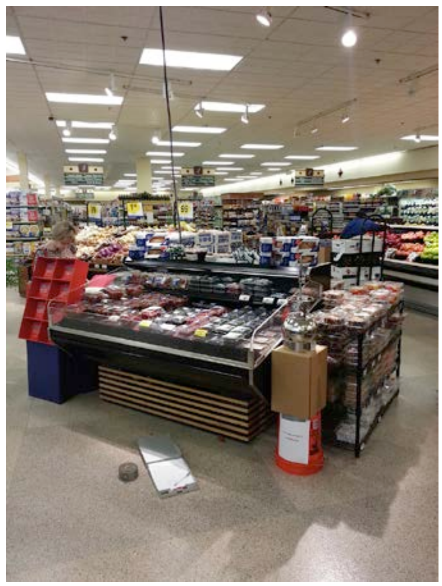
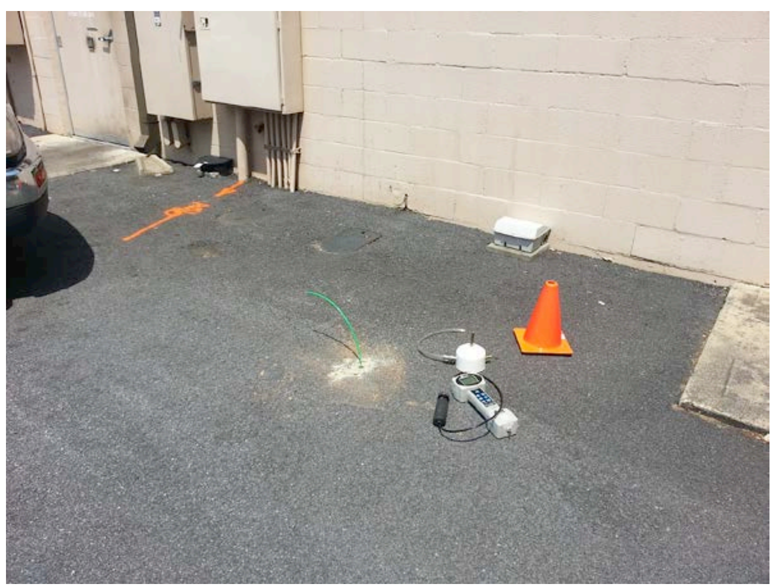


PHOTO 12.

Typical set-up of near-slab soil vapor sampling point.



APPENDIX D
ANALYTICAL DATA

NELAP CERTIFICATE NUMBER 01955
DOD ELAP CERTIFICATE NUMBER ADE - 1482

ANALYTICAL RESULTS

PERFORMED BY

GULF COAST ANALYTICAL LABORATORIES, INC.
7979 GSRI Avenue
Baton Rouge, LA 70820

Report Date 05/24/2013

GCAL Report 213051701

Deliver To	Property Solutions, Inc. 1270 Winchester Prkwy. Suite 202 Smyrna, GA 30080 770-434-1997 Ext. 210
Attn	Brant Teets

Project Rush VOC

CASE NARRATIVE

Client: Property Solutions **Report:** 213051701

Gulf Coast Analytical Laboratories received and analyzed the sample(s) listed on the sample cross-reference page of this report. Receipt of the sample(s) is documented by the attached chain of custody. This applies only to the sample(s) listed in this report. No sample integrity or quality control exceptions were identified unless noted below.

This report was resubmitted on 05/24/13. The client revised the ID for sample 213005170101 (MW-21).

VOLATILES MASS SPECTROMETRY

In the SW-846 8260B analysis, sample 21305170101 (MW-21) had to be diluted to bracket the concentration of target compounds within the calibration range of the instrument. The dilution is reflected in elevated detection limits.

MISCELLANEOUS

The volatile containers for samples 21305170101 (MW-21) and 21305170104 (MW-25) contained headspace in excess of that allowed by the method. The sample was analyzed at the clients request.

Laboratory Endorsement

Sample analysis was performed in accordance with approved methodologies provided by the Environmental Protection Agency or other recognized agencies. The samples and their corresponding extracts will be maintained for a period of 30 days unless otherwise arranged. Following this retention period the samples will be disposed in accordance with GCAL's Standard Operating Procedures.

Common Abbreviations Utilized in this Report

ND	Indicates the result was Not Detected at the specified RDL
DO	Indicates the result was Diluted Out
MI	Indicates the result was subject to Matrix Interference
TNTC	Indicates the result was Too Numerous To Count
SUBC	Indicates the analysis was Sub-Contracted
FLD	Indicates the analysis was performed in the Field
PQL	Practical Quantitation Limit
MDL	Method Detection Limit
RDL	Reporting Detection Limit
00:00	Reported as a time equivalent to 12:00 AM

Reporting Flags Utilized in this Report

J	Indicates the result is between the MDL and RDL
U	Indicates the compound was analyzed for but not detected
B	Indicates the analyte was detected in the associated Method Blank

Sample receipt at GCAL is documented through the attached chain of custody. In accordance with NELAC, this report shall be reproduced only in full and with the written permission of GCAL. The results contained within this report relate only to the samples reported. The documented results are presented within this report.

This report pertains only to the samples listed in the Report Sample Summary and should be retained as a permanent record thereof. The results contained within this report are intended for the use of the client. Any unauthorized use of the information contained in this report is prohibited.

I certify that this data package is in compliance with the NELAC standard and terms and conditions of the contract and Statement of Work both technically and for completeness, for other than the conditions in the case narrative. Release of the data contained in this hardcopy data package and in the computer-readable data submitted has been authorized by the Quality Assurance Manager or his/her designee, as verified by the following signature.

Estimated uncertainty of measurement is available upon request. This report is in compliance with the DOD QSM as specified in the contract if applicable.

Authorized Signature
GCAL REPORT 213051701

Report Sample Summary

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
21305170101	MW-21	Water	05/15/2013 13:25	05/17/2013 09:00
21305170102	MW-7	Water	05/15/2013 14:25	05/17/2013 09:00
21305170103	MW-32	Water	05/15/2013 15:10	05/17/2013 09:00
21305170104	MW-25	Water	05/15/2013 16:30	05/17/2013 09:00

Summary of Compounds Detected

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
21305170101	**MW-21**	Water	05/15/2013 13:25	05/17/2013 09:00

SW-846 8260B

CAS#	Parameter	Result	RDL	REG LIMIT	Units
71-43-2	Benzene	745	25.0		ug/L

SW-846 8260B

CAS#	Parameter	Result	RDL	REG LIMIT	Units
1634-04-4	tert-Butyl methyl ether (MTBE)	1780	100		ug/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
21305170101	**MW-21**	Water	05/15/2013 13:25	05/17/2013 09:00

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			5	05/17/2013 13:01	AMD	507508

CAS#	Parameter	Result	RDL	REG LIMIT	Units
630-20-6	1,1,1,2-Tetrachloroethane	<25.0	25.0		ug/L
71-55-6	1,1,1-Trichloroethane	<25.0	25.0		ug/L
79-34-5	1,1,2,2-Tetrachloroethane	<25.0	25.0		ug/L
79-00-5	1,1,2-Trichloroethane	<25.0	25.0		ug/L
75-34-3	1,1-Dichloroethane	<25.0	25.0		ug/L
75-35-4	1,1-Dichloroethene	<25.0	25.0		ug/L
563-58-6	1,1-Dichloropropene	<25.0	25.0		ug/L
96-18-4	1,2,3-Trichloropropane	<25.0	25.0		ug/L
120-82-1	1,2,4-Trichlorobenzene	<25.0	25.0		ug/L
95-63-6	1,2,4-Trimethylbenzene	<25.0	25.0		ug/L
96-12-8	1,2-Dibromo-3-chloropropane	<25.0	25.0		ug/L
106-93-4	1,2-Dibromoethane	<25.0	25.0		ug/L
95-50-1	1,2-Dichlorobenzene	<25.0	25.0		ug/L
107-06-2	1,2-Dichloroethane	<25.0	25.0		ug/L
540-59-0	1,2-Dichloroethene(Total)	<50.0	50.0		ug/L
78-87-5	1,2-Dichloropropane	<25.0	25.0		ug/L
108-67-8	1,3,5-Trimethylbenzene	<25.0	25.0		ug/L
541-73-1	1,3-Dichlorobenzene	<25.0	25.0		ug/L
142-28-9	1,3-Dichloropropane	<25.0	25.0		ug/L
106-46-7	1,4-Dichlorobenzene	<25.0	25.0		ug/L
594-20-7	2,2-Dichloropropane	<25.0	25.0		ug/L
78-93-3	2-Butanone	<25.0	25.0		ug/L
95-49-8	2-Chlorotoluene	<25.0	25.0		ug/L
591-78-6	2-Hexanone	<25.0	25.0		ug/L
106-43-4	4-Chlorotoluene	<25.0	25.0		ug/L
99-87-6	4-Isopropyltoluene	<25.0	25.0		ug/L
108-10-1	4-Methyl-2-pentanone	<25.0	25.0		ug/L
67-64-1	Acetone	<25.0	25.0		ug/L
71-43-2	**Benzene**	**745**	**25.0**		**ug/L**
108-86-1	Bromobenzene	<25.0	25.0		ug/L
74-97-5	Bromochloromethane	<25.0	25.0		ug/L
75-27-4	Bromodichloromethane	<25.0	25.0		ug/L
75-25-2	Bromoform	<25.0	25.0		ug/L
74-83-9	Bromomethane	<25.0	25.0		ug/L
75-15-0	Carbon disulfide	<25.0	25.0		ug/L
56-23-5	Carbon tetrachloride	<25.0	25.0		ug/L
108-90-7	Chlorobenzene	<25.0	25.0		ug/L
75-00-3	Chloroethane	<25.0	25.0		ug/L
67-66-3	Chloroform	<25.0	25.0		ug/L
74-87-3	Chloromethane	<25.0	25.0		ug/L
124-48-1	Dibromochloromethane	<25.0	25.0		ug/L
74-95-3	Dibromomethane	<25.0	25.0		ug/L
75-71-8	Dichlorodifluoromethane	<25.0	25.0		ug/L
100-41-4	Ethylbenzene	<25.0	25.0		ug/L
87-68-3	Hexachlorobutadiene	<25.0	25.0		ug/L
98-82-8	Isopropylbenzene (Cumene)	<25.0	25.0		ug/L
74-88-4	Methyl iodide	<25.0	25.0		ug/L
75-09-2	Methylene chloride	<25.0	25.0		ug/L
91-20-3	Naphthalene	<25.0	25.0		ug/L
100-42-5	Styrene	<25.0	25.0		ug/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
21305170101	**MW-21**	Water	05/15/2013 13:25	05/17/2013 09:00

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			5	05/17/2013 13:01	AMD	507508

CAS#	Parameter	Result	RDL	REG LIMIT	Units
127-18-4	Tetrachloroethene	<25.0	25.0		ug/L
108-88-3	Toluene	<25.0	25.0		ug/L
79-01-6	Trichloroethene	<25.0	25.0		ug/L
75-69-4	Trichlorofluoromethane	<25.0	25.0		ug/L
76-13-1	Trichlorotrifluoroethane	<25.0	25.0		ug/L
75-01-4	Vinyl chloride	<25.0	25.0		ug/L
1330-20-7	Xylene (total)	<75.0	75.0		ug/L
156-59-2	cis-1,2-Dichloroethene	<25.0	25.0		ug/L
10061-01-5	cis-1,3-Dichloropropene	<25.0	25.0		ug/L
136777-61-2	m,p-Xylene	<50.0	50.0		ug/L
104-51-8	n-Butylbenzene	<25.0	25.0		ug/L
103-65-1	n-Propylbenzene	<25.0	25.0		ug/L
95-47-6	o-Xylene	<25.0	25.0		ug/L
135-98-8	sec-Butylbenzene	<25.0	25.0		ug/L
98-06-6	tert-Butylbenzene	<25.0	25.0		ug/L
156-60-5	trans-1,2-Dichloroethene	<25.0	25.0		ug/L
10061-02-6	trans-1,3-Dichloropropene	<25.0	25.0		ug/L
110-57-6	trans-1,4-Dichloro-2-butene	<25.0	25.0		ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	250	282	ug/L	113	78 - 130
1868-53-7	Dibromofluoromethane	250	251	ug/L	100	77 - 127
2037-26-5	Toluene d8	250	260	ug/L	104	76 - 134
17060-07-0	1,2-Dichloroethane-d4	250	227	ug/L	91	71 - 127

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			20	05/17/2013 15:29	AMD	507508

CAS#	Parameter	Result	RDL	REG LIMIT	Units
1634-04-4	**tert-Butyl methyl ether (MTBE)**	**1780**	**100**		**ug/L**

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	1000	1110	ug/L	111	78 - 130
1868-53-7	Dibromofluoromethane	1000	1010	ug/L	101	77 - 127
2037-26-5	Toluene d8	1000	1020	ug/L	102	76 - 134
17060-07-0	1,2-Dichloroethane-d4	1000	934	ug/L	93	71 - 127

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
21305170102	**MW-7**	Water	05/15/2013 14:25	05/17/2013 09:00

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	05/17/2013 13:22	AMD	507508

CAS#	Parameter	Result	RDL	REG LIMIT	Units
630-20-6	1,1,1,2-Tetrachloroethane	<5.00	5.00		ug/L
71-55-6	1,1,1-Trichloroethane	<5.00	5.00		ug/L
79-34-5	1,1,2,2-Tetrachloroethane	<5.00	5.00		ug/L
79-00-5	1,1,2-Trichloroethane	<5.00	5.00		ug/L
75-34-3	1,1-Dichloroethane	<5.00	5.00		ug/L
75-35-4	1,1-Dichloroethene	<5.00	5.00		ug/L
563-58-6	1,1-Dichloropropene	<5.00	5.00		ug/L
96-18-4	1,2,3-Trichloropropane	<5.00	5.00		ug/L
120-82-1	1,2,4-Trichlorobenzene	<5.00	5.00		ug/L
95-63-6	1,2,4-Trimethylbenzene	<5.00	5.00		ug/L
96-12-8	1,2-Dibromo-3-chloropropane	<5.00	5.00		ug/L
106-93-4	1,2-Dibromoethane	<5.00	5.00		ug/L
95-50-1	1,2-Dichlorobenzene	<5.00	5.00		ug/L
107-06-2	1,2-Dichloroethane	<5.00	5.00		ug/L
540-59-0	1,2-Dichloroethene(Total)	<10.0	10.0		ug/L
78-87-5	1,2-Dichloropropane	<5.00	5.00		ug/L
108-67-8	1,3,5-Trimethylbenzene	<5.00	5.00		ug/L
541-73-1	1,3-Dichlorobenzene	<5.00	5.00		ug/L
142-28-9	1,3-Dichloropropane	<5.00	5.00		ug/L
106-46-7	1,4-Dichlorobenzene	<5.00	5.00		ug/L
594-20-7	2,2-Dichloropropane	<5.00	5.00		ug/L
78-93-3	2-Butanone	<5.00	5.00		ug/L
95-49-8	2-Chlorotoluene	<5.00	5.00		ug/L
591-78-6	2-Hexanone	<5.00	5.00		ug/L
106-43-4	4-Chlorotoluene	<5.00	5.00		ug/L
99-87-6	4-Isopropyltoluene	<5.00	5.00		ug/L
108-10-1	4-Methyl-2-pentanone	<5.00	5.00		ug/L
67-64-1	Acetone	<5.00	5.00		ug/L
71-43-2	Benzene	<5.00	5.00		ug/L
108-86-1	Bromobenzene	<5.00	5.00		ug/L
74-97-5	Bromochloromethane	<5.00	5.00		ug/L
75-27-4	Bromodichloromethane	<5.00	5.00		ug/L
75-25-2	Bromoform	<5.00	5.00		ug/L
74-83-9	Bromomethane	<5.00	5.00		ug/L
75-15-0	Carbon disulfide	<5.00	5.00		ug/L
56-23-5	Carbon tetrachloride	<5.00	5.00		ug/L
108-90-7	Chlorobenzene	<5.00	5.00		ug/L
75-00-3	Chloroethane	<5.00	5.00		ug/L
67-66-3	Chloroform	<5.00	5.00		ug/L
74-87-3	Chloromethane	<5.00	5.00		ug/L
124-48-1	Dibromochloromethane	<5.00	5.00		ug/L
74-95-3	Dibromomethane	<5.00	5.00		ug/L
75-71-8	Dichlorodifluoromethane	<5.00	5.00		ug/L
100-41-4	Ethylbenzene	<5.00	5.00		ug/L
87-68-3	Hexachlorobutadiene	<5.00	5.00		ug/L
98-82-8	Isopropylbenzene (Cumene)	<5.00	5.00		ug/L
74-88-4	Methyl iodide	<5.00	5.00		ug/L
75-09-2	Methylene chloride	<5.00	5.00		ug/L
91-20-3	Naphthalene	<5.00	5.00		ug/L
100-42-5	Styrene	<5.00	5.00		ug/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
21305170102	**MW-7**	Water	05/15/2013 14:25	05/17/2013 09:00

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	05/17/2013 13:22	AMD	507508

CAS#	Parameter	Result	RDL	REG LIMIT	Units
127-18-4	Tetrachloroethene	<5.00	5.00		ug/L
108-88-3	Toluene	<5.00	5.00		ug/L
79-01-6	Trichloroethene	<5.00	5.00		ug/L
75-69-4	Trichlorofluoromethane	<5.00	5.00		ug/L
76-13-1	Trichlorotrifluoroethane	<5.00	5.00		ug/L
75-01-4	Vinyl chloride	<5.00	5.00		ug/L
1330-20-7	Xylene (total)	<15.0	15.0		ug/L
156-59-2	cis-1,2-Dichloroethene	<5.00	5.00		ug/L
10061-01-5	cis-1,3-Dichloropropene	<5.00	5.00		ug/L
136777-61-2	m,p-Xylene	<10.0	10.0		ug/L
104-51-8	n-Butylbenzene	<5.00	5.00		ug/L
103-65-1	n-Propylbenzene	<5.00	5.00		ug/L
95-47-6	o-Xylene	<5.00	5.00		ug/L
135-98-8	sec-Butylbenzene	<5.00	5.00		ug/L
1634-04-4	tert-Butyl methyl ether (MTBE)	<5.00	5.00		ug/L
98-06-6	tert-Butylbenzene	<5.00	5.00		ug/L
156-60-5	trans-1,2-Dichloroethene	<5.00	5.00		ug/L
10061-02-6	trans-1,3-Dichloropropene	<5.00	5.00		ug/L
110-57-6	trans-1,4-Dichloro-2-butene	<5.00	5.00		ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	54.5	ug/L	109	78 - 130
1868-53-7	Dibromofluoromethane	50	52.3	ug/L	105	77 - 127
2037-26-5	Toluene d8	50	50.7	ug/L	101	76 - 134
17060-07-0	1,2-Dichloroethane-d4	50	47.3	ug/L	95	71 - 127

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
21305170103	**MW-32**	Water	05/15/2013 15:10	05/17/2013 09:00

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	05/17/2013 13:44	AMD	507508

CAS#	Parameter	Result	RDL	REG LIMIT	Units
630-20-6	1,1,1,2-Tetrachloroethane	<5.00	5.00		ug/L
71-55-6	1,1,1-Trichloroethane	<5.00	5.00		ug/L
79-34-5	1,1,2,2-Tetrachloroethane	<5.00	5.00		ug/L
79-00-5	1,1,2-Trichloroethane	<5.00	5.00		ug/L
75-34-3	1,1-Dichloroethane	<5.00	5.00		ug/L
75-35-4	1,1-Dichloroethene	<5.00	5.00		ug/L
563-58-6	1,1-Dichloropropene	<5.00	5.00		ug/L
96-18-4	1,2,3-Trichloropropane	<5.00	5.00		ug/L
120-82-1	1,2,4-Trichlorobenzene	<5.00	5.00		ug/L
95-63-6	1,2,4-Trimethylbenzene	<5.00	5.00		ug/L
96-12-8	1,2-Dibromo-3-chloropropane	<5.00	5.00		ug/L
106-93-4	1,2-Dibromoethane	<5.00	5.00		ug/L
95-50-1	1,2-Dichlorobenzene	<5.00	5.00		ug/L
107-06-2	1,2-Dichloroethane	<5.00	5.00		ug/L
540-59-0	1,2-Dichloroethene(Total)	<10.0	10.0		ug/L
78-87-5	1,2-Dichloropropane	<5.00	5.00		ug/L
108-67-8	1,3,5-Trimethylbenzene	<5.00	5.00		ug/L
541-73-1	1,3-Dichlorobenzene	<5.00	5.00		ug/L
142-28-9	1,3-Dichloropropane	<5.00	5.00		ug/L
106-46-7	1,4-Dichlorobenzene	<5.00	5.00		ug/L
594-20-7	2,2-Dichloropropane	<5.00	5.00		ug/L
78-93-3	2-Butanone	<5.00	5.00		ug/L
95-49-8	2-Chlorotoluene	<5.00	5.00		ug/L
591-78-6	2-Hexanone	<5.00	5.00		ug/L
106-43-4	4-Chlorotoluene	<5.00	5.00		ug/L
99-87-6	4-Isopropyltoluene	<5.00	5.00		ug/L
108-10-1	4-Methyl-2-pentanone	<5.00	5.00		ug/L
67-64-1	Acetone	<5.00	5.00		ug/L
71-43-2	Benzene	<5.00	5.00		ug/L
108-86-1	Bromobenzene	<5.00	5.00		ug/L
74-97-5	Bromochloromethane	<5.00	5.00		ug/L
75-27-4	Bromodichloromethane	<5.00	5.00		ug/L
75-25-2	Bromoform	<5.00	5.00		ug/L
74-83-9	Bromomethane	<5.00	5.00		ug/L
75-15-0	Carbon disulfide	<5.00	5.00		ug/L
56-23-5	Carbon tetrachloride	<5.00	5.00		ug/L
108-90-7	Chlorobenzene	<5.00	5.00		ug/L
75-00-3	Chloroethane	<5.00	5.00		ug/L
67-66-3	Chloroform	<5.00	5.00		ug/L
74-87-3	Chloromethane	<5.00	5.00		ug/L
124-48-1	Dibromochloromethane	<5.00	5.00		ug/L
74-95-3	Dibromomethane	<5.00	5.00		ug/L
75-71-8	Dichlorodifluoromethane	<5.00	5.00		ug/L
100-41-4	Ethylbenzene	<5.00	5.00		ug/L
87-68-3	Hexachlorobutadiene	<5.00	5.00		ug/L
98-82-8	Isopropylbenzene (Cumene)	<5.00	5.00		ug/L
74-88-4	Methyl iodide	<5.00	5.00		ug/L
75-09-2	Methylene chloride	<5.00	5.00		ug/L
91-20-3	Naphthalene	<5.00	5.00		ug/L
100-42-5	Styrene	<5.00	5.00		ug/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
21305170103	**MW-32**	Water	05/15/2013 15:10	05/17/2013 09:00

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	05/17/2013 13:44	AMD	507508

CAS#	Parameter	Result	RDL	REG LIMIT	Units
127-18-4	Tetrachloroethene	<5.00	5.00		ug/L
108-88-3	Toluene	<5.00	5.00		ug/L
79-01-6	Trichloroethene	<5.00	5.00		ug/L
75-69-4	Trichlorofluoromethane	<5.00	5.00		ug/L
76-13-1	Trichlorotrifluoroethane	<5.00	5.00		ug/L
75-01-4	Vinyl chloride	<5.00	5.00		ug/L
1330-20-7	Xylene (total)	<15.0	15.0		ug/L
156-59-2	cis-1,2-Dichloroethene	<5.00	5.00		ug/L
10061-01-5	cis-1,3-Dichloropropene	<5.00	5.00		ug/L
136777-61-2	m,p-Xylene	<10.0	10.0		ug/L
104-51-8	n-Butylbenzene	<5.00	5.00		ug/L
103-65-1	n-Propylbenzene	<5.00	5.00		ug/L
95-47-6	o-Xylene	<5.00	5.00		ug/L
135-98-8	sec-Butylbenzene	<5.00	5.00		ug/L
1634-04-4	tert-Butyl methyl ether (MTBE)	<5.00	5.00		ug/L
98-06-6	tert-Butylbenzene	<5.00	5.00		ug/L
156-60-5	trans-1,2-Dichloroethene	<5.00	5.00		ug/L
10061-02-6	trans-1,3-Dichloropropene	<5.00	5.00		ug/L
110-57-6	trans-1,4-Dichloro-2-butene	<5.00	5.00		ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	54.5	ug/L	109	78 - 130
1868-53-7	Dibromofluoromethane	50	52.5	ug/L	105	77 - 127
2037-26-5	Toluene d8	50	51.8	ug/L	104	76 - 134
17060-07-0	1,2-Dichloroethane-d4	50	45.5	ug/L	91	71 - 127

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
21305170104	**MW-25**	Water	05/15/2013 16:30	05/17/2013 09:00

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	05/17/2013 14:04	AMD	507508

CAS#	Parameter	Result	RDL	REG LIMIT	Units
630-20-6	1,1,1,2-Tetrachloroethane	<5.00	5.00		ug/L
71-55-6	1,1,1-Trichloroethane	<5.00	5.00		ug/L
79-34-5	1,1,2,2-Tetrachloroethane	<5.00	5.00		ug/L
79-00-5	1,1,2-Trichloroethane	<5.00	5.00		ug/L
75-34-3	1,1-Dichloroethane	<5.00	5.00		ug/L
75-35-4	1,1-Dichloroethene	<5.00	5.00		ug/L
563-58-6	1,1-Dichloropropene	<5.00	5.00		ug/L
96-18-4	1,2,3-Trichloropropane	<5.00	5.00		ug/L
120-82-1	1,2,4-Trichlorobenzene	<5.00	5.00		ug/L
95-63-6	1,2,4-Trimethylbenzene	<5.00	5.00		ug/L
96-12-8	1,2-Dibromo-3-chloropropane	<5.00	5.00		ug/L
106-93-4	1,2-Dibromoethane	<5.00	5.00		ug/L
95-50-1	1,2-Dichlorobenzene	<5.00	5.00		ug/L
107-06-2	1,2-Dichloroethane	<5.00	5.00		ug/L
540-59-0	1,2-Dichloroethene(Total)	<10.0	10.0		ug/L
78-87-5	1,2-Dichloropropane	<5.00	5.00		ug/L
108-67-8	1,3,5-Trimethylbenzene	<5.00	5.00		ug/L
541-73-1	1,3-Dichlorobenzene	<5.00	5.00		ug/L
142-28-9	1,3-Dichloropropane	<5.00	5.00		ug/L
106-46-7	1,4-Dichlorobenzene	<5.00	5.00		ug/L
594-20-7	2,2-Dichloropropane	<5.00	5.00		ug/L
78-93-3	2-Butanone	<5.00	5.00		ug/L
95-49-8	2-Chlorotoluene	<5.00	5.00		ug/L
591-78-6	2-Hexanone	<5.00	5.00		ug/L
106-43-4	4-Chlorotoluene	<5.00	5.00		ug/L
99-87-6	4-Isopropyltoluene	<5.00	5.00		ug/L
108-10-1	4-Methyl-2-pentanone	<5.00	5.00		ug/L
67-64-1	Acetone	<5.00	5.00		ug/L
71-43-2	Benzene	<5.00	5.00		ug/L
108-86-1	Bromobenzene	<5.00	5.00		ug/L
74-97-5	Bromochloromethane	<5.00	5.00		ug/L
75-27-4	Bromodichloromethane	<5.00	5.00		ug/L
75-25-2	Bromoform	<5.00	5.00		ug/L
74-83-9	Bromomethane	<5.00	5.00		ug/L
75-15-0	Carbon disulfide	<5.00	5.00		ug/L
56-23-5	Carbon tetrachloride	<5.00	5.00		ug/L
108-90-7	Chlorobenzene	<5.00	5.00		ug/L
75-00-3	Chloroethane	<5.00	5.00		ug/L
67-66-3	Chloroform	<5.00	5.00		ug/L
74-87-3	Chloromethane	<5.00	5.00		ug/L
124-48-1	Dibromochloromethane	<5.00	5.00		ug/L
74-95-3	Dibromomethane	<5.00	5.00		ug/L
75-71-8	Dichlorodifluoromethane	<5.00	5.00		ug/L
100-41-4	Ethylbenzene	<5.00	5.00		ug/L
87-68-3	Hexachlorobutadiene	<5.00	5.00		ug/L
98-82-8	Isopropylbenzene (Cumene)	<5.00	5.00		ug/L
74-88-4	Methyl iodide	<5.00	5.00		ug/L
75-09-2	Methylene chloride	<5.00	5.00		ug/L
91-20-3	Naphthalene	<5.00	5.00		ug/L
100-42-5	Styrene	<5.00	5.00		ug/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
21305170104	**MW-25**	Water	05/15/2013 16:30	05/17/2013 09:00

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	05/17/2013 14:04	AMD	507508

CAS#	Parameter	Result	RDL	REG LIMIT	Units
127-18-4	Tetrachloroethene	<5.00	5.00		ug/L
108-88-3	Toluene	<5.00	5.00		ug/L
79-01-6	Trichloroethene	<5.00	5.00		ug/L
75-69-4	Trichlorofluoromethane	<5.00	5.00		ug/L
76-13-1	Trichlorotrifluoroethane	<5.00	5.00		ug/L
75-01-4	Vinyl chloride	<5.00	5.00		ug/L
1330-20-7	Xylene (total)	<15.0	15.0		ug/L
156-59-2	cis-1,2-Dichloroethene	<5.00	5.00		ug/L
10061-01-5	cis-1,3-Dichloropropene	<5.00	5.00		ug/L
136777-61-2	m,p-Xylene	<10.0	10.0		ug/L
104-51-8	n-Butylbenzene	<5.00	5.00		ug/L
103-65-1	n-Propylbenzene	<5.00	5.00		ug/L
95-47-6	o-Xylene	<5.00	5.00		ug/L
135-98-8	sec-Butylbenzene	<5.00	5.00		ug/L
1634-04-4	tert-Butyl methyl ether (MTBE)	<5.00	5.00		ug/L
98-06-6	tert-Butylbenzene	<5.00	5.00		ug/L
156-60-5	trans-1,2-Dichloroethene	<5.00	5.00		ug/L
10061-02-6	trans-1,3-Dichloropropene	<5.00	5.00		ug/L
110-57-6	trans-1,4-Dichloro-2-butene	<5.00	5.00		ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	55.7	ug/L	111	78 - 130
1868-53-7	Dibromofluoromethane	50	51	ug/L	102	77 - 127
2037-26-5	Toluene d8	50	51.5	ug/L	103	76 - 134
17060-07-0	1,2-Dichloroethane-d4	50	46.9	ug/L	94	71 - 127

GC/MS Volatiles Quality Control Summary

Analytical Batch	507508	Client ID	MB507508			LCS507508			LCSD507508			
Prep Batch	N/A	GCAL ID	1192608			1192609			1192610			
		Sample Type	Method Blank			LCS			LCSD			
		Analytical Date	05/17/2013 10:32			05/17/2013 08:43			05/17/2013 09:25			
		Matrix	Water			Water			Water			
SW-846 8260B			**Units** ug/L		**Spike**			**Control**				**RPD**
			Result	**RDL**	**Added**	**Result**	**% R**	**Limits % R**	**Result**	**% R**	**RPD**	**Limit**
67-64-1	Acetone		<5.00	5.00	50.0	33.4	67	44 - 156	34.2	68	2	30
107-02-8	Acrolein		<25.0	25.0	250	261	104	30 - 160	250	100	4	30
107-13-1	Acrylonitrile		<25.0	25.0	250	224	90	64 - 137	216	86	4	30
74-97-5	Bromochloromethane		<5.00	5.00	50.0	50.3	101	76 - 130	45.2	90	11	30
75-27-4	Bromodichloromethane		<5.00	5.00	50.0	47.4	95	74 - 125	42.4	85	11	30
75-25-2	Bromoform		<5.00	5.00	50.0	46.6	93	64 - 122	45.1	90	3	30
74-83-9	Bromomethane		<5.00	5.00	50.0	53.5	107	47 - 138	43.3	87	21	30
75-15-0	Carbon disulfide		<5.00	5.00	50.0	49.9	100	69 - 136	46.7	93	7	30
56-23-5	Carbon tetrachloride		<5.00	5.00	50.0	44.3	89	76 - 128	41.0	82	8	30
75-00-3	Chloroethane		<5.00	5.00	50.0	48.9	98	62 - 141	43.3	87	12	30
136777-61-2	m,p-Xylene		<10.0	10.0	100	93.9	94	74 - 126	92.0	92	2	30
67-66-3	Chloroform		<5.00	5.00	50.0	47.4	95	75 - 122	42.1	84	12	30
74-87-3	Chloromethane		<5.00	5.00	50.0	43.0	86	59 - 132	40.5	81	6	30
124-48-1	Dibromochloromethane		<5.00	5.00	50.0	46.0	92	71 - 123	43.5	87	6	30
74-95-3	Dibromomethane		<5.00	5.00	50.0	49.6	99	72 - 129	45.3	91	9	30
75-71-8	Dichlorodifluoromethane		<5.00	5.00	50.0	48.2	96	58 - 140	43.6	87	10	30
75-34-3	1,1-Dichloroethane		<5.00	5.00	50.0	45.5	91	74 - 127	40.7	81	11	30
107-06-2	1,2-Dichloroethane		<5.00	5.00	50.0	42.6	85	71 - 129	38.9	78	9	30
156-59-2	cis-1,2-Dichloroethene		<5.00	5.00	50.0	44.4	89	73 - 130	39.9	80	11	30
156-60-5	trans-1,2-Dichloroethene		<5.00	5.00	50.0	46.1	92	69 - 132	41.8	84	10	30
75-09-2	Methylene chloride		<5.00	5.00	50.0	41.4	83	68 - 132	36.7	73	12	30
78-87-5	1,2-Dichloropropane		<5.00	5.00	50.0	46.1	92	72 - 128	40.2	80	14	30
10061-01-5	cis-1,3-Dichloropropene		<5.00	5.00	50.0	42.8	86	71 - 132	38.5	77	11	30
10061-02-6	trans-1,3-Dichloropropene		<5.00	5.00	50.0	42.0	84	71 - 131	37.9	76	10	30
100-41-4	Ethylbenzene		<5.00	5.00	50.0	51.3	103	74 - 126	48.9	98	5	30
591-78-6	2-Hexanone		<5.00	5.00	50.0	32.9	66	50 - 135	34.3	69	4	30
98-82-8	Isopropylbenzene (Cumene)		<5.00	5.00	50.0	50.8	102	71 - 125	51.6	103	2	30
78-93-3	2-Butanone		<5.00	5.00	50.0	37.3	75	58 - 137	35.0	70	6	30
74-88-4	Methyl iodide		<5.00	5.00	50.0	54.2	108	57 - 141	43.9	88	21	30
108-10-1	4-Methyl-2-pentanone		<5.00	5.00	50.0	35.3	71	57 - 132	35.2	70	0	30
103-65-1	n-Propylbenzene		<5.00	5.00	50.0	44.5	89	75 - 129	42.2	84	5	30
100-42-5	Styrene		<5.00	5.00	50.0	45.3	91	71 - 127	43.2	86	5	30
127-18-4	Tetrachloroethene		<5.00	5.00	50.0	54.4	109	68 - 128	52.7	105	3	30

GC/MS Volatiles Quality Control Summary

Analytical Batch 507508	Client ID	MB507508			LCS507508			LCSD507508			
Prep Batch N/A	GCAL ID	1192608			1192609			1192610			
	Sample Type	Method Blank			LCS			LCSD			
	Analytical Date	05/17/2013 10:32			05/17/2013 08:43			05/17/2013 09:25			
	Matrix	Water			Water			Water			

SW-846 8260B		Units Result	ug/L RDL	Spike Added	Result	% R	Control Limits % R	Result	% R	RPD	RPD Limit
630-20-6	1,1,1,2-Tetrachloroethane	<5.00	5.00	50.0	51.1	102	75 - 124	47.6	95	7	30
79-34-5	1,1,2,2-Tetrachloroethane	<5.00	5.00	50.0	43.4	87	70 - 122	39.6	79	9	30
120-82-1	1,2,4-Trichlorobenzene	<5.00	5.00	50.0	45.5	91	61 - 135	45.1	90	1	30
71-55-6	1,1,1-Trichloroethane	<5.00	5.00	50.0	49.4	99	76 - 126	45.5	91	8	30
79-00-5	1,1,2-Trichloroethane	<5.00	5.00	50.0	49.7	99	72 - 121	46.1	92	8	30
75-69-4	Trichlorofluoromethane	<5.00	5.00	50.0	49.9	100	72 - 136	45.8	92	9	30
96-18-4	1,2,3-Trichloropropane	<5.00	5.00	50.0	41.0	82	70 - 120	38.1	76	7	30
95-63-6	1,2,4-Trimethylbenzene	<5.00	5.00	50.0	42.6	85	74 - 125	40.9	82	4	30
108-67-8	1,3,5-Trimethylbenzene	<5.00	5.00	50.0	46.7	93	71 - 132	44.5	89	5	30
75-01-4	Vinyl chloride	<5.00	5.00	50.0	44.4	89	68 - 132	40.4	81	9	30
95-47-6	o-Xylene	<5.00	5.00	50.0	45.5	91	73 - 130	43.0	86	6	30
96-12-8	1,2-Dibromo-3-chloropropane	<5.00	5.00	50.0	48.6	97	57 - 121	45.6	91	6	30
106-93-4	1,2-Dibromoethane	<5.00	5.00	50.0	47.2	94	70 - 124	44.5	89	6	30
108-05-4	Vinyl acetate	<5.00	5.00	50.0	0.00	**0***	54 - 147	0.00	**0***	0	30
1634-04-4	tert-Butyl methyl ether (MTBE)	<5.00	5.00	50.0	47.7	95	71 - 125	43.9	88	8	30
540-59-0	1,2-Dichloroethene(Total)	<10.0	10.0	100	90.5	91	74 - 128	81.8	82	10	30
99-87-6	4-Isopropyltoluene	<5.00	5.00	50.0	42.5	85	71 - 129	41.6	83	2	30
1330-20-7	Xylene (total)	<15.0	15.0	150	139	93	74 - 127	135	90	3	30
110-57-6	trans-1,4-Dichloro-2-butene	<5.00	5.00	50.0	35.0	70	56 - 132	31.7	63	10	30
594-20-7	2,2-Dichloropropane	<5.00	5.00	50.0	44.3	89	77 - 124	40.7	81	8	30
76-13-1	Trichlorotrifluoroethane	<5.00	5.00	50.0	49.3	99	72 - 136	46.1	92	7	30
563-58-6	1,1-Dichloropropene	<5.00	5.00	50.0	46.7	93	72 - 131	44.2	88	6	30
110-75-8	2-Chloroethylvinyl ether	<5.00	5.00	50.0	40.9	82	56 - 124	37.8	76	8	30
142-28-9	1,3-Dichloropropane	<5.00	5.00	50.0	47.1	94	74 - 122	43.6	87	8	30
108-86-1	Bromobenzene	<5.00	5.00	50.0	40.2	80	71 - 120	36.5	73	10	30
95-49-8	2-Chlorotoluene	<5.00	5.00	50.0	42.0	84	72 - 127	39.4	79	6	30
106-43-4	4-Chlorotoluene	<5.00	5.00	50.0	43.2	86	75 - 126	40.2	80	7	30
98-06-6	tert-Butylbenzene	<5.00	5.00	50.0	43.7	87	72 - 126	41.6	83	5	30
135-98-8	sec-Butylbenzene	<5.00	5.00	50.0	47.1	94	70 - 136	46.4	93	1	30
541-73-1	1,3-Dichlorobenzene	<5.00	5.00	50.0	45.8	92	74 - 126	42.2	84	8	30
106-46-7	1,4-Dichlorobenzene	<5.00	5.00	50.0	44.2	88	72 - 122	41.3	83	7	30
104-51-8	n-Butylbenzene	<5.00	5.00	50.0	41.3	83	69 - 134	40.7	81	1	30
95-50-1	1,2-Dichlorobenzene	<5.00	5.00	50.0	46.0	92	71 - 126	43.1	86	7	30

GC/MS Volatiles Quality Control Summary

Analytical Batch 507508	Client ID	MB507508			LCS507508			LCSD507508			
Prep Batch N/A	GCAL ID	1192608			1192609			1192610			
	Sample Type	Method Blank			LCS			LCSD			
	Analytical Date	05/17/2013 10:32			05/17/2013 08:43			05/17/2013 09:25			
	Matrix	Water			Water			Water			
SW-846 8260B		**Units** **Result**	ug/L **RDL**	**Spike Added**	**Result**	**% R**	**Control Limits % R**	**Result**	**% R**	**RPD**	**RPD Limit**
87-68-3	Hexachlorobutadiene	<5.00	5.00	50.0	46.1	92	61 - 144	48.0	96	4	30
91-20-3	Naphthalene	<5.00	5.00	50.0	41.7	83	57 - 138	41.2	82	1	35
75-35-4	1,1-Dichloroethene	<5.00	5.00	50.0	53.4	107	69 - 129	49.9	100	7	20
71-43-2	Benzene	<5.00	5.00	50.0	48.5	97	70 - 129	43.6	87	11	20
79-01-6	Trichloroethene	<5.00	5.00	50.0	52.4	105	76 - 129	48.2	96	8	20
108-88-3	Toluene	<5.00	5.00	50.0	48.2	96	72 - 120	45.0	90	7	20
108-90-7	Chlorobenzene	<5.00	5.00	50.0	49.4	99	74 - 123	45.9	92	7	20
Surrogate											
460-00-4	4-Bromofluorobenzene	54.3	109	50	56	112	78 - 130	58.6	117		
1868-53-7	Dibromofluoromethane	52.1	104	50	52.3	105	77 - 127	51.8	104		
2037-26-5	Toluene d8	51.8	104	50	49.4	99	76 - 134	50.4	101		
17060-07-0	1,2-Dichloroethane-d4	44.9	90	50	43.8	88	71 - 127	47.2	94		

GCAL ANALYTICAL LABORATORIES, LLC
7979 GSRI Ave., Baton Rouge, LA 70820-7402
Phone: 225.769.4900 • Fax: 225.767.5717 • www.gcal.com

CHAIN OF CUSTODY RECORD

GCAL USE ONLY

PROPERTY SOLUTIONS|4848|21305|7|01|05|2013

Report to:
Client: PROPERTY Solutions STE202
Address: 1270 WINCHESTER PKWY SMYRNA, GA 30080
Contact: BRANT TEETS
Phone: 770-434-1997 EXT 210
E-mail: BTEETS@PROPERTYSOLUTIONSINC.COM

Bill to:
Client: SAME AS REPORT
Address:
Contact:
Phone:
E-mail:

P.O. Number:
Project Name/Number:

Sampled By: Thom Lawrence

Analytical Requests & Method: 8260

GCAL use only:
Custody Seal used ☐ yes ☐ no
intact ☐ yes ☐ no
Temperature °C 3.7 E20

☐ Dissolved Analysis Requested
☐ Field filtered
☐ Lab filtered

Matrix¹	Date	Time (2400)	Comp	Grab	Sample Description	No Containers	8260	Preservative
W	5-15	1325		✓	~~MW 37~~ 21 SMG 5/23/13	3	/	1
W	"	1425		✓	MW 7	3	/	2
W	"	1510		✓	MW 32	3	/	3
W	"	1630		✓	MW 25	3	/	4

Air Bill No: 7997 8113 2999

Turn Around Time (Business Days): ☒ 24h* ☐ 48h* ☐ 3 days* ☐ 1 week* ☐ Standard (Per Contract/Quote)

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
[signature]	5-16-13	14:22	[signature]	5/16/13	1422
FEDEX	5.17.13	0900	[signature]	5.17.13	09:00

Note: DUE 5/20/13 by 4:00 PM CST

By submitting these samples, you agree to GCAL's terms and conditions contained in our most recent schedule of services.

Matrix¹: W = water, S = solid, L = liquid, T = tissue

*Requires prior approval, rush charges may apply.

We cannot accept verbal changes. Please email written changes to your PM.

SAMPLE RECEIVING CHECKLIST

213051701

SAMPLE DELIVERY GROUP	213051701
Client 4848 - Property Solutions	**Transport Method** FEDEX
Profile Number 243146	**Received By** Law , Brittany P.
Line Item(s) 1 - RUSH VOC	**Receive Date(s)** 05/17/13

CHECKLIST

	Yes	No	NA
Were all samples received using proper thermal preservation?	☑	☐	☐
When used, w ere all custody seals intact?	☑	☐	☐
Were all samples received in proper containers?	☑	☐	☐
Were all samples received using proper chemical preservation?	☑	☐	☐
Was preservative added to any container at the lab?	☐	☑	☐
Were all containers received in good condition?	☑	☐	☐
Were all VOA vials received w ith no head space?	☐	☑	☐
Do all sample labels match the Chain of Custody?	☑	☐	☐
Did the Chain of Custody list the sampling technician?	☑	☐	☐
Was the COC maintained i.e. all signatures, dates and time of receipt included?	☑	☐	☐

COOLERS

Airbill	Temp(oC)
7997 8113 2999	3.7 (E20)

DISCREPANCIES

None

LABORATORY PRESERVATIONS

None

NOTES	Three vials for analysis 8260 for sample ID MW-25 received w ith headspace. Zero vials remain. Client notified.

NELAP CERTIFICATE NUMBER 01955
DOD ELAP CERTIFICATE NUMBER ADE - 1482

ANALYTICAL RESULTS

PERFORMED BY

GULF COAST ANALYTICAL LABORATORIES, INC.

7979 GSRI Avenue

Baton Rouge, LA 70820

Report Date 05/24/2013

GCAL Report 213051809

Deliver To	Property Solutions, Inc. 1270 Winchester Prkwy. Suite 202 Smyrna, GA 30080 770-434-1997 Ext. 210
Attn	Brant Teets

Project Fountain Oaks

CASE NARRATIVE

Client: Property Solutions **Report:** 213051809

Gulf Coast Analytical Laboratories received and analyzed the sample(s) listed on the sample cross-reference page of this report. Receipt of the sample(s) is documented by the attached chain of custody. This applies only to the sample(s) listed in this report. No sample integrity or quality control exceptions were identified unless noted below.

This report was resubmitted on 05/24/13. The client revised the ID for sample 21305180911 (MW17).

VOLATILES MASS SPECTROMETRY

In the SW-846 8260B analysis, samples 21305180904 (MW22), 21305180902 (MW16), 21305180905 (MW20), 21305180906 (MW5) and 21305180912 (MW2) had to be diluted to bracket the concentration of target compounds within the calibration range of the instrument. The dilution is reflected in elevated detection limits.

In the SW-846 8260B analysis for analytical batch 507518, the LCS and/or LCSD recoveries are above the upper control limit for 1,2-Dibromo-3-Chloropropane. This compound was not detected in the associated samples.

Laboratory Endorsement

Sample analysis was performed in accordance with approved methodologies provided by the Environmental Protection Agency or other recognized agencies. The samples and their corresponding extracts will be maintained for a period of 30 days unless otherwise arranged. Following this retention period the samples will be disposed in accordance with GCAL's Standard Operating Procedures.

Common Abbreviations Utilized in this Report

ND	Indicates the result was Not Detected at the specified RDL
DO	Indicates the result was Diluted Out
MI	Indicates the result was subject to Matrix Interference
TNTC	Indicates the result was Too Numerous To Count
SUBC	Indicates the analysis was Sub-Contracted
FLD	Indicates the analysis was performed in the Field
PQL	Practical Quantitation Limit
MDL	Method Detection Limit
RDL	Reporting Detection Limit
00:00	Reported as a time equivalent to 12:00 AM

Reporting Flags Utilized in this Report

J	Indicates the result is between the MDL and RDL
U	Indicates the compound was analyzed for but not detected
B	Indicates the analyte was detected in the associated Method Blank

Sample receipt at GCAL is documented through the attached chain of custody. In accordance with NELAC, this report shall be reproduced only in full and with the written permission of GCAL. The results contained within this report relate only to the samples reported. The documented results are presented within this report.

This report pertains only to the samples listed in the Report Sample Summary and should be retained as a permanent record thereof. The results contained within this report are intended for the use of the client. Any unauthorized use of the information contained in this report is prohibited.

I certify that this data package is in compliance with the NELAC standard and terms and conditions of the contract and Statement of Work both technically and for completeness, for other than the conditions in the case narrative. Release of the data contained in this hardcopy data package and in the computer-readable data submitted has been authorized by the Quality Assurance Manager or his/her designee, as verified by the following signature.

Estimated uncertainty of measurement is available upon request. This report is in compliance with the DOD QSM as specified in the contract if applicable.

Authorized Signature
GCAL REPORT 213051809

Report Sample Summary

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
21305180901	MW33	Water	05/17/2013 08:56	05/18/2013 10:20
21305180902	MW16	Water	05/17/2013 09:31	05/18/2013 10:20
21305180903	MW19	Water	05/17/2013 10:08	05/18/2013 10:20
21305180904	MW22	Water	05/17/2013 10:42	05/18/2013 10:20
21305180905	MW20	Water	05/17/2013 11:20	05/18/2013 10:20
21305180906	MW5	Water	05/17/2013 11:31	05/18/2013 10:20
21305180907	MW29	Water	05/17/2013 12:17	05/18/2013 10:20
21305180908	MW30	Water	05/17/2013 13:05	05/18/2013 10:20
21305180909	MW13D	Water	05/17/2013 14:10	05/18/2013 10:20
21305180910	MW13S	Water	05/17/2013 14:45	05/18/2013 10:20
21305180911	MW17	Water	05/17/2013 15:47	05/18/2013 10:20
21305180912	MW2	Water	05/17/2013 16:10	05/18/2013 10:20
21305180913	MW27	Water	05/17/2013 16:40	05/18/2013 10:20
21305180914	MW18	Water	05/17/2013 17:10	05/18/2013 10:20
21305180915	TRIP BLANK	Water	05/17/2013 00:00	05/18/2013 10:20

Summary of Compounds Detected

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
21305180902	**MW16**	Water	05/17/2013 09:31	05/18/2013 10:20

SW-846 8260B

CAS#	Parameter	Result	RDL	REG LIMIT	Units
156-59-2	cis-1,2-Dichloroethene	96.2	50.0		ug/L
1634-04-4	tert-Butyl methyl ether (MTBE)	961	50.0		ug/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
21305180903	**MW19**	Water	05/17/2013 10:08	05/18/2013 10:20

SW-846 8260B

CAS#	Parameter	Result	RDL	REG LIMIT	Units
127-18-4	Tetrachloroethene	19.3	5.00		ug/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
21305180904	**MW22**	Water	05/17/2013 10:42	05/18/2013 10:20

SW-846 8260B

CAS#	Parameter	Result	RDL	REG LIMIT	Units
540-59-0	1,2-Dichloroethene(Total)	83.8	50.0		ug/L
127-18-4	Tetrachloroethene	989	25.0		ug/L
79-01-6	Trichloroethene	37.5	25.0		ug/L
156-59-2	cis-1,2-Dichloroethene	83.8	25.0		ug/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
21305180905	**MW20**	Water	05/17/2013 11:20	05/18/2013 10:20

SW-846 8260B

CAS#	Parameter	Result	RDL	REG LIMIT	Units
540-59-0	1,2-Dichloroethene(Total)	79.1	50.0		ug/L
71-43-2	Benzene	95.3	25.0		ug/L
127-18-4	Tetrachloroethene	200	25.0		ug/L
156-59-2	cis-1,2-Dichloroethene	79.1	25.0		ug/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
21305180906	**MW5**	Water	05/17/2013 11:31	05/18/2013 10:20

SW-846 8260B

CAS#	Parameter	Result	RDL	REG LIMIT	Units
540-59-0	1,2-Dichloroethene(Total)	72.1	50.0		ug/L
71-43-2	Benzene	26.6	25.0		ug/L
127-18-4	Tetrachloroethene	246	25.0		ug/L
156-59-2	cis-1,2-Dichloroethene	72.1	25.0		ug/L

Summary of Compounds Detected (con't)

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
21305180907	**MW29**	Water	05/17/2013 12:17	05/18/2013 10:20

SW-846 8260B

CAS#	Parameter	Result	RDL	REG LIMIT	Units
540-59-0	1,2-Dichloroethene(Total)	11.8	10.0		ug/L
156-59-2	cis-1,2-Dichloroethene	11.8	5.00		ug/L
1634-04-4	tert-Butyl methyl ether (MTBE)	14.9	5.00		ug/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
21305180908	**MW30**	Water	05/17/2013 13:05	05/18/2013 10:20

SW-846 8260B

CAS#	Parameter	Result	RDL	REG LIMIT	Units
127-18-4	Tetrachloroethene	17.9	5.00		ug/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
21305180909	**MW13D**	Water	05/17/2013 14:10	05/18/2013 10:20

SW-846 8260B

CAS#	Parameter	Result	RDL	REG LIMIT	Units
78-93-3	2-Butanone	10.5	5.00		ug/L
67-64-1	Acetone	54.5	5.00		ug/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
21305180910	**MW13S**	Water	05/17/2013 14:45	05/18/2013 10:20

SW-846 8260B

CAS#	Parameter	Result	RDL	REG LIMIT	Units
127-18-4	Tetrachloroethene	54.1	5.00		ug/L
156-59-2	cis-1,2-Dichloroethene	6.31	5.00		ug/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
21305180912	**MW2**	Water	05/17/2013 16:10	05/18/2013 10:20

SW-846 8260B

CAS#	Parameter	Result	RDL	REG LIMIT	Units
127-18-4	Tetrachloroethene	2470	100		ug/L
79-01-6	Trichloroethene	170	100		ug/L

Summary of Compounds Detected (con't)

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
21305180913	**MW27**	Water	05/17/2013 16:40	05/18/2013 10:20

SW-846 8260B

CAS#	Parameter	Result	RDL	REG LIMIT	Units
540-59-0	**1,2-Dichloroethene(Total)**	**11.2**	**10.0**		**ug/L**
127-18-4	**Tetrachloroethene**	**47.8**	**5.00**		**ug/L**
79-01-6	**Trichloroethene**	**5.80**	**5.00**		**ug/L**
156-59-2	**cis-1,2-Dichloroethene**	**11.2**	**5.00**		**ug/L**

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
21305180914	**MW18**	Water	05/17/2013 17:10	05/18/2013 10:20

SW-846 8260B

CAS#	Parameter	Result	RDL	REG LIMIT	Units
540-59-0	**1,2-Dichloroethene(Total)**	**22.5**	**10.0**		**ug/L**
127-18-4	**Tetrachloroethene**	**43.5**	**5.00**		**ug/L**
79-01-6	**Trichloroethene**	**34.5**	**5.00**		**ug/L**
156-59-2	**cis-1,2-Dichloroethene**	**22.5**	**5.00**		**ug/L**

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
21305180901	**MW33**	Water	05/17/2013 08:56	05/18/2013 10:20

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	05/18/2013 15:39	AMD	507518

CAS#	Parameter	Result	RDL	REG LIMIT	Units
630-20-6	1,1,1,2-Tetrachloroethane	<5.00	5.00		ug/L
71-55-6	1,1,1-Trichloroethane	<5.00	5.00		ug/L
79-34-5	1,1,2,2-Tetrachloroethane	<5.00	5.00		ug/L
79-00-5	1,1,2-Trichloroethane	<5.00	5.00		ug/L
75-34-3	1,1-Dichloroethane	<5.00	5.00		ug/L
75-35-4	1,1-Dichloroethene	<5.00	5.00		ug/L
563-58-6	1,1-Dichloropropene	<5.00	5.00		ug/L
96-18-4	1,2,3-Trichloropropane	<5.00	5.00		ug/L
120-82-1	1,2,4-Trichlorobenzene	<5.00	5.00		ug/L
95-63-6	1,2,4-Trimethylbenzene	<5.00	5.00		ug/L
96-12-8	1,2-Dibromo-3-chloropropane	<5.00	5.00		ug/L
106-93-4	1,2-Dibromoethane	<5.00	5.00		ug/L
95-50-1	1,2-Dichlorobenzene	<5.00	5.00		ug/L
107-06-2	1,2-Dichloroethane	<5.00	5.00		ug/L
540-59-0	1,2-Dichloroethene(Total)	<10.0	10.0		ug/L
78-87-5	1,2-Dichloropropane	<5.00	5.00		ug/L
108-67-8	1,3,5-Trimethylbenzene	<5.00	5.00		ug/L
541-73-1	1,3-Dichlorobenzene	<5.00	5.00		ug/L
142-28-9	1,3-Dichloropropane	<5.00	5.00		ug/L
106-46-7	1,4-Dichlorobenzene	<5.00	5.00		ug/L
594-20-7	2,2-Dichloropropane	<5.00	5.00		ug/L
78-93-3	2-Butanone	<5.00	5.00		ug/L
95-49-8	2-Chlorotoluene	<5.00	5.00		ug/L
591-78-6	2-Hexanone	<5.00	5.00		ug/L
106-43-4	4-Chlorotoluene	<5.00	5.00		ug/L
99-87-6	4-Isopropyltoluene	<5.00	5.00		ug/L
108-10-1	4-Methyl-2-pentanone	<5.00	5.00		ug/L
67-64-1	Acetone	<5.00	5.00		ug/L
71-43-2	Benzene	<5.00	5.00		ug/L
108-86-1	Bromobenzene	<5.00	5.00		ug/L
74-97-5	Bromochloromethane	<5.00	5.00		ug/L
75-27-4	Bromodichloromethane	<5.00	5.00		ug/L
75-25-2	Bromoform	<5.00	5.00		ug/L
74-83-9	Bromomethane	<5.00	5.00		ug/L
75-15-0	Carbon disulfide	<5.00	5.00		ug/L
56-23-5	Carbon tetrachloride	<5.00	5.00		ug/L
108-90-7	Chlorobenzene	<5.00	5.00		ug/L
75-00-3	Chloroethane	<5.00	5.00		ug/L
67-66-3	Chloroform	<5.00	5.00		ug/L
74-87-3	Chloromethane	<5.00	5.00		ug/L
124-48-1	Dibromochloromethane	<5.00	5.00		ug/L
74-95-3	Dibromomethane	<5.00	5.00		ug/L
75-71-8	Dichlorodifluoromethane	<5.00	5.00		ug/L
100-41-4	Ethylbenzene	<5.00	5.00		ug/L
87-68-3	Hexachlorobutadiene	<5.00	5.00		ug/L
98-82-8	Isopropylbenzene (Cumene)	<5.00	5.00		ug/L
74-88-4	Methyl iodide	<5.00	5.00		ug/L
75-09-2	Methylene chloride	<5.00	5.00		ug/L
91-20-3	Naphthalene	<5.00	5.00		ug/L
100-42-5	Styrene	<5.00	5.00		ug/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
21305180901	**MW33**	Water	05/17/2013 08:56	05/18/2013 10:20

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	05/18/2013 15:39	AMD	507518

CAS#	Parameter	Result	RDL	REG LIMIT	Units
127-18-4	Tetrachloroethene	<5.00	5.00		ug/L
108-88-3	Toluene	<5.00	5.00		ug/L
79-01-6	Trichloroethene	<5.00	5.00		ug/L
75-69-4	Trichlorofluoromethane	<5.00	5.00		ug/L
76-13-1	Trichlorotrifluoroethane	<5.00	5.00		ug/L
75-01-4	Vinyl chloride	<5.00	5.00		ug/L
1330-20-7	Xylene (total)	<15.0	15.0		ug/L
156-59-2	cis-1,2-Dichloroethene	<5.00	5.00		ug/L
10061-01-5	cis-1,3-Dichloropropene	<5.00	5.00		ug/L
136777-61-2	m,p-Xylene	<10.0	10.0		ug/L
104-51-8	n-Butylbenzene	<5.00	5.00		ug/L
103-65-1	n-Propylbenzene	<5.00	5.00		ug/L
95-47-6	o-Xylene	<5.00	5.00		ug/L
135-98-8	sec-Butylbenzene	<5.00	5.00		ug/L
1634-04-4	tert-Butyl methyl ether (MTBE)	<5.00	5.00		ug/L
98-06-6	tert-Butylbenzene	<5.00	5.00		ug/L
156-60-5	trans-1,2-Dichloroethene	<5.00	5.00		ug/L
10061-02-6	trans-1,3-Dichloropropene	<5.00	5.00		ug/L
110-57-6	trans-1,4-Dichloro-2-butene	<5.00	5.00		ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	56.6	ug/L	113	78 - 130
1868-53-7	Dibromofluoromethane	50	50.5	ug/L	101	77 - 127
2037-26-5	Toluene d8	50	50.6	ug/L	101	76 - 134
17060-07-0	1,2-Dichloroethane-d4	50	46	ug/L	92	71 - 127

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
21305180902	**MW16**	Water	05/17/2013 09:31	05/18/2013 10:20

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			10	05/18/2013 15:16	AMD	507518

CAS#	Parameter	Result	RDL	REG LIMIT	Units
630-20-6	1,1,1,2-Tetrachloroethane	<50.0	50.0		ug/L
71-55-6	1,1,1-Trichloroethane	<50.0	50.0		ug/L
79-34-5	1,1,2,2-Tetrachloroethane	<50.0	50.0		ug/L
79-00-5	1,1,2-Trichloroethane	<50.0	50.0		ug/L
75-34-3	1,1-Dichloroethane	<50.0	50.0		ug/L
75-35-4	1,1-Dichloroethene	<50.0	50.0		ug/L
563-58-6	1,1-Dichloropropene	<50.0	50.0		ug/L
96-18-4	1,2,3-Trichloropropane	<50.0	50.0		ug/L
120-82-1	1,2,4-Trichlorobenzene	<50.0	50.0		ug/L
95-63-6	1,2,4-Trimethylbenzene	<50.0	50.0		ug/L
96-12-8	1,2-Dibromo-3-chloropropane	<50.0	50.0		ug/L
106-93-4	1,2-Dibromoethane	<50.0	50.0		ug/L
95-50-1	1,2-Dichlorobenzene	<50.0	50.0		ug/L
107-06-2	1,2-Dichloroethane	<50.0	50.0		ug/L
540-59-0	1,2-Dichloroethene(Total)	<100	100		ug/L
78-87-5	1,2-Dichloropropane	<50.0	50.0		ug/L
108-67-8	1,3,5-Trimethylbenzene	<50.0	50.0		ug/L
541-73-1	1,3-Dichlorobenzene	<50.0	50.0		ug/L
142-28-9	1,3-Dichloropropane	<50.0	50.0		ug/L
106-46-7	1,4-Dichlorobenzene	<50.0	50.0		ug/L
594-20-7	2,2-Dichloropropane	<50.0	50.0		ug/L
78-93-3	2-Butanone	<50.0	50.0		ug/L
95-49-8	2-Chlorotoluene	<50.0	50.0		ug/L
591-78-6	2-Hexanone	<50.0	50.0		ug/L
106-43-4	4-Chlorotoluene	<50.0	50.0		ug/L
99-87-6	4-Isopropyltoluene	<50.0	50.0		ug/L
108-10-1	4-Methyl-2-pentanone	<50.0	50.0		ug/L
67-64-1	Acetone	<50.0	50.0		ug/L
71-43-2	Benzene	<50.0	50.0		ug/L
108-86-1	Bromobenzene	<50.0	50.0		ug/L
74-97-5	Bromochloromethane	<50.0	50.0		ug/L
75-27-4	Bromodichloromethane	<50.0	50.0		ug/L
75-25-2	Bromoform	<50.0	50.0		ug/L
74-83-9	Bromomethane	<50.0	50.0		ug/L
75-15-0	Carbon disulfide	<50.0	50.0		ug/L
56-23-5	Carbon tetrachloride	<50.0	50.0		ug/L
108-90-7	Chlorobenzene	<50.0	50.0		ug/L
75-00-3	Chloroethane	<50.0	50.0		ug/L
67-66-3	Chloroform	<50.0	50.0		ug/L
74-87-3	Chloromethane	<50.0	50.0		ug/L
124-48-1	Dibromochloromethane	<50.0	50.0		ug/L
74-95-3	Dibromomethane	<50.0	50.0		ug/L
75-71-8	Dichlorodifluoromethane	<50.0	50.0		ug/L
100-41-4	Ethylbenzene	<50.0	50.0		ug/L
87-68-3	Hexachlorobutadiene	<50.0	50.0		ug/L
98-82-8	Isopropylbenzene (Cumene)	<50.0	50.0		ug/L
74-88-4	Methyl iodide	<50.0	50.0		ug/L
75-09-2	Methylene chloride	<50.0	50.0		ug/L
91-20-3	Naphthalene	<50.0	50.0		ug/L
100-42-5	Styrene	<50.0	50.0		ug/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
21305180902	**MW16**	Water	05/17/2013 09:31	05/18/2013 10:20

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			10	05/18/2013 15:16	AMD	507518

CAS#	Parameter	Result	RDL	REG LIMIT	Units
127-18-4	Tetrachloroethene	<50.0	50.0		ug/L
108-88-3	Toluene	<50.0	50.0		ug/L
79-01-6	Trichloroethene	<50.0	50.0		ug/L
75-69-4	Trichlorofluoromethane	<50.0	50.0		ug/L
76-13-1	Trichlorotrifluoroethane	<50.0	50.0		ug/L
75-01-4	Vinyl chloride	<50.0	50.0		ug/L
1330-20-7	Xylene (total)	<150	150		ug/L
156-59-2	**cis-1,2-Dichloroethene**	**96.2**	**50.0**		**ug/L**
10061-01-5	cis-1,3-Dichloropropene	<50.0	50.0		ug/L
136777-61-2	m,p-Xylene	<100	100		ug/L
104-51-8	n-Butylbenzene	<50.0	50.0		ug/L
103-65-1	n-Propylbenzene	<50.0	50.0		ug/L
95-47-6	o-Xylene	<50.0	50.0		ug/L
135-98-8	sec-Butylbenzene	<50.0	50.0		ug/L
1634-04-4	**tert-Butyl methyl ether (MTBE)**	**961**	**50.0**		**ug/L**
98-06-6	tert-Butylbenzene	<50.0	50.0		ug/L
156-60-5	trans-1,2-Dichloroethene	<50.0	50.0		ug/L
10061-02-6	trans-1,3-Dichloropropene	<50.0	50.0		ug/L
110-57-6	trans-1,4-Dichloro-2-butene	<50.0	50.0		ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	500	564	ug/L	113	78 - 130
1868-53-7	Dibromofluoromethane	500	493	ug/L	99	77 - 127
2037-26-5	Toluene d8	500	511	ug/L	102	76 - 134
17060-07-0	1,2-Dichloroethane-d4	500	440	ug/L	88	71 - 127

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
21305180903	**MW19**	Water	05/17/2013 10:08	05/18/2013 10:20

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	05/18/2013 23:05	AMD	507587

CAS#	Parameter	Result	RDL	REG LIMIT	Units
630-20-6	1,1,1,2-Tetrachloroethane	<5.00	5.00		ug/L
71-55-6	1,1,1-Trichloroethane	<5.00	5.00		ug/L
79-34-5	1,1,2,2-Tetrachloroethane	<5.00	5.00		ug/L
79-00-5	1,1,2-Trichloroethane	<5.00	5.00		ug/L
75-34-3	1,1-Dichloroethane	<5.00	5.00		ug/L
75-35-4	1,1-Dichloroethene	<5.00	5.00		ug/L
563-58-6	1,1-Dichloropropene	<5.00	5.00		ug/L
96-18-4	1,2,3-Trichloropropane	<5.00	5.00		ug/L
120-82-1	1,2,4-Trichlorobenzene	<5.00	5.00		ug/L
95-63-6	1,2,4-Trimethylbenzene	<5.00	5.00		ug/L
96-12-8	1,2-Dibromo-3-chloropropane	<5.00	5.00		ug/L
106-93-4	1,2-Dibromoethane	<5.00	5.00		ug/L
95-50-1	1,2-Dichlorobenzene	<5.00	5.00		ug/L
107-06-2	1,2-Dichloroethane	<5.00	5.00		ug/L
540-59-0	1,2-Dichloroethene(Total)	<10.0	10.0		ug/L
78-87-5	1,2-Dichloropropane	<5.00	5.00		ug/L
108-67-8	1,3,5-Trimethylbenzene	<5.00	5.00		ug/L
541-73-1	1,3-Dichlorobenzene	<5.00	5.00		ug/L
142-28-9	1,3-Dichloropropane	<5.00	5.00		ug/L
106-46-7	1,4-Dichlorobenzene	<5.00	5.00		ug/L
594-20-7	2,2-Dichloropropane	<5.00	5.00		ug/L
78-93-3	2-Butanone	<5.00	5.00		ug/L
95-49-8	2-Chlorotoluene	<5.00	5.00		ug/L
591-78-6	2-Hexanone	<5.00	5.00		ug/L
106-43-4	4-Chlorotoluene	<5.00	5.00		ug/L
99-87-6	4-Isopropyltoluene	<5.00	5.00		ug/L
108-10-1	4-Methyl-2-pentanone	<5.00	5.00		ug/L
67-64-1	Acetone	<5.00	5.00		ug/L
71-43-2	Benzene	<5.00	5.00		ug/L
108-86-1	Bromobenzene	<5.00	5.00		ug/L
74-97-5	Bromochloromethane	<5.00	5.00		ug/L
75-27-4	Bromodichloromethane	<5.00	5.00		ug/L
75-25-2	Bromoform	<5.00	5.00		ug/L
74-83-9	Bromomethane	<5.00	5.00		ug/L
75-15-0	Carbon disulfide	<5.00	5.00		ug/L
56-23-5	Carbon tetrachloride	<5.00	5.00		ug/L
108-90-7	Chlorobenzene	<5.00	5.00		ug/L
75-00-3	Chloroethane	<5.00	5.00		ug/L
67-66-3	Chloroform	<5.00	5.00		ug/L
74-87-3	Chloromethane	<5.00	5.00		ug/L
124-48-1	Dibromochloromethane	<5.00	5.00		ug/L
74-95-3	Dibromomethane	<5.00	5.00		ug/L
75-71-8	Dichlorodifluoromethane	<5.00	5.00		ug/L
100-41-4	Ethylbenzene	<5.00	5.00		ug/L
87-68-3	Hexachlorobutadiene	<5.00	5.00		ug/L
98-82-8	Isopropylbenzene (Cumene)	<5.00	5.00		ug/L
74-88-4	Methyl iodide	<5.00	5.00		ug/L
75-09-2	Methylene chloride	<5.00	5.00		ug/L
91-20-3	Naphthalene	<5.00	5.00		ug/L
100-42-5	Styrene	<5.00	5.00		ug/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
21305180903	**MW19**	Water	05/17/2013 10:08	05/18/2013 10:20

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	05/18/2013 23:05	AMD	507587

CAS#	Parameter	Result	RDL	REG LIMIT	Units
127-18-4	**Tetrachloroethene**	**19.3**	**5.00**		**ug/L**
108-88-3	Toluene	<5.00	5.00		ug/L
79-01-6	Trichloroethene	<5.00	5.00		ug/L
75-69-4	Trichlorofluoromethane	<5.00	5.00		ug/L
76-13-1	Trichlorotrifluoroethane	<5.00	5.00		ug/L
75-01-4	Vinyl chloride	<5.00	5.00		ug/L
1330-20-7	Xylene (total)	<15.0	15.0		ug/L
156-59-2	cis-1,2-Dichloroethene	<5.00	5.00		ug/L
10061-01-5	cis-1,3-Dichloropropene	<5.00	5.00		ug/L
136777-61-2	m,p-Xylene	<10.0	10.0		ug/L
104-51-8	n-Butylbenzene	<5.00	5.00		ug/L
103-65-1	n-Propylbenzene	<5.00	5.00		ug/L
95-47-6	o-Xylene	<5.00	5.00		ug/L
135-98-8	sec-Butylbenzene	<5.00	5.00		ug/L
1634-04-4	tert-Butyl methyl ether (MTBE)	<5.00	5.00		ug/L
98-06-6	tert-Butylbenzene	<5.00	5.00		ug/L
156-60-5	trans-1,2-Dichloroethene	<5.00	5.00		ug/L
10061-02-6	trans-1,3-Dichloropropene	<5.00	5.00		ug/L
110-57-6	trans-1,4-Dichloro-2-butene	<5.00	5.00		ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	53	ug/L	106	78 - 130
1868-53-7	Dibromofluoromethane	50	51.8	ug/L	104	77 - 127
2037-26-5	Toluene d8	50	51.1	ug/L	102	76 - 134
17060-07-0	1,2-Dichloroethane-d4	50	44.7	ug/L	89	71 - 127

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
21305180904	**MW22**	Water	05/17/2013 10:42	05/18/2013 10:20

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			5	05/18/2013 14:31	AMD	507518

CAS#	Parameter	Result	RDL	REG LIMIT	Units
630-20-6	1,1,1,2-Tetrachloroethane	<25.0	25.0		ug/L
71-55-6	1,1,1-Trichloroethane	<25.0	25.0		ug/L
79-34-5	1,1,2,2-Tetrachloroethane	<25.0	25.0		ug/L
79-00-5	1,1,2-Trichloroethane	<25.0	25.0		ug/L
75-34-3	1,1-Dichloroethane	<25.0	25.0		ug/L
75-35-4	1,1-Dichloroethene	<25.0	25.0		ug/L
563-58-6	1,1-Dichloropropene	<25.0	25.0		ug/L
96-18-4	1,2,3-Trichloropropane	<25.0	25.0		ug/L
120-82-1	1,2,4-Trichlorobenzene	<25.0	25.0		ug/L
95-63-6	1,2,4-Trimethylbenzene	<25.0	25.0		ug/L
96-12-8	1,2-Dibromo-3-chloropropane	<25.0	25.0		ug/L
106-93-4	1,2-Dibromoethane	<25.0	25.0		ug/L
95-50-1	1,2-Dichlorobenzene	<25.0	25.0		ug/L
107-06-2	1,2-Dichloroethane	<25.0	25.0		ug/L
540-59-0	**1,2-Dichloroethene(Total)**	**83.8**	**50.0**		**ug/L**
78-87-5	1,2-Dichloropropane	<25.0	25.0		ug/L
108-67-8	1,3,5-Trimethylbenzene	<25.0	25.0		ug/L
541-73-1	1,3-Dichlorobenzene	<25.0	25.0		ug/L
142-28-9	1,3-Dichloropropane	<25.0	25.0		ug/L
106-46-7	1,4-Dichlorobenzene	<25.0	25.0		ug/L
594-20-7	2,2-Dichloropropane	<25.0	25.0		ug/L
78-93-3	2-Butanone	<25.0	25.0		ug/L
95-49-8	2-Chlorotoluene	<25.0	25.0		ug/L
591-78-6	2-Hexanone	<25.0	25.0		ug/L
106-43-4	4-Chlorotoluene	<25.0	25.0		ug/L
99-87-6	4-Isopropyltoluene	<25.0	25.0		ug/L
108-10-1	4-Methyl-2-pentanone	<25.0	25.0		ug/L
67-64-1	Acetone	<25.0	25.0		ug/L
71-43-2	Benzene	<25.0	25.0		ug/L
108-86-1	Bromobenzene	<25.0	25.0		ug/L
74-97-5	Bromochloromethane	<25.0	25.0		ug/L
75-27-4	Bromodichloromethane	<25.0	25.0		ug/L
75-25-2	Bromoform	<25.0	25.0		ug/L
74-83-9	Bromomethane	<25.0	25.0		ug/L
75-15-0	Carbon disulfide	<25.0	25.0		ug/L
56-23-5	Carbon tetrachloride	<25.0	25.0		ug/L
108-90-7	Chlorobenzene	<25.0	25.0		ug/L
75-00-3	Chloroethane	<25.0	25.0		ug/L
67-66-3	Chloroform	<25.0	25.0		ug/L
74-87-3	Chloromethane	<25.0	25.0		ug/L
124-48-1	Dibromochloromethane	<25.0	25.0		ug/L
74-95-3	Dibromomethane	<25.0	25.0		ug/L
75-71-8	Dichlorodifluoromethane	<25.0	25.0		ug/L
100-41-4	Ethylbenzene	<25.0	25.0		ug/L
87-68-3	Hexachlorobutadiene	<25.0	25.0		ug/L
98-82-8	Isopropylbenzene (Cumene)	<25.0	25.0		ug/L
74-88-4	Methyl iodide	<25.0	25.0		ug/L
75-09-2	Methylene chloride	<25.0	25.0		ug/L
91-20-3	Naphthalene	<25.0	25.0		ug/L
100-42-5	Styrene	<25.0	25.0		ug/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
21305180904	**MW22**	Water	05/17/2013 10:42	05/18/2013 10:20

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			5	05/18/2013 14:31	AMD	507518

CAS#	Parameter	Result	RDL	REG LIMIT	Units
127-18-4	**Tetrachloroethene**	**989**	**25.0**		**ug/L**
108-88-3	Toluene	<25.0	25.0		ug/L
79-01-6	**Trichloroethene**	**37.5**	**25.0**		**ug/L**
75-69-4	Trichlorofluoromethane	<25.0	25.0		ug/L
76-13-1	Trichlorotrifluoroethane	<25.0	25.0		ug/L
75-01-4	Vinyl chloride	<25.0	25.0		ug/L
1330-20-7	Xylene (total)	<75.0	75.0		ug/L
156-59-2	**cis-1,2-Dichloroethene**	**83.8**	**25.0**		**ug/L**
10061-01-5	cis-1,3-Dichloropropene	<25.0	25.0		ug/L
136777-61-2	m,p-Xylene	<50.0	50.0		ug/L
104-51-8	n-Butylbenzene	<25.0	25.0		ug/L
103-65-1	n-Propylbenzene	<25.0	25.0		ug/L
95-47-6	o-Xylene	<25.0	25.0		ug/L
135-98-8	sec-Butylbenzene	<25.0	25.0		ug/L
1634-04-4	tert-Butyl methyl ether (MTBE)	<25.0	25.0		ug/L
98-06-6	tert-Butylbenzene	<25.0	25.0		ug/L
156-60-5	trans-1,2-Dichloroethene	<25.0	25.0		ug/L
10061-02-6	trans-1,3-Dichloropropene	<25.0	25.0		ug/L
110-57-6	trans-1,4-Dichloro-2-butene	<25.0	25.0		ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	250	286	ug/L	114	78 - 130
1868-53-7	Dibromofluoromethane	250	251	ug/L	100	77 - 127
2037-26-5	Toluene d8	250	255	ug/L	102	76 - 134
17060-07-0	1,2-Dichloroethane-d4	250	224	ug/L	90	71 - 127

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
21305180905	**MW20**	Water	05/17/2013 11:20	05/18/2013 10:20

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			5	05/19/2013 02:12	AMD	507587

CAS#	Parameter	Result	RDL	REG LIMIT	Units
630-20-6	1,1,1,2-Tetrachloroethane	<25.0	25.0		ug/L
71-55-6	1,1,1-Trichloroethane	<25.0	25.0		ug/L
79-34-5	1,1,2,2-Tetrachloroethane	<25.0	25.0		ug/L
79-00-5	1,1,2-Trichloroethane	<25.0	25.0		ug/L
75-34-3	1,1-Dichloroethane	<25.0	25.0		ug/L
75-35-4	1,1-Dichloroethene	<25.0	25.0		ug/L
563-58-6	1,1-Dichloropropene	<25.0	25.0		ug/L
96-18-4	1,2,3-Trichloropropane	<25.0	25.0		ug/L
120-82-1	1,2,4-Trichlorobenzene	<25.0	25.0		ug/L
95-63-6	1,2,4-Trimethylbenzene	<25.0	25.0		ug/L
96-12-8	1,2-Dibromo-3-chloropropane	<25.0	25.0		ug/L
106-93-4	1,2-Dibromoethane	<25.0	25.0		ug/L
95-50-1	1,2-Dichlorobenzene	<25.0	25.0		ug/L
107-06-2	1,2-Dichloroethane	<25.0	25.0		ug/L
540-59-0	**1,2-Dichloroethene(Total)**	**79.1**	**50.0**		**ug/L**
78-87-5	1,2-Dichloropropane	<25.0	25.0		ug/L
108-67-8	1,3,5-Trimethylbenzene	<25.0	25.0		ug/L
541-73-1	1,3-Dichlorobenzene	<25.0	25.0		ug/L
142-28-9	1,3-Dichloropropane	<25.0	25.0		ug/L
106-46-7	1,4-Dichlorobenzene	<25.0	25.0		ug/L
594-20-7	2,2-Dichloropropane	<25.0	25.0		ug/L
78-93-3	2-Butanone	<25.0	25.0		ug/L
95-49-8	2-Chlorotoluene	<25.0	25.0		ug/L
591-78-6	2-Hexanone	<25.0	25.0		ug/L
106-43-4	4-Chlorotoluene	<25.0	25.0		ug/L
99-87-6	4-Isopropyltoluene	<25.0	25.0		ug/L
108-10-1	4-Methyl-2-pentanone	<25.0	25.0		ug/L
67-64-1	Acetone	<25.0	25.0		ug/L
71-43-2	**Benzene**	**95.3**	**25.0**		**ug/L**
108-86-1	Bromobenzene	<25.0	25.0		ug/L
74-97-5	Bromochloromethane	<25.0	25.0		ug/L
75-27-4	Bromodichloromethane	<25.0	25.0		ug/L
75-25-2	Bromoform	<25.0	25.0		ug/L
74-83-9	Bromomethane	<25.0	25.0		ug/L
75-15-0	Carbon disulfide	<25.0	25.0		ug/L
56-23-5	Carbon tetrachloride	<25.0	25.0		ug/L
108-90-7	Chlorobenzene	<25.0	25.0		ug/L
75-00-3	Chloroethane	<25.0	25.0		ug/L
67-66-3	Chloroform	<25.0	25.0		ug/L
74-87-3	Chloromethane	<25.0	25.0		ug/L
124-48-1	Dibromochloromethane	<25.0	25.0		ug/L
74-95-3	Dibromomethane	<25.0	25.0		ug/L
75-71-8	Dichlorodifluoromethane	<25.0	25.0		ug/L
100-41-4	Ethylbenzene	<25.0	25.0		ug/L
87-68-3	Hexachlorobutadiene	<25.0	25.0		ug/L
98-82-8	Isopropylbenzene (Cumene)	<25.0	25.0		ug/L
74-88-4	Methyl iodide	<25.0	25.0		ug/L
75-09-2	Methylene chloride	<25.0	25.0		ug/L
91-20-3	Naphthalene	<25.0	25.0		ug/L
100-42-5	Styrene	<25.0	25.0		ug/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
21305180905	**MW20**	Water	05/17/2013 11:20	05/18/2013 10:20

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			5	05/19/2013 02:12	AMD	507587

CAS#	Parameter	Result	RDL	REG LIMIT	Units
127-18-4	**Tetrachloroethene**	**200**	**25.0**		**ug/L**
108-88-3	Toluene	<25.0	25.0		ug/L
79-01-6	Trichloroethene	<25.0	25.0		ug/L
75-69-4	Trichlorofluoromethane	<25.0	25.0		ug/L
76-13-1	Trichlorotrifluoroethane	<25.0	25.0		ug/L
75-01-4	Vinyl chloride	<25.0	25.0		ug/L
1330-20-7	Xylene (total)	<75.0	75.0		ug/L
156-59-2	**cis-1,2-Dichloroethene**	**79.1**	**25.0**		**ug/L**
10061-01-5	cis-1,3-Dichloropropene	<25.0	25.0		ug/L
136777-61-2	m,p-Xylene	<50.0	50.0		ug/L
104-51-8	n-Butylbenzene	<25.0	25.0		ug/L
103-65-1	n-Propylbenzene	<25.0	25.0		ug/L
95-47-6	o-Xylene	<25.0	25.0		ug/L
135-98-8	sec-Butylbenzene	<25.0	25.0		ug/L
1634-04-4	tert-Butyl methyl ether (MTBE)	<25.0	25.0		ug/L
98-06-6	tert-Butylbenzene	<25.0	25.0		ug/L
156-60-5	trans-1,2-Dichloroethene	<25.0	25.0		ug/L
10061-02-6	trans-1,3-Dichloropropene	<25.0	25.0		ug/L
110-57-6	trans-1,4-Dichloro-2-butene	<25.0	25.0		ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	250	269	ug/L	108	78 - 130
1868-53-7	Dibromofluoromethane	250	254	ug/L	102	77 - 127
2037-26-5	Toluene d8	250	254	ug/L	102	76 - 134
17060-07-0	1,2-Dichloroethane-d4	250	228	ug/L	91	71 - 127

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
21305180906	**MW5**	Water	05/17/2013 11:31	05/18/2013 10:20

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			5	05/19/2013 02:35	AMD	507587

CAS#	Parameter	Result	RDL	REG LIMIT	Units
630-20-6	1,1,1,2-Tetrachloroethane	<25.0	25.0		ug/L
71-55-6	1,1,1-Trichloroethane	<25.0	25.0		ug/L
79-34-5	1,1,2,2-Tetrachloroethane	<25.0	25.0		ug/L
79-00-5	1,1,2-Trichloroethane	<25.0	25.0		ug/L
75-34-3	1,1-Dichloroethane	<25.0	25.0		ug/L
75-35-4	1,1-Dichloroethene	<25.0	25.0		ug/L
563-58-6	1,1-Dichloropropene	<25.0	25.0		ug/L
96-18-4	1,2,3-Trichloropropane	<25.0	25.0		ug/L
120-82-1	1,2,4-Trichlorobenzene	<25.0	25.0		ug/L
95-63-6	1,2,4-Trimethylbenzene	<25.0	25.0		ug/L
96-12-8	1,2-Dibromo-3-chloropropane	<25.0	25.0		ug/L
106-93-4	1,2-Dibromoethane	<25.0	25.0		ug/L
95-50-1	1,2-Dichlorobenzene	<25.0	25.0		ug/L
107-06-2	1,2-Dichloroethane	<25.0	25.0		ug/L
540-59-0	**1,2-Dichloroethene(Total)**	**72.1**	**50.0**		**ug/L**
78-87-5	1,2-Dichloropropane	<25.0	25.0		ug/L
108-67-8	1,3,5-Trimethylbenzene	<25.0	25.0		ug/L
541-73-1	1,3-Dichlorobenzene	<25.0	25.0		ug/L
142-28-9	1,3-Dichloropropane	<25.0	25.0		ug/L
106-46-7	1,4-Dichlorobenzene	<25.0	25.0		ug/L
594-20-7	2,2-Dichloropropane	<25.0	25.0		ug/L
78-93-3	2-Butanone	<25.0	25.0		ug/L
95-49-8	2-Chlorotoluene	<25.0	25.0		ug/L
591-78-6	2-Hexanone	<25.0	25.0		ug/L
106-43-4	4-Chlorotoluene	<25.0	25.0		ug/L
99-87-6	4-Isopropyltoluene	<25.0	25.0		ug/L
108-10-1	4-Methyl-2-pentanone	<25.0	25.0		ug/L
67-64-1	Acetone	<25.0	25.0		ug/L
71-43-2	**Benzene**	**26.6**	**25.0**		**ug/L**
108-86-1	Bromobenzene	<25.0	25.0		ug/L
74-97-5	Bromochloromethane	<25.0	25.0		ug/L
75-27-4	Bromodichloromethane	<25.0	25.0		ug/L
75-25-2	Bromoform	<25.0	25.0		ug/L
74-83-9	Bromomethane	<25.0	25.0		ug/L
75-15-0	Carbon disulfide	<25.0	25.0		ug/L
56-23-5	Carbon tetrachloride	<25.0	25.0		ug/L
108-90-7	Chlorobenzene	<25.0	25.0		ug/L
75-00-3	Chloroethane	<25.0	25.0		ug/L
67-66-3	Chloroform	<25.0	25.0		ug/L
74-87-3	Chloromethane	<25.0	25.0		ug/L
124-48-1	Dibromochloromethane	<25.0	25.0		ug/L
74-95-3	Dibromomethane	<25.0	25.0		ug/L
75-71-8	Dichlorodifluoromethane	<25.0	25.0		ug/L
100-41-4	Ethylbenzene	<25.0	25.0		ug/L
87-68-3	Hexachlorobutadiene	<25.0	25.0		ug/L
98-82-8	Isopropylbenzene (Cumene)	<25.0	25.0		ug/L
74-88-4	Methyl iodide	<25.0	25.0		ug/L
75-09-2	Methylene chloride	<25.0	25.0		ug/L
91-20-3	Naphthalene	<25.0	25.0		ug/L
100-42-5	Styrene	<25.0	25.0		ug/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
21305180906	**MW5**	Water	05/17/2013 11:31	05/18/2013 10:20

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			5	05/19/2013 02:35	AMD	507587

CAS#	Parameter	Result	RDL	REG LIMIT	Units
127-18-4	**Tetrachloroethene**	**246**	**25.0**		**ug/L**
108-88-3	Toluene	<25.0	25.0		ug/L
79-01-6	Trichloroethene	<25.0	25.0		ug/L
75-69-4	Trichlorofluoromethane	<25.0	25.0		ug/L
76-13-1	Trichlorotrifluoroethane	<25.0	25.0		ug/L
75-01-4	Vinyl chloride	<25.0	25.0		ug/L
1330-20-7	Xylene (total)	<75.0	75.0		ug/L
156-59-2	**cis-1,2-Dichloroethene**	**72.1**	**25.0**		**ug/L**
10061-01-5	cis-1,3-Dichloropropene	<25.0	25.0		ug/L
136777-61-2	m,p-Xylene	<50.0	50.0		ug/L
104-51-8	n-Butylbenzene	<25.0	25.0		ug/L
103-65-1	n-Propylbenzene	<25.0	25.0		ug/L
95-47-6	o-Xylene	<25.0	25.0		ug/L
135-98-8	sec-Butylbenzene	<25.0	25.0		ug/L
1634-04-4	tert-Butyl methyl ether (MTBE)	<25.0	25.0		ug/L
98-06-6	tert-Butylbenzene	<25.0	25.0		ug/L
156-60-5	trans-1,2-Dichloroethene	<25.0	25.0		ug/L
10061-02-6	trans-1,3-Dichloropropene	<25.0	25.0		ug/L
110-57-6	trans-1,4-Dichloro-2-butene	<25.0	25.0		ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	250	263	ug/L	105	78 - 130
1868-53-7	Dibromofluoromethane	250	264	ug/L	106	77 - 127
2037-26-5	Toluene d8	250	255	ug/L	102	76 - 134
17060-07-0	1,2-Dichloroethane-d4	250	226	ug/L	90	71 - 127

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
21305180907	**MW29**	Water	05/17/2013 12:17	05/18/2013 10:20

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	05/18/2013 23:30	AMD	507587

CAS#	Parameter	Result	RDL	REG LIMIT	Units
630-20-6	1,1,1,2-Tetrachloroethane	<5.00	5.00		ug/L
71-55-6	1,1,1-Trichloroethane	<5.00	5.00		ug/L
79-34-5	1,1,2,2-Tetrachloroethane	<5.00	5.00		ug/L
79-00-5	1,1,2-Trichloroethane	<5.00	5.00		ug/L
75-34-3	1,1-Dichloroethane	<5.00	5.00		ug/L
75-35-4	1,1-Dichloroethene	<5.00	5.00		ug/L
563-58-6	1,1-Dichloropropene	<5.00	5.00		ug/L
96-18-4	1,2,3-Trichloropropane	<5.00	5.00		ug/L
120-82-1	1,2,4-Trichlorobenzene	<5.00	5.00		ug/L
95-63-6	1,2,4-Trimethylbenzene	<5.00	5.00		ug/L
96-12-8	1,2-Dibromo-3-chloropropane	<5.00	5.00		ug/L
106-93-4	1,2-Dibromoethane	<5.00	5.00		ug/L
95-50-1	1,2-Dichlorobenzene	<5.00	5.00		ug/L
107-06-2	1,2-Dichloroethane	<5.00	5.00		ug/L
540-59-0	**1,2-Dichloroethene(Total)**	**11.8**	**10.0**		**ug/L**
78-87-5	1,2-Dichloropropane	<5.00	5.00		ug/L
108-67-8	1,3,5-Trimethylbenzene	<5.00	5.00		ug/L
541-73-1	1,3-Dichlorobenzene	<5.00	5.00		ug/L
142-28-9	1,3-Dichloropropane	<5.00	5.00		ug/L
106-46-7	1,4-Dichlorobenzene	<5.00	5.00		ug/L
594-20-7	2,2-Dichloropropane	<5.00	5.00		ug/L
78-93-3	2-Butanone	<5.00	5.00		ug/L
95-49-8	2-Chlorotoluene	<5.00	5.00		ug/L
591-78-6	2-Hexanone	<5.00	5.00		ug/L
106-43-4	4-Chlorotoluene	<5.00	5.00		ug/L
99-87-6	4-Isopropyltoluene	<5.00	5.00		ug/L
108-10-1	4-Methyl-2-pentanone	<5.00	5.00		ug/L
67-64-1	Acetone	<5.00	5.00		ug/L
71-43-2	Benzene	<5.00	5.00		ug/L
108-86-1	Bromobenzene	<5.00	5.00		ug/L
74-97-5	Bromochloromethane	<5.00	5.00		ug/L
75-27-4	Bromodichloromethane	<5.00	5.00		ug/L
75-25-2	Bromoform	<5.00	5.00		ug/L
74-83-9	Bromomethane	<5.00	5.00		ug/L
75-15-0	Carbon disulfide	<5.00	5.00		ug/L
56-23-5	Carbon tetrachloride	<5.00	5.00		ug/L
108-90-7	Chlorobenzene	<5.00	5.00		ug/L
75-00-3	Chloroethane	<5.00	5.00		ug/L
67-66-3	Chloroform	<5.00	5.00		ug/L
74-87-3	Chloromethane	<5.00	5.00		ug/L
124-48-1	Dibromochloromethane	<5.00	5.00		ug/L
74-95-3	Dibromomethane	<5.00	5.00		ug/L
75-71-8	Dichlorodifluoromethane	<5.00	5.00		ug/L
100-41-4	Ethylbenzene	<5.00	5.00		ug/L
87-68-3	Hexachlorobutadiene	<5.00	5.00		ug/L
98-82-8	Isopropylbenzene (Cumene)	<5.00	5.00		ug/L
74-88-4	Methyl iodide	<5.00	5.00		ug/L
75-09-2	Methylene chloride	<5.00	5.00		ug/L
91-20-3	Naphthalene	<5.00	5.00		ug/L
100-42-5	Styrene	<5.00	5.00		ug/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
21305180907	**MW29**	Water	05/17/2013 12:17	05/18/2013 10:20

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	05/18/2013 23:30	AMD	507587

CAS#	Parameter	Result	RDL	REG LIMIT	Units
127-18-4	Tetrachloroethene	<5.00	5.00		ug/L
108-88-3	Toluene	<5.00	5.00		ug/L
79-01-6	Trichloroethene	<5.00	5.00		ug/L
75-69-4	Trichlorofluoromethane	<5.00	5.00		ug/L
76-13-1	Trichlorotrifluoroethane	<5.00	5.00		ug/L
75-01-4	Vinyl chloride	<5.00	5.00		ug/L
1330-20-7	Xylene (total)	<15.0	15.0		ug/L
156-59-2	**cis-1,2-Dichloroethene**	**11.8**	**5.00**		**ug/L**
10061-01-5	cis-1,3-Dichloropropene	<5.00	5.00		ug/L
136777-61-2	m,p-Xylene	<10.0	10.0		ug/L
104-51-8	n-Butylbenzene	<5.00	5.00		ug/L
103-65-1	n-Propylbenzene	<5.00	5.00		ug/L
95-47-6	o-Xylene	<5.00	5.00		ug/L
135-98-8	sec-Butylbenzene	<5.00	5.00		ug/L
1634-04-4	**tert-Butyl methyl ether (MTBE)**	**14.9**	**5.00**		**ug/L**
98-06-6	tert-Butylbenzene	<5.00	5.00		ug/L
156-60-5	trans-1,2-Dichloroethene	<5.00	5.00		ug/L
10061-02-6	trans-1,3-Dichloropropene	<5.00	5.00		ug/L
110-57-6	trans-1,4-Dichloro-2-butene	<5.00	5.00		ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	52.7	ug/L	105	78 - 130
1868-53-7	Dibromofluoromethane	50	51.5	ug/L	103	77 - 127
2037-26-5	Toluene d8	50	50.3	ug/L	101	76 - 134
17060-07-0	1,2-Dichloroethane-d4	50	45.6	ug/L	91	71 - 127

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
21305180908	**MW30**	Water	05/17/2013 13:05	05/18/2013 10:20

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	05/18/2013 23:53	AMD	507587

CAS#	Parameter	Result	RDL	REG LIMIT	Units
630-20-6	1,1,1,2-Tetrachloroethane	<5.00	5.00		ug/L
71-55-6	1,1,1-Trichloroethane	<5.00	5.00		ug/L
79-34-5	1,1,2,2-Tetrachloroethane	<5.00	5.00		ug/L
79-00-5	1,1,2-Trichloroethane	<5.00	5.00		ug/L
75-34-3	1,1-Dichloroethane	<5.00	5.00		ug/L
75-35-4	1,1-Dichloroethene	<5.00	5.00		ug/L
563-58-6	1,1-Dichloropropene	<5.00	5.00		ug/L
96-18-4	1,2,3-Trichloropropane	<5.00	5.00		ug/L
120-82-1	1,2,4-Trichlorobenzene	<5.00	5.00		ug/L
95-63-6	1,2,4-Trimethylbenzene	<5.00	5.00		ug/L
96-12-8	1,2-Dibromo-3-chloropropane	<5.00	5.00		ug/L
106-93-4	1,2-Dibromoethane	<5.00	5.00		ug/L
95-50-1	1,2-Dichlorobenzene	<5.00	5.00		ug/L
107-06-2	1,2-Dichloroethane	<5.00	5.00		ug/L
540-59-0	1,2-Dichloroethene(Total)	<10.0	10.0		ug/L
78-87-5	1,2-Dichloropropane	<5.00	5.00		ug/L
108-67-8	1,3,5-Trimethylbenzene	<5.00	5.00		ug/L
541-73-1	1,3-Dichlorobenzene	<5.00	5.00		ug/L
142-28-9	1,3-Dichloropropane	<5.00	5.00		ug/L
106-46-7	1,4-Dichlorobenzene	<5.00	5.00		ug/L
594-20-7	2,2-Dichloropropane	<5.00	5.00		ug/L
78-93-3	2-Butanone	<5.00	5.00		ug/L
95-49-8	2-Chlorotoluene	<5.00	5.00		ug/L
591-78-6	2-Hexanone	<5.00	5.00		ug/L
106-43-4	4-Chlorotoluene	<5.00	5.00		ug/L
99-87-6	4-Isopropyltoluene	<5.00	5.00		ug/L
108-10-1	4-Methyl-2-pentanone	<5.00	5.00		ug/L
67-64-1	Acetone	<5.00	5.00		ug/L
71-43-2	Benzene	<5.00	5.00		ug/L
108-86-1	Bromobenzene	<5.00	5.00		ug/L
74-97-5	Bromochloromethane	<5.00	5.00		ug/L
75-27-4	Bromodichloromethane	<5.00	5.00		ug/L
75-25-2	Bromoform	<5.00	5.00		ug/L
74-83-9	Bromomethane	<5.00	5.00		ug/L
75-15-0	Carbon disulfide	<5.00	5.00		ug/L
56-23-5	Carbon tetrachloride	<5.00	5.00		ug/L
108-90-7	Chlorobenzene	<5.00	5.00		ug/L
75-00-3	Chloroethane	<5.00	5.00		ug/L
67-66-3	Chloroform	<5.00	5.00		ug/L
74-87-3	Chloromethane	<5.00	5.00		ug/L
124-48-1	Dibromochloromethane	<5.00	5.00		ug/L
74-95-3	Dibromomethane	<5.00	5.00		ug/L
75-71-8	Dichlorodifluoromethane	<5.00	5.00		ug/L
100-41-4	Ethylbenzene	<5.00	5.00		ug/L
87-68-3	Hexachlorobutadiene	<5.00	5.00		ug/L
98-82-8	Isopropylbenzene (Cumene)	<5.00	5.00		ug/L
74-88-4	Methyl iodide	<5.00	5.00		ug/L
75-09-2	Methylene chloride	<5.00	5.00		ug/L
91-20-3	Naphthalene	<5.00	5.00		ug/L
100-42-5	Styrene	<5.00	5.00		ug/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
21305180908	**MW30**	Water	05/17/2013 13:05	05/18/2013 10:20

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	05/18/2013 23:53	AMD	507587

CAS#	Parameter	Result	RDL	REG LIMIT	Units
127-18-4	**Tetrachloroethene**	**17.9**	**5.00**		**ug/L**
108-88-3	Toluene	<5.00	5.00		ug/L
79-01-6	Trichloroethene	<5.00	5.00		ug/L
75-69-4	Trichlorofluoromethane	<5.00	5.00		ug/L
76-13-1	Trichlorotrifluoroethane	<5.00	5.00		ug/L
75-01-4	Vinyl chloride	<5.00	5.00		ug/L
1330-20-7	Xylene (total)	<15.0	15.0		ug/L
156-59-2	cis-1,2-Dichloroethene	<5.00	5.00		ug/L
10061-01-5	cis-1,3-Dichloropropene	<5.00	5.00		ug/L
136777-61-2	m,p-Xylene	<10.0	10.0		ug/L
104-51-8	n-Butylbenzene	<5.00	5.00		ug/L
103-65-1	n-Propylbenzene	<5.00	5.00		ug/L
95-47-6	o-Xylene	<5.00	5.00		ug/L
135-98-8	sec-Butylbenzene	<5.00	5.00		ug/L
1634-04-4	tert-Butyl methyl ether (MTBE)	<5.00	5.00		ug/L
98-06-6	tert-Butylbenzene	<5.00	5.00		ug/L
156-60-5	trans-1,2-Dichloroethene	<5.00	5.00		ug/L
10061-02-6	trans-1,3-Dichloropropene	<5.00	5.00		ug/L
110-57-6	trans-1,4-Dichloro-2-butene	<5.00	5.00		ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	52.9	ug/L	106	78 - 130
1868-53-7	Dibromofluoromethane	50	52.3	ug/L	105	77 - 127
2037-26-5	Toluene d8	50	51.1	ug/L	102	76 - 134
17060-07-0	1,2-Dichloroethane-d4	50	44.9	ug/L	90	71 - 127

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
21305180909	**MW13D**	Water	05/17/2013 14:10	05/18/2013 10:20

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	05/19/2013 00:16	AMD	507587

CAS#	Parameter	Result	RDL	REG LIMIT	Units
630-20-6	1,1,1,2-Tetrachloroethane	<5.00	5.00		ug/L
71-55-6	1,1,1-Trichloroethane	<5.00	5.00		ug/L
79-34-5	1,1,2,2-Tetrachloroethane	<5.00	5.00		ug/L
79-00-5	1,1,2-Trichloroethane	<5.00	5.00		ug/L
75-34-3	1,1-Dichloroethane	<5.00	5.00		ug/L
75-35-4	1,1-Dichloroethene	<5.00	5.00		ug/L
563-58-6	1,1-Dichloropropene	<5.00	5.00		ug/L
96-18-4	1,2,3-Trichloropropane	<5.00	5.00		ug/L
120-82-1	1,2,4-Trichlorobenzene	<5.00	5.00		ug/L
95-63-6	1,2,4-Trimethylbenzene	<5.00	5.00		ug/L
96-12-8	1,2-Dibromo-3-chloropropane	<5.00	5.00		ug/L
106-93-4	1,2-Dibromoethane	<5.00	5.00		ug/L
95-50-1	1,2-Dichlorobenzene	<5.00	5.00		ug/L
107-06-2	1,2-Dichloroethane	<5.00	5.00		ug/L
540-59-0	1,2-Dichloroethene(Total)	<10.0	10.0		ug/L
78-87-5	1,2-Dichloropropane	<5.00	5.00		ug/L
108-67-8	1,3,5-Trimethylbenzene	<5.00	5.00		ug/L
541-73-1	1,3-Dichlorobenzene	<5.00	5.00		ug/L
142-28-9	1,3-Dichloropropane	<5.00	5.00		ug/L
106-46-7	1,4-Dichlorobenzene	<5.00	5.00		ug/L
594-20-7	2,2-Dichloropropane	<5.00	5.00		ug/L
78-93-3	**2-Butanone**	**10.5**	**5.00**		**ug/L**
95-49-8	2-Chlorotoluene	<5.00	5.00		ug/L
591-78-6	2-Hexanone	<5.00	5.00		ug/L
106-43-4	4-Chlorotoluene	<5.00	5.00		ug/L
99-87-6	4-Isopropyltoluene	<5.00	5.00		ug/L
108-10-1	4-Methyl-2-pentanone	<5.00	5.00		ug/L
67-64-1	**Acetone**	**54.5**	**5.00**		**ug/L**
71-43-2	Benzene	<5.00	5.00		ug/L
108-86-1	Bromobenzene	<5.00	5.00		ug/L
74-97-5	Bromochloromethane	<5.00	5.00		ug/L
75-27-4	Bromodichloromethane	<5.00	5.00		ug/L
75-25-2	Bromoform	<5.00	5.00		ug/L
74-83-9	Bromomethane	<5.00	5.00		ug/L
75-15-0	Carbon disulfide	<5.00	5.00		ug/L
56-23-5	Carbon tetrachloride	<5.00	5.00		ug/L
108-90-7	Chlorobenzene	<5.00	5.00		ug/L
75-00-3	Chloroethane	<5.00	5.00		ug/L
67-66-3	Chloroform	<5.00	5.00		ug/L
74-87-3	Chloromethane	<5.00	5.00		ug/L
124-48-1	Dibromochloromethane	<5.00	5.00		ug/L
74-95-3	Dibromomethane	<5.00	5.00		ug/L
75-71-8	Dichlorodifluoromethane	<5.00	5.00		ug/L
100-41-4	Ethylbenzene	<5.00	5.00		ug/L
87-68-3	Hexachlorobutadiene	<5.00	5.00		ug/L
98-82-8	Isopropylbenzene (Cumene)	<5.00	5.00		ug/L
74-88-4	Methyl iodide	<5.00	5.00		ug/L
75-09-2	Methylene chloride	<5.00	5.00		ug/L
91-20-3	Naphthalene	<5.00	5.00		ug/L
100-42-5	Styrene	<5.00	5.00		ug/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
21305180909	**MW13D**	Water	05/17/2013 14:10	05/18/2013 10:20

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	05/19/2013 00:16	AMD	507587

CAS#	Parameter	Result	RDL	REG LIMIT	Units
127-18-4	Tetrachloroethene	<5.00	5.00		ug/L
108-88-3	Toluene	<5.00	5.00		ug/L
79-01-6	Trichloroethene	<5.00	5.00		ug/L
75-69-4	Trichlorofluoromethane	<5.00	5.00		ug/L
76-13-1	Trichlorotrifluoroethane	<5.00	5.00		ug/L
75-01-4	Vinyl chloride	<5.00	5.00		ug/L
1330-20-7	Xylene (total)	<15.0	15.0		ug/L
156-59-2	cis-1,2-Dichloroethene	<5.00	5.00		ug/L
10061-01-5	cis-1,3-Dichloropropene	<5.00	5.00		ug/L
136777-61-2	m,p-Xylene	<10.0	10.0		ug/L
104-51-8	n-Butylbenzene	<5.00	5.00		ug/L
103-65-1	n-Propylbenzene	<5.00	5.00		ug/L
95-47-6	o-Xylene	<5.00	5.00		ug/L
135-98-8	sec-Butylbenzene	<5.00	5.00		ug/L
1634-04-4	tert-Butyl methyl ether (MTBE)	<5.00	5.00		ug/L
98-06-6	tert-Butylbenzene	<5.00	5.00		ug/L
156-60-5	trans-1,2-Dichloroethene	<5.00	5.00		ug/L
10061-02-6	trans-1,3-Dichloropropene	<5.00	5.00		ug/L
110-57-6	trans-1,4-Dichloro-2-butene	<5.00	5.00		ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	58.6	ug/L	117	78 - 130
1868-53-7	Dibromofluoromethane	50	51.6	ug/L	103	77 - 127
2037-26-5	Toluene d8	50	50.6	ug/L	101	76 - 134
17060-07-0	1,2-Dichloroethane-d4	50	44.9	ug/L	90	71 - 127

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
21305180910	**MW13S**	Water	05/17/2013 14:45	05/18/2013 10:20

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	05/19/2013 00:38	AMD	507587

CAS#	Parameter	Result	RDL	REG LIMIT	Units
630-20-6	1,1,1,2-Tetrachloroethane	<5.00	5.00		ug/L
71-55-6	1,1,1-Trichloroethane	<5.00	5.00		ug/L
79-34-5	1,1,2,2-Tetrachloroethane	<5.00	5.00		ug/L
79-00-5	1,1,2-Trichloroethane	<5.00	5.00		ug/L
75-34-3	1,1-Dichloroethane	<5.00	5.00		ug/L
75-35-4	1,1-Dichloroethene	<5.00	5.00		ug/L
563-58-6	1,1-Dichloropropene	<5.00	5.00		ug/L
96-18-4	1,2,3-Trichloropropane	<5.00	5.00		ug/L
120-82-1	1,2,4-Trichlorobenzene	<5.00	5.00		ug/L
95-63-6	1,2,4-Trimethylbenzene	<5.00	5.00		ug/L
96-12-8	1,2-Dibromo-3-chloropropane	<5.00	5.00		ug/L
106-93-4	1,2-Dibromoethane	<5.00	5.00		ug/L
95-50-1	1,2-Dichlorobenzene	<5.00	5.00		ug/L
107-06-2	1,2-Dichloroethane	<5.00	5.00		ug/L
540-59-0	1,2-Dichloroethene(Total)	<10.0	10.0		ug/L
78-87-5	1,2-Dichloropropane	<5.00	5.00		ug/L
108-67-8	1,3,5-Trimethylbenzene	<5.00	5.00		ug/L
541-73-1	1,3-Dichlorobenzene	<5.00	5.00		ug/L
142-28-9	1,3-Dichloropropane	<5.00	5.00		ug/L
106-46-7	1,4-Dichlorobenzene	<5.00	5.00		ug/L
594-20-7	2,2-Dichloropropane	<5.00	5.00		ug/L
78-93-3	2-Butanone	<5.00	5.00		ug/L
95-49-8	2-Chlorotoluene	<5.00	5.00		ug/L
591-78-6	2-Hexanone	<5.00	5.00		ug/L
106-43-4	4-Chlorotoluene	<5.00	5.00		ug/L
99-87-6	4-Isopropyltoluene	<5.00	5.00		ug/L
108-10-1	4-Methyl-2-pentanone	<5.00	5.00		ug/L
67-64-1	Acetone	<5.00	5.00		ug/L
71-43-2	Benzene	<5.00	5.00		ug/L
108-86-1	Bromobenzene	<5.00	5.00		ug/L
74-97-5	Bromochloromethane	<5.00	5.00		ug/L
75-27-4	Bromodichloromethane	<5.00	5.00		ug/L
75-25-2	Bromoform	<5.00	5.00		ug/L
74-83-9	Bromomethane	<5.00	5.00		ug/L
75-15-0	Carbon disulfide	<5.00	5.00		ug/L
56-23-5	Carbon tetrachloride	<5.00	5.00		ug/L
108-90-7	Chlorobenzene	<5.00	5.00		ug/L
75-00-3	Chloroethane	<5.00	5.00		ug/L
67-66-3	Chloroform	<5.00	5.00		ug/L
74-87-3	Chloromethane	<5.00	5.00		ug/L
124-48-1	Dibromochloromethane	<5.00	5.00		ug/L
74-95-3	Dibromomethane	<5.00	5.00		ug/L
75-71-8	Dichlorodifluoromethane	<5.00	5.00		ug/L
100-41-4	Ethylbenzene	<5.00	5.00		ug/L
87-68-3	Hexachlorobutadiene	<5.00	5.00		ug/L
98-82-8	Isopropylbenzene (Cumene)	<5.00	5.00		ug/L
74-88-4	Methyl iodide	<5.00	5.00		ug/L
75-09-2	Methylene chloride	<5.00	5.00		ug/L
91-20-3	Naphthalene	<5.00	5.00		ug/L
100-42-5	Styrene	<5.00	5.00		ug/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
21305180910	**MW13S**	Water	05/17/2013 14:45	05/18/2013 10:20

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	05/19/2013 00:38	AMD	507587

CAS#	Parameter	Result	RDL	REG LIMIT	Units
127-18-4	**Tetrachloroethene**	**54.1**	**5.00**		**ug/L**
108-88-3	Toluene	<5.00	5.00		ug/L
79-01-6	Trichloroethene	<5.00	5.00		ug/L
75-69-4	Trichlorofluoromethane	<5.00	5.00		ug/L
76-13-1	Trichlorotrifluoroethane	<5.00	5.00		ug/L
75-01-4	Vinyl chloride	<5.00	5.00		ug/L
1330-20-7	Xylene (total)	<15.0	15.0		ug/L
156-59-2	**cis-1,2-Dichloroethene**	**6.31**	**5.00**		**ug/L**
10061-01-5	cis-1,3-Dichloropropene	<5.00	5.00		ug/L
136777-61-2	m,p-Xylene	<10.0	10.0		ug/L
104-51-8	n-Butylbenzene	<5.00	5.00		ug/L
103-65-1	n-Propylbenzene	<5.00	5.00		ug/L
95-47-6	o-Xylene	<5.00	5.00		ug/L
135-98-8	sec-Butylbenzene	<5.00	5.00		ug/L
1634-04-4	tert-Butyl methyl ether (MTBE)	<5.00	5.00		ug/L
98-06-6	tert-Butylbenzene	<5.00	5.00		ug/L
156-60-5	trans-1,2-Dichloroethene	<5.00	5.00		ug/L
10061-02-6	trans-1,3-Dichloropropene	<5.00	5.00		ug/L
110-57-6	trans-1,4-Dichloro-2-butene	<5.00	5.00		ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	52.8	ug/L	106	78 - 130
1868-53-7	Dibromofluoromethane	50	52.3	ug/L	105	77 - 127
2037-26-5	Toluene d8	50	51.2	ug/L	102	76 - 134
17060-07-0	1,2-Dichloroethane-d4	50	45.1	ug/L	90	71 - 127

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
21305180911	**MW17**	Water	05/17/2013 15:47	05/18/2013 10:20

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	05/19/2013 01:02	AMD	507587

CAS#	Parameter	Result	RDL	REG LIMIT	Units
630-20-6	1,1,1,2-Tetrachloroethane	<5.00	5.00		ug/L
71-55-6	1,1,1-Trichloroethane	<5.00	5.00		ug/L
79-34-5	1,1,2,2-Tetrachloroethane	<5.00	5.00		ug/L
79-00-5	1,1,2-Trichloroethane	<5.00	5.00		ug/L
75-34-3	1,1-Dichloroethane	<5.00	5.00		ug/L
75-35-4	1,1-Dichloroethene	<5.00	5.00		ug/L
563-58-6	1,1-Dichloropropene	<5.00	5.00		ug/L
96-18-4	1,2,3-Trichloropropane	<5.00	5.00		ug/L
120-82-1	1,2,4-Trichlorobenzene	<5.00	5.00		ug/L
95-63-6	1,2,4-Trimethylbenzene	<5.00	5.00		ug/L
96-12-8	1,2-Dibromo-3-chloropropane	<5.00	5.00		ug/L
106-93-4	1,2-Dibromoethane	<5.00	5.00		ug/L
95-50-1	1,2-Dichlorobenzene	<5.00	5.00		ug/L
107-06-2	1,2-Dichloroethane	<5.00	5.00		ug/L
540-59-0	1,2-Dichloroethene(Total)	<10.0	10.0		ug/L
78-87-5	1,2-Dichloropropane	<5.00	5.00		ug/L
108-67-8	1,3,5-Trimethylbenzene	<5.00	5.00		ug/L
541-73-1	1,3-Dichlorobenzene	<5.00	5.00		ug/L
142-28-9	1,3-Dichloropropane	<5.00	5.00		ug/L
106-46-7	1,4-Dichlorobenzene	<5.00	5.00		ug/L
594-20-7	2,2-Dichloropropane	<5.00	5.00		ug/L
78-93-3	2-Butanone	<5.00	5.00		ug/L
95-49-8	2-Chlorotoluene	<5.00	5.00		ug/L
591-78-6	2-Hexanone	<5.00	5.00		ug/L
106-43-4	4-Chlorotoluene	<5.00	5.00		ug/L
99-87-6	4-Isopropyltoluene	<5.00	5.00		ug/L
108-10-1	4-Methyl-2-pentanone	<5.00	5.00		ug/L
67-64-1	Acetone	<5.00	5.00		ug/L
71-43-2	Benzene	<5.00	5.00		ug/L
108-86-1	Bromobenzene	<5.00	5.00		ug/L
74-97-5	Bromochloromethane	<5.00	5.00		ug/L
75-27-4	Bromodichloromethane	<5.00	5.00		ug/L
75-25-2	Bromoform	<5.00	5.00		ug/L
74-83-9	Bromomethane	<5.00	5.00		ug/L
75-15-0	Carbon disulfide	<5.00	5.00		ug/L
56-23-5	Carbon tetrachloride	<5.00	5.00		ug/L
108-90-7	Chlorobenzene	<5.00	5.00		ug/L
75-00-3	Chloroethane	<5.00	5.00		ug/L
67-66-3	Chloroform	<5.00	5.00		ug/L
74-87-3	Chloromethane	<5.00	5.00		ug/L
124-48-1	Dibromochloromethane	<5.00	5.00		ug/L
74-95-3	Dibromomethane	<5.00	5.00		ug/L
75-71-8	Dichlorodifluoromethane	<5.00	5.00		ug/L
100-41-4	Ethylbenzene	<5.00	5.00		ug/L
87-68-3	Hexachlorobutadiene	<5.00	5.00		ug/L
98-82-8	Isopropylbenzene (Cumene)	<5.00	5.00		ug/L
74-88-4	Methyl iodide	<5.00	5.00		ug/L
75-09-2	Methylene chloride	<5.00	5.00		ug/L
91-20-3	Naphthalene	<5.00	5.00		ug/L
100-42-5	Styrene	<5.00	5.00		ug/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
21305180911	**MW17**	Water	05/17/2013 15:47	05/18/2013 10:20

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	05/19/2013 01:02	AMD	507587

CAS#	Parameter	Result	RDL	REG LIMIT	Units
127-18-4	Tetrachloroethene	<5.00	5.00		ug/L
108-88-3	Toluene	<5.00	5.00		ug/L
79-01-6	Trichloroethene	<5.00	5.00		ug/L
75-69-4	Trichlorofluoromethane	<5.00	5.00		ug/L
76-13-1	Trichlorotrifluoroethane	<5.00	5.00		ug/L
75-01-4	Vinyl chloride	<5.00	5.00		ug/L
1330-20-7	Xylene (total)	<15.0	15.0		ug/L
156-59-2	cis-1,2-Dichloroethene	<5.00	5.00		ug/L
10061-01-5	cis-1,3-Dichloropropene	<5.00	5.00		ug/L
136777-61-2	m,p-Xylene	<10.0	10.0		ug/L
104-51-8	n-Butylbenzene	<5.00	5.00		ug/L
103-65-1	n-Propylbenzene	<5.00	5.00		ug/L
95-47-6	o-Xylene	<5.00	5.00		ug/L
135-98-8	sec-Butylbenzene	<5.00	5.00		ug/L
1634-04-4	tert-Butyl methyl ether (MTBE)	<5.00	5.00		ug/L
98-06-6	tert-Butylbenzene	<5.00	5.00		ug/L
156-60-5	trans-1,2-Dichloroethene	<5.00	5.00		ug/L
10061-02-6	trans-1,3-Dichloropropene	<5.00	5.00		ug/L
110-57-6	trans-1,4-Dichloro-2-butene	<5.00	5.00		ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	52.2	ug/L	104	78 - 130
1868-53-7	Dibromofluoromethane	50	51.7	ug/L	103	77 - 127
2037-26-5	Toluene d8	50	50.1	ug/L	100	76 - 134
17060-07-0	1,2-Dichloroethane-d4	50	45.9	ug/L	92	71 - 127

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
21305180912	**MW2**	Water	05/17/2013 16:10	05/18/2013 10:20

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			20	05/19/2013 03:20	AMD	507587

CAS#	Parameter	Result	RDL	REG LIMIT	Units
630-20-6	1,1,1,2-Tetrachloroethane	<100	100		ug/L
71-55-6	1,1,1-Trichloroethane	<100	100		ug/L
79-34-5	1,1,2,2-Tetrachloroethane	<100	100		ug/L
79-00-5	1,1,2-Trichloroethane	<100	100		ug/L
75-34-3	1,1-Dichloroethane	<100	100		ug/L
75-35-4	1,1-Dichloroethene	<100	100		ug/L
563-58-6	1,1-Dichloropropene	<100	100		ug/L
96-18-4	1,2,3-Trichloropropane	<100	100		ug/L
120-82-1	1,2,4-Trichlorobenzene	<100	100		ug/L
95-63-6	1,2,4-Trimethylbenzene	<100	100		ug/L
96-12-8	1,2-Dibromo-3-chloropropane	<100	100		ug/L
106-93-4	1,2-Dibromoethane	<100	100		ug/L
95-50-1	1,2-Dichlorobenzene	<100	100		ug/L
107-06-2	1,2-Dichloroethane	<100	100		ug/L
540-59-0	1,2-Dichloroethene(Total)	<200	200		ug/L
78-87-5	1,2-Dichloropropane	<100	100		ug/L
108-67-8	1,3,5-Trimethylbenzene	<100	100		ug/L
541-73-1	1,3-Dichlorobenzene	<100	100		ug/L
142-28-9	1,3-Dichloropropane	<100	100		ug/L
106-46-7	1,4-Dichlorobenzene	<100	100		ug/L
594-20-7	2,2-Dichloropropane	<100	100		ug/L
78-93-3	2-Butanone	<100	100		ug/L
95-49-8	2-Chlorotoluene	<100	100		ug/L
591-78-6	2-Hexanone	<100	100		ug/L
106-43-4	4-Chlorotoluene	<100	100		ug/L
99-87-6	4-Isopropyltoluene	<100	100		ug/L
108-10-1	4-Methyl-2-pentanone	<100	100		ug/L
67-64-1	Acetone	<100	100		ug/L
71-43-2	Benzene	<100	100		ug/L
108-86-1	Bromobenzene	<100	100		ug/L
74-97-5	Bromochloromethane	<100	100		ug/L
75-27-4	Bromodichloromethane	<100	100		ug/L
75-25-2	Bromoform	<100	100		ug/L
74-83-9	Bromomethane	<100	100		ug/L
75-15-0	Carbon disulfide	<100	100		ug/L
56-23-5	Carbon tetrachloride	<100	100		ug/L
108-90-7	Chlorobenzene	<100	100		ug/L
75-00-3	Chloroethane	<100	100		ug/L
67-66-3	Chloroform	<100	100		ug/L
74-87-3	Chloromethane	<100	100		ug/L
124-48-1	Dibromochloromethane	<100	100		ug/L
74-95-3	Dibromomethane	<100	100		ug/L
75-71-8	Dichlorodifluoromethane	<100	100		ug/L
100-41-4	Ethylbenzene	<100	100		ug/L
87-68-3	Hexachlorobutadiene	<100	100		ug/L
98-82-8	Isopropylbenzene (Cumene)	<100	100		ug/L
74-88-4	Methyl iodide	<100	100		ug/L
75-09-2	Methylene chloride	<100	100		ug/L
91-20-3	Naphthalene	<100	100		ug/L
100-42-5	Styrene	<100	100		ug/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
21305180912	**MW2**	Water	05/17/2013 16:10	05/18/2013 10:20

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			20	05/19/2013 03:20	AMD	507587

CAS#	Parameter	Result	RDL	REG LIMIT	Units
127-18-4	**Tetrachloroethene**	**2470**	**100**		**ug/L**
108-88-3	Toluene	<100	100		ug/L
79-01-6	**Trichloroethene**	**170**	**100**		**ug/L**
75-69-4	Trichlorofluoromethane	<100	100		ug/L
76-13-1	Trichlorotrifluoroethane	<100	100		ug/L
75-01-4	Vinyl chloride	<100	100		ug/L
1330-20-7	Xylene (total)	<300	300		ug/L
156-59-2	cis-1,2-Dichloroethene	<100	100		ug/L
10061-01-5	cis-1,3-Dichloropropene	<100	100		ug/L
136777-61-2	m,p-Xylene	<200	200		ug/L
104-51-8	n-Butylbenzene	<100	100		ug/L
103-65-1	n-Propylbenzene	<100	100		ug/L
95-47-6	o-Xylene	<100	100		ug/L
135-98-8	sec-Butylbenzene	<100	100		ug/L
1634-04-4	tert-Butyl methyl ether (MTBE)	<100	100		ug/L
98-06-6	tert-Butylbenzene	<100	100		ug/L
156-60-5	trans-1,2-Dichloroethene	<100	100		ug/L
10061-02-6	trans-1,3-Dichloropropene	<100	100		ug/L
110-57-6	trans-1,4-Dichloro-2-butene	<100	100		ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	1000	1060	ug/L	106	78 - 130
1868-53-7	Dibromofluoromethane	1000	1060	ug/L	106	77 - 127
2037-26-5	Toluene d8	1000	1020	ug/L	102	76 - 134
17060-07-0	1,2-Dichloroethane-d4	1000	897	ug/L	90	71 - 127

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
21305180913	**MW27**	Water	05/17/2013 16:40	05/18/2013 10:20

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	05/19/2013 01:25	AMD	507587

CAS#	Parameter	Result	RDL	REG LIMIT	Units
630-20-6	1,1,1,2-Tetrachloroethane	<5.00	5.00		ug/L
71-55-6	1,1,1-Trichloroethane	<5.00	5.00		ug/L
79-34-5	1,1,2,2-Tetrachloroethane	<5.00	5.00		ug/L
79-00-5	1,1,2-Trichloroethane	<5.00	5.00		ug/L
75-34-3	1,1-Dichloroethane	<5.00	5.00		ug/L
75-35-4	1,1-Dichloroethene	<5.00	5.00		ug/L
563-58-6	1,1-Dichloropropene	<5.00	5.00		ug/L
96-18-4	1,2,3-Trichloropropane	<5.00	5.00		ug/L
120-82-1	1,2,4-Trichlorobenzene	<5.00	5.00		ug/L
95-63-6	1,2,4-Trimethylbenzene	<5.00	5.00		ug/L
96-12-8	1,2-Dibromo-3-chloropropane	<5.00	5.00		ug/L
106-93-4	1,2-Dibromoethane	<5.00	5.00		ug/L
95-50-1	1,2-Dichlorobenzene	<5.00	5.00		ug/L
107-06-2	1,2-Dichloroethane	<5.00	5.00		ug/L
540-59-0	**1,2-Dichloroethene(Total)**	**11.2**	**10.0**		**ug/L**
78-87-5	1,2-Dichloropropane	<5.00	5.00		ug/L
108-67-8	1,3,5-Trimethylbenzene	<5.00	5.00		ug/L
541-73-1	1,3-Dichlorobenzene	<5.00	5.00		ug/L
142-28-9	1,3-Dichloropropane	<5.00	5.00		ug/L
106-46-7	1,4-Dichlorobenzene	<5.00	5.00		ug/L
594-20-7	2,2-Dichloropropane	<5.00	5.00		ug/L
78-93-3	2-Butanone	<5.00	5.00		ug/L
95-49-8	2-Chlorotoluene	<5.00	5.00		ug/L
591-78-6	2-Hexanone	<5.00	5.00		ug/L
106-43-4	4-Chlorotoluene	<5.00	5.00		ug/L
99-87-6	4-Isopropyltoluene	<5.00	5.00		ug/L
108-10-1	4-Methyl-2-pentanone	<5.00	5.00		ug/L
67-64-1	Acetone	<5.00	5.00		ug/L
71-43-2	Benzene	<5.00	5.00		ug/L
108-86-1	Bromobenzene	<5.00	5.00		ug/L
74-97-5	Bromochloromethane	<5.00	5.00		ug/L
75-27-4	Bromodichloromethane	<5.00	5.00		ug/L
75-25-2	Bromoform	<5.00	5.00		ug/L
74-83-9	Bromomethane	<5.00	5.00		ug/L
75-15-0	Carbon disulfide	<5.00	5.00		ug/L
56-23-5	Carbon tetrachloride	<5.00	5.00		ug/L
108-90-7	Chlorobenzene	<5.00	5.00		ug/L
75-00-3	Chloroethane	<5.00	5.00		ug/L
67-66-3	Chloroform	<5.00	5.00		ug/L
74-87-3	Chloromethane	<5.00	5.00		ug/L
124-48-1	Dibromochloromethane	<5.00	5.00		ug/L
74-95-3	Dibromomethane	<5.00	5.00		ug/L
75-71-8	Dichlorodifluoromethane	<5.00	5.00		ug/L
100-41-4	Ethylbenzene	<5.00	5.00		ug/L
87-68-3	Hexachlorobutadiene	<5.00	5.00		ug/L
98-82-8	Isopropylbenzene (Cumene)	<5.00	5.00		ug/L
74-88-4	Methyl iodide	<5.00	5.00		ug/L
75-09-2	Methylene chloride	<5.00	5.00		ug/L
91-20-3	Naphthalene	<5.00	5.00		ug/L
100-42-5	Styrene	<5.00	5.00		ug/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
21305180913	**MW27**	Water	05/17/2013 16:40	05/18/2013 10:20

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	05/19/2013 01:25	AMD	507587

CAS#	Parameter	Result	RDL	REG LIMIT	Units
127-18-4	**Tetrachloroethene**	**47.8**	**5.00**		**ug/L**
108-88-3	Toluene	<5.00	5.00		ug/L
79-01-6	**Trichloroethene**	**5.80**	**5.00**		**ug/L**
75-69-4	Trichlorofluoromethane	<5.00	5.00		ug/L
76-13-1	Trichlorotrifluoroethane	<5.00	5.00		ug/L
75-01-4	Vinyl chloride	<5.00	5.00		ug/L
1330-20-7	Xylene (total)	<15.0	15.0		ug/L
156-59-2	**cis-1,2-Dichloroethene**	**11.2**	**5.00**		**ug/L**
10061-01-5	cis-1,3-Dichloropropene	<5.00	5.00		ug/L
136777-61-2	m,p-Xylene	<10.0	10.0		ug/L
104-51-8	n-Butylbenzene	<5.00	5.00		ug/L
103-65-1	n-Propylbenzene	<5.00	5.00		ug/L
95-47-6	o-Xylene	<5.00	5.00		ug/L
135-98-8	sec-Butylbenzene	<5.00	5.00		ug/L
1634-04-4	tert-Butyl methyl ether (MTBE)	<5.00	5.00		ug/L
98-06-6	tert-Butylbenzene	<5.00	5.00		ug/L
156-60-5	trans-1,2-Dichloroethene	<5.00	5.00		ug/L
10061-02-6	trans-1,3-Dichloropropene	<5.00	5.00		ug/L
110-57-6	trans-1,4-Dichloro-2-butene	<5.00	5.00		ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	53.1	ug/L	106	78 - 130
1868-53-7	Dibromofluoromethane	50	52.4	ug/L	105	77 - 127
2037-26-5	Toluene d8	50	51	ug/L	102	76 - 134
17060-07-0	1,2-Dichloroethane-d4	50	45.6	ug/L	91	71 - 127

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
21305180914	**MW18**	Water	05/17/2013 17:10	05/18/2013 10:20

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	05/19/2013 01:47	AMD	507587

CAS#	Parameter	Result	RDL	REG LIMIT	Units
630-20-6	1,1,1,2-Tetrachloroethane	<5.00	5.00		ug/L
71-55-6	1,1,1-Trichloroethane	<5.00	5.00		ug/L
79-34-5	1,1,2,2-Tetrachloroethane	<5.00	5.00		ug/L
79-00-5	1,1,2-Trichloroethane	<5.00	5.00		ug/L
75-34-3	1,1-Dichloroethane	<5.00	5.00		ug/L
75-35-4	1,1-Dichloroethene	<5.00	5.00		ug/L
563-58-6	1,1-Dichloropropene	<5.00	5.00		ug/L
96-18-4	1,2,3-Trichloropropane	<5.00	5.00		ug/L
120-82-1	1,2,4-Trichlorobenzene	<5.00	5.00		ug/L
95-63-6	1,2,4-Trimethylbenzene	<5.00	5.00		ug/L
96-12-8	1,2-Dibromo-3-chloropropane	<5.00	5.00		ug/L
106-93-4	1,2-Dibromoethane	<5.00	5.00		ug/L
95-50-1	1,2-Dichlorobenzene	<5.00	5.00		ug/L
107-06-2	1,2-Dichloroethane	<5.00	5.00		ug/L
540-59-0	**1,2-Dichloroethene(Total)**	**22.5**	**10.0**		**ug/L**
78-87-5	1,2-Dichloropropane	<5.00	5.00		ug/L
108-67-8	1,3,5-Trimethylbenzene	<5.00	5.00		ug/L
541-73-1	1,3-Dichlorobenzene	<5.00	5.00		ug/L
142-28-9	1,3-Dichloropropane	<5.00	5.00		ug/L
106-46-7	1,4-Dichlorobenzene	<5.00	5.00		ug/L
594-20-7	2,2-Dichloropropane	<5.00	5.00		ug/L
78-93-3	2-Butanone	<5.00	5.00		ug/L
95-49-8	2-Chlorotoluene	<5.00	5.00		ug/L
591-78-6	2-Hexanone	<5.00	5.00		ug/L
106-43-4	4-Chlorotoluene	<5.00	5.00		ug/L
99-87-6	4-Isopropyltoluene	<5.00	5.00		ug/L
108-10-1	4-Methyl-2-pentanone	<5.00	5.00		ug/L
67-64-1	Acetone	<5.00	5.00		ug/L
71-43-2	Benzene	<5.00	5.00		ug/L
108-86-1	Bromobenzene	<5.00	5.00		ug/L
74-97-5	Bromochloromethane	<5.00	5.00		ug/L
75-27-4	Bromodichloromethane	<5.00	5.00		ug/L
75-25-2	Bromoform	<5.00	5.00		ug/L
74-83-9	Bromomethane	<5.00	5.00		ug/L
75-15-0	Carbon disulfide	<5.00	5.00		ug/L
56-23-5	Carbon tetrachloride	<5.00	5.00		ug/L
108-90-7	Chlorobenzene	<5.00	5.00		ug/L
75-00-3	Chloroethane	<5.00	5.00		ug/L
67-66-3	Chloroform	<5.00	5.00		ug/L
74-87-3	Chloromethane	<5.00	5.00		ug/L
124-48-1	Dibromochloromethane	<5.00	5.00		ug/L
74-95-3	Dibromomethane	<5.00	5.00		ug/L
75-71-8	Dichlorodifluoromethane	<5.00	5.00		ug/L
100-41-4	Ethylbenzene	<5.00	5.00		ug/L
87-68-3	Hexachlorobutadiene	<5.00	5.00		ug/L
98-82-8	Isopropylbenzene (Cumene)	<5.00	5.00		ug/L
74-88-4	Methyl iodide	<5.00	5.00		ug/L
75-09-2	Methylene chloride	<5.00	5.00		ug/L
91-20-3	Naphthalene	<5.00	5.00		ug/L
100-42-5	Styrene	<5.00	5.00		ug/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
21305180914	**MW18**	Water	05/17/2013 17:10	05/18/2013 10:20

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	05/19/2013 01:47	AMD	507587

CAS#	Parameter	Result	RDL	REG LIMIT	Units
127-18-4	**Tetrachloroethene**	**43.5**	**5.00**		**ug/L**
108-88-3	Toluene	<5.00	5.00		ug/L
79-01-6	**Trichloroethene**	**34.5**	**5.00**		**ug/L**
75-69-4	Trichlorofluoromethane	<5.00	5.00		ug/L
76-13-1	Trichlorotrifluoroethane	<5.00	5.00		ug/L
75-01-4	Vinyl chloride	<5.00	5.00		ug/L
1330-20-7	Xylene (total)	<15.0	15.0		ug/L
156-59-2	**cis-1,2-Dichloroethene**	**22.5**	**5.00**		**ug/L**
10061-01-5	cis-1,3-Dichloropropene	<5.00	5.00		ug/L
136777-61-2	m,p-Xylene	<10.0	10.0		ug/L
104-51-8	n-Butylbenzene	<5.00	5.00		ug/L
103-65-1	n-Propylbenzene	<5.00	5.00		ug/L
95-47-6	o-Xylene	<5.00	5.00		ug/L
135-98-8	sec-Butylbenzene	<5.00	5.00		ug/L
1634-04-4	tert-Butyl methyl ether (MTBE)	<5.00	5.00		ug/L
98-06-6	tert-Butylbenzene	<5.00	5.00		ug/L
156-60-5	trans-1,2-Dichloroethene	<5.00	5.00		ug/L
10061-02-6	trans-1,3-Dichloropropene	<5.00	5.00		ug/L
110-57-6	trans-1,4-Dichloro-2-butene	<5.00	5.00		ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	53.4	ug/L	107	78 - 130
1868-53-7	Dibromofluoromethane	50	51.2	ug/L	102	77 - 127
2037-26-5	Toluene d8	50	50.2	ug/L	100	76 - 134
17060-07-0	1,2-Dichloroethane-d4	50	45.2	ug/L	90	71 - 127

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
21305180915	TRIP BLANK	Water	05/17/2013 00:00	05/18/2013 10:20

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	05/18/2013 13:16	AMD	507518

CAS#	Parameter	Result	RDL	REG LIMIT	Units
630-20-6	1,1,1,2-Tetrachloroethane	<5.00	5.00		ug/L
71-55-6	1,1,1-Trichloroethane	<5.00	5.00		ug/L
79-34-5	1,1,2,2-Tetrachloroethane	<5.00	5.00		ug/L
79-00-5	1,1,2-Trichloroethane	<5.00	5.00		ug/L
75-34-3	1,1-Dichloroethane	<5.00	5.00		ug/L
75-35-4	1,1-Dichloroethene	<5.00	5.00		ug/L
563-58-6	1,1-Dichloropropene	<5.00	5.00		ug/L
96-18-4	1,2,3-Trichloropropane	<5.00	5.00		ug/L
120-82-1	1,2,4-Trichlorobenzene	<5.00	5.00		ug/L
95-63-6	1,2,4-Trimethylbenzene	<5.00	5.00		ug/L
96-12-8	1,2-Dibromo-3-chloropropane	<5.00	5.00		ug/L
106-93-4	1,2-Dibromoethane	<5.00	5.00		ug/L
95-50-1	1,2-Dichlorobenzene	<5.00	5.00		ug/L
107-06-2	1,2-Dichloroethane	<5.00	5.00		ug/L
540-59-0	1,2-Dichloroethene(Total)	<10.0	10.0		ug/L
78-87-5	1,2-Dichloropropane	<5.00	5.00		ug/L
108-67-8	1,3,5-Trimethylbenzene	<5.00	5.00		ug/L
541-73-1	1,3-Dichlorobenzene	<5.00	5.00		ug/L
142-28-9	1,3-Dichloropropane	<5.00	5.00		ug/L
106-46-7	1,4-Dichlorobenzene	<5.00	5.00		ug/L
594-20-7	2,2-Dichloropropane	<5.00	5.00		ug/L
78-93-3	2-Butanone	<5.00	5.00		ug/L
95-49-8	2-Chlorotoluene	<5.00	5.00		ug/L
591-78-6	2-Hexanone	<5.00	5.00		ug/L
106-43-4	4-Chlorotoluene	<5.00	5.00		ug/L
99-87-6	4-Isopropyltoluene	<5.00	5.00		ug/L
108-10-1	4-Methyl-2-pentanone	<5.00	5.00		ug/L
67-64-1	Acetone	<5.00	5.00		ug/L
71-43-2	Benzene	<5.00	5.00		ug/L
108-86-1	Bromobenzene	<5.00	5.00		ug/L
74-97-5	Bromochloromethane	<5.00	5.00		ug/L
75-27-4	Bromodichloromethane	<5.00	5.00		ug/L
75-25-2	Bromoform	<5.00	5.00		ug/L
74-83-9	Bromomethane	<5.00	5.00		ug/L
75-15-0	Carbon disulfide	<5.00	5.00		ug/L
56-23-5	Carbon tetrachloride	<5.00	5.00		ug/L
108-90-7	Chlorobenzene	<5.00	5.00		ug/L
75-00-3	Chloroethane	<5.00	5.00		ug/L
67-66-3	Chloroform	<5.00	5.00		ug/L
74-87-3	Chloromethane	<5.00	5.00		ug/L
124-48-1	Dibromochloromethane	<5.00	5.00		ug/L
74-95-3	Dibromomethane	<5.00	5.00		ug/L
75-71-8	Dichlorodifluoromethane	<5.00	5.00		ug/L
100-41-4	Ethylbenzene	<5.00	5.00		ug/L
87-68-3	Hexachlorobutadiene	<5.00	5.00		ug/L
98-82-8	Isopropylbenzene (Cumene)	<5.00	5.00		ug/L
74-88-4	Methyl iodide	<5.00	5.00		ug/L
75-09-2	Methylene chloride	<5.00	5.00		ug/L
91-20-3	Naphthalene	<5.00	5.00		ug/L
100-42-5	Styrene	<5.00	5.00		ug/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
21305180915	**TRIP BLANK**	Water	05/17/2013 00:00	05/18/2013 10:20

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	05/18/2013 13:16	AMD	507518

CAS#	Parameter	Result	RDL	REG LIMIT	Units
127-18-4	Tetrachloroethene	<5.00	5.00		ug/L
108-88-3	Toluene	<5.00	5.00		ug/L
79-01-6	Trichloroethene	<5.00	5.00		ug/L
75-69-4	Trichlorofluoromethane	<5.00	5.00		ug/L
76-13-1	Trichlorotrifluoroethane	<5.00	5.00		ug/L
75-01-4	Vinyl chloride	<5.00	5.00		ug/L
1330-20-7	Xylene (total)	<15.0	15.0		ug/L
156-59-2	cis-1,2-Dichloroethene	<5.00	5.00		ug/L
10061-01-5	cis-1,3-Dichloropropene	<5.00	5.00		ug/L
136777-61-2	m,p-Xylene	<10.0	10.0		ug/L
104-51-8	n-Butylbenzene	<5.00	5.00		ug/L
103-65-1	n-Propylbenzene	<5.00	5.00		ug/L
95-47-6	o-Xylene	<5.00	5.00		ug/L
135-98-8	sec-Butylbenzene	<5.00	5.00		ug/L
1634-04-4	tert-Butyl methyl ether (MTBE)	<5.00	5.00		ug/L
98-06-6	tert-Butylbenzene	<5.00	5.00		ug/L
156-60-5	trans-1,2-Dichloroethene	<5.00	5.00		ug/L
10061-02-6	trans-1,3-Dichloropropene	<5.00	5.00		ug/L
110-57-6	trans-1,4-Dichloro-2-butene	<5.00	5.00		ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	59.3	ug/L	119	78 - 130
1868-53-7	Dibromofluoromethane	50	51	ug/L	102	77 - 127
2037-26-5	Toluene d8	50	51.4	ug/L	103	76 - 134
17060-07-0	1,2-Dichloroethane-d4	50	44.2	ug/L	88	71 - 127

GC/MS Volatiles Quality Control Summary

Analytical Batch 507518	**Client ID**	MB507518			LCS507518			LCSD507518			
Prep Batch N/A	**GCAL ID**	1192728			1192729			1192730			
	Sample Type	Method Blank			LCS			LCSD			
	Analytical Date	05/18/2013 11:50			05/18/2013 10:21			05/18/2013 10:42			
	Matrix	Water			Water			Water			
SW-846 8260B		**Units** **Result**	ug/L **RDL**	**Spike Added**	**Result**	**% R**	**Control Limits % R**	**Result**	**% R**	**RPD**	**RPD Limit**
67-64-1	Acetone	<5.00	5.00	50.0	46.5	93	44 - 156	52.1	104	11	30
107-02-8	Acrolein	<25.0	25.0	250	242	97	30 - 160	284	114	16	30
107-13-1	Acrylonitrile	<25.0	25.0	250	231	92	64 - 137	263	105	13	30
74-97-5	Bromochloromethane	<5.00	5.00	50.0	55.9	112	76 - 130	57.3	115	2	30
75-27-4	Bromodichloromethane	<5.00	5.00	50.0	52.6	105	74 - 125	53.6	107	2	30
75-25-2	Bromoform	<5.00	5.00	50.0	51.6	103	64 - 122	55.7	111	8	30
74-83-9	Bromomethane	<5.00	5.00	50.0	44.8	90	47 - 138	58.5	117	27	30
75-15-0	Carbon disulfide	<5.00	5.00	50.0	56.3	113	69 - 136	53.4	107	5	30
56-23-5	Carbon tetrachloride	<5.00	5.00	50.0	51.4	103	76 - 128	48.5	97	6	30
75-00-3	Chloroethane	<5.00	5.00	50.0	54.3	109	62 - 141	53.5	107	1	30
136777-61-2	m,p-Xylene	<10.0	10.0	100	109	109	74 - 126	99.9	100	9	30
67-66-3	Chloroform	<5.00	5.00	50.0	51.6	103	75 - 122	52.3	105	1	30
74-87-3	Chloromethane	<5.00	5.00	50.0	43.3	87	59 - 132	43.7	87	1	30
124-48-1	Dibromochloromethane	<5.00	5.00	50.0	48.9	98	71 - 123	52.2	104	7	30
74-95-3	Dibromomethane	<5.00	5.00	50.0	54.9	110	72 - 129	59.8	120	9	30
75-71-8	Dichlorodifluoromethane	<5.00	5.00	50.0	49.3	99	58 - 140	48.4	97	2	30
75-34-3	1,1-Dichloroethane	<5.00	5.00	50.0	51.0	102	74 - 127	51.2	102	0	30
107-06-2	1,2-Dichloroethane	<5.00	5.00	50.0	47.6	95	71 - 129	49.8	100	5	30
156-59-2	cis-1,2-Dichloroethene	<5.00	5.00	50.0	48.2	96	73 - 130	49.7	99	3	30
156-60-5	trans-1,2-Dichloroethene	<5.00	5.00	50.0	52.4	105	69 - 132	51.2	102	2	30
75-09-2	Methylene chloride	<5.00	5.00	50.0	46.7	93	68 - 132	48.6	97	4	30
78-87-5	1,2-Dichloropropane	<5.00	5.00	50.0	50.2	100	72 - 128	51.1	102	2	30
10061-01-5	cis-1,3-Dichloropropene	<5.00	5.00	50.0	46.3	93	71 - 132	49.0	98	6	30
10061-02-6	trans-1,3-Dichloropropene	<5.00	5.00	50.0	45.2	90	71 - 131	48.6	97	7	30
100-41-4	Ethylbenzene	<5.00	5.00	50.0	58.1	116	74 - 126	55.6	111	4	30
591-78-6	2-Hexanone	<5.00	5.00	50.0	39.3	79	50 - 135	46.2	92	16	30
98-82-8	Isopropylbenzene (Cumene)	<5.00	5.00	50.0	61.3	123	71 - 125	52.6	105	15	30
78-93-3	2-Butanone	<5.00	5.00	50.0	44.5	89	58 - 137	49.2	98	10	30
74-88-4	Methyl iodide	<5.00	5.00	50.0	50.9	102	57 - 141	59.3	119	15	30
108-10-1	4-Methyl-2-pentanone	<5.00	5.00	50.0	41.6	83	57 - 132	47.4	95	13	30
103-65-1	n-Propylbenzene	<5.00	5.00	50.0	50.7	101	75 - 129	45.6	91	11	30
100-42-5	Styrene	<5.00	5.00	50.0	51.5	103	71 - 127	50.2	100	3	30
127-18-4	Tetrachloroethene	<5.00	5.00	50.0	63.8	128	68 - 128	54.8	110	15	30

GC/MS Volatiles Quality Control Summary

Analytical Batch 507518	**Client ID**	MB507518			LCS507518			LCSD507518			
Prep Batch N/A	**GCAL ID**	1192728			1192729			1192730			
	Sample Type	Method Blank			LCS			LCSD			
	Analytical Date	05/18/2013 11:50			05/18/2013 10:21			05/18/2013 10:42			
	Matrix	Water			Water			Water			
SW-846 8260B		**Units** ug/L		**Spike**			**Control**				**RPD**
		Result	**RDL**	**Added**	**Result**	**% R**	**Limits % R**	**Result**	**% R**	**RPD**	**Limit**
630-20-6	1,1,1,2-Tetrachloroethane	<5.00	5.00	50.0	55.2	110	75 - 124	55.4	111	0	30
79-34-5	1,1,2,2-Tetrachloroethane	<5.00	5.00	50.0	45.8	92	70 - 122	53.2	106	15	30
120-82-1	1,2,4-Trichlorobenzene	<5.00	5.00	50.0	48.6	97	61 - 135	45.8	92	6	30
71-55-6	1,1,1-Trichloroethane	<5.00	5.00	50.0	55.8	112	76 - 126	54.1	108	3	30
79-00-5	1,1,2-Trichloroethane	<5.00	5.00	50.0	53.4	107	72 - 121	58.4	117	9	30
75-69-4	Trichlorofluoromethane	<5.00	5.00	50.0	55.4	111	72 - 136	54.8	110	1	30
96-18-4	1,2,3-Trichloropropane	<5.00	5.00	50.0	43.9	88	70 - 120	51.2	102	15	30
95-63-6	1,2,4-Trimethylbenzene	<5.00	5.00	50.0	47.5	95	74 - 125	43.6	87	9	30
108-67-8	1,3,5-Trimethylbenzene	<5.00	5.00	50.0	53.1	106	71 - 132	47.3	95	12	30
75-01-4	Vinyl chloride	<5.00	5.00	50.0	46.0	92	68 - 132	46.9	94	2	30
95-47-6	o-Xylene	<5.00	5.00	50.0	50.8	102	73 - 130	48.6	97	4	30
96-12-8	1,2-Dibromo-3-chloropropane	<5.00	5.00	50.0	55.8	112	57 - 121	62.5	**125***	11	30
106-93-4	1,2-Dibromoethane	<5.00	5.00	50.0	49.3	99	70 - 124	54.9	110	11	30
108-05-4	Vinyl acetate	<5.00	5.00	50.0	0.00	**0***	54 - 147	0.00	**0***	0	30
1634-04-4	tert-Butyl methyl ether (MTBE)	<5.00	5.00	50.0	52.6	105	71 - 125	57.2	114	8	30
540-59-0	1,2-Dichloroethene(Total)	<10.0	10.0	100	101	101	74 - 128	101	101	0	30
99-87-6	4-Isopropyltoluene	<5.00	5.00	50.0	48.2	96	71 - 129	42.2	84	13	30
1330-20-7	Xylene (total)	<15.0	15.0	150	160	107	74 - 127	148	99	8	30
110-57-6	trans-1,4-Dichloro-2-butene	<5.00	5.00	50.0	36.8	74	56 - 132	44.8	90	20	30
594-20-7	2,2-Dichloropropane	<5.00	5.00	50.0	48.7	97	77 - 124	48.8	98	0	30
76-13-1	Trichlorotrifluoroethane	<5.00	5.00	50.0	56.9	114	72 - 136	52.2	104	9	30
563-58-6	1,1-Dichloropropene	<5.00	5.00	50.0	53.7	107	72 - 131	50.9	102	5	30
110-75-8	2-Chloroethylvinyl ether	<5.00	5.00	50.0	37.4	75	56 - 124	42.2	84	12	30
142-28-9	1,3-Dichloropropane	<5.00	5.00	50.0	50.5	101	74 - 122	53.1	106	5	30
108-86-1	Bromobenzene	<5.00	5.00	50.0	43.0	86	71 - 120	44.1	88	3	30
95-49-8	2-Chlorotoluene	<5.00	5.00	50.0	46.8	94	72 - 127	44.8	90	4	30
106-43-4	4-Chlorotoluene	<5.00	5.00	50.0	47.7	95	75 - 126	46.3	93	3	30
98-06-6	tert-Butylbenzene	<5.00	5.00	50.0	49.8	100	72 - 126	44.2	88	12	30
135-98-8	sec-Butylbenzene	<5.00	5.00	50.0	54.1	108	70 - 136	46.5	93	15	30
541-73-1	1,3-Dichlorobenzene	<5.00	5.00	50.0	51.0	102	74 - 126	48.0	96	6	30
106-46-7	1,4-Dichlorobenzene	<5.00	5.00	50.0	49.0	98	72 - 122	47.4	95	3	30
104-51-8	n-Butylbenzene	<5.00	5.00	50.0	45.6	91	69 - 134	39.6	79	14	30
95-50-1	1,2-Dichlorobenzene	<5.00	5.00	50.0	51.5	103	71 - 126	50.3	101	2	30

GC/MS Volatiles Quality Control Summary

Analytical Batch 507518		**Client ID**	MB507518			LCS507518			LCSD507518		
Prep Batch N/A		**GCAL ID**	1192728			1192729			1192730		
		Sample Type	Method Blank			LCS			LCSD		
		Analytical Date	05/18/2013 11:50			05/18/2013 10:21			05/18/2013 10:42		
		Matrix	Water			Water			Water		
SW-846 8260B			**Units** ug/L **Result**	**RDL**	**Spike Added**	**Result**	**% R**	**Control Limits % R**	**Result**	**% R**	**RPD**	**RPD Limit**
87-68-3	Hexachlorobutadiene		<5.00	5.00	50.0	53.7	107	61 - 144	43.9	88	20	30
91-20-3	Naphthalene		<5.00	5.00	50.0	43.9	88	57 - 138	51.9	104	17	35
75-35-4	1,1-Dichloroethene		<5.00	5.00	50.0	59.9	120	69 - 129	58.5	117	2	20
71-43-2	Benzene		<5.00	5.00	50.0	53.6	107	70 - 129	53.7	107	0	20
79-01-6	Trichloroethene		<5.00	5.00	50.0	60.0	120	76 - 129	57.6	115	4	20
108-88-3	Toluene		<5.00	5.00	50.0	54.5	109	72 - 120	52.9	106	3	20
108-90-7	Chlorobenzene		<5.00	5.00	50.0	55.1	110	74 - 123	54.0	108	2	20
Surrogate												
460-00-4	4-Bromofluorobenzene		54.2	108	50	55.8	112	78 - 130	55.5	111		
1868-53-7	Dibromofluoromethane		53.7	107	50	51.8	104	77 - 127	53.2	106		
2037-26-5	Toluene d8		51.1	102	50	48.6	97	76 - 134	48.8	98		
17060-07-0	1,2-Dichloroethane-d4		46.5	93	50	46.1	92	71 - 127	47.5	95		

Analytical Batch 507587		**Client ID**	MB507587			LCS507587			LCSD507587			
Prep Batch N/A		**GCAL ID**	1193196			1193197			1193198			
		Sample Type	Method Blank			LCS			LCSD			
		Analytical Date	05/18/2013 22:43			05/18/2013 20:35			05/18/2013 21:39			
		Matrix	Water			Water			Water			
SW-846 8260B			**Units** ug/L **Result**	**RDL**	**Spike Added**	**Result**	**% R**	**Control Limits % R**	**Result**	**% R**	**RPD**	**RPD Limit**
67-64-1	Acetone		<5.00	5.00	50.0	38.4	77	44 - 156	40.4	81	5	30
107-02-8	Acrolein		<25.0	25.0	250	231	92	30 - 160	227	91	2	30
107-13-1	Acrylonitrile		<25.0	25.0	250	206	82	64 - 137	202	81	2	30
74-97-5	Bromochloromethane		<5.00	5.00	50.0	50.5	101	76 - 130	52.1	104	3	30
75-27-4	Bromodichloromethane		<5.00	5.00	50.0	47.9	96	74 - 125	48.1	96	0	30
75-25-2	Bromoform		<5.00	5.00	50.0	44.8	90	64 - 122	46.1	92	3	30
74-83-9	Bromomethane		<5.00	5.00	50.0	51.7	103	47 - 138	49.1	98	5	30
75-15-0	Carbon disulfide		<5.00	5.00	50.0	54.0	108	69 - 136	51.5	103	5	30
56-23-5	Carbon tetrachloride		<5.00	5.00	50.0	47.2	94	76 - 128	45.3	91	4	30
75-00-3	Chloroethane		<5.00	5.00	50.0	50.5	101	62 - 141	50.8	102	1	30
136777-61-2	m,p-Xylene		<10.0	10.0	100	101	101	74 - 126	95.3	95	6	30
67-66-3	Chloroform		<5.00	5.00	50.0	47.9	96	75 - 122	48.8	98	2	30

GC/MS Volatiles Quality Control Summary

Analytical Batch 507587	**Client ID**	MB507587			LCS507587			LCSD507587			
Prep Batch N/A	**GCAL ID**	1193196			1193197			1193198			
	Sample Type	Method Blank			LCS			LCSD			
	Analytical Date	05/18/2013 22:43			05/18/2013 20:35			05/18/2013 21:39			
	Matrix	Water			Water			Water			

SW-846 8260B		**Units** Result	ug/L **RDL**	**Spike Added**	**Result**	**% R**	**Control Limits % R**	**Result**	**% R**	**RPD**	**RPD Limit**
74-87-3	Chloromethane	<5.00	5.00	50.0	47.5	95	59 - 132	44.8	90	6	30
124-48-1	Dibromochloromethane	<5.00	5.00	50.0	44.9	90	71 - 123	45.9	92	2	30
74-95-3	Dibromomethane	<5.00	5.00	50.0	49.6	99	72 - 129	51.4	103	4	30
75-71-8	Dichlorodifluoromethane	<5.00	5.00	50.0	53.2	106	58 - 140	51.9	104	2	30
75-34-3	1,1-Dichloroethane	<5.00	5.00	50.0	46.4	93	74 - 127	46.9	94	1	30
107-06-2	1,2-Dichloroethane	<5.00	5.00	50.0	43.2	86	71 - 129	44.4	89	3	30
156-59-2	cis-1,2-Dichloroethene	<5.00	5.00	50.0	46.8	94	73 - 130	46.7	93	0	30
156-60-5	trans-1,2-Dichloroethene	<5.00	5.00	50.0	47.7	95	69 - 132	47.6	95	0	30
75-09-2	Methylene chloride	<5.00	5.00	50.0	41.8	84	68 - 132	42.1	84	1	30
78-87-5	1,2-Dichloropropane	<5.00	5.00	50.0	47.2	94	72 - 128	47.6	95	1	30
10061-01-5	cis-1,3-Dichloropropene	<5.00	5.00	50.0	43.2	86	71 - 132	43.5	87	1	30
10061-02-6	trans-1,3-Dichloropropene	<5.00	5.00	50.0	41.7	83	71 - 131	42.4	85	2	30
100-41-4	Ethylbenzene	<5.00	5.00	50.0	54.9	110	74 - 126	51.4	103	7	30
591-78-6	2-Hexanone	<5.00	5.00	50.0	35.6	71	50 - 135	37.3	75	5	30
98-82-8	Isopropylbenzene (Cumene)	<5.00	5.00	50.0	57.5	115	71 - 125	52.3	105	9	30
78-93-3	2-Butanone	<5.00	5.00	50.0	38.9	78	58 - 137	39.8	80	2	30
74-88-4	Methyl iodide	<5.00	5.00	50.0	51.0	102	57 - 141	49.4	99	3	30
108-10-1	4-Methyl-2-pentanone	<5.00	5.00	50.0	36.4	73	57 - 132	38.1	76	5	30
103-65-1	n-Propylbenzene	<5.00	5.00	50.0	51.0	102	75 - 129	45.7	91	11	30
100-42-5	Styrene	<5.00	5.00	50.0	48.1	96	71 - 127	45.8	92	5	30
127-18-4	Tetrachloroethene	<5.00	5.00	50.0	58.0	116	68 - 128	52.9	106	9	30
630-20-6	1,1,1,2-Tetrachloroethane	<5.00	5.00	50.0	51.5	103	75 - 124	50.2	100	3	30
79-34-5	1,1,2,2-Tetrachloroethane	<5.00	5.00	50.0	42.7	85	70 - 122	45.0	90	5	30
120-82-1	1,2,4-Trichlorobenzene	<5.00	5.00	50.0	53.5	107	61 - 135	40.8	82	27	30
71-55-6	1,1,1-Trichloroethane	<5.00	5.00	50.0	51.9	104	76 - 126	51.8	104	0	30
79-00-5	1,1,2-Trichloroethane	<5.00	5.00	50.0	48.6	97	72 - 121	51.4	103	6	30
75-69-4	Trichlorofluoromethane	<5.00	5.00	50.0	53.1	106	72 - 136	51.6	103	3	30
96-18-4	1,2,3-Trichloropropane	<5.00	5.00	50.0	40.9	82	70 - 120	43.3	87	6	30
95-63-6	1,2,4-Trimethylbenzene	<5.00	5.00	50.0	48.8	98	74 - 125	42.6	85	14	30
108-67-8	1,3,5-Trimethylbenzene	<5.00	5.00	50.0	52.9	106	71 - 132	47.6	95	11	30
75-01-4	Vinyl chloride	<5.00	5.00	50.0	46.7	93	68 - 132	45.2	90	3	30
95-47-6	o-Xylene	<5.00	5.00	50.0	49.0	98	73 - 130	46.8	94	5	30
96-12-8	1,2-Dibromo-3-chloropropane	<5.00	5.00	50.0	45.8	92	57 - 121	48.8	98	6	30

GC/MS Volatiles Quality Control Summary

Analytical Batch	507587	**Client ID**	MB507587	LCS507587	LCSD507587
Prep Batch	N/A	**GCAL ID**	1193196	1193197	1193198
		Sample Type	Method Blank	LCS	LCSD
		Analytical Date	05/18/2013 22:43	05/18/2013 20:35	05/18/2013 21:39
		Matrix	Water	Water	Water

SW-846 8260B		**Units** Result	ug/L RDL	**Spike Added**	**Result**	**% R**	**Control Limits % R**	**Result**	**% R**	**RPD**	**RPD Limit**
106-93-4	1,2-Dibromoethane	<5.00	5.00	50.0	46.0	92	70 - 124	47.3	95	3	30
108-05-4	Vinyl acetate	<5.00	5.00	50.0	0.00	0*	54 - 147	0.00	0*	0	30
1634-04-4	tert-Butyl methyl ether (MTBE)	<5.00	5.00	50.0	47.9	96	71 - 125	48.0	96	0	30
540-59-0	1,2-Dichloroethene(Total)	<10.0	10.0	100	94.5	95	74 - 128	94.3	94	0	30
99-87-6	4-Isopropyltoluene	<5.00	5.00	50.0	50.7	101	71 - 129	42.6	85	17	30
1330-20-7	Xylene (total)	<15.0	15.0	150	150	100	74 - 127	142	95	5	30
110-57-6	trans-1,4-Dichloro-2-butene	<5.00	5.00	50.0	33.4	67	56 - 132	35.4	71	6	30
594-20-7	2,2-Dichloropropane	<5.00	5.00	50.0	44.8	90	77 - 124	45.6	91	2	30
76-13-1	Trichlorotrifluoroethane	<5.00	5.00	50.0	53.4	107	72 - 136	49.9	100	7	30
563-58-6	1,1-Dichloropropene	<5.00	5.00	50.0	52.0	104	72 - 131	50.6	101	3	30
110-75-8	2-Chloroethylvinyl ether	<5.00	5.00	50.0	36.8	74	56 - 124	37.6	75	2	30
142-28-9	1,3-Dichloropropane	<5.00	5.00	50.0	46.4	93	74 - 122	47.1	94	1	30
108-86-1	Bromobenzene	<5.00	5.00	50.0	38.3	77	71 - 120	37.8	76	1	30
95-49-8	2-Chlorotoluene	<5.00	5.00	50.0	46.8	94	72 - 127	43.0	86	8	30
106-43-4	4-Chlorotoluene	<5.00	5.00	50.0	47.9	96	75 - 126	44.3	89	8	30
98-06-6	tert-Butylbenzene	<5.00	5.00	50.0	50.6	101	72 - 126	44.3	89	13	30
135-98-8	sec-Butylbenzene	<5.00	5.00	50.0	55.6	111	70 - 136	47.2	94	16	30
541-73-1	1,3-Dichlorobenzene	<5.00	5.00	50.0	49.5	99	74 - 126	45.3	91	9	30
106-46-7	1,4-Dichlorobenzene	<5.00	5.00	50.0	47.7	95	72 - 122	45.2	90	5	30
104-51-8	n-Butylbenzene	<5.00	5.00	50.0	48.7	97	69 - 134	39.7	79	20	30
95-50-1	1,2-Dichlorobenzene	<5.00	5.00	50.0	50.3	101	71 - 126	46.7	93	7	30
87-68-3	Hexachlorobutadiene	<5.00	5.00	50.0	53.9	108	61 - 144	44.9	90	18	30
91-20-3	Naphthalene	<5.00	5.00	50.0	45.8	92	57 - 138	38.7	77	17	35
75-35-4	1,1-Dichloroethene	<5.00	5.00	50.0	56.7	113	69 - 129	56.8	114	0	20
71-43-2	Benzene	<5.00	5.00	50.0	50.4	101	70 - 129	50.9	102	1	20
79-01-6	Trichloroethene	<5.00	5.00	50.0	54.4	109	76 - 129	54.3	109	0	20
108-88-3	Toluene	<5.00	5.00	50.0	49.9	100	72 - 120	49.7	99	0	20
108-90-7	Chlorobenzene	<5.00	5.00	50.0	50.7	101	74 - 123	50.2	100	1	20
Surrogate											
460-00-4	4-Bromofluorobenzene	52.8	106	50	56.6	113	78 - 130	55.6	111		
1868-53-7	Dibromofluoromethane	51.3	103	50	51.6	103	77 - 127	52.6	105		
2037-26-5	Toluene d8	50.8	102	50	48.7	97	76 - 134	49.4	99		
17060-07-0	1,2-Dichloroethane-d4	43.2	86	50	44.9	90	71 - 127	45.5	91		

GCAL ANALYTICAL LABORATORIES, LLC

CHAIN OF CUSTODY RECORD

GCAL USE ONLY

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Phone: 225.769.4900 • Fax: 225.767.5717 • www.gcal.com

PROPERTY SOLUTIONS | 4848 | 213051809 | 05/20/13

Report to:
Client: Property Solutions
Address: 1270 Windesler Parkway Suite 202
Contact: Brant Teets
Phone: 770 434-1997
E-mail: bteets@propertysolutionsinc.com

Bill to:
Client:
Address:
Contact:
Phone:
E-mail:

Analytical Requests & Method

GCAL use only:
Custody Seal
used ☐ yes ☐ no
intact ☐ yes ☐ no
Temperature °C 3.8 E20

P.O. Number:
Project Name/Number: Fountain Oaks

Sampled By: Mam Lawrance / Brant Teets

☐ Dissolved Analysis Requested
☐ Field filtered
☐ Lab filtered

Matrix[1]	Date	Time (2400)	Comp	Grab	Sample Description	No Containers	VOCs HCl	Preservative
GW	5-12	856		X	MW33	3	X	1
GW		931			MW16			2
GW		1008			MW19			3
GW		1042			MW22			4
		1120			MW20			5
		1131			MW5			6
		1217			MW29			7
		1305			MW30			8
		1410			MW13D			9
		1445			MW13S			10
		1547			MW ~~X~~ 17 SMG 5/23/13			11
		1610			MW2			12
								13 BK

Air Bill No:

Turn Around Time (Business Days): ☒ 24h* ☐ 48h* ☐ 3 days* ☐ 1 week* ☐ Standard (Per Contract/Quote)

Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time
[signature]	5-17	1830	[signature]	5/17/13	1830
FEDEX	5.18.13	10:20	[signature]	5.18.13	10:20

Note: 7997 9427 3270 pg 1 of 2

By submitting these samples, you agree to GCAL's terms and conditions contained in our most recent schedule of services.

Matrix[1]: W = water, S = solid, L = liquid, T = tissue

*Requires prior approval, rush charges may apply.

We cannot accept verbal changes. Please email written changes to your PM.

GCAL

7979 GSRI Avenue, Baton Rouge, Louisiana 70820-7402
Phone 225.769.4900 • Fax 225.767.5717

Chain of Custody Record

Lab use only

Client Name	Client #	Workorder #	Due Date
PROPERTY SOLUTIONS	4848	21305 1809	05/20/13

Report to:
Client: Property Solutions
Address:
Contact:
Phone:
Fax:

Bill to:
Client:
Address:
Contact:
Phone:
Fax:

P.O. Number

Project Name/Number

Sampled By:

Analytical Requests & Method

Lab use only:
Custody Seal
used ☐ yes ☐ no
intact ☐ yes ☐ no
Temperature °C 3.8 E20

Matrix[1]	Date	Time (2400)	Comp	Grab	Sample Description	Preservatives	No Containers	VOC										Remarks:	Lab ID 05/18
GW	5-17	1640		X	MW27	HCl	3	X											13
GW	5-17	1710		X	MW18	HCl	3	X											14
	5-17				Trip Blank	HCL	3	X			Smco 5/20/13								

Turn Around Time: ~~☐ 24/48 hrs.~~ ☐ 3 days ☐ 1 week ☐ Standard ☐ Other

Relinquished by: (Signature)	Received by: (Signature)	Date:	Time:
[signature]	[signature]	5-17	1830
FEDEX	[signature]	5.18.13	10:20

Note: 7997 9427 3270
pg 2 of 2

By submitting these samples, you agree to the terms and conditions contained in our most recent schedule of services.

Matrix[1]: W = water, S = soil, SD = solid, L = liquid, SL = sludge, o = oil, CT = charcoal tube, A = air bag

We cannot accept verbal changes. Please fax written changes to (225) 767-5717

GCAL-06 11/98

WHITE: CLIENT FINAL REPORT — CANARY: LABORATORY — PINK: CLIENT

GCAL ANALYTICAL LABORATORIES, LLC

SAMPLE RECEIVING CHECKLIST

213051809

SAMPLE DELIVERY GROUP 213051809

Client 4848 - Property Solutions	**Transport Method** FEDEX
Profile Number 243146	**Received By** Law, Brittany P.
Line Item(s) 1 - RUSH VOC	**Receive Date(s)** 05/18/13

CHECKLIST

	Yes	No	NA
Were all samples received using proper thermal preservation?	☑	☐	☐
When used, were all custody seals intact?	☑	☐	☐
Were all samples received in proper containers?	☑	☐	☐
Were all samples received using proper chemical preservation?	☑	☐	☐
Was preservative added to any container at the lab?	☐	☑	☐
Were all containers received in good condition?	☑	☐	☐
Were all VOA vials received with no head space?	☑	☐	☐
Do all sample labels match the Chain of Custody?	☑	☐	☐
Did the Chain of Custody list the sampling technician?	☑	☐	☐
Was the COC maintained i.e. all signatures, dates and time of receipt included?	☐	☑	☐

COOLERS

Airbill	Temp(oC)
7997 9427 3270	3.8 (E20)

DISCREPANCIES

None

LABORATORY PRESERVATIONS

None

NOTES

Mobile
Geochemistry
Inc.

21 May 2013

Mr. Jim Fineis
Atlas Geo-Sampling Company
120 Nottaway Lane
Alpharetta, GA 30009

H&P Project: AG051713-10
Client Project: PS Roswell Rd.

Dear Mr. Jim Fineis:

Enclosed is the analytical report for the above referenced project. The data herein applies to samples as received by H&P Mobile Geochemistry, Inc. on 17-May-13 which were analyzed in accordance with the attached Chain of Custody record(s).

The results for all sample analyses and required QA/QC analyses are presented in the following sections and summarized in the documents:

- Sample Summary
- Case Narrative (if applicable)
- Sample Results
- Quality Control Summary
- Notes and Definitions / Appendix
- Chain of Custody

Unless otherwise noted, all analyses were performed and reviewed in compliance with our Quality Systems Manual and Standard Operating Procedures. This report shall not be reproduced, except in full, without the written approval of H&P Mobile Geochemistry, Inc.

We at H&P Mobile Geochemistry, Inc. sincerely appreciate the opportunity to provide analytical services to you on this project. If you have any questions or concerns regarding this analytical report, please contact me at your convenience at 760-804-9678.

Sincerely,

for

Janis Villarreal
Laboratory Director

H&P Mobile Geochemistry, Inc. operates under CA Environmental Lab Accreditation Program Numbers 2579, 2740, 2741, 2742, 2743, 2745 and 2754. National Environmental Laboratory Accreditation Conference (NELAC) Standards Lab #11845

H&P Mobile
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Atlas Geo-Sampling Company 120 Nottaway Lane Alpharetta, GA 30009	Project: AG051713-10 Project Number: PS Roswell Rd. Project Manager: Mr. Jim Fineis	Reported: 21-May-13 10:32

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
SV-1	E305067-01	Vapor	16-May-13	17-May-13
SV-2	E305067-02	Vapor	16-May-13	17-May-13
SV-3	E305067-03	Vapor	16-May-13	17-May-13
SV-4	E305067-04	Vapor	16-May-13	17-May-13
SV-5	E305067-05	Vapor	16-May-13	17-May-13
SV-6	E305067-06	Vapor	16-May-13	17-May-13

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Volatile Organic Compounds by EPA TO-15

H&P Mobile Geochemistry, Inc.

Analyte	Result	Reporting Limit	Units	Dilution Factor	Batch	Prepared	Analyzed	Method	Notes
SV-1 (E305067-01) Vapor Sampled: 16-May-13 Received: 17-May-13									
Dichlorodifluoromethane (F12)	**11**	5.0	ug/m3	1	EE32008	20-May-13	20-May-13	EPA TO-15	
Chloromethane	ND	2.1	"	"	"	"	"	"	
Dichlorotetrafluoroethane (F114)	ND	7.1	"	"	"	"	"	"	
Vinyl chloride	ND	2.6	"	"	"	"	"	"	
Bromomethane	ND	16	"	"	"	"	"	"	
Chloroethane	ND	8.0	"	"	"	"	"	"	
Trichlorofluoromethane (F11)	ND	5.6	"	"	"	"	"	"	
Acetone	**39**	24	"	"	"	"	"	"	
1,1-Dichloroethene	ND	4.0	"	"	"	"	"	"	
1,1,2-Trichlorotrifluoroethane (F113)	ND	7.7	"	"	"	"	"	"	
Methylene chloride (Dichloromethane)	ND	3.5	"	"	"	"	"	"	
Carbon disulfide	ND	6.3	"	"	"	"	"	"	
trans-1,2-Dichloroethene	ND	8.0	"	"	"	"	"	"	
1,1-Dichloroethane	ND	4.1	"	"	"	"	"	"	
2-Butanone (MEK)	ND	30	"	"	"	"	"	"	
cis-1,2-Dichloroethene	ND	4.0	"	"	"	"	"	"	
Chloroform	ND	4.9	"	"	"	"	"	"	
1,1,1-Trichloroethane	ND	5.5	"	"	"	"	"	"	
1,2-Dichloroethane (EDC)	ND	4.1	"	"	"	"	"	"	
Benzene	**8.4**	3.2	"	"	"	"	"	"	
Carbon tetrachloride	ND	6.4	"	"	"	"	"	"	
Trichloroethene	ND	5.5	"	"	"	"	"	"	
1,2-Dichloropropane	ND	9.4	"	"	"	"	"	"	
Bromodichloromethane	ND	6.8	"	"	"	"	"	"	
cis-1,3-Dichloropropene	ND	4.6	"	"	"	"	"	"	
4-Methyl-2-pentanone (MIBK)	ND	8.3	"	"	"	"	"	"	
trans-1,3-Dichloropropene	ND	4.6	"	"	"	"	"	"	
Toluene	**48**	3.8	"	"	"	"	"	"	
1,1,2-Trichloroethane	ND	5.5	"	"	"	"	"	"	
2-Hexanone (MBK)	ND	8.3	"	"	"	"	"	"	
Dibromochloromethane	ND	8.6	"	"	"	"	"	"	
Tetrachloroethene	**1200**	6.9	"	"	"	"	"	"	
1,2-Dibromoethane (EDB)	ND	7.8	"	"	"	"	"	"	
1,1,1,2-Tetrachloroethane	ND	7.0	"	"	"	"	"	"	
Chlorobenzene	ND	4.7	"	"	"	"	"	"	
Ethylbenzene	**12**	4.4	"	"	"	"	"	"	
m,p-Xylene	**40**	8.8	"	"	"	"	"	"	
Styrene	ND	4.3	"	"	"	"	"	"	

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Atlas Geo-Sampling Company 120 Nottaway Lane Alpharetta, GA 30009	Project: AG051713-10 Project Number: PS Roswell Rd. Project Manager: Mr. Jim Fineis	Reported: 21-May-13 10:32

Volatile Organic Compounds by EPA TO-15

H&P Mobile Geochemistry, Inc.

Analyte	Result	Reporting Limit	Units	Dilution Factor	Batch	Prepared	Analyzed	Method	Notes
SV-1 (E305067-01) Vapor Sampled: 16-May-13 Received: 17-May-13									
o-Xylene	**13**	4.4	ug/m3	1	EE32008	20-May-13	20-May-13	EPA TO-15	
Bromoform	ND	10	"	"	"	"	"	"	
1,1,2,2-Tetrachloroethane	ND	7.0	"	"	"	"	"	"	
4-Ethyltoluene	ND	5.0	"	"	"	"	"	"	
1,3,5-Trimethylbenzene	ND	5.0	"	"	"	"	"	"	
1,2,4-Trimethylbenzene	**14**	5.0	"	"	"	"	"	"	
1,3-Dichlorobenzene	ND	12	"	"	"	"	"	"	
1,4-Dichlorobenzene	ND	12	"	"	"	"	"	"	
1,2-Dichlorobenzene	ND	12	"	"	"	"	"	"	
1,2,4-Trichlorobenzene	ND	7.5	"	"	"	"	"	"	
Hexachlorobutadiene	ND	11	"	"	"	"	"	"	
Surrogate: 1,2-Dichloroethane-d4		*98.2 %*	*76-134*		"	"	"	"	
Surrogate: Toluene-d8		*100 %*	*78-125*		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		*101 %*	*77-127*		"	"	"	"	
SV-2 (E305067-02) Vapor Sampled: 16-May-13 Received: 17-May-13									
Dichlorodifluoromethane (F12)	**31**	5.0	ug/m3	1	EE32008	20-May-13	20-May-13	EPA TO-15	
Chloromethane	ND	2.1	"	"	"	"	"	"	
Dichlorotetrafluoroethane (F114)	ND	7.1	"	"	"	"	"	"	
Vinyl chloride	ND	2.6	"	"	"	"	"	"	
Bromomethane	ND	16	"	"	"	"	"	"	
Chloroethane	ND	8.0	"	"	"	"	"	"	
Trichlorofluoromethane (F11)	**58**	5.6	"	"	"	"	"	"	
Acetone	**61**	24	"	"	"	"	"	"	
1,1-Dichloroethene	ND	4.0	"	"	"	"	"	"	
1,1,2-Trichlorotrifluoroethane (F113)	ND	7.7	"	"	"	"	"	"	
Methylene chloride (Dichloromethane)	ND	3.5	"	"	"	"	"	"	
Carbon disulfide	**7.0**	6.3	"	"	"	"	"	"	
trans-1,2-Dichloroethene	ND	8.0	"	"	"	"	"	"	
1,1-Dichloroethane	ND	4.1	"	"	"	"	"	"	
2-Butanone (MEK)	ND	30	"	"	"	"	"	"	
cis-1,2-Dichloroethene	ND	4.0	"	"	"	"	"	"	
Chloroform	ND	4.9	"	"	"	"	"	"	
1,1,1-Trichloroethane	ND	5.5	"	"	"	"	"	"	
1,2-Dichloroethane (EDC)	ND	4.1	"	"	"	"	"	"	
Benzene	**37**	3.2	"	"	"	"	"	"	
Carbon tetrachloride	ND	6.4	"	"	"	"	"	"	

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Volatile Organic Compounds by EPA TO-15

H&P Mobile Geochemistry, Inc.

Analyte	Result	Reporting Limit	Units	Dilution Factor	Batch	Prepared	Analyzed	Method	Notes
SV-2 (E305067-02) Vapor Sampled: 16-May-13 Received: 17-May-13									
Trichloroethene	**7.2**	5.5	ug/m3	1	EE32008	20-May-13	20-May-13	EPA TO-15	
1,2-Dichloropropane	ND	9.4	"	"	"	"	"	"	
Bromodichloromethane	ND	6.8	"	"	"	"	"	"	
cis-1,3-Dichloropropene	ND	4.6	"	"	"	"	"	"	
4-Methyl-2-pentanone (MIBK)	**14**	8.3	"	"	"	"	"	"	
trans-1,3-Dichloropropene	ND	4.6	"	"	"	"	"	"	
Toluene	**110**	3.8	"	"	"	"	"	"	
1,1,2-Trichloroethane	ND	5.5	"	"	"	"	"	"	
2-Hexanone (MBK)	ND	8.3	"	"	"	"	"	"	
Dibromochloromethane	ND	8.6	"	"	"	"	"	"	
Tetrachloroethene	**780**	6.9	"	"	"	"	"	"	
1,2-Dibromoethane (EDB)	ND	7.8	"	"	"	"	"	"	
1,1,1,2-Tetrachloroethane	ND	7.0	"	"	"	"	"	"	
Chlorobenzene	**8.5**	4.7	"	"	"	"	"	"	
Ethylbenzene	**30**	4.4	"	"	"	"	"	"	
m,p-Xylene	**90**	8.8	"	"	"	"	"	"	
Styrene	ND	4.3	"	"	"	"	"	"	
o-Xylene	**27**	4.4	"	"	"	"	"	"	
Bromoform	ND	10	"	"	"	"	"	"	
1,1,2,2-Tetrachloroethane	ND	7.0	"	"	"	"	"	"	
4-Ethyltoluene	**10**	5.0	"	"	"	"	"	"	
1,3,5-Trimethylbenzene	**11**	5.0	"	"	"	"	"	"	
1,2,4-Trimethylbenzene	**34**	5.0	"	"	"	"	"	"	
1,3-Dichlorobenzene	ND	12	"	"	"	"	"	"	
1,4-Dichlorobenzene	ND	12	"	"	"	"	"	"	
1,2-Dichlorobenzene	ND	12	"	"	"	"	"	"	
1,2,4-Trichlorobenzene	ND	7.5	"	"	"	"	"	"	
Hexachlorobutadiene	ND	11	"	"	"	"	"	"	
Surrogate: 1,2-Dichloroethane-d4		*107 %*	*76-134*		*"*	*"*	*"*	*"*	
Surrogate: Toluene-d8		*102 %*	*78-125*		*"*	*"*	*"*	*"*	
Surrogate: 4-Bromofluorobenzene		*101 %*	*77-127*		*"*	*"*	*"*	*"*	

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Volatile Organic Compounds by EPA TO-15

H&P Mobile Geochemistry, Inc.

Analyte	Result	Reporting Limit	Units	Dilution Factor	Batch	Prepared	Analyzed	Method	Notes
SV-3 (E305067-03) Vapor Sampled: 16-May-13 Received: 17-May-13									
Dichlorodifluoromethane (F12)	ND	5.0	ug/m3	1	EE32008	20-May-13	20-May-13	EPA TO-15	
Chloromethane	ND	2.1	"	"	"	"	"	"	
Dichlorotetrafluoroethane (F114)	ND	7.1	"	"	"	"	"	"	
Vinyl chloride	ND	2.6	"	"	"	"	"	"	
Bromomethane	ND	16	"	"	"	"	"	"	
Chloroethane	ND	8.0	"	"	"	"	"	"	
Trichlorofluoromethane (F11)	ND	5.6	"	"	"	"	"	"	
Acetone	**32**	24	"	"	"	"	"	"	
1,1-Dichloroethene	ND	4.0	"	"	"	"	"	"	
1,1,2-Trichlorotrifluoroethane (F113)	ND	7.7	"	"	"	"	"	"	
Methylene chloride (Dichloromethane)	ND	3.5	"	"	"	"	"	"	
Carbon disulfide	ND	6.3	"	"	"	"	"	"	
trans-1,2-Dichloroethene	ND	8.0	"	"	"	"	"	"	
1,1-Dichloroethane	ND	4.1	"	"	"	"	"	"	
2-Butanone (MEK)	ND	30	"	"	"	"	"	"	
cis-1,2-Dichloroethene	ND	4.0	"	"	"	"	"	"	
Chloroform	ND	4.9	"	"	"	"	"	"	
1,1,1-Trichloroethane	ND	5.5	"	"	"	"	"	"	
1,2-Dichloroethane (EDC)	ND	4.1	"	"	"	"	"	"	
Benzene	**13**	3.2	"	"	"	"	"	"	
Carbon tetrachloride	ND	6.4	"	"	"	"	"	"	
Trichloroethene	ND	5.5	"	"	"	"	"	"	
1,2-Dichloropropane	ND	9.4	"	"	"	"	"	"	
Bromodichloromethane	ND	6.8	"	"	"	"	"	"	
cis-1,3-Dichloropropene	ND	4.6	"	"	"	"	"	"	
4-Methyl-2-pentanone (MIBK)	ND	8.3	"	"	"	"	"	"	
trans-1,3-Dichloropropene	ND	4.6	"	"	"	"	"	"	
Toluene	**27**	3.8	"	"	"	"	"	"	
1,1,2-Trichloroethane	ND	5.5	"	"	"	"	"	"	
2-Hexanone (MBK)	ND	8.3	"	"	"	"	"	"	
Dibromochloromethane	ND	8.6	"	"	"	"	"	"	
Tetrachloroethene	**87**	6.9	"	"	"	"	"	"	
1,2-Dibromoethane (EDB)	ND	7.8	"	"	"	"	"	"	
1,1,1,2-Tetrachloroethane	ND	7.0	"	"	"	"	"	"	
Chlorobenzene	ND	4.7	"	"	"	"	"	"	
Ethylbenzene	**6.9**	4.4	"	"	"	"	"	"	
m,p-Xylene	**25**	8.8	"	"	"	"	"	"	
Styrene	ND	4.3	"	"	"	"	"	"	

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Volatile Organic Compounds by EPA TO-15

H&P Mobile Geochemistry, Inc.

Analyte	Result	Reporting Limit	Units	Dilution Factor	Batch	Prepared	Analyzed	Method	Notes
SV-3 (E305067-03) Vapor Sampled: 16-May-13 Received: 17-May-13									
o-Xylene	**9.1**	4.4	ug/m3	1	EE32008	20-May-13	20-May-13	EPA TO-15	
Bromoform	ND	10	"	"	"	"	"	"	
1,1,2,2-Tetrachloroethane	ND	7.0	"	"	"	"	"	"	
4-Ethyltoluene	ND	5.0	"	"	"	"	"	"	
1,3,5-Trimethylbenzene	ND	5.0	"	"	"	"	"	"	
1,2,4-Trimethylbenzene	**12**	5.0	"	"	"	"	"	"	
1,3-Dichlorobenzene	ND	12	"	"	"	"	"	"	
1,4-Dichlorobenzene	ND	12	"	"	"	"	"	"	
1,2-Dichlorobenzene	ND	12	"	"	"	"	"	"	
1,2,4-Trichlorobenzene	ND	7.5	"	"	"	"	"	"	
Hexachlorobutadiene	ND	11	"	"	"	"	"	"	
Surrogate: 1,2-Dichloroethane-d4		*108 %*	*76-134*		"	"	"	"	
Surrogate: Toluene-d8		*101 %*	*78-125*		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		*98.2 %*	*77-127*		"	"	"	"	
SV-4 (E305067-04) Vapor Sampled: 16-May-13 Received: 17-May-13									
Dichlorodifluoromethane (F12)	ND	5.0	ug/m3	1	EE32008	20-May-13	20-May-13	EPA TO-15	
Chloromethane	ND	2.1	"	"	"	"	"	"	
Dichlorotetrafluoroethane (F114)	ND	7.1	"	"	"	"	"	"	
Vinyl chloride	ND	2.6	"	"	"	"	"	"	
Bromomethane	ND	16	"	"	"	"	"	"	
Chloroethane	ND	8.0	"	"	"	"	"	"	
Trichlorofluoromethane (F11)	ND	5.6	"	"	"	"	"	"	
Acetone	**92**	24	"	"	"	"	"	"	
1,1-Dichloroethene	ND	4.0	"	"	"	"	"	"	
1,1,2-Trichlorotrifluoroethane (F113)	ND	7.7	"	"	"	"	"	"	
Methylene chloride (Dichloromethane)	ND	3.5	"	"	"	"	"	"	
Carbon disulfide	**7.9**	6.3	"	"	"	"	"	"	
trans-1,2-Dichloroethene	ND	8.0	"	"	"	"	"	"	
1,1-Dichloroethane	ND	4.1	"	"	"	"	"	"	
2-Butanone (MEK)	ND	30	"	"	"	"	"	"	
cis-1,2-Dichloroethene	ND	4.0	"	"	"	"	"	"	
Chloroform	**8.6**	4.9	"	"	"	"	"	"	
1,1,1-Trichloroethane	ND	5.5	"	"	"	"	"	"	
1,2-Dichloroethane (EDC)	ND	4.1	"	"	"	"	"	"	
Benzene	**140**	3.2	"	"	"	"	"	"	
Carbon tetrachloride	ND	6.4	"	"	"	"	"	"	

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Atlas Geo-Sampling Company 120 Nottaway Lane Alpharetta, GA 30009	Project: AG051713-10 Project Number: PS Roswell Rd. Project Manager: Mr. Jim Fineis	Reported: 21-May-13 10:32

Volatile Organic Compounds by EPA TO-15

H&P Mobile Geochemistry, Inc.

Analyte	Result	Reporting Limit	Units	Dilution Factor	Batch	Prepared	Analyzed	Method	Notes
SV-4 (E305067-04) Vapor Sampled: 16-May-13 Received: 17-May-13									
Trichloroethene	ND	5.5	ug/m3	1	EE32008	20-May-13	20-May-13	EPA TO-15	
1,2-Dichloropropane	ND	9.4	"	"	"	"	"	"	
Bromodichloromethane	ND	6.8	"	"	"	"	"	"	
cis-1,3-Dichloropropene	ND	4.6	"	"	"	"	"	"	
4-Methyl-2-pentanone (MIBK)	**21**	8.3	"	"	"	"	"	"	
trans-1,3-Dichloropropene	ND	4.6	"	"	"	"	"	"	
Toluene	**170**	3.8	"	"	"	"	"	"	
1,1,2-Trichloroethane	ND	5.5	"	"	"	"	"	"	
2-Hexanone (MBK)	ND	8.3	"	"	"	"	"	"	
Dibromochloromethane	ND	8.6	"	"	"	"	"	"	
Tetrachloroethene	**180**	6.9	"	"	"	"	"	"	
1,2-Dibromoethane (EDB)	ND	7.8	"	"	"	"	"	"	
1,1,1,2-Tetrachloroethane	ND	7.0	"	"	"	"	"	"	
Chlorobenzene	**20**	4.7	"	"	"	"	"	"	
Ethylbenzene	**32**	4.4	"	"	"	"	"	"	
m,p-Xylene	**91**	8.8	"	"	"	"	"	"	
Styrene	ND	4.3	"	"	"	"	"	"	
o-Xylene	**27**	4.4	"	"	"	"	"	"	
Bromoform	ND	10	"	"	"	"	"	"	
1,1,2,2-Tetrachloroethane	ND	7.0	"	"	"	"	"	"	
4-Ethyltoluene	**5.5**	5.0	"	"	"	"	"	"	
1,3,5-Trimethylbenzene	**6.7**	5.0	"	"	"	"	"	"	
1,2,4-Trimethylbenzene	**23**	5.0	"	"	"	"	"	"	
1,3-Dichlorobenzene	ND	12	"	"	"	"	"	"	
1,4-Dichlorobenzene	ND	12	"	"	"	"	"	"	
1,2-Dichlorobenzene	ND	12	"	"	"	"	"	"	
1,2,4-Trichlorobenzene	ND	7.5	"	"	"	"	"	"	
Hexachlorobutadiene	ND	11	"	"	"	"	"	"	
Surrogate: 1,2-Dichloroethane-d4		*114 %*	*76-134*		*"*	*"*	*"*	*"*	
Surrogate: Toluene-d8		*101 %*	*78-125*		*"*	*"*	*"*	*"*	
Surrogate: 4-Bromofluorobenzene		*97.5 %*	*77-127*		*"*	*"*	*"*	*"*	

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Atlas Geo-Sampling Company 120 Nottaway Lane Alpharetta, GA 30009	Project: AG051713-10 Project Number: PS Roswell Rd. Project Manager: Mr. Jim Fineis	Reported: 21-May-13 10:32

Volatile Organic Compounds by EPA TO-15

H&P Mobile Geochemistry, Inc.

Analyte	Result	Reporting Limit	Units	Dilution Factor	Batch	Prepared	Analyzed	Method	Notes
SV-5 (E305067-05) Vapor Sampled: 16-May-13 Received: 17-May-13									
Dichlorodifluoromethane (F12)	ND	5.0	ug/m3	1	EE31706	17-May-13	17-May-13	EPA TO-15	
Chloromethane	ND	2.1	"	"	"	"	"	"	
Dichlorotetrafluoroethane (F114)	ND	7.1	"	"	"	"	"	"	
Vinyl chloride	ND	2.6	"	"	"	"	"	"	
Bromomethane	ND	16	"	"	"	"	"	"	
Chloroethane	ND	8.0	"	"	"	"	"	"	
Trichlorofluoromethane (F11)	ND	5.6	"	"	"	"	"	"	
Acetone	**100**	24	"	"	"	"	"	"	
1,1-Dichloroethene	ND	4.0	"	"	"	"	"	"	
1,1,2-Trichlorotrifluoroethane (F113)	ND	7.7	"	"	"	"	"	"	
Methylene chloride (Dichloromethane)	ND	3.5	"	"	"	"	"	"	
Carbon disulfide	**7.7**	6.3	"	"	"	"	"	"	
trans-1,2-Dichloroethene	ND	8.0	"	"	"	"	"	"	
1,1-Dichloroethane	ND	4.1	"	"	"	"	"	"	
2-Butanone (MEK)	ND	30	"	"	"	"	"	"	
cis-1,2-Dichloroethene	ND	4.0	"	"	"	"	"	"	
Chloroform	ND	4.9	"	"	"	"	"	"	
1,1,1-Trichloroethane	ND	5.5	"	"	"	"	"	"	
1,2-Dichloroethane (EDC)	ND	4.1	"	"	"	"	"	"	
Benzene	**17**	3.2	"	"	"	"	"	"	
Carbon tetrachloride	ND	6.4	"	"	"	"	"	"	
Trichloroethene	ND	5.5	"	"	"	"	"	"	
1,2-Dichloropropane	ND	9.4	"	"	"	"	"	"	
Bromodichloromethane	ND	6.8	"	"	"	"	"	"	
cis-1,3-Dichloropropene	ND	4.6	"	"	"	"	"	"	
4-Methyl-2-pentanone (MIBK)	**15**	8.3	"	"	"	"	"	"	
trans-1,3-Dichloropropene	ND	4.6	"	"	"	"	"	"	
Toluene	**65**	3.8	"	"	"	"	"	"	
1,1,2-Trichloroethane	ND	5.5	"	"	"	"	"	"	
2-Hexanone (MBK)	ND	8.3	"	"	"	"	"	"	
Dibromochloromethane	ND	8.6	"	"	"	"	"	"	
Tetrachloroethene	ND	6.9	"	"	"	"	"	"	
1,2-Dibromoethane (EDB)	ND	7.8	"	"	"	"	"	"	
1,1,1,2-Tetrachloroethane	ND	7.0	"	"	"	"	"	"	
Chlorobenzene	**8.3**	4.7	"	"	"	"	"	"	
Ethylbenzene	**21**	4.4	"	"	"	"	"	"	
m,p-Xylene	**64**	8.8	"	"	"	"	"	"	
Styrene	ND	4.3	"	"	"	"	"	"	

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Atlas Geo-Sampling Company 120 Nottaway Lane Alpharetta, GA 30009	Project: AG051713-10 Project Number: PS Roswell Rd. Project Manager: Mr. Jim Fineis	Reported: 21-May-13 10:32

Volatile Organic Compounds by EPA TO-15

H&P Mobile Geochemistry, Inc.

Analyte	Result	Reporting Limit	Units	Dilution Factor	Batch	Prepared	Analyzed	Method	Notes
SV-5 (E305067-05) Vapor Sampled: 16-May-13 Received: 17-May-13									
o-Xylene	**22**	4.4	ug/m3	1	EE31706	17-May-13	17-May-13	EPA TO-15	
Bromoform	ND	10	"	"	"	"	"	"	
1,1,2,2-Tetrachloroethane	ND	7.0	"	"	"	"	"	"	
4-Ethyltoluene	**5.9**	5.0	"	"	"	"	"	"	
1,3,5-Trimethylbenzene	**5.8**	5.0	"	"	"	"	"	"	
1,2,4-Trimethylbenzene	**20**	5.0	"	"	"	"	"	"	
1,3-Dichlorobenzene	ND	12	"	"	"	"	"	"	
1,4-Dichlorobenzene	ND	12	"	"	"	"	"	"	
1,2-Dichlorobenzene	ND	12	"	"	"	"	"	"	
1,2,4-Trichlorobenzene	ND	7.5	"	"	"	"	"	"	
Hexachlorobutadiene	ND	11	"	"	"	"	"	"	
Surrogate: 1,2-Dichloroethane-d4		*98.1 %*	*76-134*		*"*	*"*	*"*	*"*	
Surrogate: Toluene-d8		*103 %*	*78-125*		*"*	*"*	*"*	*"*	
Surrogate: 4-Bromofluorobenzene		*95.5 %*	*77-127*		*"*	*"*	*"*	*"*	
SV-6 (E305067-06) Vapor Sampled: 16-May-13 Received: 17-May-13									
Dichlorodifluoromethane (F12)	**7.6**	5.0	ug/m3	1	EE31706	17-May-13	17-May-13	EPA TO-15	
Chloromethane	ND	2.1	"	"	"	"	"	"	
Dichlorotetrafluoroethane (F114)	ND	7.1	"	"	"	"	"	"	
Vinyl chloride	ND	2.6	"	"	"	"	"	"	
Bromomethane	ND	16	"	"	"	"	"	"	
Chloroethane	ND	8.0	"	"	"	"	"	"	
Trichlorofluoromethane (F11)	**19**	5.6	"	"	"	"	"	"	
Acetone	**250**	24	"	"	"	"	"	"	
1,1-Dichloroethene	ND	4.0	"	"	"	"	"	"	
1,1,2-Trichlorotrifluoroethane (F113)	ND	7.7	"	"	"	"	"	"	
Methylene chloride (Dichloromethane)	ND	3.5	"	"	"	"	"	"	
Carbon disulfide	ND	6.3	"	"	"	"	"	"	
trans-1,2-Dichloroethene	ND	8.0	"	"	"	"	"	"	
1,1-Dichloroethane	ND	4.1	"	"	"	"	"	"	
2-Butanone (MEK)	**43**	30	"	"	"	"	"	"	
cis-1,2-Dichloroethene	ND	4.0	"	"	"	"	"	"	
Chloroform	ND	4.9	"	"	"	"	"	"	
1,1,1-Trichloroethane	ND	5.5	"	"	"	"	"	"	
1,2-Dichloroethane (EDC)	ND	4.1	"	"	"	"	"	"	
Benzene	**25**	3.2	"	"	"	"	"	"	
Carbon tetrachloride	ND	6.4	"	"	"	"	"	"	

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Atlas Geo-Sampling Company 120 Nottaway Lane Alpharetta, GA 30009	Project: AG051713-10 Project Number: PS Roswell Rd. Project Manager: Mr. Jim Fineis	Reported: 21-May-13 10:32

Volatile Organic Compounds by EPA TO-15

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Analyte	Result	Reporting Limit	Units	Dilution Factor	Batch	Prepared	Analyzed	Method	Notes
SV-6 (E305067-06) Vapor Sampled: 16-May-13 Received: 17-May-13									
Trichloroethene	ND	5.5	ug/m3	1	EE31706	17-May-13	17-May-13	EPA TO-15	
1,2-Dichloropropane	ND	9.4	"	"	"	"	"	"	
Bromodichloromethane	ND	6.8	"	"	"	"	"	"	
cis-1,3-Dichloropropene	ND	4.6	"	"	"	"	"	"	
4-Methyl-2-pentanone (MIBK)	**36**	8.3	"	"	"	"	"	"	
trans-1,3-Dichloropropene	ND	4.6	"	"	"	"	"	"	
Toluene	**84**	3.8	"	"	"	"	"	"	
1,1,2-Trichloroethane	ND	5.5	"	"	"	"	"	"	
2-Hexanone (MBK)	ND	8.3	"	"	"	"	"	"	
Dibromochloromethane	ND	8.6	"	"	"	"	"	"	
Tetrachloroethene	**24**	6.9	"	"	"	"	"	"	
1,2-Dibromoethane (EDB)	ND	7.8	"	"	"	"	"	"	
1,1,1,2-Tetrachloroethane	ND	7.0	"	"	"	"	"	"	
Chlorobenzene	**5.7**	4.7	"	"	"	"	"	"	
Ethylbenzene	**26**	4.4	"	"	"	"	"	"	
m,p-Xylene	**79**	8.8	"	"	"	"	"	"	
Styrene	ND	4.3	"	"	"	"	"	"	
o-Xylene	**24**	4.4	"	"	"	"	"	"	
Bromoform	ND	10	"	"	"	"	"	"	
1,1,2,2-Tetrachloroethane	ND	7.0	"	"	"	"	"	"	
4-Ethyltoluene	**9.3**	5.0	"	"	"	"	"	"	
1,3,5-Trimethylbenzene	**8.4**	5.0	"	"	"	"	"	"	
1,2,4-Trimethylbenzene	**33**	5.0	"	"	"	"	"	"	
1,3-Dichlorobenzene	ND	12	"	"	"	"	"	"	
1,4-Dichlorobenzene	ND	12	"	"	"	"	"	"	
1,2-Dichlorobenzene	ND	12	"	"	"	"	"	"	
1,2,4-Trichlorobenzene	ND	7.5	"	"	"	"	"	"	
Hexachlorobutadiene	ND	11	"	"	"	"	"	"	
Surrogate: 1,2-Dichloroethane-d4		*101 %*	*76-134*		"	"	"	"	
Surrogate: Toluene-d8		*99.8 %*	*78-125*		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		*99.3 %*	*77-127*		"	"	"	"	

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Atlas Geo-Sampling Company	Project: AG051713-10	
120 Nottaway Lane	Project Number: PS Roswell Rd.	Reported:
Alpharetta, GA 30009	Project Manager: Mr. Jim Fineis	21-May-13 10:32

Volatile Organic Compounds by EPA TO-15 - Quality Control
H&P Mobile Geochemistry, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch EE31706 - TO-15										
Blank (EE31706-BLK1)				Prepared & Analyzed: 17-May-13						
Dichlorodifluoromethane (F12)	ND	5.0	ug/m3							
Chloromethane	ND	2.1	"							
Dichlorotetrafluoroethane (F114)	ND	7.1	"							
Vinyl chloride	ND	2.6	"							
Bromomethane	ND	16	"							
Chloroethane	ND	8.0	"							
Trichlorofluoromethane (F11)	ND	5.6	"							
Acetone	ND	24	"							
1,1-Dichloroethene	ND	4.0	"							
1,1,2-Trichlorotrifluoroethane (F113)	ND	7.7	"							
Methylene chloride (Dichloromethane)	ND	3.5	"							
Carbon disulfide	ND	6.3	"							
trans-1,2-Dichloroethene	ND	8.0	"							
1,1-Dichloroethane	ND	4.1	"							
2-Butanone (MEK)	ND	30	"							
cis-1,2-Dichloroethene	ND	4.0	"							
Chloroform	ND	4.9	"							
1,1,1-Trichloroethane	ND	5.5	"							
1,2-Dichloroethane (EDC)	ND	4.1	"							
Benzene	ND	3.2	"							
Carbon tetrachloride	ND	6.4	"							
Trichloroethene	ND	5.5	"							
1,2-Dichloropropane	ND	9.4	"							
Bromodichloromethane	ND	6.8	"							
cis-1,3-Dichloropropene	ND	4.6	"							
4-Methyl-2-pentanone (MIBK)	ND	8.3	"							
trans-1,3-Dichloropropene	ND	4.6	"							
Toluene	ND	3.8	"							
1,1,2-Trichloroethane	ND	5.5	"							
2-Hexanone (MBK)	ND	8.3	"							
Dibromochloromethane	ND	8.6	"							
Tetrachloroethene	ND	6.9	"							
1,2-Dibromoethane (EDB)	ND	7.8	"							
1,1,1,2-Tetrachloroethane	ND	7.0	"							

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Volatile Organic Compounds by EPA TO-15 - Quality Control
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Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch EE31706 - TO-15										
Blank (EE31706-BLK1)				Prepared & Analyzed: 17-May-13						
Chlorobenzene	ND	4.7	ug/m3							
Ethylbenzene	ND	4.4	"							
m,p-Xylene	ND	8.8	"							
Styrene	ND	4.3	"							
o-Xylene	ND	4.4	"							
Bromoform	ND	10	"							
1,1,2,2-Tetrachloroethane	ND	7.0	"							
4-Ethyltoluene	ND	5.0	"							
1,3,5-Trimethylbenzene	ND	5.0	"							
1,2,4-Trimethylbenzene	ND	5.0	"							
1,3-Dichlorobenzene	ND	12	"							
1,4-Dichlorobenzene	ND	12	"							
1,2-Dichlorobenzene	ND	12	"							
1,2,4-Trichlorobenzene	ND	7.5	"							
Hexachlorobutadiene	ND	11	"							
Surrogate: 1,2-Dichloroethane-d4	*243*		*"*	*214*		*113*	*76-134*			
Surrogate: Toluene-d8	*202*		*"*	*207*		*97.7*	*78-125*			
Surrogate: 4-Bromofluorobenzene	*352*		*"*	*364*		*96.5*	*77-127*			
LCS (EE31706-BS1)				Prepared & Analyzed: 17-May-13						
Dichlorodifluoromethane (F12)	100	5.0	ug/m3	101		100	65-135			
Vinyl chloride	44	2.6	"	52.0		84.8	65-135			
Chloroethane	50	8.0	"	53.6		93.3	65-135			
Trichlorofluoromethane (F11)	120	5.6	"	113		110	65-135			
1,1-Dichloroethene	94	4.0	"	80.8		116	65-135			
1,1,2-Trichlorotrifluoroethane (F113)	150	7.7	"	155		99.7	65-135			
Methylene chloride (Dichloromethane)	78	3.5	"	70.8		111	65-135			
trans-1,2-Dichloroethene	97	8.0	"	80.8		120	65-135			
1,1-Dichloroethane	93	4.1	"	82.4		113	65-135			
cis-1,2-Dichloroethene	94	4.0	"	80.0		117	65-135			
Chloroform	92	4.9	"	99.2		92.8	65-135			
1,1,1-Trichloroethane	110	5.5	"	111		95.6	65-135			
1,2-Dichloroethane (EDC)	81	4.1	"	82.4		98.6	65-135			

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Atlas Geo-Sampling Company 120 Nottaway Lane Alpharetta, GA 30009	Project: AG051713-10 Project Number: PS Roswell Rd. Project Manager: Mr. Jim Fineis	Reported: 21-May-13 10:32

Volatile Organic Compounds by EPA TO-15 - Quality Control
H&P Mobile Geochemistry, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch EE31706 - TO-15										
LCS (EE31706-BS1)				Prepared & Analyzed: 17-May-13						
Benzene	65	3.2	ug/m3	64.8		101	65-135			
Carbon tetrachloride	140	6.4	"	128		108	65-135			
Trichloroethene	99	5.5	"	110		90.8	65-135			
Toluene	65	3.8	"	76.8		85.2	65-135			
1,1,2-Trichloroethane	99	5.5	"	111		89.4	65-135			
Tetrachloroethene	120	6.9	"	138		86.2	65-135			
1,1,1,2-Tetrachloroethane	130	7.0	"	140		94.6	65-135			
Ethylbenzene	88	4.4	"	88.4		99.7	65-135			
m,p-Xylene	180	8.8	"	177		102	65-135			
o-Xylene	90	4.4	"	88.4		102	65-135			
1,1,2,2-Tetrachloroethane	140	7.0	"	140		97.7	65-135			
Surrogate: 1,2-Dichloroethane-d4	*229*		"	*214*		*107*	*76-134*			
Surrogate: Toluene-d8	*205*		"	*207*		*98.9*	*78-125*			
Surrogate: 4-Bromofluorobenzene	*365*		"	*364*		*100*	*77-127*			
LCS Dup (EE31706-BSD1)				Prepared & Analyzed: 17-May-13						
Dichlorodifluoromethane (F12)	89	5.0	ug/m3	101		88.2	65-135	12.6	35	
Vinyl chloride	41	2.6	"	52.0		78.4	65-135	7.88	35	
Chloroethane	44	8.0	"	53.6		81.4	65-135	13.6	35	
Trichlorofluoromethane (F11)	110	5.6	"	113		96.8	65-135	12.8	35	
1,1-Dichloroethene	82	4.0	"	80.8		101	65-135	13.8	35	
1,1,2-Trichlorotrifluoroethane (F113)	150	7.7	"	155		93.8	65-135	6.11	35	
Methylene chloride (Dichloromethane)	68	3.5	"	70.8		96.1	65-135	14.0	35	
trans-1,2-Dichloroethene	79	8.0	"	80.8		98.1	65-135	20.4	35	
1,1-Dichloroethane	80	4.1	"	82.4		97.3	65-135	15.0	35	
cis-1,2-Dichloroethene	81	4.0	"	80.0		101	65-135	14.4	35	
Chloroform	92	4.9	"	99.2		92.6	65-135	0.215	35	
1,1,1-Trichloroethane	100	5.5	"	111		90.7	65-135	5.27	35	
1,2-Dichloroethane (EDC)	75	4.1	"	82.4		90.9	65-135	8.10	35	
Benzene	58	3.2	"	64.8		89.4	65-135	12.1	35	
Carbon tetrachloride	120	6.4	"	128		90.8	65-135	16.9	35	
Trichloroethene	100	5.5	"	110		91.5	65-135	0.873	35	
Toluene	67	3.8	"	76.8		86.9	65-135	1.96	35	

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Atlas Geo-Sampling Company 120 Nottaway Lane Alpharetta, GA 30009	Project: AG051713-10 Project Number: PS Roswell Rd. Project Manager: Mr. Jim Fineis	Reported: 21-May-13 10:32

Volatile Organic Compounds by EPA TO-15 - Quality Control
H&P Mobile Geochemistry, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch EE31706 - TO-15										
LCS Dup (EE31706-BSD1)				Prepared & Analyzed: 17-May-13						
1,1,2-Trichloroethane	100	5.5	ug/m3	111		89.7	65-135	0.332	35	
Tetrachloroethene	120	6.9	"	138		84.9	65-135	1.51	35	
1,1,1,2-Tetrachloroethane	130	7.0	"	140		94.2	65-135	0.369	35	
Ethylbenzene	89	4.4	"	88.4		101	65-135	0.993	35	
m,p-Xylene	180	8.8	"	177		99.2	65-135	2.94	35	
o-Xylene	87	4.4	"	88.4		98.3	65-135	3.48	35	
1,1,2,2-Tetrachloroethane	130	7.0	"	140		93.8	65-135	4.00	35	
Surrogate: 1,2-Dichloroethane-d4	*218*		*"*	*214*		*102*	*76-134*			
Surrogate: Toluene-d8	*206*		*"*	*207*		*99.6*	*78-125*			
Surrogate: 4-Bromofluorobenzene	*362*		*"*	*364*		*99.3*	*77-127*			
Batch EE32008 - TO-15										
Blank (EE32008-BLK1)				Prepared & Analyzed: 20-May-13						
Dichlorodifluoromethane (F12)	ND	5.0	ug/m3							
Chloromethane	ND	2.1	"							
Dichlorotetrafluoroethane (F114)	ND	7.1	"							
Vinyl chloride	ND	2.6	"							
Bromomethane	ND	16	"							
Chloroethane	ND	8.0	"							
Trichlorofluoromethane (F11)	ND	5.6	"							
Acetone	ND	24	"							
1,1-Dichloroethene	ND	4.0	"							
1,1,2-Trichlorotrifluoroethane (F113)	ND	7.7	"							
Methylene chloride (Dichloromethane)	ND	3.5	"							
Carbon disulfide	ND	6.3	"							
trans-1,2-Dichloroethene	ND	8.0	"							
1,1-Dichloroethane	ND	4.1	"							
2-Butanone (MEK)	ND	30	"							
cis-1,2-Dichloroethene	ND	4.0	"							
Chloroform	ND	4.9	"							
1,1,1-Trichloroethane	ND	5.5	"							
1,2-Dichloroethane (EDC)	ND	4.1	"							

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Atlas Geo-Sampling Company	Project:	AG051713-10	
120 Nottaway Lane	Project Number:	PS Roswell Rd.	Reported:
Alpharetta, GA 30009	Project Manager:	Mr. Jim Fineis	21-May-13 10:32

Volatile Organic Compounds by EPA TO-15 - Quality Control

H&P Mobile Geochemistry, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch EE32008 - TO-15										
Blank (EE32008-BLK1)				Prepared & Analyzed: 20-May-13						
Benzene	ND	3.2	ug/m3							
Carbon tetrachloride	ND	6.4	"							
Trichloroethene	ND	5.5	"							
1,2-Dichloropropane	ND	9.4	"							
Bromodichloromethane	ND	6.8	"							
cis-1,3-Dichloropropene	ND	4.6	"							
4-Methyl-2-pentanone (MIBK)	ND	8.3	"							
trans-1,3-Dichloropropene	ND	4.6	"							
Toluene	ND	3.8	"							
1,1,2-Trichloroethane	ND	5.5	"							
2-Hexanone (MBK)	ND	8.3	"							
Dibromochloromethane	ND	8.6	"							
Tetrachloroethene	ND	6.9	"							
1,2-Dibromoethane (EDB)	ND	7.8	"							
1,1,1,2-Tetrachloroethane	ND	7.0	"							
Chlorobenzene	ND	4.7	"							
Ethylbenzene	ND	4.4	"							
m,p-Xylene	ND	8.8	"							
Styrene	ND	4.3	"							
o-Xylene	ND	4.4	"							
Bromoform	ND	10	"							
1,1,2,2-Tetrachloroethane	ND	7.0	"							
4-Ethyltoluene	ND	5.0	"							
1,3,5-Trimethylbenzene	ND	5.0	"							
1,2,4-Trimethylbenzene	ND	5.0	"							
1,3-Dichlorobenzene	ND	12	"							
1,4-Dichlorobenzene	ND	12	"							
1,2-Dichlorobenzene	ND	12	"							
1,2,4-Trichlorobenzene	ND	7.5	"							
Hexachlorobutadiene	ND	11	"							
Surrogate: 1,2-Dichloroethane-d4	*230*		*"*	*214*		*107*	*76-134*			
Surrogate: Toluene-d8	*202*		*"*	*207*		*97.4*	*78-125*			
Surrogate: 4-Bromofluorobenzene	*345*		*"*	*364*		*94.8*	*77-127*			

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Atlas Geo-Sampling Company 120 Nottaway Lane Alpharetta, GA 30009	Project: AG051713-10 Project Number: PS Roswell Rd. Project Manager: Mr. Jim Fineis	Reported: 21-May-13 10:32

Volatile Organic Compounds by EPA TO-15 - Quality Control

H&P Mobile Geochemistry, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch EE32008 - TO-15										
LCS (EE32008-BS1)				Prepared & Analyzed: 20-May-13						
Dichlorodifluoromethane (F12)	85	5.0	ug/m3	101		84.8	65-135			
Vinyl chloride	37	2.6	"	52.0		70.8	65-135			
Chloroethane	42	8.0	"	53.6		79.1	65-135			
Trichlorofluoromethane (F11)	99	5.6	"	113		87.1	65-135			
1,1-Dichloroethene	79	4.0	"	80.8		98.0	65-135			
1,1,2-Trichlorotrifluoroethane (F113)	140	7.7	"	155		93.2	65-135			
Methylene chloride (Dichloromethane)	65	3.5	"	70.8		92.2	65-135			
trans-1,2-Dichloroethene	73	8.0	"	80.8		89.9	65-135			
1,1-Dichloroethane	71	4.1	"	82.4		86.0	65-135			
cis-1,2-Dichloroethene	82	4.0	"	80.0		103	65-135			
Chloroform	91	4.9	"	99.2		91.3	65-135			
1,1,1-Trichloroethane	100	5.5	"	111		89.8	65-135			
1,2-Dichloroethane (EDC)	76	4.1	"	82.4		91.6	65-135			
Benzene	56	3.2	"	64.8		86.5	65-135			
Carbon tetrachloride	120	6.4	"	128		91.0	65-135			
Trichloroethene	100	5.5	"	110		92.7	65-135			
Toluene	67	3.8	"	76.8		86.7	65-135			
1,1,2-Trichloroethane	100	5.5	"	111		90.2	65-135			
Tetrachloroethene	120	6.9	"	138		84.9	65-135			
1,1,1,2-Tetrachloroethane	130	7.0	"	140		93.0	65-135			
Ethylbenzene	88	4.4	"	88.4		99.7	65-135			
m,p-Xylene	170	8.8	"	177		98.8	65-135			
o-Xylene	89	4.4	"	88.4		100	65-135			
1,1,2,2-Tetrachloroethane	130	7.0	"	140		96.0	65-135			
Surrogate: 1,2-Dichloroethane-d4	*212*		*"*	*214*		*99.1*	*76-134*			
Surrogate: Toluene-d8	*205*		*"*	*207*		*98.9*	*78-125*			
Surrogate: 4-Bromofluorobenzene	*365*		*"*	*364*		*100*	*77-127*			

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Atlas Geo-Sampling Company 120 Nottaway Lane Alpharetta, GA 30009	Project: AG051713-10 Project Number: PS Roswell Rd. Project Manager: Mr. Jim Fineis	Reported: 21-May-13 10:32

Volatile Organic Compounds by EPA TO-15 - Quality Control
H&P Mobile Geochemistry, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch EE32008 - TO-15										
LCS Dup (EE32008-BSD1)				Prepared & Analyzed: 20-May-13						
Dichlorodifluoromethane (F12)	100	5.0	ug/m3	101		99.7	65-135	16.1	35	
Vinyl chloride	47	2.6	"	52.0		89.9	65-135	23.8	35	
Chloroethane	52	8.0	"	53.6		96.9	65-135	20.2	35	
Trichlorofluoromethane (F11)	120	5.6	"	113		107	65-135	20.9	35	
1,1-Dichloroethene	91	4.0	"	80.8		113	65-135	14.4	35	
1,1,2-Trichlorotrifluoroethane (F113)	150	7.7	"	155		97.7	65-135	4.69	35	
Methylene chloride (Dichloromethane)	77	3.5	"	70.8		108	65-135	16.2	35	
trans-1,2-Dichloroethene	94	8.0	"	80.8		116	65-135	25.1	35	
1,1-Dichloroethane	89	4.1	"	82.4		107	65-135	22.2	35	
cis-1,2-Dichloroethene	85	4.0	"	80.0		106	65-135	2.98	35	
Chloroform	92	4.9	"	99.2		92.9	65-135	1.73	35	
1,1,1-Trichloroethane	110	5.5	"	111		101	65-135	12.2	35	
1,2-Dichloroethane (EDC)	85	4.1	"	82.4		103	65-135	11.3	35	
Benzene	64	3.2	"	64.8		99.4	65-135	13.9	35	
Carbon tetrachloride	130	6.4	"	128		102	65-135	11.8	35	
Trichloroethene	100	5.5	"	110		91.4	65-135	1.40	35	
Toluene	64	3.8	"	76.8		82.7	65-135	4.69	35	
1,1,2-Trichloroethane	97	5.5	"	111		87.1	65-135	3.53	35	
Tetrachloroethene	120	6.9	"	138		83.5	65-135	1.71	35	
1,1,1,2-Tetrachloroethane	130	7.0	"	140		90.8	65-135	2.38	35	
Ethylbenzene	88	4.4	"	88.4		99.0	65-135	0.701	35	
m,p-Xylene	170	8.8	"	177		98.5	65-135	0.302	35	
o-Xylene	88	4.4	"	88.4		99.3	65-135	1.10	35	
1,1,2,2-Tetrachloroethane	130	7.0	"	140		94.0	65-135	2.04	35	
Surrogate: 1,2-Dichloroethane-d4	*244*		*"*	*214*		*114*	*76-134*			
Surrogate: Toluene-d8	*204*		*"*	*207*		*98.8*	*78-125*			
Surrogate: 4-Bromofluorobenzene	*364*		*"*	*364*		*99.7*	*77-127*			

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Atlas Geo-Sampling Company	Project:	AG051713-10	
120 Nottaway Lane	Project Number:	PS Roswell Rd.	Reported:
Alpharetta, GA 30009	Project Manager:	Mr. Jim Fineis	21-May-13 10:32

Notes and Definitions

DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference

Appendix

H&P Mobile Geochemistry, Inc. is approved as an Environmental Laboratory in conformance with the Environmental Laboratory Accreditation Program (CA) for the category of Volatile and Semi-Volatile Organic Chemistry of Hazardous Waste for the following methods:

Certificate# 2741, 2743, 2579, 2754 & 2740 approved for EPA 8260 and LUFT GC/MS
Certificate# 2742, 2745, & 2741 approved for LUFT
Certificate# 2745 & 2742 approved for EPA 418.1

H&P Mobile Geochemistry, Inc. is approved as an Environmental Laboratory in conformance with the National Environmental Accreditation Conference Standards for the category Environmental Analysis Air and Emissions for the following analytes and methods:

1,2,4-Trichlorobenzene by EPA TO-15 & TO-14A
Hexachlorobutadiene by EPA TO-15 & TO-14A
Bromodichloromethane by EPA TO-15 & TO-14A
1,2-Dichlorobenzene by EPA TO-15 & TO-14A
Dichlorotetrafluoroethane by EPA TO-14A
1,4-Dichlorobenzene by EPA TO-15 & TO-14A
Benzene by EPA TO-15 & TO-14A
Chlorobenzene by EPA TO-15 & TO-14A
Ethyl benzene by EPA TO-15 & TO-14A
Styrene by EPA TO-15 & TO-14A
Toluene by EPA TO-15 & TO-14A
Total Xylenes by EPA TO-15 & TO-14A
1,1,1-Trichloroethane by EPA TO-15 & TO-14A
1,1,2,2-Tetrachloroethane by EPA TO-15 & TO-14A
1,1,2-Trichloroethane by EPA TO-15 & TO-14A
1,1-Dichloroethane by EPA TO-15 & TO-14A
1,1-Dichloroethene by EPA TO-15 & TO-14A
1,2-Dichloroethane by EPA TO-15 & TO-14A
1,2-Dichloropropane by EPA TO-15 & TO-14A
Benzyl Chloride by EPA TO-15 & TO-14A
Bromoform by EPA TO-15
Bromomethane by EPA TO-15 & TO-14A
Carbon tetrachloride by EPA TO-15 & TO-14A
Chloroethane by EPA TO-15 & TO-14A
Chloroform by EPA TO-15 & TO-14A
Chloromethane by EPA TO-15 & TO-14A
cis-1,2-Dichloroethene by EPA TO-15 & TO-14A
cis-1,3-Dichloropropene by EPA TO-15 & TO-14A
Methylene chloride by EPA TO -15 & TO-14A
Tetrachloroethane by EPA TO-15 & TO-14A
trans-1,2-Dichloroethene by EPA TO-15
trans-1,3-Dichloropropene by EPA TO-15 & TO-14A
Trichloroethene by EPA TO-15 & TO-14A
Vinyl chloride by EPA TO -15 & TO-14A
2-Butanone by EPA TO-15
4-Methyl-2-Pentanone by EPA TO-15
Hexane by EPA TO-15
Methyl tert-butyl ether by EPA TO-15
Vinyl acetate by EPA TO-15
Dibromochloromethane by EPA TO-15
1,3-Dichlorobenzene by EPA TO-15 & TO-14A
Trichlorofluoromethane by EPA TO-14A
Naphthalene by H&P SOP TO-15/GC-MS
1,2-Dibromoethane (EDB) by EPA TO-15 & TO-14A
1,2-Dibromo-3-chloropropane by EPA TO-15
1,3-Butadiene by EPA TO-15
1,1,2-Trichlorotrifluoroethane by EPA TO-15 & TO-14A
Carbon disulfide by EPA TO-15
1,4-Dioxane by EPA TO-15

This certification applies to samples analyzed in summa canisters.

Chain of Custody Record

H&P Mobile Geochemistry, Inc.

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☐ 1855 Coronado Ave., Signal Hill, CA 90755 • ph 800.834.9888

Date:
(SN) H&P Project # AG051713-10
Outside Lab:

Client: Atlas Geo Sampling
Address: 120 Nottaway Lane
Alpharetta, GA 30005
Email: jimfinels @ atlasgeo...
Collector: Jim Finels
Client Project # PS Roswell Rd
Location: 4910 Roswell Rd
Phone: 770 883 3372
Fax:
Page: 1 of 1
Project Contact:
Turn around time: *48-HOUR

Geotracker EDF: Yes ☐ No ☐
Global ID:
Excel EDD: Yes ☐ No ☐

Sample Receipt
Intact: ☑ Yes ☐ No
Seal Intact: ☐ Yes ☐ No ☑ N/A
Cold: ☐ Yes ☐ No ☑ N/A
Temperature: RT

Special Instructions: Fedex # 8022 3887 9433
Rush - See Suzie - PRELIMS BY 5/21/13 NOON (SN)

Lab Work Order # E305067

Sample Name	Field Point Name (CAN#)	Purge Vol	Time	Date	Sample Type	Container Type	Total # of containers	8260B Full List	8260B ☐ BTEX/OXY ☐ TPH gas	LUFT/8015M TPH ☐ g ☐ d ☐ ext	418.1 TRPH	VOC's: Full List ☐ 8260B ☐ TO-15	VOC's: Short List/DTSC ☐ 8260B ☑ TO-15	VOC's: SAM, 8260B ☐ SAM A ☐ SAM B	Naphthalene ☐ 8260B ☐ TO-15	Oxygenates ☐ 8260B ☐ TO-15	TPHv gas ☐ 8260B ☐ TO-15	Ketones ☐ 8260B ☐ TO-15	Other ☐ 8260B ☐ TO-15	Leak Check Compound ☐ 1,1 DFA ☐ OTHER	Methane	Fixed Gases ☐ CO2 ☐ O2 ☐ N2		VAC#
SV-1	HP056	180	1445	5-16-13	SG	Summa							/											-4.0
SV-2	HP069	↓	1500	"	↓	↓							/											-4.5
SV-3	HP197	↓	1515	"	↓	↓							/											-4.8
SV-4	HP202	↓	1535	"	↓	↓							/											-4.1
SV-5	HP308	↓	1550	"	↓	↓							/											-3.5
SV-6	HP155	↓	1620	"	↓	↓							/											-4.5

SOIL/GW — SOIL VAPOR/AIR ANALYSIS

Approved/Relinquished by: (Signature)	(company)	Received by: (Signature)	(company)	Date	Time
[signature]	Atlas			5-16-13	1645
		[signature]	H&P	5-17-13	0935

*Signature constitutes authorization to proceed with analysis and acceptance of condition on back.

Sample disposal instruction: ☐ Disposal ☐ Return to client ☐ Pickup

H&P Mobile Geochemistry Inc.

23 May 2013

Mr. Jim Fineis
Atlas Geo-Sampling Company
120 Nottaway Lane
Alpharetta, GA 30009

H&P Project: AG052013-13
Client Project: PS Roswell Rd. / 4910 Roswell Rd.

Dear Mr. Jim Fineis:

Enclosed is the analytical report for the above referenced project. The data herein applies to samples as received by H&P Mobile Geochemistry, Inc. on 20-May-13 which were analyzed in accordance with the attached Chain of Custody record(s).

The results for all sample analyses and required QA/QC analyses are presented in the following sections and summarized in the documents:

- Sample Summary
- Case Narrative (if applicable)
- Sample Results
- Quality Control Summary
- Notes and Definitions / Appendix
- Chain of Custody

Unless otherwise noted, all analyses were performed and reviewed in compliance with our Quality Systems Manual and Standard Operating Procedures. This report shall not be reproduced, except in full, without the written approval of H&P Mobile Geochemistry, Inc.

We at H&P Mobile Geochemistry, Inc. sincerely appreciate the opportunity to provide analytical services to you on this project. If you have any questions or concerns regarding this analytical report, please contact me at your convenience at 760-804-9678.

Sincerely,

Janis Villarreal
Laboratory Director

H&P Mobile Geochemistry, Inc. operates under CA Environmental Lab Accreditation Program Numbers 2579, 2740, 2741, 2742, 2743, 2745 and 2754. National Environmental Laboratory Accreditation Conference (NELAC) Standards Lab #11845

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Atlas Geo-Sampling Company 120 Nottaway Lane Alpharetta, GA 30009	Project: AG052013-13 Project Number: PS Roswell Rd. / 4910 Roswell Rd. Project Manager: Mr. Jim Fineis	Reported: 23-May-13 11:41

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
IA1	E305083-01	Vapor	16-May-13	20-May-13
IA2	E305083-02	Vapor	16-May-13	20-May-13
IA3	E305083-03	Vapor	16-May-13	20-May-13
IA4	E305083-04	Vapor	16-May-13	20-May-13
IA5	E305083-05	Vapor	16-May-13	20-May-13
IA6	E305083-06	Vapor	16-May-13	20-May-13

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Atlas Geo-Sampling Company 120 Nottaway Lane Alpharetta, GA 30009	Project: AG052013-13 Project Number: PS Roswell Rd. / 4910 Roswell Rd. Project Manager: Mr. Jim Fineis	Reported: 23-May-13 11:41

DETECTIONS SUMMARY

Sample ID: **IA1** Laboratory ID: **E305083-01**

Analyte	Result	Reporting Limit	Units	Method	Notes
Dichlorodifluoromethane (F12)	1.8	1.0	ug/m3	EPA TO-15	
Chloromethane	1.4	0.21	ug/m3	EPA TO-15	
Trichlorofluoromethane (F11)	7.4	0.56	ug/m3	EPA TO-15	
Acetone	31	1.2	ug/m3	EPA TO-15	
Methylene chloride (Dichloromethane)	0.72	0.35	ug/m3	EPA TO-15	
Carbon disulfide	3.0	0.32	ug/m3	EPA TO-15	
2-Butanone (MEK)	3.4	0.60	ug/m3	EPA TO-15	
Chloroform	0.95	0.25	ug/m3	EPA TO-15	
Benzene	1.0	0.16	ug/m3	EPA TO-15	
Carbon tetrachloride	0.57	0.32	ug/m3	EPA TO-15	
Toluene	4.5	0.76	ug/m3	EPA TO-15	
Ethylbenzene	0.64	0.44	ug/m3	EPA TO-15	
m,p-Xylene	1.7	0.44	ug/m3	EPA TO-15	
Styrene	0.65	0.43	ug/m3	EPA TO-15	
o-Xylene	0.66	0.44	ug/m3	EPA TO-15	
1,2,4-Trimethylbenzene	0.73	0.50	ug/m3	EPA TO-15	

Sample ID: **IA2** Laboratory ID: **E305083-02**

Analyte	Result	Reporting Limit	Units	Method	Notes
Dichlorodifluoromethane (F12)	2.3	1.0	ug/m3	EPA TO-15	
Chloromethane	1.6	0.21	ug/m3	EPA TO-15	
Trichlorofluoromethane (F11)	8.4	0.56	ug/m3	EPA TO-15	
Acetone	33	1.2	ug/m3	EPA TO-15	
Methylene chloride (Dichloromethane)	0.60	0.35	ug/m3	EPA TO-15	
2-Butanone (MEK)	3.6	0.60	ug/m3	EPA TO-15	
Chloroform	1.1	0.25	ug/m3	EPA TO-15	
Benzene	0.95	0.16	ug/m3	EPA TO-15	
Carbon tetrachloride	0.59	0.32	ug/m3	EPA TO-15	
Toluene	3.6	0.76	ug/m3	EPA TO-15	
Ethylbenzene	0.50	0.44	ug/m3	EPA TO-15	
m,p-Xylene	1.3	0.44	ug/m3	EPA TO-15	
Styrene	0.75	0.43	ug/m3	EPA TO-15	
o-Xylene	0.54	0.44	ug/m3	EPA TO-15	
1,2,4-Trimethylbenzene	0.59	0.50	ug/m3	EPA TO-15	

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Sample ID: **IA3** Laboratory ID: **E305083-03**

Analyte	Result	Reporting Limit	Units	Method	Notes
Dichlorodifluoromethane (F12)	2.4	1.0	ug/m3	EPA TO-15	
Chloromethane	1.4	0.21	ug/m3	EPA TO-15	
Trichlorofluoromethane (F11)	13	0.56	ug/m3	EPA TO-15	
Acetone	26	1.2	ug/m3	EPA TO-15	
Methylene chloride (Dichloromethane)	0.41	0.35	ug/m3	EPA TO-15	
Carbon disulfide	0.73	0.32	ug/m3	EPA TO-15	
2-Butanone (MEK)	1.9	0.60	ug/m3	EPA TO-15	
Benzene	0.75	0.16	ug/m3	EPA TO-15	
Carbon tetrachloride	0.40	0.32	ug/m3	EPA TO-15	
Toluene	2.2	0.76	ug/m3	EPA TO-15	
m,p-Xylene	1.2	0.44	ug/m3	EPA TO-15	
1,2,4-Trimethylbenzene	0.52	0.50	ug/m3	EPA TO-15	

Sample ID: **IA4** Laboratory ID: **E305083-04**

Analyte	Result	Reporting Limit	Units	Method	Notes
Dichlorodifluoromethane (F12)	2.8	1.0	ug/m3	EPA TO-15	
Chloromethane	1.1	0.21	ug/m3	EPA TO-15	
Trichlorofluoromethane (F11)	16	0.56	ug/m3	EPA TO-15	
Acetone	29	1.2	ug/m3	EPA TO-15	
1,1,2-Trichlorotrifluoroethane (F113)	2.8	0.77	ug/m3	EPA TO-15	
Methylene chloride (Dichloromethane)	0.43	0.35	ug/m3	EPA TO-15	
Carbon disulfide	0.48	0.32	ug/m3	EPA TO-15	
2-Butanone (MEK)	1.8	0.60	ug/m3	EPA TO-15	
Chloroform	0.28	0.25	ug/m3	EPA TO-15	
Benzene	0.76	0.16	ug/m3	EPA TO-15	
Carbon tetrachloride	0.34	0.32	ug/m3	EPA TO-15	
Toluene	2.6	0.76	ug/m3	EPA TO-15	
Ethylbenzene	0.45	0.44	ug/m3	EPA TO-15	
m,p-Xylene	1.4	0.44	ug/m3	EPA TO-15	
Styrene	0.65	0.43	ug/m3	EPA TO-15	
o-Xylene	0.55	0.44	ug/m3	EPA TO-15	
1,2,4-Trimethylbenzene	0.55	0.50	ug/m3	EPA TO-15	

Sample ID: **IA5** Laboratory ID: **E305083-05**

Analyte	Result	Reporting Limit	Units	Method	Notes
Dichlorodifluoromethane (F12)	3.4	1.0	ug/m3	EPA TO-15	
Chloromethane	1.5	0.21	ug/m3	EPA TO-15	

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Sample ID: **IA5** Laboratory ID: **E305083-05**

Analyte	Result	Reporting Limit	Units	Method	Notes
Trichlorofluoromethane (F11)	22	0.56	ug/m3	EPA TO-15	
Acetone	250	1.2	ug/m3	EPA TO-15	E
1,1,2-Trichlorotrifluoroethane (F113)	16	0.77	ug/m3	EPA TO-15	
Methylene chloride (Dichloromethane)	0.62	0.35	ug/m3	EPA TO-15	
2-Butanone (MEK)	2.3	0.60	ug/m3	EPA TO-15	
Chloroform	1.0	0.25	ug/m3	EPA TO-15	
1,1,1-Trichloroethane	3.1	0.55	ug/m3	EPA TO-15	
Benzene	0.82	0.16	ug/m3	EPA TO-15	
Carbon tetrachloride	0.43	0.32	ug/m3	EPA TO-15	
Toluene	4.0	0.76	ug/m3	EPA TO-15	
Tetrachloroethene	3.1	0.69	ug/m3	EPA TO-15	
Ethylbenzene	0.92	0.44	ug/m3	EPA TO-15	
m,p-Xylene	2.6	0.44	ug/m3	EPA TO-15	
Styrene	2.0	0.43	ug/m3	EPA TO-15	
o-Xylene	0.88	0.44	ug/m3	EPA TO-15	
1,2,4-Trimethylbenzene	0.51	0.50	ug/m3	EPA TO-15	

Sample ID: **IA6** Laboratory ID: **E305083-06**

Analyte	Result	Reporting Limit	Units	Method	Notes
Dichlorodifluoromethane (F12)	3.1	1.0	ug/m3	EPA TO-15	
Chloromethane	1.5	0.21	ug/m3	EPA TO-15	
Trichlorofluoromethane (F11)	23	0.56	ug/m3	EPA TO-15	
Acetone	36	1.2	ug/m3	EPA TO-15	
1,1,2-Trichlorotrifluoroethane (F113)	1.2	0.77	ug/m3	EPA TO-15	
Methylene chloride (Dichloromethane)	0.42	0.35	ug/m3	EPA TO-15	
2-Butanone (MEK)	2.0	0.60	ug/m3	EPA TO-15	
Chloroform	0.49	0.25	ug/m3	EPA TO-15	
Benzene	0.61	0.16	ug/m3	EPA TO-15	
Carbon tetrachloride	0.42	0.32	ug/m3	EPA TO-15	
Toluene	2.8	0.76	ug/m3	EPA TO-15	
Tetrachloroethene	1.2	0.69	ug/m3	EPA TO-15	
m,p-Xylene	1.2	0.44	ug/m3	EPA TO-15	
1,2,4-Trimethylbenzene	0.65	0.50	ug/m3	EPA TO-15	

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Volatile Organic Compounds by EPA TO-15

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Analyte	Result	Reporting Limit	Units	Dilution Factor	Batch	Prepared	Analyzed	Method	Notes
IA1 (E305083-01) Vapor Sampled: 16-May-13 Received: 20-May-13									
Dichlorodifluoromethane (F12)	**1.8**	1.0	ug/m3	1	EE32209	22-May-13	22-May-13	EPA TO-15	
Chloromethane	**1.4**	0.21	"	"	"	"	"	"	
Dichlorotetrafluoroethane (F114)	ND	0.71	"	"	"	"	"	"	
Vinyl chloride	ND	0.13	"	"	"	"	"	"	
Bromomethane	ND	0.39	"	"	"	"	"	"	
Chloroethane	ND	0.27	"	"	"	"	"	"	
Trichlorofluoromethane (F11)	**7.4**	0.56	"	"	"	"	"	"	
Acetone	**31**	1.2	"	"	"	"	"	"	
1,1-Dichloroethene	ND	0.40	"	"	"	"	"	"	
1,1,2-Trichlorotrifluoroethane (F113)	ND	0.77	"	"	"	"	"	"	
Methylene chloride (Dichloromethane)	**0.72**	0.35	"	"	"	"	"	"	
Carbon disulfide	**3.0**	0.32	"	"	"	"	"	"	
trans-1,2-Dichloroethene	ND	0.40	"	"	"	"	"	"	
1,1-Dichloroethane	ND	0.41	"	"	"	"	"	"	
2-Butanone (MEK)	**3.4**	0.60	"	"	"	"	"	"	
cis-1,2-Dichloroethene	ND	0.40	"	"	"	"	"	"	
Chloroform	**0.95**	0.25	"	"	"	"	"	"	
1,1,1-Trichloroethane	ND	0.55	"	"	"	"	"	"	
1,2-Dichloroethane (EDC)	ND	0.41	"	"	"	"	"	"	
Benzene	**1.0**	0.16	"	"	"	"	"	"	
Carbon tetrachloride	**0.57**	0.32	"	"	"	"	"	"	
Trichloroethene	ND	0.55	"	"	"	"	"	"	
1,2-Dichloropropane	ND	0.47	"	"	"	"	"	"	
Bromodichloromethane	ND	0.68	"	"	"	"	"	"	
cis-1,3-Dichloropropene	ND	0.46	"	"	"	"	"	"	
4-Methyl-2-pentanone (MIBK)	ND	0.83	"	"	"	"	"	"	
trans-1,3-Dichloropropene	ND	0.46	"	"	"	"	"	"	
Toluene	**4.5**	0.76	"	"	"	"	"	"	
1,1,2-Trichloroethane	ND	0.55	"	"	"	"	"	"	
2-Hexanone (MBK)	ND	0.83	"	"	"	"	"	"	
Dibromochloromethane	ND	0.86	"	"	"	"	"	"	
Tetrachloroethene	ND	0.69	"	"	"	"	"	"	
1,2-Dibromoethane (EDB)	ND	0.78	"	"	"	"	"	"	
1,1,1,2-Tetrachloroethane	ND	0.70	"	"	"	"	"	"	
Chlorobenzene	ND	0.47	"	"	"	"	"	"	
Ethylbenzene	**0.64**	0.44	"	"	"	"	"	"	
m,p-Xylene	**1.7**	0.44	"	"	"	"	"	"	
Styrene	**0.65**	0.43	"	"	"	"	"	"	

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Atlas Geo-Sampling Company 120 Nottaway Lane Alpharetta, GA 30009	Project: AG052013-13 Project Number: PS Roswell Rd. / 4910 Roswell Rd. Project Manager: Mr. Jim Fineis	Reported: 23-May-13 11:41

Volatile Organic Compounds by EPA TO-15

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Analyte	Result	Reporting Limit	Units	Dilution Factor	Batch	Prepared	Analyzed	Method	Notes
IA1 (E305083-01) Vapor Sampled: 16-May-13 Received: 20-May-13									
o-Xylene	**0.66**	0.44	"	"	"	"	"	"	
Bromoform	ND	1.0	"	"	"	"	"	"	
1,1,2,2-Tetrachloroethane	ND	0.70	"	"	"	"	"	"	
4-Ethyltoluene	ND	0.50	"	"	"	"	"	"	
1,3,5-Trimethylbenzene	ND	0.50	"	"	"	"	"	"	
1,2,4-Trimethylbenzene	**0.73**	0.50	"	"	"	"	"	"	
1,3-Dichlorobenzene	ND	0.61	"	"	"	"	"	"	
1,4-Dichlorobenzene	ND	0.61	"	"	"	"	"	"	
1,2-Dichlorobenzene	ND	0.61	"	"	"	"	"	"	
1,2,4-Trichlorobenzene	ND	0.75	"	"	"	"	"	"	
Hexachlorobutadiene	ND	2.1	"	"	"	"	"	"	
Surrogate: 1,2-Dichloroethane-d4		*105 %*	*76-134*		"	"	"	"	
Surrogate: Toluene-d8		*104 %*	*78-125*		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		*103 %*	*77-127*		"	"	"	"	
IA2 (E305083-02) Vapor Sampled: 16-May-13 Received: 20-May-13									
Dichlorodifluoromethane (F12)	**2.3**	1.0	ug/m3	1	EE32209	22-May-13	22-May-13	EPA TO-15	
Chloromethane	**1.6**	0.21	"	"	"	"	"	"	
Dichlorotetrafluoroethane (F114)	ND	0.71	"	"	"	"	"	"	
Vinyl chloride	ND	0.13	"	"	"	"	"	"	
Bromomethane	ND	0.39	"	"	"	"	"	"	
Chloroethane	ND	0.27	"	"	"	"	"	"	
Trichlorofluoromethane (F11)	**8.4**	0.56	"	"	"	"	"	"	
Acetone	**33**	1.2	"	"	"	"	"	"	
1,1-Dichloroethene	ND	0.40	"	"	"	"	"	"	
1,1,2-Trichlorotrifluoroethane (F113)	ND	0.77	"	"	"	"	"	"	
Methylene chloride (Dichloromethane)	**0.60**	0.35	"	"	"	"	"	"	
Carbon disulfide	ND	0.32	"	"	"	"	"	"	
trans-1,2-Dichloroethene	ND	0.40	"	"	"	"	"	"	
1,1-Dichloroethane	ND	0.41	"	"	"	"	"	"	
2-Butanone (MEK)	**3.6**	0.60	"	"	"	"	"	"	
cis-1,2-Dichloroethene	ND	0.40	"	"	"	"	"	"	
Chloroform	**1.1**	0.25	"	"	"	"	"	"	
1,1,1-Trichloroethane	ND	0.55	"	"	"	"	"	"	
1,2-Dichloroethane (EDC)	ND	0.41	"	"	"	"	"	"	
Benzene	**0.95**	0.16	"	"	"	"	"	"	
Carbon tetrachloride	**0.59**	0.32	"	"	"	"	"	"	

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120 Nottaway Lane	Project Number: PS Roswell Rd. / 4910 Roswell Rd.	Reported:
Alpharetta, GA 30009	Project Manager: Mr. Jim Fineis	23-May-13 11:41

Volatile Organic Compounds by EPA TO-15

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Analyte	Result	Reporting Limit	Units	Dilution Factor	Batch	Prepared	Analyzed	Method	Notes
IA2 (E305083-02) Vapor Sampled: 16-May-13 Received: 20-May-13									
Trichloroethene	ND	0.55	"	"	"	"	"	"	
1,2-Dichloropropane	ND	0.47	"	"	"	"	"	"	
Bromodichloromethane	ND	0.68	"	"	"	"	"	"	
cis-1,3-Dichloropropene	ND	0.46	"	"	"	"	"	"	
4-Methyl-2-pentanone (MIBK)	ND	0.83	"	"	"	"	"	"	
trans-1,3-Dichloropropene	ND	0.46	"	"	"	"	"	"	
Toluene	**3.6**	0.76	"	"	"	"	"	"	
1,1,2-Trichloroethane	ND	0.55	"	"	"	"	"	"	
2-Hexanone (MBK)	ND	0.83	"	"	"	"	"	"	
Dibromochloromethane	ND	0.86	"	"	"	"	"	"	
Tetrachloroethene	ND	0.69	"	"	"	"	"	"	
1,2-Dibromoethane (EDB)	ND	0.78	"	"	"	"	"	"	
1,1,1,2-Tetrachloroethane	ND	0.70	"	"	"	"	"	"	
Chlorobenzene	ND	0.47	"	"	"	"	"	"	
Ethylbenzene	**0.50**	0.44	"	"	"	"	"	"	
m,p-Xylene	**1.3**	0.44	"	"	"	"	"	"	
Styrene	**0.75**	0.43	"	"	"	"	"	"	
o-Xylene	**0.54**	0.44	"	"	"	"	"	"	
Bromoform	ND	1.0	"	"	"	"	"	"	
1,1,2,2-Tetrachloroethane	ND	0.70	"	"	"	"	"	"	
4-Ethyltoluene	ND	0.50	"	"	"	"	"	"	
1,3,5-Trimethylbenzene	ND	0.50	"	"	"	"	"	"	
1,2,4-Trimethylbenzene	**0.59**	0.50	"	"	"	"	"	"	
1,3-Dichlorobenzene	ND	0.61	"	"	"	"	"	"	
1,4-Dichlorobenzene	ND	0.61	"	"	"	"	"	"	
1,2-Dichlorobenzene	ND	0.61	"	"	"	"	"	"	
1,2,4-Trichlorobenzene	ND	0.75	"	"	"	"	"	"	
Hexachlorobutadiene	ND	2.1	"	"	"	"	"	"	
Surrogate: 1,2-Dichloroethane-d4		*103 %*	*76-134*		*"*	*"*	*"*	*"*	
Surrogate: Toluene-d8		*103 %*	*78-125*		*"*	*"*	*"*	*"*	
Surrogate: 4-Bromofluorobenzene		*101 %*	*77-127*		*"*	*"*	*"*	*"*	

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Volatile Organic Compounds by EPA TO-15

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IA3 (E305083-03) Vapor Sampled: 16-May-13 Received: 20-May-13

Analyte	Result	Reporting Limit	Units	Dilution Factor	Batch	Prepared	Analyzed	Method	Notes
Dichlorodifluoromethane (F12)	**2.4**	1.0	ug/m3	1	EE32209	22-May-13	22-May-13	EPA TO-15	
Chloromethane	**1.4**	0.21	"	"	"	"	"	"	
Dichlorotetrafluoroethane (F114)	ND	0.71	"	"	"	"	"	"	
Vinyl chloride	ND	0.13	"	"	"	"	"	"	
Bromomethane	ND	0.39	"	"	"	"	"	"	
Chloroethane	ND	0.27	"	"	"	"	"	"	
Trichlorofluoromethane (F11)	**13**	0.56	"	"	"	"	"	"	
Acetone	**26**	1.2	"	"	"	"	"	"	
1,1-Dichloroethene	ND	0.40	"	"	"	"	"	"	
1,1,2-Trichlorotrifluoroethane (F113)	ND	0.77	"	"	"	"	"	"	
Methylene chloride (Dichloromethane)	**0.41**	0.35	"	"	"	"	"	"	
Carbon disulfide	**0.73**	0.32	"	"	"	"	"	"	
trans-1,2-Dichloroethene	ND	0.40	"	"	"	"	"	"	
1,1-Dichloroethane	ND	0.41	"	"	"	"	"	"	
2-Butanone (MEK)	**1.9**	0.60	"	"	"	"	"	"	
cis-1,2-Dichloroethene	ND	0.40	"	"	"	"	"	"	
Chloroform	ND	0.25	"	"	"	"	"	"	
1,1,1-Trichloroethane	ND	0.55	"	"	"	"	"	"	
1,2-Dichloroethane (EDC)	ND	0.41	"	"	"	"	"	"	
Benzene	**0.75**	0.16	"	"	"	"	"	"	
Carbon tetrachloride	**0.40**	0.32	"	"	"	"	"	"	
Trichloroethene	ND	0.55	"	"	"	"	"	"	
1,2-Dichloropropane	ND	0.47	"	"	"	"	"	"	
Bromodichloromethane	ND	0.68	"	"	"	"	"	"	
cis-1,3-Dichloropropene	ND	0.46	"	"	"	"	"	"	
4-Methyl-2-pentanone (MIBK)	ND	0.83	"	"	"	"	"	"	
trans-1,3-Dichloropropene	ND	0.46	"	"	"	"	"	"	
Toluene	**2.2**	0.76	"	"	"	"	"	"	
1,1,2-Trichloroethane	ND	0.55	"	"	"	"	"	"	
2-Hexanone (MBK)	ND	0.83	"	"	"	"	"	"	
Dibromochloromethane	ND	0.86	"	"	"	"	"	"	
Tetrachloroethene	ND	0.69	"	"	"	"	"	"	
1,2-Dibromoethane (EDB)	ND	0.78	"	"	"	"	"	"	
1,1,1,2-Tetrachloroethane	ND	0.70	"	"	"	"	"	"	
Chlorobenzene	ND	0.47	"	"	"	"	"	"	
Ethylbenzene	ND	0.44	"	"	"	"	"	"	
m,p-Xylene	**1.2**	0.44	"	"	"	"	"	"	
Styrene	ND	0.43	"	"	"	"	"	"	

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Volatile Organic Compounds by EPA TO-15

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Analyte	Result	Reporting Limit	Units	Dilution Factor	Batch	Prepared	Analyzed	Method	Notes
IA3 (E305083-03) Vapor Sampled: 16-May-13 Received: 20-May-13									
o-Xylene	ND	0.44	"	"	"	"	"	"	
Bromoform	ND	1.0	"	"	"	"	"	"	
1,1,2,2-Tetrachloroethane	ND	0.70	"	"	"	"	"	"	
4-Ethyltoluene	ND	0.50	"	"	"	"	"	"	
1,3,5-Trimethylbenzene	ND	0.50	"	"	"	"	"	"	
1,2,4-Trimethylbenzene	**0.52**	0.50	"	"	"	"	"	"	
1,3-Dichlorobenzene	ND	0.61	"	"	"	"	"	"	
1,4-Dichlorobenzene	ND	0.61	"	"	"	"	"	"	
1,2-Dichlorobenzene	ND	0.61	"	"	"	"	"	"	
1,2,4-Trichlorobenzene	ND	0.75	"	"	"	"	"	"	
Hexachlorobutadiene	ND	2.1	"	"	"	"	"	"	
Surrogate: 1,2-Dichloroethane-d4		*101 %*	*76-134*		"	"	"	"	
Surrogate: Toluene-d8		*103 %*	*78-125*		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		*102 %*	*77-127*		"	"	"	"	
IA4 (E305083-04) Vapor Sampled: 16-May-13 Received: 20-May-13									
Dichlorodifluoromethane (F12)	**2.8**	1.0	ug/m3	1	EE32209	22-May-13	22-May-13	EPA TO-15	
Chloromethane	**1.1**	0.21	"	"	"	"	"	"	
Dichlorotetrafluoroethane (F114)	ND	0.71	"	"	"	"	"	"	
Vinyl chloride	ND	0.13	"	"	"	"	"	"	
Bromomethane	ND	0.39	"	"	"	"	"	"	
Chloroethane	ND	0.27	"	"	"	"	"	"	
Trichlorofluoromethane (F11)	**16**	0.56	"	"	"	"	"	"	
Acetone	**29**	1.2	"	"	"	"	"	"	
1,1-Dichloroethene	ND	0.40	"	"	"	"	"	"	
1,1,2-Trichlorotrifluoroethane (F113)	**2.8**	0.77	"	"	"	"	"	"	
Methylene chloride (Dichloromethane)	**0.43**	0.35	"	"	"	"	"	"	
Carbon disulfide	**0.48**	0.32	"	"	"	"	"	"	
trans-1,2-Dichloroethene	ND	0.40	"	"	"	"	"	"	
1,1-Dichloroethane	ND	0.41	"	"	"	"	"	"	
2-Butanone (MEK)	**1.8**	0.60	"	"	"	"	"	"	
cis-1,2-Dichloroethene	ND	0.40	"	"	"	"	"	"	
Chloroform	**0.28**	0.25	"	"	"	"	"	"	
1,1,1-Trichloroethane	ND	0.55	"	"	"	"	"	"	
1,2-Dichloroethane (EDC)	ND	0.41	"	"	"	"	"	"	
Benzene	**0.76**	0.16	"	"	"	"	"	"	
Carbon tetrachloride	**0.34**	0.32	"	"	"	"	"	"	

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Atlas Geo-Sampling Company 120 Nottaway Lane Alpharetta, GA 30009	Project: AG052013-13 Project Number: PS Roswell Rd. / 4910 Roswell Rd. Project Manager: Mr. Jim Fineis	Reported: 23-May-13 11:41

Volatile Organic Compounds by EPA TO-15

H&P Mobile Geochemistry, Inc.

Analyte	Result	Reporting Limit	Units	Dilution Factor	Batch	Prepared	Analyzed	Method	Notes
IA4 (E305083-04) Vapor Sampled: 16-May-13 Received: 20-May-13									
Trichloroethene	ND	0.55	"	"	"	"	"	"	
1,2-Dichloropropane	ND	0.47	"	"	"	"	"	"	
Bromodichloromethane	ND	0.68	"	"	"	"	"	"	
cis-1,3-Dichloropropene	ND	0.46	"	"	"	"	"	"	
4-Methyl-2-pentanone (MIBK)	ND	0.83	"	"	"	"	"	"	
trans-1,3-Dichloropropene	ND	0.46	"	"	"	"	"	"	
Toluene	**2.6**	0.76	"	"	"	"	"	"	
1,1,2-Trichloroethane	ND	0.55	"	"	"	"	"	"	
2-Hexanone (MBK)	ND	0.83	"	"	"	"	"	"	
Dibromochloromethane	ND	0.86	"	"	"	"	"	"	
Tetrachloroethene	ND	0.69	"	"	"	"	"	"	
1,2-Dibromoethane (EDB)	ND	0.78	"	"	"	"	"	"	
1,1,1,2-Tetrachloroethane	ND	0.70	"	"	"	"	"	"	
Chlorobenzene	ND	0.47	"	"	"	"	"	"	
Ethylbenzene	**0.45**	0.44	"	"	"	"	"	"	
m,p-Xylene	**1.4**	0.44	"	"	"	"	"	"	
Styrene	**0.65**	0.43	"	"	"	"	"	"	
o-Xylene	**0.55**	0.44	"	"	"	"	"	"	
Bromoform	ND	1.0	"	"	"	"	"	"	
1,1,2,2-Tetrachloroethane	ND	0.70	"	"	"	"	"	"	
4-Ethyltoluene	ND	0.50	"	"	"	"	"	"	
1,3,5-Trimethylbenzene	ND	0.50	"	"	"	"	"	"	
1,2,4-Trimethylbenzene	**0.55**	0.50	"	"	"	"	"	"	
1,3-Dichlorobenzene	ND	0.61	"	"	"	"	"	"	
1,4-Dichlorobenzene	ND	0.61	"	"	"	"	"	"	
1,2-Dichlorobenzene	ND	0.61	"	"	"	"	"	"	
1,2,4-Trichlorobenzene	ND	0.75	"	"	"	"	"	"	
Hexachlorobutadiene	ND	2.1	"	"	"	"	"	"	
Surrogate: 1,2-Dichloroethane-d4		*84.4 %*	*76-134*		*"*	*"*	*"*	*"*	
Surrogate: Toluene-d8		*101 %*	*78-125*		*"*	*"*	*"*	*"*	
Surrogate: 4-Bromofluorobenzene		*101 %*	*77-127*		*"*	*"*	*"*	*"*	

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Atlas Geo-Sampling Company 120 Nottaway Lane Alpharetta, GA 30009	Project: AG052013-13 Project Number: PS Roswell Rd. / 4910 Roswell Rd. Project Manager: Mr. Jim Fineis	Reported: 23-May-13 11:41

Volatile Organic Compounds by EPA TO-15

H&P Mobile Geochemistry, Inc.

Analyte	Result	Reporting Limit	Units	Dilution Factor	Batch	Prepared	Analyzed	Method	Notes
IA5 (E305083-05) Vapor Sampled: 16-May-13 Received: 20-May-13									
Dichlorodifluoromethane (F12)	**3.4**	1.0	ug/m3	1	EE32209	22-May-13	22-May-13	EPA TO-15	
Chloromethane	**1.5**	0.21	"	"	"	"	"	"	
Dichlorotetrafluoroethane (F114)	ND	0.71	"	"	"	"	"	"	
Vinyl chloride	ND	0.13	"	"	"	"	"	"	
Bromomethane	ND	0.39	"	"	"	"	"	"	
Chloroethane	ND	0.27	"	"	"	"	"	"	
Trichlorofluoromethane (F11)	**22**	0.56	"	"	"	"	"	"	
Acetone	**250**	1.2	"	"	"	"	"	"	E
1,1-Dichloroethene	ND	0.40	"	"	"	"	"	"	
1,1,2-Trichlorotrifluoroethane (F113)	**16**	0.77	"	"	"	"	"	"	
Methylene chloride (Dichloromethane)	**0.62**	0.35	"	"	"	"	"	"	
Carbon disulfide	ND	0.32	"	"	"	"	"	"	
trans-1,2-Dichloroethene	ND	0.40	"	"	"	"	"	"	
1,1-Dichloroethane	ND	0.41	"	"	"	"	"	"	
2-Butanone (MEK)	**2.3**	0.60	"	"	"	"	"	"	
cis-1,2-Dichloroethene	ND	0.40	"	"	"	"	"	"	
Chloroform	**1.0**	0.25	"	"	"	"	"	"	
1,1,1-Trichloroethane	**3.1**	0.55	"	"	"	"	"	"	
1,2-Dichloroethane (EDC)	ND	0.41	"	"	"	"	"	"	
Benzene	**0.82**	0.16	"	"	"	"	"	"	
Carbon tetrachloride	**0.43**	0.32	"	"	"	"	"	"	
Trichloroethene	ND	0.55	"	"	"	"	"	"	
1,2-Dichloropropane	ND	0.47	"	"	"	"	"	"	
Bromodichloromethane	ND	0.68	"	"	"	"	"	"	
cis-1,3-Dichloropropene	ND	0.46	"	"	"	"	"	"	
4-Methyl-2-pentanone (MIBK)	ND	0.83	"	"	"	"	"	"	
trans-1,3-Dichloropropene	ND	0.46	"	"	"	"	"	"	
Toluene	**4.0**	0.76	"	"	"	"	"	"	
1,1,2-Trichloroethane	ND	0.55	"	"	"	"	"	"	
2-Hexanone (MBK)	ND	0.83	"	"	"	"	"	"	
Dibromochloromethane	ND	0.86	"	"	"	"	"	"	
Tetrachloroethene	**3.1**	0.69	"	"	"	"	"	"	
1,2-Dibromoethane (EDB)	ND	0.78	"	"	"	"	"	"	
1,1,1,2-Tetrachloroethane	ND	0.70	"	"	"	"	"	"	
Chlorobenzene	ND	0.47	"	"	"	"	"	"	
Ethylbenzene	**0.92**	0.44	"	"	"	"	"	"	
m,p-Xylene	**2.6**	0.44	"	"	"	"	"	"	
Styrene	**2.0**	0.43	"	"	"	"	"	"	

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Atlas Geo-Sampling Company 120 Nottaway Lane Alpharetta, GA 30009	Project: AG052013-13 Project Number: PS Roswell Rd. / 4910 Roswell Rd. Project Manager: Mr. Jim Fineis	Reported: 23-May-13 11:41

Volatile Organic Compounds by EPA TO-15

H&P Mobile Geochemistry, Inc.

Analyte	Result	Reporting Limit	Units	Dilution Factor	Batch	Prepared	Analyzed	Method	Notes
IA5 (E305083-05) Vapor Sampled: 16-May-13 Received: 20-May-13									
o-Xylene	**0.88**	0.44	"	"	"	"	"	"	
Bromoform	ND	1.0	"	"	"	"	"	"	
1,1,2,2-Tetrachloroethane	ND	0.70	"	"	"	"	"	"	
4-Ethyltoluene	ND	0.50	"	"	"	"	"	"	
1,3,5-Trimethylbenzene	ND	0.50	"	"	"	"	"	"	
1,2,4-Trimethylbenzene	**0.51**	0.50	"	"	"	"	"	"	
1,3-Dichlorobenzene	ND	0.61	"	"	"	"	"	"	
1,4-Dichlorobenzene	ND	0.61	"	"	"	"	"	"	
1,2-Dichlorobenzene	ND	0.61	"	"	"	"	"	"	
1,2,4-Trichlorobenzene	ND	0.75	"	"	"	"	"	"	
Hexachlorobutadiene	ND	2.1	"	"	"	"	"	"	
Surrogate: 1,2-Dichloroethane-d4		*102 %*	*76-134*		"	"	"	"	
Surrogate: Toluene-d8		*102 %*	*78-125*		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		*102 %*	*77-127*		"	"	"	"	
IA6 (E305083-06) Vapor Sampled: 16-May-13 Received: 20-May-13									
Dichlorodifluoromethane (F12)	**3.1**	1.0	ug/m3	1	EE32209	22-May-13	22-May-13	EPA TO-15	
Chloromethane	**1.5**	0.21	"	"	"	"	"	"	
Dichlorotetrafluoroethane (F114)	ND	0.71	"	"	"	"	"	"	
Vinyl chloride	ND	0.13	"	"	"	"	"	"	
Bromomethane	ND	0.39	"	"	"	"	"	"	
Chloroethane	ND	0.27	"	"	"	"	"	"	
Trichlorofluoromethane (F11)	**23**	0.56	"	"	"	"	"	"	
Acetone	**36**	1.2	"	"	"	"	"	"	
1,1-Dichloroethene	ND	0.40	"	"	"	"	"	"	
1,1,2-Trichlorotrifluoroethane (F113)	**1.2**	0.77	"	"	"	"	"	"	
Methylene chloride (Dichloromethane)	**0.42**	0.35	"	"	"	"	"	"	
Carbon disulfide	ND	0.32	"	"	"	"	"	"	
trans-1,2-Dichloroethene	ND	0.40	"	"	"	"	"	"	
1,1-Dichloroethane	ND	0.41	"	"	"	"	"	"	
2-Butanone (MEK)	**2.0**	0.60	"	"	"	"	"	"	
cis-1,2-Dichloroethene	ND	0.40	"	"	"	"	"	"	
Chloroform	**0.49**	0.25	"	"	"	"	"	"	
1,1,1-Trichloroethane	ND	0.55	"	"	"	"	"	"	
1,2-Dichloroethane (EDC)	ND	0.41	"	"	"	"	"	"	
Benzene	**0.61**	0.16	"	"	"	"	"	"	
Carbon tetrachloride	**0.42**	0.32	"	"	"	"	"	"	

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Atlas Geo-Sampling Company 120 Nottaway Lane Alpharetta, GA 30009	Project: AG052013-13 Project Number: PS Roswell Rd. / 4910 Roswell Rd. Project Manager: Mr. Jim Fineis	Reported: 23-May-13 11:41

Volatile Organic Compounds by EPA TO-15

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Analyte	Result	Reporting Limit	Units	Dilution Factor	Batch	Prepared	Analyzed	Method	Notes
IA6 (E305083-06) Vapor Sampled: 16-May-13 Received: 20-May-13									
Trichloroethene	ND	0.55	"	"	"	"	"	"	
1,2-Dichloropropane	ND	0.47	"	"	"	"	"	"	
Bromodichloromethane	ND	0.68	"	"	"	"	"	"	
cis-1,3-Dichloropropene	ND	0.46	"	"	"	"	"	"	
4-Methyl-2-pentanone (MIBK)	ND	0.83	"	"	"	"	"	"	
trans-1,3-Dichloropropene	ND	0.46	"	"	"	"	"	"	
Toluene	**2.8**	0.76	"	"	"	"	"	"	
1,1,2-Trichloroethane	ND	0.55	"	"	"	"	"	"	
2-Hexanone (MBK)	ND	0.83	"	"	"	"	"	"	
Dibromochloromethane	ND	0.86	"	"	"	"	"	"	
Tetrachloroethene	**1.2**	0.69	"	"	"	"	"	"	
1,2-Dibromoethane (EDB)	ND	0.78	"	"	"	"	"	"	
1,1,1,2-Tetrachloroethane	ND	0.70	"	"	"	"	"	"	
Chlorobenzene	ND	0.47	"	"	"	"	"	"	
Ethylbenzene	ND	0.44	"	"	"	"	"	"	
m,p-Xylene	**1.2**	0.44	"	"	"	"	"	"	
Styrene	ND	0.43	"	"	"	"	"	"	
o-Xylene	ND	0.44	"	"	"	"	"	"	
Bromoform	ND	1.0	"	"	"	"	"	"	
1,1,2,2-Tetrachloroethane	ND	0.70	"	"	"	"	"	"	
4-Ethyltoluene	ND	0.50	"	"	"	"	"	"	
1,3,5-Trimethylbenzene	ND	0.50	"	"	"	"	"	"	
1,2,4-Trimethylbenzene	**0.65**	0.50	"	"	"	"	"	"	
1,3-Dichlorobenzene	ND	0.61	"	"	"	"	"	"	
1,4-Dichlorobenzene	ND	0.61	"	"	"	"	"	"	
1,2-Dichlorobenzene	ND	0.61	"	"	"	"	"	"	
1,2,4-Trichlorobenzene	ND	0.75	"	"	"	"	"	"	
Hexachlorobutadiene	ND	2.1	"	"	"	"	"	"	
Surrogate: 1,2-Dichloroethane-d4		*101 %*		*76-134*	"	"	"	"	
Surrogate: Toluene-d8		*104 %*		*78-125*	"	"	"	"	
Surrogate: 4-Bromofluorobenzene		*101 %*		*77-127*	"	"	"	"	

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Atlas Geo-Sampling Company	Project: AG052013-13	
120 Nottaway Lane	Project Number: PS Roswell Rd. / 4910 Roswell Rd.	Reported:
Alpharetta, GA 30009	Project Manager: Mr. Jim Fineis	23-May-13 11:41

Volatile Organic Compounds by EPA TO-15 - Quality Control
H&P Mobile Geochemistry, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch EE32209 - TO-15										
Blank (EE32209-BLK1)				Prepared & Analyzed: 22-May-13						
Dichlorodifluoromethane (F12)	ND	1.0	ug/m3							
Chloromethane	ND	0.21	"							
Dichlorotetrafluoroethane (F114)	ND	0.71	"							
Vinyl chloride	ND	0.13	"							
Bromomethane	ND	0.39	"							
Chloroethane	ND	0.27	"							
Trichlorofluoromethane (F11)	ND	0.56	"							
Acetone	ND	1.2	"							
1,1-Dichloroethene	ND	0.40	"							
1,1,2-Trichlorotrifluoroethane (F113)	ND	0.77	"							
Methylene chloride (Dichloromethane)	ND	0.35	"							
Carbon disulfide	ND	0.32	"							
trans-1,2-Dichloroethene	ND	0.40	"							
1,1-Dichloroethane	ND	0.41	"							
2-Butanone (MEK)	ND	0.60	"							
cis-1,2-Dichloroethene	ND	0.40	"							
Chloroform	ND	0.25	"							
1,1,1-Trichloroethane	ND	0.55	"							
1,2-Dichloroethane (EDC)	ND	0.41	"							
Benzene	ND	0.16	"							
Carbon tetrachloride	ND	0.32	"							
Trichloroethene	ND	0.55	"							
1,2-Dichloropropane	ND	0.47	"							
Bromodichloromethane	ND	0.68	"							
cis-1,3-Dichloropropene	ND	0.46	"							
4-Methyl-2-pentanone (MIBK)	ND	0.83	"							
trans-1,3-Dichloropropene	ND	0.46	"							
Toluene	ND	0.76	"							
1,1,2-Trichloroethane	ND	0.55	"							
2-Hexanone (MBK)	ND	0.83	"							
Dibromochloromethane	ND	0.86	"							
Tetrachloroethene	ND	0.69	"							
1,2-Dibromoethane (EDB)	ND	0.78	"							
1,1,1,2-Tetrachloroethane	ND	0.70	"							

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Volatile Organic Compounds by EPA TO-15 - Quality Control
H&P Mobile Geochemistry, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch EE32209 - TO-15										
Blank (EE32209-BLK1)				Prepared & Analyzed: 22-May-13						
Chlorobenzene	ND	0.47	ug/m3							
Ethylbenzene	ND	0.44	"							
m,p-Xylene	ND	0.44	"							
Styrene	ND	0.43	"							
o-Xylene	ND	0.44	"							
Bromoform	ND	1.0	"							
1,1,2,2-Tetrachloroethane	ND	0.70	"							
4-Ethyltoluene	ND	0.50	"							
1,3,5-Trimethylbenzene	ND	0.50	"							
1,2,4-Trimethylbenzene	ND	0.50	"							
1,3-Dichlorobenzene	ND	0.61	"							
1,4-Dichlorobenzene	ND	0.61	"							
1,2-Dichlorobenzene	ND	0.61	"							
1,2,4-Trichlorobenzene	ND	0.75	"							
Hexachlorobutadiene	ND	2.1	"							
Surrogate: 1,2-Dichloroethane-d4	*233*		*"*	*214*		*109*	*76-134*			
Surrogate: Toluene-d8	*208*		*"*	*207*		*101*	*78-125*			
Surrogate: 4-Bromofluorobenzene	*363*		*"*	*364*		*99.6*	*77-127*			
LCS (EE32209-BS1)				Prepared & Analyzed: 22-May-13						
Dichlorodifluoromethane (F12)	10	1.0	ug/m3	10.1		99.1	65-135			
Vinyl chloride	4.4	0.13	"	5.20		84.3	65-135			
Chloroethane	4.8	0.27	"	5.36		88.9	65-135			
Trichlorofluoromethane (F11)	10	0.56	"	11.3		92.7	65-135			
1,1-Dichloroethene	7.1	0.40	"	8.08		88.1	65-135			
1,1,2-Trichlorotrifluoroethane (F113)	14	0.77	"	15.5		88.4	65-135			
Methylene chloride (Dichloromethane)	5.9	0.35	"	7.08		83.9	65-135			
trans-1,2-Dichloroethene	6.8	0.40	"	8.08		84.0	65-135			
1,1-Dichloroethane	7.6	0.41	"	8.24		91.7	65-135			
cis-1,2-Dichloroethene	6.6	0.40	"	8.00		82.0	65-135			
Chloroform	8.7	0.25	"	9.92		87.2	65-135			
1,1,1-Trichloroethane	9.8	0.55	"	11.1		88.3	65-135			
1,2-Dichloroethane (EDC)	7.4	0.41	"	8.24		89.9	65-135			

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Atlas Geo-Sampling Company	Project:	AG052013-13	
120 Nottaway Lane	Project Number:	PS Roswell Rd. / 4910 Roswell Rd.	Reported:
Alpharetta, GA 30009	Project Manager:	Mr. Jim Fineis	23-May-13 11:41

Volatile Organic Compounds by EPA TO-15 - Quality Control
H&P Mobile Geochemistry, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch EE32209 - TO-15										
LCS (EE32209-BS1)				Prepared & Analyzed: 22-May-13						
Benzene	5.3	0.16	ug/m3	6.48		82.0	65-135			
Carbon tetrachloride	11	0.32	"	12.8		89.8	65-135			
Trichloroethene	9.8	0.55	"	11.0		89.0	65-135			
Toluene	6.2	0.76	"	7.68		80.3	65-135			
1,1,2-Trichloroethane	8.9	0.55	"	11.1		80.1	65-135			
Tetrachloroethene	11	0.69	"	13.8		81.6	65-135			
1,1,1,2-Tetrachloroethane	11	0.70	"	14.0		80.2	65-135			
Ethylbenzene	7.6	0.44	"	8.84		85.7	65-135			
m,p-Xylene	15	0.44	"	17.7		86.4	65-135			
o-Xylene	7.9	0.44	"	8.84		89.0	65-135			
1,1,2,2-Tetrachloroethane	12	0.70	"	14.0		83.0	65-135			
Surrogate: 1,2-Dichloroethane-d4	*236*		*"*	*214*		*110*	*76-134*			
Surrogate: Toluene-d8	*210*		*"*	*207*		*101*	*78-125*			
Surrogate: 4-Bromofluorobenzene	*384*		*"*	*364*		*105*	*77-127*			
LCS Dup (EE32209-BSD1)				Prepared & Analyzed: 22-May-13						
Dichlorodifluoromethane (F12)	9.9	1.0	ug/m3	10.1		98.5	65-135	0.655	35	
Vinyl chloride	5.0	0.13	"	5.20		95.4	65-135	12.3	35	
Chloroethane	4.8	0.27	"	5.36		89.9	65-135	1.06	35	
Trichlorofluoromethane (F11)	11	0.56	"	11.3		93.6	65-135	0.963	35	
1,1-Dichloroethene	7.1	0.40	"	8.08		88.4	65-135	0.339	35	
1,1,2-Trichlorotrifluoroethane (F113)	14	0.77	"	15.5		88.1	65-135	0.282	35	
Methylene chloride (Dichloromethane)	6.1	0.35	"	7.08		86.0	65-135	2.58	35	
trans-1,2-Dichloroethene	6.8	0.40	"	8.08		84.0	65-135	0.00	35	
1,1-Dichloroethane	7.5	0.41	"	8.24		90.4	65-135	1.42	35	
cis-1,2-Dichloroethene	6.6	0.40	"	8.00		82.9	65-135	1.16	35	
Chloroform	8.6	0.25	"	9.92		87.0	65-135	0.228	35	
1,1,1-Trichloroethane	9.6	0.55	"	11.1		86.7	65-135	1.81	35	
1,2-Dichloroethane (EDC)	7.2	0.41	"	8.24		86.9	65-135	3.49	35	
Benzene	5.2	0.16	"	6.48		79.7	65-135	2.84	35	
Carbon tetrachloride	11	0.32	"	12.8		86.8	65-135	3.39	35	
Trichloroethene	9.5	0.55	"	11.0		87.0	65-135	2.26	35	
Toluene	6.1	0.76	"	7.68		78.9	65-135	1.75	35	

H&P Mobile
Geochemistry Inc.

2470 Impala Drive
Carlsbad, CA 92010
760-804-9678 Phone
760-804-9159 Fax

Atlas Geo-Sampling Company	Project: AG052013-13	
120 Nottaway Lane	Project Number: PS Roswell Rd. / 4910 Roswell Rd.	Reported:
Alpharetta, GA 30009	Project Manager: Mr. Jim Fineis	23-May-13 11:41

Volatile Organic Compounds by EPA TO-15 - Quality Control

H&P Mobile Geochemistry, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch EE32209 - TO-15										
LCS Dup (EE32209-BSD1)				Prepared & Analyzed: 22-May-13						
1,1,2-Trichloroethane	8.8	0.55	ug/m3	11.1		79.5	65-135	0.746	35	
Tetrachloroethene	11	0.69	"	13.8		78.9	65-135	3.41	35	
1,1,1,2-Tetrachloroethane	11	0.70	"	14.0		79.4	65-135	0.998	35	
Ethylbenzene	7.5	0.44	"	8.84		85.1	65-135	0.757	35	
m,p-Xylene	15	0.44	"	17.7		84.6	65-135	2.12	35	
o-Xylene	7.6	0.44	"	8.84		86.3	65-135	3.12	35	
1,1,2,2-Tetrachloroethane	11	0.70	"	14.0		80.9	65-135	2.55	35	
Surrogate: 1,2-Dichloroethane-d4	*233*		*"*	*214*		*109*	*76-134*			
Surrogate: Toluene-d8	*208*		*"*	*207*		*100*	*78-125*			
Surrogate: 4-Bromofluorobenzene	*382*		*"*	*364*		*105*	*77-127*			

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Alpharetta, GA 30009	Project Manager:	Mr. Jim Fineis	23-May-13 11:41

Notes and Definitions

E	The concentration indicated for this analyte is an estimated value above the calibration range of the instrument. This value is considered an estimate (CLP E-flag).
DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference

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120 Nottaway Lane	Project Number:	PS Roswell Rd. / 4910 Roswell Rd.	Reported:
Alpharetta, GA 30009	Project Manager:	Mr. Jim Fineis	23-May-13 11:41

Appendix

H&P Mobile Geochemistry, Inc. is approved as an Environmental Testing Laboratory (Certification # L11-175) in accordance with the DoD-ELAP program. H&P is approved as an Environmental Laboratory in conformance with the Environmental Laboratory Accreditation Program (CA) for the category of Volatile and Semi-Volatile Organic Chemistry of Hazardous Waste for the following methods:

Certificate# 2741, 2743, 2579, 2754 & 2740 approved for EPA 8260 and LUFT GC/MS
Certificate# 2742, 2745, & 2741 approved for LUFT
Certificate# 2745 & 2742 approved for EPA 418.1

H&P Mobile Geochemistry, Inc. is approved as an Environmental Laboratory in conformance with the National Environmental Accreditation Conference Standards for the category Environmental Analysis Air and Emissions for the following analytes and methods:

1,2,4-Trichlorobenzene by EPA TO-15 & TO-14A
Hexachlorobutadiene by EPA TO-15 & TO-14A
Bromodichloromethane by EPA TO-15 & TO-14A
1,2-Dichlorobenzene by EPA TO-15 & TO-14A
Dichlorotetrafluoroethane by EPA TO-14A
1,4-Dichlorobenzene by EPA TO-15 & TO-14A
Benzene by EPA TO-15 & TO-14A
Chlorobenzene by EPA TO-15 & TO-14A
Ethyl benzene by EPA TO-15 & TO-14A
Styrene by EPA TO-15 & TO-14A
Toluene by EPA TO-15 & TO-14A
Total Xylenes by EPA TO-15 & TO-14A
1,1,1-Trichloroethane by EPA TO-15 & TO-14A
1,1,2,2-Tetrachloroethane by EPA TO-15 & TO-14A
1,1,2-Trichloroethane by EPA TO-15 & TO-14A
1,1-Dichloroethane by EPA TO-15 & TO-14A
1,1-Dichloroethene by EPA TO-15 & TO-14A
1,2-Dichloroethane by EPA TO-15 & TO-14A
1,2-Dichloropropane by EPA TO-15 & TO-14A
Benzyl Chloride by EPA TO-15 & TO-14A
Bromoform by EPA TO-15
Bromomethane by EPA TO-15 & TO-14A
Carbon tetrachloride by EPA TO-15 & TO-14A
Chloroethane by EPA TO-15 & TO-14A
Chloroform by EPA TO-15 & TO-14A
Chloromethane by EPA TO-15 & TO-14A
cis-1,2-Dichloroethene by EPA TO-15 & TO-14A
cis-1,3-Dichloropropene by EPA TO-15 & TO-14A
Methylene chloride by EPA TO -15 & TO-14A
Tetrachloroethane by EPA TO-15 & TO-14A
trans-1,2-Dichloroethene by EPA TO-15
trans-1,3-Dichloropropene by EPA TO-15 & TO-14A
Trichloroethene by EPA TO-15 & TO-14A
Vinyl chloride by EPA TO -15 & TO-14A
2-Butanone by EPA TO-15
4-Methyl-2-Pentanone by EPA TO-15
Hexane by EPA TO-15
Methyl tert-butyl ether by EPA TO-15
Vinyl acetate by EPA TO-15
Dibromochloromethane by EPA TO-15
1,3-Dichlorobenzene by EPA TO-15 & TO-14A
Trichlorofluoromethane by EPA TO-14A
Naphthalene by H&P SOP TO-15/GC-MS
1,2-Dibromoethane (EDB) by EPA TO-15 & TO-14A
1,2-Dibromo-3-chloropropane by EPA TO-15
1,3-Butadiene by EPA TO-15
1,1,2-Trichlorotrifluoroethane by EPA TO-15 & TO-14A
Carbon disulfide by EPA TO-15
1,4-Dioxane by EPA TO-15

This certification applies to samples analyzed in summa canisters.

Chain of Custody Record

H&P Mobile Geochemistry, Inc.

☐ 2470 Impala Dr., Carlsbad, CA 92010 • ph 760.804.9678 • fax 760.804.9159
☐ 1855 Coronado Ave., Signal Hill, CA 90755 • ph 800.834.9888

Date:
H&P Project # AG052013-13
Outside Lab:

Client: ~~[illegible]~~ Atlas Geo Sampling
Address: 120 Mittamos Ln, Alpharetta, GA 30009
Email: JimFinels @ atlasgeo.com

Collector: Jim Finels
Client Project #: PS Roswell Rd
Location: 4916 Roswell Rd
Phone: 770 885 3372 Fax:

Page: 1 of 1
Project Contact:
5/22: 1130 - RUSH REQUESTED.
Turn around time: 24 HOURS (5/23)

Geotracker EDF: Yes ☐ No ☐
Global ID:
Excel EDD: Yes ☐ No ☐

Sample Receipt
Intact: ☑ Yes ☐ No
Seal Intact: ☐ Yes ☐ No ☑ N/A
Cold: ☐ Yes ☐ No ☑ N/A
Temperature: RT

Special Instructions: Hold until released - Suzie is ~~[illegible]~~ aware of this
UPS TRACK# 1Z 93T T61 01 4745 4202
1Z 93T T61 84 4641 7429

Lab Work Order #: E305083

SOIL/GW: 8260B Full List; 8260B ☐ BTEX/OXY ☐ TPH gas; LUFT/8015M TPH ☐ g ☐ d ☐ ext; 418.1 TRPH

SOIL VAPOR/AIR ANALYSIS: VOC's: Full List ☐ 8260B ☐ TO-15; VOC's: Short List/DTSC ☐ 8260B ☑ TO-15; VOC's: SAM, 8260B ☐ SAM A ☐ SAM B; Naphthalene ☐ 8260B ☐ TO-15; Oxygenates ☐ 8260B ☐ TO-15; TPHv gas ☐ 8260B ☐ TO-15; Ketones ☐ 8260B ☐ TO-15; Other ☐ 8260B ☐ TO-15; Leak Check Compound ☐ 1,1 DFA ☐ OTHER; Methane; Fixed Gases ☐ CO2 ☐ O2 ☐ N2

Sample Name	Field Point Name	Purge Vol	Time	Date	Sample Type	Container Type	Total # of containers	8260B Full List	8260B	LUFT/8015M TPH	418.1 TRPH	VOC's: Full List	VOC's: Short List/DTSC	VOC's: SAM, 8260B	Naphthalene	Oxygenates	TPHv gas	Ketones	Other	Leak Check Compound	Methane	Fixed Gases	CAN#	VAC#
IA1	Kroger	N/A		5-16-13	IA	6L Summa	1						/										5T012	-1.7
IA2	Kroger	↓		↓	↓	6L Summa	1						/										5T026	-2.0
IA3	Wine					"	1						/										347	-2.2
IA4	Open					"	1						/										345	-3.1
IA5	Coin 3 Hg		1835			"	1						/										305	-2.1
IA6	ARTS	↓		↓	↓	"	1						/										289	-2.2

Approved/Relinquished by: (Signature)	(company)	Received by: (Signature)	(company)	Date	Time
[signature]	Atlas			5-17-13	9 26 AM
		S Martin	H&P	5-20-13	1020

*Signature constitutes authorization to proceed with analysis and acceptance of condition on back.

Sample disposal instruction: ☐ Disposal ☐ Return to client ☐ Pickup

H&P Mobile Geochemistry Inc.

Air Sampling into Summa (Indoor, Outdoor, Ambient)

Site Address: 4410 Roswell Road

Project Name: PS Roswell Rd

Sample Collector: Jim Finetts

Date: 5-16-13

Arrival Time: 8 30 am

Departure Time: 7 45 pm

	Sample Information					Sample Start		Sample Check		Sample Check		Sample End		Field Notes
	Sample ID	Date	Summa ID #	Flow Controller ID #	Flow Rate (hrs or cc/min)	Start Time	Initial Vacuum (" Hg)	Check Time	Check Vacuum (" Hg)	Check Time	Check Vacuum (" Hg)	End Time	End Vacuum (" Hg)	
1	IA1	5-16-13				1020	30		10			1820	3	Kroger
2	IA2					1025	30		10			1825	4	Kroger
3	IA3					1130	30		9			1915	2	Beer
4	IA4					1000	30		11			1815	3	Open
5	IA5					955	30		10			1805	4	Coin
6	IA6					1110	30		9			1910	5	ARTS
7														
8														
9														
10														

Weather Conditions

Weather Summary: Sunny

Barometric Pressure:

Ambient Temp Avg:

Ambient Temp High/Low: 88/68

Indoor Air Temp Avg: 72

Wind Speed/Direction: N/A

Other:

Potential Outdoor Sources of Pollution

Source	*Location*

Household Products

Type	*Ingredient(s)*

APPENDIX E
PROFESSIONAL QUALIFICATIONS

BRANT TEETS
SENIOR PROJECT MANAGER

EDUCATION	B.S. Earth Sciences, 1997 State University of New York College at Brockport Brockport, New York
ACCREDITATIONS	40 Hour OSHA Hazardous Materials Training; Asbestos in Buildings: Air Sampling and Analysis (NIOSH 582 Equivalent); Asbestos in Buildings: Inspection and Assessment; Asbestos in Buildings: The Management Plan; Lead Inspector: EPA (Target Housing and Child-Occupied Facilities); Landfill Gas System Technician Training

SUMMARY OF QUALIFICATIONS

Mr. Teets has over thirteen years of advanced education, training and experience in environmental site assessments, oversight/management/monitoring of large asbestos abatement projects, AHERA inspections and management plans, hydrological investigations, and site remediation for private and municipal sites throughout the United States. Mr. Teets' experience includes involvement in different phases of hazardous waste investigation projects involving: soil and groundwater assessments; use of conventional and innovative treatment technologies to remediate contaminated media; hydrogeological investigations; regulatory negotiation and compliance; and design and operation of groundwater/soil remediation systems.

REPRESENTATIVE PROJECT EXPERIERNCE

Phase I ESAs – Nationwide

Projects typically include conducting on-site evaluations for the presence/absence of environmental concerns, conducting regulatory records research, and reviewing historical documentation of the subject property. Property types range from undeveloped rural land to complex industrial facilities in developed urban areas.

Phase II ESAs – Nationwide

Projects typically include conducting subsurface evaluations to determine the presence/absence of soil/ groundwater contamination. Subsurface evaluations are typically accomplished by installing borings in areas of concern and collecting soil, vapor, and/or groundwater samples for submittal to an accredited laboratory for appropriate analysis.

Site Remediation Projects – Southeastern United States

Projects typically include overseeing and/or conducting various remedial activities at contaminated sites. Remedial activities may include excavation and removal of contaminated media, implementation and operation of various soil/groundwater remediation systems, or in-situ remediation via injection of a biological or chemical treatment to the subsurface. Remediation is typically performed until regulatory closure is granted.

Asbestos Abatement Projects – Various sites in Georgia

Projects typically include preparation of Asbestos Abatement Specifications, oversight and management of abatement process to ensure abatement is performed in accordance with applicable state and federal regulations, air monitoring during abatement, and final clearance air sampling and analysis at completion of abatement activities. Clients include commercial, municipal, and education (K-12).

Appendix I

Compliance Status Report & Progress Report - Electronic Copy (Compact Disc)