UNIVERSITY OF GEORGIA

Environmental Safety Division
Building # 2118
240A Riverbend Road
Athens, Georgia 30602-8002
TEL 706-542-5801 | FAX 706-542-0108
www.esd.uga.edu

May 31, 2022

Ms. Emilea Dukes, Program Manager
Treatment and Storage Program
Georgia Department of Natural Resources
Environmental Protection Division
Suite 1456, East Tower
2 Martin Luther King, Jr. Dr. SE, Suite 1154
Atlanta, GA 30334-9000

Re: 100% Final Corrective Action Design

Dear Ms. Dukes:

Please find enclosed the University of Georgia's (UGA) 100% Final Corrective Action Design for the Milledge Avenue Landfill. This report is required pursuant to Hazardous Waste Permit No. HW-041(CA). The final design builds on the interim designs we have previously provided to EPD and describes aggressive actions that UGA will implement to address contamination at the Milledge Avenue Landfill. The corrective action is structured in a phased approach with certain action's contingent on the success of previous phases.

In accordance with the Georgia Rules for Hazardous Waste Management 391-3-11.11, §270.11, I certify under penalty of law that this document and all attachments were prepared under my direction or supervision according to 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 the 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.

If you have any questions or concerns, please contact Jim Ussery at 404-374-8620.

Sincerely,

John McCollum
Associate Vice President for Environmental Safety

Enclosures

100% REMEDIAL DESIGN FOR CORRECTIVE ACTION

Milledge Avenue Site
University of Georgia
Athens, Georgia
May 31, 2022

PREPARED FOR:

Mr. Jim Ussery, P.E.
Environmental Safety Division
University of Georgia
240A Riverbend Road
Athens, Georgia 30602

PREPARED BY:

Resolute
Environmental & Water Resources Consulting

1003 Weatherstone Parkway, Suite 320
Woodstock, Georgia 30188

Resolute
Environmental & Water Resources Consulting

1003 Weatherstone Parkway, Suite 320
Woodstock, GA 30188
Telephone: 678-398-9942
Fax: 888-881-8219

Ms. Emilea Dukes
Program Manager, Treatment and Storage Unit
Hazardous Waste Management and Remediation Program
Land Protection Branch
Georgia Environmental Protection Division
2 Martin Luther King, Jr. Drive, SE,
Suite 1054 East Floyd Tower
Atlanta, Georgia 30334

Subject: Final Remedial Design
Milledge Avenue Site, University of Georgia

Dear Ms. Dukes:

On behalf of the University of Georgia (UGA), Resolute Environmental & Water Resources Consulting, LLC (Resolute) is pleased to present this Final Remedial Design for the UGA Milledge Avenue Site in Athens, Georgia. This work was performed in accordance with the requirements presented in UGA's Hazardous Waste Facility Permit [Permit No. HW-041(CA), EPA ID No. GAD073460941], dated December 17, 2019, and the *Pilot Study Work Plan* dated October 23, 2020.

Should you have any questions or comments, or require additional information, please contact the undersigned at (678) 398-9942.

Sincerely,
Resolute Environmental & Water Resources Consulting, LLC

Tommy A. Jordan, P.G., PMP
Senior Project Manager

Stephen K. Wilson, P.G.
Principal

Attachments

cc: John McCollum, UGA
Jim Ussery, UGA

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ACRONYM LIST

ACL	Alternative Concentration Limit
ASTM	American Society for Testing and Materials
BASP	Base Activated Sodium Persulfate
bgs	Below Ground Surface
CAP	Corrective Action Plan
CB	Cement Bentonite
CCl_4	Carbon Tetrachloride
cm/sec	centimeters per second
COC	Constituents of Concern
CSM	Conceptual Site Model
DO	Dissolved Oxygen
DPT	Direct Push Technology
DQO	Data Quality Objective
EC	Electrical Conductivity
EPA	Environmental Protection Agency
EPD	Environmental Protection Division
ft/sec	feet per second
GWPS	Groundwater Protection Standards
HL	Hydrated Lime
HPT	Hydraulic Profiling Tool
HRSC	High Resolution Site Characterization
ISBR	In-Situ Biological Remediation
ISCO	In-Situ Chemical Oxidation
ISCR	In-Situ Chemical Reduction
K	Hydraulic Conductivity
KP	Potassium Persulfate
MASW	Multichannel Analysis of Surface Waves
MCL	Maximum Concentration Limit
MFR	Modified Fenton's Reagent
ml/min	milliliters per minute
mS/m	millisiemens per meter
ORP	Oxygen Reduction Potential
POC	Point of Compliance
POE	Point of Exposure
PRB	Permeable Reactive Barrier
PSWP	Pilot Study Workplan
PWR	Partially Weathered Rock
RCRA	Resource Conservation and Recovery Act
ROI	Radius of Influence
SOD	Soil Oxidant Demand
SP	Sodium Persulfate
SWMU	Solid Waste Management Unit
TMW	Temporary Monitoring Well
TOC	Total Organic Carbon
ug/L	micrograms per liter
ug/m3	micrograms per meter cubed
ug/m^3	microgram per cubic meter
UIC	Underground Injection Control
VOC	Volatile Organic Compound
Vs	Shear Wave Velocity

CERTIFICATION

I certify that I am a qualified groundwater scientist who has received a baccalaureate or post-graduate degree in the natural sciences or engineering, and have sufficient training and experience in groundwater hydrology and related fields, as demonstrated by state registration and completion of accredited university courses, that enable me to make sound professional judgments regarding groundwater monitoring and contaminant fate and transport. I further certify that this report was prepared by me or by a subordinate working under my direction.

Tommy A. Jordan, P.G., PMP
Georgia Registered Professional Geologist No. 001788

1.0 INTRODUCTION

On behalf of the University of Georgia, Resolute Environmental & Water Resources Consulting, LLC (Resolute) is presenting this 100% Remedial Design in accordance with the *Pilot Study Workplan* (PSWP) dated October 23, 2020, and *Documents and Submittal Schedule*, dated October 19, 2020. This Final Remedial Design presents our Corrective Action approach to protect human health and environment, schedule, and estimated costs.

The Milledge Avenue Site ("Site") is a former landfill located near Milledge Avenue and Will Hunter Road, in Athens, Georgia. The Site is one (1) of four Solid Waste Management Units (SWMUs) regulated by the Georgia Environmental Protection Division (EPD) under the Resource Conservation and Recovery Act (RCRA) and has been the subject of significant prior assessment and interim remedial measures. On December 17, 2019, EPD issued Hazardous Waste Facility Permit No. HW-041 [CA] ("the Permit") for the investigation and corrective action of releases from the former landfill. A Site Map is provided as **Figure 1-1**.

During the development of this Remedial Design, Resolute identified uncertainties, data gaps and lack of subsurface information that created an unacceptable level of risk for success. Therefore, Resolute utilized the Triad approach in systematic planning to evaluate the uncertainties, identify key decisions, and develop a strategy to obtain critical site characterization data. Resolute compiled a list of 15 Study questions and uncertainties essential for completing a Remedial Design. Those Study questions resulted in Data Quality Objectives (DQOs) for an additional Subsurface Investigation completed in August 2021. A summary of the Study questions and DQOs are presented in **Attachment 1**. The Subsurface Investigation was organized into three Study Areas (A, B, and C). A Study Area Map is attached as **Figure 1-2**. Results of the Subsurface Investigation are further discussed in Section 3.0, Pilot Scale Test Methods.

Groundwater flow direction downgradient of the landfill is generally to the northwest. A current potentiometric surface map is provided as **Figure 1-3**. The current Groundwater Protection Standards (GWPS) for the Site are the respective Primary Drinking Water Maximum Concentration Limits (MCLs) for the Constituents of Concern (COCs), and screening level for 1,4-Dioxane, as shown here:

- Chloroform (80 ug/l),
- Carbon tetrachloride (5 ug/l),
- 1,2-Dichloroethane (5 ug/l),
- 1,2-Dichloropropane (5 ug/l),
- Tetrachloroethene (PCE) (5 ug/l),
- Lindane (Gamma BHC) (0.2 ug/l), and,
- 1,4-Dioxane (0.46 ug/l)

Currently, only Chloroform and 1,4-Dioxane are detected beyond the landfill above GWPS. It should be noted that Chloroform does not have an MCL but has a Maximum Contaminant Level Goal (MCLG) which is not an enforceable standard. Similarly, 1,4-Dioxane does not have an MCL, and the screening level is much lower than an actual risk based standard would be. 1,4-Dioxane has been detected in the surface water in the downgradient creek in one location (SW-3). Tables summarizing the January 2022 concentrations of COCs in monitoring wells and surface water at the site are provided as **Tables 1-1 1-2,**

respectively. A current cross-section depicting the subsurface conditions in January 2022 and groundwater concentrations for Chloroform and 1,4-Dioxane are depicted in **Figure 1-4**. The subsurface lithology is typically characterized by a silty soil profile extending from the ground surface to approximately 30 feet, followed by a saprolite/partially weathered rock transition zone to bedrock at approximately 100 feet below ground surface. Groundwater is typically found approximately 20 feet below ground surface at and around the landfill.

2.0 EVALUATION OF REMEDIAL TECHNOLOGIES

As presented in the PSWP, a Permeable Reactive Barrier (PRB), with a potential funnel-and-gate, is the intended remedial approach to be evaluated for the area immediately downgradient of the landfill, and a technically appropriate treatment of a dissolved phase plume farther downgradient in the saturated zone and bedrock. Remedial technologies were evaluated using a literature review, interviews with technology subject matter experts, bench scale treatability studies, and Pilot Studies.

2.1 ISCR and ISBR Treatability Study

A bench study was performed evaluating In-Situ Chemical Reduction (ISCR) and In-Situ Biological Remediation (ISBR) technologies using two proven PRB candidate products (Geoform ER and EHC Plus) to evaluate their effectiveness on the site COCs, including volatile organic compounds (VOCs), 1,4-Dioxane, and Gamma BHC (Lindane). Resolute collected groundwater to be used in the treatability study from monitoring well MW-4, which has recently shown the highest concentrations of COCs, as well as detectable concentrations of Lindane. These remediation compounds are a mixture of sulfate, ferrous iron, electron donors, pH buffer, and nutrients. These mixtures were designed to enhance mechanisms for dehalogenation via anaerobic bioremediation, abiotic degradation, and the formation of reactive minerals.

The results from the bench testing indicate effective reduction in VOC COCs and lindane in 14- and 28-day treatment duration, but nominal results in the 1,4-Dioxane concentration reduction. An evaluation of longer treatment time of 56 days was recommended by the manufacturer. However, the 56-day analytical results, and the 1,4-Dioxane results did not show additional mass reduction. Therefore, additional technology investigation was required (ISCO, proprietary products, and potential treatment trains), including additional treatability studies, as presented in the following section. The treatability study report is included in **Appendix A**.

The low dosage of Geoform™ ER® + EHC® (0.28% +0.28%) reduced concentrations of Chloroform ($CHCl_3$) by 99.9% in 56 days, Lindane by 99.2%, and Carbon Tetrachloride (CCl_4) by >96.8% in 56 days. Based on case studies with Geoform, the product is expected to last several years.

Relevant conclusions as it relates to the Final Design:

- Geoform is not effective in reducing concentrations of 1,4-Dioxane
- Geoform is an effective in-situ injection treatment for Lindane (Gama BHC), Chloroform, Carbon Tetrachloride and other site COCs.
- Currently, Lindane is only detected above GWPS (0.2 ug/L) in one location inside the landfill (MW-4) with a concentration of 0.39 ug/L. If Lindane is detected outside the landfill above GWPS, an

injection consisting of Geoform™ ER® + EHC® can be used to protect the creek and migration of the contaminant downgradient of the landfill

- The longevity and effectiveness of Geoform™ ER® + EHC® is expected to last several years.

2.2 Base Activated Persulfate Treatability Study

Based on literature review and interviews with technology subject matter experts, the technology with the highest confidence level for effective long-term treatment of the COCs above GWPS at the site is ISCO using base activated persulfate. Resolute initiated a treatability study on groundwater from monitoring well MW-4, which has recently shown the highest concentrations of COCs, as well as detectable concentrations of Gama BHC (Lindane). The treatability study was performed by In-Situ Oxidative Technologies, Inc. (ISOTEC), and the report (including results tables and analytical reports) is included in **Appendix B**.

The primary objective of the study was to evaluate the treatment effectiveness on site COCs of base activated sodium persulfate (BASP). The latter was used in the study as a surrogate for slower-acting potassium persulfate (KP) activated with hydrated lime. In addition, base buffering capacity and Soil Oxidant Demand (SOD) tests were performed on unimpacted site soil near the landfill. The base buffering capacity for site soil is 6 ml/kg. The 7-day SOD is 0.4 grams/kg soil for 1 g/L sodium persulfate dosage and 1.8 g/kg soil for a 5 g/L sodium persulfate dosage.

Prior to commencing the laboratory batch tests, initial characterization of the samples received was performed to collect data for VOCs (including 1,4-Dioxane), pesticides, iron and manganese on the groundwater sample and total organic carbon (TOC) on the soil sample.

Once the COC concentrations in the groundwater were confirmed to be representative of MW-4, batch reactors were prepared. Treatment effectiveness was evaluated for BASP on groundwater only. A total of 4 reactors were set up, with 1 reactor serving as a Baseline, 1 as a Control and the remaining 2 as treatment reactors to evaluate BASP at two different doses (1 g/l and 5 g/l).

Results of the treatability study revealed that the Groundwater Protective Goals at the site can be achieved using a dosage rate of 5g/L, with the exception of Carbon Tetrachloride. The treatability study farther indicated that 40% of the oxidant was used up at the time the GWPS were reached (within 7 days contact time). Carbon Tetrachloride (CCl_4), a highly oxidized compound, was not reduced through chemical oxidation using BASP during the treatability study. The following were the results of the BASP treatability study:

Table T2-1
Summary of ISCO Treatability Study Results

Reagent doses tested>>>	1 g/l	5 g/l
VOCs reduction	42.1%	98.6%
Chloroform reduction	42.3%	100%
1,4-Doxane reduction	51.2%	99.6%
Pesticides reduction	100%	100%

Conclusions of the BASP Bench Study relevant to the final Remedial Design include:

- A 5 g/l dose of BASP can effectively reduce site COCs by > 98.6 %, except for CCl_4

3.0 PILOT SCALE TEST METHODS

Resolute conducted an additional Remedial Investigation to address uncertainties and data gaps critical to validating and developing a potential funnel and gate PRB remedial design. This section discusses the additional investigation performed as well as a BASP Pilot Study, PRB Pilot Study, BASP Pilot Study, and a Modified Fentons Reagent (MFR) Pilot Study of the dissolved phased impacted groundwater in the overburden.

3.1 Additional Remedial Investigation

Resolute developed a multiphase remedial investigation to obtain information necessary to complete a remedial design for the proposed PRB and funnel and gate system. The objectives of the investigation are provided in **Attachment 1**. The first phase of the investigation involved completing a High-Resolution Site Characterization (HRSC) of the subsurface in the area of the proposed funnel and gate as well as upgradient of the landfill.

The boundaries of the Investigation include Area A, Area B, Area Cas depicted on **Figure 1-2.** Area A is the anticipated location of the PRB "gate". Area B (subdivided into B-1 through B-3) and is the anticipated location of the funnel Cement Bentonite (CB) wall and wings. Area C is upgradient of the landfill and potentially an area for engineering controls of groundwater flow volume and velocity.

3.1.1 Hydraulic Profiling Investigation

Resolute designed and implemented a HRSC investigation around the landfill boundary in the first phase of the remedial investigation. The main purpose of the HRSC was to identify potential zones of high and low permeability in the subsurface overburden for subsequent discreet groundwater sampling, vapor sampling, and geotechnical sampling. Resolute used this information to assess contaminate flux in the downgradient area of the landfill, develop design parameters for the PRB pilot and full-scale implementation, and groundwater modeling for a potential funnel and gate configuration.

Resolute contracted and supervised Dakota Technologies in performing the HRSC utilizing a Hydraulic Profiling Tool (HPT) which measures the pressure required to inject a flow of water into the soil as the probe is advanced into the subsurface. The injection pressure log is an excellent indicator of formation permeability. In addition to measurement of injection pressure, the HPT was used to measure hydrostatic pressure under the zero-flow condition. This allows the development of a hydrostatic pressure graph for the log and prediction of the position of the groundwater surface.

The direct push probe is advanced into the ground at a rate of approximately 2 cm/sec. The pump in the HPT flow module draws water from the supply tank and pumps water down the trunk line at a constant flow rate (250-mL/min). An inline flow meter measures the flow rate. The downhole pressure sensor monitors the pressure generated by injecting water into the formation matrix. The HPT probe also includes a Wenner type array for measurement of soil electrical conductivity (EC) as the probe is advanced to depth. EC is a measure of the soil's ability to conduct an electrical current using the Wenner array of the HPT/EC probe. Conductivity is the reciprocal of electrical resistivity and has the units (in this application) of millisiemens per meter (mS/m). Since soil is in the pathway of the charge flow, the grain size can be evaluated by comparing the EC log to a soil boring. Conductivity readings in the 100s indicate smaller grain (such as clay).

The HPT log provides graphs of the electrical conductance, HPT pressure and flow rate versus depth. The full field report and HPT logs are provided in **Appendix C**. The location of the HPT boring locations is provided in **Figure 3-1**.

The results of the HPT profiling were used to develop sampling locations and depth intervals for the geotechnical, vapor, and discreet groundwater sampling events (Phase 2 of the investigation). Boring depths extended to refusal and ranged from ground surface to approximately 65 feet (refusal).

The HPT investigation revealed:

- Little evidence to support the presence of thick subsurface strata of high permeable units in the overburden, which was an uncertainty.
- The majority of the subsurface around the landfill is densely packed silts and sands in the saturated overburden.
- The tightly packed subsurface would not allow for proper dissipation testing to estimate hydraulic conductivity values, suggesting low permeability in general.
- Confirmed that the saprolite and partially weathered rock thickness is highly variable and DPT injection depths of chemical oxidants via DPT methodology may be limited.

3.1.2 Geotechnical Investigation

Resolute developed a sampling plan to obtain undisturbed geotechnical samples based on the results of the HPT investigation results, the pilot study performed in the saturated overburden, and groundwater modeling needs. Shelby Tubes were collected in the saturated overburden across the site at depths ranging from 21 feet below ground surface(bgs) to 70 feet bgs, wax sealed, and shipped to Daniel B. Stephens & Associates in Albuquerque, New Mexico for testing. The locations of the Shelby Tube samples are illustrated in **Figure 3-2**. Photographs were taken of the extracted undisturbed samples and sent to Resolute for selecting the appropriate interval for geotechnical testing. Resolute reviewed the core samples and selected the appropriate interval of the Shelby Tube core that represented the specific objective of that subsurface location and interval based on the HPT results. In addition, reviewing the core photographs provided lithologic data to compare to historical bore logs and field observations. Photographs of the extracted Shelby Tube cores are included in the laboratory report included in **Appendix D**. The samples were laboratory analyzed for Hydraulic Conductivity (K) by ASTM D5084, Moisture Content by ASTM D2216, Dry and Wet Density by ASTM D7263, Grain Size analysis and calculated porosity. The results are summarized in **Table 3-1**.

In addition, three rock core samples obtained during the installation of Bedrock Well MW-9C were testing for K, density, specific gravity, and calculated porosity. The rock cores were collected in three distinct geologic zones of the bedrock. The three observed zones were 1) Sample MW9C-A: partially weathered rock at a depth of approximately 49-55 feet bgs, 2) Sample MW9C-B: fractured rock at approximately 59-69 feet bgs, and 3) Sample MW9C-C Competent rock at approximately 69-140 feet bgs. Results of the geotechnical testing of the rock cores are included in **Table 3-1.**

The results of the geotechnical testing on saturated soil revealed a range of K values from 1.5×10^{-4} centimeters per second (cm/sec) to 6.7×10^{-6} cm/sec. Total porosity values ranged from 33.9 % to 43.9%. Bulk Density ranged from 118.6 pounds per cubic foot (pcf) to 130.6 pcf. Natural moisture content ranged from 25.3% to 39.2%. A

The results of the geotechnical testing on the bedrock revealed increasing density and decreasing porosity with increasing depth, as expected based on the geologic zones. K was relatively constant at approximately 5×10^{-4} cm/sec. Porosity ranged from 2.9% to 0.5%. Bulk density ranged from 166 pcf to 173 pcf. Specific gravity was 2.7 for each sample. Grain size analysis reveals that the samples have a sand content ranging from 61.7 to 76.8 % and a fines (silts and clays) content of 22.43% to 36.0%. The laboratory results and photographs revealed that the lithology across the site in the saturated zone is primarily weathered rock and saprolite consisting of silty fine to coarse SAND (SM) and or clayey SAND (SC), depending on plasticity.

The conclusions of the data from the geotechnical investigation relevant to the remedial design are:

- K is slower in some areas across the site by up to 2 orders of magnitude than historic slug testing revealed. The slower conductivity further supports the feasibility of a PRB with a potential funnel and gate system along the downgradient edge of the landfill.
- Laboratory K value and porosity reduce uncertainty, quantified variability in the subsurface, and helped understand the results of the Pilot Study performed near MW-9 (See Section 3.3 for the Pilot Scale Study discussion).

- Allows for design calculations of contact time with the oxidants and PRB thickness determinations.
- Allows for more accurate oxidant dosing and implementation designs for the overburden dissolved plume and bedrock plume.
- Allows for groundwater modeling of groundwater velocities and particle tracing across the site.
- Allows for groundwater modeling of potential upgradient engineering controls of groundwater flow into the landfill.
- Review of soil in the Shelby Tube Photographs provides an understanding of the relative range of the soils in the saturated zone across the site.

3.1.3 Soil Vapor Investigation

In August 2021, Resolute designed and implemented a soil vapor investigation around the landfill to assess if a soil vapor plume may exist above the saturated zone that may be an alternative mechanism for Carbon Tetrachloride, a parent compound of the most prevalent COC, Chloroform, and possibly contribute to an ongoing source to the groundwater (PSWP2020, pg. 10-11). Resolute contracted Jim Fineis, of Total Vapor Solutions to install soil vapor implants and collect soil vapor samples across the site.

Resolute reviewed the HPT logs and selected fourteen (14) sample locations and depths that indicated potential permeable vapor pathways in the soil. Soil vapor sample locations are illustrated in **Figure 3-3a**. Sample depths in Study Area A and B ranged from 4 feet to 20 feet bgs. Sample depths in Study Area C (upgradient of the landfill) ranged between 15-20 ft bgs. Each sample location was greater than 10 feet above the groundwater surface to reduce the potential for impacts from volatilization from the groundwater.

The soil vapor implants were installed using a direct push rig to create a 1.5" diameter borehole to the desired depth. An Airstone implant attached to Nylaflow tubing was installed within the open borehole. Quartz sand was placed around the Airstone implant, and the thickness of the concrete slab was sealed with bentonite. Prior to sample collection, the implants were allowed to equilibrate for a minimum 8 hours. All implants were purged of ambient air prior to sample collection. The samples were collected in batch-certified 1 Liter summa canisters equipped with 200 ml/min flow controllers. A helium leak test and a secondary leak test (shut-in test) were performed on the summa canisters and the associated sampling apparatus. Soil vapor samples were sent to Eurofins Test America in Savannah and analyzed for Site COC VOCs by EPA Method TO15.

Results of the soil vapor analysis show Chloroform ranging from <4.8 micrograms per cubic meter (ug/m^3) to 22,000 ug/m^3. Carbon Tetrachloride was detected from < 5.5 ug/m^3 to 11,000 ug/m^3. The highest concentrations detected for Chloroform and Carbon Tetrachloride were located along the upgradient boundary near the existing passive air vents in the landfill. Tetrachloroethane was detected up to 150 ug/m^3 and 1,2 Dichloropropane was detected in 1 upgradient sample at 400 ug/m^3. The results are summarized in **Table 3-2**. The soil vapor investigation report is presented in **Appendix E**.

A figure illustrating the isoconcentrations of VOCs in soil vapor is provided in **Figure 3-3a**. A figure depicting the chloroform groundwater plume and potentiometric surface with the chloroform vapor plume is illustrated in **Figure 3-3b**. As shown in **Figure 3-3b**, the highest concentrations of the Chloroform vapor plume appear directly upgradient of the highest concentrations in the groundwater plume. The soil vapor plume also correlates to the east and west extents of the Chloroform groundwater plume which

strongly suggests a direct correlation between the impact of Chloroform to the groundwater and the Chloroform vapor plume.

In addition, soil vapors for Chloroform and other VOCs are modeled to extend over MW-1 to the north of the landfill. Historically, in periods of high rainfall, trace concentrations of VOCs have been detected in MW-1. Infiltration of the rainwater may absorb vapor contaminants in the unsaturated zone and impact the groundwater further strengthening the correlation of groundwater impact from the vapor plume.

Conclusions relevant to the remedial design and corrective action include:

- A soil vapor plume of Chloroform, Carbon Tetrachloride, and other VOCs is present.
- There appears to be a direct correlation between vapor phase and dissolved phase (groundwater) Chloroform concentrations.
- Reduction in concentrations of Chloroform and other VOCs in the vapor plume under that landfill may reduce concentrations and size of the groundwater plume of Chloroform and other VOCs in the groundwater.
- Soil vapors of Chloroform and other VOCs are modeled to extend over MW-1 to the north of the landfill. Historically, in periods of high rainfall, trace concentrations of VOCs have been detected in MW-1. Infiltration of the precipitation may absorb vapor contaminants in the unsaturated zone and impact the groundwater.
- Mitigation of the vapor plume beneath the landfill should be conducted and evaluated prior to finalizing the requirements and necessity of the funnel and gate system.

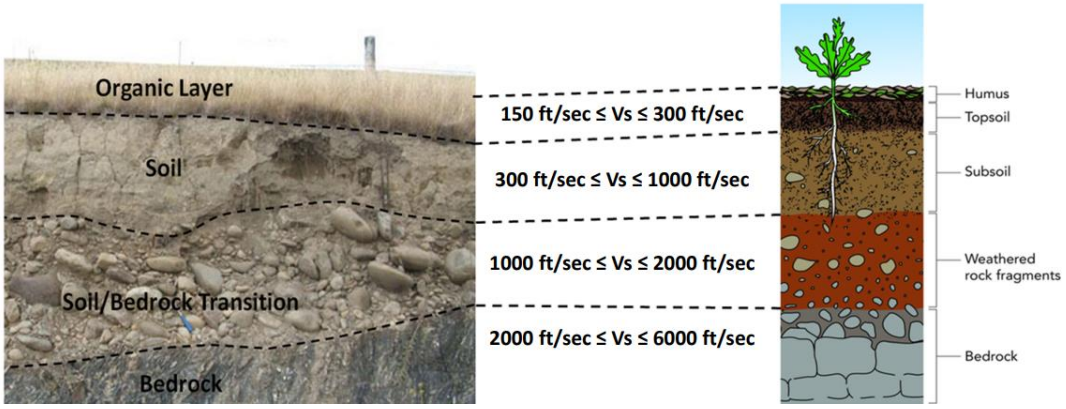
3.1.4 Geophysical Investigation

Resolute designed and conducted a geophysical investigation in September 2021. The objectives of the work were to better understand the bedrock surface profile, evaluate the varying thickness and density of partially weathered rock (PWR), and attempt to identify the approximate location of buried waste within the landfill. Both multichannel analysis of surface waves (MASW) and seismic backscatter analyses were employed with an array of four survey lines across study areas A, B, C, and inside the landfill.

MASW measures the seismic surface waves generated from a seismic source and then analyzes the propagation velocities of those surface waves. It then deduces shear wave velocity (Vs) variations below the surveyed area. Seismic wave velocities can help interpret subsurface media. An advantage to MASW is that the velocities are unaffected by groundwater and therefore reduces discrepancies and uncertainty in subsurface interpretation and analysis. Seismic velocities related to subsurface materials are estimated to be (Park, 1999):

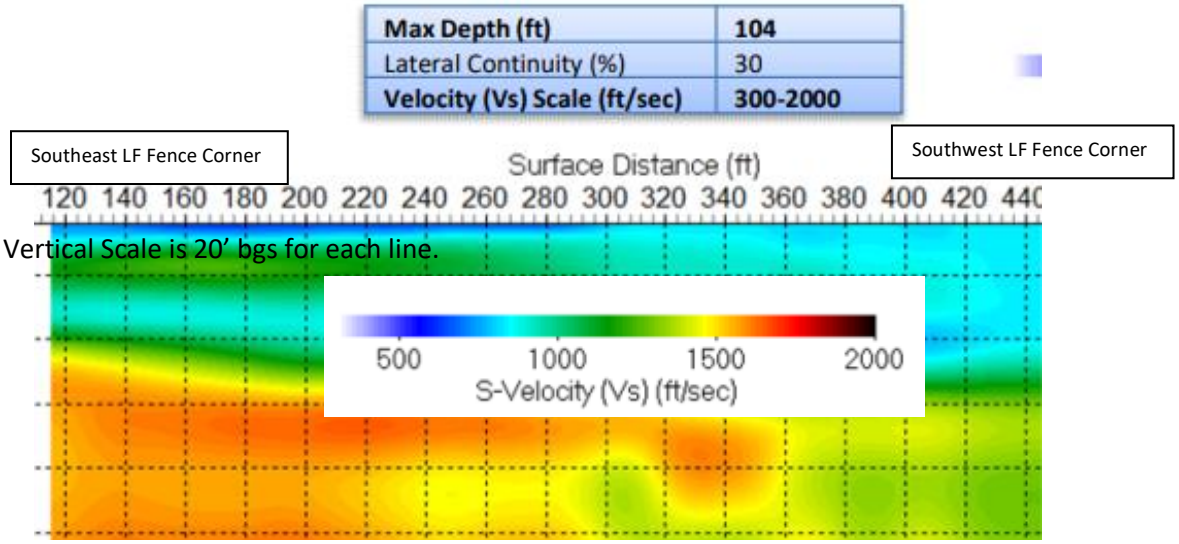
Figure TF3-1
Seismic Velocities

- Vs ≤ 300 ft/sec – **"extremely soft" soil**
- 300 ft/sec ≤ Vs ≤ 600 ft/sec – **"soft" soil**
- 600 ft/sec ≤ Vs ≤ 1000 ft/sec – **"stiff" soil**
- 1000 ft/sec ≤ Vs ≤ 2000 ft/sec – **"weathered" zone**
- 2000 ft/sec ≤ Vs – **"rock"**
- 3000 ft/sec ≤ Vs – **"competent" rock**



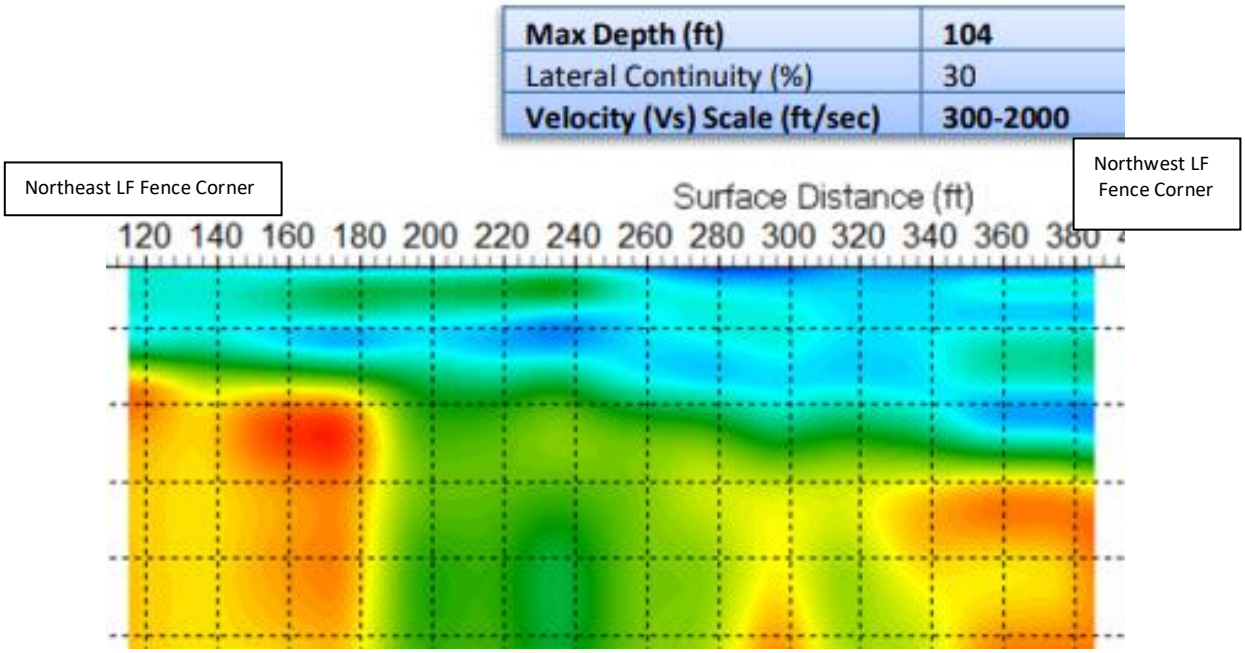
Line 1 and Line 2 were located along the upgradient and downgradient edges of the landfill, respectively. Line 3 and Line 4 were in an east-west transect in the landfill with Line 3 being the more northern of the two. Line 1 and Line 2 both used a 230-foot streamer with 24 geophones spaced 10 feet apart. The source was then placed 60 feet from the last geophone to reach a depth of approximately 100 feet bgs, which was greater than the expected bedrock based on historical information. Each shot was taken for 10 seconds, followed by moving 20 feet until the entire survey area had been covered. Line 3 and Line 4 used a 110-foot streamer with 24 geophones placed at 5-foot intervals. The source was placed 10 feet away from the last geophone. The purpose of the shorter streamer and geophone interval was to evaluate near surface and closely spaced anomalies in the landfill. Each shot was taken for 10 seconds, followed by moving the streamer 10 feet until the entire survey area had been covered. The source used for both was a 16-pound sledgehammer and an aluminum plate capable of producing quality data to a depth of 100 ft bgs. A geode seismograph head unit recorded the data which was then sent to Park Seismic for analysis and interpretation. The detailed Analysis Report with graphical representation of subsurface media is in **Appendix F**. Below are graphical representations of Lines 1 and Lines 2 from the Analysis Report.

Figure TF3-2
Geophysical Survey Line 1 (Upgradient Edge of Landfill)



Vertical Scale is 20’ bgs for each line.

Figure TF3-3
Geophysical Survey Line 2 (Downgradient Edge of Landfill)



Note: Vertical Scale is 20’ bgs for each line.

Conclusions from MASW analysis include:

- Analysis of wave velocities of Line 1 and Line 2 indicate that competent bedrock is below 104 feet at the edges of the landfill, the maximum reach of the geophysical survey. Historical Conceptual

Site Model (CSM) (BC2014) indicated that bedrock was approximately 65 feet below ground surface at the location of Line 1 (upgradient landfill Boundary) and Line 2 (downgradient edge of landfill Boundary).

- Weathered bedrock in Study Area A is approximately 60 feet below the surface with pockets of dense weathered rock. Generally, the PWR increases in density with depth. There are potential migration pathways through less dense saturated soil in the eastern portion of Study A, which is anticipated to be the PRB gate.
- Backscatter analysis of Line 3 and Line 4 inside the landfill indicate five discrete anomalies within the landfill at a depth from 3 feet to approximately 30 feet bgs. The identified features have relatively low energy (e.g., < 50%) which is characteristic of small-scale origins such as laboratory waste. The estimated location of these subsurface anomalies is illustrated in **Figure 3-4.** Historical information inferred that the buried waste extended approximately 12-15 feet bgs (PSWP2020). The geophysical survey suggests that buried source material may extend into the saturated zone and/or groundwater surface which historically been from 23 to 30 feet bgs (PSWP2020, pg. 11).

3.1.5 Discrete Groundwater Sampling

Resolute designed and implemented a discreet groundwater sampling event. The locations and depths of the discreet sampling were selected by reviewing the HPT logs for zones of high permeability and representative permeable zones in the saturated zone along the downgradient edge of the landfill. The locations of the discrete groundwater sampling are illustrated in **Figure 3-4**. The objectives of the discreet groundwater sampling were to obtain COC concentration data to evaluate groundwater flux in the area of the proposed PRB and funnel and gate system. The groundwater flux will be used along with the groundwater modeling to complete the final requirements for the PRB and funnel and gate system. A second objective was to evaluate the depth required for the PRB based on the depth of impact in the saturated zone. A third objective of the discreet groundwater sampling was to evaluate if site COCs had migrated downward through the groundwater to the top of bedrock. Historical records and boring logs indicate that the upper portion of bedrock at the site is fractured. Therefore, Resolute has made the conservative assumption that COC impacted groundwater is likely to migrate into bedrock fractures near the downgradient location at which impacted groundwater reaches the top of rock.

Discrete groundwater samples were collected using direct push technology (DPT). A direct push rod was extended to the required depth. A stainless-steel screen was released as the rods were retrieved by two feet. HDPE tubing was lowered into the rods to the screen interval and a groundwater sample was collected using a peristaltic pump. Groundwater samples were analyzed for Site COC VOCs by EPA Method 8260, 1,4-Dioxane by EPA Method 8260 SIM, and Pesticides by EPA Method 8081. A summary of analytical results is presented in **Table 3-3**. A cross section integrating groundwater concentrations and lithologic profile from the geophysical survey is provided in **Figure 3-5**. The laboratory analytical report is presented in **Appendix G**.

Results of the discrete sampling revealed:

- In Study Area A, the location of the PRB Pilot Study (Section 3.2) and location of the gate of the funnel and gate system, concentrations of Site COCs were below laboratory reporting limits below a depth of 41 feet bgs.
- Three top of rock samples (T1-0GWS, T1-1GWS, and T1-2GWS) did not reveal Site COCs above reporting limits. These samples were collected 5 ft, 20 ft, and 35 ft north (downgradient), respectively, of the landfill fence. This allows a minimum of 35 feet horizonal area for PRB gate installation.
- Site COCs were not detected above reporting limits downgradient of the northeast corner of the landfill (B2-T1-20'-30').
- Chloroform (1,150 ug/L), Carbon Tetrachloride (9.3 ug/L), 11,2 Dichloropropane (8.53 ug/L) and 1,4-Dioxane (77.1 ug/L) were detected at Piezometer P3 at a sampling depth of 35'.
- Gama BHC (Lindane) was not detected (> 0.05 ug/L) in the groundwater samples.

3.1.6 Groundwater Modeling

Resolute developed a groundwater-flow model of the Site using the U.S. Geological Survey's (USGS) MODFLOW-2005 groundwater-flow model (Harbaugh 2005). This section will summarize the findings of the modeling. The full detailed report is included in **Appendix H** and should be read in its entirety, including figures and tables. The groundwater-flow model of the Site is used to assess groundwater-flow conditions for 2021 based on measured groundwater elevations during January and July 2021. Simulation results of two PRB design scenarios are presented in terms of the impact of the PRB designs on (1) groundwater elevations within the landfill and (2) groundwater velocity magnitudes and directions.

The CSM of groundwater flow was developed and described in the RCRA Corrective Action Plan (CAP2020). Briefly, groundwater flow at the site originates as infiltration from precipitation on topographically higher ground, located southeast of the landfill. Groundwater flows to the northwest, under the landfill cap and is currently impacted by buried laboratory waste in the landfill. Groundwater moves farther northwest, topographically and hydraulically downgradient of the landfill until it reaches an unnamed creek. There are no municipal or domestic wells near the site that impact groundwater flow. Thus, changes in groundwater levels and groundwater flow are a result of changing infiltration patterns from precipitation events throughout the year.

Based on the CSM for groundwater flow at the site and augmented with the information obtained from the Remedial Investigation described in this report, a three-dimensional steady-state groundwater-flow model was developed for the Milledge Avenue Site, in Athens, Georgia. The modeling software package used is the Groundwater Modeling System (Aquaveo 2021) and the USGS's MODFLOW-2005 groundwater-flow model (Harbaugh 2005). The objective of the modeling analysis was to determine the impact of constructing a PRB using a funnel and gate system on groundwater elevations in the landfill and groundwater velocities within the PRB system at depth. Model input parameter values were obtained from field measurements of water levels during 2021 and laboratory determined geotechnical properties

(hydraulic conductivity and porosity) using Shelby Tube cores obtained during the geotechnical evaluation discussed in Section 3.1.2 of this report.

After the steady-state groundwater-flow model of the Site was developed, a potentiometric surface map of the mean conditions for 2021 were used for assessing the "goodness of fit" of model simulations. Therefore, a potentiometric surface map representing the mean groundwater elevations of January 2021 and July 2021 was developed using the January 2021 and July 2021 measured water-level data.

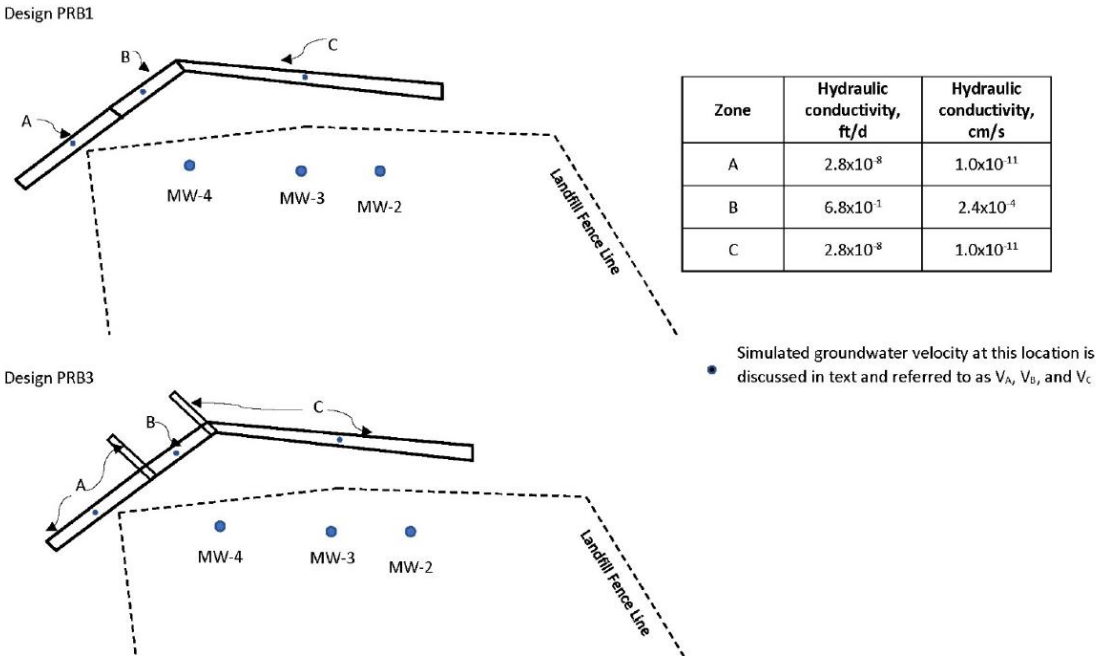
The "goodness of fit" based on comparing measured and simulated groundwater elevations and corresponding residuals at the 27 observation points were constructed showing observed versus simulated water levels and observed versus corresponding residuals. Overall, there is a good fit between observed and simulated groundwater elevations. The differences between observed and simulated groundwater elevations in the monitoring wells in the landfill (MW-2, MW-3, and MW-4) were less than one foot.

Based on simulated groundwater flow at the Site, groundwater velocities (V_{gw}) are computed in MODFLOW-2005. The velocity magnitudes at the site are lowest in the area about 40 ft south of the landfill near MW-1, about 5.0×10^{-2} ft/d (1.8×10^{-5} cm/s). Just north of the landfill's northern fence line, velocity magnitudes are about 1.5×10^{-1} ft/d (5.6×10^{-5} cm/s). The highest magnitudes of groundwater velocity are located more than 650 ft northwest of the landfill's northern fence line in the interstream (creek) areas where groundwater discharges to the creeks. These values are in the range of 1 ft/d (4.0×10^{-4} cm/s).

Two PRB design scenarios (PRB1 and PRB3) were evaluated in terms of the impact of the PRB designs on (1) groundwater elevations within the landfill and (2) groundwater velocity magnitudes and directions in the overburden (soil, saprolite, and PWR lithologies). The modeling analyses assessed the impact and effectiveness of the PRB design scenarios under the precipitation and groundwater recharge conditions occurring during 2021. These design scenarios were developed as hypothetical worst-case simulations.

As illustrated below, the PRB1 design consist of three zones including an impermeable west wing (A), the PRB (B), and impermeable east wing (C). The PRB3 design consists of PRB1 with walls extending parallel to groundwater direction beginning at the intersection of A/B and B/C. The modeling of PRB1 and PRB3 revealed similar results. Therefore, if warranted in the future, the installation of these parallel walls to control post PRB contaminate migration is feasible. The input hydraulic conductivity value for the impermeable wings were 1×10^{-11} cm/s (impermeable). The input hydraulic conductivity value for the PRB was 2.4×10^{-4} cm/s (the average value obtained from geotechnical testing at the PRB location). The location of Zone B is the location of the PRB Pilot Study currently being evaluated at the site.

Figure TF3-3



Zone	Hydraulic conductivity, ft/d	Hydraulic conductivity, cm/s
A	$2.8x10^{-8}$	$1.0x10^{-11}$
B	$6.8x10^{-1}$	$2.4x10^{-4}$
C	$2.8x10^{-8}$	$1.0x10^{-11}$

● Simulated groundwater velocity at this location is discussed in text and referred to as V_A, V_B, and V_C

Groundwater Model Simulated Designs

An initial design for design scenario PRB1 included the depth of the impermeable wings (funnel portion of the design) to extend to 70 ft bgs. The Discrete Groundwater sampling conducted during the Remedial Investigation and previously discussed in Section 3.1.5, revealed COC concentrations below GWPS at a depth of 45 ft bgs. Therefore, a simulation of zone A and C of the PRB1 design at a depth of 70 ft bgs was developed. The results indicated no increase in groundwater elevations resulted. Since this was an unlikely real-world scenario, a particle flow path run was performed and revealed that water particles from higher groundwater elevations flowed under the impermeable wing wall which could result in COCs above GWPS flowing under the impermeable wall. Therefore, the depth of the impermeable wall (Zone A and C) was extended to bedrock (approximately 100') and evaluated for impacts to velocity and groundwater elevation in the landfill (worst-case scenario).

Below are the modeling results of the impact to the groundwater elevation in the landfill with the PRB and funnel and gate system consisting of a depth to bedrock (approximately 100 ft bgs) in Zone A and C, and a PRB depth of 45' in Zone B.

Table T3-3

Changes in Simulated groundwater elevations in the landfill for PRB1

Monitor Well	Jan-July 2021 mean groundwater elevation, ft	PRB1 Design groundwater elevation, ft	[1]Change, feet
MW-2	612.36	615.11	-2.75
MW-3	611.26	614.38	-3.02
MW-4	610.13	612.18	-2.05

[1]Change is defined as the simulated Jan-July 2021 mean groundwater elevation minus the PRB1 Design simulated groundwater elevation; a negative value indicates an increase in water level

The resultant velocity through the PRB (Zone B) as a result of the PRB1 are presented below.

Table T3-4

Simulated groundwater-flow velocities for PRB1

Model Layer (Elevation, ft)	[1]V_A ft/d (cm/s)	[2]V_B ft/d (cm/s)	[3]V_C ft/d (cm/s)
PRB Design Scenario PRB1			
1 (610)	0.0013 ($4.5x10^{-7}$)	0.1348 ($4.8x10^{-5}$)	0.0008 ($2.8x10^{-7}$)
5 (580)	0.0017 ($6.0x10^{-7}$)	0.1808 ($6.4x10^{-5}$)	0.0011 ($3.9x10^{-7}$)
10 (560)	0.0017 ($6.0x10^{-7}$)	0.1405 ($5.0x10^{-5}$)	0.0011 ($3.9x10^{-7}$)
17 (535)	0.0017 ($6.0x10^{-7}$)	0.0866 ($3.1x10^{-5}$)	0.0011 ($3.9x10^{-7}$)

[1]See Figure T3-1 for locations of V_A within the funnel and gate PRB system; effective porosity is 0.39
[2]See Figure T3-1 for locations of V_B within the funnel and gate PRB system; effective porosity is 0.39
[3]See Figure T3-1 for locations of V_C within the funnel and gate PRB system; effective porosity is 0.39

Results of the groundwater modeling relevant to the remedial design include:

- The groundwater modeling supports the remedy of a Base Activated Persulfate PRB and funnel and gate system.
- Installation of parallel walls (PRB3), if warranted in the future to control post PRB plume migration, produce similar results as PRB1.
- Modeling results of designs PRB1 and PRB3 were similar, indicating that the more complex PRB3 design is unnecessary for an effective PRB and funnel and gate system.

- Modeling indicated that Chloroform and 1,4-Dioxane concentrations above current GWPS could potentially migrate below an impermeable funnel wall set to a depth of 70 feet below ground surface.
- An impermeable funnel wall extending to bedrock (approximately 100' bgs) with an approximately 45-foot deep PRB gate estimates groundwater elevations at three monitoring-well locations in the landfill (MW-2, MW-3, and MW-3) would rise three feet or less.
- An impermeable funnel wall extending to bedrock (approximately 100 ft bgs) with an approximately 45-foot-deep gate estimates groundwater velocity magnitudes through the PRB would be less than 0.18 ft/d, which is within an acceptable range for reactive barrier treatment using Klozur® KP.

3.1.7 Phase III Subsurface Investigation

In June 2021, Resolute conducted a BASP pilot study near the MW9 monitoring well cluster immediately upgradient of the creek and is discussed in Section 3.3.1 of this report. This area is depicted as the "Plume Pilot Study Area" in **Figure 1-2**. In October 2021, Resolute designed and implemented a subsurface investigation in the downgradient overburden plume to further characterize and understand the geologic and hydrogeologic characteristics of the saturated soil profile relevant for final remedy design of ChemOx injections and protecting the creek from COC impacts. The locations and depths of the direct push (DPT) soil and ground sampling were developed by creating a grid system in the area immediately upgradient of the creek. The locations of the DPT borings and analytical results are illustrated in **Figure 3-6**. A summary of the analytical results is below in **Table T3-5**. The analytical report, bulk density testing reports, and boring logs of the Phase III Subsurface Investigation are provided in **Appendix I.**

Resolute advanced and collected 16 soil borings using a tract mounted DPT drill rig with standard 1.25-inch I.D. diameter acetate liners. The depths of the soil borings ranged from 15 ft bgs to 20 ft bgs and terminated at the beginning of the saprolite lithologic layer. The static groundwater is between three ft bgs and 12 ft bgs, depending on the proximity to the creek and variation based on the undulating topography in the area. Topographic elevations increase moving upgradient (southwesterly direction) from the creek.

The saturated soil profile consisted of a varied mix of sand, silt, and clay. Resolute collected four samples in the saturated zones for bulk density testing and porosity testing on the representative lithologies at the site. The results are provided below in **Table T3-6**. After reviewing the subsurface boring logs, a clay layer was observed in the saturated soil profile above the saprolite which suggested that a confined layer of impacted groundwater may be feeding the creek and contributing to the detection of 1,4-Dioxane in the surface water of the creek (at sample location SW-3) directly downgradient.

Groundwater samples were collected in selected DPT boring locations at the groundwater surface and analyzed for Chloroform and 1,4-Dioxane by EPA Method 8260B and transported on ice under proper chain of custody to Pace Analytical Laboratories in Lebanon, Tennessee. Groundwater samples were collected in laboratory supplied 40 ml vials using a parastaltic pump and HDPE tubing. Results of the analytical testing are provided in **Table T3-5** below.

Table T3-5
Summary of Phase III DPT Analytical Results

Sample ID	1,4-Dioxane (ug/L)	Chloroform (ug/L)
-A6	< 3.00	< 5.00
H2	14.2	< 5.00
P-8	28.0	6.25
L7	5.46	< 5.00
I8	11.5	< 5.00
SW-D1	11.8	NS
SW-H0	< 3.00	NS
SW-L1	< 3.00	NS

Table T3-6

Summary of Phase III DPT Geotechnical Testing

Boring Location	Soil Description	Density (pcf)	Porosity (*n*) %
F3.5	clayey SAND	147.8	28.0
H2	Saprolite	119.9	37.6
H7	sandy silty CLAY	85.3	59.9
I8	silty SAND	112.1	48.5

pcf = pounds per cubic feet

Conclusions from the Phase III DPT investigation relevant to the final design include:

- The soil profile consisted of a very heterogeneous mix of sand, silt, and clay which may result in unpredictable outcomes during injection events
- The characteristics of the saturated soil profile and saprolite are distinctly different and the injection approach must consider those characteristics in the final remedy.
- The clayey sand is very dense, with less porosity than other lithologies, which may result in limited horizontal distribution of injected reagents in the saturated soil zone and produce a preferential pathway down the borehole if a bottom-up approach to injection is utilized.
- A clay layer was observed below the groundwater and above the saprolite suggesting a confined layer of impacted groundwater may be feeding the creek, resulting in the detection of 1,4-Dioxane at the surface water sampling location SW-3.

3.2 Remedy Adjacent to Downgradient Edge of Landfill

Resolute installed a Based Activated Persulfate pilot PRB in Study Area A on the downgradient edge of the landfill in December 2021. Resolute utilized the information from the Additional Remedial Investigations presented in Section 3.1, and BASP bench testing discussed in Section 2.2 to develop and install the pilot PRB. The location of Study Area A is illustrated in **Figure 1-2**. A cross-section depicting the location of the Pilot PRB is illustrated in **Figure 1-4**. The injection locations for the pilot PRB are illustrated in **Figure 3-7**. The pilot PRB is hydraulically downgradient of monitoring well MW-4, which historically has shown some of the highest concentrations of COCs, including Gama BHC (Lindane). The pilot PRB was installed perpendicular to the groundwater direction. The primary objectives of the PRB Pilot Study are to 1) confirm reduction of site COCs to meet Groundwater Protective Goals, 2) evaluate the longevity of base activated potassium persulfate (KP), and 3) act as a proactive measure to reduce contaminant mass in the highest concentration area of the impacted groundwater. The design, dosage, and location of the PRB has been developed using the information obtained during the Remedial Investigation and the Base Activated Persulfate Treatability Study (Section 2.2) which demonstrated reduction of CVOCs concentrations to very low or non-detect concentrations necessary to achieve respective maximum contaminant levels (MCLs) for the COCs and EPA 2017 screening level for 1,4-Dioxane(< 0.46 µg/L), although significant concentration reduction of carbon tetrachloride and Lindane were not achieved in the BASP bench study. A cross-section of the subsurface densities, K values, and groundwater concentrations in Study Area A and across the downgradient edge of the landfill are provided in **Figure 3-5**.

Prior to conducting the PRB pilot study, Resolute submitted a Pilot Underground Injection Control (UIC) Notification to the Georgia EPD and received approval. The pilot UIC permit and approval email is included in **Appendix J**.

Resolute subcontracted with ISOTEC to conduct the field injection for the PRB. The PRB Pilot Study area received approximately 3,485 gallons of potassium persulfate (KP), sodium persulfate (SP), hydrated lime (HL) as slurry mixture with an approximate ratio (pounds/gallon) of 1.85: 0.55: 0.96, respectively. The slurry volume was distributed across a length of approximately 35 feet utilizing 11 injection points (IPs) forming the PRB. The injection points were spaced based on a 5-foot radius of influence. As determined in the Discrete Sampling conducted during the Remedial Investigation, COCs were below reporting limits in the PRB Pilot Study Area A at 41 feet bgs. Therefore, the PRB injections were installed from 19 feet bgs (groundwater surface elevation is measured at 21 feet) to approximately 45 feet bgs. A high pressure, top-down approach was used to inject the chemical oxidants. Refusal was met at depths as shallow as 38 feet bgs using 2.25-inch standard ISOTEC slurry injection tooling using direct push technology. Subsequent attempts to reach deeper depths using smaller diameter 1.5-inch injection tooling utilizing a bottom-up approach were not successful. The final depth of pilot PRB varied from 38 ft bgs to 46 ft bgs. Information provided by the on-site driller indicated that refusal could be anticipated using DPT rods setups at the depths encountered, based on their previous site experience. Within the PRB, a former deep (~100+ ft bgs) boring conducted during the remedial investigation, approximately 4-inches in diameter and immediately adjacent to injection locations IP5, IP6, and IP7, was a route of short-circuiting and frequent daylighting to surface of reagents while injecting in the vicinity, regardless of injection depth. The pilot injection report is included in **Appendix J**.

Resolute installed a total of seven (7) temporary monitoring wells (TMW) to evaluate the performance of the pilot study (**Figure 3-7**). One cluster of three 2-inch PVC TMW wells (designator PWD) was installed immediately downgradient of the PRB. One cluster of two, 2-inch PVC TMW wells (designator PWU) was installed immediately upgradient of the PRB. And one cluster of two, 2-inch PVC TMW wells (designator PW-PRB) was installed within the PRB injection area.

The downgradient well cluster (PWD) consists of one well screened at 20-25' below ground surface (bgs), one well screened at 35' to 40' bgs, and one well screen at 50'-55' bgs. The upgradient well cluster (PWU) and well cluster within the injection zone (PW-PRB) consists of one well screened at 20-25' below ground surface (bgs) and one well screened at 35' to 40' bgs.

Groundwater samples were collected from the seven (7) temporary monitoring wells prior to the injection activities to serve as baseline values. Performance groundwater samples are analyzed for site COCs (VOCs by EPA8260, Lindane by EPA8081, and 1-4 Dioxane by EPA8260SIM,). In addition, Resolute is collecting performance parameters (ORP, DO, pH, temperature, sulfate, total organic carbon, persulfate) prior to and after injection. Post injection performance monitoring data has been collected for 1 week, 6 weeks, and 3 months. Resolute will also collect 6 months, 9 months and 12 months post-injection groundwater samples. The performance analytical and monitoring data are provided in **Table 3-4** and **Table 3-5**, respectively.

Results of the performance monitoring data indicates significant reduction in site COCs. Performance monitoring indicates that the PRB is successfully reducing the Chloroform concentration to below the GWPS. The performance monitoring indicates that the PRB is capable of reducing 1,4-Dioxane by up to 98% and below the GWPS in some locations. The variability in effectiveness is a result of the heterogeneity of the subsurface and variable distribution of oxidant. As such, the 1,4-Dioxane may not be reduced to the GWPS at the PRB location. For this reason, Resolute is proposing a compliance point concentration immediately after the PRB. This compliance point concentration is discussed further in Section 4.1.1 of this report. Carbon Tetrachloride and other COCs were shown to be below GWPS at the PRB.

Results of the PRB Pilot Study revealed the following relevant conclusions:

- Given sufficient contact, the dosage used during the pilot study achieves the Remedial Goals for Chloroform, 1,4-Dioxane and other site VOC COCs. Lindane was not detected in the pilot study performance wells.
- Pilot study revealed ROI exceeding 8 feet.
- Pilot study revealed subsurface preferential pathways for the oxidants and heterogeneous distribution of product.
- The analytical data suggests variability in effectiveness in reducing of COCs.
- Reduction of 1,4-Dioxane to screening level (0.4) may not be consistently achieved in actual subsurface conditions.
- Performance monitoring indicates that consistently achieving the proposed maximum point of compliance for 1,4-Dioxane is very likely across the length of the PRB.
- Variability in vertical concentrations of COCs in the groundwater may be due to the displacement of the dissolved plume.

- Performance monitoring at one well point directly downgradient of the PRB may not reveal a complete picture of the effectiveness of the PRB, therefore during full scale implementation, wells should be distributed across the PRB length.
- DPT injection depth is limited to varying depth across the PRB of approximately 38-46 feet in depth
- Surfacing was encountered in the center of the PRB from borings advanced during the previous investigations.
- PW analytical results of COCs suggest that sources are providing heterogeneous mass flux in the immediate downgradient plume.

3.3 Remedy for Groundwater Plume Downgradient of Landfill/PRB

3.3.1 Sodium Persulfate (SP) Pilot Study

In June 2021, Resolute conducted a base activated ISCO pilot-scale test at the site near monitoring wells MW-9a and MW-9b due to the area's historical presence of Chloroform and 1,4-Dioxane. Primary objectives of the pilot study included evaluating reduction in concentrations of the primary COCs (Chloroform and 1,4-Dioxane), evaluate historical subsurface data, and evaluate implementation at the site. In addition, this pilot study was intended to reduce contaminant mass of 1,4-Dioxane near the tributaries feeding the creek. The injected base activated SP, manufactured by Evonik (formerly PeroxyChem), and reagent ratios were those used in effective and successful mixtures as determined by Evonik technical team based on limited historical subsurface data in the overburden at this site. The injection locations, spacing, depth, and volume of remediation reagents were based on historical slug test data, depth of groundwater data, and COC concentrations. Historic slug test data, assumed porosity, and hydraulic gradient suggested an average seepage velocity up to 6 inches per day at the site and ROI of 5 feet.

Seven (7) temporary monitoring wells were installed (TMW-1 to TMW-7) using DPT and constructed with 1" PVC casing and screen and packed with sand around the screened interval. TMW-1 to TMW-3 were installed to 15 feet bgs and screened from 5 feet to 15 feet bgs. TMW-1 was used as a ROI well and was place three feet from both Injection points. TMW-4 to TMW-7 were installed to 30 feet below ground surface and screened from 10 feet to 30 feet below ground surface. The temporary monitoring wells were placed in an arc around the injection points. A pilot study map is provided as **Figure 3-8**.

Based on the anticipated groundwater velocity from historical data, two (2) injection points were placed 5 feet apart and 18 feet hydraulically upgradient from MW-9a and MW-9b. Each injection point was installed using DPT and advanced to 30 feet below ground surface. Using the injection tool, the reagents were injected bottom upward from 30 feet up to 10 feet below ground surface. PeroxyChem's Klozur SP® reagent mixture with a base-activated with Sodium Hydroxide was injected into the groundwater plume. These reagents were mixed with water to facilitate subsurface distribution. Eighty (80) pounds of the product, along with 8-gallons of water, were injected per vertical foot in the injection zone of each location, for a total of 500 pounds of Klozur SP® and 1,250 pounds of Sodium Hydroxide reagent per boring (3,500 pounds reagent /600 gallons total for the pilot injection event). The injection data report can be found in **Appendix K**.

Groundwater samples were collected from wells MW-9a, MW-9b, TMW-2 and TMW-3 prior to the injection activities to serve as baseline values for COCs by EPA Method 8260, 8260 SIM, 8081, and EPA Method 6020. In addition, a groundwater sample from a nearby upgradient well (MW-7a) was collected and analyzed for sodium and sulfate background concentrations, COCs (VOCs, Lindane, and 1,4-Dioxane, and selected dissolved metals recommended by the EPD for chemical oxidation treatment (Arsenic, Barium, Cadmium, Chromium, Copper, Lead, Selenium, and Hexavalent Chromium). In addition, performance parameters (oxygen reduction potential (ORP), dissolved oxygen (DO), pH, temperature, sulfate) were collected prior to injection. Performance parameters were used to assess the presence of the reagent in the groundwater prior to sampling. Groundwater samples were collected at 2 weeks post injection for TMW-2. Groundwater samples were collected at 5 weeks post injection at TMW-2, TMW-3, MW-9a and MW-9b and selectively analyzed for VOCs, monitoring parameters, and metals. Groundwater samples were collected at 6 weeks at TMW-4 and TMW-6 for VOCs and monitoring parameters. Performance Monitoring Data is provided in **Table 3-6.** A summary of the Analytical data collected can be found in **Table 3-7**.

The following results were observed during the injection and analysis of groundwater samples:

- The ROI, anticipated to be 5 feet, was observed to be less than 1 foot from the injection points. This can be deduced from the parameter readings in TMW-1 during and post injection compared to MW-4 at 6 weeks after injection. The specific conductance for TMW-4 (2' from IP1) after 6 weeks was 100 to 500 times greater than that observed in TMW-1 (3' from IP1 and IP2).
- The actual groundwater velocity in the pilot area was significantly less than the historical slug test data suggested at the site. Historical slug test data showed average seepage velocities across the site to be up to 6 inches per day. Laboratory data from an undisturbed Shelby tube in the pilot study area (ST-12) during the Remedial Investigation indicated a groundwater velocity of 0.0022 inches per day (K=1.30E-6 cm/sec with hydraulic gradient of 0.05) in the area around MW-9a and MW-9b.
- There was an overall reduction of the primary COCs detected. After 6 weeks Chloroform was reduced from 90.9 ug/L to 50.1 ug/L, and 1,4-Dioxane from 295 ug/L to 17.0 ug/L.

Based on the results of the ISCO Sodium Persulfate pilot study, conclusions relevant to the final design at the site include:

- The reagents were able to reduce Chloroform up to 44.9% and 1,4-Dioxane of by 94%.
- The pilot study revealed that higher pressure would be needed to increase the ROI and for a successful implementation and distribution of the reagent.
- The pilot study suggests that due to the dense subsurface, in a bottom-up injection method there is a potential for oxidant to travel vertically down the borehole instead of horizontally outward.
- Sodium persulfate significantly increased sodium and sulfate concentrations in the groundwater.
- Use of SP increased concentrations of dissolved Barium (1300 ug/L) and dissolved Chromium (220 ug/L).
- The pilot study revealed the potential use of interim slow released oxidant (Klozur KP®) as a part of a potential downgradient of the landfill full-scale strategy. This potential approach is further discussed in Section 4.2.

3.3.2 Modified Fenton's Reagent Pilot Study

In December 2021, Resolute conducted a Modified Fenton's Reagent (MFR) with hydrogen peroxide activation ISCO pilot-scale test at the site between the creek and MW-9a and MW-9b. This pilot study was based on the results of the SP Pilot Study (Section 3.3.1) and the Phase III DPT subsurface investigation (Section 3.1.7) which suggested that two distinct subsurface zones are present. An upper saturated zone which may be directly feeding the creek and a deeper zone which may be moving under the creek. This pilot study was to evaluate if treatment of the upper zone is sufficient to protect the creek from COC impact and further evaluate the implementation requirements for full scale injections in the upper saturated zone. This area has a presence of Chloroform and 1,4-Dioxane exceeding GWPS in the groundwater. Recent semi-annual sampling events revealed that the tributary feeding the creek has been impacted with 1,4-Dioxane at SW-A3, immediately downgradient of monitoring well MW-9a and MW-9b. The field report for the MFR pilot study is included in the PRB Pilot study report in **Appendix J,** as these two pilot studies were conducted concurrently.

Resolute developed a grid to design the MFR pilot study. The grid lines created 5'x 5' squares with lines numbered 1 to 5 running in the northeast-southwest direction. Perpendicular to these, lines were lettered from A to I running in a northwest to southeast direction. Injection points were placed on the intersection of these lines where terrain and trees would allow. Points were offset and set in the center of the boxes and given a double letter and .5 names. This is to indicate the lines that the injection point comes between such as BC 2.5. Where the injection point was inserted between lines B, C, 2, and 3. The injection points are illustrated in **Figure 3-9**. The UIC pilot approval email is provided in **Appendix J**.

A DPT rig was used to advance the boring into the top four feet of the groundwater surface. The depth to groundwater ranged from just below the ground surface in the area north of RW-4 to approximately eight to nine feet bgs in the locations west of MW-9a. After the borings were completed, injection rods with a four-foot injection screen were lowered to the bottom of the boring. The MFR was then pumped into the injection rods. The nine gallons of the reagent would subsequently be injected from the groundwater surface to four feet below it. The topography of the injection area varies from a low point north of RW-4 and along the creek to MW-9a being the highest in elevation. Over two days a total of 702 gallons were injected into thirty-two injection points spaced out along the gird. An additional two injection points were installed directly upgradient of MW-9a and staggered in depth to cover most of MW-9a's screened interval. During the injection there was daylighting of MFR near the injection points, primarily where the groundwater surface was close to the ground surface or steep topographic relief near the injection points.

As reported in the Annual Monitoring Report dated March 23, 2022, Resolute collected a surface water sample in the creek at SW-A3 in January 2022 immediately downgradient of the MFR pilot. 1,4-Dioxane was detected at a concentration of 4.29 ug/L which was similar to a sample collected in July 2021 (4.7 ug/L).

The results of the MFR pilot study relevant to the final design include:

- An MFR injection event immediately upgradient of the surface water sample SW-A3 in the creek did not result in effective reduction of 1,4- Dioxane sufficient to protect the creek short term or long term.
- Results of the MFR Pilot Study suggests that groundwater uplift is likely from deeper saturated zones which can migrate COCs to the creek.

- In order to protect the creek, chemical oxidation injections should occur at deeper saturated zones (below top 4 feet of the saturated zone).
- Shallow injections may encounter surfacing.

4.0 FINAL REMEDY

This section discusses the final design for implementing corrective action at the downgradient edge of the landfill, and the dissolved groundwater plume farther downgradient in the overburden and bedrock. As previously discussed, the remedial technology proposed to treat the site COCs is ISCO. The corrective action at the Site will take place in three proposed phases.

The priority of the final remedy corrective action is protecting the creek, while making progress toward reducing site COCs to below GWPS. Phase I of the corrective active will consist of ISCO injections immediately upgradient of the creek (protect the creek), continued monitoring the effectiveness of the existing PRB pilot, high vacuum vapor and groundwater extraction at the downgradient and upgradient edges of the landfill, and shallow and deep injection well installation and injections in the saturated zones downgradient of the landfill. Phase II consists of extension and recharge of the PRB, value engineering and evaluation of the necessity and/or requirements for the funnel barrier wall along the downgradient edge of the landfill, continued vapor and groundwater extraction in the source area if warranted, continued injection in the downgradient saturated zone in the body of the plume and immediately upgradient of the creek. Phase III consists of Operations and Maintenance of the corrective action.

4.1 Remedy Adjacent to Downgradient Edge of Landfill

The proposed final remedy for the downgradient edge of the landfill is a PRB. using Based Activated Persulfate. If necessary, based on the effectiveness of other corrective activities described in this remedial design a funnel and gate system may be added to intercept groundwater contaminates and direct them to the PRB. Based on successful results of the Base-Activated Persulfate Treatability Study presented in section 2.2, the results of the PRB Pilot Study as presented in Section 3.2, and groundwater modeling, the final conceptual design for a potential funnel and gate system is presented in this section. The PRB and Funnel and Gate location is illustrated in **Figure 4-1a**

During Phase I of the corrective action, performance monitoring will continue with the PRB pilot currently installed at the downgradient edge of the landfill. The performance monitoring will evaluate the effectiveness of the treatment and monitor the PRB for breakthrough. Breakthrough is determined as the time at which the potassium persulfate no longer effectively treats the COCs and additional injection is required. Based on literature and past performance, the KP is anticipated to last from 1 to 2 years, or more.
Once breakthrough has occurred, the PRB will be recharged (additional injection of KP). Based on additional performance monitoring data groundwater sampling, the dosage may be adjusted to optimize effectiveness. Based on existing data, the dosage applied during the PRB pilot study is sufficient to progress the site toward compliance with existing GWPS. During recharge, the PRB may be extended approximately 15 feet to the west in order to intercept and treat the modeled Chloroform and other COC

plume. This extension may not be necessary if the size of the plume can be reduced by the vapor and groundwater extraction performed in the source area (See Section 4.1.2). Also, during the recharge, three permanent performance wells will be installed on the downgradient edge of the PRB (PW-1, PW-2, and POC) as illustrated in **Figure 4-1a**. These permanent 2-inch PVC wells will be screened at an interval of approximately 30-40 feet bgs to monitor the effectiveness of the PRB. The PRB performance monitoring wells will be sampled quarterly for site COC and performance parameters as discussed in Section in 4.3, Groundwater Performance Monitoring Plan.

Phase II of the corrective action immediately downgradient of the landfill begins after the above activities are completed and is defined by another recharge of the PRB. Dosage optimization and value engineering will be performed prior to recharging the PRB. Additional recharging of the PRB, as necessary, will signify entering into Phase III.

During Phase I, Phase II, and Phase III corrective action activities, Resolute will perform an evaluation and value engineering on the effectiveness of the PRB, extraction events in the source area (see Section 4.1.2) as well as the effectiveness of ISCO injections in the body of the plume (see Section 4.2) . Based on the effectiveness of Phase I, Phase II, and Phase III corrective action activities the installation of the funnel wall may be an additional corrective action If warranted, a modification or addendum to the original design presented in this 100% Remedial Design would be submitted to the EPD. The funnel wall will be an impermeable barrier that "funnels" groundwater into the PRB "gate." The funnel wall will extend from the PRB in an eastward direction for approximately 130 feet and terminate approximately 30 feet east and downgradient of MW-2 (**Figure 4-1b**). The length of the funnel intercepts and captures contaminates in the groundwater exceeding the GWPS. Based on current information obtained from activities discussed previously in this report, the funnel wall is proposed to extend from approximately 10 feet above the groundwater water surface to solid bedrock at approximately 100 feet bgs. The proposed funnel wall location is illustrated in **Figure 4-1a**. The impermeable funnel wall will be a soil bentonite wall installed via trenching technology. Spoils from the excavation will be initially staged on poly sheeting and protective barriers will be built along the nearly dry intermittent stream to protect any runoff. Resolute will collect and perform analytical testing on the spoils to confirm the spoils can be spread on site or disposed of as non-hazardous soil. Simple berming/containment will need to be placed around the sheeting to inhibit liquid runoff. Based on current conditions, (which may be modified prior to installation, if necessary) the design criteria are:

Table T4-1
Cut-Off Wall Design Criteria

Hydraulic Conductivity	Average $\leq$ 1.0 x 10^{-7}, No sample > 7.0 x 10^{-6}
Maximum Depth	105 feet Below Ground Surface
Width	$\geq$ 3 feet
Total Length	210 linear feet
Frequency and Testing of Quality Control Samples	1 per 200 cubic yards/ Hydraulic Conductivity (ASTM D5084)

Once installed, the soil bentonite wall will provide a flexible, permanent barrier to direct groundwater migrating from the landfill to the PRB gate for control and treatment. The PRB will be recharged as necessary and performance monitoring will continue immediately downgradient of the landfill.

4.1.1 Evaluation of 1,4-Dioxane Point of Compliance

The results of the PRB pilot and prior bench-scale studies indicate that 1,4 -Dioxane can be treated greater than 99.6%. However, the PRB pilot also indicates heterogeneity in the subsurface which influences a homogenous treatment barrier. As such, some groundwater concentrations of 1,4- Dioxane may exceed the GWPS immediately downgradient of the PRB. Therefore, UGA is proposing a point of compliance (POC) concentration to ensure regulatory compliance will be reached while the creek is also protected. Note that UGA is not proposing an Alternative Concentration limit (ACL) for the site, but is using the guidance to establish a POC in a location at a sufficient distance upgradient of the creek and immediately downgradient of the landfill to allow additional proactive ISCO treatment, if needed, to protect the creek, bring the site into compliance, and ensure the contaminants will not reach the receptor above GWPS.

The POC concentration approach is appropriate for the following reasons:

- The site is regulated as a Solid Waste Management Unit (SWMU). As such, the requirement for design is to protect human health and the environment which is achieved by the proposed POC.
- As presented in Section 6 of the CAP (CAP2020), the vertical and horizontal extents of impacted groundwater have been assessed, and the extents were within the State Botanical Garden property boundaries.
- The nearest well to the Site is an irrigation well located at the Botanical Gardens greenhouse, which is in a different drainage basin from the landfill. Drinking water wells are not present within one mile hydraulically downgradient of the Site.
- Therefore, a complete exposure pathway to humans is not present. The unnamed creek represents a point of exposure (POE) for ecological receptors.
- Since the Site is owned by the University of Georgia and is part of the State Botanical Gardens, the anticipated future use of the Site is highly likely to remain unchanged from the present.

The data collected from January 2020 to January 2022 allows for an evaluation of an attenuation for 1,4-Dioxane from the landfill and the creek for the development of an appropriate point of compliance concentration. The remediation priorities are to protect the creek, remove risk of exposure, and bring the site into compliance. UGA proposes establishing a POC immediately downgradient of the PRB. The point of compliance establishes a maximum concentration of 1-4, Dioxane that will result in a non-detect condition at the ecological POE, which is the unnamed creek downgradient of MW-9a and MW9b. The establishment of a POC at the immediately downgradient edge of the landfill protects the creek through the resultant non-detect condition at the creek and also prevents exposure of 1,4-Dixoane above the GWPS.

The evaluation and proposed POC was performed in accordance with the EPA Office of Solid Waste Management Division (OSWER) Directive 9481.00-6C, ACL Guidance, Part 1. The Point of Compliance (POC) is defined in the Subpart F Regulations (40CFR 264.95) as a “vertical surface” located at the hydraulically downgradient limit of the waste management area that extends down to the uppermost aquifer underlying the regulated unit. The POC location is proposed to be a permanent monitoring well immediately following the location of the PRB in the overburden at a depth of 30 to 35 feet. The PRB is located immediately downgradient of landfill fenced boundary.

“The point of exposure (POE) is the point at which it is assumed a potential receptor can come into contact, either now or in the future, with the contaminated groundwater. Therefore, the groundwater-quality at

the POE must be protective of that receptor" (OSWER1987). The potential receptor of the Milledge Avenue Site is the downgradient creek which traverses the State Botanical Gardens.

Five co-located surface and sediment sample locations (SW-A1 through SW-A5) have been part of the Semiannual monitoring plan at the Milledge Site (**Figure 1-1**) since 2019. SW-A3 is the only sample location in the creek that has had a detection of 1,4-Dioxane, as well as being the most direct downgradient point of entry into the creek, based on potentiometric surface maps and the Phase III Investigation (Section 3.1.7). As discussed in Section 3.1.7, Resolute collected surface water samples along the creek to determine where impacted groundwater fed into the creek. Based on the Phase III investigation, 1,4-Dioxane enters the creek in a convergent point of two intermittent streams (sample location SW-A3/SD-A3) directly downgradient of the MW-9 well cluster near the former pump and treat recovery wells. Therefore, sample location SW-A3 is proposed to be the POE as the primary evidence of entry into the creek before dilution with a second intermittent stream (historically non-detect for 1-4 Dioxane). (The reliance on dilution is not being used in proposing the POC concentration). Recently, 1,4-Dioxane has been detected above the screening level concentration in the surface water. The POE and POC are illustrated in **Figure 4-1a.**

The proposed POC concentration for 1,4-Dioxane was calculated using attenuation factors (AF) observed at the site. The highest concentrations of 1,4-Dioxane are found in the upper saturated zones within the landfill boundary at MW-3 and MW-4 (average of 260 ug/L and 427 ug/L, respectively). Based on evaluating the concentrations of 1,4-Dioxane in groundwater monitoring wells from inside the landfill and the creek, the following AFs and reductions have been observed:

- AF range for MW-3 to SW-A3 has been 96.7%-98.7% since 2020.
- AF range for MW-4 to SW-A3 has been 96.7%-99.3% since 2020.
- POC will be approximately 55 feet from MW-4 and inline from MW-4 to MW-9a
- Based on average concentrations and AF, a POC concentration for 1,4-Dioxane of 91 ug/L results in a non-detect concentration at SW-A3 by EPA Method 8260.
- MW-9a and MW9b can be used as sentinel wells to show that the concentration of 1,4-Dioxane is reducing at the attenuation factor modeled. In addition, ISCO treatment will be actively implemented in this area during Phase I and Phase II of corrective action and discussed further in Section 4.2.1 of this report.

Therefore, the proposed POC concentration for 1,4-Dioxane at the proposed POC monitoring well is 91 ug/L and will result in a concentration below detection limits.

4.1.2 Addressing Contaminant Source in the Landfill

As discussed in Section 3.1.3 and 4.1, reduction in concentrations of Chloroform and other VOCs in the vapor plume currently under the landfill may reduce concentrations and size of the groundwater plume of Chloroform and other VOCs in the groundwater.

During Phase I of the corrective action plan, Resolute proposes to perform High Vacuum Extraction of Groundwater and Vapor. Reducing the VOCs in the soil vapor could lead to lower concentrations in the groundwater flowing out of the landfill. A subcontractor will be obtained to conduct multiphase extraction events.

The vacuum extraction events will be conducted over an 8 to 10 hour period that will include initial set up, preparation of equipment, bringing the unit up to temperature at the routine steady-state operating conditions required for volumetric flowrate, afterburner temperature, and other operating equipment. Extraction will then commence and continue for the remainder of time or until a set volume of fluid is removed. The extracted vapor and fluid will be combusted and disposed of properly. Resolute will monitor the event and work with the subcontractor to ensure that the health and safety remains a top priority.
During Phase I, the existing landfill vents installed along the southern boundary will be assessed to determine if they may be useful for vapor extraction events. In addition, four extraction wells are planned to be installed to the groundwater table in the southern (upgradient) and northern (downgradient) areas of the landfill. Quarterly extraction events are proposed to assess the effect on the groundwater and vapor plume. Vapor samples will be collected in up to 10 existing groundwater monitoring wells or the vapor extraction wells one week after the extraction events and analyzed for VOCs by EPA TO15. Concentrations of groundwater collected during the semi-annual groundwater events in MW-2, MW-3, MW-4, and MW-5 will also be used to evaluate the effect of vapor and groundwater extraction on the size and concentrations of COCs in the groundwater.

After a sufficient number of extraction events occur to evaluate and determine whether the activities have a positive impact on reducing the groundwater contamination, Phase II of the corrective action will begin. During Phase II corrective action in the landfill additional multiphase extraction events will occur periodically. Resolute will monitor the groundwater in the extracted area and determine the amount of extraction events necessary to continue reducing the contaminates flowing out of the landfill.

Additionally, the landfill gas vents present on site may be modified for low flow continuous venting. Solar powered vent fans may be installed on the landfill vents to pull vapor concentrations out of the landfill at a higher rate than current passive venting. This process will be a low-cost effort to have continuous soil vapor venting in the landfill and assist in lowering COC concentrations which, in turn, may lower the number of injections that are necessary to treat the overburden plume downgradient of the landfill.

If effective, continued vacuum events and venting can continue in Phase II and Phase III of the corrective action. Venting of COCs will be included in the UGA's current air permit prior to implementing passive or semi-active venting.

4.1.3 Addressing Lindane and Carbon Tetrachloride in the Final Remedy

At the request of the Georgia EPD, the list of site-specific COCs was expanded in September 2019 after sampling monitoring well MW-4, immediately downgradient of the former landfill, for the list of Appendix IX constituents at the request of EPD. Gamma BHC (Lindane) and 1,4-Dioxane were detected at concentrations exceeding their respective MCLs. Other BHC compounds (alpha-BHC, beta-BHC, delta-BHC) were also detected at concentrations similar to or less than Lindane, but these BHC compounds do not have MCLs. As a result of this September 2019 sampling, Lindane and 1,4-Dioxane were added to the

list of site-specific COC analytes beginning in January 2020. In the Corrective Action Plan, dated 2020, the MCL for Lindane (0.2 ug/L) was proposed as the GWPS for this constituent (CAP2020).

Since January 2020, Lindane has been detected inside the landfill at well MW-4 ranging in concentration from 0.3 ug/L to 0.7 ug/L (Resolute2021). Lindane was also detected below the drinking water MCL in MW-3 in July 2020 (0.07 ug/L) and once in MW-7a in (January 2022 at 0.18 ug/L). MW-7a is located approximately 150 feet downgradient of the landfill. Lindane has not been detected in the bedrock wells at the site. The overburden groundwater plume for Lindane is presented in the January 2022 Annual Monitoring Report and included as **Figure 4-1c.** Based on the historical monitoring data collected, the extent of Lindane has remained very localized.

Carbon Tetrachloride has only been detected above GWPS in the shallow groundwater monitoring wells inside the landfill (MW-2, MW-3, and MW-4) at a concentration range of 5.1 ug/L to 80.3 ug/L. As discussed in Section 3.2 of this report, the PRB pilot study results suggests that Base Activated Persulfate may be effective in reducing Carbon Tetrachloride as much as 54%.

A summary of the Lindane and Carbon Tetrachloride, as it relates to the Remedial Design is as follows:

- Geoform™ ER® + EHC®, as demonstrated by the bench scale study discussed in Section 2.1 is effective in reducing Lindane and Carbon Tetrachloride to site GWPS.
- The PRB pilot study suggests that Base Activated Persulfate may reduce Carbon Tetrachloride by as much as 54%, but Base Activated Persulfate is not very effective in reducing concentrations of Lindane.
-
- Lindane is limited to the overburden and not the bedrock.
- Lindane is not detected above drinking water MCLs beyond the Landfill boundary.
- Lindane has only been detected above the drinking water MCL in one monitoring well inside the landfill boundary (MW-4).
- The groundwater plume for Lindane is limited to the western portion of the landfill.
- No drinking water wells are within one mile of the site.
- A complete exposure pathway to humans in not present at the site.
- During the 30 years of the existence of the landfill, Lindane has not been released to the GW in a sufficient quantity or concentration to generate a GW plume which threatens exposure at the downgradient creek.

The remedy for Lindane and Carbon Tetrachloride will initially be the vapor and groundwater extraction in the source area, as discussed in Section 4.1.2. The effectiveness of this will be evaluated through groundwater monitoring. In the event Lindane or Carbon Tetrachloride is detected outside the landfill or beyond the PRB above GWPS, corrective action to lower concentrations below GWPS will be implemented using targeted in-situ injections of Geoform™ ER® + EHC®, as demonstrated by the bench scale study discussed in Section 2.1. The application of Geoform™ to address Lindane or Carbon Tetrachloride in the groundwater can be through injection wells or direct push, whichever is warranted.

4.2 Remedy For Groundwater Plume Downgradient of Landfill/PRB

The impacted groundwater farther downgradient of the landfill consists of the overburden dissolved plume and dissolved bedrock plume. Based on information from the ISCO Pilot Study performed around MW-9, and data from the Remedial Investigation, and PRB Pilot Study, Resolute proposes to remediate the downgradient plume in a phased approach to address the priorities of protecting impacts to the creek, followed by reducing concentrations of COCs to below GWPS in the overburden and downgradient groundwater plume.

4.2.1 Overburden Groundwater Plume Remedial Design

One of the primary objectives for the site is protection of the sensitive receptor, the gaining tributary which lies at the downgradient edge of the COCs in groundwater in the overburden zone, followed by reducing concentrations of COCs throughout the plume, and addressing the source. Since the dissolved plume has continued to migrate toward the creek and an extended period of time is needed to evaluate the effectiveness of the PRB Pilot Study, Resolute proposes that Phase I of corrective action will be performed in the overburden plume immediately upgradient of creek, in the area of the MW-9 well cluster and former recovery wells (near the vicinity of the previous base activated persulfate ISCO Pilot Study discussed in Section 3.3) and MFR pilot study in 2021 (See **Figure 4-1b**.)

A base activated sodium persulfate (BASP) has been demonstrated to be an effective remedial chemical oxidant during the treatability and pilot study programs. A 5 gram per liter (g/L) solution of sodium persulfate (Klozur SP) along with a 25% sodium hydroxide (NaOH) activator will be administered to chemically oxidize groundwater contaminants. The injection system will utilize a low-pressure, less than 25 psi, and/or gravity feed delivery system, depending on intake observations during the injection event. Each injection well would be administered approximately 262 pounds of Klozur SP with 700 pounds of NaOH comprising a 550-gallon solution per event. Up to three injection events per year are planned for the Phase I portion of the active remediation.

This first phase of corrective action in the downgradient overburden will use ISCO for treatment directly upgradient of the creek where 1,4-Dioxane was detected (SW-A3). Based on previous MFR pilot study and DPT III Investigation, this saturated saprolite/partially weathered rock transition zone is believed to be the primary source of 1,4-Dioxane to the gaining stream directly downgradient from the MW-9 area.

As such, former recovery well RW-2 will be utilized as an injection well (IW-5). Former recovery well RW-2 is screened within 40 feet of the saprolitic and partially weathered rock from a depth of 24 ft bgs to the bottom of the well at 64 ft bgs. The elevation of the stream surface in the vicinity of the recovery wells is approximately 575 feet, MSL. The screened interval of RW-2 (525-565 ft. MSL) corresponds closely to the surface water elevation of the creek. Detections of COC's in surface water from the creek indicate that impacted groundwater has discharged into the creek. Evaluation of historical data and MFR pilot study, suggest that a positive (upward) vertical groundwater gradient into the creek. Utilizing RW-2, located near the creek floodplain and directly upgradient of the point of exposure (SW-3), will protect the creek by reducing groundwater COC concentrations. The location of RW-2/IW-5 is illustrated in **Figure 4-1a**. The potentiometric surface in the creek floodplain and immediately upgradient of the creek is illustrated in **Figure 3-6**.

Table T4.2-1
Summary of Recovery Well Construction

Recovery Well ID	Depth (Ft-BGS)	Screened Interval (Ft-BGS)	Well Material Construction
R-1	60.4	20 - 60	PVC
R-2/IW-5	64.73	24.73 - 64.73	PVC
R-3	60.2	20.2 - 60.2	PVC
R-4	53.29	23.29 - 53.29	PVC
R-5	60.48	20.48 - 60.48	PVC

After evaluation the effectiveness of chemical oxidant injection utilizing R-2/IW-5 as an injection point, additional former recovery wells may be included for subsequent injection events, as needed, to provide broader coverage and contaminant reduction in order to adequately protect the creek.

In order to address the mid plume overburden impact to groundwater, a shallow injection well (IW-4S) will be installed upgradient from monitoring well MW-6b. The purpose of this injection well is to mitigate contaminants in groundwater emanating from the landfill and limit groundwater impact down-gradient. The existing piezometer (PZ-3) will also be utilized as a shallow groundwater injection point to bolster oxidant distribution and contaminant removal in the area of wells MW-6a & b (see **Figure 4-1b**). The location for IW-4S was selected to truncate the plume so that a PRB system could be located closer to the source area. This injection well location will also serve to reduce elevated concentrations of chloroform detected in well MW-6a and 1,4-Dioxane detected in well MW-6b. Injection well IW-4S will be constructed as a 4-inch well to a total depth of 45-feet bgs with 20-feet of 0.030 inch slotted screen within the partially weathered rock zone.

Table T4.2-2
Summary of Proposed Injection Well Construction

Recovery Well ID	Depth (Ft-BGS)	Screened Interval (Ft-BGS)	Well Material Construction
IW-1D	95	55-95	PVC
IW-2D	95	55-95	PVC
IW-3D	95	55-95	PVC
IW-4S	45	25-45	PVC

4.2.2 Bedrock Groundwater Plume Remedial Design

Bedrock at the site has been characterized and discussed in previous reports (PSWP2021; CAP2020, BC1996). Additional data on bedrock was collected during the Remedial Investigation discussed in Section 3.0. Competent bedrock at the site is observed to be gneiss with most fractures and secondary porosity in the upper twenty (20) feet of bedrock. Overlying competent bedrock is partially weathered rock or

PWR, followed by saprolite and soils composed primarily of silts with some sand. Competent bedrock immediately downgradient of the landfill is greater than 104 feet below ground surface based on the geophysical study. Saprolite transitioning to PWR is variable, but typically begins at approximately 30 to 60 feet below ground surface.

Based on observations of soil and rock coring at the site, fractures in the shallower bedrock are often interconnected with other fractures and the overlying PWR and soils. Deeper fractures were observed with less frequency and interconnectivity than shallow fractures.

Based on discreet groundwater sampling near the top of rock (approximately 100 feet below ground surface), COCs appear to be entering the bedrock fractures from the overlying overburden soils and PWR in an area between monitoring well MW-13 to a location approximately 130 feet hydraulically upgradient of well MW-13 (also referred to as "mid-plume" area). The bedrock groundwater plumes extend from monitoring well MW-13 downgradient to monitoring well MW-20.

The Phase I corrective action for bedrock groundwater includes the installation of three deep injection wells (IW-1D, IW2-D, and IW-3D) into the fractured zones above competent bedrock and socket into the upper competent bedrock between monitoring well MW-13 and approximately 130 feet upgradient of well MW-13, as depicted in **Figure 4-1b**. The approach is to inject base-activated SP into the same fracture zone where impacted groundwater is thought to be entering the bedrock from the overburden, thus allowing the ISCO to follow and remediate the impacted groundwater pathways in bedrock. SP has a prolonged duration of activity (up to 3 months and sometimes longer), allowing greater distribution in the fracture system. SP would be used over KP because the latter cannot be distributed through monitoring well screening, is very slow to dissolve and can clog or fill fractures in bedrock, potentially blocking or causing changes to groundwater flow near the injection location.

This approach consists of drilling to the target injection interval in the bedrock zone with a sonic rig and the installation of three 4-inch diameter injection wells located in the mid-plume down-gradient of the proposed PRB system location, see **Figure 4-1b**. The injection wells would primarily target the bottom 10 to 15 feet of fractured bedrock, which is the zone identified as having the highest horizontal groundwater velocity, and the partially weathered rock above the fractured bedrock. Rock core observation during injection well installations will be visually assessed for appropriate depth determinations. The deep injection wells (IW-1D, IW-2D, IW-3D) will be constructed to a total depth of 95 feet with 40-feet of 0.030-slot screen to maximize oxidant distribution throughout the partially weathered and fractured bedrock zone where the highest COC concentrations and groundwater flow conditions exist to afford the maximum reduction in contaminant mass. The rationale for the locations selected for injection wells IW-1D, IW-2D, and IW-3D (**Figure 4-1b**) was based on previously discussed groundwater and hydrologic assessments that would allow the maximum distribution and remedial potential through the mid-plume so that a PRB system could be located closer to the source area. In short, this strategy would mitigate the down-gradient groundwater conditions in order to focus resources near the source area and reduce the likelihood of persistent down-gradient groundwater and surface water impact.

Injections to reduce the concentrations of COCs to below GWPS in the downgradient groundwater will occur as needed in Phase I and Phase II, of corrective action. Phase II of the corrective action in the downgradient plume shall begin after the above injection wells are installed and approximately two years

of ISCO injections conducted at an interval of approximately three times per year. Phase III corrective action is discussed in Section 6.0.

4.3 Groundwater Performance Monitoring Plan

The groundwater performance monitoring plan for the PRB Pilot Study includes collecting the parameters presented in the table below in the proposed performance wells at 1 week, 6 weeks, 3 months, 6 months, 9 months, and 12 months.

During Phase I, II, and III of corrective action for the PRB, Table T4.3-1 will be utilized for quarterly sampling of PW-1, PW-2, and performance well POC.

Table T4.3-1
PRB Pilot Study Performance Monitoring Plan

Parameter	Relevance to the Pilot Study
VOCs by EPA 8260B, 1,4-Dioxane by EPA 8260B SIM, Pesticides by EPA 8081	Measure the reduction in contaminate concentrations entering and leaving the PRB.
Total Organic Carbon by 9060A	TOC should decrease in concentration in wells impacted by reagent injection
Sulfate by EPA 9056A	Sulfate is a breakdown product of sodium persulfate and provides indication of injected solution transport and distribution
pH (Direct Read Instrument)	Base activation and Oxidation can increase the pH and provides indication of injected solution transport and distribution
ORP (Direct Read Instrument)	ORP will increase with oxidizing conditions following injection of ISCO reagents
Specific Conductivity (Direct Read Instrument)	Specific conductivity will increase in wells impacted by injection of chemical reagents due to increase in dissolved phase ions (sodium) in the groundwater
Persulfate (Field Test Kit)	Field screening for the presence of persulfate in groundwater.

Table T4.3-1 will be utilized for performance monitoring of ISCO injections in the downgradient groundwater overburden plume during Phase I, II, and III as discussed in Section 4.2. Performance sampling will occur at 2 weeks, 4 weeks, and 10 weeks after injections. Relevant monitoring wells near the injection points that allow for evaluation of the effectiveness of the injections may include MW-13, MW-9A, -9B, -9C, MW-6A,-6B, MW-14C, MW-20.

Performance monitoring for vapor high vacuum events will include vapor sampling at up to 10 locations after each event and analysis for VOCs by EPA TO 15 to evaluate reductions in vapor concentrations.

5.0 REMEDY IMPLEMENTATION SCHEDULE

Below is the schedule for full-scale implementation of the corrective action

Table T5-1
Remedy Implementation Schedule

Activity	Schedule
PRB Pilot Study	In progress
PRB Recharge and Extension (Physical extension to west)	Within 90 days of exhaustion of PRB Pilot effectiveness
Downgradient Overburden Groundwater Dissolved Plume (area near the creek and mid plume area)	Begin Phase I activities within 30 days after approval by EPD
Bedrock groundwater Dissolved Plume	Begin Phase I activities within 30 days after approval by EPD
High Vacuum Extraction (source area)	Within 90 days after approval of by EPD
Phase II Corrective Action	Within 90 days following completion of Phase I Corrective Action
Optional Funnel Wall Installation	Upon determination of necessity of additional correction action

6.0 OPERATIONS & MAINTENANCE (O&M) PLAN

O&M is Phase III of the corrective action. Operation and maintenance will include

- Surgical ISCO Injections and monitoring as needed in the downgradient plume.
- KP PRB recharge and performance sampling of the PRB, as needed.
- Passive/semi active venting of source vapor plume, if effective.
- High vacuum extraction of groundwater and vapor in the source area, if effective.
- Continued semi-annual monitoring per the site RCRA permit.
- Value engineering and corrective action effectiveness evaluations.

7.0 FULL SCALE REMEDY PROJECT COSTS

The estimated cost for the full-scale remediation is summarized below.

Table T7-1
Full Scale Remedy Project Costs

Task Description	Phase I	Phase II	Phase III (Annual Average)
Compliance Monitoring Sampling	**$97,383**	**$71,358**	**$63,800**
Compliance Monitoring Consulting	**$38,248**	**$21,856**	**$22,900**
Vapor and GW Extraction	**$255,694**	**$0**	**$110,683**
PRB Installation and O&M	**$137,160**	**$110,098**	
Downgradient Plume Injections	**$707,168**	**$266,558**	
Funnel Wall Installation (Additional Measure)		**1,023,00**	
Total Project Cost Estimate	**$1,235,653**	**$1,492,870**	**$197,383**

8.0 CLASS III PERMIT

Upon approval of the Remedial Design and prior to Corrective Action ISCO injections, a Class III permit will be provided to the EPD under separate cover in accordance with Georgia EPD requirements.

9.0 REFERENCES

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(Park1999) Park C.B., Miller R.D., and Xia J. 1999. *Multichannel Analysis of Surface Waves*. Geophysics, **64**(3): 800–808.

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Attachment-1 Subsurface Investigation Data Quality Objective Summary

Milledge Avenue Site

Athens, Georgia

Problem Necessiting the Investigation: The lack of subsurface data is presenting unnacceptable risks to evaluate the feasibility and completion of a design of a Permeable Reactor Barrier Wall (PRB).			
Item ID	**Principal Study Questions**	**Objecives of Study Questions**	**Tasks Where the Data will be collected**
A.	What is the GW velocity across the downgradient boundary of the site and wings?	Determine expected GW velocity through PRB. Determine if GW control is needed upstream to reduce velocity through a PRB. Determine through modeling the changes to GW surface elevation with variations to Funnel/Gate design and PRB design.	Geophyscal Surveying, Darcy Calcs, ASTM Hydraulic Conductivty Lab Testing of Undisturbed Samples (Shelby Tubes), GW Modeling, HPT Investigation.
B.	What will be the anticipated GW velocity in the funnel after a CB wall is built?	Same as A	Geophyscal Surveying, Darcy Calcs, ASTM Hydraulic Conductivty Lab Testing of Undisturbed Samples (Shelby Tubes), GW Modeling, HPT Investigation.
C.	What is the max contaminate flux in vertical and horizontal profile?	Determine preferential pathways of contaminant mass to be able to complete a design and feasibility of PRB, and contaminate mass to treat.	HPT Investigation, Discreet GW Sampling and Laboratory Anaysis
D.	What is the porosity and effective porosity in the impacted saturated zone?	Data required for GW Modeling	Shelby Tube Collection and Geotechnical Laboratory Testing (ASTM Hydraulic Conductivity, Dry and Wet Soil Desity Testing , porosity calculation)
E.	Can Groundwater flow entering in and exiting the site be controlled (i.e. a GW diversion barrier up-gradient of the landfill), controlling GW surface elevation?	Assist in evaluating if GW velocity needs to be reduced, and can controls be placed upgradient.	HPT Investigation, Geophysical Surveying, GW Modeling, Geotechnical Laboratory Testing (ASTM K testing, porosity, soil density)
F.	Is the bedrock surface feasible for CB wall, what challenges, risks, are present at the bedrock boundary?	Determine if contaminate mass has the potential to seep under the PRB if the bedrock interface is not competent.	Geophysical Surveying, Discrete GW sampling
G.	Can we isolate the overburden from the bedrock by putting in a grout slurry?	Same as F	Geophysical Surveying
H.	Will the CB wall need to extend into the bedrock? How far?	Same as F	Geophysical Surveying
I.	How far along the downggradient edge of the landfill would be designed, what data is needed along those boundaries?	Determine the extent of the Funnel and Gate system	HPT Investigation, Geophysical Surveying, Geotechnical lab testing (Shelby Tubes), GW Modeling
J.	Is a funnel necessary?	Determine necessity of funnel system	HTP Investigation. GW Modelng, Discrete GW sampling
K.	Is there value in utilizing existing data, particle tracking modeling, and looking at upgradient treatment?	Conserve costs by obtaining needed modeling data	Geotechnical lab testing, Discrete GW sampling, GW Modeling
L.	In Area A, at what point does the contaminate enter the bedrock?	What depth and location is available for the placement of the PRB wall(s).	Discreet GW grab sampling along bedrock base in Area A.
M.	What is the vertical hydraulic gradient of bedrock and overburden? . a. Is there an upper migration of contaminate from the GW upward? b. Is there a differential vapor phase along the vertical profile along the downgradient landfill boundary?	To understand groundwater flow for modeling of GW and mass transport.	Discreet GW sampling, Soil Vapor Implant sampling,
N.	Will adding Ions/Cations through injections (salts, K, Na, Sulfate) in downgradient plume negatively affect the creek?	Avoid unintended consequences with implementation of the ISCO remedy near the creek in the downgradient plume	GW modeling, Creek flow data
O.	Is Vapor phase plume possible in the vadose soil that may be causing some minor hits of contaminates in the GW? a. Is there an upper migration of contaminate from the GW upward? b. Is there a differential vapor phase along the vertical profile along the downgradient landfill boundary?	Understand transport of contaminate (vapor and dissolved phases) and data needed to evaluate feasibility and design of extent of funnel and gate	Phase I Soil Vapor Implant sampling. Assumption is that VOCs are the indicator of a plume. Presence of any Lindane is not relevant to the study question.

TABLES

Table 1-1
Summary of Analytical Results for Site Constituents of Concern
Groundwater
Milledge Avenue Site
Athens, GA

Sample ID	Sample Date	Chloroform (ug/L)	Carbon tetrachloride (ug/L)	1,2-Dichloroethane (ug/L)	1,2-Dichloropropane (ug/L)	Tetrachloroethene (PCE) (ug/L)	Lindane (Gamma BHC) (ug/L)	1,4-Dioxane (ug/L)
Site GW Protection Standards		**80**	**5**	**5**	**5**	**5**	**0.2**	**0.46**
MW-2	1/12/2021	**320**	**5.17**	<1.00	<1.00	<1.00	<0.0500	**19.80**
	7/14/2021	**303**	**7.02**	<1.00	<1.00	<1.00	<0.0500	**25.3**
	1/19/2022	**345**	<10.0	<10.0	<10.0	<10.0	<0.0500	**17.1**
MW-3	1/12/2021	**2050**	<50.0	<50.0	<50.0	<50.0	<0.0500	**337**
	7/14/2021	**2180**	**51.2**	<50.0	<50.0	<50.0	<0.0500	**362**
	1/19/2022	**2970**	**80.3**	<50.0	<50.0	<50.0	<0.0500	**131**
MW-4	1/12/2021	**1400**	<25.0	<25.0	<25.0	<25.0	**0.714**	**963**
	7/14/2021	**1150**	**27.3**	<25.0	<25.0	<25.0	**0.324**	**329**
	1/19/2022	**1210**	**36.1**	<25.0	<25.0	<25.0	**0.392**	**247**
MW-5b	1/12/2021	<5.00	<1.00	<1.00	<1.00	<1.00	<0.0500	**6.72***
	7/14/2021	<5.00	<1.00	<1.00	<1.00	<1.00	<0.0500	<3.00
	1/19/2022	<5.00	<1.00	<1.00	<1.00	<1.00	<0.0500	<3.00
MW-5c	1/12/2021	<5.00	<1.00	<1.00	<1.00	<1.00	<0.0500	**4.26***
	7/14/2021	<5.00	<1.00	<1.00	<1.00	<1.00	<0.0500	<3.00
	1/19/2022	<5.00	<1.00	<1.00	<1.00	<1.00	<0.0500	<3.00
MW-6a	1/13/2021	**102**	1.27	<1.00	<1.00	<1.00	<0.0500	**6.43***
	7/14/2021	**113**	1.54	<1.00	<1.00	<1.00	<0.0500	**9.31**
	1/20/2022	**101**	1.56	<1.00	<1.00	<1.00	<0.0500	**7.92**
MW-6b	1/13/2021	54.3	<1.00	<1.00	<1.00	<1.00	<0.0500	<3.00
	7/14/2021	62.0	1.01	<1.00	<1.00	<1.00	<0.0500	**5.59**
	1/20/2022	62.3	<1.00	<1.00	<1.00	<1.00	<0.0500	**4.13**
MW-7a	1/13/2021	10.0	<1.00	<1.00	<1.00	<1.00	<0.0500	<3.00
	7/13/2021	7.30	<1.00	<1.00	<1.00	<1.00	<0.0500	<3.00
	1/18/2022	9.83	<1.00	<1.00	<1.00	1.63	0.183	**4.28**
MW-7b	1/13/2021	<5.00	<1.00	<1.00	<1.00	2.48	<0.0500	**42.5**
	7/13/2021	<5.00	<1.00	<1.00	<1.00	2.29	<0.0500	**39.7**
	1/19/2022	<5.00	<1.00	<1.00	<1.00	1.89	<0.0500	**27.4**
MW-9a	1/13/2021	25.3	<1.00	<1.00	<1.00	1.49	<0.0500	**36.2**
	6/25/2021	32.0	<1.00	<1.00	<1.00	1.17	<0.0500	**28.4**
	1/18/2022	27.8	<1.00	<1.00	<1.00	1.14	<0.0500	**19.6**
MW-9b	1/13/2021	**188**	<1.00	<1.00	<1.00	<1.00	<0.0500	**36.1**
	6/25/2021	**163**	<1.00	<1.00	<1.00	<1.00	<0.0500	**49.0**
	1/18/2022	**126**	<1.00	<1.00	<1.00	<1.00	<0.0500	**30.5**
MW-9c	1/13/2021	<5.00	<1.00	<1.00	<1.00	<1.00	<0.0500	**3.82***
	2/23/2022	NS	NS	NS	NS	NS	NS	**6.27**
	2/23/2022	NS	NS	NS	NS	NS	NS	**6.44 ****
MW-10a	1/12/2021	<5.00	<1.00	<1.00	<1.00	<1.00	<0.0500	<3.00
	1/19/2022	<5.00	<1.00	<1.00	<1.00	<1.00	<0.0500	<3.00
MW-10b	1/12/2021	<5.00	<1.00	<1.00	<1.00	<1.00 J3	<0.0500	<3.00
	1/19/2022	<5.00	<1.00	<1.00	<1.00	<1.00	<0.0500	<3.00
MW-12a	1/13/2021	<5.00	<1.00	<1.00	<1.00	<1.00 J3	<0.0500	<3.00
	1/20/2022	<5.00	<1.00	<1.00	<1.00	<1.00	<0.0500	<3.00
MW-12b	1/13/2021	<5.00	<1.00	<1.00	<1.00	<1.00	<0.0500	<3.00
	1/20/2022	<5.00	<1.00	<1.00	<1.00	<1.00	<0.0500	<3.00
MW-13	1/12/2021	**282**	1.71	<1.00	<1.00	<1.00	<0.0500	**12.9**
	7/13/2021	**210**	1.65	<1.00	<1.00	<1.00	<0.0500	**18.4**
	1/19/2022	**167**	<5.00	<5.00	<5.00	<5.00	<0.0500	**9.14**
MW-14a	1/13/2021	12.8	<1.00	<1.00	<1.00	<1.00	<0.0500	<3.00
	7/13/2021	13.1	<1.00	<1.00	<1.00	<1.00	<0.0500	**4.82**
	1/19/2022	12.3	<1.00	<1.00	<1.00	<1.00	<0.0500	<3.00
MW-14b	1/13/2021	<5.00	<1.00	<1.00	<1.00	<1.00	<0.0500	<3.00
	1/19/2022	<5.00	<1.00	<1.00	<1.00	<1.00	<0.0500	<3.00
MW-14c	1/12/2021	<5.00	<1.00	<1.00	<1.00	<1.00	<0.0500	<3.00
	1/19/2022	<5.00	<1.00	<1.00	<1.00	<1.00	<0.0500	<3.00
MW-20	1/12/2021	<5.00	<1.00	<1.00	<1.00	<1.00	<0.0500	**6.23***
	7/13/2021	<5.00	<1.00	<1.00	<1.00	<1.00	<0.0500	**10.8**
	8/11/2021	NA	NA	NA	NA	NA	NA	**7.41**
	1/18/2022	<5.00	<1.00	<1.00	<1.00	<1.00	<0.0500	**6.39**
WP-1	1/12/2021	<5.00	<1.00	<1.00	<1.00	<1.00	<0.0500	<3.00
	1/19/2022	5.48	<1.00	<1.00	<1.00	<1.00	<0.0500	<3.00
WP-2	1/12/2021	11.3	<1.00	<1.00	<1.00	<1.00	<0.0500	<3.00
	7/14/2021	6.43	<1.00	<1.00	<1.00	<1.00	<0.0500	<3.00
	1/18/2022	5.13	<1.00	<1.00	<1.00	<1.00	<0.0500	<3.00
WP-3	1/12/2021	<5.00	<1.00	<1.00	<1.00	<1.00	<0.0500	<3.00
	1/18/2022	<5.00	<1.00	<1.00	<1.00	<1.00	<0.0500	<3.00

Notes:
NA - Not Analyzed
J3 - The associated batch QC was outside the established quality control range for precision
< - Less than labratories Reported Detection Limit (RDL)
*** Value previously reported below detection limits based on the Analytical Report submitted at the time. See Results Section in the report for further details.**
**** Duplicate sample reported as Sample ID MW-9CD**

Table 1-2
Summary of Analytical Results for Site Constituents of Concern
Surface Water and Sediment
Milledge Avenue Site
Athens, GA

Sample ID	Sample Date	Chloroform (ug/L)	Carbon tetrachloride (ug/L)	1,2-Dichloroethane (ug/L)	1,2-Dichloropropane (ug/L)	Tetrachloroethene (PCE) (ug/L)	Lindane (Gamma BHC) (ug/L)	1,4-Dioxane (ug/L)
GA In-Stream Water Quality Standards	**--**	**470**	**1.6**	**37**	**15**	**3.3**	**0.95**	**NE**
SW-A1	--	NS	NS	NS	NS	NS	NS	NS
	--	NS	NS	NS	NS	NS	NS	NS
SW-A2	7/12/2021	<5.00	<1.00	<1.00	<1.00	<1.00	<0.0500	<3.00
	1/20/2022	<5.00	<1.00	<1.00	<1.00	<1.00	<0.0500	<3.00
SW-A3	7/12/2021	<5.00	<1.00	<1.00	<1.00	<1.00	<0.0500	4.58
	1/20/2022	<5.00	<1.00	<1.00	<1.00	<1.00	<0.0500	4.29
SW-A4	7/12/2021	<5.00	<1.00	<1.00	<1.00	<1.00	<0.0500	<3.00
	1/20/2022	<5.00	<1.00	<1.00	<1.00	<1.00	<0.0500	<3.00
SW-A5	7/12/2021	<5.00	<1.00	<1.00	<1.00	<1.00	<0.0500	<3.00
	1/20/2022	<5.00	<1.00	<1.00	<1.00	<1.00	<0.0500	<3.00
Sediment Sample ID	--	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**
S-A1	7/12/2021	<0.0115	<0.0230	<0.0115	<0.0230	<0.0115	<0.0534	<0.0534 J3
	1/20/2022	<0.00334	<0.00668	<0.00334	<0.00668	<0.00334	<0.0221	<0.0668
S-A2	7/12/2021	<0.00444	<0.00888	<0.00444	<0.00888	<0.00444	<0.0270	<0.00270 J3
	1/20/2022	<0.00519	<0.0104	<0.00519	<0.0104	<0.00519	<0.0270	<0.00270
S-A3	7/12/2021	<0.00387	<0.00774	<0.00387	<0.00774	<0.00387	<0.0251	<0.00251 J3
	1/20/2022	<0.00738	<0.0148	<0.00738	<0.0148	<0.00738	<0.0294	<0.00294
S-A4	7/12/2021	<0.00485	<0.00970	<0.00485	<0.00970	<0.00485	<0.0277	<0.00277 J3
	1/20/2022	<0.00510	<0.0102	<0.00510	<0.0102	<0.00510	<0.0262	<0.00262
S-A5	7/12/2021	<0.00417	<0.00834	<0.00417	<0.00834	<0.00417	<0.0260	<0.00260 J3
	1/20/2022	<0.00411	<0.00822	<0.00411	<0.00822	<0.00411	<0.0251	<0.00251

Notes:
NS - Not Sampled
NE - Not Established
J3 - The associated batch QC was outside the established quality control range for precision
< - Less than labratories Reported Detection Limit (RDL)
***GA EPD In Stream Water Quality Standard, 10/7/2019**

Table: 3-1 Summary of Geotechnical Properties Testing

Milledge Avenue Site

Athens, Georgia

Sample Number (depth)	Sample Type	Natural Moisture Content (%)	Dry Bulk Density		Wet Bulk Density		Porosity (%), *	K_{sat} (cm/sec)	Bulk Specific Gravity	% Gravel (>4.75mm)	% Sand (<4.75mm, >0.075mm)	% Silt (<0.075mm, >0.002mm)	%Clay (<0.002mm)	USCS Classification
			(g/cm^3)	pcf	g/cm^3)	pcf								
ST-1 (45.5'-46')	Undisturbed Soil	32.0	1.63	101.85	1.95	121.85	40.7	7.1E-05	N/A					
ST-2 (44.5'-45')	Undisturbed Soil	25.3	1.72	107.38	1.97	123.21	37.5	2.3E-04	N/A					
ST-3 (21'-21.5')	Undisturbed Soil	33.3	1.68	105.02	2.02	125.82	38.8	6.3E-05	N/A					
ST-4 (27.5'-28')	Undisturbed Soil	30.0	1.69	105.42	1.99	124.14	38.6	2.2E-05	N/A	3.7	61.7	24.4	10.2	SM/SC/SC-SM Silty Sand/Clayey Sand/ Silty Clayey Sand
ST-5 (31.5'-32')	Undisturbed Soil	31.6	1.58	98.92	1.90	118.62	42.4	2.9E-04	N/A	0.7	76.8	20.6	1.8	SM/SC/SC-SM Silty Sand/Clayey Sand/ Silty Clayey Sand
ST-6 (37'-37.5')	Undisturbed Soil	36.9	1.54	96.34	1.91	119.40	43.9	2.4E-04	N/A	0.6	73.6	24.4	1.4	SM/SC/SC-SM Silty Sand/Clayey Sand/ Silty Clayey Sand
ST-7 (69.5'-70')	Undisturbed Soil	28.9	1.79	111.51	2.08	129.55	35.0	6.7E-06	N/A	1.6	67.8	27.4	3.3	SM/SC/SC-SM Silty Sand/Clayey Sand/ Silty Clayey Sand
ST-8 (54.5'-55')	Undisturbed Soil	36.0	1.75	109.38	2.11	131.86	36.3	3.3E-06	N/A					
ST-9 (39'-39.5')	Undisturbed Soil	27.5	1.82	113.41	2.09	130.58	33.9	7.0E-05	N/A	9.2	66.1	20.6	4.0	SM/SC/SC-SM Silty Sand/Clayey Sand/ Silty Clayey Sand
ST-10 (24'-24.5')	Undisturbed Soil	31.0	1.69	105.23	2.00	124.56	38.7	1.5E-04	N/A					
ST-11 (15.5'-16')	Undisturbed Soil	39.2	1.55	97.00	1.95	121.44	43.5	9.3E-05	N/A					
ST-12 (21'-21.5')	Undisturbed Soil	32.2	1.67	104.46	2.00	124.57	39.2	1.3E-06	N/A	0.4	63.6	25.0	11.0	SM/SC/SC-SM Silty Sand/Clayey Sand/ Silty Clayey Sand
MW9C-A	Bedrock Core	0.5	2.66	165.92	2.66	166.26	2.9	5.1E-04	2.74					
MW9C-B	Bedrock Core	0.6	2.72	169.90	2.73	170.29	1.5	5.1E-04	2.77					
MW9C-C	Bedrock Core	0.4	2.77	172.84	2.77	173.11	0.5	4.5E-04	2.79					

Notes:
Ksat = saturated hydraulic conductivity
pcf = pounds per cubic foot
*Porosity calculations are based on the use of an assumed specific gravity value of 2.75 for undisturbed Soil samples
N/A= Not Tested

Completed By: CL/MJD
Reviewed By: TAJ

Table 3-2 Soil Vapor Analytical Results
Milledge Avenue Site
Athens, Georgia

Sample ID		Contaminates of Concern µg/m3)					
	Sample Depth (ft bgs)	Chloroform	Carbon Tetrachloride	1,2-Dichloroethane	1,2-Dichloropropane	Tetrachloroethene	1,4-Dioxane
B2-SV1	4	4.4	<5.5	<3.5	<4.0	<5.9	<13
B1-SV2	6	<4.8	<6.2	<4.0	<4.5	<6.6	<14
B1-SV3	6	27	<5.9	<3.8	<4.3	<6.3	<13
B1-SV4	6	66	<6.5	<4.2	<4.8	<7.0	<15
B1-SV5	11	260	190	3.8	4.4	110	<14
A-SV6	10	2,400	390	<9.2	<10	150	<33
A-SV7	10	2,500	160	<9.2	<10	90	<33
A-SV8	10	26	10	<3.8	<4.3	19	<13
B3-SV9	12	15	35	<3.8	<4.3	25	<13
B3-SV10	20	260	270	<3.7	<4.2	89	<13
B3-SV11	10	96	150	<3.8	<4.4	67	<14
C-SV12	15	8,000	3,700	<37	<43	130	<130
C-SV13	20	19,000	11,000	<74	<85	<120	<260
C-SV14	15	22,000	2,900	400	<140	<210	<440

µg - microgram
m3 - meters cubed
ft bgs- feet below ground surface
Prepared by JB
Checked by TAJ

Table 3-3 Discrete GW Sampling Results
Milledge Avenue Site
Athens, Georgia

Contaminates of Concern (ug/L)							
Sample ID	Chloroform	Carbon Tetrachloride	1,2-Dichloroethane	1,2-Dichloropropane	Tetrachloroethene	1,4-Dioxane *	Gamma BHC
Site GW Protective Standards	80	5	5	5	5	0.46	0.2
T1-0GWS **	< 5.00	< 1.00	< 1.00	< 1.00	< 1.00	< 0.597	< 0.05
T1-1GWS **	< 5.00	< 1.00	< 1.00	< 1.00	< 1.00	< 0.597	< 0.05
T1-2GWS **	< 10.0	< 2.00	< 2.00	< 2.00	< 2.00	< 0.597	< 0.05
A-T1-B1-48'-GWS	< 5.00	< 1.00	< 1.00	< 1.00	< 1.00	< 0.597	< 0.05
A-T2-B2-28'-GWS	41.5	< 1.00	1.60	< 1.00	< 1.00	49.7	< 0.05
A-T2-B3-54'-GWS	< 5.00	< 1.00	< 1.00	< 1.00	< 1.00	< 0.597	< 0.05
A-T2-B5-41'-GWS	< 5.00	< 1.00	< 1.00	< 1.00	< 1.00	< 0.597	< 0.05
B2-T1-20'-30' GWS	< 5.00	< 1.00	< 1.00	< 1.00	< 1.00	< 0.597	< 0.05
P3-35'-GWS	1,150	9.30	1.66	8.53	< 1.00	77.1	< 0.05

* The method detection limit (MDL) is indicated
**Samples were collected at approximately 100 ft below ground surface at the top of bedrock (auger refusal)

Prepared by TAJ
Checked by JB

Table 3-4 PRB Pilot Study Analytical Results

Milledge Avenue Site
Athens, Georgia

Sample ID	Performance Duration	Sample Date	Screened Interval (ft BTOC)	Sample Zone (ft BTOC)	Gamma BHC (ug/L)	1,2-Dichloroethane (ug/L)	1,2-Dichloropropane (ug/L)	Carbon tetrachloride (ug/L)	Chloroform (ug/L)	Tetrachloroethene (ug/L)	1,4-Dioxane (ug/L)
Site GW Protection Standards					**0.2**	**5**	**5**	**5**	**80**	**5**	**0.46***
PW-Ua	Pre-Injection	11/17/2021	22.90 - 27.90	25.4	< 0.0500	< 1.00	< 1.00	4.23	**356**	1.53	**42.0**
	1 week	12/20/2021	22.90 - 27.90	25.4	< 0.0500	< 1.00	< 1.00	**5.90**	**380**	1.22	**25.8**
	6 weeks	1/21/2022	22.90 - 27.90	25.4	< 0.0500	< 1.00	< 1.00	2.64	**164**	< 1.00	< 3.0
	3 months	3/10/2022	22.90 - 27.90	25.4	<0.0500	<1.00	<1.00	1.45	**98.2**	<1.00	<3.0
PW-Ub	Pre-Injection	11/17/2021	36.69 - 41.69	39.19	< 0.0500	2.23	< 1.00	< 1.00	**493**	3.18	**157**
	1 week	12/20/2021	36.69 - 41.69	39.19	< 0.0500	< 1.00	< 1.00	< 1.00	22.3	< 1.00	**9.69**
	6 week	1/21/2022	36.69 - 41.69	39.19	< 0.0500	< 1.00	< 1.00	< 1.00	29.4	< 1.00	**10.9**
	3 months	3/10/2022	36.69 - 41.69	39.19	< 0.0500	< 1.00	< 1.00	< 1.00	15.4	< 1.00	<3.0
PW-PRBa	Pre-Injection	11/17/2021	20.0 - 25.0	23.5	< 0.0500	< 1.00	< 1.00	1.86	**225**	1.47	**25.0**
	1 week	12/20/2021	20.0 - 25.0	NS	NS	NS	NS	NS	NS	NS	NS
	6 weeks	1/21/2022	20.0 - 25.0	NS	NS	NS	NS	NS	NS	NS	NS
	3 months	3/10/2022	19.0 - 24.0	21.50	< 0.0500	< 1.00	< 1.00	1.55	10.9	1.47	< 3.0
PW-PRBb	Pre-Injection	11/17/2021	35.21 - 40.21	38.5	< 0.0500	1.70	< 1.00	< 1.00	**130**	2.90	**86.4**
	1 week	12/20/2021	35.21 - 40.21	37.71	< 0.0500	1.88	< 1.00	< 1.00	9.45	4.99	**131**
	6 weeks	1/21/2022	35.21 - 40.21	37.71	< 0.0500	2.76	< 1.00	< 1.00	< 5.00	**6.55**	**141**
	3 months	3/10/2022	35.21 - 40.21	37.5	< 0.0500	3.68	< 1.00	< 1.00	< 5.00	**7.27**	**117**
PW-Da	Pre-Injection	11/17/2021	20.0 - 25.0	23.5	< 0.0500	< 1.00	< 1.00	< 1.00	**110**	< 1.00	< 3.00
	1 week	12/20/2021	20.0 - 25.0	22.5	< 0.0500	< 1.00	< 1.00	< 1.00	**153**	< 1.00	< 3.00
	6 Weeks	1/21/2022	20.0 - 25.0	22.5	< 0.0500	< 1.00	< 1.00	2.66	**171**	< 1.00	< 3.00
	3 months	3/10/2022	20.0 - 25.0	22.5	< 0.0500	< 1.00	< 1.00	1.54	25.2	< 1.00	< 3.00
PW-Db	Pre-Injection	11/17/2021	35.31 - 40.31	38	< 0.0500	1.37	< 1.00	< 1.00	< 5.00	**5.53**	**209**
	1 week	12/20/2021	35.31 - 40.31	37.5	< 0.0500	1.32	< 1.00	< 1.00	< 5.00	1.78	**114**
	6 weeks	1/21/2022	35.31 - 40.31	37.8	0.0505	1.41	< 1.00	< 1.00	< 5.00	1.22	**59.3**
	3 months	3/10/2022	35.31 - 40.31	37.8	< 0.0500	1.41	< 1.00	1.45	5.44	< 1.00	**27.4**
PW-Dc	Pre-Injection	11/17/2021	50.30 - 55.30	53	< 0.0500	< 1.00	< 1.00	< 1.00	22.9	< 1.00	**7.01**
	1 week	12/20/2021	50.30 - 55.30	52.8	< 0.0500	< 1.00	< 1.00	< 1.00	18.3	< 1.00	**4.68**
	6 weeks	1/20/2022	50.30 - 55.30	50.3	< 0.0500	< 1.00	< 1.00	< 1.00	9.80	< 1.00	**3.79**
	3 months	3/10/2022	50.30 - 55.30	52.8	< 0.0500	< 1.00	< 1.00	< 1.00	6.73	< 1.00	< 3.0

Notes:

* EPA Region 4 Screening Level
PW-U = Upgradient Wells
PW-PRB = In PRB Zone
PW-D = Downgradient
Unless otherwise noted, parameters recorded at the time of sampling
ug/L= micrograms per liter
mg/L= milligrams per liter

s.u. =Standard Units
mV= millivolts
µS/cm) = microseimens per centimeter
NTU= Nephelometric Turbidity Units
NA= not Applicable
J = Below reporting limit, but above Method Detection Limit (estimate)
ft BTOC = feet below top of casing (top of casing is approximate land surface)

NS = Not Sampled
NA= Not Applicable

Checked By: RM 2/14/22

Table 3-5 PRB Pilot Study Monitoring Data

Milledge Avenue Site
Athens, Georgia

Sample ID	Performance Duration	Sample Date	Screened Interval (ft BTOC)	Sample Zone (ft BTOC)	Temp (°C)	pH (s.u.)		Dissolved Oxygen (mg/L)		ORP (mV)	Specific Conductivity (µS/cm)	Turbidity (NTU)	Sodium Persulfate CHEMets Kit (ppm)	Sulfate (mg/L)	Total Organic Carbon (ug/L)
						Initial Reading	Final Reading	Initial Reading	Final Reading						
Site GW Protection Standards					NA	NA		NA		NA	NA	NA			
PW-Ua	Pre-Injection	11/17/2021	22.90 - 27.90	25.4	19.30	5.06	4.87	4.52	4.31	96.6	244.01	7.55	NA	81,000	1640
	1 week	12/20/2021	22.90 - 27.90	25.4	14.04	4.71	4.79	11.85	11.72	197.9	3,078.3	61.40	> 70	301,000	< 1000
	6 weeks	1/21/2022	22.90 - 27.90	25.4	9.97	10.55	6.21	21.17	19.21	166.5	1,225.5	20.60	> 70	179,000	1,210
	3 months	3/10/2022	22.90 - 27.90	25.4	15.17	5.41	6.01	14.37	15.24	88.1	618.5	2.11	> 70	152,000	<1,000
PW-Ub	Pre-Injection	11/17/2021	36.69 - 41.69	39.19	19.8	6.00	6.04	0.72	0.48	41.4	308.61	25.10	NA	42,800	< 1,000
	1 week	12/20/2021	36.69 - 41.69	39.19	14.44	6.15	8.58	20.41	12.72	157.6	6,057.6	42.00	> 70	672,000	< 1,000
	6 week	1/21/2022	36.69 - 41.69	39.19	11.72	11.70	10.26	38.73	28.24	42.2	2,928.1	16.50	> 70	379,000	< 1,000
	3 months	3/10/2022	36.69 - 41.69	39.19	14.85	11.75	10.42	34.72	20.52	44.9	1,490.3	10.73	> 70	237,000	< 1,000
PW-PRBa	Pre-Injection	11/17/2021	20.0 - 25.0	23.5	15.6	5.52	5.36	6.50	5.63	70.7	299.40	15.30	NA	106,000	< 1000
	1 week	12/20/2021	20.0 - 25.0	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	6 weeks	1/21/2022	20.0 - 25.0	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	3 months	3/10/2022	19.0 - 24.0	21.50	15.82	10.95	4.90	36.75	35.55	248.2	11,158	14.90	> 70	2,110,000	< 1,000
PW-PRBb	Pre-Injection	11/17/2021	35.21 - 40.21	38.5	17.7	5.77	5.84	1.82	1.06	45.3	189.83	7.26	NA	51,000	< 1,000
	1 week	12/20/2021	35.21 - 40.21	37.71	12.91	6.92	6.39	0.76	0.29	180.1	289.95	6.67	> 70	44,800	< 1,000
	6 weeks	1/21/2022	35.21 - 40.21	37.71	9.74	6.99	6.08	0.88	0.36	85.5	235.78	2.27	2.1	34,500	< 1,000
	3 months	3/10/2022	35.21 - 40.21	37.5	15.76	6.01	6.14	1.96	0.65	80.6	211.56	8.24	0.7	32,100	< 1,000
PW-Da	Pre-Injection	11/17/2021	20.0 - 25.0	23.5	19.26	5.01	4.76	5.14	5.13	80.4	205.99	17.10	NA	82,800	< 1000
	1 week	12/20/2021	20.0 - 25.0	22.5	15.78	6.22	8.90	25.81	27.52	204.6	7,123.6	12.80	> 70	776,000	< 1000
	6 Weeks	1/21/2022	20.0 - 25.0	22.5	9.23	6.30	6.17	34.41	31.21	199.7	6,034.0	30.10	> 70	890,000	1,500
	3 months	3/10/2022	20.0 - 25.0	22.5	16.07	8.00	5.07	27.82	33.12	187.5	5,192.8	19.90	> 70	961,000	< 1,000
PW-Db	Pre-Injection	11/17/2021	35.31 - 40.31	38	19.40	6.17	6.13	1.13	0.63	-9.7	262.28	14.30	NA	62,800	< 1,000
	1 week	12/20/2021	35.31 - 40.31	37.5	14.23	4.23	4.39	15.22	8.84	329.9	4,402.4	12.29	> 70	1,310,000	< 1,000
	6 weeks	1/21/2022	35.31 - 40.31	37.8	10.33	4.55	4.70	17.90	15.22	234.5	3,033.8	27.70	> 70	812,000	1,170
	3 months	3/10/2022	35.31 - 40.31	37.8	15.76	3.61	3.12	20.73	18.60	545.9	5,507.0	21.90	> 70	6,230,000	< 1,000
PW-Dc	Pre-Injection	11/17/2021	50.30 - 55.30	53	19.49	6.35	6.25	1.36	1.13	-43.0	108.21	26.17	NA	20,000	< 1,000
	1 week	12/20/2021	50.30 - 55.30	52.8	15.64	6.44	7.09	27.57	27.29	144.8	610.59	9.33	> 70	54,300	< 1,000
	6 weeks	1/20/2022	50.30 - 55.30	50.3	13.69	6.11	6.59	8.87	28.22	117.3	700.85	4.93	> 70	132,000	< 1,000
	3 months	3/10/2022	50.30 - 55.30	52.8	15.76	6.46	6.44	33.30	33.24	251.9	676.14	3.98	> 70	147,000	< 1,000

Notes:

Made by: TAJ
Checked by: RM

* EPA Region 4 Screening Level
PW-U = Upgradient Wells
PW-PRB = In PRB Zone
PW-D = Downgradient

NS = Not Sampled
NA= Not Applicable

Unless otherwise noted, parameters recorded
ug/L= micrograms per liter
mg/L= milligrams per liter
s.u. =Standard Units
mV= millivolts

µS/cm) = microseimens per centimeter
NTU= Nephelometric Turbidity Units
NA= not Applicable
J = Below reporting limit, but above Method Detection Limit (estimate)
ft BTOC = feet below top of casing (top of casing is approximate land surface)

Table 3-6 Body of Plume Pilot Study Analytical Results
Milledge Avenue Site
Athens, Georgia

Sample ID	Sample Date	Screened Interval (BGS)	Sample Zone (Ft BGS)	Chloroform (ug/L)	Carbon Tetrachloride (ug/L)	1,2-Dichloroethane (ug/L)	1,2-Dichloropropane (ug/L)	Tetrachloroethene (ug/L)	Gamma BHC (ug/L)	1,4-Dioxane (ug/L)	Arsenic, Dissolved (ug/L)	Barium, Dissolved (ug/L)	Cadmium, Dissolved (ug/L)	Chromium, Dissolved (ug/L)	Copper, Dissolved (ug/L)	Lead, Dissolved (ug/L)	Selenium, Dissolved (ug/L)
GW Protection Standards				**80**	**5**	**5**	**5**	**5**	**0.2**	**0.46**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**
TMW-2 (Pre-Injection)	6/25/2021	5-15'	10	**90.90**	< 1.00	< 1.00	2.67	< 1.00	< 0.05	**295.00**	< 2.00	**68.2**	< 1.00	< 2.00	< 5.00	< 2.00	< 2.00
TMW-2 (2 weeks)	7/14/2021	5-15'	10	**81.1**	< 1.00	< 1.00	2.00	< 1.00	< 0.05	**267.00**	< 2.00	**37.4**	< 1.00	< 2.00	< 5.00	< 2.00	< 2.00
TMW-2 (4 weeks)	7/28/2021	5-15'	10	**136.00**	<1.00	< 1.00	2.91	NT		**141.00**	NT	NT	NT	NT	NT	NT	NT
TMW-3 (Pre-injection)	6/25/2021	5-15'	8	11.3	< 1.00	< 1.00	< 1.00	< 1.00	< 0.05	28.0	< 2.00	76.7	< 1.00	< 2.00	< 5.00	< 2.00	< 2.00
MW-9A (Pre-injection)	6/25/2021	12.5'-22.5'	8	32	< 1.00	< 1.00	< 1.00	1.17	< 0.05	28.4	< 2.0	133	< 1.0	< 2.00	< 5.00	< 2.00	< 2.00
MW-9B (Pre-injection)	6/25/2021	38.5'-48.5'	8	**163**	< 1.00	< 1.00	< 1.00	< 1.00	< 0.05	49.0	< 2.00	100	< 1.00	< 2.00	< 5.00	< 2.00	< 2.00
TMW-4 (6 weeks)	8/11/2021	10-30'	30	50.1	<1.00	<1.00	< 1.00	<1.00		**17.0**	<10.0	**142**	<5.0	**220**	< 25.0	< 10.0	< 10.0
TMW-6 (6 weeks)	8/11/2021	10-30'	30	**95.5**	<1.00	<1.0	< 1.00	<1.00		**25.3**	< 2.00	**1,300**	< 1.00	**4.13**	< 5.00	< 2.00	< 2.00

Notes:
Only Site COCs reported
NT= Not Tested
ug/L= micrograms per liter
mg/L= milligrams per liter
s.u. =Standard Units
mV= millivolts
µS/cm) = microseimens per centimeter
NTU= Nephelometric Turbidity Units
NA= not Analyzed
NE = Not Established for the site
BGS = Below Ground Surface

Prepared by TAJ
Checked by JB

Table 3-7 Body of Plume Pilot Study Monitoring Data

Milledge Avenue Site
Athens, Georgia

Sample ID	Sample Date	Screened Interval (BGS)	Sample Zone (BGS)	Temp (°C)	pH (s.u.)	Dissolved Oxygen (mg/L)	ORP (mV)	Specific Conductivity (µS/cm)	Turbidity (NTU)	Sodium (mg/L)	Sulfate (mg/L)
GW Protection Standards				**NA**	**NA**	**NA**	**NA**	**NA**	**NA**		
TMW-1 (ROI Well PreInjection	6/30/2021	5'-15'	10.48	22.14		5.51	84.77	120.36			
TMW-1 (ROI Well During Injection- Injection 1)	6/30/2021	5'-15'	9.35	25.20	5.79	3.12	100.58	77.01			
TMW-1 (ROI Well During Injection- Injection 2)	6/30/2021	5'-15'	10.33	24.32	5.64	2.77	76.74	63.31			
TMW-1 (ROI Well) Post Injection	8/3/2021	5'-15'	10.33	24.32	5.64	2.77	76.74	63.31		18.2	13.7
MW-7a (Background/Upgradient)	7/13/2021									3.01	< 5.0
TMW-2 (Pre-Injection)	6/30/2021	5-15'	9.46								
TMW-2 (During Injection)	6/30/2021	5-15'	9.33								
TMW-2 (Pre-Injection)	6/25/2021	5-15'	10.38	21.91	5.00	5.47	84.77	117.97	4.98		< 5.0
TMW-2 (2 weeks)	7/14/2021	5-15'	10.12	24.20	5.57	5.35	105.00	76.30	3.41		
TMW-2 (4 weeks)	7/28/2021	5-15'	9.50	22.97	5.69	4.10	229.19	79.16			
TMW-2 (5 weeks)	8/3/2021	5-15'								3.54	1.49 J
TMW-2 (6 weeks)	8/11/2021	5-15'			6.74	2.66		42.11			
TMW-3 (Pre-injection)	6/25/2021	5-15'	8.3	17.30	5.67	3.56	82.57	67.58	7.45		< 5.0
TMW-3 (4 weeks)	7/28/2021	5-15'	8.04	21.15	5.56	0.36	267.93	88.17	NT		
TMW-3 (5 weeks)	8/3/2021	5-15'								3.65	< 5.0
TMW-4 (6 weeks)	8/11/2021	10-30'	10'		12.10	11.39		5594.88			
TMW-4 (6 weeks)	8/11/2021	10-30'	20'		12.37	14.1		6263.01			
TMW-4 (6 weeks)	8/11/2021	10-30'	30'		13.12	17.23		14637.00		2,880	2,210
TMW-5 (6 weeks)	8/11/2021	10-30'	10'		9.91	2.98		156.00			
TMW-5 (6 weeks)	8/11/2021	10-30'	20'		8.01	1.25		81.99			
TMW-5(6 weeks)	8/11/2021	10-30'	30'		7.75	1.08		93.90			
TMW-6 (6 weeks)	8/11/2021	10-30'	10'		6.16	6.1		616.98			
TMW-6 (6 weeks)	8/11/2021	10-30'	20'		5.81	9.4		1211.63			
TMW-6 (6 weeks)	8/11/2021	10-30'	30'		5.46	5.06		2144.34		93.70	86.60
TMW-7 (6 weeks)	8/11/2021	10-30'	10'		6.01	2.07		85.41			
TMW-7 (6 weeks)	8/11/2021	10-30'	20'		6.61	1.05		75.60			
TMW-7(6 weeks)	8/11/2021	10-30'	30'		6.46	1.36		72.17			
MW-9A (Pre-injection)	6/25/2021	12.5'-22.5'	7.83	16.81307	5.25	1.55	89.64	53.37	1.56		< 5.0
MW-9A (4 weeks)	7/28/2021	12.5'-22.5'	7..90	18.84081	5.26	1.72	334.15	104.21			
MW-9A (5 weeks)	8/3/2002	12.5'-22.5'								4.4	1.68 J
MW-9B (Pre-injection)	6/25/2021	38.5'-48.5'	8.43	16.93	5.60	1.47	87.56	88.10	7.82		< 5.0
MW-9B (4 weeks)	7/28/2021	38.5'-48.5'	8.49	19.2259	5.56	0.96	286.17	168.89			
MW-9B (5 weeks)	8/3/2021	38.5'-48.5'								5.95	1.08 J

Notes:

NT= Not Tested
ug/L= micrograms per liter
mg/L= milligrams per liter
s.u. =Standard Units
mV= millivolts
µS/cm) = microseimens per centimeter
NTU= Nephelometric Turbidity Units
NA= not Applicable
J = Below reporting limit, but above Method Detection Limit (estimate)

FIGURES

N

0 95 190 380 570 760

Feet

P-11
WP-4
SW-A5/S-A5
MW-20
P-12
WP-3
SW-A4/S-A4
MW-17
MW-10a
MW-10b
P-10
MW-11
WP-2
MW-18
P-9
MW-16a
MW-14b
MW-16b
WP-1
MW-14c
MW-14a
MW-15
SW-A2/S-A2
SW-A3/S-A3
RW-5
RW-4
RW-3
P-7
MW-9a
RW-2/IW-5
MW-9c
MW-9b
P-8
RW-1
SW-A1/S-A1
MW-13
MW-6a
MW-7a
MW-6b
MW-8b
MW-8a
MW-7b
P-4
P-3
MW-12b
MW-12a
P-6
MW-5c
MW-4
MW-3
MW-2
MW-5b
P-1
MW-1
MW-19

Legend

- Monitoring Well (Bedrock)
- Monitoring Well (Overburden)
- Recovery Well
- Peizometer
- Surface Water/Sediment Sample Location
- Perennial Stream
- Drainage Ditch/Ephemeral Stream
- Trail
- Unpaved Road
- Groundwater Treatment System
- Fence Around Capped Landfill

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Milledge Avenue Site
Site Map

Athens, GA

Figure

1-1

N

0 45 90 180 270 360 Feet

MW-16a
MW-16b
MW-14b
MW-14c
MW-14a
WP-1
MW-15
A'
RW-5
RW-4
RW-3
P-7
MW-9a
RW-2/IW-5
MW-9c
MW-9b
P-8
RW-1
Plume Pilot Study Area
MW-13
MW-6a
MW-6b
MW-7a
MW-7b
MW-8b
MW-8a
P-4
P-3
MW-12b
MW-12a
Area A
Area B-1
Area B-2
MW-5c
MW-5b
MW-3
MW-2
MW-4
Area B-3
P-1
P-6
Area C
MW-1
MW-19

610 620 630 640 650 660 670 680 690

Legend

- Bedrock Monitoring Well
- Overburden Monitoring Well
- Recovery Well
- Peizometer
- Landfill_vents
- Perennial Stream
- Drainage Ditch/Ephemeral Stream
- Unpaved Road
- Trail
- Study Area Location
- Groundwater Treatment System
- Fence Around Capped Landfill

Document Path: C:\Users\R2remote\Resolute Environmental\RE_SP - Environmental\ArcGIS\University of Georgia\Task 12 - Remediation Design\50% design\Figure 1-2 - Study Area Map.mxd

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Milledge Avenue Site Study Area Map

Athens, GA

Figure 1-2

N

0 75 150 300 450 600
Feet

P-11 557.38
WP-4 551.83
P-12 554.60
WP-3 557.13
P-10 566.86
MW-10a 563.28
MW-11 562.02
MW-10b 562.80
WP-2 566.27
P-9 572.61
MW-16a 578.82
MW-14b 570.72
MW-16b 575.11
WP-1 568.36
MW-14a 574.69
RW-4 578.59
RW-5 579.56
RW-3 581.01
P-7 579.99
MW-9a 581.14
RW-1 580.55
RW-2/IW-5 580.36
P-8 580.01
MW-6a 601.32
MW-7a 593.52
MW-8b 589.18
MW-8a 590.62
P-4 592.96
P-3 604.24
MW-12a 605.81
P-6 602.15
MW-4 608.57
MW-3 609.78
MW-2 609.94
P-1 624.36
MW-1 621.17
MW-19 635.22

555 560 565 570 575 580 585 590 595 600 605 610 615 620 625 630 635

Legend

- Monitoring Well (Bedrock)
- Monitoring Well (Overburden)
- Recovery Well
- Peizometer
- Groundwater Potentiometric Contour
- Estimated Groundwater Potentiometric Contour
- Groundwater Flow Direction
- Perennial Stream
- Drainage Ditch/Ephemeral Stream
- Unpaved Road
- Trail
- Groundwater Treatment System
- Fence Around Capped Landfill

MW-7a 593.52 Groundwater Elevation (Monitoring Well)

P-6 602.15 Groundwater Elevation (Piezometer)

RW-2 580.36 Groundwater Elevation (Recovery Well)

Notes:
Potentiometric surface elevations shown in ft NVGD 83.

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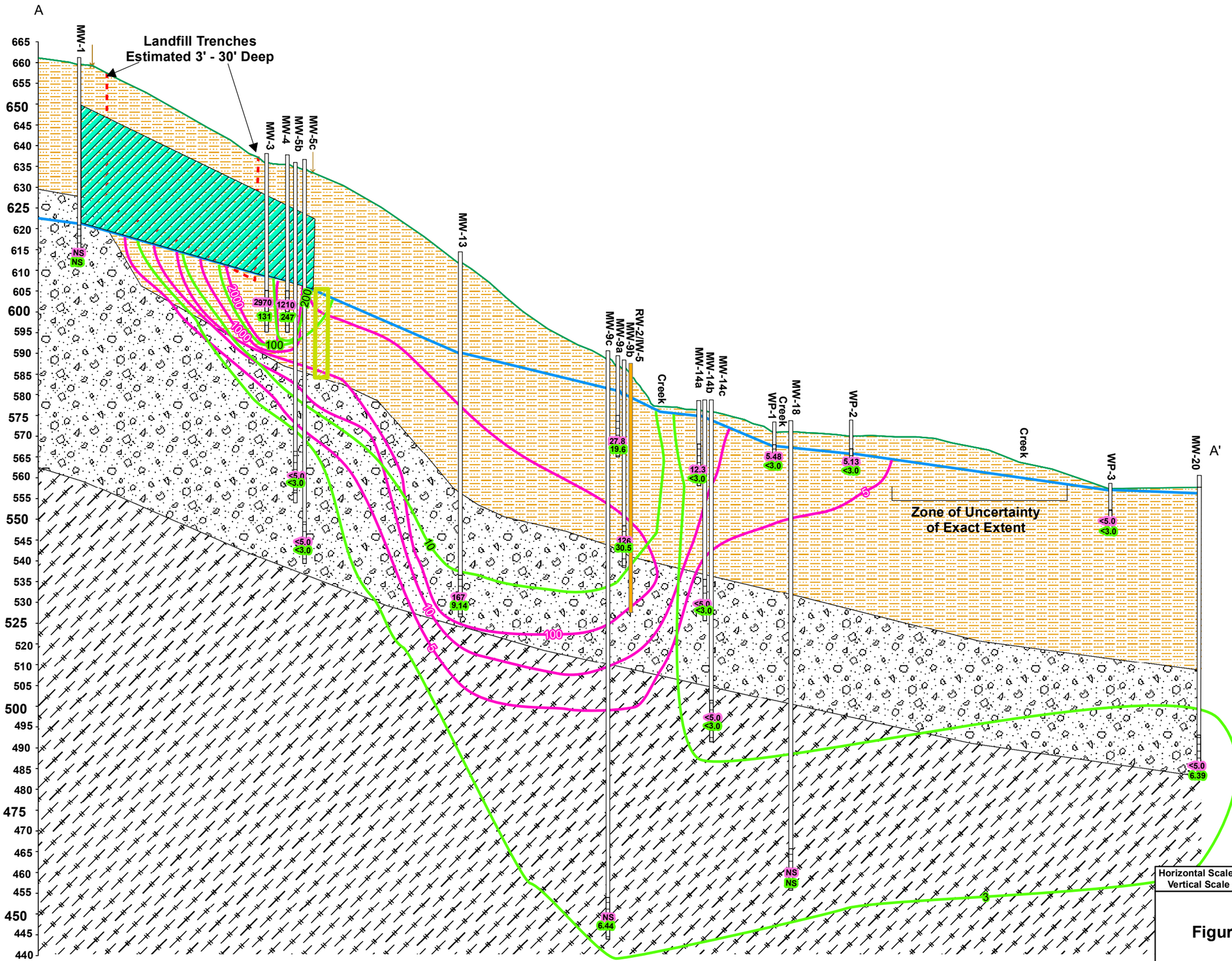
Milledge Avenue Site
Groundwater Potentiometric Surface Map
Overburden Zone
January 2022
Athens, GA

Figure
1-3

Document Path: C:\Users\R2remote\Resolute Environmental\RE_SP - Environmental\ArcGIS\University of Georgia\Semi-Annual Sampling Reports\2022 01 Report\Groundwater Potentiometric Surface Jan 2022.mxd



Legend

- Well Riser
- Well Screen
- 1,4 Dioxane Isocontour
- Chloroform Isocontour
- Ground Surface
- Groundwater Surface
- Estimated Trench Location
- Fence
- Overburden - Sand with Silt and Clay
- Partially Weathered Rock/Saprolite
- Bedrock
- Pilot PRB
- Recovery Well
- Vadose Zone Impact
- 16.7 Chloroform Concentration
- 9.14 1,4-Dioxane Concentration

Notes:
All concentrations shown in ug/L.
MW-18 is projected 40 feet off of cross-section profile.
Creek runs parrallel to profile line, with creek crossings indicated in cross-section

Horizontal Scale = 1:120
Vertical Scale = 1:25

Milledge Avenue Site
Cross-Section A-A'
Chloroform and 1,4-Dioxane Concentrations
January 2022

Athens, GA

Figure

1-4

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N

0 25 50 100 150
Feet

MW-13
MW-6a
MW-6b
MW-7a
MW-7b
MW-12b
MW-12a
P-4
P-3
P-1
A-T1-B4
A-T1-B3
A-T1-B2
A-T1-B1
B1-B1
B1-B2
B1-B3
B2-B1
A-T2-B2
A-T2-B1
A-T2-B5
A-T2-B4
A-T2-B3
MW-5c
MW-5b
MW-4
MW-3
MW-2
B3-B-1
B3-B-2
B3-B-3
B3-B-4
B3-B-5
B3-B-6
C-B-1
C-B-2
C-B-3
C-B-4
C-B-5
MW-1
C-B-6
C-B-7
C-B-8
610
620
630
640
650
660
670

Legend

- HPT Boring
- Bedrock Monitoring Well
- Monitoring Well
- Recovery Well
- Peizometer
- Landfill_vents
- Fence Around Capped Landfill
- Unpaved Road
- Trail
- Perennial Stream
- Drainage Ditch/Ephemeral Stream
- Elevation Contours

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Milledge Avenue Site
Hydraulic Profiling Tool
Boring Location Map
Athens, GA

Figure
3-1

N

0 10 20 40 60 80
Feet

A B C D E F G H I J K L M

RW-5
RW-4
RW-3
D4
F3.5
RW-2/IW-5
MW-9b
TMW-7
TMW-6
MW-9a
MW-9c
TMW-2
IP2
H4.5
TMW-1
TMW-3
TMW-4
IP1
TMW-5
ST-12
J2
H7
J4.5
H9
RW-1
P-8
J7
CR1
L4.5
J9
H12
H15
ST-9

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

580 590 600

Legend

- Boring Guide Points
- Shelby Tube Sample Locations
- Pilot Injection Wells
- Bedrock Monitoring Well
- Monitoring Well
- Recovery Well
- Peizometer
- Landfill_vents
- Perennial Stream
- Drainage Ditch/Ephemeral Stream
- Unpaved Road
- Trail
- Groundwater Treatment System
- Fence Around Capped Landfill

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Milledge Avenue Site Geotechnical Sample Location Map

Athens, GA

Figure 3-2

N

0 25 50 100 150
Feet

Sample ID	Sample Depth (ft bgs)	Constituents of Concern µg/m3)				
		Carbon Tetrachloride	1,2-Dichloroethane	1,2-Dichloropropane	Tetrachloroethene	1,4-Dioxane
B2-SV1	4	<5.5	<3.5	<4.0	<5.9	<13
B1-SV2	6	<6.2	<4.0	<4.5	<6.6	<14
B1-SV3	6	<5.9	<3.8	<4.3	<6.3	<13
B1-SV4	6	<6.5	<4.2	<4.8	<7.0	<15
B1-SV5	11	190	3.8	4.4	110	<14
A-SV6	10	390	<9.2	<10	150	<33
A-SV7	10	160	<9.2	<10	90	<33
A-SV8	10	10	<3.8	<4.3	19	<13
B3-SV9	12	35	<3.8	<4.3	25	<13
B3-SV10	20	270	<3.7	<4.2	89	<13
B3-SV11	10	150	<3.8	<4.4	67	<14
C-SV12	15	3,700	<37	<43	130	<130
C-SV13	20	11,000	<74	<85	<120	<260
C-SV14	15	2,900	400	<140	<210	<440

MW-13
MW-6a
MW-6b
MW-7a
MW-7b
P-4
P-3
MW-12b
MW-12a
B1-SV5 260
B1-SV4 66
B1-SV3 27
B1-SV2 <4.8
B2-SV1 4.4
A-SV8 26
A-SV7 2500
A-SV6 2400
MW-5c
MW-5b
MW-4
MW-3
MW-2
B3-SV9 15
B3-SV10 260
B3-SV11 96
P-1
C-SV12 8000
C-SV13 19000
C-SV14 22000
MW-1
5000
10000
20000
50000
100000
100
1000

Legend

- Soil Vapor Implants
- Bedrock Monitoring Well
- Monitoring Well
- Recovery Well
- Peizometer
- Landfill_vents
- Unpaved Road
- Trail
- Perennial Stream
- Drainage Ditch/Ephemeral Stream
- Trench Location
- Chloroform Isocontour
- Total VOC Isocontour
- Estimated Trench Boundary
- B3-SV11 96 Chloroform Concentration

Notes:
Concentrations are in micrograms per meter cubed

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Milledge Avenue Site
Soil Vapor Analytical Results and Isoconcentration Map
Athens, GA

Figure
3-3a

N

0 45 90 180 270 360 Feet

WP-2 WP-1 P-9 MW-16a MW-16b MW-14b MW-14a RW-5 RW-4 RW-3 P-7 RW-2/IW-5 MW-9a RW-1 P-8 MW-8b MW-8a MW-7a MW-6a P-4 P-3 MW-12a B1-SV5 B1-SV3 B1-SV4 B1-SV2 B2-SV1 A-SV8 A-SV7 A-SV6 MW-3 MW-2 MW-4 B3-SV9 B3-SV10 B3-SV11 P-6 P-1 C-SV12 C-SV13 C-SV14 MW-1

565 570 575 580 585 590 595 600 605 610 615 620 625 635

5000 10000 20000 100 1000 5 10

Legend

- Monitoring Well (Bedrock)
- Monitoring Well (Overburden)
- Recovery Well
- Peizometer
- Groundwater Potentiometric Contour
- Estimated Groundwater Potentiometric Contour
- Groundwater Flow Direction
- Perennial Stream
- Drainage Ditch/Ephemeral Stream
- Unpaved Road
- Trail
- Groundwater Treatment System
- Fence Around Capped Landfill
- Soil Vapor Implants
- Chloroform Soil Vapor Isocontour
- Estimated Chloroform Groundwater Isocontour (ug/L)
- Chloroform Groundwater Isocontour (ug/L)

Notes:
Potentiometric surface elevations shown in ft NVGD 83.
Soil Vapor in micrograms per meter cubed

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Milledge Avenue Site
Chloroform Soil Vapor and Groundwater Isoconcentation Potentiometric Map
Athens, GA

Figure
3-3b

N

0 25 50 100 150
Feet

MW-13
MW-6a
MW-6b
MW-7a
MW-7b
MW-12b
MW-12a
P-4
P-3
P3-35'-GWS
T1-2GWS
T1-1GWS
A-T1-B1-48'-GWS
A-T2-B3-54'-GWS
A-T2-B5-41'-GWS
A-T2-B2-28'-GWS
T1-0GWS
MW-5c
MW-5b
MW-4
MW-3
MW-2
B2-T1-20'-30'-GWS
P-1
MW-1

Legend

- Trench Location
- Estimated Trench Boundary
- Groundwater Sample Location
- Landfill_vents
- Bedrock Monitoring Well
- Monitoring Well
- Recovery Well
- Peizometer
- Fence Around Capped Landfill
- Unpaved Road
- Trail
- Perennial Stream
- Drainage Ditch/Ephemeral Stream

Notes:
Depths are shown in feet Below Ground Surface

T1-0, T1-1, and T1-2 - samples collected near bedrock surface ~100' below ground surface

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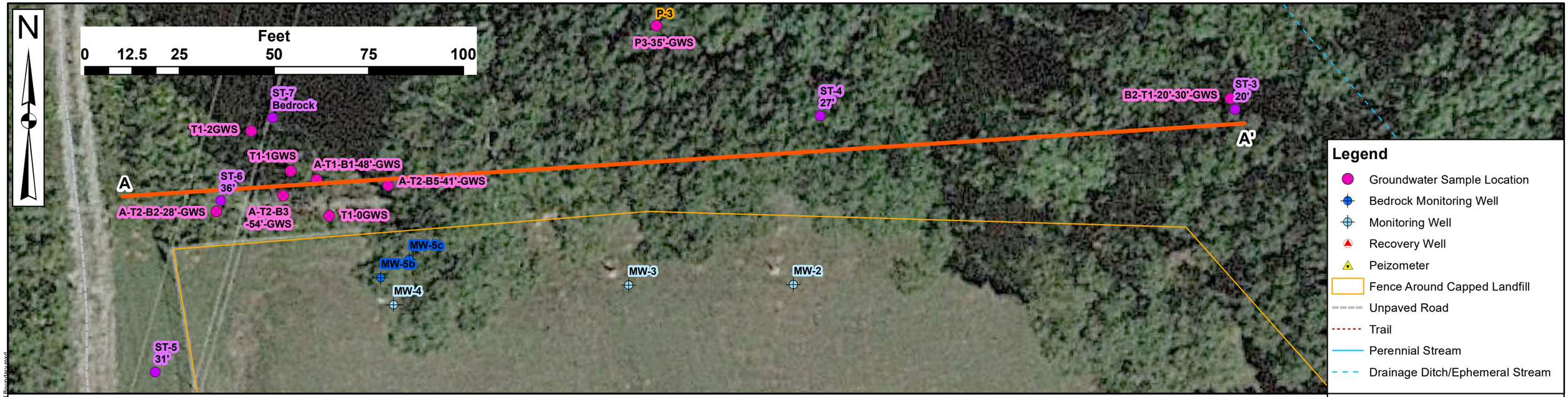
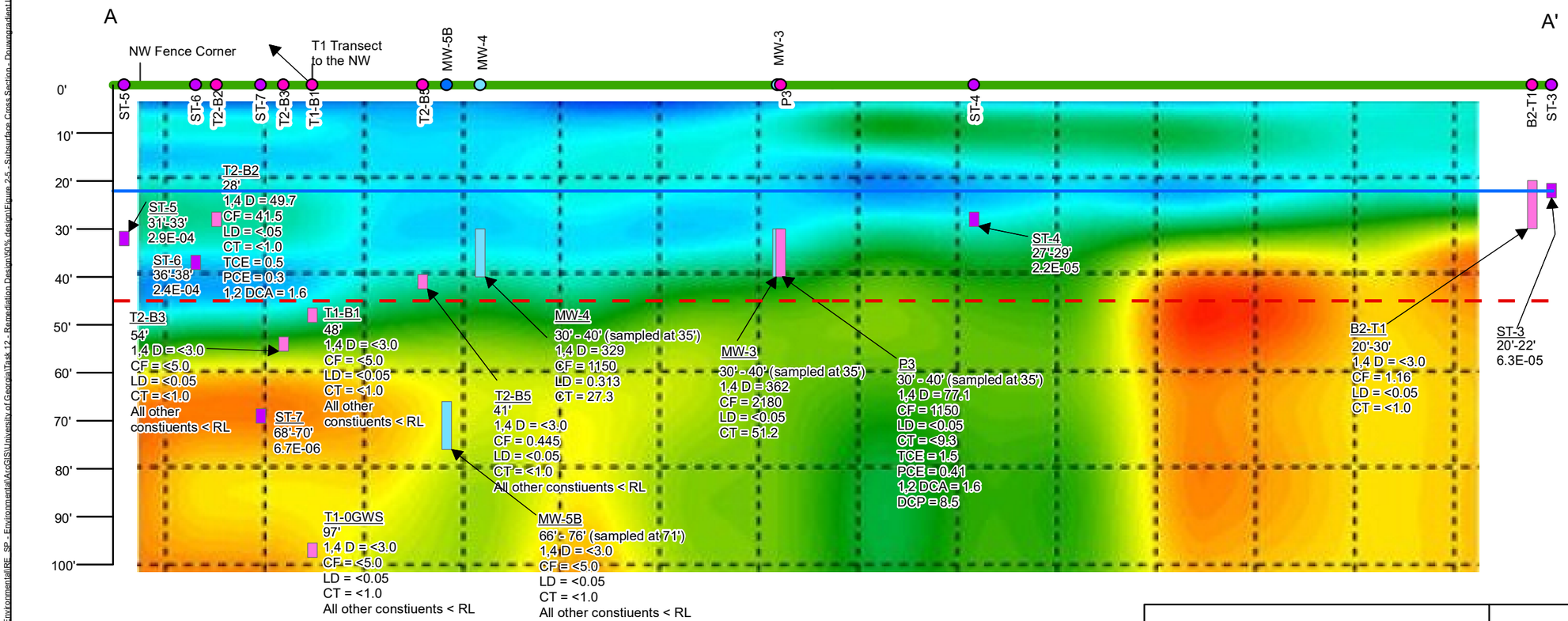
Milledge Avenue Site
Discrete Groundwater Sample Location Map
Athens, GA

Figure
3-4





- Concentrations in ug/L
- 1,4 D = 1,4 Dioxane
- CF = Cloroform
- LD = Lindane
- CT = Carbon Tetrachloride
- TCE = Trichloroethane
- PCE = Tetrachloroethane
-1,2 DCA = 1,2 Dichloroethane
- DCP = Dichloropropane

Background Color Notes:
Blue = Soil - Red Brown to Grey SILT with some fine sand.
Green to Yellow to Red = Increasing density of Partially Weathered Rock (PWR) - Grey to white SILT.
No Rock or Competent Bedrock Detected within 104' BGS.

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Milledge Avenue Site
Subsurface Cross-Section
Downgradient
Landfill Boundary
Athens, GA

Figure
3-5

Document Path: C:\Data\Resolute Environmental\RE_SP - Environmental\ArcGIS\University of Georgia\Task 12 - Remediation Design\50% design\Figure 2-5 - Subsurface Cross Section - Downgradient Landfill Boundary.mxd

N

0 10 20 40 60 80
Feet

A B C D E F G H I J K L

580 590 600

RW-5
A6
<3.00
<5.00
RW-3
RW-4
D1
11.8
D4
F3.5
B
RW-2/IW-5
MW-9b
TMW-7
TMW-6
MW-9c
MW-9a
IP2
TMW-2
TMW-1
H4.5
IP1
TMW-4
TMW-3
ST-12
TMW-5
H7
H0
<3.00
H2
14.2
<5.00
J2
J4.5
H9
RW-1
I8
11.5
<5.00
P-8
28.0
6.25
J7
H12
L4.5
J9
L7
5.46
<5.00
H15
L1
<3.00
ST-9

1 2 4 5 6 7 8 9 10 11 12 13 14 15

Legend

- Shelby Tube Sample Locations
- Boring Guide Points
- Pilot Injection Wells
- Bedrock Monitoring Well
- Monitoring Well
- Recovery Well
- Peizometer
- Landfill_vents
- Perennial Stream
- Drainage Ditch/Ephemeral Stream
- Unpaved Road
- Trail
- Groundwater Treatment System
- Fence Around Capped Landfill
- Approximate Saturated Ground Surface

<3.00 - 1,4-Dioxane Results (ug/L)

<5.00 - Chloroform Results (ug/L)

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Milledge Avenue Site
Phase III DPT
Boring Locations
and Analytical Results
Athens, GA

Figure
3-6

N

0 5 10 20 Feet

PW-Da
PW-Dc
PW-Db
PW-PRBa
PW-PRBb
PW-Ub
PW-Ua
1
2
3
4
4b
5
6
7
7b
8
8b
9
10
11
630
MW-5c
MW-5b
MW-4
MW-3

Legend

- Performance Well
- PRB Injection Location
- Bedrock Monitoring Well
- Monitoring Well
- Fence Around Capped Landfill
- PRB
- Elevation_Contours

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Milledge Avenue Site
Permeable Reactive Barrier
Injection Location Map

Athens, GA

Figure

3-7

N

0 1.5 3 6 9 12
Feet

TMW-1
Depth -15' BGS
Screened from 5' to 15' BGS

TMW-2
Depth -15' BGS
Screened from 5' to 15' BGS

TMW-3
Depth -15' BGS
Screened from 5' to 15' BGS

TMW-4
Depth -30' BGS
Screened from 10'-30' BGS

TMW-5
Depth -30' BGS
Screened from 10'-30' BGS

TMW-6
Depth -30' BGS
Screened from 10'-30' BGS

TMW-7
Depth -30' BGS
Screened from 10'-30' BGS

RW-2/IW-5

Tree

TMW-7

(18' from IP2)

(12' From IP2)

TMW-6

MW-9b

8 ft

MW-9a

MW-9c

6.0 ft

IP2

TMW-2

18.0 ft

TMW-1

2.0 ft

5 ft

10 ft

Trees

(1' from IP1)

IP1

TMW-3

TMW-4

(10' from IP1)

TMW-5

PI-1
30' BGS
Injected from 30' upward to 10' BGS

PI-2
30' BGS
Injected form 30' upward to 10' BGS

MW-9b
Depth - 47.86' BGS
Screened from 37.86' - 47.86' BGS

MW-9a
Depth - 21.82' BGS
Screened from 11.82' - 21.82' BGS

Legend

- Pilot Injection Points
- Temporary Monitoring Well
- Tree
- Bedrock Monitoring Well
- Monitoring Well
- Recovery Well
- Peizometer

Notes:
BGS - Below Ground Surface
BTOC - Below Top of Casing

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Milledge Avenue Site
Temporary Monitoring Well and SP Injection Location Map

Athens, GA

Figure

3-8

Document Path: C:\Users\R2remote\Resolute Environmental\RE_SP - Environmental\ArcGIS\University of Georgia\Task_10 - Pilot Injection\SP Pilot Injection\Figure 1 - Pilot Injection

N

0 5 10 20 30 40 Feet

B1 AB 2 BC 1.5 B 3 RW-4 BC 2.5 C 2 B 4 BC 3.5 D1 C 3 C 4 D 3 E 2 D 4 DE 3.5 E 3 F 2 E 4 F 3 G 2 F 4 FG 3.5 G 3 GH 2.5 H 2 G 4 GH 3.5 H 3 HI 2.5 I 2 HI 3.5 H 4(H 4.5) I 3 I 4 RW-1 P-8

RW-5 RW-3 RW-2/IW-5 MW-9b MW-9a 9A S 9A D MW-9c

590 580

Legend

- Surface Water Sample
- MFR Injection Locations
- Approximate Saturated Ground Surface
- Bedrock Monitoring Well
- Monitoring Well
- Recovery Well
- Piezometer
- Elevation_Contours
- Perennial Stream
- Drainage Ditch/Ephemeral Stream
- Groundwater Treatment System

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Milledge Avenue Site
Modified Fenton's Reagent Injection Location Map
Athens, GA

Figure
3-9

N

0 50 100 200 Feet

WP-1
MW-14b
MW-14a
SW-A2/S-A2
SW-A3/S-A3
RW-5
RW-4
RW-3
RW-2/IW-5
MW-9a
RW-1
P-8
Point of Exposure
SW-A1/S-A1
IW-3D
MW-7a
IW-4S
MW-6a
IW-1D
IW-2D
MW-12a
P-4
P-3
PW-2
POC Well
PW-1
MW-4
MW-3
MW-2

Legend

- Injection Well
- Point of Compliance Well
- Performance Well
- Monitoring Well (Bedrock)
- Monitoring Well (Overburden)
- Recovery Well
- Peizometer
- Surface Water/Sediment Sample Location
- PRB
- PRB Extension
- Cut Off Wall
- Groundwater Flow Direction
- Groundwater Potentiometric Contour
- Estimated Groundwater Potentiometric Contour
- Chloroform Isocontour (ug/L)
- Estimated Chloroform Isocontour (ug/L)
- 1,4-Dioxane Isocontour (ug/L)
- Estimated 1,4-Dioxane Isocontour (ug/L)
- Landfill_vents
- Perennial Stream
- Drainage Ditch/Ephemeral Stream
- Unpaved Road
- Trail
- Culvert
- Groundwater Treatment System
- Fence Around Capped Landfill

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Milledge Avenue Site
Permeable Reactive Barrier Design
Overburden Zone

Athens, GA

Figure

4-1a

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N

0 50 100 200 Feet

WP-1
MW-14b
MW-14a
SW-A2/S-A2
SW-A3/S-A3
RW-5
RW-4
RW-3
RW-2/IW-5
MW-9a
RW-1
P-8
Point of Exposure
SW-A1/S-A1
IW-3D
MW-7a
IW-4S
MW-6a
IW-1D
IW-2D
P-4
P-3
MW-12a
POC Well
MW-4
MW-3
MW-2

Legend

- Injection Well
- Point of Compliance Well
- Monitoring Well (Bedrock)
- Monitoring Well (Overburden)
- Recovery Well
- Peizometer
- Surface Water/Sediment Sample Location
- PRB
- Groundwater Flow Direction
- Groundwater Potentiometric Contour
- Estimated Groundwater Potentiometric Contour
- Chloroform Isocontour (ug/L)
- Estimated Chloroform Isocontour (ug/L)
- 1,4-Dioxane Isocontour (ug/L)
- Estimated 1,4-Dioxane Isocontour (ug/L)
- Landfill_vents
- Perennial Stream
- Drainage Ditch/Ephemeral Stream
- Unpaved Road
- Trail
- Culvert
- Groundwater Treatment System
- Fence Around Capped Landfill

Resolute
Environmental & Water Resources Consulting

Woodstock, GA | March 2022

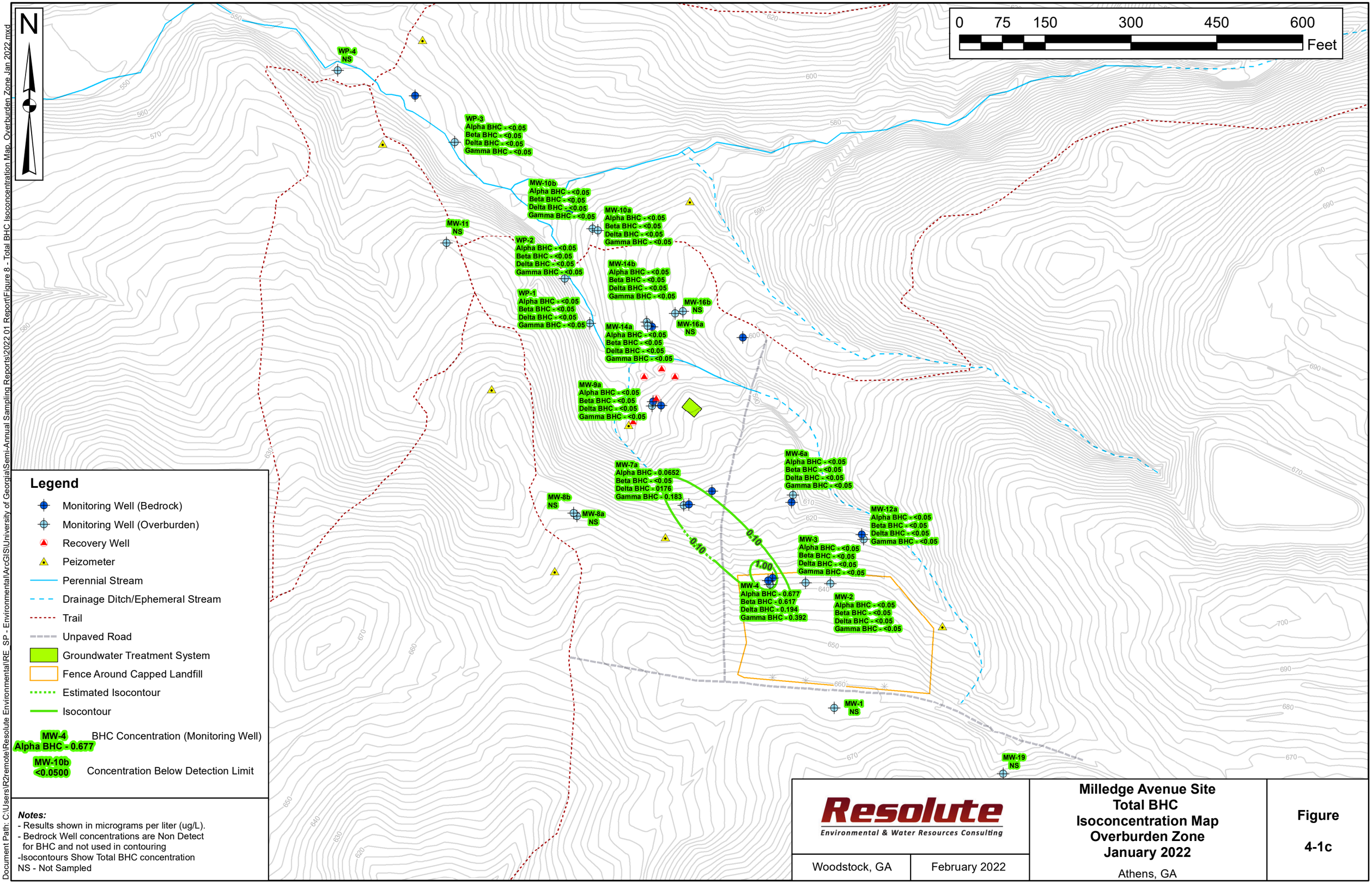
Milledge Avenue Site Downgradient Groundwater Plume Remedial Design

Athens, GA

Figure

4-1b

Document Path: C:\Users\R2remote\Resolute Environmental\RE_SP - Environmental\ArcGIS\University of Georgia\Task 12 - Remediation Design\NEW Maps Since .gdb Change\Phase I Overburden CA.mxd


N
0 75 150 300 450 600
Feet
WP-4
NS
WP-3
Alpha BHC - <0.05
Beta BHC - <0.05
Delta BHC - <0.05
Gamma BHC - <0.05
MW-10b
Alpha BHC - <0.05
Beta BHC - <0.05
Delta BHC - <0.05
Gamma BHC - <0.05
MW-10a
Alpha BHC - <0.05
Beta BHC - <0.05
Delta BHC - <0.05
Gamma BHC - <0.05
MW-11
NS
WP-2
Alpha BHC - <0.05
Beta BHC - <0.05
Delta BHC - <0.05
Gamma BHC - <0.05
MW-14b
Alpha BHC - <0.05
Beta BHC - <0.05
Delta BHC - <0.05
Gamma BHC - <0.05
WP-1
Alpha BHC - <0.05
Beta BHC - <0.05
Delta BHC - <0.05
Gamma BHC - <0.05
MW-16b
NS
MW-16a
NS
MW-14a
Alpha BHC - <0.05
Beta BHC - <0.05
Delta BHC - <0.05
Gamma BHC - <0.05
MW-9a
Alpha BHC - <0.05
Beta BHC - <0.05
Delta BHC - <0.05
Gamma BHC - <0.05
MW-7a
Alpha BHC - 0.0652
Beta BHC - <0.05
Delta BHC - 0176
Gamma BHC - 0.183
MW-8b
NS
MW-8a
NS
MW-6a
Alpha BHC - <0.05
Beta BHC - <0.05
Delta BHC - <0.05
Gamma BHC - <0.05
MW-12a
Alpha BHC - <0.05
Beta BHC - <0.05
Delta BHC - <0.05
Gamma BHC - <0.05
MW-3
Alpha BHC - <0.05
Beta BHC - <0.05
Delta BHC - <0.05
Gamma BHC - <0.05
0.10
0.10
1.00
MW-4
Alpha BHC - 0.677
Beta BHC - 0.617
Delta BHC - 0.194
Gamma BHC - 0.392
MW-2
Alpha BHC - <0.05
Beta BHC - <0.05
Delta BHC - <0.05
Gamma BHC - <0.05
MW-1
NS
MW-19
NS
Legend
Monitoring Well (Bedrock)
Monitoring Well (Overburden)
Recovery Well
Peizometer
Perennial Stream
Drainage Ditch/Ephemeral Stream
Trail
Unpaved Road
Groundwater Treatment System
Fence Around Capped Landfill
Estimated Isocontour
Isocontour
MW-4
Alpha BHC - 0.677
BHC Concentration (Monitoring Well)
MW-10b
<0.0500
Concentration Below Detection Limit
Notes:
- Results shown in micrograms per liter (ug/L).
- Bedrock Well concentrations are Non Detect for BHC and not used in contouring
-Isocontours Show Total BHC concentration
NS - Not Sampled
Resolute
Environmental & Water Resources Consulting
Woodstock, GA
February 2022
Milledge Avenue Site
Total BHC
Isoconcentration Map
Overburden Zone
January 2022
Athens, GA
Figure
4-1c
Document Path: C:\Users\R2remote\Resolute Environmental\RE_SP - Environmental\ArcGIS\University of Georgia\Semi-Annual Sampling Reports\2022 01 Report\Figure 8 - Total BHC Isoconcentration Map_Overburden Zone Jan 2022.mxd

APPENDICES

Appendix A – ISCR and ISBR Treatability Study Report

Appendix B – ISCO Treatability Study Report

Appendix C – High Resolution Site Characterization Report-HPT Investigation

Appendix D – Geotechnical Testing Laboratory Report

Appendix E – Soil Vapor Investigation

Appendix F – Analysis of MASW Report

Appendix G – Discrete Sampling Analytical Report

Appendix H – Groundwater Modeling Report

Appendix I – Phase III DPT Boring Logs and Analytical Sampling Report

Appendix J – PRB Pilot Study Field Report and Analytical Reports

Appendix K – Body of Plume SP Pilot Study Field Report and Analytical Reports

Appendix L – Body of Plume MFR Pilot Study Field Report

A. ISCR AND ISBR TREATABILITY STUDY REPORT

9 June 2021

Stephen K. Wilson, P.G.
Principal
Resolute Consulting
1003 Weatherstone Parkway, Suite 320
Woodstock, Georgia 30188

Subject: Bench-scale Treatability Testing for cVOCs, Lindane, and 1,4-dioxane in Groundwater

Dear Mr. Wilson:

A bench-scale treatability test was conducted using PeroxyChem's GeoForm™ ER and EHC® Plus reagents and aquifer solids (soil) and groundwater samples collected from an industrial site in Georgia (the Site). The main objective was to evaluate the efficacy of the reagents for treatment of contaminants of concern including selected chlorinated solvents, Lindane, and 1,4-dioxane in groundwater at the Site. A secondary objective was to estimate the influence of reagent dosage on performance. The treatability testing was conducted by Resolution Partners LLC (RP) at their laboratory in Madison WI, under the direction of PeroxyChem.

Receipt and Preparation of Soil and Groundwater Samples

Four plastic coolers were received by RP on 22 December 2020. The coolers contained 8 groundwater samples in 1-gallon amber glass jars and 18 soil samples in clear polyethylene direct push sleeves (1¼" diameter, 20" - 24" in length, total soil mass of 14.96 kg). Seven of the eight amber glass jars were in good condition; however, one was received broken. The groundwater samples were labeled as MW-4 while the soil samples were not labeled. The seven intact groundwater samples were transferred into two Tedlar bags labeled as MW-4 Bag A and MW-4 Bag B. Soil was removed from the 18 polyethylene sleeves, combined, and homogenized to prepare a single sample for use in the treatability testing. The client indicated that the soil samples were from a boring near MW-4 from ground surface to bedrock. The soil and groundwater samples were stored in a cold room (4±2°C) until needed for set-up of the testing.

Baseline Characterization of Soil and Groundwater Samples

The groundwater samples in Bag A and Bag B were submitted to PACE Analytical (Madison WI) for analyses including chlorinated VOCs (EPA 8260B, Purge & Trap), Lindane (EPA 8081), and 1,4-dioxane (EPA 8260B, SPME). Sulfate, ORP, and pH of the two groundwater samples as well as the pH of the homogenized soil were determined by RP. Sulfate was by analyzed by ion chromatography using a Dionex DX-500. Analysis for pH was by standard electrode using VWR SympHony SB80PI meter and Thermo Scientific 9701 BNMD electrode. The results of baseline characterization are presented in Table 1.

Table 1: Baseline characterization results for soil and groundwater samples from the Athens site.

Matrix	ORP (mV)	pH (SU)	Sulfate (mg/L)	$CHCl_3$	CCl_4	1,2-DCA	PCE	Lindane	1,4-dixoxane
				µg/L					
soil, saprolite	--	5.17	--	--	--	--	--	--	--
groundwater, MW-4 (Bag A)	149	4.97	99.1	1,300	15	<0.78	8.3	0.58	430
groundwater, MW-4 (Bag B)	148	4.94	88.0	1,300	16	<0.78	7.0	0.51	450

Following consultation with Resolute and based on the observed concentrations of target compounds in the soil and groundwater samples, the treatability investigation was initiated.

Treatability Test Set-up and Analyses

Fifteen sacrificial microcosms were established (*ca*. 424 mL groundwater and 212 g aquifer solids) in glass bottles with Teflon-lined lid. The bottles were filled to reduce headspace and thereby support creation of anoxic conditions. The microcosms were shaken once daily during the reaction period. The following three test conditions were evaluated at three sampling points over 8 weeks: (i) Untreated control, (ii) GeoForm™ ER + EHC® Plus Low (0.28% + 0.28% w/w; 1.8 g + 1.8g), and (iii) GeoForm™ ER + EHC® Plus High (0.54% + 0.54% w/w; 3.4 g + 3.4 g). Dosages were based on the total mass of soil and groundwater in the microcosms. Sampling was conducted on days 14, 28, and 56 after establishment of the microcosms. After each of the designated reaction periods three microcosms were sacrificed for determination of pH, ORP, and sulfate and unfiltered aliquots of groundwater were analyzed for the target compounds. After a settling period of 4 hours, groundwater samples were transferred from the microcosms to sample vials by peristaltic pump via Tygon tubing. The results are provided in Table 1.

Table 2: Influence of treatments on ORP, pH, sulfate, and concentrations of target compounds in the MW-4 groundwater/soil blend.

Control & Treatments	ORP (mV)	pH (SU)	sulfate (mg/L)	$CHCl_3$	CCl_4	1,2-DCA	PCE	Lindane	1,4-dioxane
				µg/L					
14 days									
Control	139	5.12	57.4	920	12	<0.78	3.1	0.16	460
EHC® Plus + GeoForm™ ER (low)	-31	6.27	506	650	<0.38	<0.78	<0.81	0.0061	450
EHC® Plus + GeoForm™ ER (high)	-117	6.19	894	570	<0.38	<0.78	<0.81	0.0031	470
28 days									
Control	127	4.98	144	940	11	<0.78	3.3	0.22	410
EHC® Plus + GeoForm™ ER (low)	-66	6.28	223	200	<0.38	<0.78	<0.81	<0.00084	390
EHC® Plus + GeoForm™ ER (high)	-77	6.11	144	260	<0.38	<0.78	<0.81	0.0011	390
56 days									
Control	125	5.07	54.9	820	12	<0.78	3.6	0.24	420
EHC® Plus + GeoForm™ ER (low)	-48	6.48	16.5	<0.062	<0.038	<0.078	<0.081	0.0019	450
EHC® Plus + GeoForm™ ER (high)	-69	6.33	14.4	<0.062	<0.038	1.1	<0.081	0.0017	420

Treatability Test Results

Conditions in the untreated control microcosms, including ORP, pH, and sulfate concentration, did not change appreciably over the course of the 56-day incubation. Similarly, concentrations of the target compounds were relatively stable. The only exception was in the Lindane concentration which appeared to increase by about 50% from 0.16 µg/L at the 7-day sampling to 0.24 µg/L at the 56-day sampling. This change was large enough to suggest that desorption of Lindane from the soil may have occurred.

In response to the GeoForm ER + EHC Plus treatments, both Low and High, ORP was reduced substantially and pH increased by at least 1.0 unit from near 5.0 to between 6.1 and 6.5 (Table 2). Sulfate concentration increased in response to both the Low and High reagent dosages. At the 7-day sampling point sulfate concentrations were *ca*. 500 and 900 mg/L in the Low and High treatments, respectively. Over the 56-day incubation period sulfate concentrations fell in the treatment microcosms and at day 56 sulfate levels were even lower than in the untreated control. The removal of sulfate was expected as both GeoForm ER and EHC Plus are designed to promote biological sulfate reduction with formation of free sulfide and precipitation of reactive iron sulfide minerals.

Concentrations of chlorinated VOCs, including carbon tetrachloride, chloroform, and PCE, were sharply reduced in response to both the Low and High treatments. Complete removal of carbon tetrachloride and PCE was achieved quickly, with concentrations of both reduced to below the detection limits at the first post-treatment sampling (Table 2). Removal of chloroform was slower but increased at each of the three sampling points with reduction to below the detection limit at the final sampling on day 56.

Lindane concentration was quickly and extensively reduced by both the Low and High treatments with reductions of more than 99% relative to the untreated control at the final 56-day sampling point.

The concentration of 1,4-dioxane was not influenced by either of the treatments. The concentrations of this compound at the final 56-day sampling point were equivalent to the untreated control and to the concentration determined during baseline groundwater characterization (i.e., 420 to 460 µg/L).

It should also be noted that there was no apparent benefit to use of the High reagent dosage over the Low dosage for the target compounds that were effectively treated (i.e., carbon tetrachloride, chloroform, PCE, and Lindane).

The original intent was to conduct five sampling events; however, based on the results of the first three sampling events (Table 2) the treatability was concluded, and the final two sampling events were omitted.

Based on the results of the treatability testing reported here, we believe that chlorinated organic compounds at the site can be effectively treated using the Low dosage of GeoForm™ ER + EHC® Plus. Unfortunately, 1,4-dioxane was not well-treated by either of the treatments evaluated.

Estimated Treatment Longevity

Our experience with these reagents indicates that for most sites a single application will provide effective treatment for a period of several years. This is consistent with estimates on the effective life of

microscale ZVI particles in groundwater which range from about 10 to 30 years based on accepted iron corrosion (consumption) rates (Reardon, E.J., 2005. Zerovalent Irons: Styles of Corrosion and Inorganic Control on Hydrogen Pressure Buildup. Environ. Sci. Technol., Vol. 39, pp. 7311-7317). The shorter effective life may be applicable to sites where groundwater is acidic, and dissolved oxygen and groundwater velocity are high, resulting in more rapid iron corrosion.

Another factor that impacts the treatment longevity of these reagents is the effective life of biogenic iron sulfide minerals formed by sulfate reduction/iron sulfide precipitation processes. This is also influenced by aquifer geochemistry (Figure 1; from Hayes et al., 2009. SERDP Project ER-1375) but can reasonably be expected to be in the range of several years to perhaps as much as 15 years.

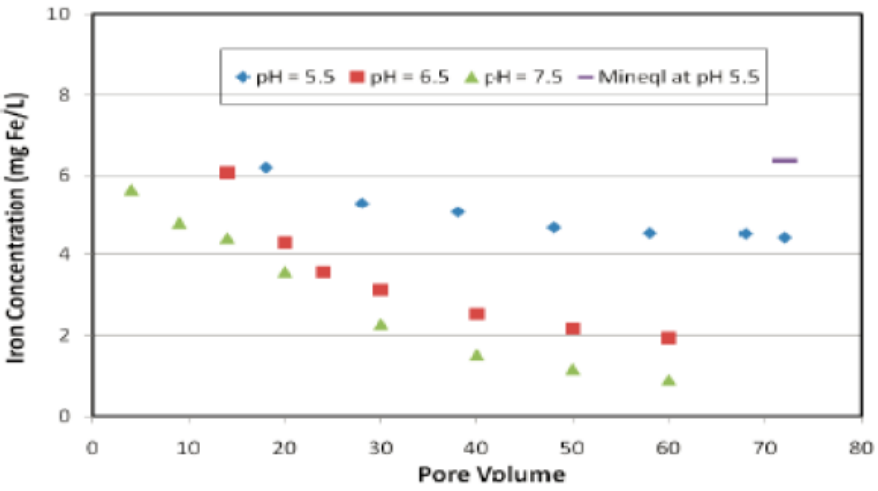


Figure 1. Influence of aqueous pH on dissolution of iron sulfide (FeS) as indicated by elution of soluble iron from FeS coated sand column (I = 0.01 M; Darcy velocity = 0.024 cm/s). Purple horizontal line indicates MINEQL+ predicted saturation iron concentration with respect to FeS at pH = 5.5.

Finally, the rate of organic carbon consumption (i.e., anaerobic fermentation) will also influence treatment longevity. We believe that half-lives for the plant-based organic component in both GeoForm ER and EHC Plus under normal groundwater temperature and pH conditions are between 6 and 12 months. Hence, with normal reagent dosages (i.e., 0.5% w/w to 1.0% w/w) the supply of organic carbon substrate is adequate to support enhanced reductive dechlorination through at least 4 half-lives, resulting in effective bio-stimulation for a period of between 24 and 48 months.

Thus, taking the influence of ZVI particle life, reactive iron sulfide mineral life, and organic carbon substrate life into consideration we expect the longevity of treatment in a reactive zone created by injecting a 0.5% w/w blend of GeoForm ER and EHC Plus to be at several years and perhaps as much as 10 years. Subject to how effectively reactive iron sulfide minerals are formed this estimate may be very conservative and effective treatment could continue for 10 years or more.

I would be pleased to answer any questions you may have about the treatability testing and this report.

Sincerely,

Alan Seech, Ph.D.
Senior Manager – Technology Applications
PeroxyChem Environmental Solutions

Copy: Tommy Jordan, Resolute
Pat Hicks, PeroxyChem
Daniel Leigh, PeroxyChem

Attachments: Material Chain of Custody
Baseline Analytical Laboratory Report
14-day Analytical Laboratory Report
28-day Analytical Laboratory Report
56-day Analytical Laboratory Report

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2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

February 11, 2021

Angela Hassell
Resolution Partners, LLC
P.O. Box 44181
Madison, WI 53744-4181

RE: PC-Resolute Athens GA

Enclosed are the analytical results for the samples received by the laboratory on 02/08/2021.

The results in this report apply to the samples analyzed in accordance with the chain of custody document. These results are in compliance with the 2009 NELAC Standards and the appropriate agencies listed below, unless otherwise noted in the case narrative. This analytical report should be reproduced in its entirety.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Jessica Esser
Project Manager

Certification List			Expires
DODELAP	DOD ELAP Accreditation (A2LA)	3269.01	03/31/2021
ILEPA	Illinois Secondary NELAP Accreditation	004366	04/30/2021
KDHE	Kansas Secondary NELAP Accreditation	E-10384	04/30/2021
LELAP	Louisiana Primary NELAP Accreditation	04165	06/30/2021
NJDEP	New Jersey Secondary NELAP Accreditation	WI004	06/30/2021
TCEQ	Texas Secondary NELAP Accreditation	T104704504-20-11	11/30/2021
WDNR	Wisconsin Certification under NR 149	113289110	08/31/2021

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2525 Advance Road
Madison, WI 53718
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608.221.4889 Fax

Resolution Partners, LLC	Project: PC-Resolute Athens GA
P.O. Box 44181	Project Number: [none]
Madison WI, 53744-4181	Project Manager: Angela Hassell

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
MW-4 (A)	A210603-01	Water	02/08/2021	02/08/2021
MW-4 (B)	A210603-02	Water	02/08/2021	02/08/2021

CASE NARRATIVE

Sample Receipt Information:
Two samples were received on 02/08/2021. Samples were received in acceptable condition.

Please see the chain of custody (COC) document at the end of this report for additional information.

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P.O. Box 44181	Project Number: [none]
Madison WI, 53744-4181	Project Manager: Angela Hassell

MW-4 (A)

A210603-01 (Water)

Date Sampled
02/08/2021 13:00

Pace Analytical - Madison

Analyte	Result	Limit of Detection	Limit of Quantitation	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
Organochlorine Pesticides by EPA Method 8081						**Preparation Batch: A102102**			
gamma-BHC (Lindane)	**0.58**	0.00084	0.025	ug/L	1	02/09/2021	02/10/2021 23:31	EPA 8081B	
Surrogate: Tetrachloro-meta-xylene			*108 %*	*59.2-160*		*02/09/2021*	*02/10/2021 23:31*	*EPA 8081B*	
Surrogate: Decachlorobiphenyl			*92.7 %*	*48.5-148*		*02/09/2021*	*02/10/2021 23:31*	*EPA 8081B*	
1,4-Dioxane by SPME GC/MS						**Preparation Batch: A102103**			
1,4-Dioxane	**430**	1.1	10	ug/L	20	02/09/2021	02/09/2021 12:41	EPA 8260B	D
Surrogate: 1,3-Dioxane			*95.5 %*	*68.1-127*		*02/09/2021*	*02/09/2021 12:41*	*EPA 8260B*	
Volatile Organic Compounds by Method 8260 - Purge and Trap						**Preparation Batch: A102113**			
1,2-Dichloroethane	ND	0.78	5.0	ug/L	10	02/09/2021	02/09/2021 16:40	EPA 8260B	
Carbon tetrachloride	**15**	0.38	5.0	ug/L	10	02/09/2021	02/09/2021 16:40	EPA 8260B	D
Chloroform	**1300**	6.2	50	ug/L	100	02/09/2021	02/09/2021 13:09	EPA 8260B	M1, D
Tetrachloroethene	**8.3**	0.81	5.0	ug/L	10	02/09/2021	02/09/2021 16:40	EPA 8260B	D
Surrogate: Toluene-d8			*78.2 %*	*82.1-110*		*02/09/2021*	*02/09/2021 16:40*	*EPA 8260B*	*S*
Surrogate: 4-Bromofluorobenzene			*84.9 %*	*66.6-120*		*02/09/2021*	*02/09/2021 16:40*	*EPA 8260B*	
Surrogate: 1,2-Dichlorobenzene-d4			*89.4 %*	*74.8-106*		*02/09/2021*	*02/09/2021 16:40*	*EPA 8260B*	

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608.221.4889 Fax

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P.O. Box 44181	Project Number: [none]
Madison WI, 53744-4181	Project Manager: Angela Hassell

MW-4 (B)

A210603-02 (Water)

Date Sampled
02/08/2021 13:10

Pace Analytical - Madison

Analyte	Result	Limit of Detection	Limit of Quantitation	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
Organochlorine Pesticides by EPA Method 8081							**Preparation Batch: A102102**		
gamma-BHC (Lindane)	**0.51**	0.00084	0.025	ug/L	1	02/09/2021	02/11/2021 00:07	EPA 8081B	
Surrogate: Tetrachloro-meta-xylene			*99.1 %*	*59.2-160*		*02/09/2021*	*02/11/2021 00:07*	*EPA 8081B*	
Surrogate: Decachlorobiphenyl			*90.1 %*	*48.5-148*		*02/09/2021*	*02/11/2021 00:07*	*EPA 8081B*	
1,4-Dioxane by SPME GC/MS							**Preparation Batch: A102103**		
1,4-Dioxane	**450**	1.1	10	ug/L	20	02/09/2021	02/09/2021 13:02	EPA 8260B	D
Surrogate: 1,3-Dioxane			*97.3 %*	*68.1-127*		*02/09/2021*	*02/09/2021 13:02*	*EPA 8260B*	
Volatile Organic Compounds by Method 8260 - Purge and Trap							**Preparation Batch: A102113**		
1,2-Dichloroethane	ND	0.78	5.0	ug/L	10	02/09/2021	02/09/2021 17:07	EPA 8260B	
Carbon tetrachloride	**16**	0.38	5.0	ug/L	10	02/09/2021	02/09/2021 17:07	EPA 8260B	D
Chloroform	**1300**	6.2	50	ug/L	100	02/09/2021	02/09/2021 13:35	EPA 8260B	D
Tetrachloroethene	**7.0**	0.81	5.0	ug/L	10	02/09/2021	02/09/2021 17:07	EPA 8260B	D
Surrogate: Toluene-d8			*78.0 %*	*82.1-110*		*02/09/2021*	*02/09/2021 17:07*	*EPA 8260B*	*S*
Surrogate: 4-Bromofluorobenzene			*79.7 %*	*66.6-120*		*02/09/2021*	*02/09/2021 17:07*	*EPA 8260B*	
Surrogate: 1,2-Dichlorobenzene-d4			*85.6 %*	*74.8-106*		*02/09/2021*	*02/09/2021 17:07*	*EPA 8260B*	

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608.221.4889 Fax

Resolution Partners, LLC	Project: PC-Resolute Athens GA
P.O. Box 44181	Project Number: [none]
Madison WI, 53744-4181	Project Manager: Angela Hassell

Organochlorine Pesticides by EPA Method 8081 - Quality Control

Pace Analytical - Madison

Analyte	Result	Limit of Quantitation	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch A102102 - EPA 3511										
Blank (A102102-BLK1)				Prepared: 02/09/2021 Analyzed: 02/10/2021 22:55						
gamma-BHC (Lindane)	ND	0.025	ug/L							
gamma-BHC (Lindane) [2C]	ND	0.025	ug/L							
Surrogate: Tetrachloro-meta-xylene	*1.83*		*ug/L*	*1.500*		*122*	*59.2-160*			
Surrogate: Tetrachloro-meta-xylene [2C]	*1.32*		*ug/L*	*1.500*		*87.9*	*57.6-139*			
Surrogate: Decachlorobiphenyl	*1.43*		*ug/L*	*1.500*		*95.4*	*48.5-148*			
Surrogate: Decachlorobiphenyl [2C]	*1.76*		*ug/L*	*1.500*		*118*	*64-145*			
LCS (A102102-BS1)				Prepared: 02/09/2021 Analyzed: 02/10/2021 21:42						
gamma-BHC (Lindane)	0.225	0.025	ug/L	0.2000		112	82.7-163			
gamma-BHC (Lindane) [2C]	0.244	0.025	ug/L	0.2000		122	79.3-142			
Surrogate: Tetrachloro-meta-xylene	*1.62*		*ug/L*	*1.500*		*108*	*59.2-160*			
Surrogate: Tetrachloro-meta-xylene [2C]	*1.54*		*ug/L*	*1.500*		*102*	*57.6-139*			
Surrogate: Decachlorobiphenyl	*1.30*		*ug/L*	*1.500*		*86.8*	*48.5-148*			
Surrogate: Decachlorobiphenyl [2C]	*1.92*		*ug/L*	*1.500*		*128*	*64-145*			
LCS Dup (A102102-BSD1)				Prepared: 02/09/2021 Analyzed: 02/10/2021 22:19						
gamma-BHC (Lindane)	0.253	0.025	ug/L	0.2000		127	82.7-163	11.9	20	
gamma-BHC (Lindane) [2C]	0.244	0.025	ug/L	0.2000		122	79.3-142	0.142	20	
Surrogate: Tetrachloro-meta-xylene	*1.68*		*ug/L*	*1.500*		*112*	*59.2-160*			
Surrogate: Tetrachloro-meta-xylene [2C]	*1.46*		*ug/L*	*1.500*		*97.1*	*57.6-139*			
Surrogate: Decachlorobiphenyl	*1.32*		*ug/L*	*1.500*		*88.1*	*48.5-148*			
Surrogate: Decachlorobiphenyl [2C]	*1.87*		*ug/L*	*1.500*		*125*	*64-145*			

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Resolution Partners, LLC	Project: PC-Resolute Athens GA
P.O. Box 44181	Project Number: [none]
Madison WI, 53744-4181	Project Manager: Angela Hassell

1,4-Dioxane by SPME GC/MS - Quality Control

Pace Analytical - Madison

Analyte	Result	Limit of Quantitation	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch A102103 - VOC by SPME										
Blank (A102103-BLK1)				Prepared: 02/09/2021 Analyzed: 02/09/2021 12:20						
1,4-Dioxane	ND	0.50	ug/L							
Surrogate: 1,3-Dioxane	*9.80*		*ug/L*	*10.00*		*98.0*	*68.1-127*			
LCS (A102103-BS1)				Prepared: 02/09/2021 Analyzed: 02/09/2021 11:38						
1,4-Dioxane	25.2	0.50	ug/L	25.00		101	80.6-120			
Surrogate: 1,3-Dioxane	*24.1*		*ug/L*	*25.00*		*96.3*	*68.1-127*			
Matrix Spike (A102103-MS1)	**Source: A210509-01**			Prepared: 02/09/2021 Analyzed: 02/09/2021 16:10						
1,4-Dioxane	39.7	0.50	ug/L	25.00	15.5	96.8	72.2-131			
Surrogate: 1,3-Dioxane	*23.2*		*ug/L*	*25.00*		*92.8*	*68.1-127*			
Matrix Spike Dup (A102103-MSD1)	**Source: A210509-01**			Prepared: 02/09/2021 Analyzed: 02/09/2021 16:31						
1,4-Dioxane	40.5	0.50	ug/L	25.00	15.5	99.9	72.2-131	1.92	20	
Surrogate: 1,3-Dioxane	*23.5*		*ug/L*	*25.00*		*93.9*	*68.1-127*			

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Resolution Partners, LLC	Project: PC-Resolute Athens GA
P.O. Box 44181	Project Number: [none]
Madison WI, 53744-4181	Project Manager: Angela Hassell

Volatile Organic Compounds by Method 8260 - Purge and Trap - Quality Control

Pace Analytical - Madison

Analyte	Result	Limit of Quantitation	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch A102113 - EPA 5030B										
Blank (A102113-BLK1)				Prepared: 02/09/2021 Analyzed: 02/09/2021 16:14						
1,2-Dichloroethane	ND	0.50	ug/L							
Carbon tetrachloride	ND	0.50	ug/L							
Chloroform	ND	0.50	ug/L							
Tetrachloroethene	ND	0.50	ug/L							
Surrogate: Toluene-d8	*9.04*		*ug/L*	*10.00*		*90.4*	*82.1-110*			
Surrogate: 4-Bromofluorobenzene	*8.99*		*ug/L*	*10.00*		*89.9*	*66.6-120*			
Surrogate: 1,2-Dichlorobenzene-d4	*8.91*		*ug/L*	*10.00*		*89.1*	*74.8-106*			
LCS (A102113-BS1)				Prepared: 02/09/2021 Analyzed: 02/09/2021 14:01						
1,2-Dichloroethane	4.50	0.50	ug/L	5.000		90.0	81.3-115			
Carbon tetrachloride	4.68	0.50	ug/L	5.000		93.6	72.7-115			
Chloroform	5.02	0.50	ug/L	5.000		100	85.9-113			
Tetrachloroethene	4.68	0.50	ug/L	5.000		93.6	85.3-114			
Surrogate: Toluene-d8	*4.84*		*ug/L*	*5.000*		*96.8*	*82.1-110*			
Surrogate: 4-Bromofluorobenzene	*4.75*		*ug/L*	*5.000*		*95.0*	*66.6-120*			
Surrogate: 1,2-Dichlorobenzene-d4	*5.00*		*ug/L*	*5.000*		*100*	*74.8-106*			
Matrix Spike (A102113-MS1)	**Source: A210603-01**			Prepared: 02/09/2021 Analyzed: 02/09/2021 17:33						
1,2-Dichloroethane	49.6	5.0	ug/L	50.00	ND	99.2	83.5-116			
Carbon tetrachloride	60.4	5.0	ug/L	50.00	15.2	90.4	71.1-113			
Chloroform	1190	5.0	ug/L	50.00	1260	NR	81.8-115			M1, E
Tetrachloroethene	57.3	5.0	ug/L	50.00	8.30	98.0	81.5-116			
Surrogate: Toluene-d8	*50.8*		*ug/L*	*50.00*		*102*	*82.1-110*			
Surrogate: 4-Bromofluorobenzene	*47.6*		*ug/L*	*50.00*		*95.2*	*66.6-120*			
Surrogate: 1,2-Dichlorobenzene-d4	*52.6*		*ug/L*	*50.00*		*105*	*74.8-106*			
Matrix Spike Dup (A102113-MSD1)	**Source: A210603-01**			Prepared: 02/09/2021 Analyzed: 02/09/2021 18:00						
1,2-Dichloroethane	49.5	5.0	ug/L	50.00	ND	99.0	83.5-116	0.202	20	
Carbon tetrachloride	53.7	5.0	ug/L	50.00	15.2	77.0	71.1-113	11.7	20	
Chloroform	1210	5.0	ug/L	50.00	1260	NR	81.8-115	0.858	20	M1, E
Tetrachloroethene	52.9	5.0	ug/L	50.00	8.30	89.2	81.5-116	7.99	20	
Surrogate: Toluene-d8	*46.9*		*ug/L*	*50.00*		*93.8*	*82.1-110*			
Surrogate: 4-Bromofluorobenzene	*45.3*		*ug/L*	*50.00*		*90.6*	*66.6-120*			
Surrogate: 1,2-Dichlorobenzene-d4	*51.9*		*ug/L*	*50.00*		*104*	*74.8-106*			

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P.O. Box 44181	Project Number: [none]
Madison WI, 53744-4181	Project Manager: Angela Hassell

Notes and Definitions

S	Surrogate recovery was outside of laboratory control limits.
M1	Spike recoveries were not evaluated because of elevated levels of the spiked analyte in the parent sample.
E	The concentration indicated is above the instrument calibration range. This value is an estimated concentration.
D	Data reported from a dilution
ND	Analyte NOT DETECTED at or above the reporting limit or limit of detection (if listed).
NR	Not Reported
dry	Sample results reported on a dry weight basis. Detection limits (if listed) and reporting limits have been adjusted for the solids content. If the word 'dry' does not appear after the units, results are reported on an as-is basis.
RPD	Relative Percent Difference

Detection limits (if listed) and reporting limits have been adjusted for dilutions, if reported.

A210603

Analytical Lab: Pace Madison	**Client Name:** ReSolution Partners LLC	Report To:	Angela Hassell
Address: 2525 Advance Rd	Project ID: PC-Resolute Athens GA		ahassell@resolutionpartnersllc.net
City/State/Zip: Madison, WI 53718	Project Number:		Kevin Baker
Lab Contact: Jessica Esser	Address: 967 Jonathon Drive		kbaker@resolutionpartersllc.net
Phone Number: 608-576-5164	City/State/Zip: Madison, WI 53718	Invoice To:	Angela Hassell
Sampler Name (print):	Project Manager: Angela Hassell		ahassell@resolutionpartnersllc.net
Sampler Signature:	Phone Number: 608-669-1248		

Sample Information							Preservative						Matrix						Analyze For:					TAT	
Description	Date Sampled	Time Sampled	No. of Containers	Grab	Composite	Filtered	Ice	HNO3	HCl	NaOH		Other:	Groundwater	Waste Water	Drinking Water	Sludge	Soil	Other :	VOCs (8260) *	Lindane	1,4-Dioxane (8260-SPME)			RUSH: (3 Bus. Days)	Standard: 15 day
MW-4 (A)	2/8/2021	1300	3				x		x				x						x	x	x		01	x	
MW-4 (B)	2/8/2021	1310	3				x		x				x						x	x	x		02	x	

Special Instructions: * Chloroform, Carbon Tetrachloride, 1,2-Dichloroethane, Tetrachloroethene (see attached required reporting limits).

Laboratory Comments: Rec on ice

Method of Shipment: Tracking No:

Relinquished By/Date: Received By/Date: 02-08-21 1630

Relinquished By/Date: Received By/Date:

Analyte	Reporting Limit (mg/L)	Method
Chloroform	80 ppb	8260
Carbon tetrachloride	5 ppb	8260
1,2-Dichloroethane	5 ppb	8260
PCE	5 ppb	8260
Lindane	0.2 ppb	8081
1,4-Dioxane	0.46 ppb	8260-SPME

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March 25, 2021

Angela Hassell
Resolution Partners, LLC
P.O. Box 44181
Madison, WI 53744-4181

RE: PC-Resolute Athens GA

Enclosed are the analytical results for the samples received by the laboratory on 03/ 11/2021.

The results in this report apply to the samples analyzed in accordance with the chain of custody document. These results are in compliance with the 2009 NELAC Standards and the appropriate agencies listed below, unless otherwise noted in the case narrative. This analytical report should be reproduced in its entirety.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Jessica Esser
Project Manager

Certification List			Expires
DODELAP	DOD ELAP Accreditation (A2LA)	3269.01	03/31/2021
ILEPA	Illinois Secondary NELAP Accreditation	004366	04/30/2021
KDHE	Kansas Secondary NELAP Accreditation	E-10384	04/30/2021
LELAP	Louisiana Primary NELAP Accreditation	04165	06/30/2021
NJDEP	New Jersey Secondary NELAP Accreditation	WI004	06/30/2021
TCEQ	Texas Secondary NELAP Accreditation	T104704504-20-11	11/30/2021
WDNR	Wisconsin Certification under NR 149	113289110	08/31/2021

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Resolution Partners, LLC	Project: PC-Resolute Athens GA
P.O. Box 44181	Project Number: [none]
Madison WI, 53744-4181	Project Manager: Angela Hassell

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
Control Day 14	A211013-01	Water	03/11/2021	03/11/2021
GF-EHC Low Day 14	A211013-02	Water	03/11/2021	03/11/2021
GF-EHC High Day 14	A211013-03	Water	03/11/2021	03/11/2021

CASE NARRATIVE

Sample Receipt Information:
Three samples were received on 03/11/2021. Samples were received in acceptable condition.

Please see the chain of custody (COC) document at the end of this report for additional information.

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Madison WI, 53744-4181

Project: PC-Resolute Athens GA
Project Number: [none]
Project Manager: Angela Hassell

Control Day 14

A211013-01 (Water)

Date Sampled
03/11/2021 10:00

Analyte	Result	Limit of Detection	Limit of Quantitation	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
Pace Analytical - Madison									
Organochlorine Pesticides by EPA Method 8081						**Preparation Batch: A103114**			
gamma-BHC (Lindane)	**0.16**	0.00084	0.025	ug/L	1	03/16/2021	03/16/2021 23:34	EPA 8081B	
Surrogate: Tetrachloro-meta-xylene			*71.2 %*	*59.2-160*		*03/16/2021*	*03/16/2021 23:34*	*EPA 8081B*	
Surrogate: Decachlorobiphenyl			*76.8 %*	*48.5-148*		*03/16/2021*	*03/16/2021 23:34*	*EPA 8081B*	
1,4-Dioxane by SPME GC/MS						**Preparation Batch: A103155**			
1,4-Dioxane	**460**	0.57	5.0	ug/L	10	03/22/2021	03/22/2021 16:14	EPA 8260B	D
Surrogate: 1,3-Dioxane			*105 %*	*72.7-123*		*03/22/2021*	*03/22/2021 16:14*	*EPA 8260B*	
Volatile Organic Compounds by Method 8260 - Purge and Trap						**Preparation Batch: A103143**			
1,2-Dichloroethane	ND	0.78	5.0	ug/L	10	03/22/2021	03/22/2021 13:09	EPA 8260B	
Carbon tetrachloride	**12**	0.38	5.0	ug/L	10	03/22/2021	03/22/2021 13:09	EPA 8260B	D
Chloroform	**920**	6.2	50	ug/L	100	03/22/2021	03/22/2021 13:35	EPA 8260B	D, B
Tetrachloroethene	**3.1**	0.81	5.0	ug/L	10	03/22/2021	03/22/2021 13:09	EPA 8260B	J, D
Surrogate: Toluene-d8			*95.4 %*	*82.1-110*		*03/22/2021*	*03/22/2021 13:09*	*EPA 8260B*	
Surrogate: 4-Bromofluorobenzene			*90.3 %*	*66.6-120*		*03/22/2021*	*03/22/2021 13:09*	*EPA 8260B*	
Surrogate: 1,2-Dichlorobenzene-d4			*83.4 %*	*74.8-106*		*03/22/2021*	*03/22/2021 13:09*	*EPA 8260B*	

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P.O. Box 44181	Project Number: [none]
Madison WI, 53744-4181	Project Manager: Angela Hassell

GF-EHC Low Day 14

A211013-02 (Water)

Date Sampled
03/11/2021 10:10

Analyte	Result	Limit of Detection	Limit of Quantitation	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
Pace Analytical - Madison									
Organochlorine Pesticides by EPA Method 8081						**Preparation Batch: A103114**			
gamma-BHC (Lindane)	**0.0061**	0.00084	0.025	ug/L	1	03/16/2021	03/17/2021 00:10	EPA 8081B	P, J
Surrogate: Tetrachloro-meta-xylene			*71.9 %*	*59.2-160*		*03/16/2021*	*03/17/2021 00:10*	*EPA 8081B*	
Surrogate: Decachlorobiphenyl			*81.0 %*	*48.5-148*		*03/16/2021*	*03/17/2021 00:10*	*EPA 8081B*	
1,4-Dioxane by SPME GC/MS						**Preparation Batch: A103155**			
1,4-Dioxane	**450**	0.57	5.0	ug/L	10	03/22/2021	03/22/2021 16:35	EPA 8260B	D
Surrogate: 1,3-Dioxane			*105 %*	*72.7-123*		*03/22/2021*	*03/22/2021 16:35*	*EPA 8260B*	
Volatile Organic Compounds by Method 8260 - Purge and Trap						**Preparation Batch: A103143**			
1,2-Dichloroethane	ND	0.78	5.0	ug/L	10	03/22/2021	03/22/2021 14:02	EPA 8260B	
Carbon tetrachloride	ND	0.38	5.0	ug/L	10	03/22/2021	03/22/2021 14:02	EPA 8260B	
Chloroform	**650**	6.2	50	ug/L	100	03/22/2021	03/22/2021 14:28	EPA 8260B	D, B
Tetrachloroethene	ND	0.81	5.0	ug/L	10	03/22/2021	03/22/2021 14:02	EPA 8260B	
Surrogate: Toluene-d8			*97.7 %*	*82.1-110*		*03/22/2021*	*03/22/2021 14:02*	*EPA 8260B*	
Surrogate: 4-Bromofluorobenzene			*95.5 %*	*66.6-120*		*03/22/2021*	*03/22/2021 14:02*	*EPA 8260B*	
Surrogate: 1,2-Dichlorobenzene-d4			*86.1 %*	*74.8-106*		*03/22/2021*	*03/22/2021 14:02*	*EPA 8260B*	

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P.O. Box 44181	Project Number: [none]
Madison WI, 53744-4181	Project Manager: Angela Hassell

GF-EHC High Day 14

A211013-03 (Water)

Date Sampled
03/11/2021 10:20

Analyte	Result	Limit of Detection	Limit of Quantitation	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
Pace Analytical - Madison									
Organochlorine Pesticides by EPA Method 8081						**Preparation Batch: A103114**			
gamma-BHC (Lindane)	**0.0031**	0.00084	0.025	ug/L	1	03/16/2021	03/17/2021 00:46	EPA 8081B	J
Surrogate: Tetrachloro-meta-xylene			*65.6 %*	*59.2-160*		*03/16/2021*	*03/17/2021 00:46*	*EPA 8081B*	
Surrogate: Decachlorobiphenyl			*52.2 %*	*48.5-148*		*03/16/2021*	*03/17/2021 00:46*	*EPA 8081B*	
1,4-Dioxane by SPME GC/MS						**Preparation Batch: A103155**			
1,4-Dioxane	**470**	0.57	5.0	ug/L	10	03/22/2021	03/22/2021 16:56	EPA 8260B	D
Surrogate: 1,3-Dioxane			*111 %*	*72.7-123*		*03/22/2021*	*03/22/2021 16:56*	*EPA 8260B*	
Volatile Organic Compounds by Method 8260 - Purge and Trap						**Preparation Batch: A103143**			
1,2-Dichloroethane	ND	0.78	5.0	ug/L	10	03/22/2021	03/22/2021 14:54	EPA 8260B	
Carbon tetrachloride	ND	0.38	5.0	ug/L	10	03/22/2021	03/22/2021 14:54	EPA 8260B	
Chloroform	**570**	6.2	50	ug/L	100	03/22/2021	03/22/2021 15:20	EPA 8260B	D, B
Tetrachloroethene	ND	0.81	5.0	ug/L	10	03/22/2021	03/22/2021 14:54	EPA 8260B	
Surrogate: Toluene-d8			*95.7 %*	*82.1-110*		*03/22/2021*	*03/22/2021 14:54*	*EPA 8260B*	
Surrogate: 4-Bromofluorobenzene			*94.7 %*	*66.6-120*		*03/22/2021*	*03/22/2021 14:54*	*EPA 8260B*	
Surrogate: 1,2-Dichlorobenzene-d4			*85.4 %*	*74.8-106*		*03/22/2021*	*03/22/2021 14:54*	*EPA 8260B*	

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P.O. Box 44181	Project Number: [none]
Madison WI, 53744-4181	Project Manager: Angela Hassell

Organochlorine Pesticides by EPA Method 8081 - Quality Control

Pace Analytical - Madison

Analyte	Result	Limit of Quantitation	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch A103114 - EPA 3511										
Blank (A103114-BLK1)				Prepared: 03/16/2021 Analyzed: 03/16/2021 22:57						
gamma-BHC (Lindane)	ND	0.025	ug/L							
gamma-BHC (Lindane) [2C]	ND	0.025	ug/L							
Surrogate: Tetrachloro-meta-xylene	*1.17*		*ug/L*	*1.500*		*78.3*	*59.2-160*			
Surrogate: Tetrachloro-meta-xylene [2C]	*1.40*		*ug/L*	*1.500*		*93.4*	*57.6-139*			
Surrogate: Decachlorobiphenyl	*1.17*		*ug/L*	*1.500*		*77.7*	*48.5-148*			
Surrogate: Decachlorobiphenyl [2C]	*1.24*		*ug/L*	*1.500*		*82.5*	*64-145*			
LCS (A103114-BS1)				Prepared: 03/16/2021 Analyzed: 03/16/2021 21:44						
gamma-BHC (Lindane)	0.176	0.025	ug/L	0.2000		88.0	82.7-163			
gamma-BHC (Lindane) [2C]	0.216	0.025	ug/L	0.2000		108	79.3-142			
Surrogate: Tetrachloro-meta-xylene	*1.16*		*ug/L*	*1.500*		*77.2*	*59.2-160*			
Surrogate: Tetrachloro-meta-xylene [2C]	*1.39*		*ug/L*	*1.500*		*92.7*	*57.6-139*			
Surrogate: Decachlorobiphenyl	*1.10*		*ug/L*	*1.500*		*73.3*	*48.5-148*			
Surrogate: Decachlorobiphenyl [2C]	*1.26*		*ug/L*	*1.500*		*84.2*	*64-145*			
LCS Dup (A103114-BSD1)				Prepared: 03/16/2021 Analyzed: 03/16/2021 22:21						
gamma-BHC (Lindane)	0.192	0.025	ug/L	0.2000		96.2	82.7-163	8.91	20	
gamma-BHC (Lindane) [2C]	0.220	0.025	ug/L	0.2000		110	79.3-142	1.89	20	
Surrogate: Tetrachloro-meta-xylene	*1.21*		*ug/L*	*1.500*		*80.6*	*59.2-160*			
Surrogate: Tetrachloro-meta-xylene [2C]	*1.45*		*ug/L*	*1.500*		*96.3*	*57.6-139*			
Surrogate: Decachlorobiphenyl	*1.21*		*ug/L*	*1.500*		*80.4*	*48.5-148*			
Surrogate: Decachlorobiphenyl [2C]	*1.37*		*ug/L*	*1.500*		*91.3*	*64-145*			

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Resolution Partners, LLC	Project: PC-Resolute Athens GA
P.O. Box 44181	Project Number: [none]
Madison WI, 53744-4181	Project Manager: Angela Hassell

1,4-Dioxane by SPME GC/MS - Quality Control

Pace Analytical - Madison

Analyte	Result	Limit of Quantitation	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch A103155 - VOC by SPME										
Blank (A103155-BLK1)				Prepared: 03/22/2021 Analyzed: 03/22/2021 15:53						
1,4-Dioxane	ND	0.50	ug/L							
Surrogate: 1,3-Dioxane	*10.6*		*ug/L*	*10.00*		*106*	*72.7-123*			
LCS (A103155-BS1)				Prepared: 03/22/2021 Analyzed: 03/22/2021 15:12						
1,4-Dioxane	28.1	0.50	ug/L	25.00		112	83.3-120			
Surrogate: 1,3-Dioxane	*27.2*		*ug/L*	*25.00*		*109*	*72.7-123*			
Matrix Spike (A103155-MS1)	**Source: A211013-03**			Prepared: 03/22/2021 Analyzed: 03/22/2021 17:17						
1,4-Dioxane	772	5.0	ug/L	250.0	471	120	78.6-125			
Surrogate: 1,3-Dioxane	*286*		*ug/L*	*250.0*		*114*	*72.7-123*			
Matrix Spike Dup (A103155-MSD1)	**Source: A211013-03**			Prepared: 03/22/2021 Analyzed: 03/22/2021 17:38						
1,4-Dioxane	762	5.0	ug/L	250.0	471	116	78.6-125	1.32	20	
Surrogate: 1,3-Dioxane	*282*		*ug/L*	*250.0*		*113*	*72.7-123*			

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P.O. Box 44181	Project Number: [none]
Madison WI, 53744-4181	Project Manager: Angela Hassell

Volatile Organic Compounds by Method 8260 - Purge and Trap - Quality Control

Pace Analytical - Madison

Analyte	Result	Limit of Quantitation	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch A103143 - EPA 5030B										
Blank (A103143-BLK1)				Prepared: 03/19/2021 Analyzed: 03/19/2021 17:43						
1,2-Dichloroethane	ND	0.50	ug/L							
Carbon tetrachloride	ND	0.50	ug/L							
Chloroform	0.17	0.50	ug/L							J
Tetrachloroethene	ND	0.50	ug/L							
Surrogate: Toluene-d8	*9.95*		*ug/L*	*10.00*		*99.5*	*82.1-110*			
Surrogate: 4-Bromofluorobenzene	*9.83*		*ug/L*	*10.00*		*98.3*	*66.6-120*			
Surrogate: 1,2-Dichlorobenzene-d4	*8.68*		*ug/L*	*10.00*		*86.8*	*74.8-106*			
LCS (A103143-BS1)				Prepared: 03/19/2021 Analyzed: 03/19/2021 21:13						
1,2-Dichloroethane	4.86	0.50	ug/L	5.000		97.2	81.3-115			
Carbon tetrachloride	5.65	0.50	ug/L	5.000		113	72.7-115			
Chloroform	4.81	0.50	ug/L	5.000		96.2	85.9-113			B
Tetrachloroethene	5.04	0.50	ug/L	5.000		101	85.3-114			
Surrogate: Toluene-d8	*5.00*		*ug/L*	*5.000*		*100*	*82.1-110*			
Surrogate: 4-Bromofluorobenzene	*4.96*		*ug/L*	*5.000*		*99.2*	*66.6-120*			
Surrogate: 1,2-Dichlorobenzene-d4	*4.98*		*ug/L*	*5.000*		*99.6*	*74.8-106*			
Matrix Spike (A103143-MS1)	**Source: A211013-03**			Prepared: 03/22/2021 Analyzed: 03/22/2021 15:46						
1,2-Dichloroethane	500	50	ug/L	500.0	ND	100	83.5-116			
Carbon tetrachloride	551	50	ug/L	500.0	ND	110	71.1-113			
Chloroform	1070	50	ug/L	500.0	570	99.8	81.8-115			B
Tetrachloroethene	531	50	ug/L	500.0	ND	106	81.5-116			
Surrogate: Toluene-d8	*516*		*ug/L*	*500.0*		*103*	*82.1-110*			
Surrogate: 4-Bromofluorobenzene	*508*		*ug/L*	*500.0*		*102*	*66.6-120*			
Surrogate: 1,2-Dichlorobenzene-d4	*506*		*ug/L*	*500.0*		*101*	*74.8-106*			
Matrix Spike Dup (A103143-MSD1)	**Source: A211013-03**			Prepared: 03/22/2021 Analyzed: 03/22/2021 16:12						
1,2-Dichloroethane	509	50	ug/L	500.0	ND	102	83.5-116	1.78	20	
Carbon tetrachloride	544	50	ug/L	500.0	ND	109	71.1-113	1.28	20	
Chloroform	1110	50	ug/L	500.0	570	108	81.8-115	3.58	20	B
Tetrachloroethene	507	50	ug/L	500.0	ND	101	81.5-116	4.62	20	
Surrogate: Toluene-d8	*513*		*ug/L*	*500.0*		*103*	*82.1-110*			
Surrogate: 4-Bromofluorobenzene	*498*		*ug/L*	*500.0*		*99.6*	*66.6-120*			
Surrogate: 1,2-Dichlorobenzene-d4	*508*		*ug/L*	*500.0*		*102*	*74.8-106*			

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P.O. Box 44181	Project Number: [none]
Madison WI, 53744-4181	Project Manager: Angela Hassell

Notes and Definitions

S	Surrogate recovery was outside of laboratory control limits.
P	The difference in the concentrations between the primary and confirmation column was > 40%.
J	Analyte was detected but is below the reporting limit. The concentration is estimated.
D	Data reported from a dilution
B	Analyte is also detected in the associated method blank.
ND	Analyte NOT DETECTED at or above the reporting limit or limit of detection (if listed).
NR	Not Reported
dry	Sample results reported on a dry weight basis. Detection limits (if listed) and reporting limits have been adjusted for the solids content. If the word 'dry' does not appear after the units, results are reported on an as-is basis.
RPD	Relative Percent Difference

Detection limits (if listed) and reporting limits have been adjusted for dilutions, if reported.

A211013

Analytical Lab: Pace Madison	**Client Name:** ReSolution Partners LLC	Report To:	Angela Hassell
Address: 2525 Advance Rd	Project ID: PC-Resolute Athens GA		ahassell@resolutionpartnersllc.net
City/State/Zip: Madison, WI 53718	Project Number:		Kevin Baker
Lab Contact: Jessica Esser	Address: 967 Jonathon Drive		kbaker@resolutionpartersllc.net
Phone Number: 608-576-5164	City/State/Zip: Madison, WI 53718	Invoice To:	Angela Hassell
Sampler Name (print): Kevin Baker	Project Manager: Angela Hassell		ahassell@resolutionpartnersllc.net
608-669-6949	Phone Number: 608-669-1248		

Sample Information							Preservative						Matrix						Analyze For:			TAT
Description	Date Sampled	Time Sampled	No. of Containers	Grab	Composite	Filtered	Ice	HNO3	HCl	NaOH	no pres.	Other:	Groundwater	Waste Water	Drinking Water	Sludge	Soil	Other :	VOCs (8260) *	Lindane	1,4-Dioxane (8260-SPME)	Standard: 15 day
Control Day 14 01	3/11/2021	1000	2				x		x				x						x			
			1				x				x		x							x	x	x
GF-EHC Low Day 14 02	3/11/2021	1010	2				x		x				x						x			
			1				x				x		x							x	x	x
GF-EHC High Day 14 03	3/11/2021	1020	2				x		x				x						x			
			1				x				x		x							x	x	x

Special Instructions: * Chloroform, Carbon Tetrachloride, 1,2-Dichloroethane, Tetrachloroethene (see attached required reporting limits).

Laboratory Comments: Rec on ice

Method of Shipment: hand delivered

Tracking No: N/A

Relinquished By/Date: Kevin Baker 3/11/2021 1611

Received By/Date: Jessica Esser 03-11-21 1611

Relinquished By/Date:

Received By/Date:

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April 08, 2021

Angela Hassell
Resolution Partners, LLC
P.O. Box 44181
Madison, WI 53744-4181

RE: PC-Resolute Athens GA

Enclosed are the analytical results for the samples received by the laboratory on 03/25/2021.

The results in this report apply to the samples analyzed in accordance with the chain of custody document. These results are in compliance with the 2009 NELAC Standards and the appropriate agencies listed below, unless otherwise noted in the case narrative. This analytical report should be reproduced in its entirety.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Molly Palzkill For Jessica Esser
Project Manager

Certification List			Expires
DODELAP	DOD ELAP Accreditation (A2LA)	3269.01	03/31/2022
ILEPA	Illinois Secondary NELAP Accreditation	004366	04/30/2021
KDHE	Kansas Secondary NELAP Accreditation	E-10384	04/30/2021
LELAP	Louisiana Primary NELAP Accreditation	04165	06/30/2021
NJDEP	New Jersey Secondary NELAP Accreditation	WI004	06/30/2021
TCEQ	Texas Secondary NELAP Accreditation	T104704504-20-11	11/30/2021
WDNR	Wisconsin Certification under NR 149	113289110	08/31/2021

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P.O. Box 44181	Project Number: [none]
Madison WI, 53744-4181	Project Manager: Angela Hassell

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
Control Day 28	A211207-01	Water	03/25/2021	03/25/2021
GF-EHC Low Day 28	A211207-02	Water	03/25/2021	03/25/2021
GF-EHC High Day 28	A211207-03	Water	03/25/2021	03/25/2021

CASE NARRATIVE

Sample Receipt Information:
Three samples were received on 03/25/2021. Samples were received in acceptable condition.

Please see the chain of custody (COC) document at the end of this report for additional information.

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Madison WI, 53744-4181	Project Manager: Angela Hassell

Control Day 28

A211207-01 (Water)

Date Sampled
03/25/2021 10:00

Pace Analytical - Madison

Analyte	Result	Limit of Detection	Limit of Quantitation	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
Organochlorine Pesticides by EPA Method 8081							**Preparation Batch: A103183**		
gamma-BHC (Lindane)	**0.22**	0.00084	0.025	ug/L	1	03/26/2021	03/26/2021 17:02	EPA 8081B	
Surrogate: Tetrachloro-meta-xylene			*92.6 %*	*59.2-160*		*03/26/2021*	*03/26/2021 17:02*	*EPA 8081B*	
Surrogate: Decachlorobiphenyl			*94.1 %*	*48.5-148*		*03/26/2021*	*03/26/2021 17:02*	*EPA 8081B*	
1,4-Dioxane by SPME GC/MS							**Preparation Batch: A103186**		
1,4-Dioxane	**410**	0.57	5.0	ug/L	10	03/30/2021	03/30/2021 22:45	EPA 8260B	D
Surrogate: 1,3-Dioxane			*92.3 %*	*72.7-123*		*03/30/2021*	*03/30/2021 22:45*	*EPA 8260B*	
Volatile Organic Compounds by Method 8260 - Purge and Trap							**Preparation Batch: A104103**		
1,2-Dichloroethane	ND	0.78	5.0	ug/L	10	04/07/2021	04/07/2021 17:43	EPA 8260B	
Carbon tetrachloride	**11**	0.38	5.0	ug/L	10	04/07/2021	04/07/2021 17:43	EPA 8260B	D
Chloroform	**940**	6.2	50	ug/L	100	04/07/2021	04/07/2021 18:11	EPA 8260B	M1, D
Tetrachloroethene	**3.3**	0.81	5.0	ug/L	10	04/07/2021	04/07/2021 17:43	EPA 8260B	J, D
Surrogate: Toluene-d8			*93.7 %*	*82.1-110*		*04/07/2021*	*04/07/2021 17:43*	*EPA 8260B*	
Surrogate: 4-Bromofluorobenzene			*101 %*	*66.6-120*		*04/07/2021*	*04/07/2021 17:43*	*EPA 8260B*	
Surrogate: 1,2-Dichlorobenzene-d4			*90.9 %*	*74.8-106*		*04/07/2021*	*04/07/2021 17:43*	*EPA 8260B*	

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Madison WI, 53744-4181	Project Manager: Angela Hassell

GF-EHC Low Day 28

A211207-02 (Water)

Date Sampled
03/25/2021 10:10

Analyte	Result	Limit of Detection	Limit of Quantitation	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
Pace Analytical - Madison									
Organochlorine Pesticides by EPA Method 8081						**Preparation Batch: A103183**			
gamma-BHC (Lindane)	ND	0.00084	0.025	ug/L	1	03/26/2021	03/26/2021 14:59	EPA 8081B	
Surrogate: Tetrachloro-meta-xylene			*88.3 %*	*59.2-160*		*03/26/2021*	*03/26/2021 17:39*	*EPA 8081B*	
Surrogate: Decachlorobiphenyl			*94.4 %*	*48.5-148*		*03/26/2021*	*03/26/2021 17:39*	*EPA 8081B*	
1,4-Dioxane by SPME GC/MS						**Preparation Batch: A103186**			
1,4-Dioxane	**390**	0.57	5.0	ug/L	10	03/30/2021	03/30/2021 23:05	EPA 8260B	D
Surrogate: 1,3-Dioxane			*94.4 %*	*72.7-123*		*03/30/2021*	*03/30/2021 23:05*	*EPA 8260B*	
Volatile Organic Compounds by Method 8260 - Purge and Trap						**Preparation Batch: A104103**			
1,2-Dichloroethane	ND	0.78	5.0	ug/L	10	04/07/2021	04/07/2021 18:39	EPA 8260B	
Carbon tetrachloride	ND	0.38	5.0	ug/L	10	04/07/2021	04/07/2021 18:39	EPA 8260B	
Chloroform	**200**	0.62	5.0	ug/L	10	04/07/2021	04/07/2021 18:39	EPA 8260B	D
Tetrachloroethene	ND	0.81	5.0	ug/L	10	04/07/2021	04/07/2021 18:39	EPA 8260B	
Surrogate: Toluene-d8			*94.3 %*	*82.1-110*		*04/07/2021*	*04/07/2021 18:39*	*EPA 8260B*	
Surrogate: 4-Bromofluorobenzene			*98.9 %*	*66.6-120*		*04/07/2021*	*04/07/2021 18:39*	*EPA 8260B*	
Surrogate: 1,2-Dichlorobenzene-d4			*85.4 %*	*74.8-106*		*04/07/2021*	*04/07/2021 18:39*	*EPA 8260B*	

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Madison WI, 53744-4181

Project: PC-Resolute Athens GA
Project Number: [none]
Project Manager: Angela Hassell

GF-EHC High Day 28

A211207-03 (Water)

Date Sampled
03/25/2021 10:20

Analyte	Result	Limit of Detection	Limit of Quantitation	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
Pace Analytical - Madison									
Organochlorine Pesticides by EPA Method 8081						**Preparation Batch: A103183**			
gamma-BHC (Lindane)	**0.0011**	0.00084	0.025	ug/L	1	03/26/2021	03/26/2021 18:15	EPA 8081B	J, P
Surrogate: Tetrachloro-meta-xylene			*87.6 %*	*59.2-160*		*03/26/2021*	*03/26/2021 18:15*	*EPA 8081B*	
Surrogate: Decachlorobiphenyl			*93.9 %*	*48.5-148*		*03/26/2021*	*03/26/2021 18:15*	*EPA 8081B*	
1,4-Dioxane by SPME GC/MS						**Preparation Batch: A103186**			
1,4-Dioxane	**390**	0.57	5.0	ug/L	10	03/30/2021	03/30/2021 23:26	EPA 8260B	D
Surrogate: 1,3-Dioxane			*94.8 %*	*72.7-123*		*03/30/2021*	*03/30/2021 23:26*	*EPA 8260B*	
Volatile Organic Compounds by Method 8260 - Purge and Trap						**Preparation Batch: A104103**			
1,2-Dichloroethane	ND	0.78	5.0	ug/L	10	04/07/2021	04/07/2021 19:36	EPA 8260B	
Carbon tetrachloride	ND	0.38	5.0	ug/L	10	04/07/2021	04/07/2021 19:36	EPA 8260B	
Chloroform	**260**	0.62	5.0	ug/L	10	04/07/2021	04/07/2021 19:36	EPA 8260B	D
Tetrachloroethene	ND	0.81	5.0	ug/L	10	04/07/2021	04/07/2021 19:36	EPA 8260B	
Surrogate: Toluene-d8			*101 %*	*82.1-110*		*04/07/2021*	*04/07/2021 19:36*	*EPA 8260B*	
Surrogate: 4-Bromofluorobenzene			*101 %*	*66.6-120*		*04/07/2021*	*04/07/2021 19:36*	*EPA 8260B*	
Surrogate: 1,2-Dichlorobenzene-d4			*88.8 %*	*74.8-106*		*04/07/2021*	*04/07/2021 19:36*	*EPA 8260B*	

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P.O. Box 44181	Project Number: [none]
Madison WI, 53744-4181	Project Manager: Angela Hassell

Organochlorine Pesticides by EPA Method 8081 - Quality Control

Pace Analytical - Madison

Analyte	Result	Limit of Quantitation	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch A103183 - EPA 3511										
Blank (A103183-BLK1)				Prepared: 03/26/2021 Analyzed: 03/26/2021 16:26						
gamma-BHC (Lindane)	ND	0.025	ug/L							
gamma-BHC (Lindane) [2C]	ND	0.025	ug/L							
Surrogate: Tetrachloro-meta-xylene	*1.38*		*ug/L*	*1.500*		*92.2*	*59.2-160*			
Surrogate: Tetrachloro-meta-xylene [2C]	*1.39*		*ug/L*	*1.500*		*92.6*	*57.6-139*			
Surrogate: Decachlorobiphenyl	*1.49*		*ug/L*	*1.500*		*99.1*	*48.5-148*			
Surrogate: Decachlorobiphenyl [2C]	*1.48*		*ug/L*	*1.500*		*98.7*	*64-145*			
LCS (A103183-BS1)				Prepared: 03/26/2021 Analyzed: 03/26/2021 15:13						
gamma-BHC (Lindane)	0.186	0.025	ug/L	0.2000		92.9	82.7-163			
gamma-BHC (Lindane) [2C]	0.209	0.025	ug/L	0.2000		105	79.3-142			
Surrogate: Tetrachloro-meta-xylene	*1.30*		*ug/L*	*1.500*		*86.6*	*59.2-160*			
Surrogate: Tetrachloro-meta-xylene [2C]	*1.41*		*ug/L*	*1.500*		*94.2*	*57.6-139*			
Surrogate: Decachlorobiphenyl	*1.40*		*ug/L*	*1.500*		*93.2*	*48.5-148*			
Surrogate: Decachlorobiphenyl [2C]	*1.46*		*ug/L*	*1.500*		*97.6*	*64-145*			
LCS Dup (A103183-BSD1)				Prepared: 03/26/2021 Analyzed: 03/26/2021 15:50						
gamma-BHC (Lindane)	0.225	0.025	ug/L	0.2000		112	82.7-163	19.1	20	
gamma-BHC (Lindane) [2C]	0.255	0.025	ug/L	0.2000		127	79.3-142	19.6	20	
Surrogate: Tetrachloro-meta-xylene	*1.49*		*ug/L*	*1.500*		*99.7*	*59.2-160*			
Surrogate: Tetrachloro-meta-xylene [2C]	*1.61*		*ug/L*	*1.500*		*108*	*57.6-139*			
Surrogate: Decachlorobiphenyl	*1.43*		*ug/L*	*1.500*		*95.2*	*48.5-148*			
Surrogate: Decachlorobiphenyl [2C]	*1.59*		*ug/L*	*1.500*		*106*	*64-145*			

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P.O. Box 44181	Project Number: [none]
Madison WI, 53744-4181	Project Manager: Angela Hassell

1,4-Dioxane by SPME GC/MS - Quality Control

Pace Analytical - Madison

Analyte	Result	Limit of Quantitation	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch A103186 - VOC by SPME										
Blank (A103186-BLK1)				Prepared: 03/30/2021 Analyzed: 03/30/2021 18:12						
1,4-Dioxane	ND	0.50	ug/L							
Surrogate: 1,3-Dioxane	*9.13*		*ug/L*	*10.00*		*91.3*	*72.7-123*			
LCS (A103186-BS1)				Prepared: 03/30/2021 Analyzed: 03/30/2021 17:30						
1,4-Dioxane	21.8	0.50	ug/L	20.00		109	83.3-120			
Surrogate: 1,3-Dioxane	*20.9*		*ug/L*	*20.00*		*105*	*72.7-123*			
Duplicate (A103186-DUP1)	**Source: A211208-05**			Prepared: 03/30/2021 Analyzed: 03/30/2021 22:24						
1,4-Dioxane	246	0.50	ug/L		261			5.79	200	
Surrogate: 1,3-Dioxane	*7.85*		*ug/L*	*10.00*		*78.5*	*72.7-123*			
Matrix Spike (A103186-MS1)	**Source: A211208-05**			Prepared: 03/30/2021 Analyzed: 03/30/2021 22:03						
1,4-Dioxane	268	0.50	ug/L	20.00	261	37.9	78.6-125			M
Surrogate: 1,3-Dioxane	*19.8*		*ug/L*	*20.00*		*99.0*	*72.7-123*			

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608.221.4889 Fax

Resolution Partners, LLC	Project: PC-Resolute Athens GA
P.O. Box 44181	Project Number: [none]
Madison WI, 53744-4181	Project Manager: Angela Hassell

Volatile Organic Compounds by Method 8260 - Purge and Trap - Quality Control

Pace Analytical - Madison

Analyte	Result	Limit of Quantitation	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch A104103 - EPA 5030B										
Blank (A104103-BLK1)				Prepared: 04/07/2021 Analyzed: 04/07/2021 17:14						
1,2-Dichloroethane	ND	0.50	ug/L							
Carbon tetrachloride	ND	0.50	ug/L							
Chloroform	ND	0.50	ug/L							
Tetrachloroethene	ND	0.50	ug/L							
Surrogate: Toluene-d8	*10.1*		*ug/L*	*10.00*		*101*	*82.1-110*			
Surrogate: 4-Bromofluorobenzene	*10.3*		*ug/L*	*10.00*		*103*	*66.6-120*			
Surrogate: 1,2-Dichlorobenzene-d4	*8.93*		*ug/L*	*10.00*		*89.3*	*74.8-106*			
LCS (A104103-BS1)				Prepared: 04/07/2021 Analyzed: 04/07/2021 21:57						
1,2-Dichloroethane	5.41	0.50	ug/L	5.000		108	81.3-115			
Carbon tetrachloride	5.41	0.50	ug/L	5.000		108	72.7-115			
Chloroform	5.31	0.50	ug/L	5.000		106	85.9-113			
Tetrachloroethene	4.96	0.50	ug/L	5.000		99.2	85.3-114			
Surrogate: Toluene-d8	*5.38*		*ug/L*	*5.000*		*108*	*82.1-110*			
Surrogate: 4-Bromofluorobenzene	*5.39*		*ug/L*	*5.000*		*108*	*66.6-120*			
Surrogate: 1,2-Dichlorobenzene-d4	*5.17*		*ug/L*	*5.000*		*103*	*74.8-106*			
Matrix Spike (A104103-MS1)	**Source: A211207-01**			Prepared: 04/07/2021 Analyzed: 04/07/2021 20:33						
1,2-Dichloroethane	517	50	ug/L	500.0	ND	103	83.5-116			
Carbon tetrachloride	542	50	ug/L	500.0	11.4	106	71.1-113			
Chloroform	1510	50	ug/L	500.0	943	114	81.8-115			
Tetrachloroethene	478	50	ug/L	500.0	ND	95.6	81.5-116			
Surrogate: Toluene-d8	*521*		*ug/L*	*500.0*		*104*	*82.1-110*			
Surrogate: 4-Bromofluorobenzene	*490*		*ug/L*	*500.0*		*98.0*	*66.6-120*			
Surrogate: 1,2-Dichlorobenzene-d4	*507*		*ug/L*	*500.0*		*101*	*74.8-106*			
Matrix Spike Dup (A104103-MSD1)	**Source: A211207-01**			Prepared: 04/07/2021 Analyzed: 04/07/2021 21:02						
1,2-Dichloroethane	521	50	ug/L	500.0	ND	104	83.5-116	0.771	20	
Carbon tetrachloride	571	50	ug/L	500.0	11.4	112	71.1-113	5.21	20	
Chloroform	1540	50	ug/L	500.0	943	120	81.8-115	1.96	20	M1
Tetrachloroethene	490	50	ug/L	500.0	ND	98.0	81.5-116	2.48	20	
Surrogate: Toluene-d8	*527*		*ug/L*	*500.0*		*105*	*82.1-110*			
Surrogate: 4-Bromofluorobenzene	*520*		*ug/L*	*500.0*		*104*	*66.6-120*			
Surrogate: 1,2-Dichlorobenzene-d4	*518*		*ug/L*	*500.0*		*104*	*74.8-106*			

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ENVIRONMENTAL SCIENCES
MOBILE LAB SERVICES

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

Resolution Partners, LLC	Project: PC-Resolute Athens GA
P.O. Box 44181	Project Number: [none]
Madison WI, 53744-4181	Project Manager: Angela Hassell

Notes and Definitions

P	The difference in the concentrations between the primary and confirmation column was > 40%.
M1	Spike recoveries were not evaluated because of elevated levels of the spiked analyte in the parent sample.
M	The matrix spike and/or matrix spike duplicate recovery was outside of the laboratory control limits.
J	Analyte was detected but is below the reporting limit. The concentration is estimated.
D	Data reported from a dilution
ND	Analyte NOT DETECTED at or above the reporting limit or limit of detection (if listed).
NR	Not Reported
dry	Sample results reported on a dry weight basis. Detection limits (if listed) and reporting limits have been adjusted for the solids content. If the word 'dry' does not appear after the units, results are reported on an as-is basis.
RPD	Relative Percent Difference

Detection limits (if listed) and reporting limits have been adjusted for dilutions, if reported.

A211207

Analytical Lab: Pace Madison	**Client Name:** ReSolution Partners LLC	Report To:	Angela Hassell
Address: 2525 Advance Rd	Project ID: PC-Resolute Athens GA		ahassell@resolutionpartnersllc.net
City/State/Zip: Madison, WI 53718	Project Number:		Kevin Baker
Lab Contact: Jessica Esser	Address: 967 Jonathon Drive		kbaker@resolutionpartersllc.net
Phone Number: 608-576-5164	City/State/Zip: Madison, WI 53718	Invoice To:	Angela Hassell
Sampler Name (print): Kevin Baker	Project Manager: Angela Hassell		ahassell@resolutionpartnersllc.net
608-669-6949	Phone Number: 608-669-1248		

Sample Information								Preservative						Matrix						Analyze For:			TAT
Description		Date Sampled	Time Sampled	No. of Containers	Grab	Composite	Filtered	Ice	HNO3	HCl	NaOH	no pres.	Other:	Groundwater	Waste Water	Drinking Water	Sludge	Soil	Other :	VOCs (8260) *	Lindane	1,4-Dioxane (8260-SPME)	Standard: 15 day
Control Day 28	01	3/25/2021	1000	2				x		x				x						x			
				1				x				x		x							x	x	x
GF-EHC Low Day 28	02	3/25/2021	1010	2				x		x				x						x			
				1				x				x		x							x	x	x
GF-EHC High Day 28	03	3/25/2021	1020	2				x		x				x						x			
				1				x				x		x							x	x	x

Special Instructions: * Chloroform, Carbon Tetrachloride, 1,2-Dichloroethane, Tetrachloroethene (see attached required reporting limits).

Method of Shipment: hand delivered Tracking No: N/A

Relinquished By/Date: [signature] 3/25/2021 1635

Received By/Date: [signature] 03-25-21 1635

Relinquished By/Date:

Received By/Date:

Laboratory Comments: Rec on ice

B. ISCO TREATABILITY STUDY REPORT

MEMORANDUM

To:	Tommy Jordan
Subject:	Bench-Scale Treatability Study Summary
Project #:	802914 – UGA Milledge Site, Athens, Georgia
From:	Yan Chin and Prasad Kakarla, P.E.
Date:	August 24, 2021

Introduction

In-Situ Oxidative Technologies, Inc. (ISOTEC^{SM}) was retained by Resolute Environmental (Resolute) to conduct a laboratory bench-scale treatability study (study) on soil and groundwater samples collected from the above referenced site. The contaminants of concern (COCs) for the study are volatile organic compounds (VOCs) and pesticides, primarily 1,4-dioxane, chloroform, and lindane. Resolute provided 1 soil and 1 groundwater (GW) samples collected from the Site for use in the test. The primary objective of the study was to evaluate the treatment effectiveness of base activated sodium persulfate (BASP) (surrogate for potassium persulfate activated with hydrated lime) on site COCs (**COC-test**) and base buffering capacity of site soils (**Buffering-test**). In addition, soil oxidant demand (SOD) was also evaluated at the request of Resolute (**SOD-test**). Therefore, the bench-scale study consisted of three tests and results for each test are summarized below.

Prior to commencing the tests, initial characterization of the samples received was performed to collect data for VOCs (including 1,4-dioxane), pesticides, iron and manganese on the GW sample; for iron, manganese and total organic carbon (TOC) on the soil sample. Results are presented in Table 1 (attached). All chemical analyses for the study were performed by SGS laboratories (SGS) of Dayton, New Jersey.

Buffering test

Soils received were composited and any stones or debris were removed. Base buffering capacity was assessed on site soil. Buffering capacity test was performed on 1:2 slurry [mixture of soil with distilled (DI) water by weight] using 25% sodium hydroxide (NaOH). The test consisted of 2 identical reactors with each reactor containing 5 g of site soil (UB-1140) and 10 ml of DI water. NaOH (25%) solution was added to each reactor in small, incremental volumes and mixed thoroughly to slowly raise the pH value of the sample

contents. The pH value was measured and recorded after each incremental NaOH addition. When a pH value reached and remained above 11 standard units (SU) for more than 1 hour, the test was terminated. The base buffering capacity of the soil was then determined by dividing the total volume in milliliter (ml) of 25% NaOH solution added by the weight of soil in kilogram (kg) being tested. The estimated base buffering capacity was determined from the average value of the two reactors and presented as ml of 25% NaOH per kg of soil (ml/kg). Results indicated a base buffering capacity value of approximately **6 ml/kg** for site soil.

COC test

Treatment effectiveness was evaluated for BASP on GW only in COC-test. A total of 4 reactors were set up, with one reactor serving as Baseline, one as Control and the remaining two as treatment reactors to evaluate BASP at two different doses (1 g/l and 5 g/l). Exactly 244 ml of groundwater were introduced in each reactor. Predetermined amount of sodium persulfate ($Na_2S_2O_8$) was injected in the appropriate treatment reactors in a single batch. DI water was used to compensate for difference between doses. Baseline and Control reactors received equivalent amount of DI water instead of reagent. Residual oxidant ($Na_2S_2O_8$) concentrations were periodically measured, and the test was terminated after oxidant consumption reached plateau in both treatment reactors. Analytical samples were collected from each reactor and submitted to SGS for VOCs (including 1,4-Dioxane) and pesticides. Results are summarized below and in Table 2 (attached).

Reagent doses tested>>>	**1 g/l**	**5 g/l**
VOCs reduction	**42.1%**	**98.6%**
Chloroform reduction	**42.3%**	**100%**
1,4-Doxane reduction	**51.2%**	**99.6%**
Pesticides reduction	**100%**	**100%**

Soil Oxidant Demand (SOD) test

The SOD test was performed on 1:2 slurry (mixture of composited soil with DI water by weight). Two reactors were set up and received $Na_2S_2O_8$ at two doses (1 g/kg and 5 g/kg) that was equivalent to the doses tested in the COC-test. Oxidant concentrations were measured for $Na_2S_2O_8$ immediately after introducing the oxidant (i.e. time = 0 days), after 1-day, after 2-days and after 7 days. SOD was determined by the difference between the initial measurements (t=0 days) and the residual oxidant concentration obtained at the specific time point (t=1, 2 or 7 days) for this study. SOD is reported as "grams per kilogram" or "g/kg" of oxidant (i.e. sodium persulfate). Concentrations of sodium persulfate were measured using a CHEMetrics colorimetric test kit. Results of the test are presented as below and also illustrated in Figure 1.

Oxidant dose tested	1-day SOD (g/kg)	2-day SOD (g/kg)	7-day SOD (g/kg)
1 g/kg ($Na_2S_2O_8$)	**0.17**	**0.22**	**0.40**
5 g/kg ($Na_2S_2O_8$)	**1.47**	**1.67**	**1.81**

Notes:

Oxidant tested was sodium persulfate ($Na_2S_2O_8$).

SOD is presented as g/kg (grams of oxidant per kilogram soil tested).

Table 1. Initial Characteristics
UGA Milledge Avenue Site, Athens, Georgia
ISOTEC Project #802914

Sample ID Matrix	GW groundwater		UB-1140 soil
VOCs	**ug/l**		
Carbon tetrachloride	45.1		NA
Chloroform	1960		NA
1,2-Dichloroethane	7.1		NA
1,2-Dichloropropane	5.4		NA
1,1,2,2-Tetrachloroethane	1.6	J	NA
Tetrachloroethene	4.1		NA
Trichloroethene	3.6		NA
Total VOCs	**2,027**		
1,4-Dioxane	220		NA
Pesticides	**ug/l**		
Aldrin	0.014		NA
alpha-BHC	0.23	[b]	NA
beta-BHC	0.015	[b]	NA
delta-BHC	0.0096	[b]	NA
gamma-BHC (Lindane)	0.06		NA
Total pesticides	**0.3286**		
			mg/kg
Total organic carbon			<1200 [c]
Metals	**ug/l**		**mg/kg**
Iron	<100		52600
Manganese	3050		1440
Solids, percent	-		82

Note:
ug/l = micrograms per liter, mg/kg = milligrams per kilogram
NA = Not analyzed
[b] More than 40 % RPD for detected concentrations between the two GC columns.
[c] TOC Replicate Range: 333 - 541 mg/kg

Table 2. Experiment Results

UGA Milledge Avenue Site, Athens, Georgia

ISOTEC Project #802914

Sample ID	BL	CT	BASP 1	BASP 5
Oxidant/Reductant used	**none**	**none**	**$Na_2S_2O_8$**	**$Na_2S_2O_8$**
Activator used	**none**	**none**	**NaOH**	**NaOH**
Oxidant added (by weight)	**0 g/l**	**0 g/l**	**1 g/l**	**5 g/l**
VOCs (ug/l)				
Acetone	ND (3.1)	ND (3.1)	14	ND (3.1)
Carbon tetrachloride	50.1	46.9	35.6	35.7
Chlorobenzene	1.6	1.2	ND (0.56)	ND (0.56)
Chloroform	2,460	2,380	1,420	ND (0.50)
1,2-Dichloroethane	7.4	7	5.4	ND (0.60)
1,2-Dichloropropane	4.5	4.5	3	ND (0.51)
1,1,2,2-Tetrachloroethane	1.6	1.5	ND (0.65)	ND (0.65)
Tetrachloroethene	4	3.9	1.5	ND (0.90)
Trichloroethene	3.5	3.3	0.57 J	ND (0.53)
Total Target VOCs (ug/l)	**2,531**	**2,447**	**1,466**	**36**
1,4-Dioxane (ug/l)	**164**	**175**	**80.1**	**0.59**
Pesticides (ug/l)				
alpha-BHC	0.210 c	0.240 c	ND (0.0033)	ND (0.0026)
gamma-BHC (Lindane)	0.058	0.052	ND (0.0037)	ND (0.0030)
Total Pesticides	**0.27**	**0.29**	**0.00**	**0.00**
% Reduction				
VOCs	-	-	**42.1%**	**98.6%**
Chloroform	-	-	**42.3%**	**100.0%**
1,4-Dioxane	-	-	**51.2%**	**99.6%**
Pesticides	-	-	**100.0%**	**100.0%**
Oxidant consumption (%)	-	-	**30.0%**	**40.0%**
TOD (g/l)*	-	-	**0.30**	**2.00**
pH (SU)	5.49	5.24	11.33	12.49
ORP (mV)	36	59	-39	-30

Note:

BASP = Base activated sodium persulfate

ug/l = micrograms per liter

c: More than 40% RPD for detected concentrations between the two GC columns.

Oxidant doses are presented as g/l (grams of oxidant per liter of groundwater being tested).

*: Total oxidant demand (TOD) is presented in g/l (grams of oxidant per liter of groundwater being tested).

Table 3: Soil Base Buffering Capacity
UGA Milledge Site, Athens, Georgia
ISOTEC Project #802914

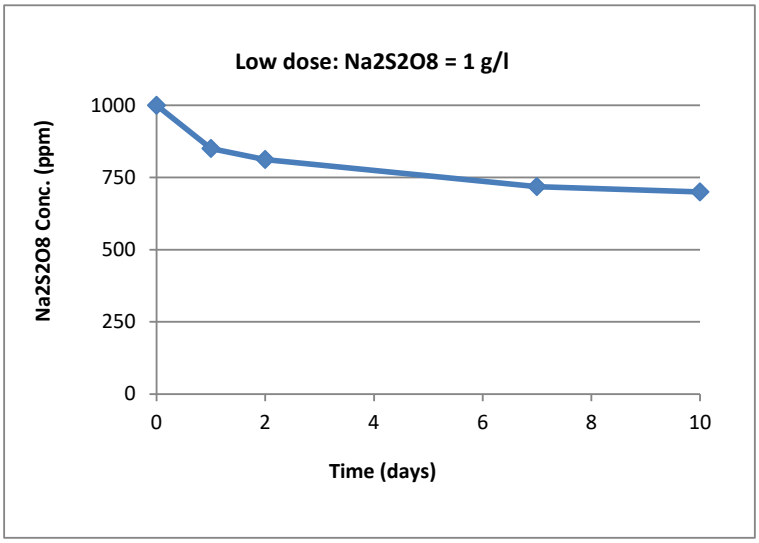
	SO (UB-1140)			
	Reactor A		Reactor B	
time	added (ml)	pH (SU)	added (ml)	pH (SU)
	0	5.35	0	5.67
	0.005	9.58	0.005	8.32
	0.0025	9.96	0.005	10.05
1:50pm	0.01	10.79	0.0025	10.26
3:04pm	0.005	10.96	0.005	10.83
1:30pm	0.0025	11.24	0.005	11.08
2:30pm	0	10.77	0	10.7
	0.0025	10.96	0.005	11.23
	0.005	11.22		
3:30pm	0	11.02	0	11.15
Total added (ml)	**0.0325**		**0.0275**	
Capacity (ml/kg)	**6.5**		**5.5**	
Average Capacity (ml/kg)				**6.00**

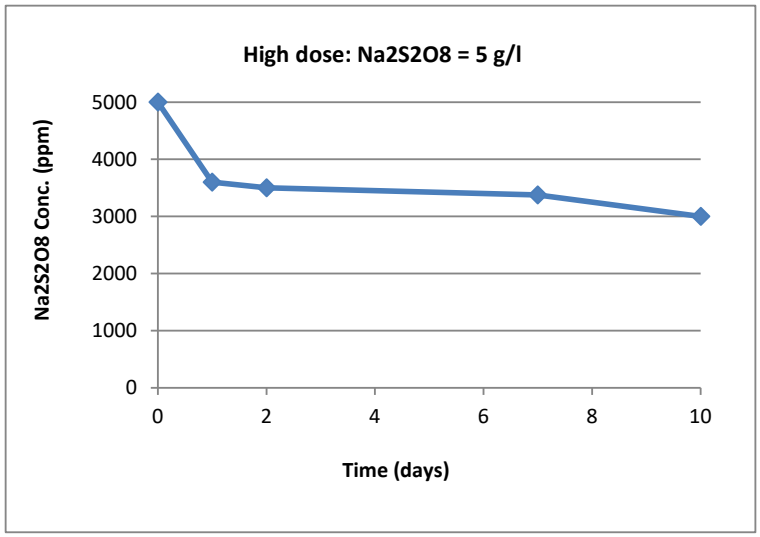
Note:

Test was performed using soil sample UB-1140

Buffering capacity is reported as "ml/kg", milliliter of 25% NaOH per kilogram of soil being tested.

Figure 1. TOD Evaluation - Oxidant Consumption As a Function of Time
UGA Milledge Site, Athens, Georgia
ISOTEC Project #: 802914





Note:
BASP = Base activated sodium persulfate
Na2S2O8 = Sodium persulfate
g/l = grams per liter; ppm = parts per million

C. HIGH RESOLUTION SITE CHARACTERIZATION REPORT-HPT INVESTIGATION

High Resolution Site Characterization Report – HPT Investigation

Client: Resolute Environmental

Project Name: Milledge Avenue Site

Location: Athens, GA

Prepared by:

Dakota Technologies Company, LLC

5001 Boone Avenue N.

New Hope, Minnesota 55428

763.424.4803

August 20, 2021

Project Number: 0260.21

TABLE OF CONTENTS

APPENDICES

1.0 HYDRAULIC PROFILING TOOL (HPT) SYSTEM DESCRIPTION

The Hydraulic Profiling Tool (HPT) is a logging tool that measures the pressure required to inject a flow of water into the soil as the probe is advanced into the subsurface. The injection pressure log is an excellent indicator of formation permeability. In addition to measurement of injection pressure, the HPT can also be used to measure hydrostatic pressure under the zero-flow condition. This allows the development of a hydrostatic pressure graph for the log and prediction of the position of the water table.

The probe is advanced into the ground at a rate of approximately 2 cm/sec. The pump in the HPT flow module draws water from the supply tank and pumps water down the trunk line at a constant flow rate (250-mL/min). An inline flow meter measures the flow rate. The downhole pressure sensor monitors the pressure generated by injecting water into the formation matrix. The HPT probe also includes a Wenner type array for measurement of soil electrical conductivity (EC) as the probe is advanced to depth. The HPT log provides graphs of the electrical conductance, HPT pressure and flow rate versus depth.

Prior to running an HPT log, quality assurance (QA) tests are run on the Wenner array and pressure sensor. The results of the QA tests are saved in an information file for later review and reporting. The Wenner array electrodes are placed on a test jig and the test load is used to verify the electrical continuity and isolation of the EC system. Next, a reference test is performed on the pressure sensor. This is accomplished by submerging the HPT probe a specified depth below the water level in a reference tube. A two-step test enables the operator to verify that the pressure sensor is providing the correct measurement for a defined length of water column. If the result is more than +/-10% out of range, the transducer fails the QA test. At completion of the field boring, another QA test is performed to verify proper probe performance during the logging event.

The HPT pressure log reveals observed pressure depending on the characteristics of the soil or sediment penetrated. It is apparent that higher pressure resulting from the injection of water into a sediment at a given flow rate indicates lower permeability and conversely, that lower pressure from injection of water at a given flow rate indicates higher permeability. This simple relationship allows you to evaluate changes in relative permeability of soils and sediments in an HPT log by reviewing the pressure versus depth log. High EC readings in general correlate with high pressure readings and conversely low EC readings usually correlate with low pressure readings. However, pressure plots frequently reveal hydraulic behavior of the soil not observed by the EC, and the EC may display responses associated with minerology and chemical conductance not observed by the pressure plot. Another important feature of the HPT pressure log is the increase in hydrostatic pressure as the probe is advanced below the water table. The increase in hydrostatic pressure results in a “rising baseline” on the pressure log. To obtain a quantitative determination of the local static water level a pressure dissipation test must be performed during the logging operation. To perform the dissipation test, the advancement of the probe is stopped, and the operator starts a time log. Water flow is turned off to observe and record the dissipation of the HPT

pressure versus time, until pressure stabilizes. The stabilized pressure is the absolute hydrostatic pressure at the depth of the test. Knowing the depth of the test, the absolute hydrostatic pressure and the atmospheric pressure the static water level may be calculated. Multiple dissipation tests may be performed at different depths during a single log to evaluate variations in piezometric head with depth and local vertical gradients in the aquifer.

Dissipation test data can be used in conjunction with the pressure and flow logs to estimate hydraulic conductivity (K) for the entire log after logging is completed. From Darcy's Law, K is proportional to the flow rate (Q) divided by the pressure (P) required to induce that flow rate in the given sediment or soil. The raw HPT pressure provided by the HPT log is the total pressure observed at the depth where the water is injected. This total pressure includes the ambient atmospheric pressure at the time of the log, the local hydrostatic pressure and the pressure required to inject the fluid into the formation:

$$P(total) = P(atm) + P(hydro) + P(inj)$$

As discussed above, the atmospheric pressure is determined from the pre and post log response tests and the hydrostatic pressure is defined by one or more dissipation tests obtained as the log is produced. The actual injection pressure [Pinj = Ptotal – (Phydro + Patm)] that was required to inject the water into the formation is calculated for each depth increment of the log. The actual injection pressure (Pinj) and the measured flow rate (Q) are then used to model an estimated K value for each depth increment of the HPT log (Geoprobe 2010b).

2.0 ELECTRICAL CONDUCTIVITY (EC) DESCRIPTION

Electrical Conductivity (EC) is a measure of the soil's ability to conduct an electrical current using the Wenner array of the HPT/EC probe. Conductivity is the reciprocal of electrical resistivity and has the units (in our application) of millisiemens per meter (mS/m). Since soil is in the pathway of the charge flow, the grain size can be determined by comparing the EC log to a soil boring. Conductivity readings in the 100s indicate smaller grain (such as clay). Larger grain size (sand and gravels) are typically in the 10s of mS/m range. Prior to every log, the Wenner array of the HPT probe is checked for proper operation by performing a conductivity test with a Wenner array test jig. The probe is put through a check of isolation and continuity.

3.0 DISCUSSION AND COMMENTS

Dakota Technologies pushed a total of 27 HPT logs to depths ranging from 19-66 feet below ground surface.

Dissipation tests were attempted at bore locations that displayed adequate porosity (HPT pressure was not excessive) for the purpose of calculating static water levels and hydraulic conductivity (estimated K) plots. Some dissipation tests did not fully equilibriate, however, for the purpose of generating K this was allowed.

The transducer passed all QA testing for each log. The HPT system utilizes a transducer that produces pressure readings between 0 and 110 psi. The pressure data graph is set at 120 psi to capture all HPT readings, with a flat line at 110 psi resulting when the transducer maximum is reached (representing soil of small grain size, such as clay).

Electrical conductivity (EC) data was collected simultaneously at each HPT location. The EC was tested before and after each HPT log was performed and passed all QA checks in the normal manner with the exception of logs Area B1-B1 and Area B1-B2 with no EC due to breakage.

The log named Area A-T2-B1 data was damaged and unrecoverable due to water damage to the field computer.

4.0 LIMITATIONS

The HPT tool is limited to a working depth (max) of 120 feet below ground water and the pressure transducer operating range is 0-101 psi. Coarse (sandy), saturated soils are required for dissipation tests to be performed. Successful (fully stabilized) dissipations are required for water table and hydraulic conductivity (Est. K) calculations. The lower K boundary for Geoprobe's empirical calculation model is about 0.1 ft./day and the upper boundary is near 75 ft./day.

The analysis and opinions expressed in this report are based upon data obtained from the specific test locations and from other information discussed in this report. Exceptions, if any, are discussed in the accompanying comments section of this report. This report is prepared for the exclusive use of our client for specific application to the project discussed and has been prepared in accordance with generally accepted practices. Reported results shall not be reproduced, except in full, without written approval of Dakota. No warranties, expressed or implied are intended or made.

5.0 REFERENCES

Geoprobe 2006a. Hydrostratigraphic Characterization Using the Hydraulic Profiling Tool (HPT), Tech Bul. No. MK3099, Kejr Inc., Salina, KS; April 2006.

Geoprobe, 2007. Geoprobe Hydraulic Profiling Tool (HPT) System, Standard Operating System Procedure, Tech. Bul. No. MK3137, Kejr Inc., Salina, KS; March 2007.

Geoprobe, 2010b. Tech Guide for Calculation of Estimated Hydraulic Conductivity (Est. K) Log from HPT Data, Kejr Inc. Salina, KS; November 2010.

McCall, Wesley and Thomas Christy, 2010. Development of a Hydraulic Conductivity Estimate for the Hydraulic Profiling Tool (HPT): Abstract and Presentation; The 2010 North American Environmental Field Conference & Exposition, The Nielsen Environmental Field School, Las Cruces, NM; January 2010.

Appendix A

HPT Field Summary Log

HPT Field Summary Log

Milledge Avenue Site

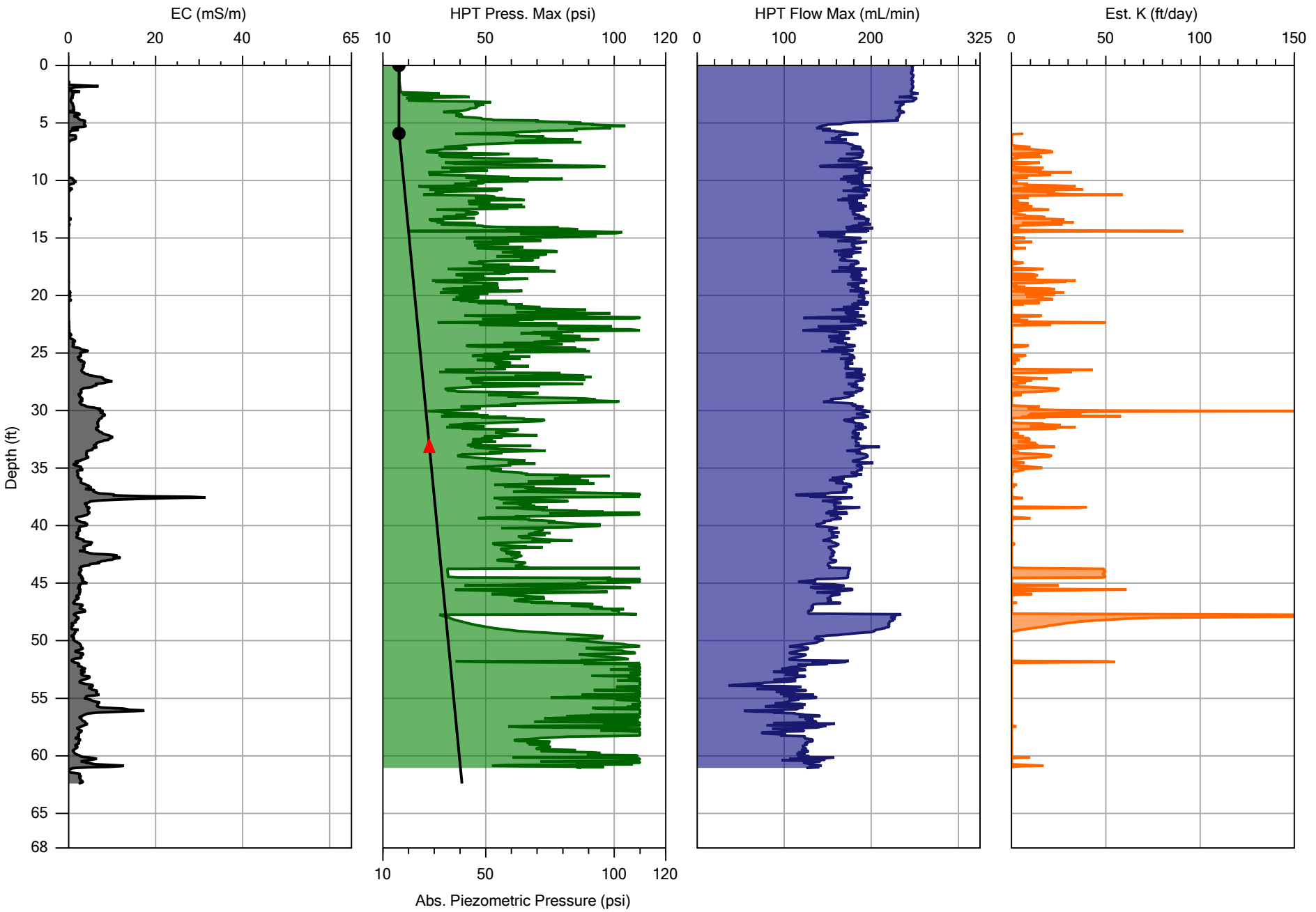
Athens, GA

File Log ID	Date	Total Depth *(ft)*	Preprobed Depth *(ft)*	QA/QC (*pass / fail*)				Static Water Level	Dissipation Test		Comments
				EC Results		Transducer Results					
				Pre-Log pass / fail	Post-Log pass / fail	Pre-Log pass / fail	Post-Log pass / fail	*based on dissipation* *(ft)*	Depth *(ft)*	Stable? *yes / no*	
Area A-T1-B1	08/14/21	61.1	3	pass	pass	pass	pass	5.9	33	Y	no comments
Area-A-T1-B2	08/14/21	45.3	0	pass	pass	pass	pass	10.2	27	Y	no comments
Area-A-T1-B3	08/14/21	47.6	0	pass	pass	pass	pass	13.8	23	Y	no comments
Area-A-T1-B4	08/16/21	62.6	0	pass	pass	pass	pass	16.9	35	Y	no comments
Area A-T2-B1	08/15/21	NA	NA	NA	NA	NA	NA	NA	NA	NA	Damaged data
Area A-T2-B2	08/15/21	54.9	0	pass	pass	pass	pass	21.7	24	Y	no comments
Area A-T2-B3	08/15/21	53.3	0	pass	pass	pass	pass	20.3	23	Y	no comments
Area A-T2-B4	08/15/21	56.4	0	pass	pass	pass	pass	20.3	22	Y	no comments
Area A-T2-B5	08/15/21	66.4	0	pass	pass	pass	pass	20.9	23	Y	no comments
Area B1-B1	08/16/21	47.1	0	pass	pass	pass	pass	18.7	26	Y	no EC
Area B1-B2	08/16/21	40.1	0	pass	pass	pass	pass	NA	NA	NA	no EC
Area B1-B3a	08/16/21	20.6	0	pass	pass	pass	pass	NA	NA	NA	no comments
Area B2-B1	08/16/21	33.9	0	pass	pass	pass	pass	18.0	24	Y	no comments
Area B3-B1	08/10/21	50.3	0	pass	pass	pass	pass	NA	NA	NA	no comments
Area B3-B2	08/10/21	32.2	0	pass	pass	pass	pass	NA	NA	NA	no comments
Area B3-B3	08/11/21	28.3	0	pass	pass	pass	pass	NA	NA	NA	no comments
Area B3-B4	08/11/21	40.6	0	pass	pass	pass	pass	NA	NA	NA	no comments
Area B3-B5	08/11/21	39.4	0	pass	pass	pass	pass	29.5	30	Y	no comments
Area B3-B6	08/11/21	39.4	0	pass	pass	pass	pass	NA	NA	N	Unsuccessful dissipation test
Area C-B-1	08/11/21	58.5	0	pass	pass	pass	pass	NA	NA	N	Unsuccessful dissipation test
Area C-B-2	08/12/21	55.1	0	pass	pass	pass	pass	NA	NA	NA	no comments
Area C-B-3	08/12/21	62.2	0	pass	pass	pass	pass	NA	NA	N	Unsuccessful dissipation test
Area C-B-4	08/12/21	28.8	0	pass	pass	pass	pass	NA	NA	NA	no comments
Area C-B-5	08/12/21	19.5	0	pass	pass	pass	pass	NA	NA	NA	no comments
Area C-B-6	08/12/21	64.9	0	pass	pass	pass	pass	24.6	42	Y	no comments
Area C-B-7	08/12/21	64.8	0	pass	pass	pass	pass	NA	NA	NA	no comments
Area C-B-8	08/13/21	27.0	0	pass	pass	pass	pass	NA	NA	NA	no comments
	Total Depth	1199.50									

DAKOTA TECHNOLOGIES

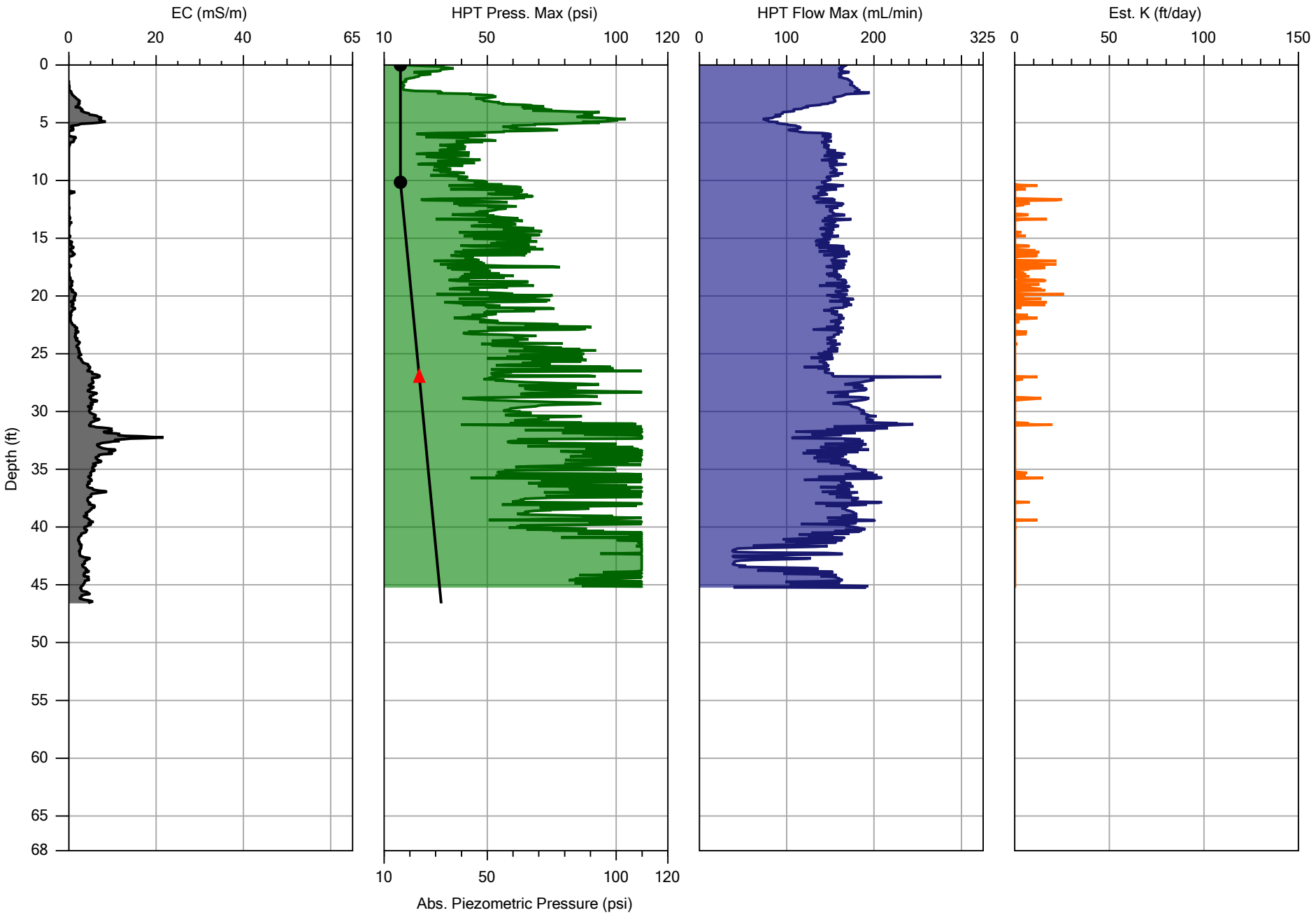
Appendix B

HPT Logs



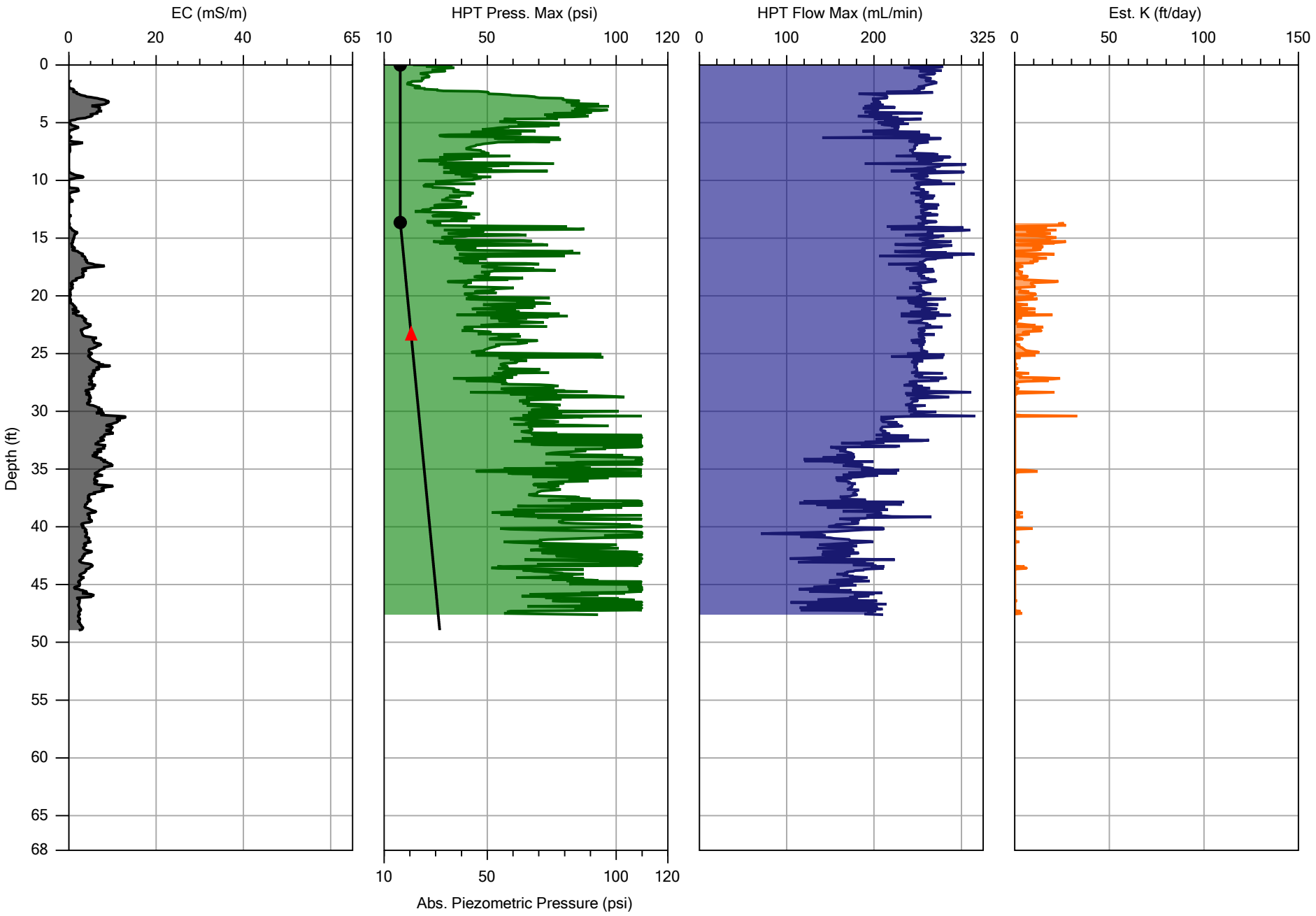
DAKOTA TECHNOLOGIES
www.DakotaTechnologies.com

		File: AREA A-T1-B1.HPT
Company: Dakota Technologies	Operator: Patterson	Date: 8/14/2021
Project ID: Landfill	Client: Resolute	Location: Athens, GA



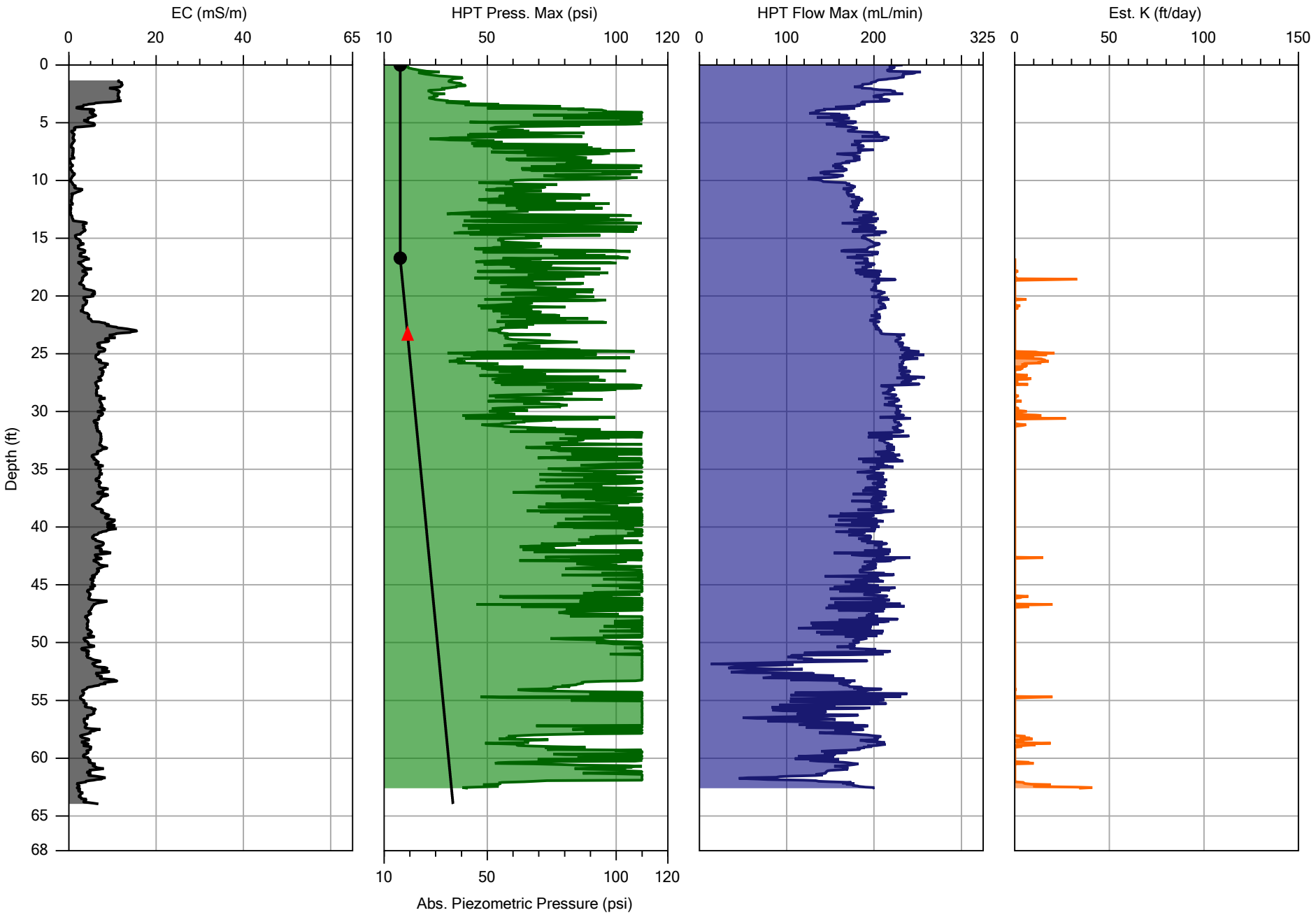
DAKOTA TECHNOLOGIES
www.DakotaTechnologies.com

		File: AREA A-T1-B2.HPT
Company: Dakota Technologies	Operator: Patterson	Date: 8/14/2021
Project ID: Landfill	Client: Resolute	Location: Athens, GA



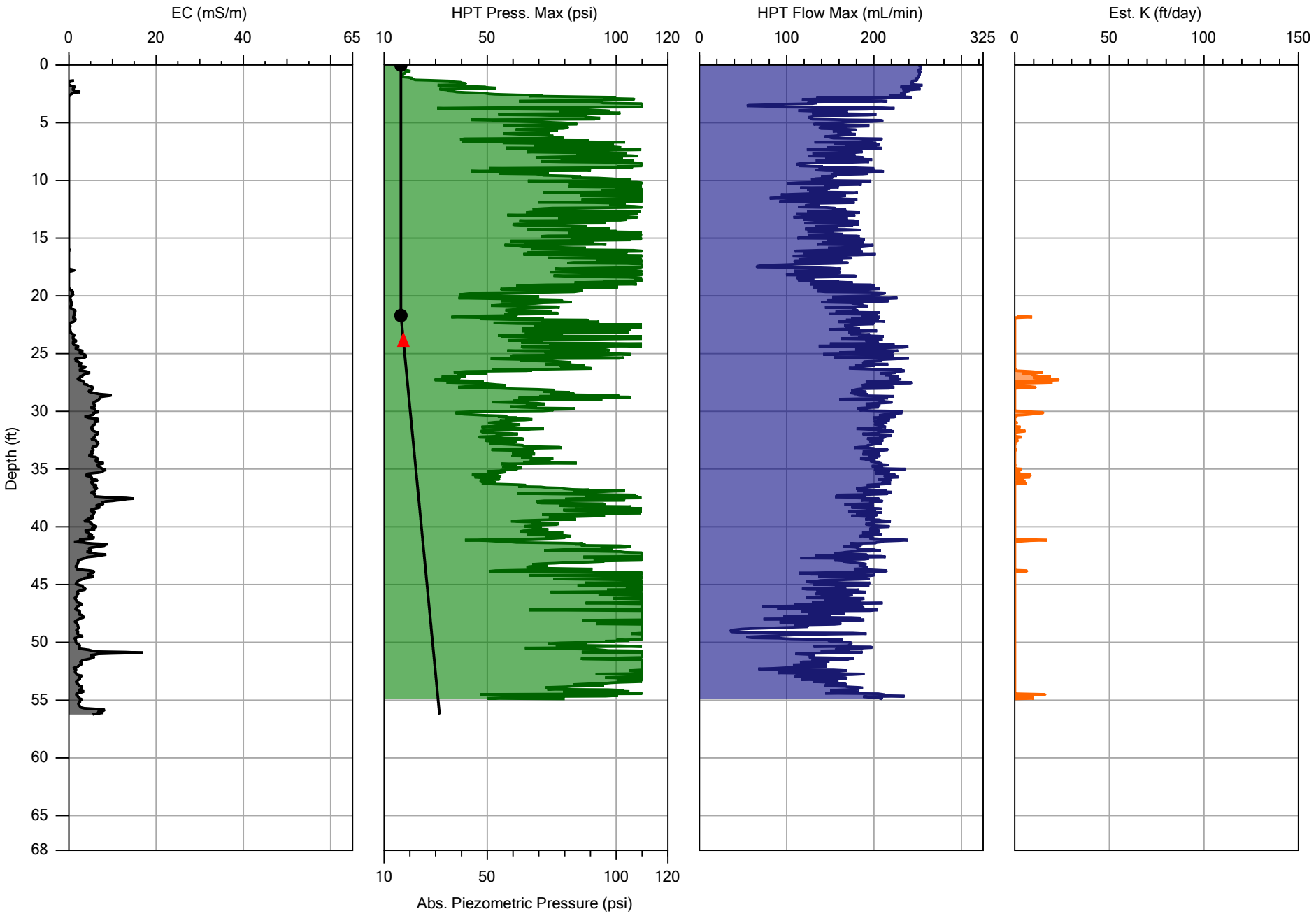
DAKOTA TECHNOLOGIES
www.DakotaTechnologies.com

		File: AREA A-T1-B3.HPT
Company: Dakota Technologies	Operator: Patterson	Date: 8/14/2021
Project ID: Landfill	Client: Resolute	Location: Athens, GA



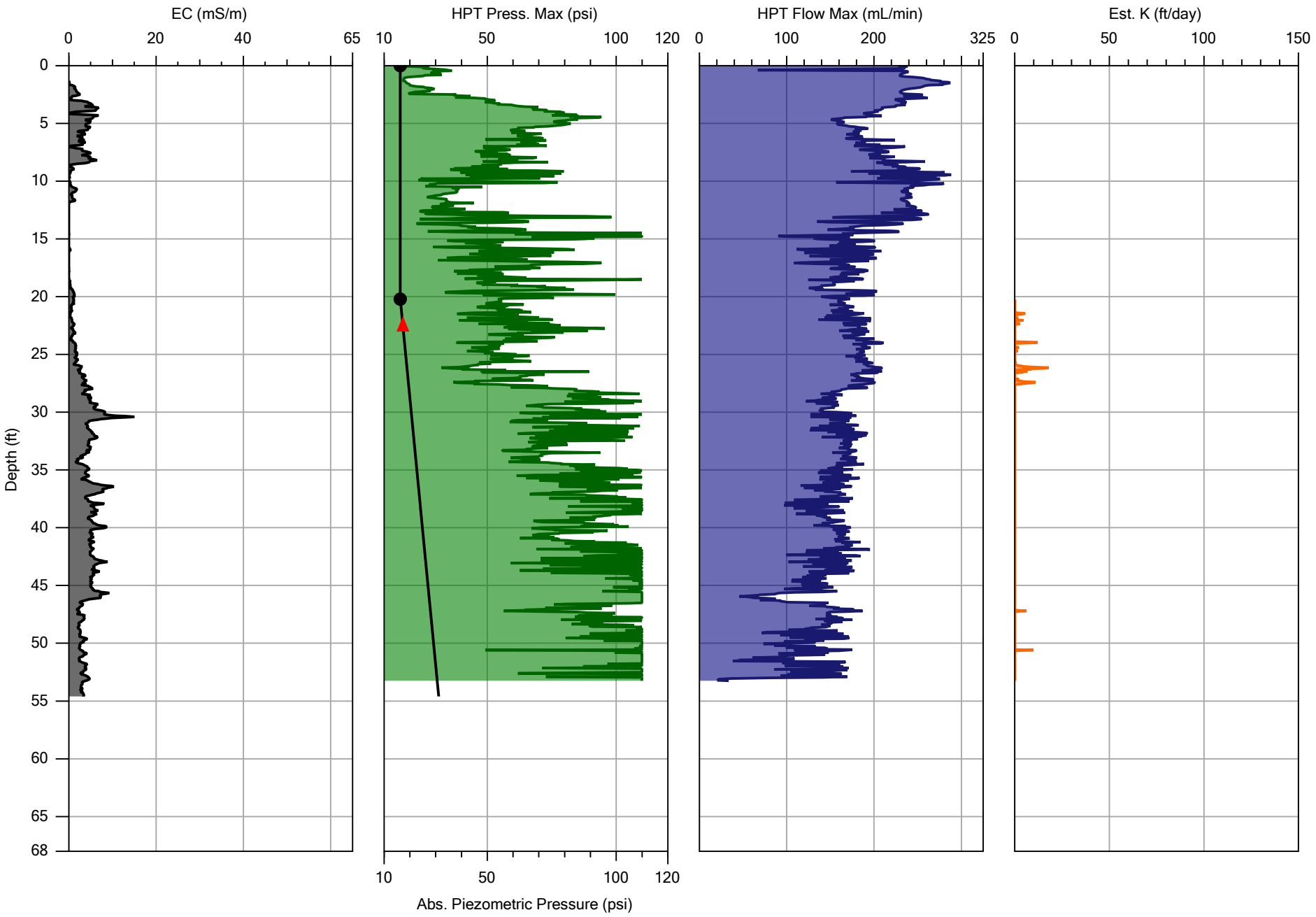
DAKOTA TECHNOLOGIES
www.DakotaTechnologies.com

		File: AREA A-T1-B4.HPT
Company: Dakota Technologies	Operator: Patterson	Date: 8/16/2021
Project ID: 260.21	Client: Resolute	Location: Athens, GA



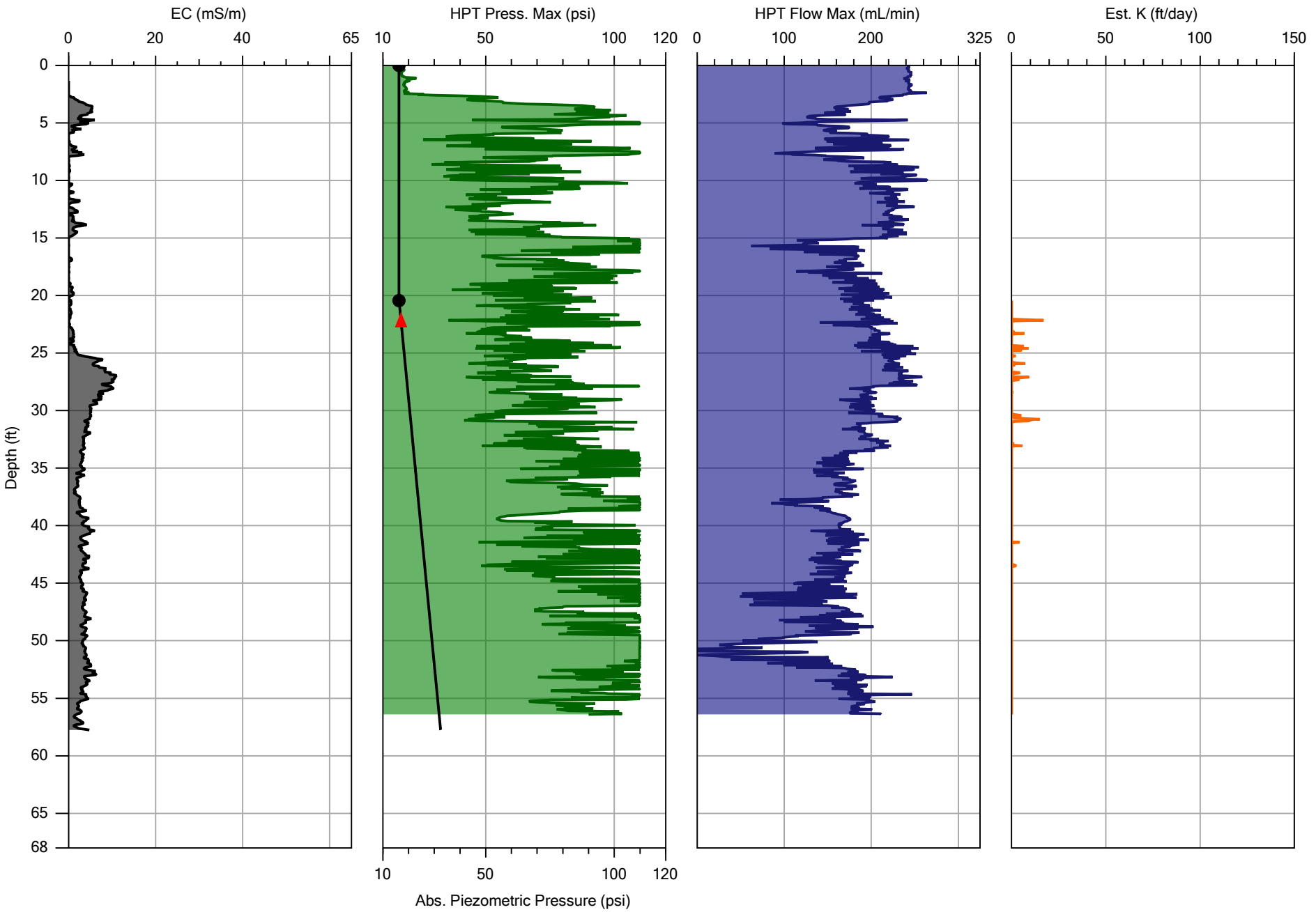
DAKOTA TECHNOLOGIES
www.DakotaTechnologies.com

		File: AREA A-T2-B2.HPT
Company: Dakota Technologies	Operator: Patterson	Date: 8/15/2021
Project ID: 260.21	Client: Resolute	Location: Athens, GA



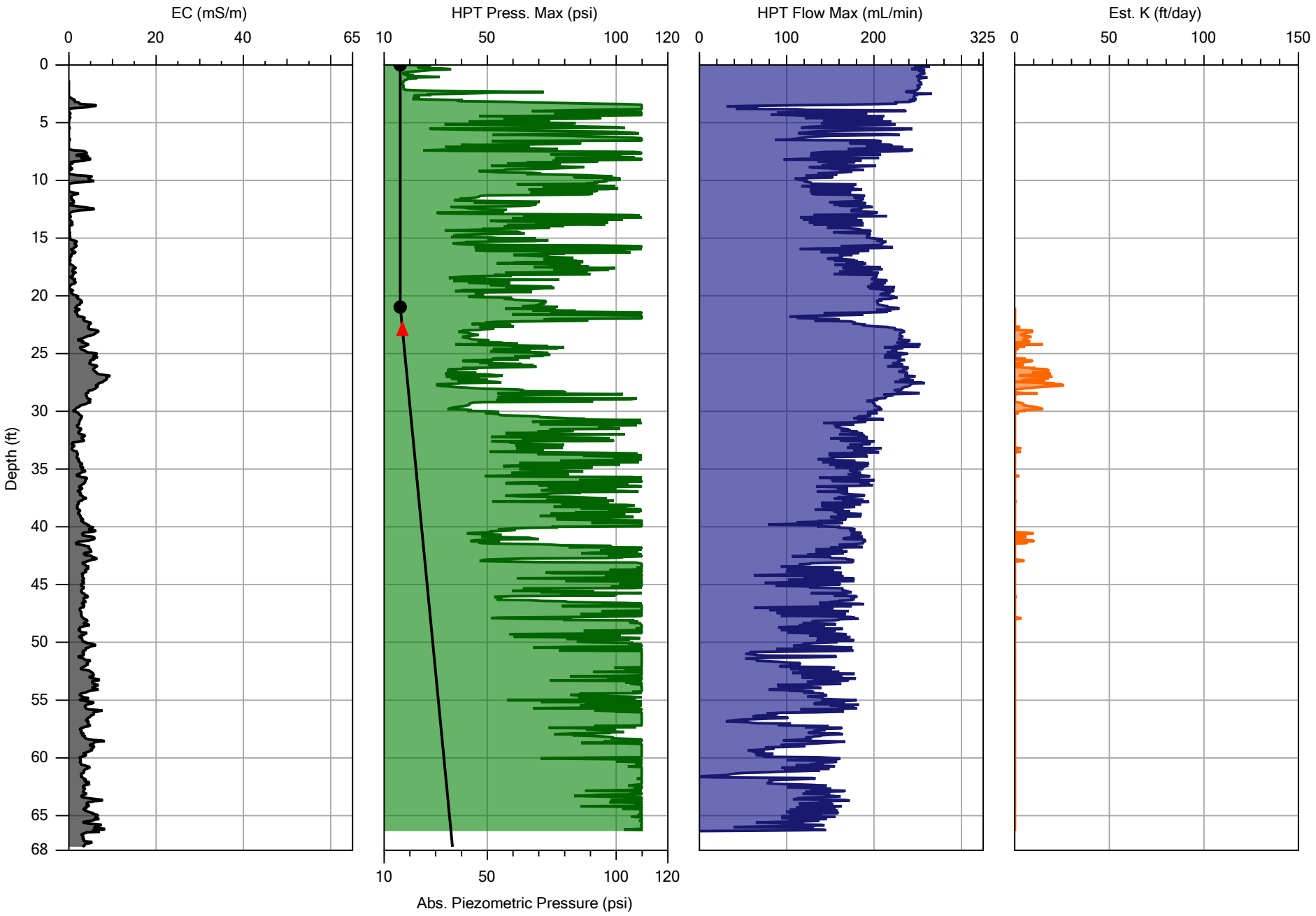
DAKOTA TECHNOLOGIES
www.DakotaTechnologies.com

		File: AREA A-T2-B3.HPT
Company: Dakota Technologies	Operator: Patterson	Date: 8/15/2021
Project ID: 260.21	Client: Resolute	Location: Athens, GA



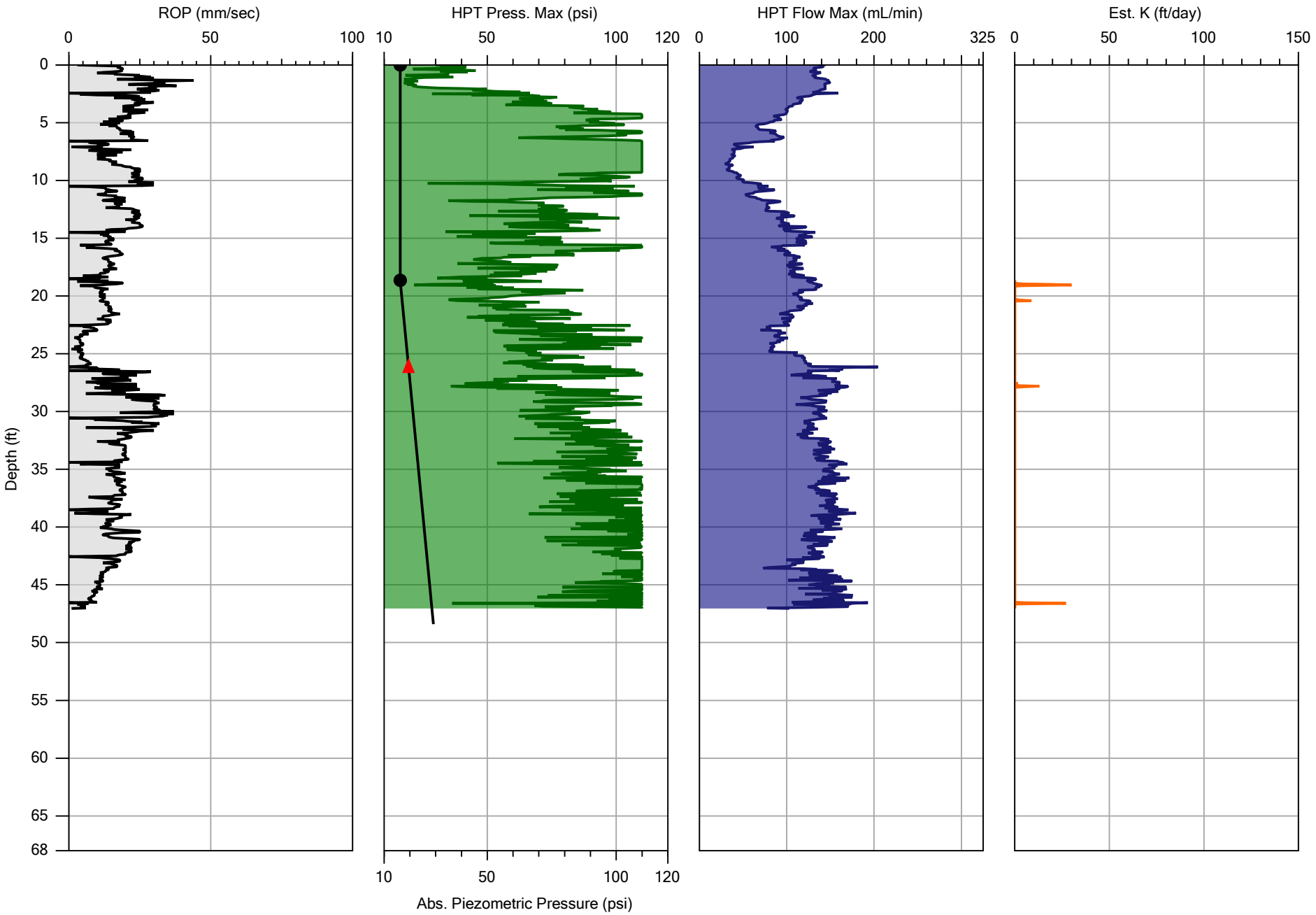
DAKOTA TECHNOLOGIES
www.DakotaTechnologies.com

		File: AREA A-T2-B4.HPT
Company: Dakota Technologies	Operator: Patterson	Date: 8/15/2021
Project ID: 260.21	Client: Resolute	Location: Athens, GA



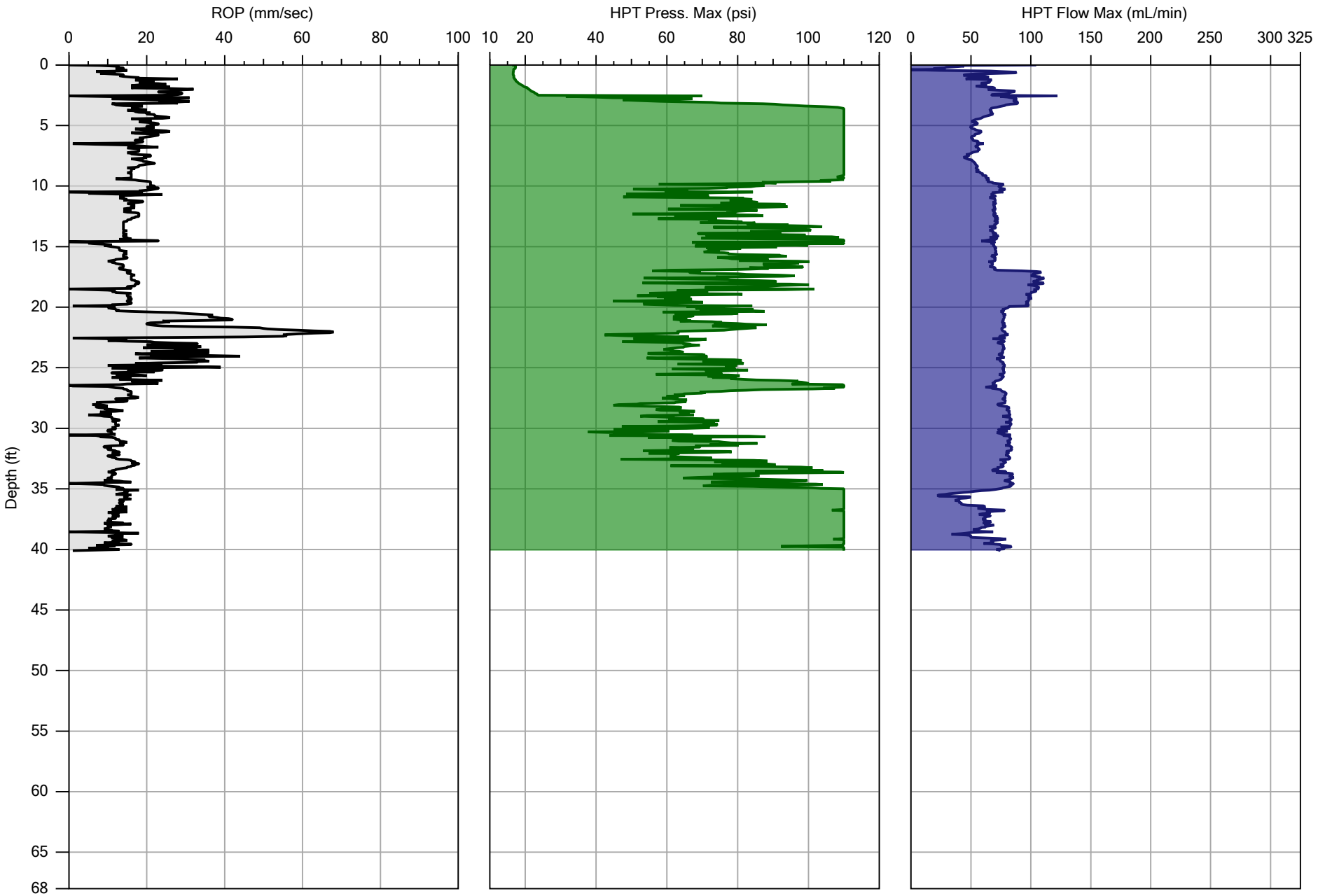
DAKOTA TECHNOLOGIES
www.DakotaTechnologies.com

		File: AREA A-T2-B5.HPT
Company: Dakota Technologies	Operator: Patterson	Date: 8/15/2021
Project ID: 260.21	Client: Resolute	Location: Athens, GA



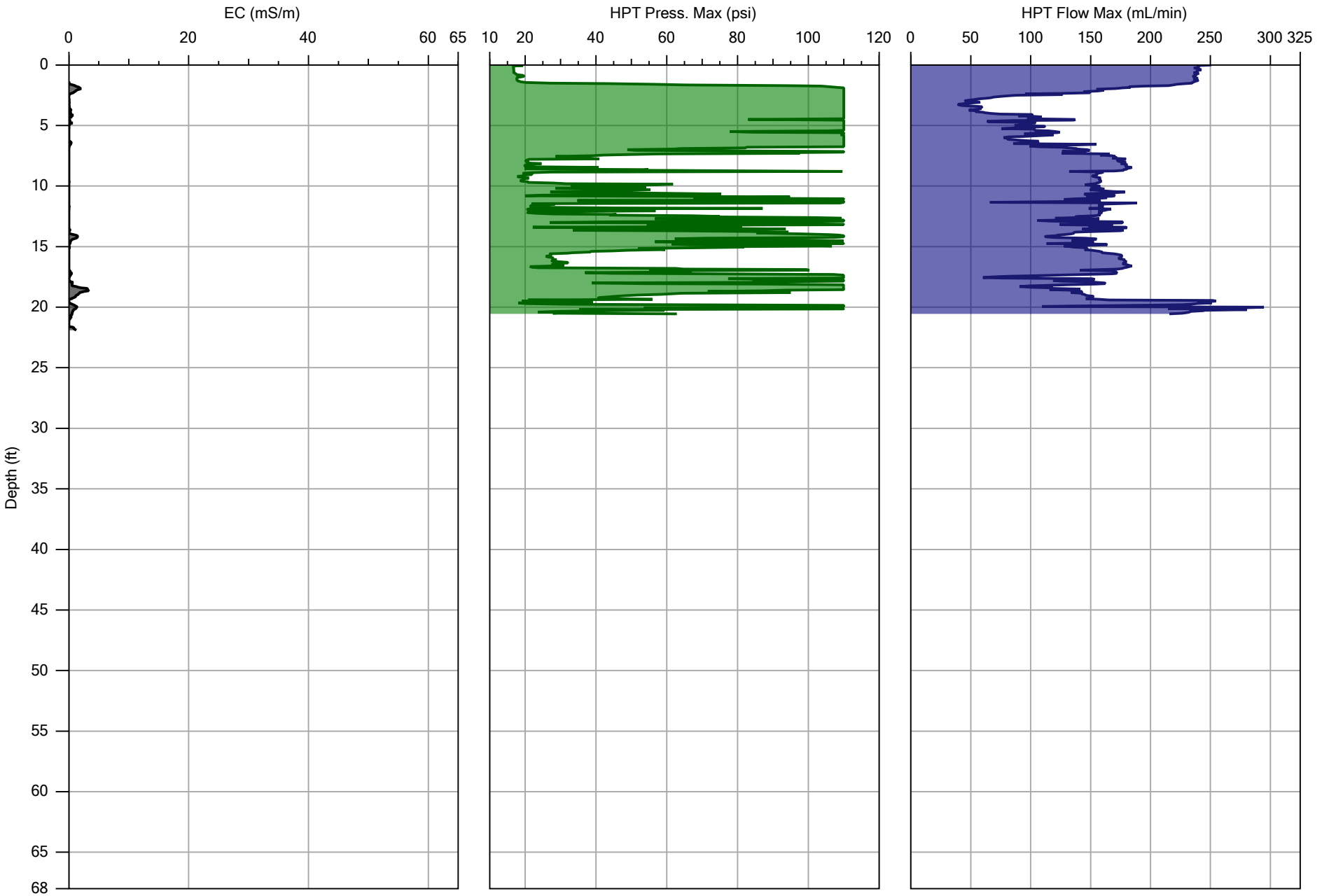
DAKOTA TECHNOLOGIES
www.DakotaTechnologies.com

		File: AREA B1-B1.HPT
Company: Dakota Technologies	Operator: Patterson	Date: 8/16/2021
Project ID: 260.21	Client: Resolute	Location: Athens, GA



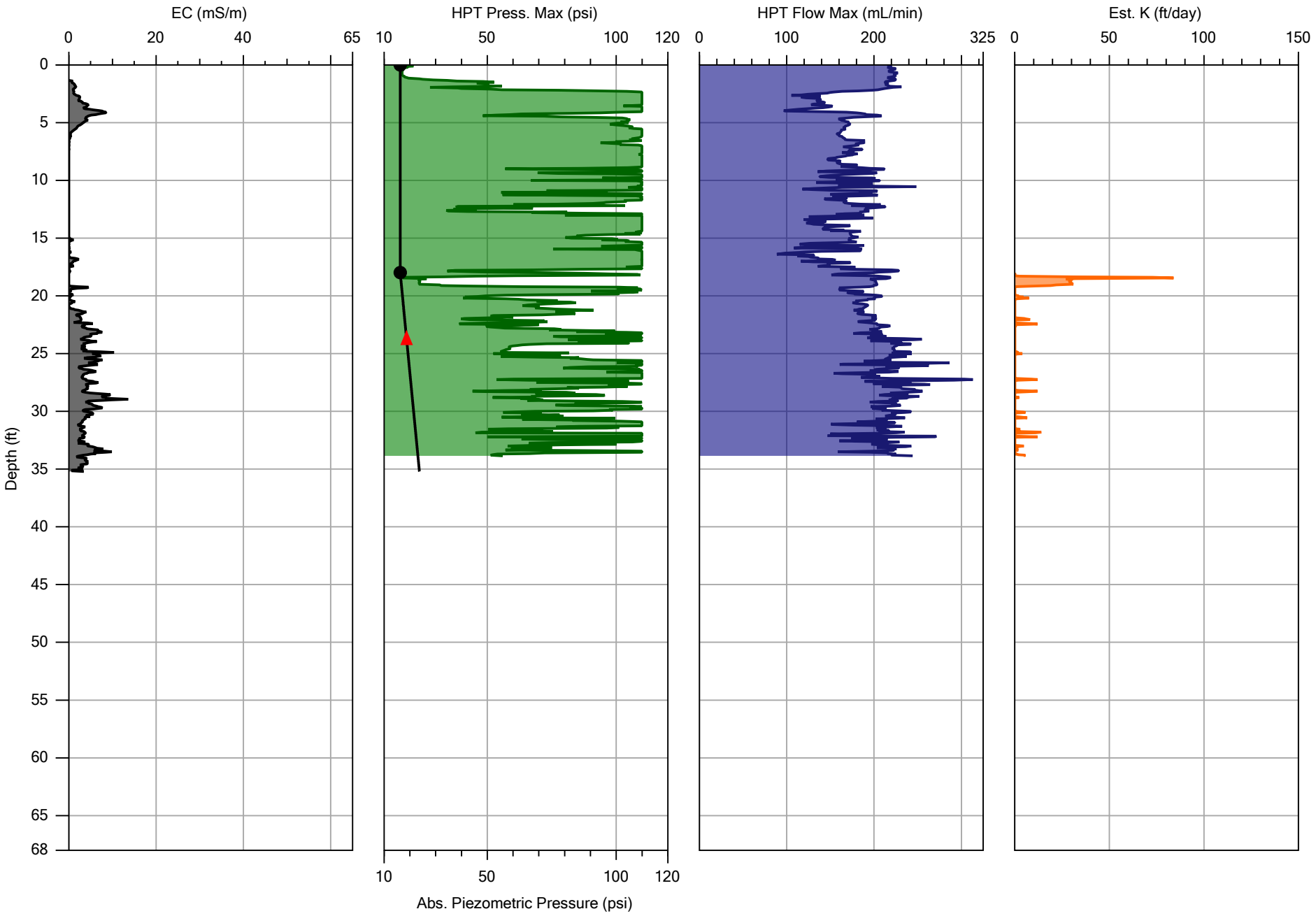
DAKOTA TECHNOLOGIES
www.DakotaTechnologies.com

		File: AREA B1-B2.HPT
Company: Dakota Technologies	Operator: Patterson	Date: 8/16/2021
Project ID: 260.21	Client: Resolute	Location: Athens, GA



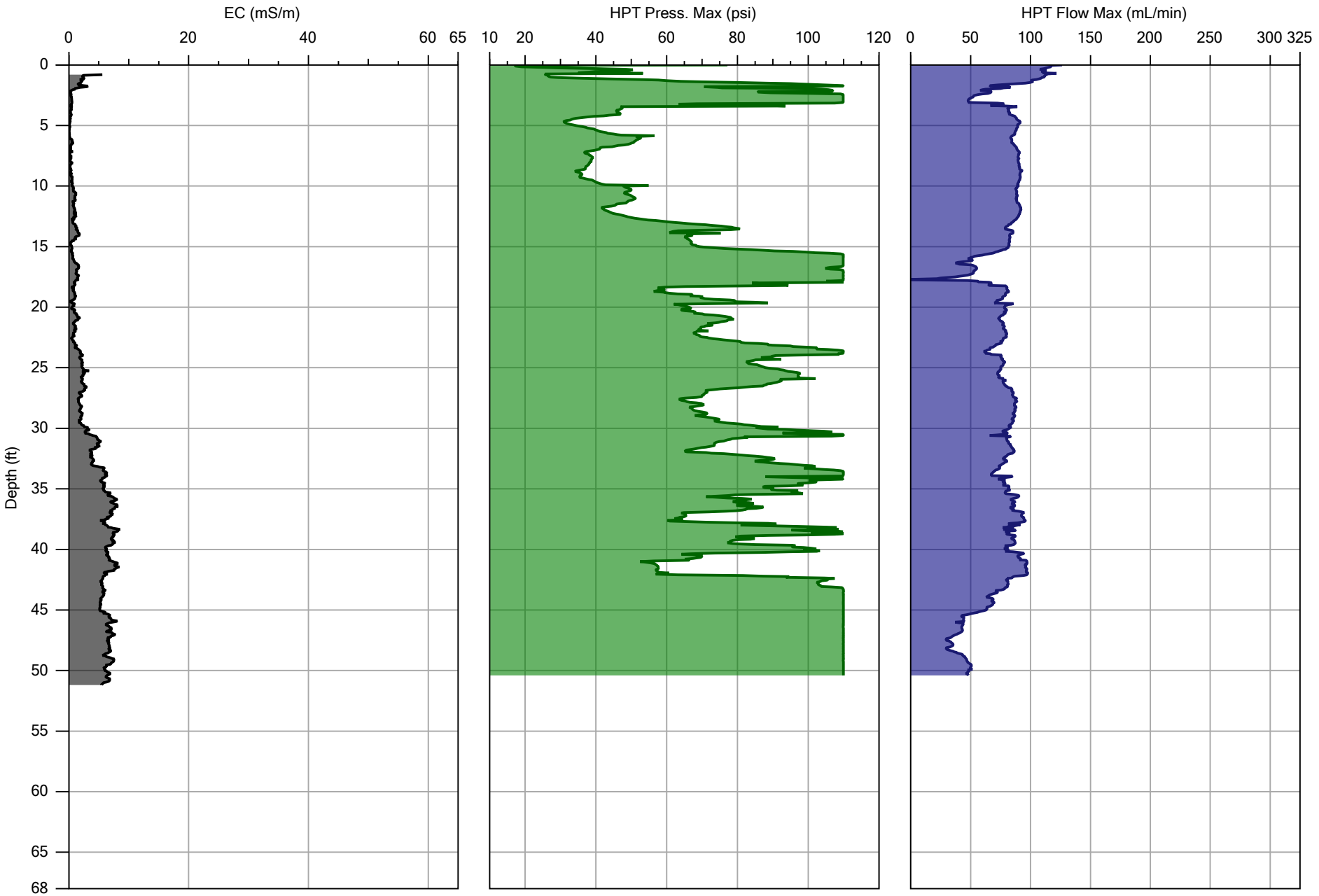
DAKOTA TECHNOLOGIES
www.DakotaTechnologies.com

		File: AREA B1-B3A.HPT
Company: Dakota Technologies	Operator: Patterson	Date: 8/16/2021
Project ID: 260.21	Client: Resolute	Location: Athens, GA



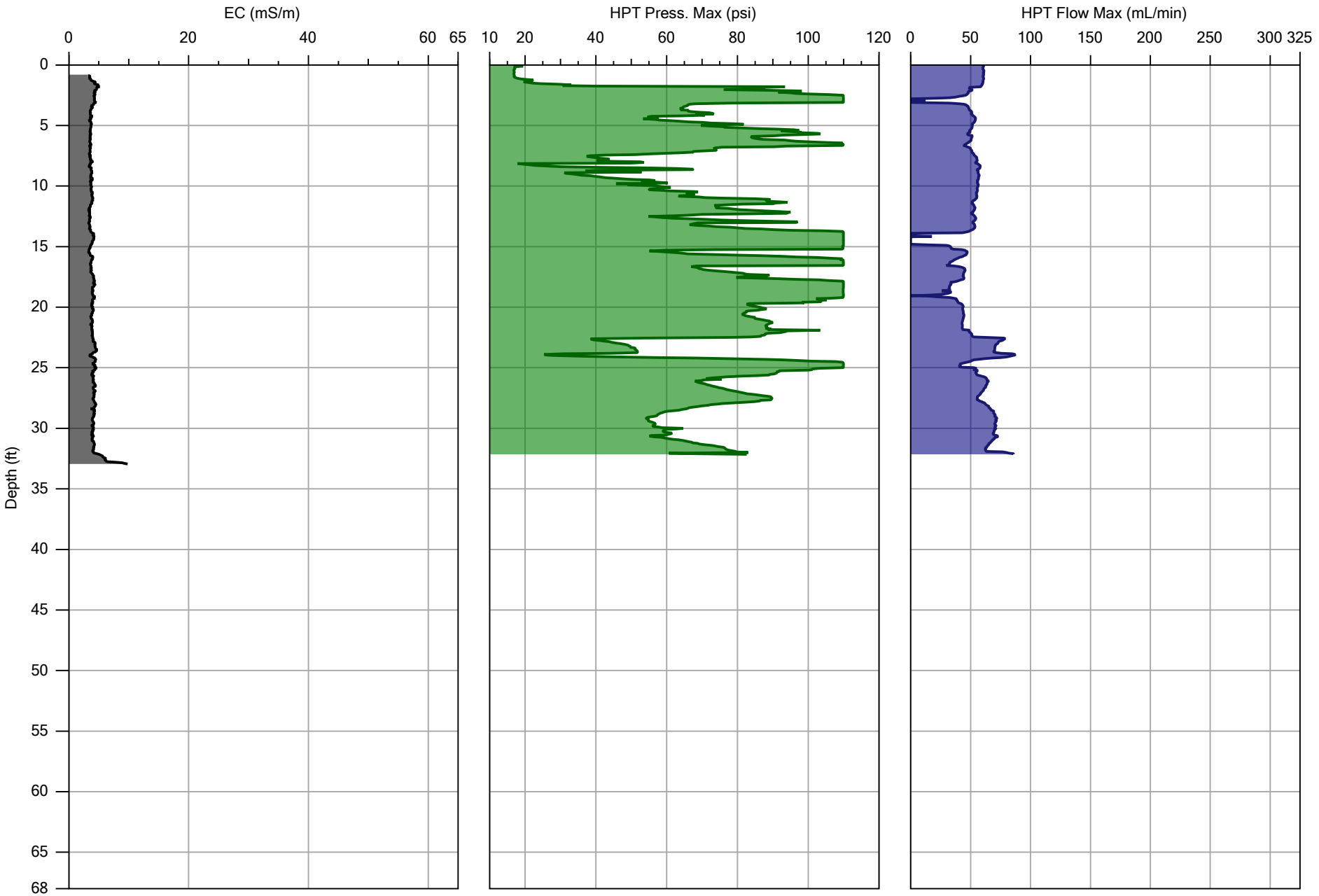
DAKOTA TECHNOLOGIES
www.DakotaTechnologies.com

		File: AREA B2-B1.HPT
Company: Dakota Technologies	Operator: Patterson	Date: 8/16/2021
Project ID: 260.21	Client: Resolute	Location: Athens, GA



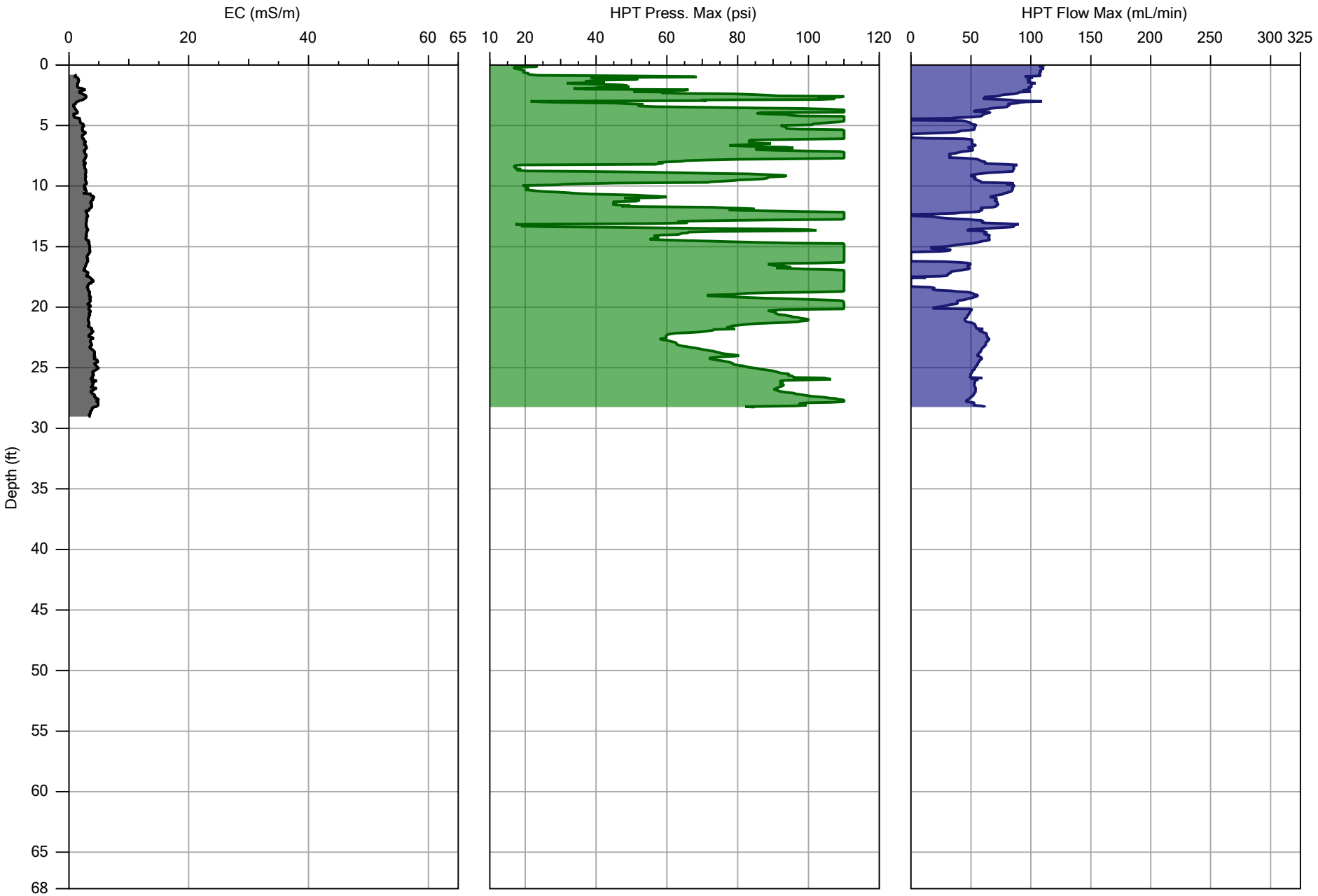
DAKOTA TECHNOLOGIES
www.DakotaTechnologies.com

		File: AREA B3-B-1.HPT
Company: Dakota Technologies	Operator: Patterson	Date: 8/10/2021
Project ID: Rosedale Site	Client: Ground Zero	Location: Middle River, MD



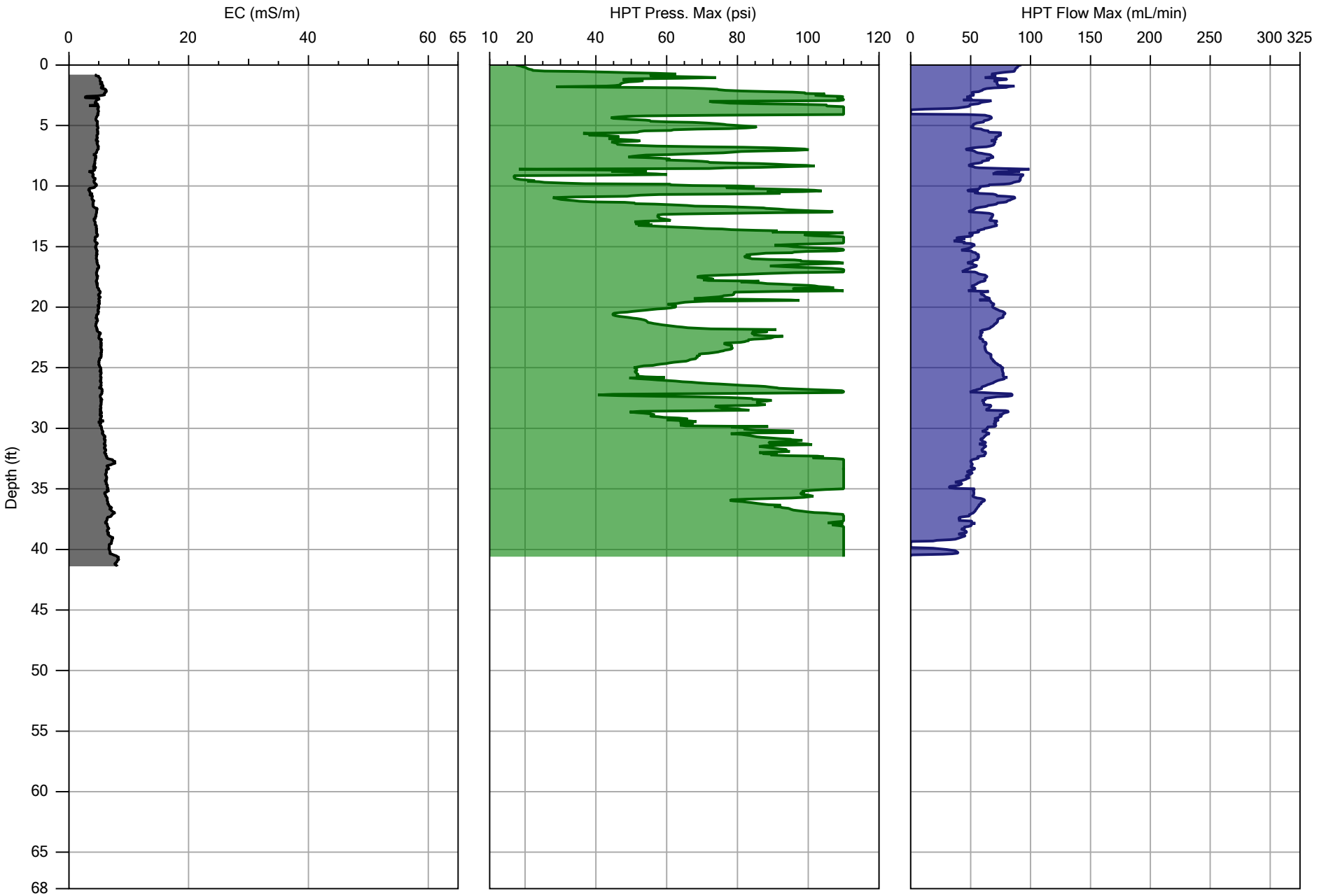
DAKOTA TECHNOLOGIES
www.DakotaTechnologies.com

		File: AREA B3-B-2.HPT
Company: Dakota Technologies	Operator: Patterson	Date: 8/10/2021
Project ID: Rosedale Site	Client: Ground Zero	Location: Middle River, MD



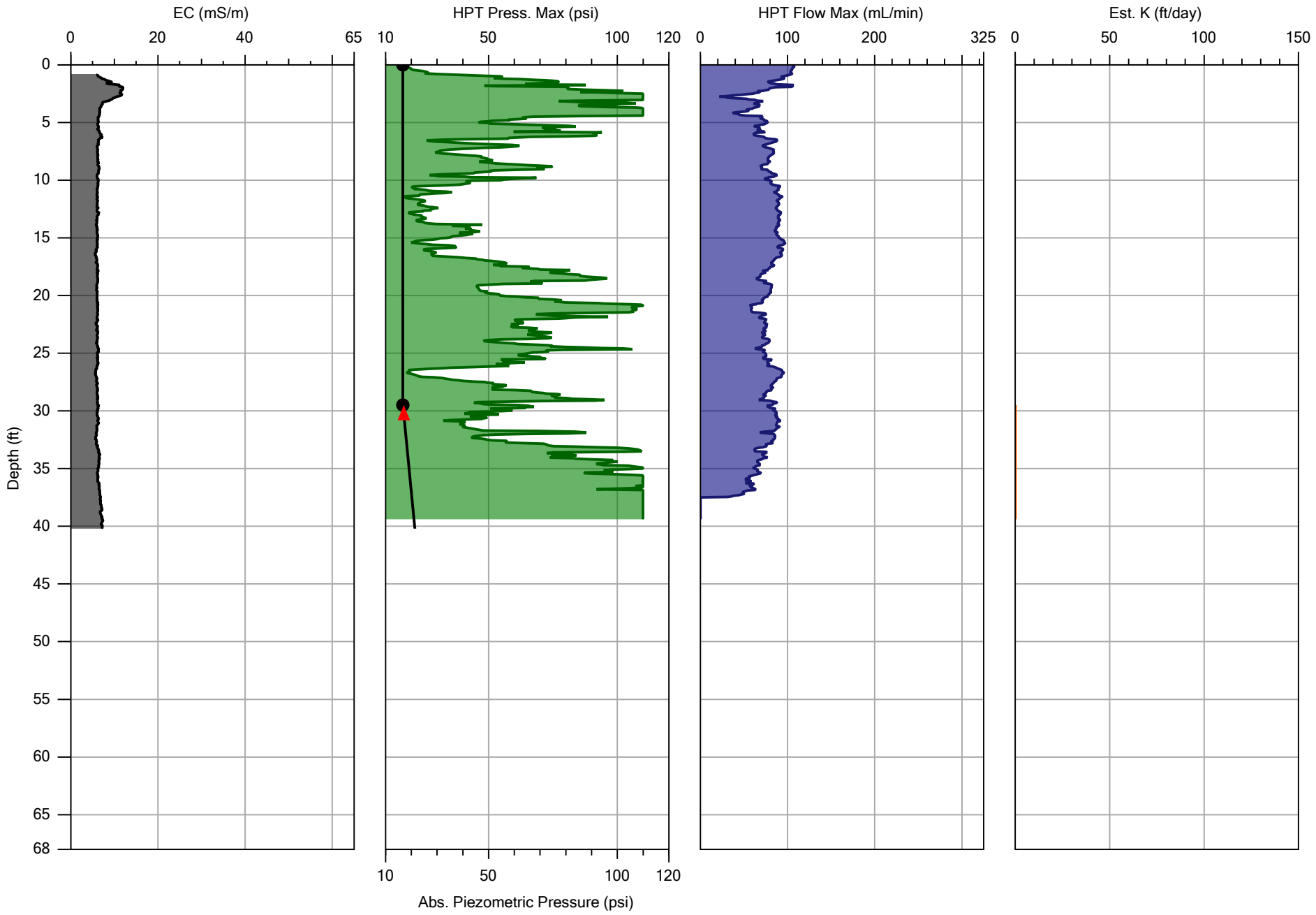
DAKOTA TECHNOLOGIES
www.DakotaTechnologies.com

		File: AREA B3-B-3.HPT
Company: Dakota Technologies	Operator: Patterson	Date: 8/11/2021
Project ID: Rosedale Site	Client: Ground Zero	Location: Middle River, MD



DAKOTA TECHNOLOGIES
www.DakotaTechnologies.com

		File: AREA B3-B-4.HPT
Company: Dakota Technologies	Operator: Patterson	Date: 8/11/2021
Project ID: Rosedale Site	Client: Ground Zero	Location: Middle River, MD



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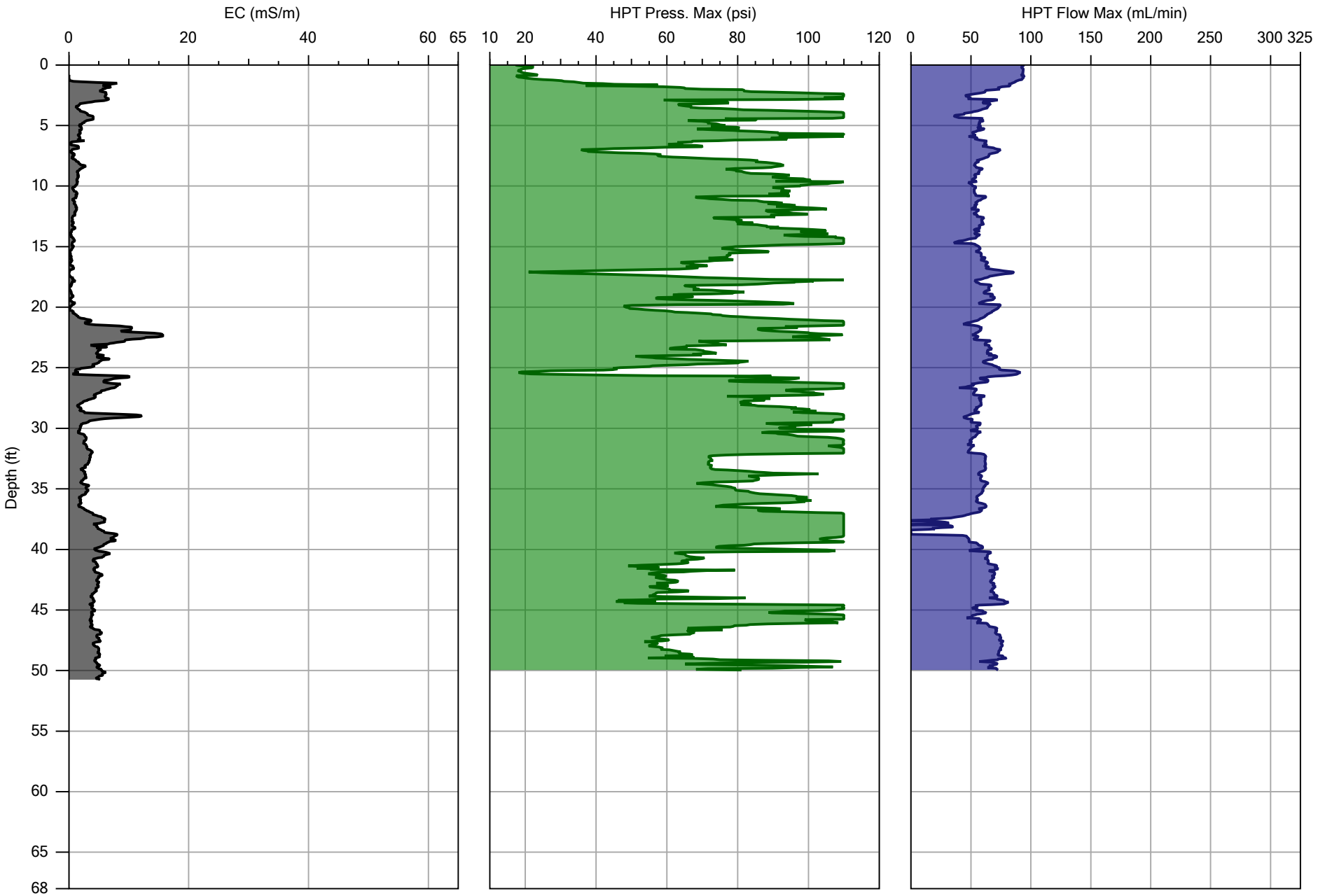
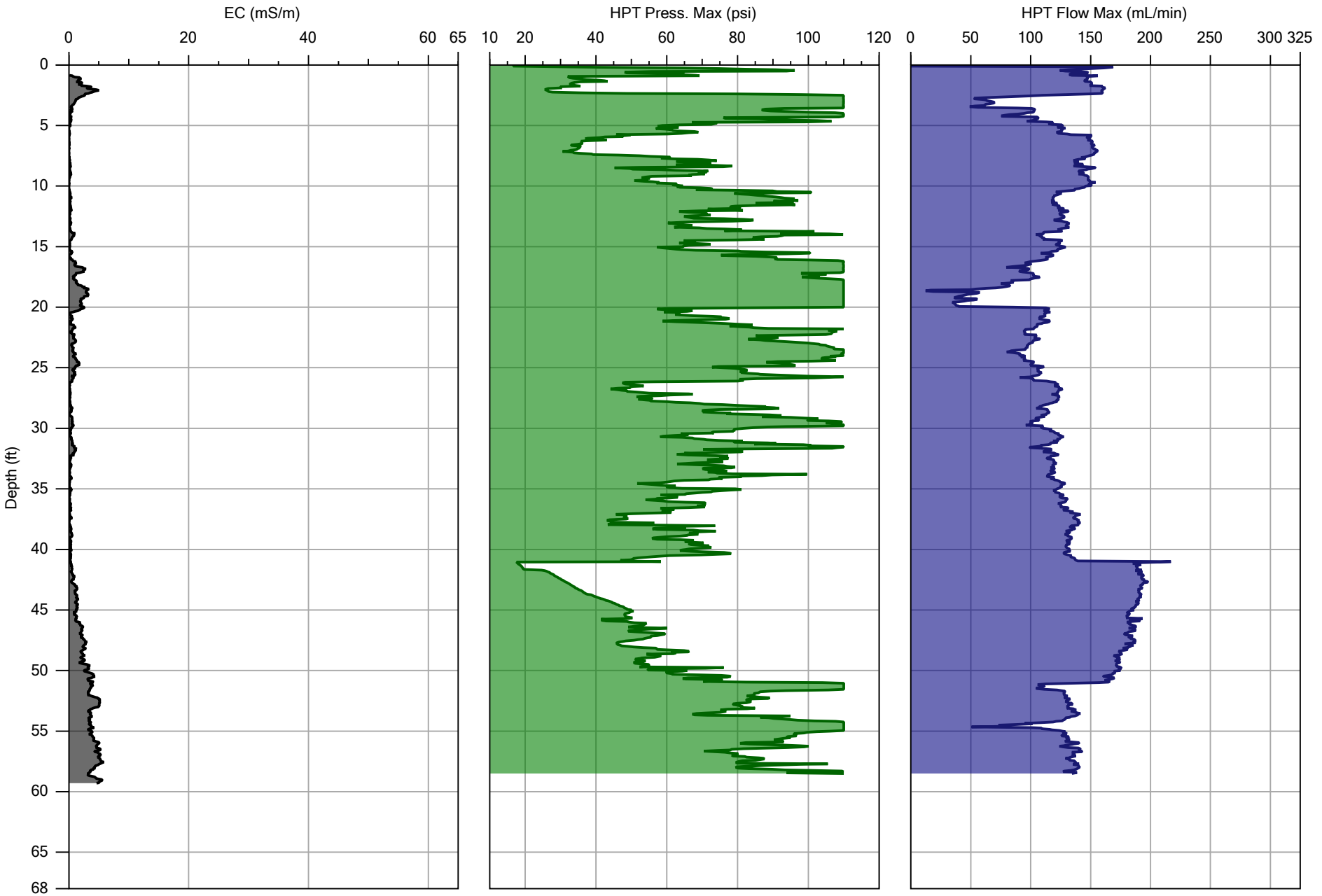
		File: AREA B3-B-5.HPT
Company: Dakota Technologies	Operator: Patterson	Date: 8/11/2021
Project ID: Rosedale Site	Client: Ground Zero	Location: Middle River, MD



DAKOTA TECHNOLOGIES
www.DakotaTechnologies.com

		File: AREA B3-B-6.HPT
Company: Dakota Technologies	Operator: Patterson	Date: 8/11/2021
Project ID: Rosedale Site	Client: Ground Zero	Location: Middle River, MD



DAKOTA TECHNOLOGIES
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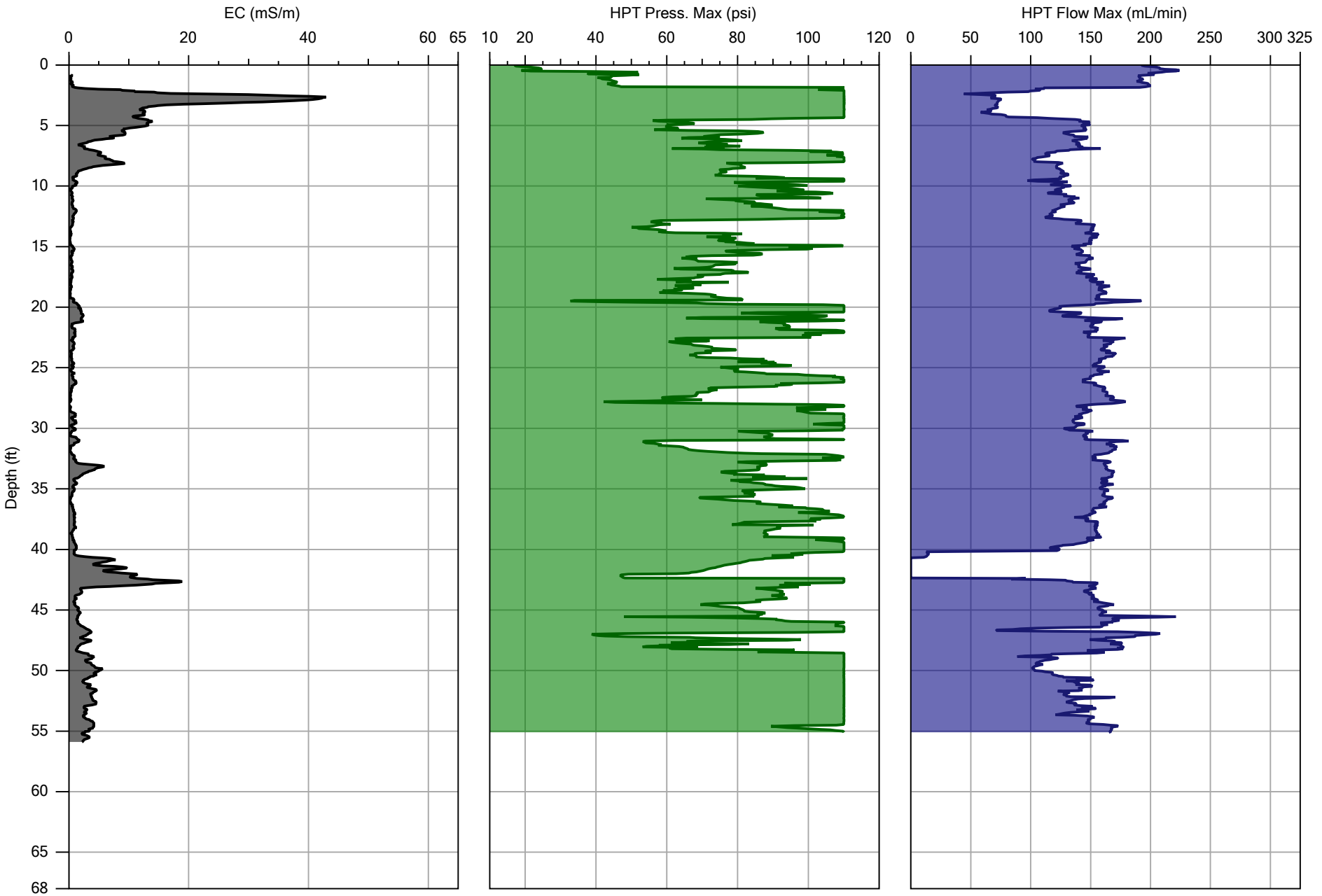
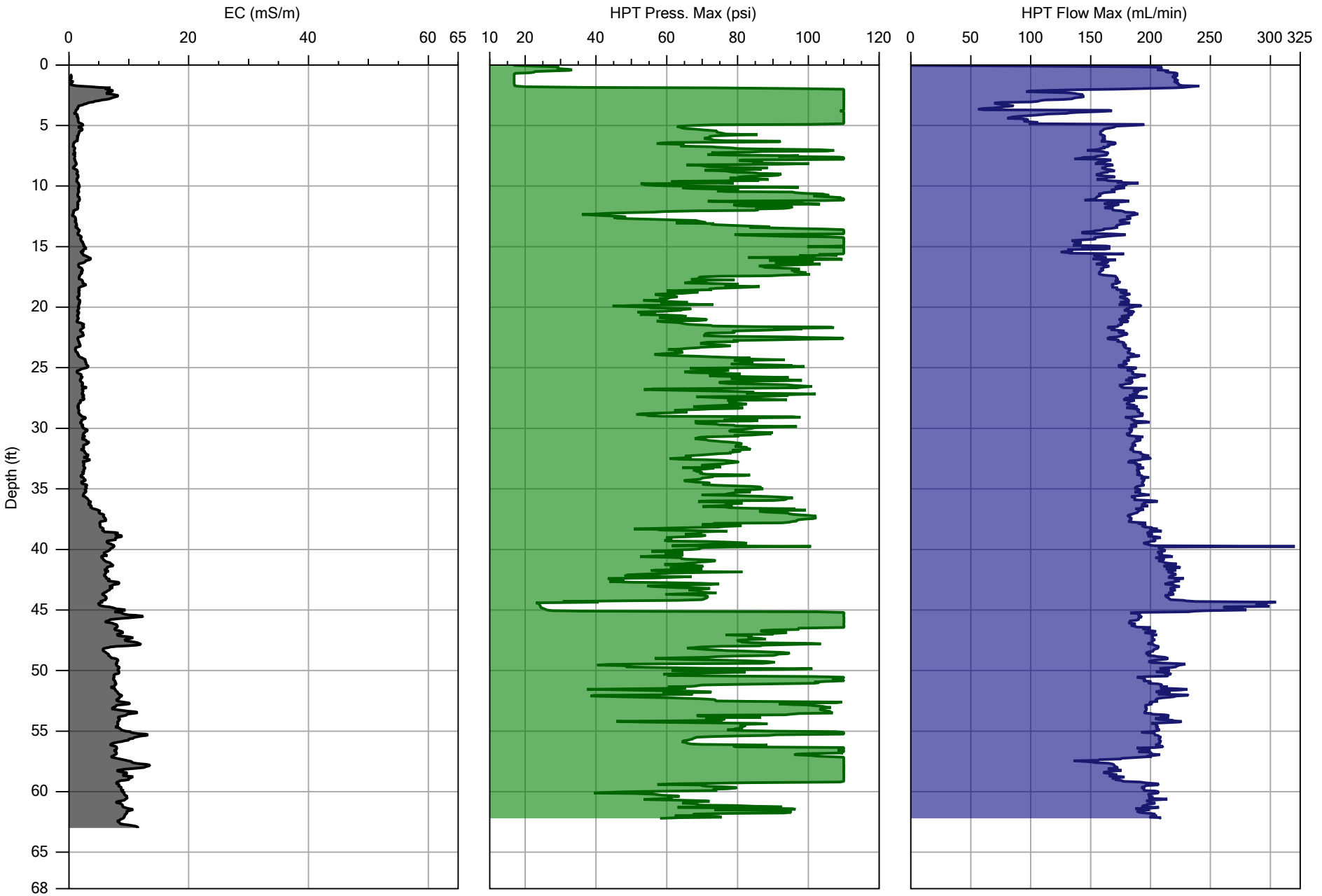
		File: AREA C-B-1.HPT
Company: Dakota Technologies	Operator: Patterson	Date: 8/11/2021
Project ID: Rosedale Site	Client: Ground Zero	Location: Middle River, MD



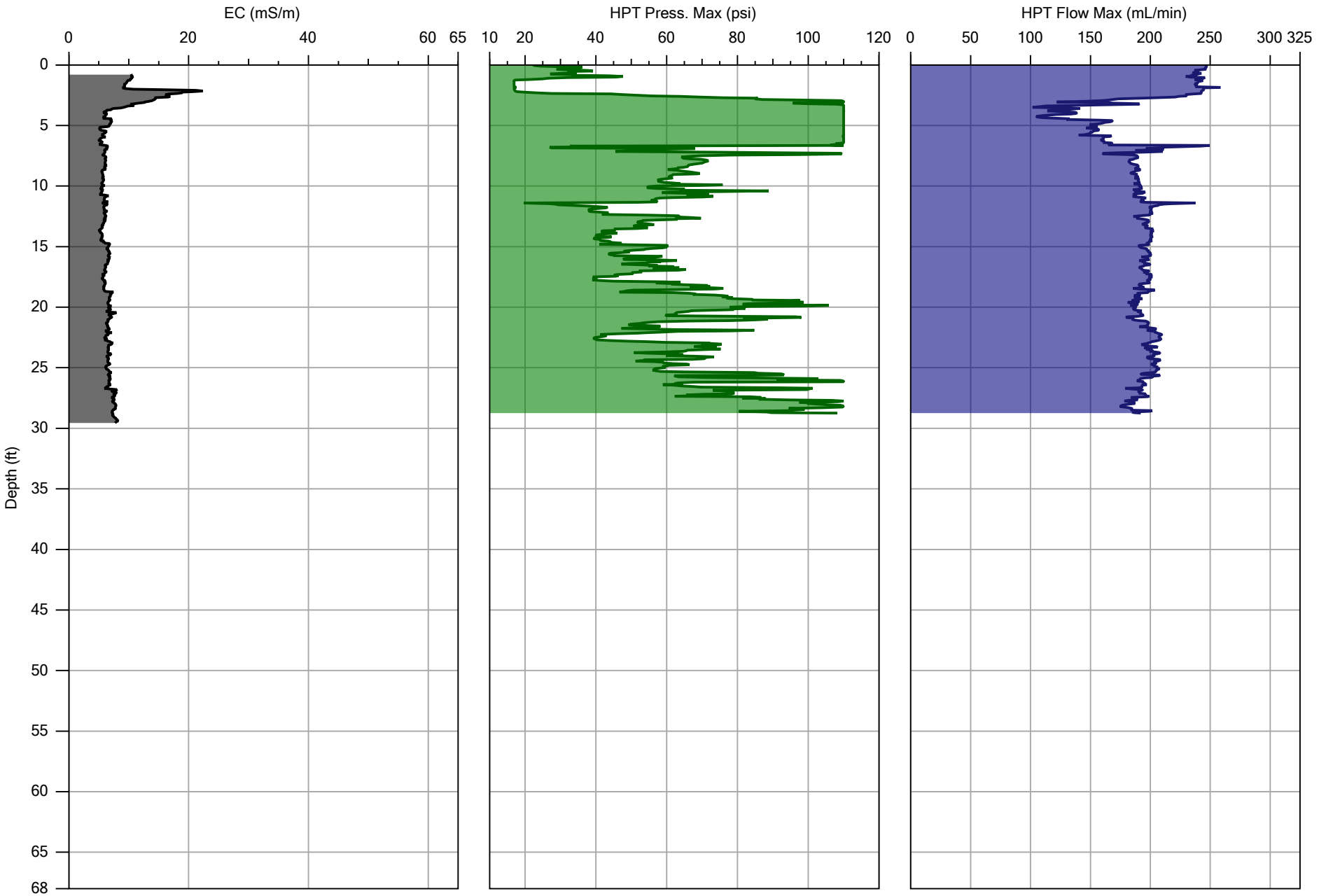
DAKOTA TECHNOLOGIES
www.DakotaTechnologies.com

		File: AREA C-B-2.HPT
Company: Dakota Technologies	Operator: Patterson	Date: 8/12/2021
Project ID: Landfill	Client: Resolute	Location: Athens, GA



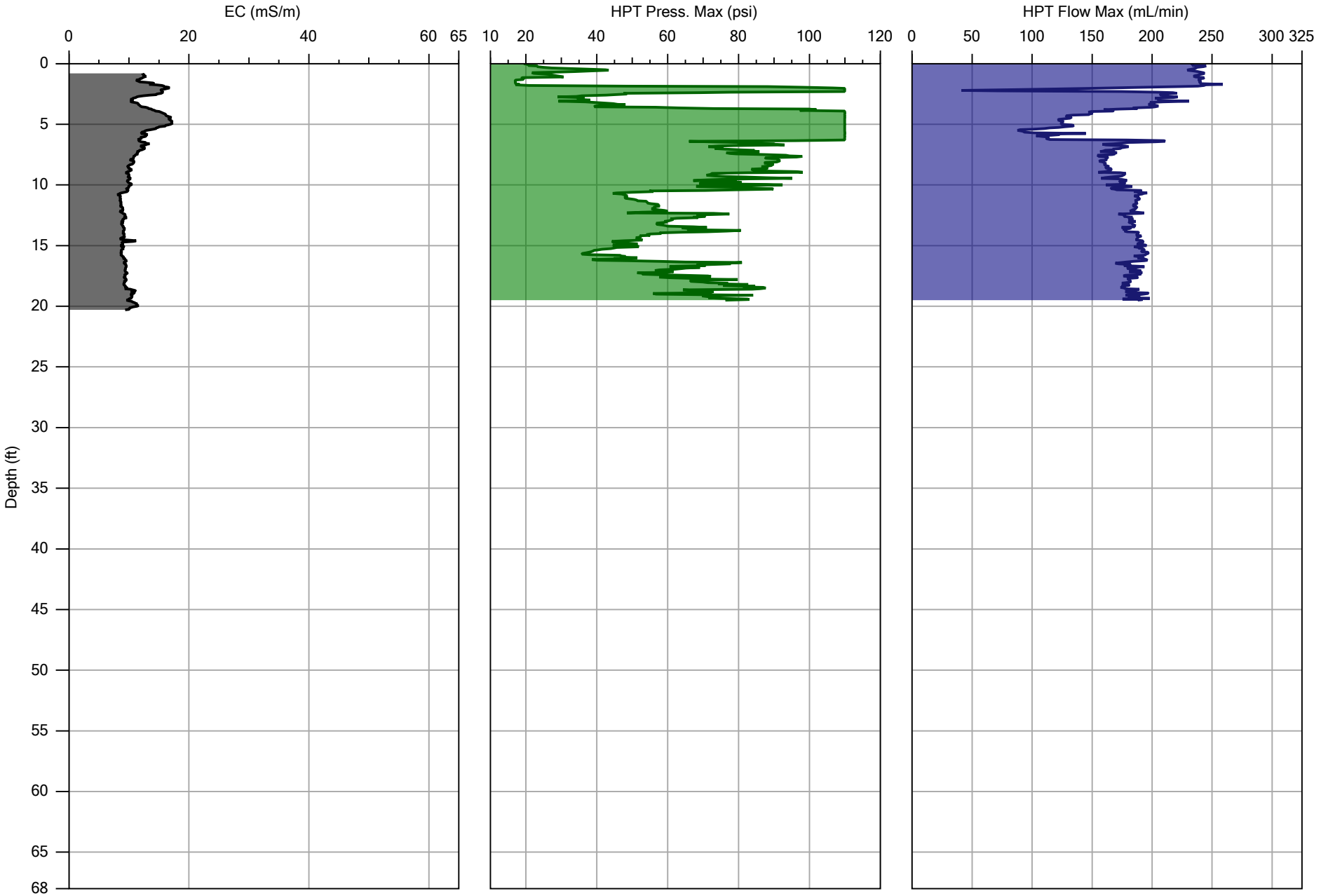
DAKOTA TECHNOLOGIES
www.DakotaTechnologies.com

		File: AREA C-B-3.HPT
Company: Dakota Technologies	Operator: Patterson	Date: 8/12/2021
Project ID: Landfill	Client: Resolute	Location: Athens, GA



DAKOTA TECHNOLOGIES
www.DakotaTechnologies.com

		File: AREA C-B-4.HPT
Company: Dakota Technologies	Operator: Patterson	Date: 8/12/2021
Project ID: Landfill	Client: Resolute	Location: Athens, GA



DAKOTA TECHNOLOGIES
www.DakotaTechnologies.com

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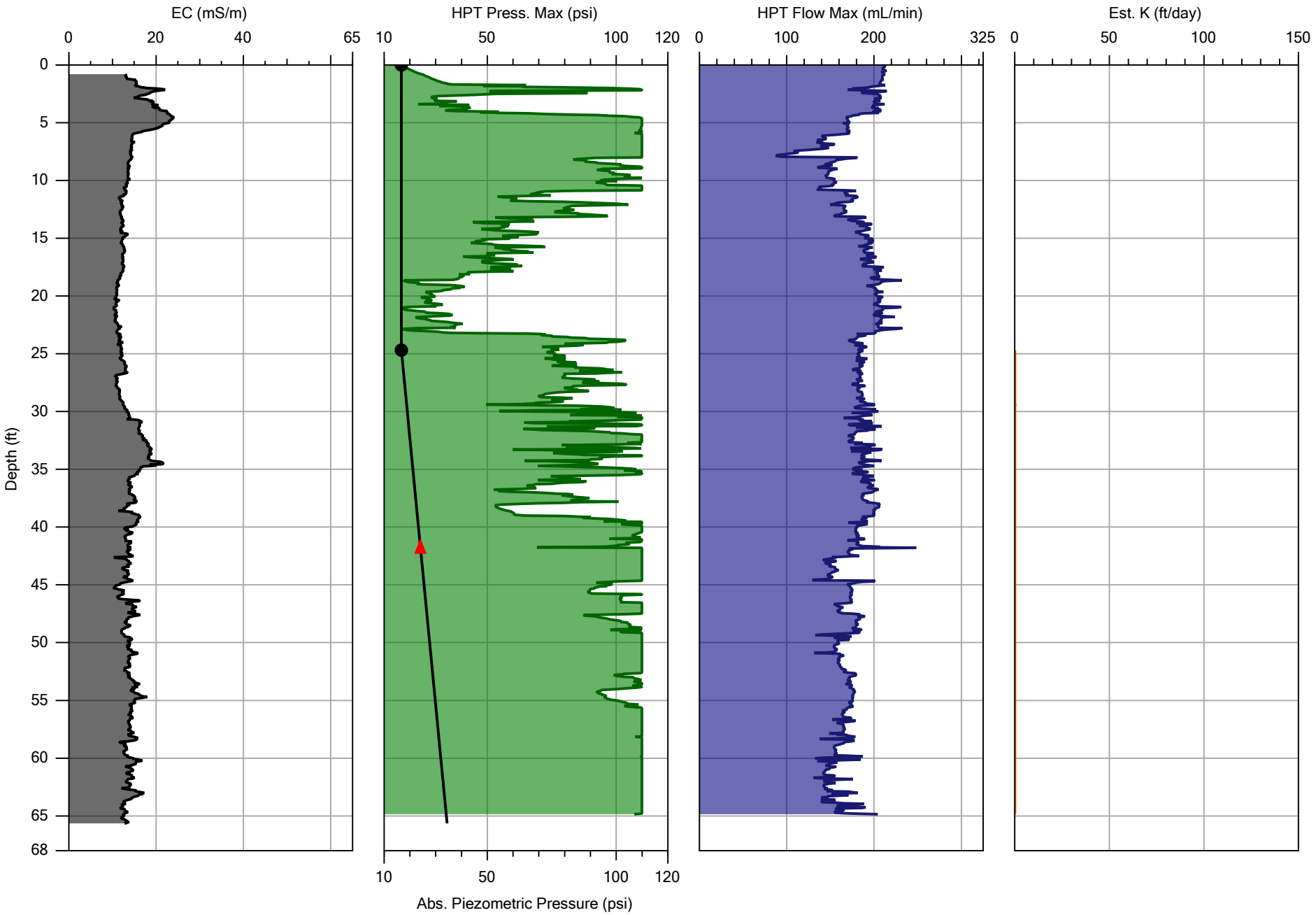
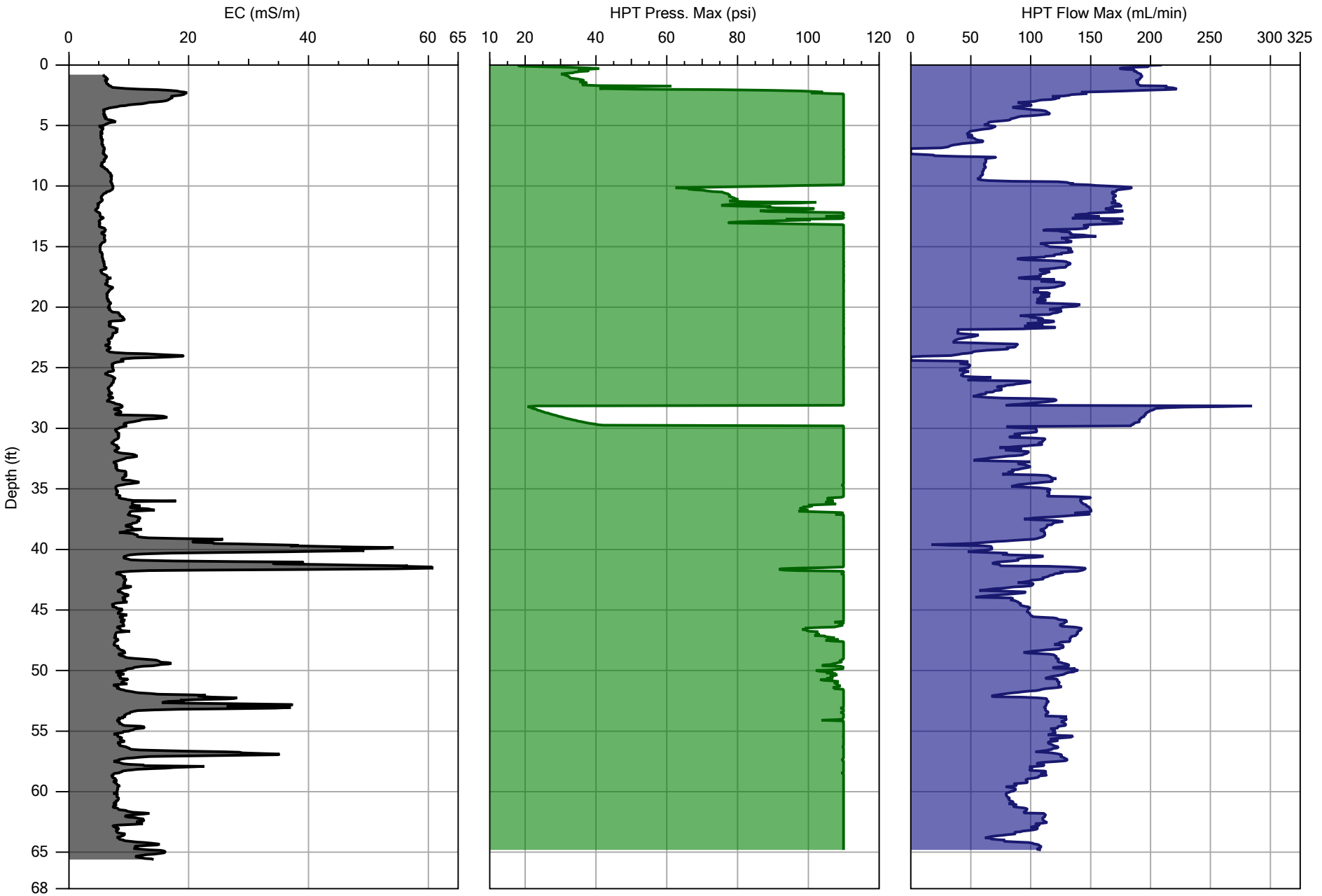
Company: Dakota Technologies	Operator: Patterson	Date: 8/12/2021
Project ID: Landfill	Client: Resolute	Location: Athens, GA



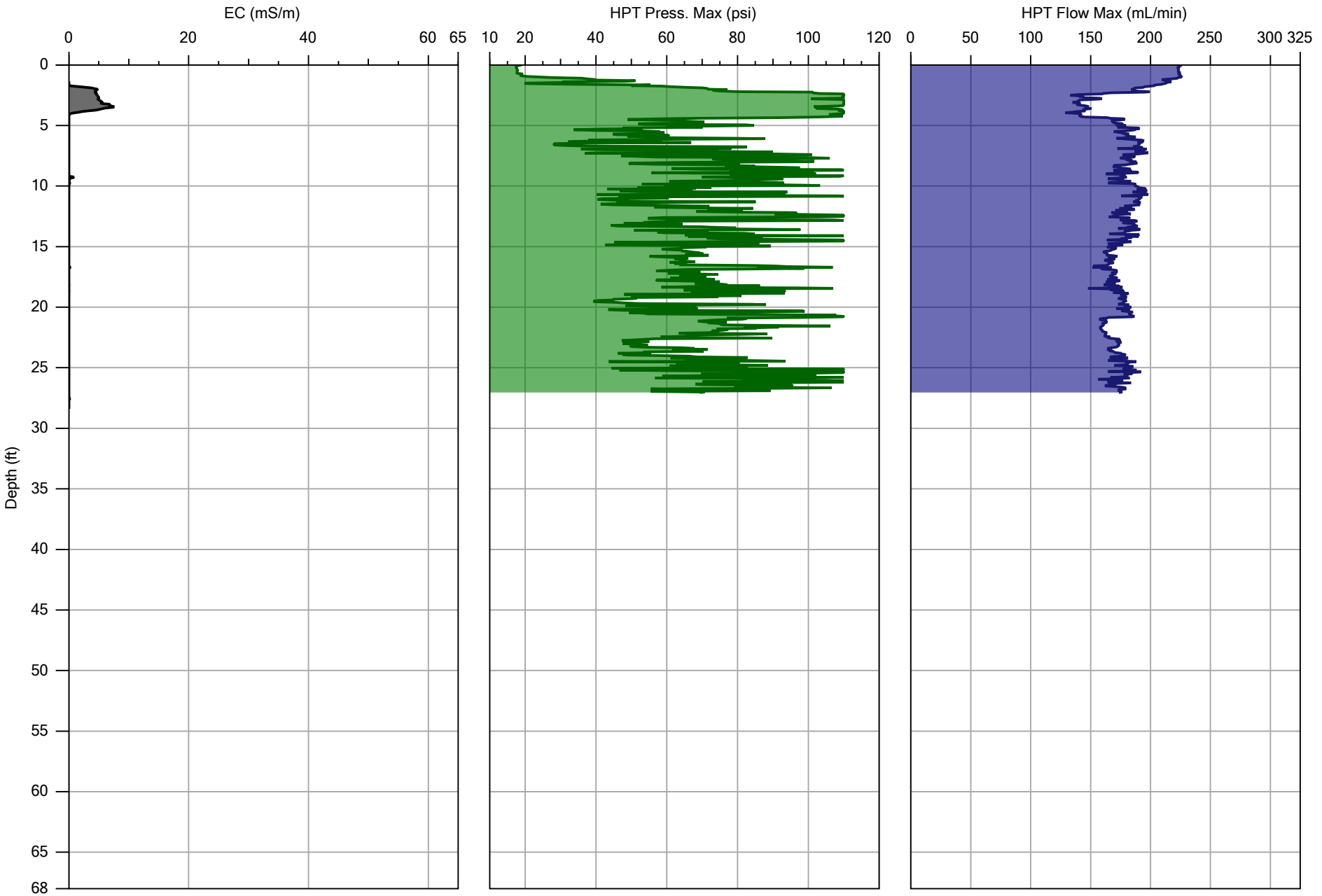
DAKOTA TECHNOLOGIES
www.DakotaTechnologies.com

		File: AREA C-B-6.HPT
Company: Dakota Technologies	Operator: Patterson	Date: 8/12/2021
Project ID: Landfill	Client: Resolute	Location: Athens, GA



DAKOTA TECHNOLOGIES
www.DakotaTechnologies.com

		File: AREA C-B-7.HPT
Company: Dakota Technologies	Operator: Patterson	Date: 8/12/2021
Project ID: Landfill	Client: Resolute	Location: Athens, GA



DAKOTA TECHNOLOGIES
www.DakotaTechnologies.com

		File: AREA C-B-8.HPT
Company: Dakota Technologies	Operator: Patterson	Date: 8/13/2021
Project ID: Landfill	Client: Resolute	Location: Athens, GA

Appendix C

HPT Reference Log

DAKOTA TECHNOLOGIES

Dakota Technologies HPT Reference Log

Conductivity Plot:

The Electrical Conductivity **(EC)** of the soil is logged simultaneously with the HPT data utilizing an integrated Wenner array. EC often provides insight into the stratigraphy and correlates with the HPT pressure plot in many instances. Typically an increase in EC (and increase in pressure) is indicative of finer, tighter soil types.

HPT Pressure Plot:

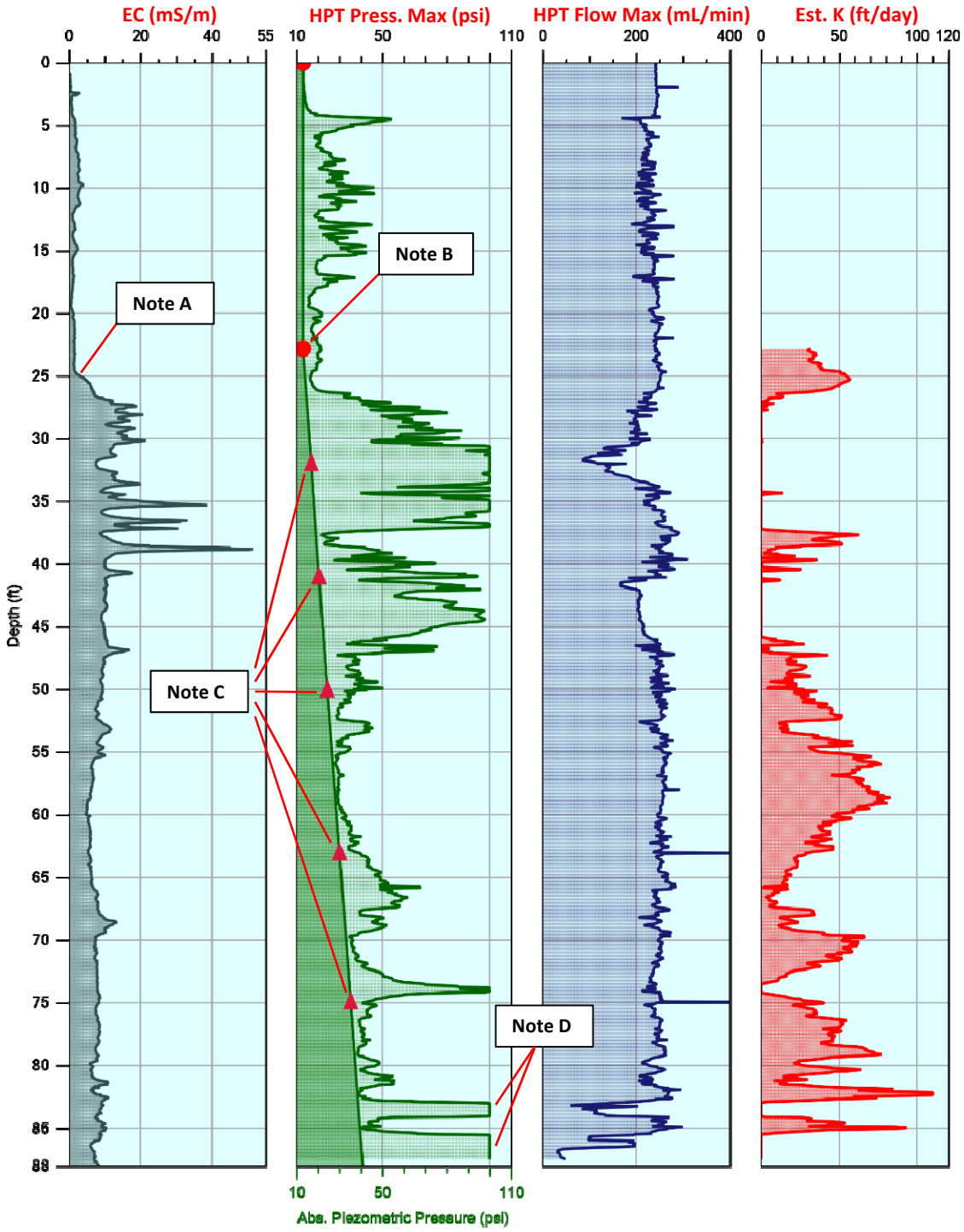
The HPT pressure gives insight into hydraulic properties of the soil as water is pumped into the formation at a constant rate. The pressure (unlike EC) is independent of certain factors such as pore water chemistry or mineralogy (contaminants, brines) and so further aids in defining soil/hydraulic properties of the area of investigation.

HPT Flow Plot:

Water is pumped out of the HPT probe and into the formation at a constant rate of typically 250 ml/min. A change in flow (usually accompanied by an inverse pressure change) is an indicator of the hydraulic properties of the soil

Estimated K Plot:

The estimated hydraulic conductivity (K) is internally calculated by utilizing pressure and flow data in conjunction with dissipation tests performed at each location. This data is useful for directing sampling, remediation and slug testing protocols.



Note A:

Increasing EC readings starting at 25 feet indicate a transition to finer grain silt with clay stringers at 35 to 39 feet.

Note B:

The hydrostatic water level has been indicated with a round marker at 22.5 feet.

Note C:

The Absolute Piezometric pressure has been calculated and graphed with the individual dissipation test points indicated by triangular markers. The pressure increases relative to the head pressure as soon as the water table is encountered. Since these points form a straight line (no inflections) it can be inferred that the water table is hydraulically connected from the first to the last dissipation test.

Note D:

The significant pressure increase (transducer maxed out, 100 psi) and drop in flow at 83 to 88 feet is due to tight formation conditions discovered by HPT parameters (and not observed by EC measurements).

D. GEOTECHNICAL TESTING LABORATORY REPORT

Laboratory Report for

Resolute Environmental

Milledge Avenue

September 9, 2021

Daniel B. Stephens & Associates, Inc.

4400 Alameda Blvd. NE, Suite C • Albuquerque, New Mexico 87113

September 9, 2021

Tommy Jordan
Resolute Environmental
1003 Weathershine Pkwy, Suite 320
Woodstock, GA 30188
(470) 895-0649

Re: DBS&A Laboratory Report for the Resolute Environmental Milledge Avenue Project

Dear Mr. Jordan:

Enclosed is the report for the Resolute Environmental Milledge Avenue project samples. Please review this report and provide any comments as samples will be held for a maximum of 30 days. After 30 days samples will be returned or disposed of in an appropriate manner.

All testing results were evaluated subjectively for consistency and reasonableness, and the results appear to be reasonably representative of the material tested. However, DBS&A does not assume any responsibility for interpretations or analyses based on the data enclosed, nor can we guarantee that these data are fully representative of the undisturbed materials at the field site. We recommend that careful evaluation of these laboratory results be made for your particular application.

The testing utilized to generate the enclosed report employs methods that are standard for the industry. The results do not constitute a professional opinion by DBS&A, nor can the results affect any professional or expert opinions rendered with respect thereto by DBS&A. You have acknowledged that all the testing undertaken by us, and the report provided, constitutes mere test results using standardized methods, and cannot be used to disqualify DBS&A from rendering any professional or expert opinion, having waived any claim of conflict of interest by DBS&A.

We are pleased to provide this service to Resolute Environmental and look forward to future laboratory testing on other projects. If you have any questions about the enclosed data, please do not hesitate to call.

Sincerely,

DANIEL B. STEPHENS & ASSOCIATES, INC.
SOIL TESTING & RESEARCH LABORATORY

Joleen Hines
Laboratory Manager

Enclosure

Daniel B. Stephens & Associates, Inc.
Soil Testing & Research Laboratory
4400 Alameda Blvd. NE, Suite C
Albuquerque, NM 87113
505-889-7752
FAX 505-889-0258

Summaries

Summary of Tests Performed

Laboratory Sample Number	Initial Soil Properties[1]			Saturated Hydraulic Conductivity[2]			Moisture Characteristics[3]								Particle Size[4]			Specific Gravity[5]		Air Perm-eability	Atterberg Limits	Proctor Compaction
	G	VM	VD	CH	FH	FW	HC	PP	FP	DPP	RH	EP	WHC	K_{unsat}	DS	WS	H	F	C			
ST-1 (44-46)	X	X				X																
ST-2 (43-45)	X	X				X																
ST-3 (20-22)	X	X				X																
ST-4 (27-29)	X	X				X																
ST-5 (31-33)	X	X				X																
ST-6 (36-38)	X	X				X																
ST-7 (68-70)	X	X				X																
ST-8 (54.5-55)	X	X				X																
ST-9 (38-40)	X	X				X																
ST-10 (23-25)	X	X				X																
ST-11 (15-17)	X	X				X																
ST-12 (20-22)	X	X				X																

[1] G = Gravimetric Moisture Content, VM = Volume Measurement Method, VD = Volume Displacement Method

[2] CH = Constant Head Rigid Wall, FH = Falling Head Rigid Wall, FW = Falling Head Rising Tail Flexible Wall

[3] HC = Hanging Column, PP = Pressure Plate, FP = Filter Paper, DPP = Dew Point Potentiometer, RH = Relative Humidity Box, EP = Effective Porosity, WHC = Water Holding Capacity, Kunsat = Calculated Unsaturated Hydraulic Conductivity

[4] DS = Dry Sieve, WS = Wet Sieve, H = Hydrometer

[5] F = Fine (<4.75mm), C = Coarse (>4.75mm)

Notes

Sample Receipt:
Twelve total samples, each in a 3" x 30" shelby tube sealed with endcaps and tape, were received between August 31 and September 1, 2021. The cores were packaged in four boxes, each with packing material, and all were received in good order.

Sample Preparation and Testing Notes:
Each tube was cut into sections using a pipe cutter. The material was extruded from the sections and photographed. Based on the photographs, the requestor selected the section from each sample to obtain a sub-sample from. The sub-samples were subjected to saturated hydraulic conductivity testing. Porosity calculations are based on the use of an assumed specific gravity value of 2.75.

Summary of Initial Moisture Content, Dry Bulk Density Wet Bulk Density and Calculated Porosity

Sample Number	Moisture Content				Dry Bulk Density (g/cm^3)	Wet Bulk Density (g/cm^3)	Calculated Porosity (%)
	As Received		Remolded				
	Gravimetric (%, g/g)	Volumetric (%, cm^3/cm^3)	Gravimetric (%, g/g)	Volumetric (%, cm^3/cm^3)			
ST-1 (45.5'-46')	19.6	32.0	---	---	1.63	1.95	40.7
ST-2 (44.5'-45')	14.7	25.3	---	---	1.72	1.97	37.5
ST-3 (21'-21.5')	19.8	33.3	---	---	1.68	2.02	38.8
ST-4 (27.5'-28')	17.8	30.0	---	---	1.69	1.99	38.6
ST-5 (31.5'-32')	19.9	31.6	---	---	1.58	1.90	42.4
ST-6 (37'-37.5')	23.9	36.9	---	---	1.54	1.91	43.9
ST-7 (69.5'-70')	16.2	28.9	---	---	1.79	2.08	35.0
ST-8 (54.5'-55')	20.6	36.0	---	---	1.75	2.11	36.3
ST-9 (39'-39.5')	15.1	27.5	---	---	1.82	2.09	33.9
ST-10 (24'-24.5')	18.4	31.0	---	---	1.69	2.00	38.7
ST-11 (15.5'-16')	25.2	39.2	---	---	1.55	1.95	43.5
ST-12 (21'-21.5')	19.2	32.2	---	---	1.67	2.00	39.2

NA = Not analyzed

--- = This sample was not remolded

Summary of Saturated Hydraulic Conductivity Tests

Sample Number	K_{sat} (cm/sec)	Oversize Corrected K_{sat} (cm/sec)	Method of Analysis	
			Constant Head Flexible Wall	Falling Head Flexible Wall
ST-1 (45.5'-46')	7.1E-05	NA		X
ST-2 (44.5'-45')	2.3E-04	NA		X
ST-3 (21'-21.5')	6.3E-05	NA		X
ST-4 (27.5'-28')	2.2E-05	NA		X
ST-5 (31.5'-32')	2.9E-04	NA		X
ST-6 (37'-37.5')	2.4E-04	NA		X
ST-7 (69.5'-70')	6.7E-06	NA		X
ST-8 (54.5'-55')	3.3E-06	NA		X
ST-9 (39'-39.5')	7.0E-05	NA		X
ST-10 (24'-24.5')	1.5E-04	NA		X
ST-11 (15.5'-16')	9.3E-05	NA		X
ST-12 (21'-21.5')	1.3E-06	NA		X

NA = Not applicable

Photos

ST-1 (44-46)

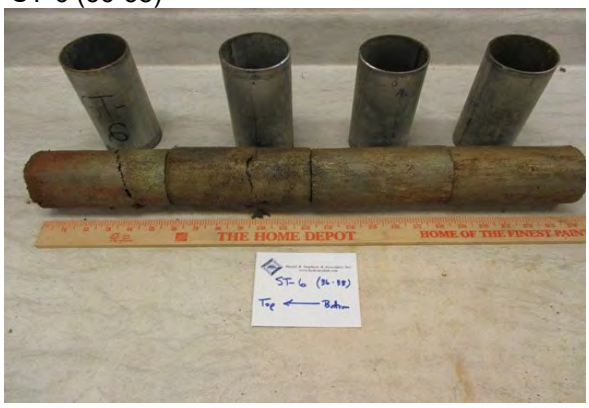
ST-2 (43-45)

ST-3 (20-22)

ST-4 (27-29)

ST-5 (31-33)

ST-6 (36-38)



Photos (Continued)

ST-7 (68-70)

ST-8 (54.5-55)

ST-9 (38-40)

ST-10 (23-25)

ST-11 (15-17)

ST-12 (20-22)

Initial Properties

Summary of Initial Moisture Content, Dry Bulk Density Wet Bulk Density and Calculated Porosity

Sample Number	Moisture Content				Dry Bulk Density (g/cm^3)	Wet Bulk Density (g/cm^3)	Calculated Porosity (%)
	As Received		Remolded				
	Gravimetric (%, g/g)	Volumetric (%, cm^3/cm^3)	Gravimetric (%, g/g)	Volumetric (%, cm^3/cm^3)			
ST-1 (45.5'-46')	19.6	32.0	---	---	1.63	1.95	40.7
ST-2 (44.5'-45')	14.7	25.3	---	---	1.72	1.97	37.5
ST-3 (21'-21.5')	19.8	33.3	---	---	1.68	2.02	38.8
ST-4 (27.5'-28')	17.8	30.0	---	---	1.69	1.99	38.6
ST-5 (31.5'-32')	19.9	31.6	---	---	1.58	1.90	42.4
ST-6 (37'-37.5')	23.9	36.9	---	---	1.54	1.91	43.9
ST-7 (69.5'-70')	16.2	28.9	---	---	1.79	2.08	35.0
ST-8 (54.5'-55')	20.6	36.0	---	---	1.75	2.11	36.3
ST-9 (39'-39.5')	15.1	27.5	---	---	1.82	2.09	33.9
ST-10 (24'-24.5')	18.4	31.0	---	---	1.69	2.00	38.7
ST-11 (15.5'-16')	25.2	39.2	---	---	1.55	1.95	43.5
ST-12 (21'-21.5')	19.2	32.2	---	---	1.67	2.00	39.2

NA = Not analyzed

--- = This sample was not remolded

Daniel B. Stephens & Associates, Inc.

Data for Initial Moisture Content, Bulk Density, Porosity, and Percent Saturation

Job Name: Resolute Environmental
Job Number: DB21.1257.00
Sample Number: ST-1 (45.5'-46')
Full Interval: ST-1 (44-46)
Remarks: Area C-B7

	As Received	Remolded
Test Date:	3-Sep-21	---
Field weight of sample* (g)*:*	615.52	
Tare weight, ring (g)*:*	0.00	
Tare weight, pan/plate (g)*:*	0.00	
Tare weight, other (g)*:*	0.00	
Dry weight of sample (g)*:*	514.50	
Sample volume (cm^3)*:*	315.35	
Assumed particle density (g/cm^3)*:*	2.75	
Gravimetric Moisture Content (% g/g)*:*	19.6	
Volumetric Moisture Content (% vol)*:*	32.0	
Dry bulk density (g/cm^3)*:*	1.63	
Wet bulk density (g/cm^3)*:*	1.95	
Calculated Porosity (% vol)*:*	40.7	
Percent Saturation:	78.8	

Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines

Comments:

* Weight including tares
NA = Not applicable
--- = This sample was not remolded

Daniel B. Stephens & Associates, Inc.

Data for Initial Moisture Content, Bulk Density, Porosity, and Percent Saturation

Job Name: Resolute Environmental
Job Number: DB21.1257.00
Sample Number: ST-2 (44.5'-45')
Full Interval: ST-2 (43-45)
Remarks: Area C-B3

	As Received	Remolded
Test Date:	3-Sep-21	---
Field weight of sample* (g)*:*	621.45	
Tare weight, ring (g)*:*	0.00	
Tare weight, pan/plate (g)*:*	0.00	
Tare weight, other (g)*:*	0.00	
Dry weight of sample (g)*:*	541.64	
Sample volume (cm^3)*:*	314.89	
Assumed particle density (g/cm^3)*:*	2.75	

Gravimetric Moisture Content (% g/g)*:*	14.7
Volumetric Moisture Content (% vol)*:*	25.3
Dry bulk density (g/cm^3)*:*	1.72
Wet bulk density (g/cm^3)*:*	1.97
Calculated Porosity (% vol)*:*	37.5
Percent Saturation:	67.7

Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines

Comments:

* Weight including tares
NA = Not applicable
--- = This sample was not remolded

Daniel B. Stephens & Associates, Inc.

Data for Initial Moisture Content, Bulk Density, Porosity, and Percent Saturation

Job Name: Resolute Environmental
Job Number: DB21.1257.00
Sample Number: ST-3 (21'-21.5')
Full Interval: ST-3 (20-22)
Remarks: Area B2-B1

	As Received	Remolded
Test Date:	1-Sep-21	---
Field weight of sample* (g)*:*	635.39	
Tare weight, ring (g)*:*	0.00	
Tare weight, pan/plate (g)*:*	0.00	
Tare weight, other (g)*:*	0.00	
Dry weight of sample (g)*:*	530.36	
Sample volume (cm^3)*:*	315.27	
Assumed particle density (g/cm^3)*:*	2.75	
Gravimetric Moisture Content (% g/g)*:*	19.8	
Volumetric Moisture Content (% vol)*:*	33.3	
Dry bulk density (g/cm^3)*:*	1.68	
Wet bulk density (g/cm^3)*:*	2.02	
Calculated Porosity (% vol)*:*	38.8	
Percent Saturation:	85.8	

Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines

Comments:

* Weight including tares
NA = Not applicable
--- = This sample was not remolded

Daniel B. Stephens & Associates, Inc.

Data for Initial Moisture Content, Bulk Density, Porosity, and Percent Saturation

Job Name: Resolute Environmental
Job Number: DB21.1257.00
Sample Number: ST-4 (27.5'-28')
Full Interval: ST-4 (27-29)
Remarks: Area B1-B3

	As Received	Remolded
Test Date:	1-Sep-21	---
Field weight of sample* (g)*:*	625.98	
Tare weight, ring (g)*:*	0.00	
Tare weight, pan/plate (g)*:*	0.00	
Tare weight, other (g)*:*	0.00	
Dry weight of sample (g)*:*	531.59	
Sample volume (cm^3)*:*	314.80	
Assumed particle density (g/cm^3)*:*	2.75	
Gravimetric Moisture Content (% g/g)*:*	17.8	
Volumetric Moisture Content (% vol)*:*	30.0	
Dry bulk density (g/cm^3)*:*	1.69	
Wet bulk density (g/cm^3)*:*	1.99	
Calculated Porosity (% vol)*:*	38.6	
Percent Saturation:	77.7	

Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines

Comments:

* Weight including tares
NA = Not applicable
--- = This sample was not remolded

Daniel B. Stephens & Associates, Inc.

Data for Initial Moisture Content, Bulk Density, Porosity, and Percent Saturation

Job Name: Resolute Environmental
Job Number: DB21.1257.00
Sample Number: ST-5 (31.5'-32')
Full Interval: ST-5 (31-33)
Remarks: Area B3-B3

	As Received	Remolded
Test Date:	1-Sep-21	---
Field weight of sample* (g)*:*	598.00	
Tare weight, ring (g)*:*	0.00	
Tare weight, pan/plate (g)*:*	0.00	
Tare weight, other (g)*:*	0.00	
Dry weight of sample (g)*:*	498.68	
Sample volume (cm^3)*:*	314.71	
Assumed particle density (g/cm^3)*:*	2.75	

Gravimetric Moisture Content (% g/g)*:*	19.9
Volumetric Moisture Content (% vol)*:*	31.6
Dry bulk density (g/cm^3)*:*	1.58
Wet bulk density (g/cm^3)*:*	1.90
Calculated Porosity (% vol)*:*	42.4
Percent Saturation:	74.5

Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines

Comments:

* Weight including tares
NA = Not applicable
--- = This sample was not remolded

Daniel B. Stephens & Associates, Inc.

Data for Initial Moisture Content, Bulk Density, Porosity, and Percent Saturation

Job Name: Resolute Environmental
Job Number: DB21.1257.00
Sample Number: ST-6 (37'-37.5')
Full Interval: ST-6 (36-38)
Remarks: Area A-T2-B2

	As Received	Remolded
Test Date:	1-Sep-21	---
Field weight of sample* (g)*:*	601.92	
Tare weight, ring (g)*:*	0.00	
Tare weight, pan/plate (g)*:*	0.00	
Tare weight, other (g)*:*	0.00	
Dry weight of sample (g)*:*	485.68	
Sample volume (cm^3)*:*	314.72	
Assumed particle density (g/cm^3)*:*	2.75	
Gravimetric Moisture Content (% g/g)*:*	23.9	
Volumetric Moisture Content (% vol)*:*	36.9	
Dry bulk density (g/cm^3)*:*	1.54	
Wet bulk density (g/cm^3)*:*	1.91	
Calculated Porosity (% vol)*:*	43.9	
Percent Saturation:	84.2	

Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines

Comments:

* Weight including tares
NA = Not applicable
--- = This sample was not remolded

Daniel B. Stephens & Associates, Inc.

Data for Initial Moisture Content, Bulk Density, Porosity, and Percent Saturation

Job Name: Resolute Environmental
Job Number: DB21.1257.00
Sample Number: ST-7 (69.5'-70')
Full Interval: ST-7 (68-70)
Remarks: Area A-T1B3

	As Received	Remolded
Test Date:	1-Sep-21	---
Field weight of sample* (g)*:*	652.82	
Tare weight, ring (g)*:*	0.00	
Tare weight, pan/plate (g)*:*	0.00	
Tare weight, other (g)*:*	0.00	
Dry weight of sample (g)*:*	561.91	
Sample volume (cm^3)*:*	314.58	
Assumed particle density (g/cm^3)*:*	2.75	
Gravimetric Moisture Content (% g/g)*:*	16.2	
Volumetric Moisture Content (% vol)*:*	28.9	
Dry bulk density (g/cm^3)*:*	1.79	
Wet bulk density (g/cm^3)*:*	2.08	
Calculated Porosity (% vol)*:*	35.0	
Percent Saturation:	82.5	

Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines

Comments:

* Weight including tares
NA = Not applicable
--- = This sample was not remolded

Daniel B. Stephens & Associates, Inc.

Data for Initial Moisture Content, Bulk Density, Porosity, and Percent Saturation

Job Name: Resolute Environmental
Job Number: DB21.1257.00
Sample Number: ST-8 (54.5'-55')
Full Interval: ST-8 (54.5-55)
Remarks: 1/2 Between MW-13 & MW-6a

	As Received	Remolded
Test Date:	1-Sep-21	---
Field weight of sample* (g)*:*	664.30	
Tare weight, ring (g)*:*	0.00	
Tare weight, pan/plate (g)*:*	0.00	
Tare weight, other (g)*:*	0.00	
Dry weight of sample (g)*:*	551.02	
Sample volume (cm^3)*:*	314.50	
Assumed particle density (g/cm^3)*:*	2.75	
Gravimetric Moisture Content (% g/g)*:*	20.6	
Volumetric Moisture Content (% vol)*:*	36.0	
Dry bulk density (g/cm^3)*:*	1.75	
Wet bulk density (g/cm^3)*:*	2.11	
Calculated Porosity (% vol)*:*	36.3	
Percent Saturation:	99.3	

Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines

Comments:

* Weight including tares
NA = Not applicable
--- = This sample was not remolded

Daniel B. Stephens & Associates, Inc.

Data for Initial Moisture Content, Bulk Density, Porosity, and Percent Saturation

Job Name: Resolute Environmental
Job Number: DB21.1257.00
Sample Number: ST-9 (39'-39.5')
Full Interval: ST-9 (38-40)
Remarks: 50'E x 12'N of PT Building NE Corner

	As Received	Remolded
Test Date:	1-Sep-21	---
Field weight of sample* (g)*:*	657.75	
Tare weight, ring (g)*:*	0.00	
Tare weight, pan/plate (g)*:*	0.00	
Tare weight, other (g)*:*	0.00	
Dry weight of sample (g)*:*	571.24	
Sample volume (cm^3)*:*	314.46	
Assumed particle density (g/cm^3)*:*	2.75	
Gravimetric Moisture Content (% g/g)*:*	15.1	
Volumetric Moisture Content (% vol)*:*	27.5	
Dry bulk density (g/cm^3)*:*	1.82	
Wet bulk density (g/cm^3)*:*	2.09	
Calculated Porosity (% vol)*:*	33.9	
Percent Saturation:	81.1	

Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines

Comments:

* Weight including tares
NA = Not applicable
--- = This sample was not remolded

Data for Initial Moisture Content, Bulk Density, Porosity, and Percent Saturation

Job Name: Resolute Environmental
Job Number: DB21.1257.00
Sample Number: ST-10 (24'-24.5')
Full Interval: ST-10 (23-25)
Remarks: 15' E of P-9

	As Received	Remolded
Test Date:	1-Sep-21	---
Field weight of sample* (g)*:*	628.39	
Tare weight, ring (g)*:*	0.00	
Tare weight, pan/plate (g)*:*	0.00	
Tare weight, other (g)*:*	0.00	
Dry weight of sample (g)*:*	530.85	
Sample volume (cm^3)*:*	314.93	
Assumed particle density (g/cm^3)*:*	2.75	
Gravimetric Moisture Content (% g/g)*:*	18.4	
Volumetric Moisture Content (% vol)*:*	31.0	
Dry bulk density (g/cm^3)*:*	1.69	
Wet bulk density (g/cm^3)*:*	2.00	
Calculated Porosity (% vol)*:*	38.7	
Percent Saturation:	80.0	

Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines

Comments:

* Weight including tares
NA = Not applicable
--- = This sample was not remolded

Daniel B. Stephens & Associates, Inc.

Data for Initial Moisture Content, Bulk Density, Porosity, and Percent Saturation

Job Name: Resolute Environmental
Job Number: DB21.1257.00
Sample Number: ST-11 (15.5'-16')
Full Interval: ST-11 (15-17)
Remarks: 60'E of P-960'E of MW-10a to P-10

	As Received	Remolded
Test Date:	1-Sep-21	---
Field weight of sample* (g)*:*	612.30	
Tare weight, ring (g)*:*	0.00	
Tare weight, pan/plate (g)*:*	0.00	
Tare weight, other (g)*:*	0.00	
Dry weight of sample (g)*:*	489.07	
Sample volume (cm^3)*:*	314.76	
Assumed particle density (g/cm^3)*:*	2.75	
Gravimetric Moisture Content (% g/g)*:*	25.2	
Volumetric Moisture Content (% vol)*:*	39.2	
Dry bulk density (g/cm^3)*:*	1.55	
Wet bulk density (g/cm^3)*:*	1.95	
Calculated Porosity (% vol)*:*	43.5	
Percent Saturation:	90.0	

Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines

Comments:

* Weight including tares
NA = Not applicable
--- = This sample was not remolded

Daniel B. Stephens & Associates, Inc.

Data for Initial Moisture Content, Bulk Density, Porosity, and Percent Saturation

Job Name: Resolute Environmental
Job Number: DB21.1257.00
Sample Number: ST-12 (21'-21.5')
Full Interval: ST-12 (20-22)
Remarks: 5' NE (upgradient) of IP-1

	As Received	Remolded
Test Date:	1-Sep-21	---
Field weight of sample* (g)*:*	628.91	
Tare weight, ring (g)*:*	0.00	
Tare weight, pan/plate (g)*:*	0.00	
Tare weight, other (g)*:*	0.00	
Dry weight of sample (g)*:*	527.41	
Sample volume (cm^3)*:*	315.19	
Assumed particle density (g/cm^3)*:*	2.75	
Gravimetric Moisture Content (% g/g)*:*	19.2	
Volumetric Moisture Content (% vol)*:*	32.2	
Dry bulk density (g/cm^3)*:*	1.67	
Wet bulk density (g/cm^3)*:*	2.00	
Calculated Porosity (% vol)*:*	39.2	
Percent Saturation:	82.3	

Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines

Comments:

* Weight including tares
NA = Not applicable
--- = This sample was not remolded

Saturated Hydraulic Conductivity

Summary of Saturated Hydraulic Conductivity Tests

Sample Number	K_{sat} (cm/sec)	Oversize Corrected K_{sat} (cm/sec)	Method of Analysis	
			Constant Head Flexible Wall	Falling Head Flexible Wall
ST-1 (45.5'-46')	7.1E-05	NA		X
ST-2 (44.5'-45')	2.3E-04	NA		X
ST-3 (21'-21.5')	6.3E-05	NA		X
ST-4 (27.5'-28')	2.2E-05	NA		X
ST-5 (31.5'-32')	2.9E-04	NA		X
ST-6 (37'-37.5')	2.4E-04	NA		X
ST-7 (69.5'-70')	6.7E-06	NA		X
ST-8 (54.5'-55')	3.3E-06	NA		X
ST-9 (39'-39.5')	7.0E-05	NA		X
ST-10 (24'-24.5')	1.5E-04	NA		X
ST-11 (15.5'-16')	9.3E-05	NA		X
ST-12 (21'-21.5')	1.3E-06	NA		X

NA = Not applicable

Saturated Hydraulic Conductivity
Flexible Wall Falling Head-Rising Tail Method

Job Name: Resolute Environmental
Job Number: DB21.1257.00
Sample Number: ST-1 (45.5'-46')
Full Interval: ST-1 (44-46)
Remarks: Area C-B7

Remolded or Initial Sample Properties		Post Permeation Sample Properties		Test and Sample Conditions	
Initial Mass (g):	615.52	*Saturated Mass (g):*	642.65	*Permeant liquid used:*	Tap Water
Diameter (cm):	7.311	*Dry Mass (g):*	514.50	*Sample Preparation:*	☑ In situ sample, extruded
Length (cm):	7.512	*Diameter (cm):*	7.302		☐ Remolded Sample
Area (cm^2):	41.98	*Length (cm):*	7.488	*Number of Lifts:*	NA
Volume (cm^3):	315.35	*Deformation (%)**:*	0.32	*Split:*	NA
Dry Density (g/cm^3):	1.63	*Area (cm^2):*	41.88	*Percent Coarse Material (%):*	0.0
Dry Density (pcf):	101.9	*Volume (cm^3):*	313.58	*Particle Density(g/cm^3):*	2.75 ☑ Assumed ☐ Measured
Water Content (%, g/g):	19.6	*Dry Density (g/cm^3):*	1.64	*Cell pressure (PSI):*	81.0
Water Content (%, vol):	32.0	*Dry Density (pcf):*	102.4	*Influent pressure (PSI):*	80.0
Void Ratio (e):	0.69	*Water Content (%, g/g):*	24.9	*Effluent pressure (PSI):*	80.0
Porosity (%, vol):	40.7	*Water Content (%, vol):*	40.9	*Panel Used:*	☐ D ☑ E ☐ F
Saturation (%):	78.8	*Void Ratio(e):*	0.68	*Reading:*	☐ Annulus ☑ Pipette
		Porosity (%, vol):	40.3		Date/Time
		Saturation (%):*	101.3	B-Value (% saturation) prior to test*:	1.00 9/6/21 750
				B-Value (% saturation) post to test:	1.00 9/7/21 730

* Per ASTM D5084 percent saturation is ensured (B-Value ≥ 95%) prior to testing, as post test saturation values may be exaggerated during depressurizing and sample removal.

**Percent Deformation: based on initial sample length and post permeation sample length.

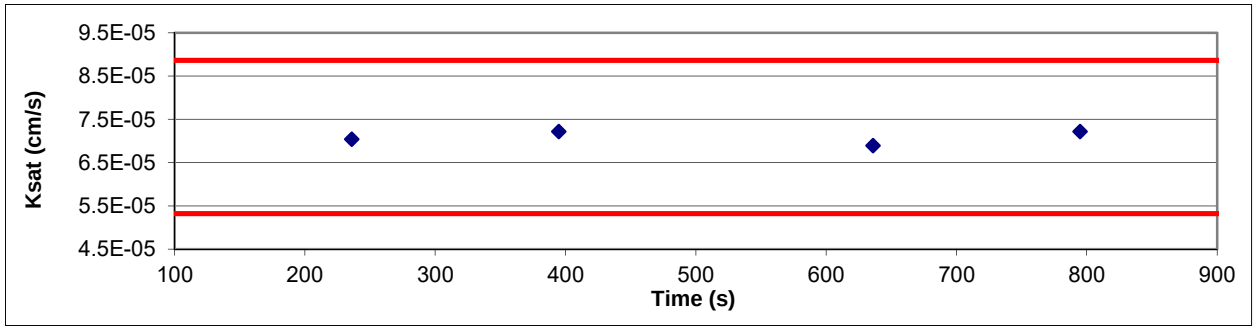
Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines

Saturated Hydraulic Conductivity
Flexible Wall Falling Head-Rising Tail Method

Job Name: Resolute Environmental
Job Number: DB21.1257.00
Sample Number: ST-1 (45.5'-46')
Full Interval: ST-1 (44-46)
Remarks: Area C-B7

Date	Time	Temp (°C)	Influent Pipette Reading	Effluent Pipette Reading	Gradient (ΔH/ΔL)	Average Flow (cm^3)	Elapsed Time (s)	Ratio (outflow to inflow)	Change in Head (Not to exceed 25%)	k_{sat} T°C (cm/s)	k_{sat} Corrected (cm/s)
Test # 1:											
06-Sep-21	08:02:00	21.8	10.00	20.00	1.54	0.87	236	1.00	20%	7.35E-05	7.04E-05
06-Sep-21	08:05:56	21.8	11.00	19.00	1.23						
Test # 2:											
06-Sep-21	08:08:16	21.8	11.50	18.50	1.08	0.43	159	1.00	14%	7.53E-05	7.21E-05
06-Sep-21	08:10:55	21.8	12.00	18.00	0.93						
Test # 3:											
07-Sep-21	07:00:00	21.8	10.00	20.00	1.54	0.87	241	1.00	20%	7.19E-05	6.89E-05
07-Sep-21	07:04:01	21.8	11.00	19.00	1.23						
Test # 4:											
07-Sep-21	07:06:21	21.8	11.50	18.50	1.08	0.43	159	1.00	14%	7.53E-05	7.21E-05
07-Sep-21	07:09:00	21.8	12.00	18.00	0.93						

***Average Ksat* (cm/sec):** **7.09E-05**
Calculated Gravel Corrected Average Ksat (cm/sec): NA



ASTM Required Range (+/- 25%)

Ksat (-25%) (cm/s): 5.32E-05

Ksat (+25%) (cm/s): 8.86E-05

Saturated Hydraulic Conductivity
Flexible Wall Falling Head-Rising Tail Method

Job Name: Resolute Environmental
Job Number: DB21.1257.00
Sample Number: ST-2 (44.5'-45')
Full Interval: ST-2 (43-45)
Remarks: Area C-B3

Remolded or Initial Sample Properties		Post Permeation Sample Properties		Test and Sample Conditions	
Initial Mass (g):	621.45	*Saturated Mass (g):*	647.05	*Permeant liquid used:*	Tap Water
Diameter (cm):	7.308	*Dry Mass (g):*	541.64	*Sample Preparation:*	☑ In situ sample, extruded
Length (cm):	7.507	*Diameter (cm):*	7.247		☐ Remolded Sample
Area (cm^2):	41.95	*Length (cm):*	7.483	*Number of Lifts:*	NA
Volume (cm^3):	314.89	*Deformation (%)**:*	0.32	*Split:*	NA
Dry Density (g/cm^3):	1.72	*Area (cm^2):*	41.25	*Percent Coarse Material (%):*	0.0
Dry Density (pcf):	107.4	*Volume (cm^3):*	308.67	*Particle Density(g/cm^3):*	2.75 ☑ Assumed ☐ Measured
Water Content (%, g/g):	14.7	*Dry Density (g/cm^3):*	1.75	*Cell pressure (PSI):*	81.0
Water Content (%, vol):	25.3	*Dry Density (pcf):*	109.5	*Influent pressure (PSI):*	80.0
Void Ratio (e):	0.60	*Water Content (%, g/g):*	19.5	*Effluent pressure (PSI):*	80.0
Porosity (%, vol):	37.5	*Water Content (%, vol):*	34.2	*Panel Used:*	☐ D ☐ E ☑ F
Saturation (%):	67.7	*Void Ratio(e):*	0.57	*Reading:*	☐ Annulus ☑ Pipette
		Porosity (%, vol):	36.2		Date/Time
		Saturation (%):*	94.4	B-Value (% saturation) prior to test*:	1.00 9/6/21 754
				B-Value (% saturation) post to test:	1.00 9/7/21 735

* Per ASTM D5084 percent saturation is ensured (B-Value ≥ 95%) prior to testing, as post test saturation values may be exaggerated during depressurizing and sample removal.

**Percent Deformation: based on initial sample length and post permeation sample length.

Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines

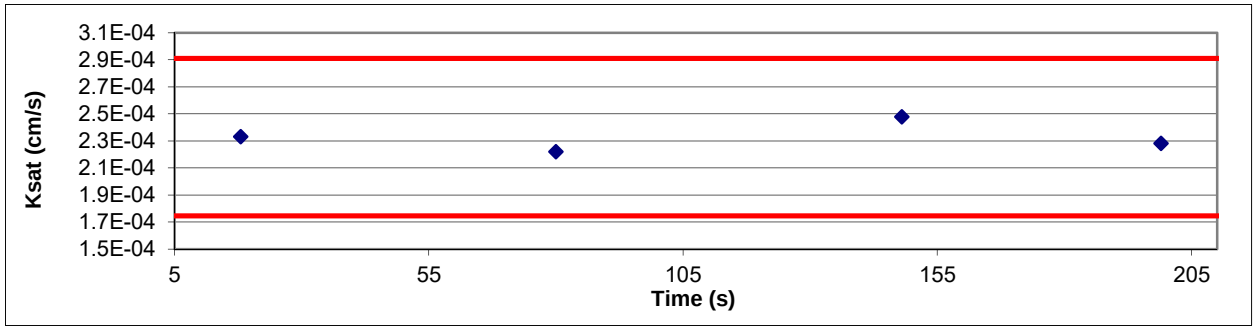
Daniel B. Stephens & Associates, Inc.

Saturated Hydraulic Conductivity
Flexible Wall Falling Head-Rising Tail Method

Job Name: Resolute Environmental
Job Number: DB21.1257.00
Sample Number: ST-2 (44.5'-45')
Full Interval: ST-2 (43-45)
Remarks: Area C-B3

Date	Time	Temp (°C)	Influent Pipette Reading	Effluent Pipette Reading	Gradient (ΔH/ΔL)	Average Flow (cm^3)	Elapsed Time (s)	Ratio (outflow to inflow)	Change in Head (Not to exceed 25%)	k_{sat} T°C (cm/s)	k_{sat} Corrected (cm/s)
Test # 1:											
06-Sep-21	07:58:41	21.8	11.30	18.70	1.14	0.17	18	1.00	5%	2.43E-04	2.33E-04
06-Sep-21	07:58:59	21.8	11.50	18.50	1.08						
Test # 2:											
06-Sep-21	07:59:49	21.8	12.00	18.00	0.93	0.43	62	1.00	17%	2.32E-04	2.22E-04
06-Sep-21	08:00:51	21.8	12.50	17.50	0.77						
Test # 3:											
07-Sep-21	07:11:00	21.8	10.00	20.00	1.54	0.87	68	1.00	20%	2.59E-04	2.48E-04
07-Sep-21	07:12:08	21.8	11.00	19.00	1.23						
Test # 4:											
07-Sep-21	07:12:45	21.8	11.50	18.50	1.08	0.43	51	1.00	14%	2.38E-04	2.28E-04
07-Sep-21	07:13:36	21.8	12.00	18.00	0.93						

***Average Ksat* (cm/sec):** **2.33E-04**
Calculated Gravel Corrected Average Ksat (cm/sec): NA



ASTM Required Range (+/- 25%)

Ksat (-25%) (cm/s): 1.75E-04

Ksat (+25%) (cm/s): 2.91E-04

Saturated Hydraulic Conductivity
Flexible Wall Falling Head-Rising Tail Method

Job Name: Resolute Environmental
Job Number: DB21.1257.00
Sample Number: ST-3 (21'-21.5')
Full Interval: ST-3 (20-22)
Remarks: Area B2-B1

Remolded or Initial Sample Properties		Post Permeation Sample Properties		Test and Sample Conditions	
Initial Mass (g):	635.39	*Saturated Mass (g):*	653.76	*Permeant liquid used:*	Tap Water
Diameter (cm):	7.310	*Dry Mass (g):*	530.36	*Sample Preparation:*	☑ In situ sample, extruded
Length (cm):	7.512	*Diameter (cm):*	7.258		☐ Remolded Sample
Area (cm^2):	41.97	*Length (cm):*	7.502	*Number of Lifts:*	NA
Volume (cm^3):	315.27	*Deformation (%)**:*	0.14	*Split:*	NA
Dry Density (g/cm^3):	1.68	*Area (cm^2):*	41.37	*Percent Coarse Material (%):*	0.0
Dry Density (pcf):	105.0	*Volume (cm^3):*	310.36	*Particle Density(g/cm^3):*	2.75 ☑ Assumed ☐ Measured
Water Content (%, g/g):	19.8	*Dry Density (g/cm^3):*	1.71	*Cell pressure (PSI):*	81.0
Water Content (%, vol):	33.3	*Dry Density (pcf):*	106.7	*Influent pressure (PSI):*	80.0
Void Ratio (e):	0.63	*Water Content (%, g/g):*	23.3	*Effluent pressure (PSI):*	80.0
Porosity (%, vol):	38.8	*Water Content (%, vol):*	39.8	*Panel Used:*	☐ G ☑ H ☐ I
Saturation (%):	85.8	*Void Ratio(e):*	0.61	*Reading:*	☐ Annulus ☑ Pipette
		Porosity (%, vol):	37.9		Date/Time
		Saturation (%):*	105.0	B-Value (% saturation) prior to test*:	1.00 9/3/21 801
				B-Value (% saturation) post to test:	1.00 9/4/21 810

* Per ASTM D5084 percent saturation is ensured (B-Value ≥ 95%) prior to testing, as post test saturation values may be exaggerated during depressurizing and sample removal.

**Percent Deformation: based on initial sample length and post permeation sample length.

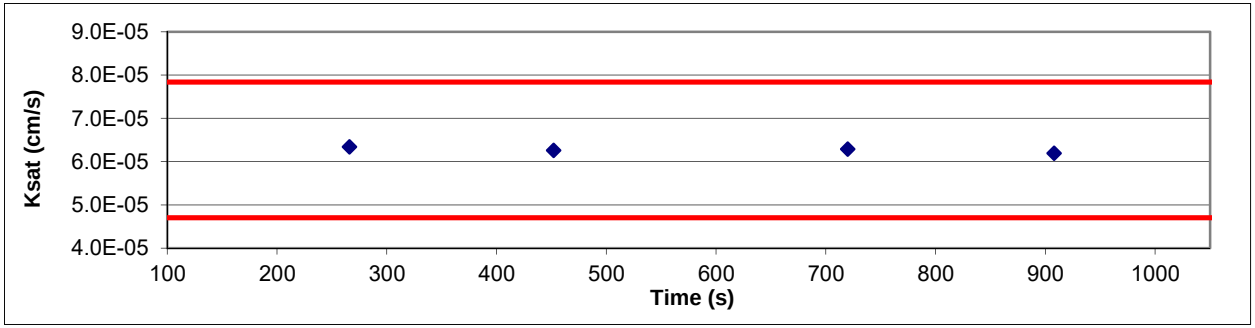
Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines

Saturated Hydraulic Conductivity
Flexible Wall Falling Head-Rising Tail Method

Job Name: Resolute Environmental
Job Number: DB21.1257.00
Sample Number: ST-3 (21'-21.5')
Full Interval: ST-3 (20-22)
Remarks: Area B2-B1

Date	Time	Temp (°C)	Influent Pipette Reading	Effluent Pipette Reading	Gradient (ΔH/ΔL)	Average Flow (cm^3)	Elapsed Time (s)	Ratio (outflow to inflow)	Change in Head (Not to exceed 25%)	k_{sat} T°C (cm/s)	k_{sat} Corrected (cm/s)
Test # 1:											
03-Sep-21	09:20:00	21.8	10.00	20.00	1.54	0.87	266	1.00	20%	6.61E-05	6.34E-05
03-Sep-21	09:24:26	21.8	11.00	19.00	1.23						
Test # 2:											
03-Sep-21	09:27:12	21.8	11.50	18.50	1.08	0.43	186	1.00	14%	6.53E-05	6.26E-05
03-Sep-21	09:30:18	21.8	12.00	18.00	0.92						
Test # 3:											
04-Sep-21	07:52:00	21.8	10.00	20.00	1.54	0.87	268	1.00	20%	6.56E-05	6.29E-05
04-Sep-21	07:56:28	21.8	11.00	19.00	1.23						
Test # 4:											
04-Sep-21	07:59:13	21.8	11.50	18.50	1.08	0.43	188	1.00	14%	6.46E-05	6.19E-05
04-Sep-21	08:02:21	21.8	12.00	18.00	0.92						

***Average Ksat* (cm/sec):** **6.27E-05**
Calculated Gravel Corrected Average Ksat (cm/sec): NA



ASTM Required Range (+/- 25%)

Ksat (-25%) (cm/s): 4.70E-05

Ksat (+25%) (cm/s): 7.84E-05

Saturated Hydraulic Conductivity
Flexible Wall Falling Head-Rising Tail Method

Job Name: Resolute Environmental
Job Number: DB21.1257.00
Sample Number: ST-4 (27.5'-28')
Full Interval: ST-4 (27-29)
Remarks: Area B1-B3

Remolded or Initial Sample Properties		Post Permeation Sample Properties		Test and Sample Conditions	
Initial Mass (g):	625.98	*Saturated Mass (g):*	642.91	*Permeant liquid used:*	Tap Water
Diameter (cm):	7.309	*Dry Mass (g):*	531.59	*Sample Preparation:*	☑ In situ sample, extruded
Length (cm):	7.503	*Diameter (cm):*	7.221		☐ Remolded Sample
Area (cm^2):	41.96	*Length (cm):*	7.495	*Number of Lifts:*	NA
Volume (cm^3):	314.80	*Deformation (%)**:*	0.11	*Split:*	NA
Dry Density (g/cm^3):	1.69	*Area (cm^2):*	40.95	*Percent Coarse Material (%):*	0.0
Dry Density (pcf):	105.4	*Volume (cm^3):*	306.94	*Particle Density(g/cm^3):*	2.75 ☑ Assumed ☐ Measured
Water Content (%, g/g):	17.8	*Dry Density (g/cm^3):*	1.73	*Cell pressure (PSI):*	81.0
Water Content (%, vol):	30.0	*Dry Density (pcf):*	108.1	*Influent pressure (PSI):*	80.0
Void Ratio (e):	0.63	*Water Content (%, g/g):*	20.9	*Effluent pressure (PSI):*	80.0
Porosity (%, vol):	38.6	*Water Content (%, vol):*	36.3	*Panel Used:*	☐ G ☐ H ☑ I
Saturation (%):	77.7	*Void Ratio(e):*	0.59	*Reading:*	☐ Annulus ☑ Pipette
		Porosity (%, vol):	37.0		Date/Time
		Saturation (%):*	98.0	B-Value (% saturation) prior to test*:	0.99 9/3/21 803
				B-Value (% saturation) post to test:	1.00 9/4/21 812

* Per ASTM D5084 percent saturation is ensured (B-Value ≥ 95%) prior to testing, as post test saturation values may be exaggerated during depressurizing and sample removal.

**Percent Deformation: based on initial sample length and post permeation sample length.

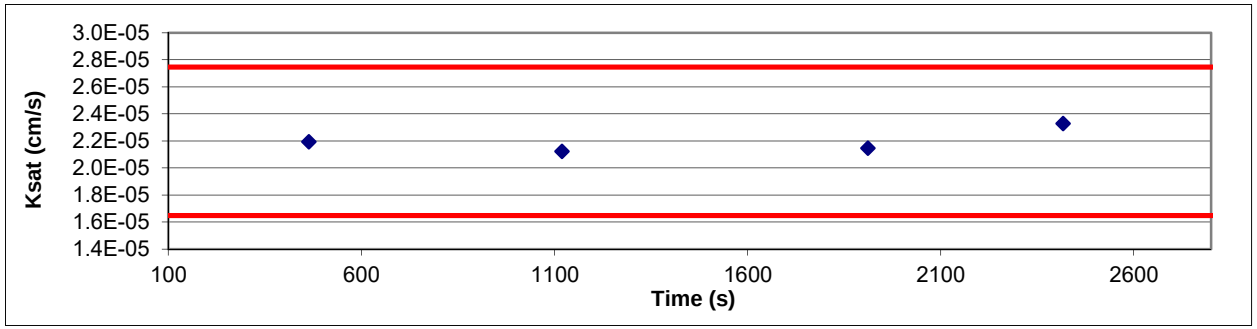
Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines

Saturated Hydraulic Conductivity
Flexible Wall Falling Head-Rising Tail Method

Job Name: Resolute Environmental
Job Number: DB21.1257.00
Sample Number: ST-4 (27.5'-28')
Full Interval: ST-4 (27-29)
Remarks: Area B1-B3

Date	Time	Temp (°C)	Influent Pipette Reading	Effluent Pipette Reading	Gradient (ΔH/ΔL)	Average Flow (cm^3)	Elapsed Time (s)	Ratio (outflow to inflow)	Change in Head (Not to exceed 25%)	k_{sat} T°C (cm/s)	k_{sat} Corrected (cm/s)
Test # 1:											
03-Sep-21	09:32:23	21.8	11.00	19.00	1.23	0.43	464	1.00	12%	2.29E-05	2.19E-05
03-Sep-21	09:40:07	21.8	11.50	18.50	1.08						
Test # 2:											
03-Sep-21	09:48:39	21.8	12.00	18.00	0.92	0.43	655	1.00	17%	2.21E-05	2.12E-05
03-Sep-21	09:59:34	21.8	12.50	17.50	0.77						
Test # 3:											
04-Sep-21	07:53:00	21.8	10.00	20.00	1.54	0.87	793	1.00	20%	2.24E-05	2.15E-05
04-Sep-21	08:06:13	21.8	11.00	19.00	1.23						
Test # 4:											
04-Sep-21	08:13:33	21.8	11.50	18.50	1.08	0.43	505	1.00	14%	2.43E-05	2.33E-05
04-Sep-21	08:21:58	21.8	12.00	18.00	0.92						

***Average Ksat* (cm/sec):** **2.20E-05**
Calculated Gravel Corrected Average Ksat (cm/sec): NA



ASTM Required Range (+/- 25%)

Ksat (-25%) (cm/s): 1.65E-05

Ksat (+25%) (cm/s): 2.75E-05

Saturated Hydraulic Conductivity
Flexible Wall Falling Head-Rising Tail Method

Job Name: Resolute Environmental
Job Number: DB21.1257.00
Sample Number: ST-5 (31.5'-32')
Full Interval: ST-5 (31-33)
Remarks: Area B3-B3

Remolded or Initial Sample Properties		Post Permeation Sample Properties		Test and Sample Conditions	
Initial Mass (g):	598.00	*Saturated Mass (g):*	625.72	*Permeant liquid used:*	Tap Water
Diameter (cm):	7.305	*Dry Mass (g):*	498.68	*Sample Preparation:*	☑ In situ sample, extruded
Length (cm):	7.509	*Diameter (cm):*	7.222		☐ Remolded Sample
Area (cm^2):	41.91	*Length (cm):*	7.503	*Number of Lifts:*	NA
Volume (cm^3):	314.71	*Deformation (%)**:*	0.09	*Split:*	NA
Dry Density (g/cm^3):	1.58	*Area (cm^2):*	40.96	*Percent Coarse Material (%):*	0.0
Dry Density (pcf):	98.9	*Volume (cm^3):*	307.33	*Particle Density(g/cm^3):*	2.75 ☑ Assumed ☐ Measured
Water Content (%, g/g):	19.9	*Dry Density (g/cm^3):*	1.62	*Cell pressure (PSI):*	81.0
Water Content (%, vol):	31.6	*Dry Density (pcf):*	101.3	*Influent pressure (PSI):*	80.0
Void Ratio (e):	0.74	*Water Content (%, g/g):*	25.5	*Effluent pressure (PSI):*	80.0
Porosity (%, vol):	42.4	*Water Content (%, vol):*	41.3	*Panel Used:*	☑ G ☐ H ☐ I
Saturation (%):	74.5	*Void Ratio(e):*	0.69	*Reading:*	☐ Annulus ☑ Pipette
		Porosity (%, vol):	41.0		Date/Time
		Saturation (%):*	100.8	B-Value (% saturation) prior to test*:	1.00 9/3/21 806
				B-Value (% saturation) post to test:	1.00 9/4/21 817

* Per ASTM D5084 percent saturation is ensured (B-Value ≥ 95%) prior to testing, as post test saturation values may be exaggerated during depressurizing and sample removal.

**Percent Deformation: based on initial sample length and post permeation sample length.

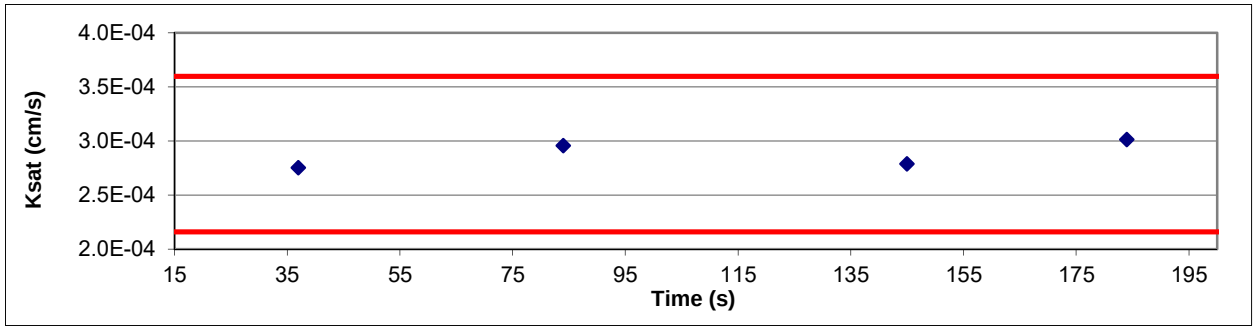
Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines

Saturated Hydraulic Conductivity
Flexible Wall Falling Head-Rising Tail Method

Job Name: Resolute Environmental
Job Number: DB21.1257.00
Sample Number: ST-5 (31.5'-32')
Full Interval: ST-5 (31-33)
Remarks: Area B3-B3

Date	Time	Temp (°C)	Influent Pipette Reading	Effluent Pipette Reading	Gradient (ΔH/ΔL)	Average Flow (cm^3)	Elapsed Time (s)	Ratio (outflow to inflow)	Change in Head (Not to exceed 25%)	k_{sat} T°C (cm/s)	k_{sat} Corrected (cm/s)
Test # 1:											
03-Sep-21	09:14:06	21.8	11.00	19.00	1.23	0.43	37	1.00	12%	2.87E-04	2.75E-04
03-Sep-21	09:14:43	21.8	11.50	18.50	1.08						
Test # 2:											
03-Sep-21	09:15:27	21.8	12.00	18.00	0.92	0.43	47	1.00	17%	3.09E-04	2.96E-04
03-Sep-21	09:16:14	21.8	12.50	17.50	0.77						
Test # 3:											
04-Sep-21	07:59:00	21.8	10.00	20.00	1.54	0.87	61	1.00	20%	2.91E-04	2.79E-04
04-Sep-21	08:00:01	21.8	11.00	19.00	1.23						
Test # 4:											
04-Sep-21	08:00:39	21.8	11.50	18.50	1.08	0.43	39	1.00	14%	3.15E-04	3.01E-04
04-Sep-21	08:01:18	21.8	12.00	18.00	0.92						

***Average Ksat* (cm/sec):** **2.88E-04**
Calculated Gravel Corrected Average Ksat (cm/sec): NA



ASTM Required Range (+/- 25%)

Ksat (-25%) (cm/s): 2.16E-04

Ksat (+25%) (cm/s): 3.60E-04

Daniel B. Stephens & Associates, Inc.

Saturated Hydraulic Conductivity
Flexible Wall Falling Head-Rising Tail Method

Job Name: Resolute Environmental
Job Number: DB21.1257.00
Sample Number: ST-6 (37'-37.5')
Full Interval: ST-6 (36-38)
Remarks: Area A-T2-B2

Remolded or Initial Sample Properties	
Initial Mass (g):	601.92
Diameter (cm):	7.307
Length (cm):	7.505
Area (cm^2):	41.93
Volume (cm^3):	314.72
Dry Density (g/cm^3):	1.54
Dry Density (pcf):	96.3
Water Content (%, g/g):	23.9
Water Content (%, vol):	36.9
Void Ratio (e):	0.78
Porosity (%, vol):	43.9
Saturation (%):	84.2

Post Permeation Sample Properties	
Saturated Mass (g):	620.66
Dry Mass (g):	485.68
Diameter (cm):	7.265
Length (cm):	7.487
*Deformation (%)**:*	0.24
Area (cm^2):	41.45
Volume (cm^3):	310.35
Dry Density (g/cm^3):	1.56
Dry Density (pcf):	97.7
Water Content (%, g/g):	27.8
Water Content (%, vol):	43.5
Void Ratio(e):	0.76
Porosity (%, vol):	43.1
Saturation (%):*	100.9

Test and Sample Conditions

Permeant liquid used: Tap Water
Sample Preparation: ☑ In situ sample, extruded
☐ Remolded Sample
Number of Lifts: NA
Split: NA
Percent Coarse Material (%): 0.0
Particle Density(g/cm^3): 2.75 ☑ Assumed ☐ Measured
Cell pressure (PSI): 81.0
Influent pressure (PSI): 80.0
Effluent pressure (PSI): 80.0
Panel Used: ☐ A ☐ B ☑ C
Reading: ☐ Annulus ☑ Pipette

		Date/Time
B-Value (% saturation) prior to test*:	0.99	9/3/21 810
B-Value (% saturation) post to test:	1.00	9/4/21 821

* Per ASTM D5084 percent saturation is ensured (B-Value ≥ 95%) prior to testing, as post test saturation values may be exaggerated or skewed during depressurizing and sample removal.
**Percent Deformation: based on initial sample length and post permeation sample length.

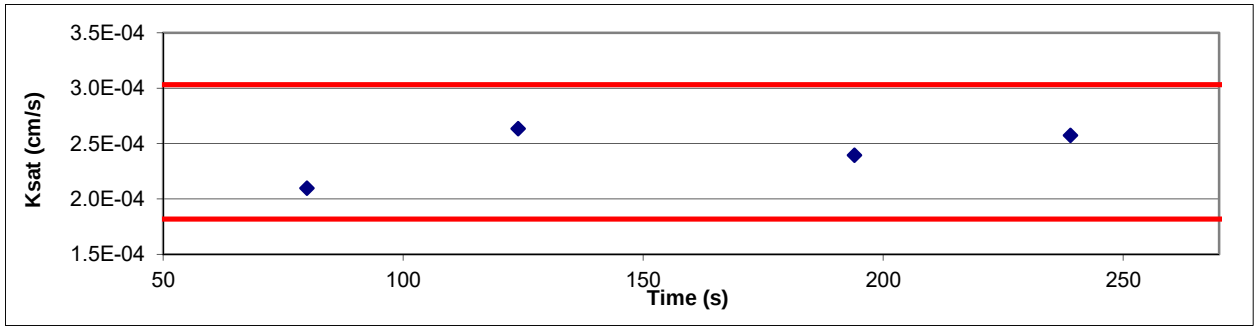
Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines

Saturated Hydraulic Conductivity
Flexible Wall Falling Head-Rising Tail Method

Job Name: Resolute Environmental
Job Number: DB21.1257.00
Sample Number: ST-6 (37'-37.5')
Full Interval: ST-6 (36-38)
Remarks: Area A-T2-B2

Date	Time	Temp (°C)	Influent Pipette Reading	Effluent Pipette Reading	Gradient (ΔH/ΔL)	Average Flow (cm^3)	Elapsed Time (s)	Ratio (outflow to inflow)	Change in Head (Not to exceed 25%)	k_{sat} T°C (cm/s)	k_{sat} Corrected (cm/s)
Test # 1:											
03-Sep-21	09:12:00	21.8	10.00	20.00	1.54	0.87	80	1.00	20%	2.19E-04	2.10E-04
03-Sep-21	09:13:20	21.8	11.00	19.00	1.23						
Test # 2:											
03-Sep-21	09:13:41	21.8	11.50	18.50	1.08	0.43	44	1.00	14%	2.75E-04	2.63E-04
03-Sep-21	09:14:25	21.8	12.00	18.00	0.93						
Test # 3:											
04-Sep-21	08:04:00	21.8	10.00	20.00	1.54	0.87	70	1.00	20%	2.50E-04	2.40E-04
04-Sep-21	08:05:10	21.8	11.00	19.00	1.23						
Test # 4:											
04-Sep-21	08:05:45	21.8	11.50	18.50	1.08	0.43	45	1.00	14%	2.69E-04	2.57E-04
04-Sep-21	08:06:30	21.8	12.00	18.00	0.93						

***Average Ksat* (cm/sec):** **2.43E-04**
Calculated Gravel Corrected Average Ksat (cm/sec): NA



ASTM Required Range (+/- 25%)

Ksat (-25%) (cm/s): 1.82E-04

Ksat (+25%) (cm/s): 3.03E-04

Saturated Hydraulic Conductivity
Flexible Wall Falling Head-Rising Tail Method

Job Name: Resolute Environmental
Job Number: DB21.1257.00
Sample Number: ST-7 (69.5'-70')
Full Interval: ST-7 (68-70)
Remarks: Area A-T1B3

Remolded or Initial Sample Properties		Post Permeation Sample Properties		Test and Sample Conditions	
Initial Mass (g):	652.82	*Saturated Mass (g):*	680.84	*Permeant liquid used:*	Tap Water
Diameter (cm):	7.302	*Dry Mass (g):*	561.91	*Sample Preparation:*	☑ In situ sample, extruded
Length (cm):	7.512	*Diameter (cm):*	7.338		☐ Remolded Sample
Area (cm^2):	41.88	*Length (cm):*	7.509	*Number of Lifts:*	NA
Volume (cm^3):	314.58	*Deformation (%)**:*	0.04	*Split:*	NA
Dry Density (g/cm^3):	1.79	*Area (cm^2):*	42.29	*Percent Coarse Material (%):*	0.0
Dry Density (pcf):	111.5	*Volume (cm^3):*	317.57	*Particle Density(g/cm^3):*	2.75 ☑ Assumed ☐ Measured
Water Content (%, g/g):	16.2	*Dry Density (g/cm^3):*	1.77	*Cell pressure (PSI):*	81.0
Water Content (%, vol):	28.9	*Dry Density (pcf):*	110.5	*Influent pressure (PSI):*	80.0
Void Ratio (e):	0.54	*Water Content (%, g/g):*	21.2	*Effluent pressure (PSI):*	80.0
Porosity (%, vol):	35.0	*Water Content (%, vol):*	37.5	*Panel Used:*	☑ A ☐ B ☐ C
Saturation (%):	82.5	*Void Ratio(e):*	0.55	*Reading:*	☐ Annulus ☑ Pipette
		Porosity (%, vol):	35.7		Date/Time
		Saturation (%):*	105.0	B-Value (% saturation) prior to test*:	1.00 9/3/21 813
				B-Value (% saturation) post to test:	1.00 9/4/21 830

* Per ASTM D5084 percent saturation is ensured (B-Value ≥ 95%) prior to testing, as post test saturation values may be exaggerated or skewed during depressurizing and sample removal.
**Percent Deformation: based on initial sample length and post permeation sample length.

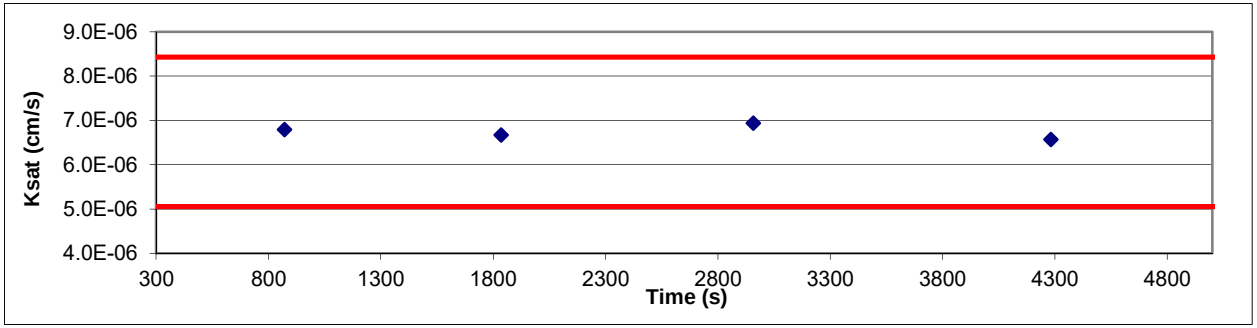
Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines

Saturated Hydraulic Conductivity
Flexible Wall Falling Head-Rising Tail Method

Job Name: Resolute Environmental
Job Number: DB21.1257.00
Sample Number: ST-7 (69.5'-70')
Full Interval: ST-7 (68-70)
Remarks: Area A-T1B3

Date	Time	Temp (°C)	Influent Pipette Reading	Effluent Pipette Reading	Gradient (ΔH/ΔL)	Average Flow (cm^3)	Elapsed Time (s)	Ratio (outflow to inflow)	Change in Head (Not to exceed 25%)	k_{sat} T°C (cm/s)	k_{sat} Corrected (cm/s)
Test # 1:											
03-Sep-21	09:24:59	21.8	6.00	19.00	2.00	0.43	871	1.00	8%	7.09E-06	6.79E-06
03-Sep-21	09:39:30	21.8	6.50	18.50	1.85						
Test # 2:											
03-Sep-21	09:39:30	21.8	6.50	18.50	1.85	0.43	964	1.00	8%	6.96E-06	6.67E-06
03-Sep-21	09:55:34	21.8	7.00	18.00	1.69						
Test # 3:											
03-Sep-21	10:13:03	21.8	7.50	17.50	1.54	0.43	1122	1.00	10%	7.24E-06	6.94E-06
03-Sep-21	10:31:45	21.8	8.00	17.00	1.38						
Test # 4:											
04-Sep-21	07:51:00	21.8	8.00	17.00	1.38	0.43	1325	1.00	11%	6.86E-06	6.57E-06
04-Sep-21	08:13:05	21.8	8.50	16.50	1.23						

***Average Ksat* (cm/sec):** **6.74E-06**
Calculated Gravel Corrected Average Ksat (cm/sec): NA



ASTM Required Range (+/- 25%)

Ksat (-25%) (cm/s): 5.06E-06

Ksat (+25%) (cm/s): 8.43E-06

Saturated Hydraulic Conductivity
Flexible Wall Falling Head-Rising Tail Method

Job Name: Resolute Environmental
Job Number: DB21.1257.00
Sample Number: ST-8 (54.5'-55')
Full Interval: ST-8 (54.5-55)
Remarks: 1/2 Between MW-13 & MW-6a

Remolded or Initial Sample Properties		Post Permeation Sample Properties		Test and Sample Conditions	
Initial Mass (g):	664.30	*Saturated Mass (g):*	651.09	*Permeant liquid used:*	Tap Water
Diameter (cm):	7.303	*Dry Mass (g):*	551.02	*Sample Preparation:*	☑ In situ sample, extruded
Length (cm):	7.508	*Diameter (cm):*	7.184		☐ Remolded Sample
Area (cm^2):	41.89	*Length (cm):*	7.501	*Number of Lifts:*	NA
Volume (cm^3):	314.50	*Deformation (%)**:*	0.10	*Split:*	NA
Dry Density (g/cm^3):	1.75	*Area (cm^2):*	40.53	*Percent Coarse Material (%):*	0.0
Dry Density (pcf):	109.4	*Volume (cm^3):*	304.04	*Particle Density(g/cm^3):*	2.75 ☑ Assumed ☐ Measured
Water Content (%, g/g):	20.6	*Dry Density (g/cm^3):*	1.81	*Cell pressure (PSI):*	81.0
Water Content (%, vol):	36.0	*Dry Density (pcf):*	113.1	*Influent pressure (PSI):*	80.1
Void Ratio (e):	0.57	*Water Content (%, g/g):*	18.2	*Effluent pressure (PSI):*	80.0
Porosity (%, vol):	36.3	*Water Content (%, vol):*	32.9	*Panel Used:*	☐ A ☑ B ☐ C
Saturation (%):	99.3	*Void Ratio(e):*	0.52	*Reading:*	☐ Annulus ☑ Pipette
		Porosity (%, vol):	34.1		Date/Time
		Saturation (%):*	96.5	B-Value (% saturation) prior to test*:	0.98 9/3/21 816
				B-Value (% saturation) post to test:	0.99 9/4/21 833

* Per ASTM D5084 percent saturation is ensured (B-Value ≥ 95%) prior to testing, as post test saturation values may be exaggerated or skewed during depressurizing and sample removal.
**Percent Deformation: based on initial sample length and post permeation sample length.

Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines

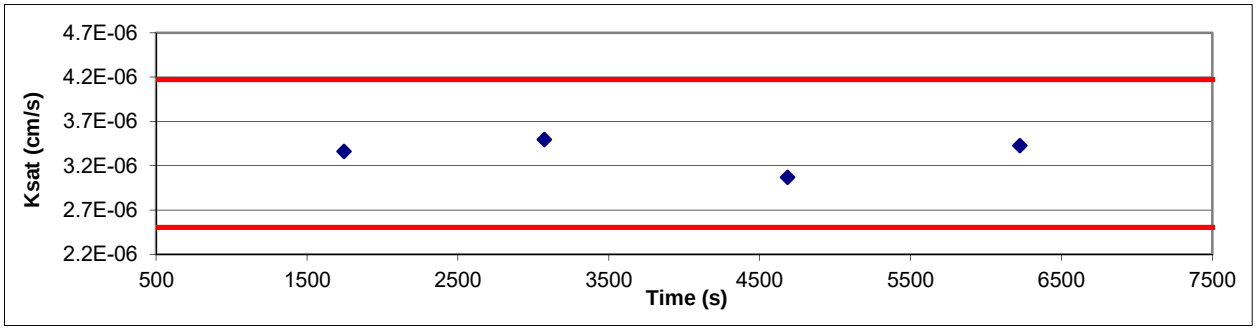
Daniel B. Stephens & Associates, Inc.

Saturated Hydraulic Conductivity
Flexible Wall Falling Head-Rising Tail Method

Job Name: Resolute Environmental
Job Number: DB21.1257.00
Sample Number: ST-8 (54.5'-55')
Full Interval: ST-8 (54.5-55)
Remarks: 1/2 Between MW-13 & MW-6a

Date	Time	Temp (°C)	Influent Pipette Reading	Effluent Pipette Reading	Gradient (ΔH/ΔL)	Average Flow (cm^3)	Elapsed Time (s)	Ratio (outflow to inflow)	Change in Head (Not to exceed 25%)	k_{sat} T°C (cm/s)	k_{sat} Corrected (cm/s)
Test # 1:											
03-Sep-21	09:40:10	21.8	6.00	19.00	2.94	0.61	1745	1.00	7%	3.51E-06	3.36E-06
03-Sep-21	10:09:15	21.8	6.70	18.30	2.72						
Test # 2:											
03-Sep-21	10:24:01	21.8	7.00	18.00	2.63	0.43	1329	1.00	6%	3.65E-06	3.49E-06
03-Sep-21	10:46:10	21.8	7.50	17.50	2.48						
Test # 3:											
03-Sep-21	10:46:10	21.8	7.50	17.50	2.48	0.43	1610	1.00	6%	3.20E-06	3.07E-06
03-Sep-21	11:13:00	21.8	8.00	17.00	2.32						
Test # 4:											
04-Sep-21	07:50:00	21.8	8.00	17.00	2.32	0.43	1541	1.00	7%	3.58E-06	3.43E-06
04-Sep-21	08:15:41	21.8	8.50	16.50	2.17						

***Average Ksat* (cm/sec):** **3.34E-06**
Calculated Gravel Corrected Average Ksat (cm/sec): NA



ASTM Required Range (+/- 25%)

Ksat (-25%) (cm/s): 2.50E-06

Ksat (+25%) (cm/s): 4.17E-06

Saturated Hydraulic Conductivity
Flexible Wall Falling Head-Rising Tail Method

Job Name: Resolute Environmental
Job Number: DB21.1257.00
Sample Number: ST-9 (39'-39.5')
Full Interval: ST-9 (38-40)
Remarks: 50'E x 12'N of PT Building NE Corner

Remolded or Initial Sample Properties		Post Permeation Sample Properties		Test and Sample Conditions	
Initial Mass (g):	657.75	*Saturated Mass (g):*	666.80	*Permeant liquid used:*	Tap Water
Diameter (cm):	7.303	*Dry Mass (g):*	571.24	*Sample Preparation:*	☑ In situ sample, extruded
Length (cm):	7.507	*Diameter (cm):*	7.208		☐ Remolded Sample
Area (cm^2):	41.89	*Length (cm):*	7.492	*Number of Lifts:*	NA
Volume (cm^3):	314.46	*Deformation (%)**:*	0.20	*Split:*	NA
Dry Density (g/cm^3):	1.82	*Area (cm^2):*	40.81	*Percent Coarse Material (%):*	0.0
Dry Density (pcf):	113.4	*Volume (cm^3):*	305.73	*Particle Density(g/cm^3):*	2.75 ☑ Assumed ☐ Measured
Water Content (%, g/g):	15.1	*Dry Density (g/cm^3):*	1.87	*Cell pressure (PSI):*	81.0
Water Content (%, vol):	27.5	*Dry Density (pcf):*	116.6	*Influent pressure (PSI):*	80.0
Void Ratio (e):	0.51	*Water Content (%, g/g):*	16.7	*Effluent pressure (PSI):*	80.0
Porosity (%, vol):	33.9	*Water Content (%, vol):*	31.3	*Panel Used:*	☑ D ☐ E ☐ F
Saturation (%):	81.1	*Void Ratio(e):*	0.47	*Reading:*	☐ Annulus ☑ Pipette
		Porosity (%, vol):	32.1		Date/Time
		Saturation (%):*	97.5	B-Value (% saturation) prior to test*:	1.00 9/3/21 820
				B-Value (% saturation) post to test:	1.00 9/4/21 838

* Per ASTM D5084 percent saturation is ensured (B-Value ≥ 95%) prior to testing, as post test saturation values may be exaggerated during depressurizing and sample removal.

**Percent Deformation: based on initial sample length and post permeation sample length.

Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines

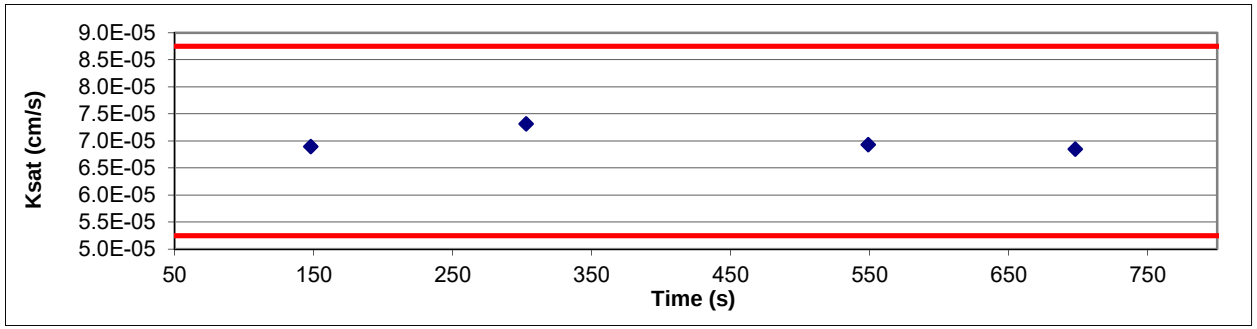
Daniel B. Stephens & Associates, Inc.

Saturated Hydraulic Conductivity
Flexible Wall Falling Head-Rising Tail Method

Job Name: Resolute Environmental
Job Number: DB21.1257.00
Sample Number: ST-9 (39'-39.5')
Full Interval: ST-9 (38-40)
Remarks: 50'E x 12'N of PT Building NE Corner

Date	Time	Temp (°C)	Influent Pipette Reading	Effluent Pipette Reading	Gradient (ΔH/ΔL)	Average Flow (cm^3)	Elapsed Time (s)	Ratio (outflow to inflow)	Change in Head (Not to exceed 25%)	k_{sat} T°C (cm/s)	k_{sat} Corrected (cm/s)
Test # 1:											
03-Sep-21	08:57:17	21.8	11.00	19.00	1.23	0.43	148	1.00	12%	7.20E-05	6.89E-05
03-Sep-21	08:59:45	21.8	11.50	18.50	1.08						
Test # 2:											
03-Sep-21	09:03:20	21.8	12.10	17.90	0.89	0.35	155	1.00	14%	7.64E-05	7.32E-05
03-Sep-21	09:05:55	21.8	12.50	17.50	0.77						
Test # 3:											
04-Sep-21	08:17:30	21.8	10.00	20.00	1.54	0.87	246	1.00	20%	7.24E-05	6.93E-05
04-Sep-21	08:21:36	21.8	11.00	19.00	1.23						
Test # 4:											
04-Sep-21	08:21:36	21.8	11.00	19.00	1.23	0.43	149	1.00	12%	7.15E-05	6.85E-05
04-Sep-21	08:24:05	21.8	11.50	18.50	1.08						

***Average Ksat* (cm/sec):** **7.00E-05**
Calculated Gravel Corrected Average Ksat (cm/sec): NA



ASTM Required Range (+/- 25%)

Ksat (-25%) (cm/s): 5.25E-05

Ksat (+25%) (cm/s): 8.75E-05

Saturated Hydraulic Conductivity
Flexible Wall Falling Head-Rising Tail Method

Job Name: Resolute Environmental
Job Number: DB21.1257.00
Sample Number: ST-10 (24'-24.5')
Full Interval: ST-10 (23-25)
Remarks: 15' E of P-9

Remolded or Initial Sample Properties	
Initial Mass (g):	628.39
Diameter (cm):	7.309
Length (cm):	7.506
Area (cm^2):	41.96
Volume (cm^3):	314.93
Dry Density (g/cm^3):	1.69
Dry Density (pcf):	105.2
Water Content (%, g/g):	18.4
Water Content (%, vol):	31.0
Void Ratio (e):	0.63
Porosity (%, vol):	38.7
Saturation (%):	80.0

Post Permeation Sample Properties	
Saturated Mass (g):	654.86
Dry Mass (g):	530.85
Diameter (cm):	7.272
Length (cm):	7.499
*Deformation (%)**:*	0.10
Area (cm^2):	41.53
Volume (cm^3):	311.45
Dry Density (g/cm^3):	1.70
Dry Density (pcf):	106.4
Water Content (%, g/g):	23.4
Water Content (%, vol):	39.8
Void Ratio(e):	0.61
Porosity (%, vol):	38.0
Saturation (%):*	104.7

Test and Sample Conditions

Permeant liquid used: Tap Water
Sample Preparation: ☑ In situ sample, extruded
☐ Remolded Sample
Number of Lifts: NA
Split: NA
Percent Coarse Material (%): 0.0
Particle Density(g/cm^3): 2.75 ☑ Assumed ☐ Measured
Cell pressure (PSI): 81.0
Influent pressure (PSI): 80.0
Effluent pressure (PSI): 80.0
Panel Used: ☐ D ☑ E ☐ F
Reading: ☐ Annulus ☑ Pipette

		Date/Time
B-Value (% saturation) prior to test*:	0.99	9/3/21 823
B-Value (% saturation) post to test:	0.99	9/4/21 841

* Per ASTM D5084 percent saturation is ensured (B-Value ≥ 95%) prior to testing, as post test saturation values may be exaggerated during depressurizing and sample removal.

**Percent Deformation: based on initial sample length and post permeation sample length.

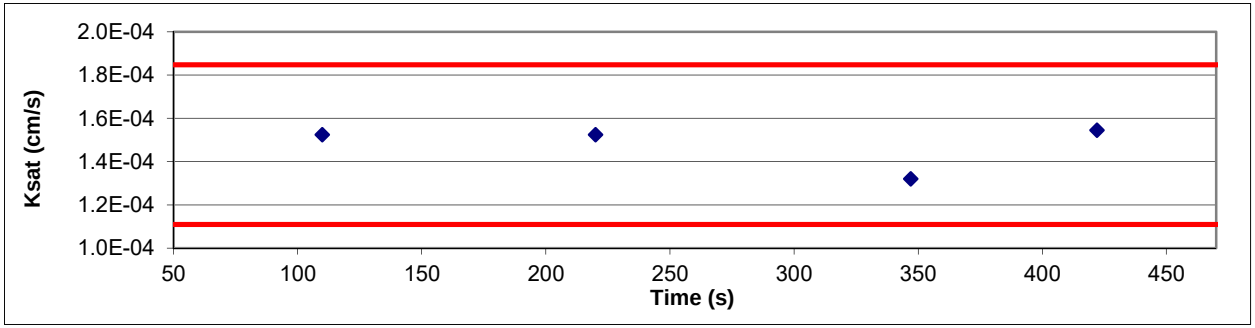
Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines

Saturated Hydraulic Conductivity
Flexible Wall Falling Head-Rising Tail Method

Job Name: Resolute Environmental
Job Number: DB21.1257.00
Sample Number: ST-10 (24'-24.5')
Full Interval: ST-10 (23-25)
Remarks: 15' E of P-9

Date	Time	Temp (°C)	Influent Pipette Reading	Effluent Pipette Reading	Gradient (ΔH/ΔL)	Average Flow (cm^3)	Elapsed Time (s)	Ratio (outflow to inflow)	Change in Head (Not to exceed 25%)	k_{sat} T°C (cm/s)	k_{sat} Corrected (cm/s)
Test # 1:											
03-Sep-21	08:53:30	21.8	10.00	20.00	1.54	0.87	110	1.00	20%	1.59E-04	1.52E-04
03-Sep-21	08:55:20	21.8	11.00	19.00	1.23						
Test # 2:											
03-Sep-21	08:59:11	21.8	12.50	17.50	0.77	0.43	110	1.00	20%	1.59E-04	1.52E-04
03-Sep-21	09:01:01	21.8	13.00	17.00	0.62						
Test # 3:											
04-Sep-21	08:21:49	21.8	10.00	20.00	1.54	0.87	127	1.00	20%	1.38E-04	1.32E-04
04-Sep-21	08:23:56	21.8	11.00	19.00	1.23						
Test # 4:											
04-Sep-21	08:23:56	21.8	11.50	18.50	1.08	0.43	75	1.00	14%	1.61E-04	1.54E-04
04-Sep-21	08:25:11	21.8	12.00	18.00	0.92						

***Average Ksat* (cm/sec):** **1.48E-04**
Calculated Gravel Corrected Average Ksat (cm/sec): NA



ASTM Required Range (+/- 25%)

Ksat (-25%) (cm/s): 1.11E-04

Ksat (+25%) (cm/s): 1.85E-04

Saturated Hydraulic Conductivity
Flexible Wall Falling Head-Rising Tail Method

Job Name: Resolute Environmental
Job Number: DB21.1257.00
Sample Number: ST-11 (15.5'-16')
Full Interval: ST-11 (15-17)
Remarks: 60'E of P-960'E of MW-10a to P-10

Remolded or Initial Sample Properties		Post Permeation Sample Properties		Test and Sample Conditions	
Initial Mass (g):	612.30	*Saturated Mass (g):*	624.86	*Permeant liquid used:*	Tap Water
Diameter (cm):	7.307	*Dry Mass (g):*	489.07	*Sample Preparation:*	☑ In situ sample, extruded
Length (cm):	7.506	*Diameter (cm):*	7.262		☐ Remolded Sample
Area (cm^2):	41.93	*Length (cm):*	7.480	*Number of Lifts:*	NA
Volume (cm^3):	314.76	*Deformation (%)**:*	0.34	*Split:*	NA
Dry Density (g/cm^3):	1.55	*Area (cm^2):*	41.42	*Percent Coarse Material (%):*	0.0
Dry Density (pcf):	97.0	*Volume (cm^3):*	309.83	*Particle Density(g/cm^3):*	2.75 ☑ Assumed ☐ Measured
Water Content (%, g/g):	25.2	*Dry Density (g/cm^3):*	1.58	*Cell pressure (PSI):*	81.0
Water Content (%, vol):	39.2	*Dry Density (pcf):*	98.5	*Influent pressure (PSI):*	80.0
Void Ratio (e):	0.77	*Water Content (%, g/g):*	27.8	*Effluent pressure (PSI):*	80.0
Porosity (%, vol):	43.5	*Water Content (%, vol):*	43.8	*Panel Used:*	☑ O ☐ P ☐ Q
Saturation (%):	90.0	*Void Ratio(e):*	0.74	*Reading:*	☐ Annulus ☑ Pipette
		Porosity (%, vol):	42.6		Date/Time
		Saturation (%):*	102.9	B-Value (% saturation) prior to test*:	1.00 9/3/21 825
				B-Value (% saturation) post to test:	1.00 9/4/21 844

* Per ASTM D5084 percent saturation is ensured (B-Value ≥ 95%) prior to testing, as post test saturation values may be exaggerated during depressurizing and sample removal.

**Percent Deformation: based on initial sample length and post permeation sample length.

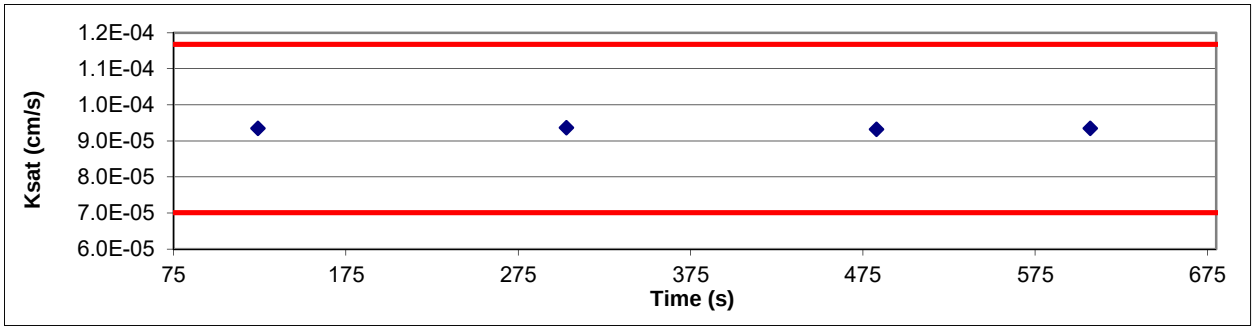
Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines

Saturated Hydraulic Conductivity
Flexible Wall Falling Head-Rising Tail Method

Job Name: Resolute Environmental
Job Number: DB21.1257.00
Sample Number: ST-11 (15.5'-16')
Full Interval: ST-11 (15-17)
Remarks: 60'E of P-960'E of MW-10a to P-10

Date	Time	Temp (°C)	Influent Pipette Reading	Effluent Pipette Reading	Gradient (ΔH/ΔL)	Average Flow (cm^3)	Elapsed Time (s)	Ratio (outflow to inflow)	Change in Head (Not to exceed 25%)	k_{sat} T°C (cm/s)	k_{sat} Corrected (cm/s)
Test # 1:											
03-Sep-21	08:40:39	21.8	11.50	18.50	1.08	0.43	124	1.00	14%	9.76E-05	9.34E-05
03-Sep-21	08:42:43	21.8	12.00	18.00	0.93						
Test # 2:											
03-Sep-21	08:45:09	21.8	12.50	17.50	0.77	0.43	179	1.00	20%	9.78E-05	9.37E-05
03-Sep-21	08:48:08	21.8	13.00	17.00	0.62						
Test # 3:											
04-Sep-21	08:30:00	21.8	10.00	20.00	1.54	0.87	180	1.00	20%	9.73E-05	9.32E-05
04-Sep-21	08:33:00	21.8	11.00	19.00	1.23						
Test # 4:											
04-Sep-21	08:34:46	21.8	11.50	18.50	1.08	0.43	124	1.00	14%	9.76E-05	9.34E-05
04-Sep-21	08:36:50	21.8	12.00	18.00	0.93						

***Average Ksat* (cm/sec):** **9.34E-05**
Calculated Gravel Corrected Average Ksat (cm/sec): NA



ASTM Required Range (+/- 25%)

Ksat (-25%) (cm/s): 7.01E-05

Ksat (+25%) (cm/s): 1.17E-04

Daniel B. Stephens & Associates, Inc.

Saturated Hydraulic Conductivity
Flexible Wall Falling Head-Rising Tail Method

Job Name: Resolute Environmental
Job Number: DB21.1257.00
Sample Number: ST-12 (21'-21.5')
Full Interval: ST-12 (20-22)
Remarks: 5' NE (upgradient) of IP-1

Remolded or Initial Sample Properties		Post Permeation Sample Properties		Test and Sample Conditions	
Initial Mass (g):	628.91	*Saturated Mass (g):*	637.16	*Permeant liquid used:*	Tap Water
Diameter (cm):	7.311	*Dry Mass (g):*	527.41	*Sample Preparation:*	☑ In situ sample, extruded
Length (cm):	7.508	*Diameter (cm):*	7.217		☐ Remolded Sample
Area (cm^2):	41.98	*Length (cm):*	7.493	*Number of Lifts:*	NA
Volume (cm^3):	315.19	*Deformation (%)**:*	0.21	*Split:*	NA
Dry Density (g/cm^3):	1.67	*Area (cm^2):*	40.91	*Percent Coarse Material (%):*	0.0
Dry Density (pcf):	104.5	*Volume (cm^3):*	306.50	*Particle Density(g/cm^3):*	2.75 ☑ Assumed ☐ Measured
Water Content (%, g/g):	19.2	*Dry Density (g/cm^3):*	1.72	*Cell pressure (PSI):*	81.0
Water Content (%, vol):	32.2	*Dry Density (pcf):*	107.4	*Influent pressure (PSI):*	80.1
Void Ratio (e):	0.64	*Water Content (%, g/g):*	20.8	*Effluent pressure (PSI):*	79.9
Porosity (%, vol):	39.2	*Water Content (%, vol):*	35.8	*Panel Used:*	☐ O ☑ P ☐ Q
Saturation (%):	82.3	*Void Ratio(e):*	0.60	*Reading:*	☐ Annulus ☑ Pipette
		Porosity (%, vol):	37.4		Date/Time
		Saturation (%):*	95.7	B-Value (% saturation) prior to test*:	1.00 9/3/21 830
				B-Value (% saturation) post to test:	1.00 9/4/21 850

* Per ASTM D5084 percent saturation is ensured (B-Value ≥ 95%) prior to testing, as post test saturation values may be exaggerated during depressurizing and sample removal.

**Percent Deformation: based on initial sample length and post permeation sample length.

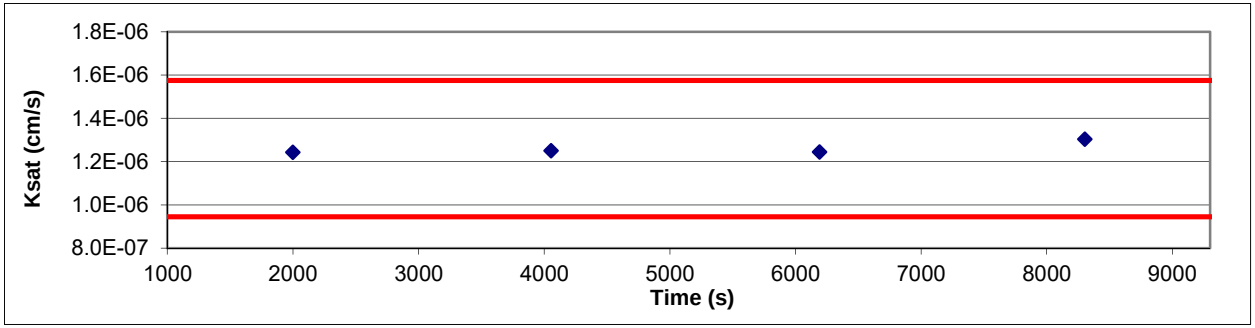
Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines

Saturated Hydraulic Conductivity
Flexible Wall Falling Head-Rising Tail Method

Job Name: Resolute Environmental
Job Number: DB21.1257.00
Sample Number: ST-12 (21'-21.5')
Full Interval: ST-12 (20-22)
Remarks: 5' NE (upgradient) of IP-1

Date	Time	Temp (°C)	Influent Pipette Reading	Effluent Pipette Reading	Gradient (ΔH/ΔL)	Average Flow (cm^3)	Elapsed Time (s)	Ratio (outflow to inflow)	Change in Head (Not to exceed 25%)	k_{sat} T°C (cm/s)	k_{sat} Corrected (cm/s)
Test # 1:											
03-Sep-21	09:38:33	21.8	4.00	23.00	4.81	0.43	2000	1.00	3%	1.30E-06	1.24E-06
03-Sep-21	10:11:53	21.8	4.50	22.50	4.65						
Test # 2:											
03-Sep-21	10:11:53	21.8	4.50	22.50	4.65	0.43	2055	1.00	3%	1.30E-06	1.25E-06
03-Sep-21	10:46:08	21.8	5.00	22.00	4.50						
Test # 3:											
03-Sep-21	10:46:08	21.8	5.00	22.00	4.50	0.43	2137	1.00	3%	1.30E-06	1.24E-06
03-Sep-21	11:21:45	21.8	5.50	21.50	4.34						
Test # 4:											
04-Sep-21	07:49:00	21.8	5.50	21.50	4.34	0.43	2112	1.00	4%	1.36E-06	1.30E-06
04-Sep-21	08:24:12	21.8	6.00	21.00	4.19						

***Average Ksat* (cm/sec):** **1.26E-06**
Calculated Gravel Corrected Average Ksat (cm/sec): NA



ASTM Required Range (+/- 25%)

Ksat (-25%) (cm/s): 9.45E-07

Ksat (+25%) (cm/s): 1.57E-06

Laboratory Tests and Methods

Tests and Methods

Dry Bulk Density:	ASTM D7263
Moisture Content:	ASTM D7263, ASTM D2216
Calculated Porosity:	ASTM D7263
Saturated Hydraulic Conductivity:	
Falling Head Rising Tail: (Flexible Wall)	ASTM D5084

Chain of Custody

Daniel B. Stephens & Associates, Inc.

Daniel B. Stephens & Associates, Inc.
Hydraulic Properties Soils Laboratory
4400 Alameda Blvd. NE, Suite C
ALBUQUERQUE, NM 87113
Ph: (505) 889-7752 (800) 933-3105
FAX (505) 889-0258

Name/Address/Phone for report:
Tommy Jordan
Resolute Environmental
1003 Weatherstone Pkwy Ste 320
~~4[illegible] 515~~ -Woodstock GA 30188

cc: Name/Address/Phone for invoice: (or same as report)
SAME

Project Name or P.O. #
Milledge Avenue

Project Contact & Phone:
Tommy Jordan
470-895-6649/
404-516-3172

DATE	SAMPLE IDENTIFICATION	# of containers	Type of Container	As Received Gravimetric Moisture Content	Initial Soil Properties (density, moisture, porosity)	Saturated Hydraulic Conductivity (rigid wall or flexible wall)	Hydraulic Properties Package (HPP) with Flexible Wall Ksat	Hydraulic Properties Package (HPP) with Rigid Wall Ksat	Particle Size Analysis (wet sieve & hydrometer)	Proctor Compaction (standard or modified)	Specific Gravity, Fines	Specific Gravity, Coarse	Atterberg Limits					REMARKS
8/~~25~~/21	ST-3 (20-22)				X		X											Area B2-B1
8/26/21	ST-4 (27-29)				X		X											Area B1-B3
8/26/21	ST-5 (31-33)				X		X											Area B3-B3
"	ST-6 (36-38)				X		X											Area A-T2-B2
"	ST-7 (68-70)				X		X											Area A-T1-B3
8/27/21	ST-8 (54.5-55)				X		X											1/2 Between MW-13 and MW6a
"	ST-9 (38-40)				X		X											50'Ex 12'N of PT Building NE Corner
"	ST-10 (23-25)				X		X											15'E of P-9
"	ST-11 (15-17)				X		X											60'E of MW 10a to P-10
"	ST-12 (20-22)				X		X											5'NE (upgradient) of IP1

1) Minor impacts of chloroform, PCE, 1-4 dioxane, and pesticides (Lindane) in free water. Use nitrile gloves. Effluent can be disposed of in municipal water supply system.
2) Take photos of extracted core with tape measure and send to Tommy to instruct where to pull K sample.

RELINQUISHED BY: (SIGNATURE) — DATE 8/28/21
RECEIVED BY: (SIGNATURE) — DATE 8/31/21

Comments: Send extracted Cores photos to Tommy to decide where to pull K sample

Daniel B. Stephens & Associates, Inc.
Hydraulic Properties Soils Laboratory
4400 Alameda Blvd. NE, Suite C
ALBUQUERQUE, NM 87113
Ph: (505) 889-7752 (800) 933-3105
FAX (505) 889-0258

Name/Address/Phone for report:
Resolute Environmental
1003 Weatherstone Pkwy Ste 320
Woodstock GA 30188

cc: Name/Address/Phone for invoice: (or same as report)
SAME

oject Name or P.O. #

oject Contact & Phone:

DATE	SAMPLE IDENTIFICATION	# of containers	Type of Container	As Received Gravimetric Moisture Content	Initial Soil Properties (density, moisture, porosity)	Saturated Hydraulic Conductivity (rigid wall or flexible wall)	Hydraulic Properties Package (HPP) with Flexible Wall Ksat	Hydraulic Properties Package (HPP) with Rigid Wall Ksat	Particle Size Analysis (wet sieve & hydrometer)	Proctor Compaction (standard or modified)	Specific Gravity, Fines	Specific Gravity, Coarse	Atterberg Limits					REMARKS
8/30	ST-1 (44-45)				X		X											Area C B-7
8/30	ST-2 (43-45)				X		X											Area C B-3

1) No impacts. Clean -
2) Take photos of extracted Coarse w/ tape measure and send to me to decide where to take sample

RELINQUISHED BY: (SIGNATURE) DATE 8/30/21

RECEIVED BY: (SIGNATURE) DATE 9/3/21

Comments:

Page _____ of _____

E. SOIL VAPOR INVESTIGATION

Milledge Avenue Landfill, 2021-08-19

Created	2021-08-19 11:26:57 EDT by Jim Fineis
Updated	2021-08-31 14:42:15 EDT by Jim Fineis
Location	33.906145, -83.3849279
Total Vapor Solutions	

Project Information

Project Name	Milledge Avenue Landfill
Project Invoiced	Yes
Job Site Photo	

Client Name	Resolute
Client Onsite?	Yes
Onsite Representative	Tommy Jordan
Job Site Address	White Trail Athens, Georgia 30606
Project Start Date	2021-08-19
Project End Data	2021-08-20
General Weather Conditions	80° and sunny
Total Vapor Responsible for Shipping Samples?	No

B1 SV-2, B1 SV-2

Sample Collected from Existing Implant	No
Photo of Implant	
Boring Number or ID	B1 SV-2
Longitude	-83.38488
Latitude	33.90605

Sample ID / Location ID

Implant Location (Address or Lat/Long)	White Trail Athens, Georgia 30606

Soil Vapor Implant Construction

Implant Installed	Yes
Installation Date	2021-08-19
Installation Time	11:15
Temporary or Permanent Implant	Temporary
Installation Method	AMS GVP Kit - Borehole Creation
Borehole Diameter in Inches	1.65
Implant Type	Shallow Soil Vapor
Implant Material	Air-stone
Tubing Type	Nylaflow
Implant Depth in Inches	72
Sand Thickness (")	12
Bentonite Thickness (")	60
Helium Leak Test Information	

Helium Leak Test Information

Helium Leak Test Performed	Yes
Helium % Start	52
Helium % Final	44
Helium In Implant (PPM or %)	0
Sample / Summa Can Information	

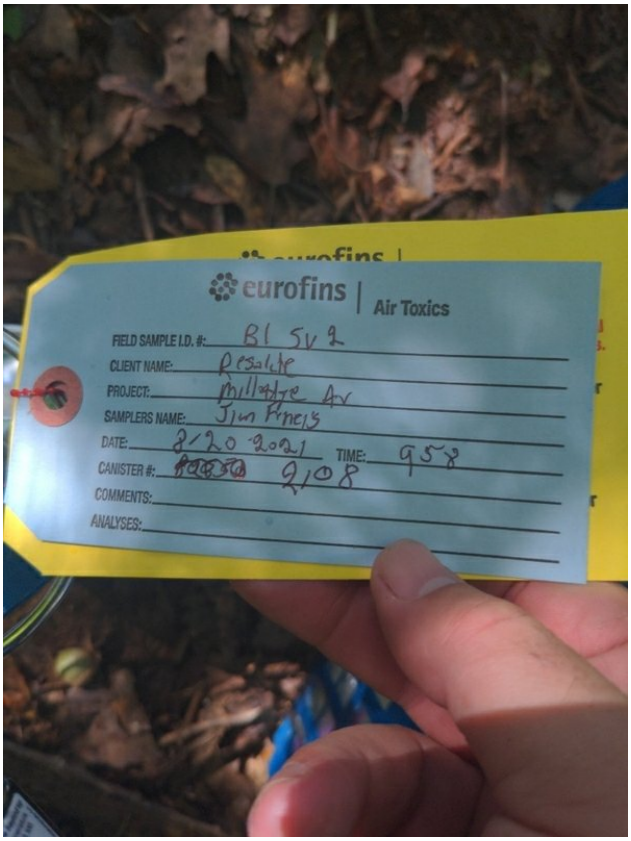
Sample Collection

Sample Collected?	Yes
Duplicate Sample Collected?	No
Sample Type	Soil Vapor
Other Field Parameters Collected?	No
Laboratory Sample ID	B1 SV-2
Summa Canister Certification	Batch Certified
Sample Date	2021-08-20
Analysis Requested	TO-15
Purge Volume (ml)	60
Shut In Test Completed	Yes
Flow Controller ID	24003
Flow Controller Photo ID	
Summa Canister ID	2108

Summa Can Photo ID

Beginning Summa Vacuum	28
Ending Summa Vacuum	0
Sample Time Start	09:58
Sample End Time	10:03

Sample Tag Photo



B2 SV-1, B2 SV-1

Sample Collected from Existing Implant	No

Photo of Implant

Boring Number or ID	B2 SV-1
Longitude	-83.38451
Latitude	33.90599

Sample ID / Location ID

Implant Location (Address or Lat/Long)	White Trail Athens, Georgia 30606

Soil Vapor Implant Construction

Implant Installed	Yes
Installation Date	2021-08-19
Installation Time	11:25
Temporary or Permanent Implant	Temporary
Installation Method	AMS GVP Kit - Borehole Creation
Borehole Diameter in Inches	1.65
Implant Type	Shallow Soil Vapor
Implant Material	Air-stone
Tubing Type	Nylaflow
Implant Depth in Inches	48
Sand Thickness (")	12
Bentonite Thickness (")	36
Helium Leak Test Information	

Helium Leak Test Information

Helium Leak Test Performed	Yes
Helium % Start	48
Helium % Final	42
Helium In Implant (PPM or %)	0
Sample / Summa Can Information	

Sample Collection

Sample Collected?	Yes
Duplicate Sample Collected?	No
Sample Type	Soil Vapor
Other Field Parameters Collected?	No
Laboratory Sample ID	B2 SV-1
Summa Canister Certification	Batch Certified
Sample Date	2021-08-20
Analysis Requested	TO-15
Purge Volume (ml)	60
Shut In Test Completed	Yes
Flow Controller ID	23614

Flow Controller Photo ID	
Summa Canister ID	1575
Summa Can Photo ID	
Beginning Summa Vacuum	29

Ending Summa Vacuum	0
Sample Time Start	09:42
Sample End Time	09:53
Sample Tag Photo	

B1 SV-3, B1 SV-3

Sample Collected from Existing Implant	No

Photo of Implant

Boring Number or ID	B1 SV-3
Longitude	-83.38451
Latitude	33.90599

Sample ID / Location ID

Implant Location (Address or Lat/Long)	Service Path Athens, Georgia 30606

Soil Vapor Implant Construction

Implant Installed	Yes
Installation Date	2021-08-19
Installation Time	11:32
Temporary or Permanent Implant	Temporary
Installation Method	AMS GVP Kit - Borehole Creation
Borehole Diameter in Inches	1.65
Implant Type	Shallow Soil Vapor
Implant Material	Air-stone
Tubing Type	Nylaflow
Implant Depth in Inches	72
Sand Thickness (")	12
Bentonite Thickness (")	60
Helium Leak Test Information	

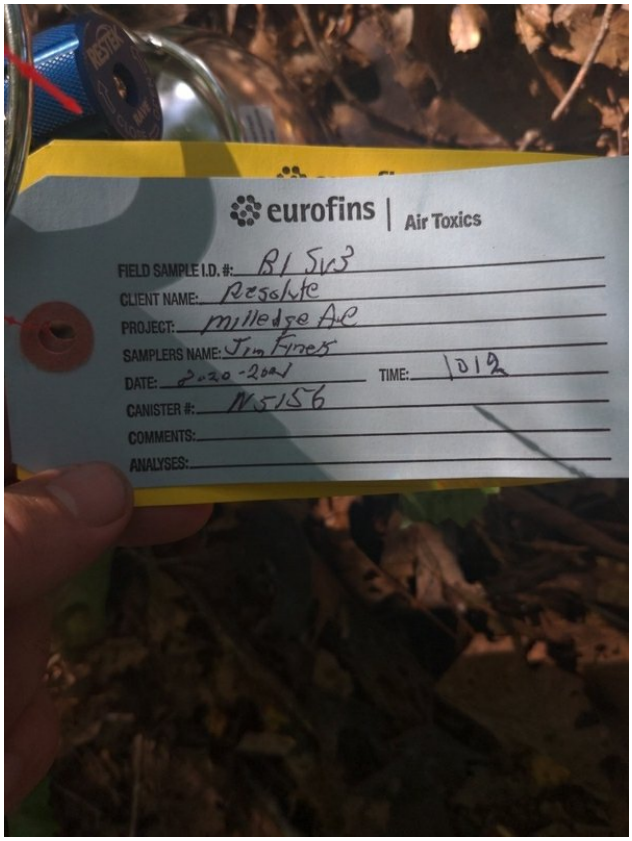
Helium Leak Test Information

Helium Leak Test Performed	Yes

Helium % Start	62
Helium % Final	56
Helium In Implant (PPM or %)	300
Sample / Summa Can Information	

Sample Collection

Sample Collected?	Yes
Duplicate Sample Collected?	No
Sample Type	Soil Vapor
Other Field Parameters Collected?	No
Laboratory Sample ID	B1 SV-3
Summa Canister Certification	Batch Certified
Sample Date	2021-08-20
Analysis Requested	TO-15
Purge Volume (ml)	60
Shut In Test Completed	Yes
Flow Controller ID	24053
Flow Controller Photo ID	
Summa Canister ID	3297

Summa Can Photo ID	
Beginning Summa Vacuum	29
Ending Summa Vacuum	0
Sample Time Start	10:12
Sample End Time	10:19
Sample Tag Photo	

B1 SV-4, B1 SV-4

Sample Collected from Existing Implant	No
Photo of Implant	
	

Boring Number or ID	B1 SV-4
Longitude	-83.38451
Latitude	33.90599

Sample ID / Location ID

Implant Location (Address or Lat/Long)	Service Path Athens, Georgia 30606

Soil Vapor Implant Construction

Implant Installed	Yes
Installation Date	2021-08-19
Installation Time	11:40
Temporary or Permanent Implant	Temporary
Installation Method	AMS GVP Kit - Borehole Creation
Borehole Diameter in Inches	1.65
Implant Type	Shallow Soil Vapor
Implant Material	Air-stone
Tubing Type	Nylaflow
Implant Depth in Inches	72
Sand Thickness (")	12
Bentonite Thickness (")	60
Helium Leak Test Information	

Helium Leak Test Information

Helium Leak Test Performed	Yes
Helium % Start	42
Helium % Final	36
Helium In Implant (PPM or %)	0
Sample / Summa Can Information	

Sample Collection

Sample Collected?	Yes
Duplicate Sample Collected?	No
Sample Type	Soil Vapor
Other Field Parameters Collected?	No
Laboratory Sample ID	B1 SV-4
Summa Canister Certification	Batch Certified
Sample Date	2021-08-20
Analysis Requested	TO-15
Purge Volume (ml)	60
Shut In Test Completed	Yes
Flow Controller ID	23605

Flow Controller Photo ID	
Summa Canister ID	2437
Summa Can Photo ID	
Beginning Summa Vacuum	29

Ending Summa Vacuum	5
Sample Time Start	10:24
Sample End Time	10:40
Sample Tag Photo	

B1 SV-5, B1 SV-5

Sample Collected from Existing Implant	No

Photo of Implant

Boring Number or ID	B1 SV-5
Longitude	-83.38521
Latitude	33.90598

Sample ID / Location ID

Implant Location (Address or Lat/Long)	Service Path Athens, Georgia 30606

Soil Vapor Implant Construction

Implant Installed	Yes
Installation Date	2021-08-19
Installation Time	11:55
Temporary or Permanent Implant	Temporary
Installation Method	AMS GVP Kit - Borehole Creation
Borehole Diameter in Inches	1.65
Implant Type	Shallow Soil Vapor
Implant Material	Air-stone
Tubing Type	Nylaflow
Implant Depth in Inches	132
Sand Thickness (")	12
Bentonite Thickness (")	120
Helium Leak Test Information	

Helium Leak Test Information

Helium Leak Test Performed	Yes
Helium % Start	52
Helium % Final	47
Helium In Implant (PPM or %)	0
Sample / Summa Can Information	

Sample Collection

Sample Collected?	Yes
Duplicate Sample Collected?	No
Sample Type	Soil Vapor
Other Field Parameters Collected?	No
Laboratory Sample ID	B1 SV-5
Summa Canister Certification	Batch Certified
Sample Date	2021-08-20
Analysis Requested	TO-15
Purge Volume (ml)	60
Shut In Test Completed	Yes
Flow Controller ID	23803

Flow Controller Photo ID	
Summa Canister ID	2509
Summa Can Photo ID	
Beginning Summa Vacuum	29

Ending Summa Vacuum	0
Sample Time Start	10:43
Sample End Time	10:50
Sample Tag Photo	

A SV-6, A SV-6

Sample Collected from Existing Implant	No

Photo of Implant

Boring Number or ID	A SV-6
Longitude	-83.38521
Latitude	33.90599

Sample ID / Location ID

Implant Location (Address or Lat/Long)	Service Path Athens, Georgia 30606

Soil Vapor Implant Construction

Implant Installed	Yes
Installation Date	2021-08-19
Installation Time	12:05
Temporary or Permanent Implant	Temporary
Installation Method	AMS GVP Kit - Borehole Creation
Borehole Diameter in Inches	1.65
Implant Type	Shallow Soil Vapor
Implant Material	Air-stone
Tubing Type	Nylaflow
Implant Depth in Inches	120
Sand Thickness (")	12
Bentonite Thickness (")	108
Helium Leak Test Information	

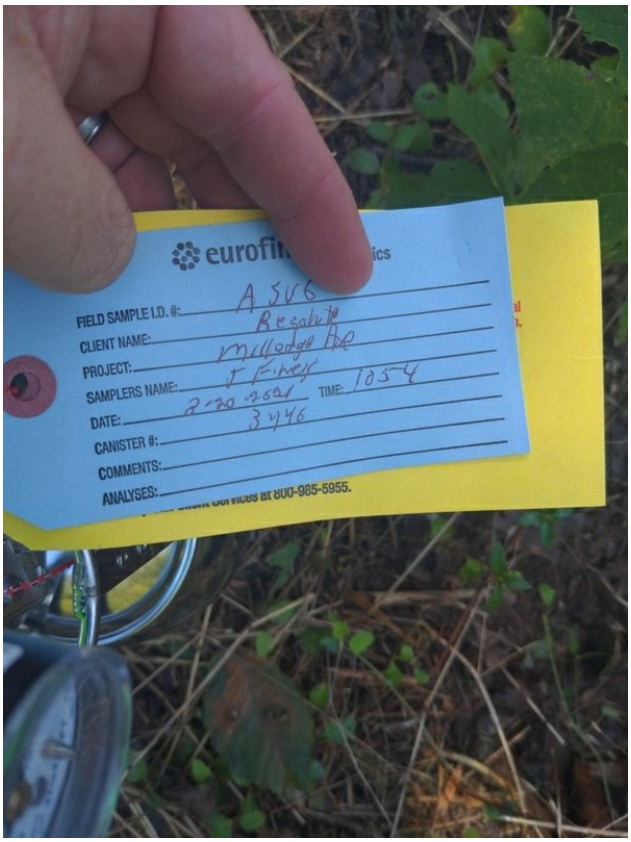
Helium Leak Test Information

Helium Leak Test Performed	Yes
Helium % Start	52
Helium % Final	45
Helium In Implant (PPM or %)	0
Sample / Summa Can Information	

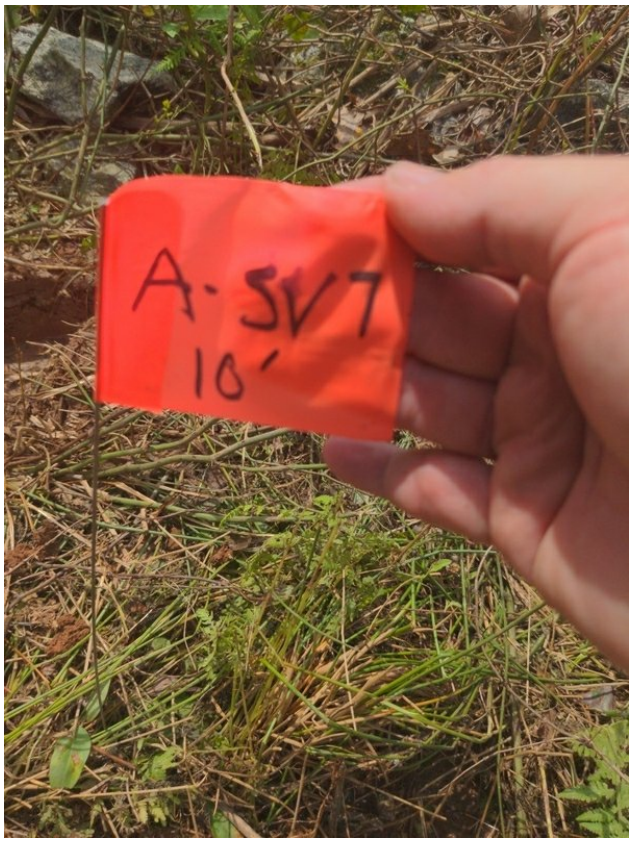
Sample Collection

Sample Collected?	Yes
Duplicate Sample Collected?	No
Sample Type	Soil Vapor
Other Field Parameters Collected?	No
Laboratory Sample ID	A SV-6
Summa Canister Certification	Batch Certified
Sample Date	2021-08-20
Analysis Requested	TO-15
Purge Volume (ml)	60
Shut In Test Completed	Yes
Flow Controller ID	23463

Flow Controller Photo ID	
Summa Canister ID	3121
Summa Can Photo ID	
Beginning Summa Vacuum	28

Ending Summa Vacuum	0
Sample Time Start	10:54
Sample End Time	11:00
Sample Tag Photo	

A SV-7, A SV-7

Sample Collected from Existing Implant	N/A
Photo of Implant	
Boring Number or ID	A SV-7
Longitude	-83.38521
Latitude	33.90598

Sample ID / Location ID

Implant Location (Address or Lat/Long)	Service Path Athens, Georgia 30606

Soil Vapor Implant Construction

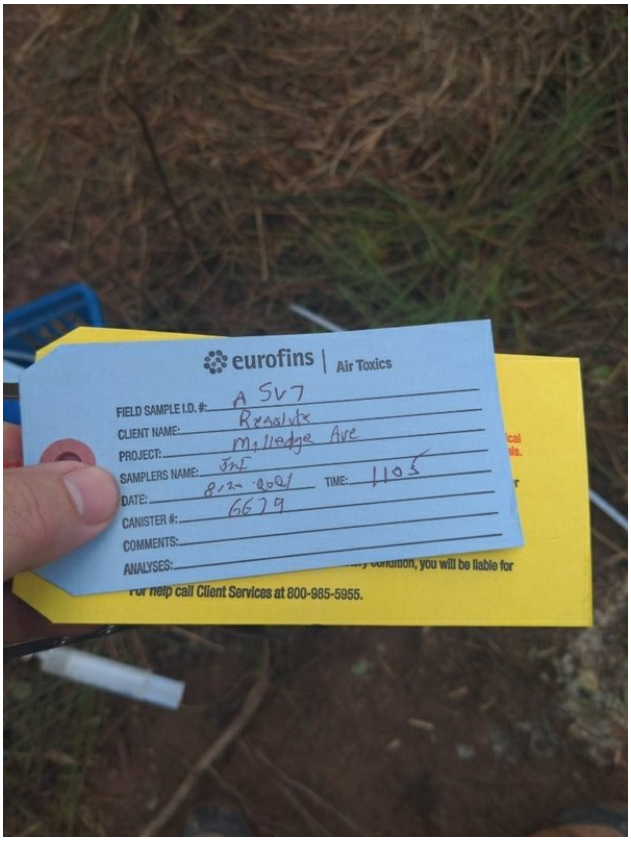
Implant Installed	Yes
Installation Date	2021-08-19
Installation Time	12:21
Temporary or Permanent Implant	Temporary
Installation Method	AMS GVP Kit - Borehole Creation
Borehole Diameter in Inches	1.65
Implant Type	Shallow Soil Vapor
Implant Material	Air-stone
Tubing Type	Nylaflow
Implant Depth in Inches	120
Sand Thickness (")	12
Bentonite Thickness (")	108
Helium Leak Test Information	

Helium Leak Test Information

Helium Leak Test Performed	Yes
Helium % Start	53
Helium % Final	50
Helium In Implant (PPM or %)	0
Sample / Summa Can Information	

Sample Collection

Sample Collected?	Yes
Duplicate Sample Collected?	No
Sample Type	Soil Vapor
Other Field Parameters Collected?	No
Laboratory Sample ID	A SV-7
Summa Canister Certification	Batch Certified
Sample Date	2021-08-18
Analysis Requested	TO-15
Purge Volume (ml)	180
Shut In Test Completed	Yes
Flow Controller ID	23787
Flow Controller Photo ID	
Summa Canister ID	1862

Summa Can Photo ID	
Beginning Summa Vacuum	28
Ending Summa Vacuum	0
Sample Time Start	11:05
Sample End Time	11:12
Sample Tag Photo	

A SV-8, A SV-8

Sample Collected from Existing Implant	No
Photo of Implant	
Boring Number or ID	A SV-8
Longitude	-83.38541
Latitude	33.90596

Sample ID / Location ID

Implant Location (Address or Lat/Long)	Service Path Athens, Georgia 30606

Soil Vapor Implant Construction

Implant Installed	Yes
Installation Date	2021-08-19
Installation Time	12:30
Temporary or Permanent Implant	Temporary
Installation Method	AMS GVP Kit - Borehole Creation
Borehole Diameter in Inches	1.65
Implant Type	Shallow Soil Vapor
Implant Material	Air-stone
Tubing Type	Nylaflow
Implant Depth in Inches	120
Sand Thickness (")	12
Bentonite Thickness (")	108
Helium Leak Test Information	

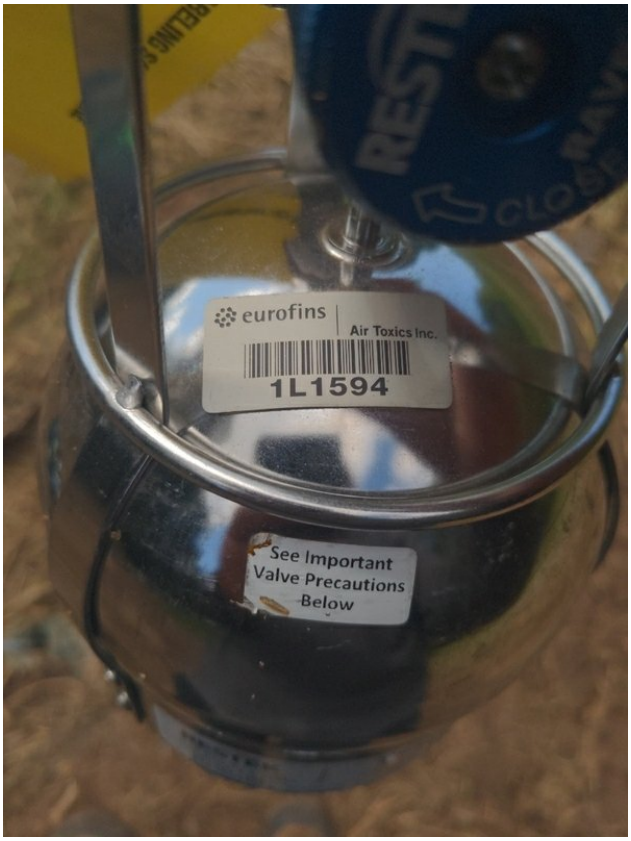
Helium Leak Test Information

Helium Leak Test Performed	Yes
Helium % Start	52
Helium % Final	47
Helium In Implant (PPM or %)	0
Sample / Summa Can Information	

Sample Collection

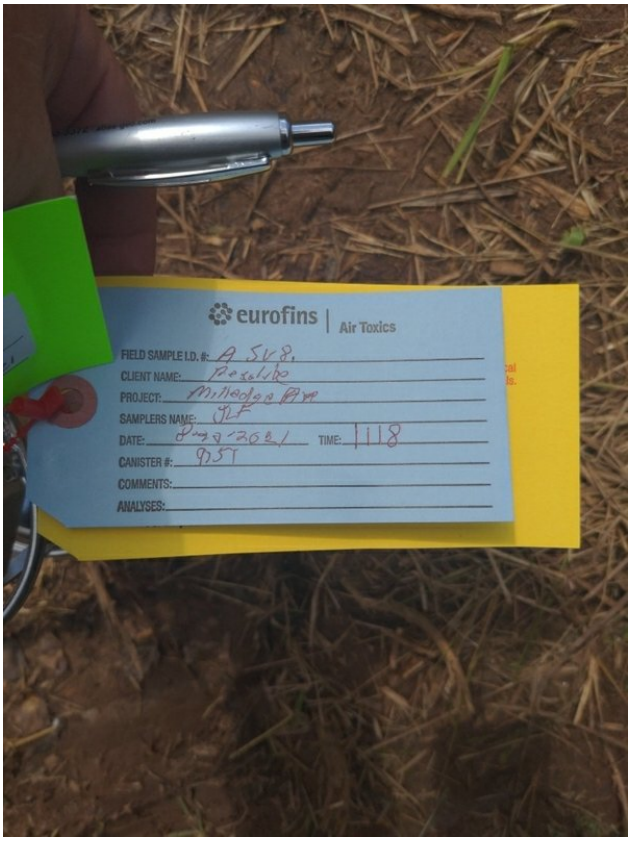
Sample Collected?	Yes
Duplicate Sample Collected?	No
Sample Type	Soil Vapor
Other Field Parameters Collected?	No
Laboratory Sample ID	A SV-8
Summa Canister Certification	Batch Certified
Sample Date	2021-08-20
Analysis Requested	TO-15
Purge Volume (ml)	60
Shut In Test Completed	Yes
Flow Controller ID	24720
Flow Controller Photo ID	
Summa Canister ID	1594

Summa Can Photo ID



Beginning Summa Vacuum	29
Ending Summa Vacuum	0
Sample Time Start	11:18
Sample End Time	11:24

Sample Tag Photo



B3 SV-9, B3 SV-9

Sample Collected from Existing Implant	No
Photo of Implant	
	

Boring Number or ID	B3 SV-9
Longitude	-83.38541
Latitude	33.90596

Sample ID / Location ID

Implant Location (Address or Lat/Long)	Service Path Athens, Georgia 30606

Soil Vapor Implant Construction

Implant Installed	Yes
Installation Date	2021-08-19
Installation Time	12:42
Temporary or Permanent Implant	Temporary
Installation Method	AMS GVP Kit - Borehole Creation
Borehole Diameter in Inches	1.65
Implant Type	Shallow Soil Vapor
Implant Material	Air-stone
Tubing Type	Nylaflow
Implant Depth in Inches	144
Sand Thickness (")	12
Bentonite Thickness (")	132
Helium Leak Test Information	

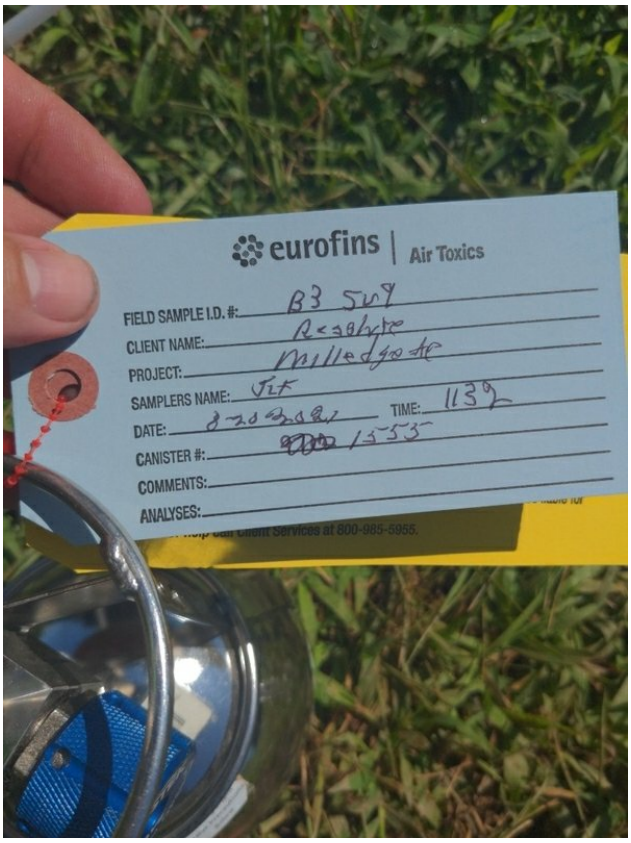
Helium Leak Test Information

Helium Leak Test Performed	Yes
Helium % Start	52
Helium % Final	44
Helium In Implant (PPM or %)	0
Sample / Summa Can Information	

Sample Collection

Sample Collected?	Yes
Duplicate Sample Collected?	No
Sample Type	Soil Vapor
Other Field Parameters Collected?	No
Laboratory Sample ID	B3 SV-9
Summa Canister Certification	Batch Certified
Sample Date	2021-08-20
Analysis Requested	TO-15
Purge Volume (ml)	60
Shut In Test Completed	Yes
Flow Controller ID	23652

Flow Controller Photo ID	
Summa Canister ID	1555
Summa Can Photo ID	
Sample Time Start	11:32

Sample End Time	11:39
Sample Tag Photo	

B3 SV-10, B3 SV-10

Sample Collected from Existing Implant	No
Photo of Implant	
Boring Number or ID	B3 SV-10
Longitude	-83.38541
Latitude	33.90596

Sample ID / Location ID

Implant Location (Address or Lat/Long)	Service Path Athens, Georgia 30606

Soil Vapor Implant Construction

Implant Installed	Yes
Installation Date	2021-08-19
Installation Time	12:50
Temporary or Permanent Implant	Temporary
Installation Method	AMS GVP Kit - Borehole Creation
Borehole Diameter in Inches	1.65
Implant Type	Shallow Soil Vapor
Implant Material	Air-stone
Tubing Type	Nylaflow
Implant Depth in Inches	240
Sand Thickness (")	12
Bentonite Thickness (")	228
Helium Leak Test Information	

Helium Leak Test Information

Helium Leak Test Performed	Yes
Helium % Start	42
Helium % Final	38
Helium In Implant (PPM or %)	0
Sample / Summa Can Information	

Sample Collection

Sample Collected?	Yes
Duplicate Sample Collected?	No
Sample Type	Soil Vapor
Other Field Parameters Collected?	No
Laboratory Sample ID	B3 SV-10
Summa Canister Certification	Batch Certified
Sample Date	2021-08-20
Analysis Requested	TO-15
Purge Volume (ml)	60
Shut In Test Completed	Yes
Flow Controller ID	23699
Flow Controller Photo ID	
Summa Canister ID	1853

Summa Can Photo ID	
Beginning Summa Vacuum	28
Ending Summa Vacuum	0
Sample Time Start	11:42
Sample End Time	11:52
Sample Tag Photo	

B3 SV-11, B3 SV-11

Sample Collected from Existing Implant	No
Photo of Implant	
Boring Number or ID	B3 SV-11
Longitude	-83.38552
Latitude	33.90581

Sample ID / Location ID

Implant Location (Address or Lat/Long)	Service Path Athens, Georgia 30606

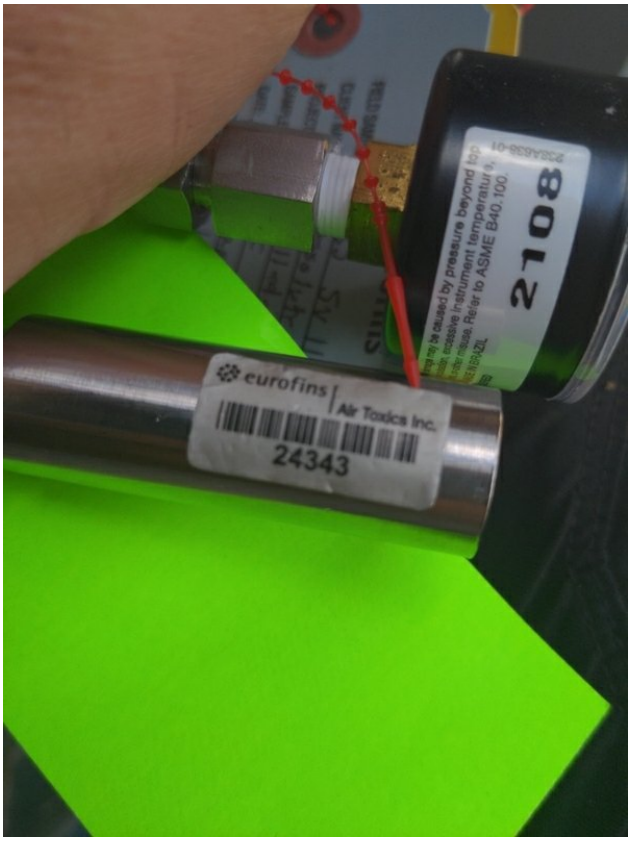
Soil Vapor Implant Construction

Implant Installed	Yes
Installation Date	2021-08-19
Installation Time	12:55
Temporary or Permanent Implant	Temporary
Installation Method	AMS GVP Kit - Borehole Creation
Borehole Diameter in Inches	1.65
Implant Type	Shallow Soil Vapor
Implant Material	Air-stone
Tubing Type	Nylaflow
Implant Depth in Inches	120
Sand Thickness (")	12
Bentonite Thickness (")	108
Helium Leak Test Information	

Helium Leak Test Information

Helium Leak Test Performed	Yes
Helium % Start	43
Helium % Final	35
Helium In Implant (PPM or %)	0
Sample / Summa Can Information	

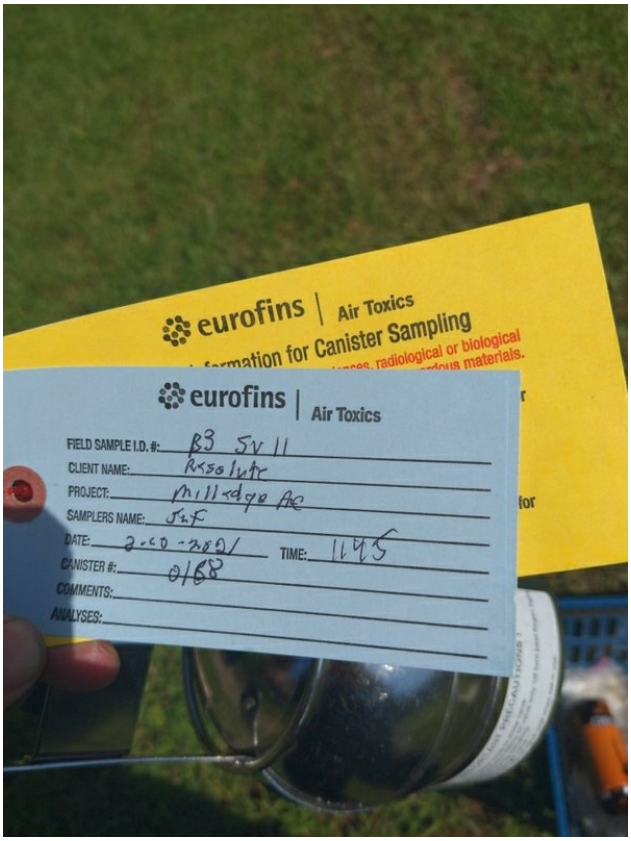
Sample Collection

Sample Collected?	Yes
Duplicate Sample Collected?	No
Sample Type	Soil Vapor
Other Field Parameters Collected?	No
Laboratory Sample ID	B3 SV-11
Summa Canister Certification	Batch Certified
Sample Date	2021-08-18
Analysis Requested	TO-15
Purge Volume (ml)	60
Shut In Test Completed	Yes
Flow Controller ID	24343
Flow Controller Photo ID	
Summa Canister ID	1788

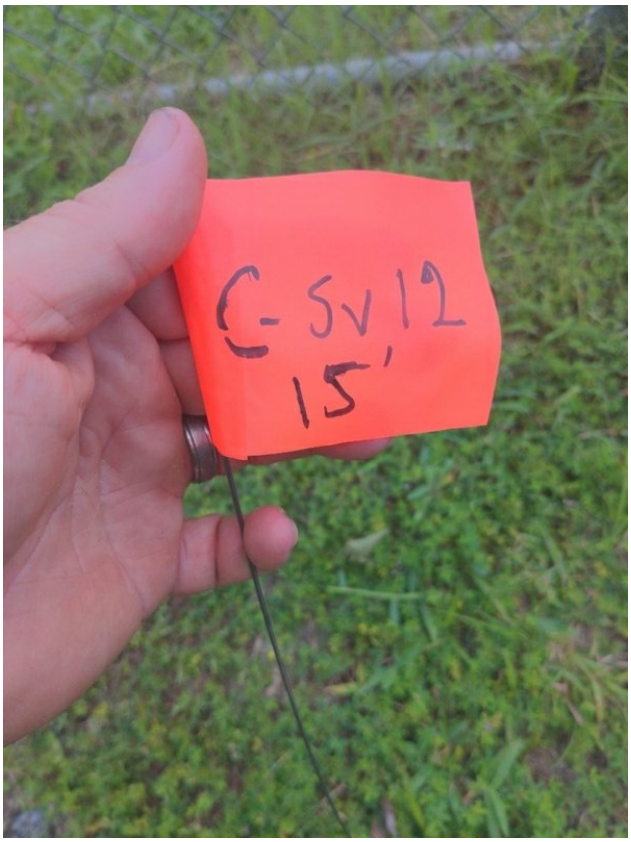
Summa Can Photo ID

Beginning Summa Vacuum	28
Ending Summa Vacuum	0
Sample Time Start	11:45
Sample End Time	11:52

Sample Tag Photo



C SV-12, C SV-12

Sample Collected from Existing Implant	No
Photo of Implant	 

Boring Number or ID	C SV-12
Longitude	-83.38549
Latitude	33.90582

Sample ID / Location ID

Implant Location (Address or Lat/Long)	Service Path Athens, Georgia 30606

Soil Vapor Implant Construction

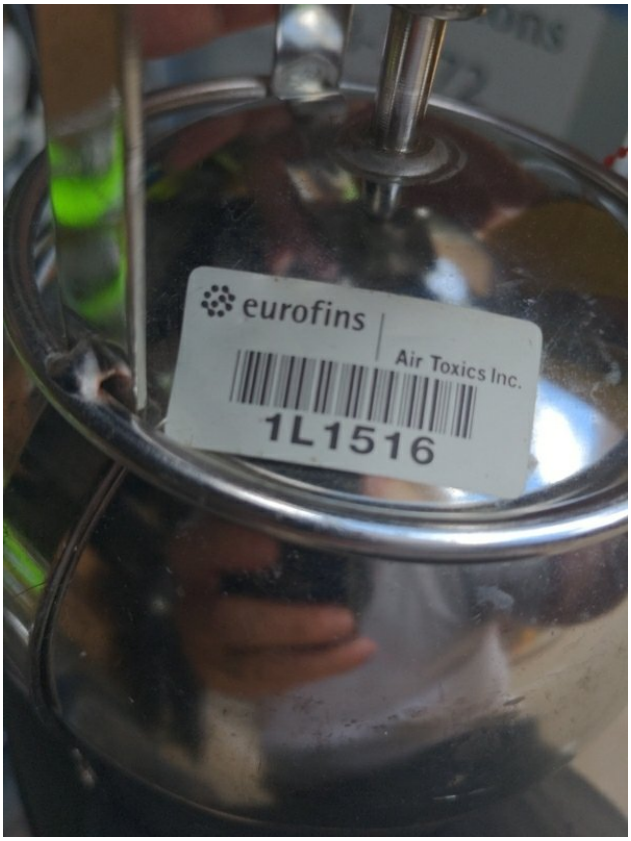
Implant Installed	Yes
Installation Date	2021-08-19
Installation Time	13:15
Temporary or Permanent Implant	Temporary
Installation Method	AMS GVP Kit - Borehole Creation
Borehole Diameter in Inches	1.65
Implant Type	Shallow Soil Vapor
Implant Material	Air-stone
Tubing Type	Nylaflow
Implant Depth in Inches	180
Sand Thickness (")	12
Bentonite Thickness (")	168
Helium Leak Test Information	

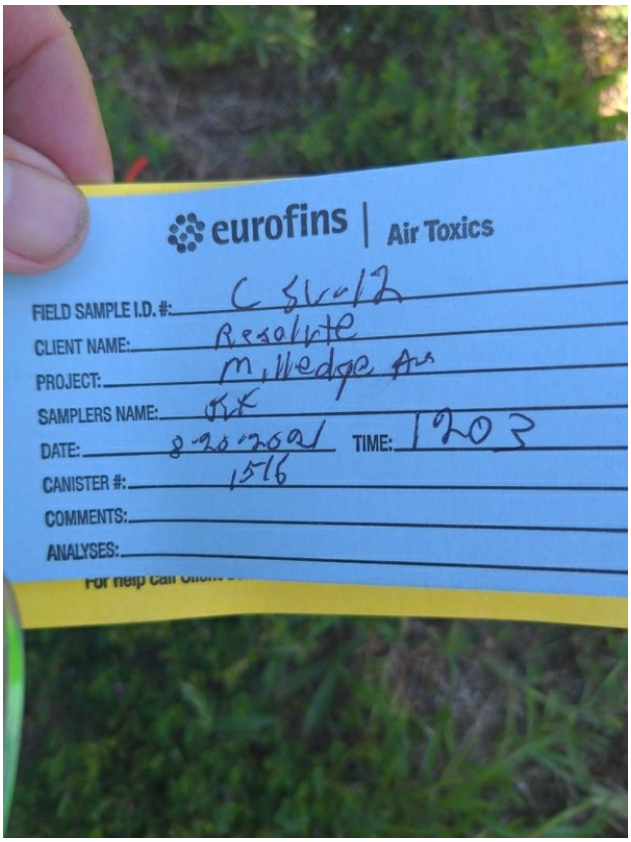
Helium Leak Test Information

Helium Leak Test Performed	Yes
Helium % Start	53
Helium % Final	48
Helium In Implant (PPM or %)	0
Sample / Summa Can Information	

Sample Collection

Sample Collected?	Yes
Duplicate Sample Collected?	No
Sample Type	Soil Vapor
Other Field Parameters Collected?	No
Laboratory Sample ID	C SV-12
Summa Canister Certification	Batch Certified
Sample Date	2021-08-20
Analysis Requested	TO-15
Purge Volume (ml)	180
Shut In Test Completed	Yes
Flow Controller ID	24285

Flow Controller Photo ID	
Summa Canister ID	1516
Summa Can Photo ID	
Beginning Summa Vacuum	28

Ending Summa Vacuum	0
Sample Time Start	12:03
Sample End Time	12:10
Sample Tag Photo	

C SV-13, C SV-13

Sample Collected from Existing Implant	No

Photo of Implant

Boring Number or ID	C SV-13
Longitude	-83.38549
Latitude	33.90582

Sample ID / Location ID

Implant Location (Address or Lat/Long)	Service Path Athens, Georgia 30606

Soil Vapor Implant Construction

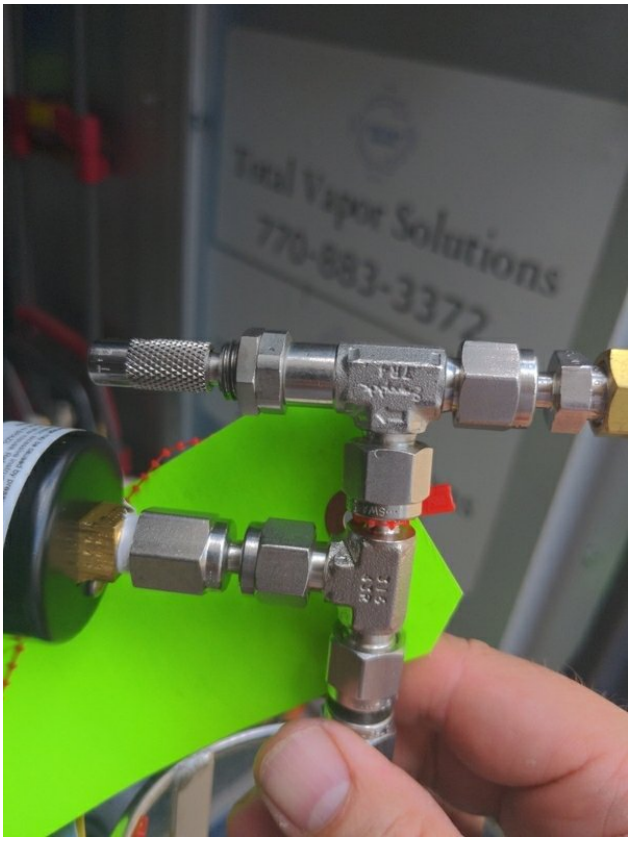
Implant Installed	Yes
Installation Date	2021-08-19
Installation Time	13:29
Temporary or Permanent Implant	Temporary
Installation Method	AMS GVP Kit - Borehole Creation
Borehole Diameter in Inches	1.65
Implant Type	Shallow Soil Vapor
Implant Material	Air-stone
Tubing Type	Nylaflow
Implant Depth in Inches	240
Sand Thickness (")	12
Bentonite Thickness (")	228
Helium Leak Test Information	

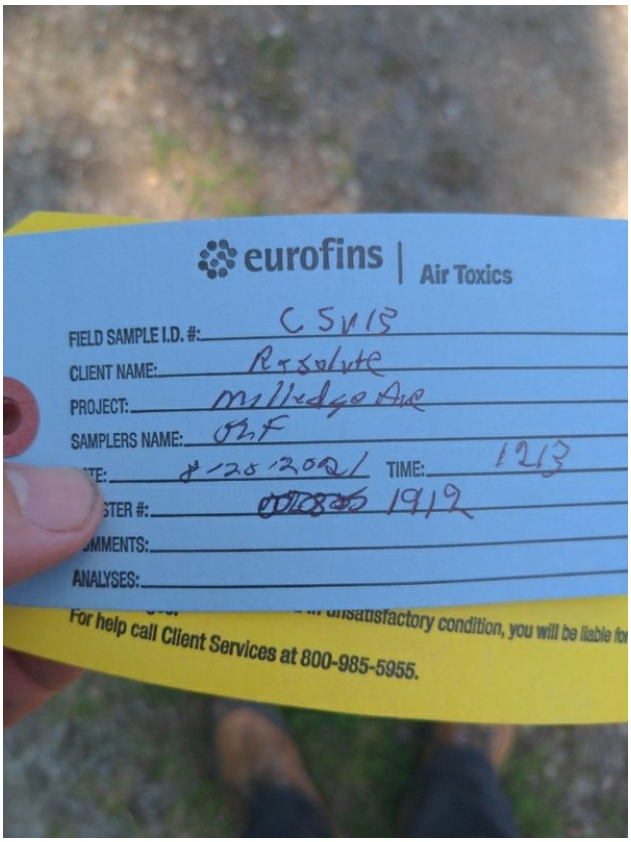
Helium Leak Test Information

Helium Leak Test Performed	Yes
Helium % Start	51
Helium % Final	47
Helium In Implant (PPM or %)	0
Sample / Summa Can Information	

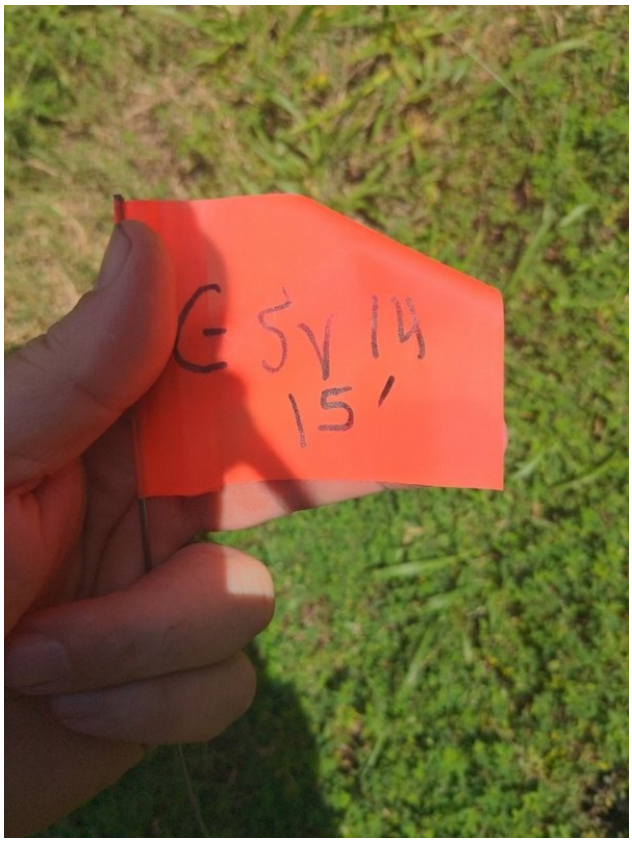
Sample Collection

Sample Collected?	Yes
Duplicate Sample Collected?	No
Sample Type	Soil Vapor
Other Field Parameters Collected?	No
Laboratory Sample ID	C SV-13
Summa Canister Certification	Batch Certified
Sample Date	2021-08-20
Analysis Requested	TO-15
Purge Volume (ml)	60
Shut In Test Completed	Yes
Flow Controller ID	0

Flow Controller Photo ID	
Summa Canister ID	1912
Summa Can Photo ID	
Beginning Summa Vacuum	28

Ending Summa Vacuum	0
Sample Time Start	12:13
Sample End Time	12:20
Sample Tag Photo	

C SV-14, C SV-14

Sample Collected from Existing Implant	No
Photo of Implant	
Boring Number or ID	C SV-14
Longitude	-83.38499
Latitude	33.90543

Sample ID / Location ID

Implant Location (Address or Lat/Long)	Service Path Athens, Georgia 30606

Soil Vapor Implant Construction

Implant Installed	Yes
Installation Date	2021-08-19
Installation Time	13:37
Temporary or Permanent Implant	Temporary
Installation Method	AMS GVP Kit - Borehole Creation
Borehole Diameter in Inches	1.65
Implant Type	Shallow Soil Vapor
Implant Material	Air-stone
Tubing Type	Nylaflow
Implant Depth in Inches	180
Sand Thickness (")	12
Bentonite Thickness (")	148
Helium Leak Test Information	

Helium Leak Test Information

Helium Leak Test Performed	Yes
Helium % Start	47
Helium % Final	41
Helium In Implant (PPM or %)	0
Sample / Summa Can Information	

Sample Collection

Sample Collected?	Yes
Duplicate Sample Collected?	No
Sample Type	Soil Vapor
Other Field Parameters Collected?	No
Laboratory Sample ID	C SV-14
Summa Canister Certification	Batch Certified
Sample Date	2021-08-20
Analysis Requested	TO-15
Purge Volume (ml)	180
Shut In Test Completed	Yes
Flow Controller ID	23381
Flow Controller Photo ID	
Summa Canister ID	3136

Summa Can Photo ID

Beginning Summa Vacuum	29
Ending Summa Vacuum	0
Sample Time Start	12:25
Sample End Time	12:33

Sample Tag Photo

Laboratory	eurofins
Sample Shipping Information	

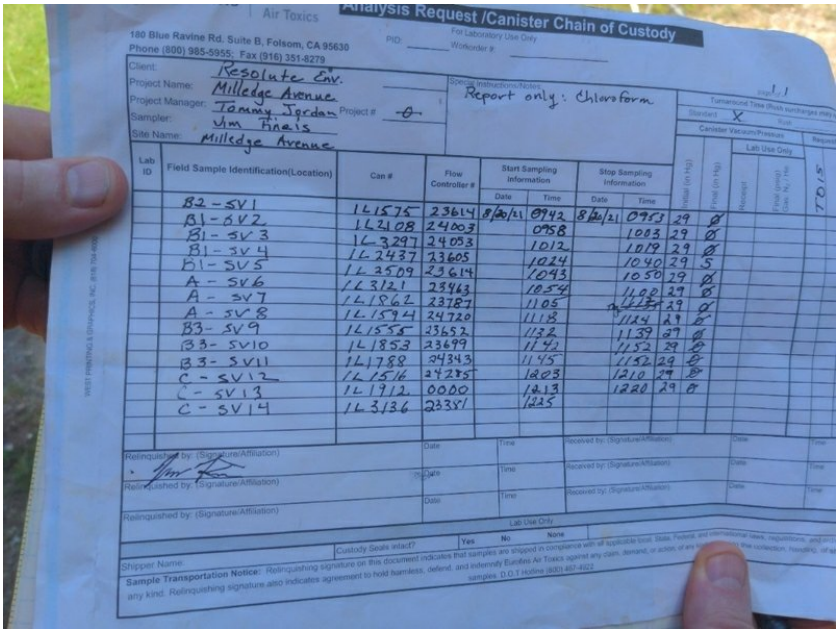
Signature of Sampler or Installer

Signed 2021-08-20 12:29:14 EDT

Client Signature

Signed 2021-08-20 12:29:09 EDT

Photo of Chain of Custody



Air Toxics

Analysis Request /Canister Chain of Custody

180 Blue Ravine Rd. Suite B, Folsom, CA 95630
Phone (800) 985-5955; Fax (916) 351-8279

For Laboratory Use Only
PID: _____ Workorder #: _____

Client: Resolute Env.
Project Name: Milledge Avenue
Project Manager: Tammy Jordan Project # -0-
Sampler: Jim Fineis
Site Name: Milledge Avenue

Special Instructions/Notes: Report only: Chloroform

Turnaround Time (Rush surcharges may apply): Standard X

Canister Vacuum/Pressure

Lab ID	Field Sample Identification(Location)	Can #	Flow Controller #	Start Sampling Information Date	Start Sampling Information Time	Stop Sampling Information Date	Stop Sampling Information Time	Initial (in Hg)	Final (in Hg)	Lab Use Only: Receipt	Lab Use Only: Final (min) Can N./ He	TO-15
	B2 - SV1	1L1575	23614	8/20/21	0942	8/20/21	0953	29	0			
	B1 - SV2	1L2108	24003		0958		1003	29	0			
	B1 - SV3	1L3297	24053		1012		1019	29	0			
	B1 - SV4	1L2437	23605		1024		1040	29	5			
	B1 - SV5	1L2509	23614		1043		1050	29	0			
	A - SV6	1L3121	23963		1054		1102	29	0			
	A - SV7	1L1862	23787		1105		1114	29	0			
	A - SV8	1L1594	24720		1118		1124	29	0			
	B3 - SV9	1L1555	23652		1132		1139	29	0			
	B3 - SV10	1L1853	23699		1142		1152	29	0			
	B3 - SV11	1L1788	24343		1145		1152	29	0			
	C - SV12	1L1516	24285		1203		1210	29	0			
	C - SV13	1L1712	0000		1213		1220	29	0			
	C - SV14	1L3136	23381		1225							

Relinquished by: (Signature/Affiliation) Date Time Received by: (Signature/Affiliation) Date Time

Relinquished by: (Signature/Affiliation) Date Time Received by: (Signature/Affiliation) Date Time

Relinquished by: (Signature/Affiliation) Date Time Received by: (Signature/Affiliation) Date Time

Lab Use Only

Shipper Name: Custody Seals intact? Yes No None

Sample Transportation Notice: Relinquishing signature on this document indicates that samples are shipped in compliance with all applicable local, State, Federal, and international laws, regulations, and any kind. Relinquishing signature also indicates agreement to hold harmless, defend, and indemnify Eurofins Air Toxics against any claim, demand, or action, of any kind, arising out of the collection, handling, of samples. D.O.T Hotline (800) 467-4922

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ANALYTICAL REPORT

Eurofins TestAmerica, Savannah
5102 LaRoche Avenue
Savannah, GA 31404
Tel: (912)354-7858

Laboratory Job ID: 680-203358-1
Client Project/Site: Milledge Avenue

For:
Resolute Env & Water Res Consulting LLC
1003 Weatherstone Parkway
Suite 320
Woodstock, Georgia 30188

Attn: Tommy Jordan

Authorized for release by:
9/7/2021 5:37:18 PM

John Andros, Project Manager I
(404)944-4744
john.andros@eurofinset.com

Definitions/Glossary

Client: Resolute Env & Water Res Consulting LLC
Job ID: 680-203358-1
Project/Site: Milledge Avenue

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

Sample Summary

Client: Resolute Env & Water Res Consulting LLC
Job ID: 680-203358-1
Project/Site: Milledge Avenue

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
680-203358-1	B2-SV1	Air	08/20/21 09:53	08/24/21 16:18
680-203358-2	B1-SV2	Air	08/20/21 10:03	08/24/21 16:18
680-203358-3	B1-SV3	Air	08/20/21 10:19	08/24/21 16:18
680-203358-4	B1-SV4	Air	08/20/21 10:40	08/24/21 16:18
680-203358-5	B1-SV5	Air	08/20/21 10:50	08/24/21 16:18
680-203358-6	A-SV6	Air	08/20/21 11:00	08/24/21 16:18
680-203358-7	A-SV7	Air	08/20/21 11:12	08/24/21 16:18
680-203358-8	A-SV8	Air	08/20/21 11:24	08/24/21 16:18
680-203358-9	B3-SV9	Air	08/20/21 11:39	08/24/21 16:18
680-203358-10	B3-SV10	Air	08/20/21 11:52	08/24/21 16:18
680-203358-11	B3-SV11	Air	08/20/21 11:52	08/24/21 16:18
680-203358-12	C-SV12	Air	08/20/21 12:10	08/24/21 16:18
680-203358-13	C-SV13	Air	08/20/21 12:20	08/24/21 16:18
680-203358-14	C-SV14	Air	08/20/21 12:33	08/24/21 16:18

Case Narrative

Client: Resolute Env & Water Res Consulting LLC
Project/Site: Milledge Avenue

Job ID: 680-203358-1

Job ID: 680-203358-1

Laboratory: Eurofins TestAmerica, Savannah

Narrative

Job Narrative
680-203358-1

Comments
No additional comments.

Receipt
The samples were received on 8/21/2021 9:35 AM. Unless otherwise noted below, the samples arrived in good condition, and where required, properly preserved and on ice.

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

9/7/2021
Mr. John Andros
Eurofins Test America
5102 LaRoche

Savannah GA 31404

Project Name: Milledge Avenue
Project #: ø
Workorder #: 2108513

Dear Mr. John Andros

The following report includes the data for the above referenced project for sample(s) received on 8/21/2021 at Eurofins Air Toxics LLC.

The data and associated QC analyzed by TO-15 are compliant with the project requirements or laboratory criteria with the exception of the deviations noted in the attached case narrative.

Thank you for choosing Eurofins Air Toxics LLC. for your air analysis needs. Eurofins Air Toxics Inc. is committed to providing accurate data of the highest quality. Please feel free to contact the Project Manager: Brian Whittaker at 916-985-1000 if you have any questions regarding the data in this report.

Regards,

Brian Whittaker

Project Manager

WORK ORDER #: 2108513

Work Order Summary

CLIENT:	Mr. John Andros Eurofins Test America 5102 LaRoche Savannah, GA 31404	**BILL TO:**	Accounts Payable Eurofins Test America 4104 Shuffel St NW North Canton, OH 44720
PHONE:	912-354-7858	**P.O. #**	680-203358-1
FAX:		**PROJECT #**	ø Milledge Avenue
DATE RECEIVED:	08/21/2021	**CONTACT:**	Brian Whittaker
DATE COMPLETED:	09/07/2021		

FRACTION #	NAME	TEST	RECEIPT VAC./PRES.	FINAL PRESSURE
01A	B2-SV1	TO-15	1.4 "Hg	9.8 psi
02A	B1-SV2	TO-15	4.5 "Hg	9.8 psi
03A	B1-SV3	TO-15	3.1 "Hg	9.9 psi
04A	B1-SV4	TO-15	5.9 "Hg	9.9 psi
05A	B1-SV5	TO-15	3.3 "Hg	10.1 psi
06A	A-SV6	TO-15	2.4 "Hg	9.9 psi
07A	A-SV7	TO-15	2.2 "Hg	10 psi
08A	A-SV8	TO-15	2.8 "Hg	10.1 psi
09A	B3-SV9	TO-15	3.1 "Hg	9.9 psi
10A	B3-SV10	TO-15	2.4 "Hg	10.1 psi
11A	B3-SV11	TO-15	3.3 "Hg	10 psi
12A	C-SV12	TO-15	2.8 "Hg	10 psi
13A	C-SV13	TO-15	2.8 "Hg	9.8 psi
14A	C-SV14	TO-15	2.8 "Hg	9.9 psi
15A	Lab Blank	TO-15	NA	NA
15B	Lab Blank	TO-15	NA	NA
16A	CCV	TO-15	NA	NA
16B	CCV	TO-15	NA	NA
17A	LCS	TO-15	NA	NA
17AA	LCSD	TO-15	NA	NA
17B	LCS	TO-15	NA	NA
17BB	LCSD	TO-15	NA	NA

CERTIFIED BY: Heidi Rayos DATE: 09/07/21

Technical Director

Certification numbers: AZ Licensure AZ0775, FL NELAP – E87680, LA NELAP – 02089, NH NELAP - 209220, NJ NELAP - CA016, NY NELAP - 11291, TX NELAP - T104704434-20-16, UT NELAP – CA009332020-12, VA NELAP - 10615, WA NELAP - C935
Name of Accreditation Body: NELAP/ORELAP (Oregon Environmental Laboratory Accreditation Program)
Accreditation number: CA300005-014, Effective date: 10/18/2020, Expiration date: 10/17/2021.
Eurofins Air Toxics, LLC certifies that the test results contained in this report meet all requirements of the NELAC standards

180 BLUE RAVINE ROAD, SUITE B FOLSOM, CA - 95630
(916) 985-1000 . (800) 985-5955 . FAX (916) 351-8279

LABORATORY NARRATIVE
EPA Method TO-15
Eurofins Test America
Workorder# 2108513

Fourteen 1 Liter Summa Canister samples were received on August 21, 2021. The laboratory performed analysis via EPA Method TO-15 using GC/MS in the full scan mode.

Receiving Notes

The Chain of Custody (COC) was not relinquished properly. A signature with date and time was not provided by the field sampler.

The Chain of Custody (COC) information for samples B2-SV1, B1-SV2, B1-SV3, B1-SV4, B1-SV5, A-SV6, A-SV7, A-SV8, B3-SV9, B3-SV10, B3-SV11, C-SV12, C-SV13 and C-SV14 did not match the entries on the sample tags with regard to sample identification. Therefore the information on the COC was used to process and report the samples.

Analytical Notes

Dilution was performed on samples A-SV6, A-SV7, C-SV12, C-SV13 and C-SV14 due to the presence of high level target species.

Definition of Data Qualifying Flags

Ten qualifiers may have been used on the data analysis sheets and indicates as follows:

B - Compound present in laboratory blank greater than reporting limit (background subtraction not performed).
J - Estimated value.
E - Exceeds instrument calibration range.
S - Saturated peak.
Q - Exceeds quality control limits.
U - Compound analyzed for but not detected above the reporting limit, LOD, or MDL value. See data page for project specific U-flag definition.
UJ- Non-detected compound associated with low bias in the CCV
N - The identification is based on presumptive evidence.
M - Reported value may be biased due to apparent matrix interferences.
CN - See Case Narrative.

File extensions may have been used on the data analysis sheets and indicates as follows:
a-File was requantified
b-File was quantified by a second column and detector
r1-File was requantified for the purpose of reissue

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Summary of Detected Compounds
EPA METHOD TO-15 GC/MS FULL SCAN

Client Sample ID: B2-SV1

Lab ID#: 2108513-01A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Chloroform	0.88	0.89	4.3	4.4

Client Sample ID: B1-SV2

Lab ID#: 2108513-02A

No Detections Were Found.

Client Sample ID: B1-SV3

Lab ID#: 2108513-03A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Chloroform	0.94	5.6	4.6	27

Client Sample ID: B1-SV4

Lab ID#: 2108513-04A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Chloroform	1.0	13	5.1	66

Client Sample ID: B1-SV5

Lab ID#: 2108513-05A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Chloroform	0.95	54	4.6	260
Carbon Tetrachloride	0.95	30	6.0	190
Tetrachloroethene	0.95	16	6.4	110

Client Sample ID: A-SV6

Lab ID#: 2108513-06A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Chloroform	2.3	500	11	2400
Carbon Tetrachloride	2.3	61	14	390

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Summary of Detected Compounds
EPA METHOD TO-15 GC/MS FULL SCAN

Client Sample ID: A-SV6

Lab ID#: 2108513-06A

Tetrachloroethene	2.3	22	15	150

Client Sample ID: A-SV7

Lab ID#: 2108513-07A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Chloroform	2.3	510	11	2500
Carbon Tetrachloride	2.3	25	14	160
Tetrachloroethene	2.3	13	15	90

Client Sample ID: A-SV8

Lab ID#: 2108513-08A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Chloroform	0.93	5.3	4.5	26
Carbon Tetrachloride	0.93	1.6	5.8	10
Tetrachloroethene	0.93	2.8	6.3	19

Client Sample ID: B3-SV9

Lab ID#: 2108513-09A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Chloroform	0.94	3.0	4.6	15
Carbon Tetrachloride	0.94	5.5	5.9	35
Tetrachloroethene	0.94	3.8	6.3	25

Client Sample ID: B3-SV10

Lab ID#: 2108513-10A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Chloroform	0.92	54	4.5	260
Carbon Tetrachloride	0.92	43	5.8	270
Tetrachloroethene	0.92	13	6.2	89

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Summary of Detected Compounds
EPA METHOD TO-15 GC/MS FULL SCAN

Client Sample ID: B3-SV11

Lab ID#: 2108513-11A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Chloroform	0.94	20	4.6	96
Carbon Tetrachloride	0.94	24	5.9	150
Tetrachloroethene	0.94	9.9	6.4	67

Client Sample ID: C-SV12

Lab ID#: 2108513-12A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Chloroform	9.2	1600	45	8000
Carbon Tetrachloride	9.2	590	58	3700
Tetrachloroethene	9.2	19	63	130

Client Sample ID: C-SV13

Lab ID#: 2108513-13A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Chloroform	18	3800	90	19000
Carbon Tetrachloride	18	1800	120	11000

Client Sample ID: C-SV14

Lab ID#: 2108513-14A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Chloroform	31	4500	150	22000
Carbon Tetrachloride	31	460	190	2900
1,2-Dichloroethane	31	100	120	400

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Client Sample ID: B2-SV1

Lab ID#: 2108513-01A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**a083023**	**Date of Collection: 8/20/21 9:53:00 AM**	
Dil. Factor:	**1.75**	**Date of Analysis: 8/30/21 09:52 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Chloroform	0.88	0.89	4.3	4.4
Carbon Tetrachloride	0.88	Not Detected	5.5	Not Detected
1,2-Dichloroethane	0.88	Not Detected	3.5	Not Detected
1,2-Dichloropropane	0.88	Not Detected	4.0	Not Detected
Tetrachloroethene	0.88	Not Detected	5.9	Not Detected
1,4-Dioxane	3.5	Not Detected	13	Not Detected

Container Type: 1 Liter Summa Canister

Surrogates	%Recovery	Method Limits
Toluene-d8	98	70-130
1,2-Dichloroethane-d4	86	70-130
4-Bromofluorobenzene	95	70-130

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Client Sample ID: B1-SV2

Lab ID#: 2108513-02A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**a083024**	**Date of Collection: 8/20/21 10:03:00 AM**	
Dil. Factor:	**1.96**	**Date of Analysis: 8/30/21 10:18 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Chloroform	0.98	Not Detected	4.8	Not Detected
Carbon Tetrachloride	0.98	Not Detected	6.2	Not Detected
1,2-Dichloroethane	0.98	Not Detected	4.0	Not Detected
1,2-Dichloropropane	0.98	Not Detected	4.5	Not Detected
Tetrachloroethene	0.98	Not Detected	6.6	Not Detected
1,4-Dioxane	3.9	Not Detected	14	Not Detected

Container Type: 1 Liter Summa Canister

Surrogates	%Recovery	Method Limits
Toluene-d8	98	70-130
1,2-Dichloroethane-d4	85	70-130
4-Bromofluorobenzene	94	70-130

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Client Sample ID: B1-SV3

Lab ID#: 2108513-03A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**a083025**	**Date of Collection: 8/20/21 10:19:00 AM**	
Dil. Factor:	**1.87**	**Date of Analysis: 8/30/21 10:44 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Chloroform	0.94	5.6	4.6	27
Carbon Tetrachloride	0.94	Not Detected	5.9	Not Detected
1,2-Dichloroethane	0.94	Not Detected	3.8	Not Detected
1,2-Dichloropropane	0.94	Not Detected	4.3	Not Detected
Tetrachloroethene	0.94	Not Detected	6.3	Not Detected
1,4-Dioxane	3.7	Not Detected	13	Not Detected

Container Type: 1 Liter Summa Canister

Surrogates	%Recovery	Method Limits
Toluene-d8	99	70-130
1,2-Dichloroethane-d4	86	70-130
4-Bromofluorobenzene	94	70-130

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Client Sample ID: B1-SV4

Lab ID#: 2108513-04A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**a083026**	**Date of Collection:**	**8/20/21 10:40:00 AM**
Dil. Factor:	**2.08**	**Date of Analysis:**	**8/30/21 11:11 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Chloroform	1.0	13	5.1	66
Carbon Tetrachloride	1.0	Not Detected	6.5	Not Detected
1,2-Dichloroethane	1.0	Not Detected	4.2	Not Detected
1,2-Dichloropropane	1.0	Not Detected	4.8	Not Detected
Tetrachloroethene	1.0	Not Detected	7.0	Not Detected
1,4-Dioxane	4.2	Not Detected	15	Not Detected

Container Type: 1 Liter Summa Canister

Surrogates	%Recovery	Method Limits
Toluene-d8	98	70-130
1,2-Dichloroethane-d4	84	70-130
4-Bromofluorobenzene	95	70-130

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Client Sample ID: B1-SV5

Lab ID#: 2108513-05A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**a083027**	**Date of Collection: 8/20/21 10:50:00 AM**	
Dil. Factor:	**1.90**	**Date of Analysis: 8/30/21 11:37 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Chloroform	0.95	54	4.6	260
Carbon Tetrachloride	0.95	30	6.0	190
1,2-Dichloroethane	0.95	Not Detected	3.8	Not Detected
1,2-Dichloropropane	0.95	Not Detected	4.4	Not Detected
Tetrachloroethene	0.95	16	6.4	110
1,4-Dioxane	3.8	Not Detected	14	Not Detected

Container Type: 1 Liter Summa Canister

Surrogates	%Recovery	Method Limits
Toluene-d8	98	70-130
1,2-Dichloroethane-d4	84	70-130
4-Bromofluorobenzene	94	70-130

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Client Sample ID: A-SV6

Lab ID#: 2108513-06A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**a083028**	**Date of Collection:**	**8/20/21 11:00:00 AM**
Dil. Factor:	**4.55**	**Date of Analysis:**	**8/31/21 12:02 AM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Chloroform	2.3	500	11	2400
Carbon Tetrachloride	2.3	61	14	390
1,2-Dichloroethane	2.3	Not Detected	9.2	Not Detected
1,2-Dichloropropane	2.3	Not Detected	10	Not Detected
Tetrachloroethene	2.3	22	15	150
1,4-Dioxane	9.1	Not Detected	33	Not Detected

Container Type: 1 Liter Summa Canister

Surrogates	%Recovery	Method Limits
Toluene-d8	97	70-130
1,2-Dichloroethane-d4	84	70-130
4-Bromofluorobenzene	95	70-130

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Client Sample ID: A-SV7

Lab ID#: 2108513-07A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**a083029**	**Date of Collection: 8/20/21 11:17:00 AM**	
Dil. Factor:	**4.53**	**Date of Analysis: 8/31/21 12:26 AM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Chloroform	2.3	510	11	2500
Carbon Tetrachloride	2.3	25	14	160
1,2-Dichloroethane	2.3	Not Detected	9.2	Not Detected
1,2-Dichloropropane	2.3	Not Detected	10	Not Detected
Tetrachloroethene	2.3	13	15	90
1,4-Dioxane	9.1	Not Detected	33	Not Detected

Container Type: 1 Liter Summa Canister

Surrogates	%Recovery	Method Limits
Toluene-d8	96	70-130
1,2-Dichloroethane-d4	84	70-130
4-Bromofluorobenzene	94	70-130

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Client Sample ID: A-SV8

Lab ID#: 2108513-08A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**a083030**	**Date of Collection:**	**8/20/21 11:24:00 AM**
Dil. Factor:	**1.86**	**Date of Analysis:**	**8/31/21 12:52 AM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Chloroform	0.93	5.3	4.5	26
Carbon Tetrachloride	0.93	1.6	5.8	10
1,2-Dichloroethane	0.93	Not Detected	3.8	Not Detected
1,2-Dichloropropane	0.93	Not Detected	4.3	Not Detected
Tetrachloroethene	0.93	2.8	6.3	19
1,4-Dioxane	3.7	Not Detected	13	Not Detected

Container Type: 1 Liter Summa Canister

Surrogates	%Recovery	Method Limits
Toluene-d8	97	70-130
1,2-Dichloroethane-d4	82	70-130
4-Bromofluorobenzene	94	70-130

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Client Sample ID: B3-SV9

Lab ID#: 2108513-09A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**a083031**	**Date of Collection: 8/20/21 11:39:00 AM**	
Dil. Factor:	**1.87**	**Date of Analysis: 8/31/21 01:19 AM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Chloroform	0.94	3.0	4.6	15
Carbon Tetrachloride	0.94	5.5	5.9	35
1,2-Dichloroethane	0.94	Not Detected	3.8	Not Detected
1,2-Dichloropropane	0.94	Not Detected	4.3	Not Detected
Tetrachloroethene	0.94	3.8	6.3	25
1,4-Dioxane	3.7	Not Detected	13	Not Detected

Container Type: 1 Liter Summa Canister

Surrogates	%Recovery	Method Limits
Toluene-d8	96	70-130
1,2-Dichloroethane-d4	84	70-130
4-Bromofluorobenzene	93	70-130

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Client Sample ID: B3-SV10

Lab ID#: 2108513-10A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**a083032**	**Date of Collection: 8/20/21 11:52:00 AM**	
Dil. Factor:	**1.83**	**Date of Analysis: 8/31/21 01:45 AM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Chloroform	0.92	54	4.5	260
Carbon Tetrachloride	0.92	43	5.8	270
1,2-Dichloroethane	0.92	Not Detected	3.7	Not Detected
1,2-Dichloropropane	0.92	Not Detected	4.2	Not Detected
Tetrachloroethene	0.92	13	6.2	89
1,4-Dioxane	3.7	Not Detected	13	Not Detected

Container Type: 1 Liter Summa Canister

Surrogates	%Recovery	Method Limits
Toluene-d8	98	70-130
1,2-Dichloroethane-d4	84	70-130
4-Bromofluorobenzene	94	70-130

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Client Sample ID: B3-SV11

Lab ID#: 2108513-11A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**a083113**	**Date of Collection: 8/20/21 11:52:00 AM**	
Dil. Factor:	**1.89**	**Date of Analysis: 8/31/21 05:36 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Chloroform	0.94	20	4.6	96
Carbon Tetrachloride	0.94	24	5.9	150
1,2-Dichloroethane	0.94	Not Detected	3.8	Not Detected
1,2-Dichloropropane	0.94	Not Detected	4.4	Not Detected
Tetrachloroethene	0.94	9.9	6.4	67
1,4-Dioxane	3.8	Not Detected	14	Not Detected

Container Type: 1 Liter Summa Canister

Surrogates	%Recovery	Method Limits
Toluene-d8	97	70-130
1,2-Dichloroethane-d4	84	70-130
4-Bromofluorobenzene	93	70-130

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Client Sample ID: C-SV12

Lab ID#: 2108513-12A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**a083115**	**Date of Collection: 8/20/21 12:10:00 PM**	
Dil. Factor:	**18.5**	**Date of Analysis: 8/31/21 06:26 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Chloroform	9.2	1600	45	8000
Carbon Tetrachloride	9.2	590	58	3700
1,2-Dichloroethane	9.2	Not Detected	37	Not Detected
1,2-Dichloropropane	9.2	Not Detected	43	Not Detected
Tetrachloroethene	9.2	19	63	130
1,4-Dioxane	37	Not Detected	130	Not Detected

Container Type: 1 Liter Summa Canister

Surrogates	%Recovery	Method Limits
Toluene-d8	98	70-130
1,2-Dichloroethane-d4	82	70-130
4-Bromofluorobenzene	94	70-130

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Client Sample ID: C-SV13

Lab ID#: 2108513-13A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**a083116**	**Date of Collection: 8/20/21 12:20:00 PM**	
Dil. Factor:	**36.8**	**Date of Analysis: 8/31/21 06:50 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Chloroform	18	3800	90	19000
Carbon Tetrachloride	18	1800	120	11000
1,2-Dichloroethane	18	Not Detected	74	Not Detected
1,2-Dichloropropane	18	Not Detected	85	Not Detected
Tetrachloroethene	18	Not Detected	120	Not Detected
1,4-Dioxane	74	Not Detected	260	Not Detected

Container Type: 1 Liter Summa Canister

Surrogates	%Recovery	Method Limits
Toluene-d8	97	70-130
1,2-Dichloroethane-d4	82	70-130
4-Bromofluorobenzene	93	70-130

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Client Sample ID: C-SV14

Lab ID#: 2108513-14A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**a083114**	**Date of Collection: 8/20/21 12:33:00 PM**	
Dil. Factor:	**61.6**	**Date of Analysis: 8/31/21 06:01 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Chloroform	31	4500	150	22000
Carbon Tetrachloride	31	460	190	2900
1,2-Dichloroethane	31	100	120	400
1,2-Dichloropropane	31	Not Detected	140	Not Detected
Tetrachloroethene	31	Not Detected	210	Not Detected
1,4-Dioxane	120	Not Detected	440	Not Detected

Container Type: 1 Liter Summa Canister

Surrogates	%Recovery	Method Limits
Toluene-d8	97	70-130
1,2-Dichloroethane-d4	83	70-130
4-Bromofluorobenzene	95	70-130

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Client Sample ID: Lab Blank

Lab ID#: 2108513-15A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**a083022a**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 8/30/21 08:19 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Chloroform	0.50	Not Detected	2.4	Not Detected
Carbon Tetrachloride	0.50	Not Detected	3.1	Not Detected
1,2-Dichloroethane	0.50	Not Detected	2.0	Not Detected
1,2-Dichloropropane	0.50	Not Detected	2.3	Not Detected
Tetrachloroethene	0.50	Not Detected	3.4	Not Detected
1,4-Dioxane	2.0	Not Detected	7.2	Not Detected

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
Toluene-d8	98	70-130
1,2-Dichloroethane-d4	84	70-130
4-Bromofluorobenzene	94	70-130

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Client Sample ID: Lab Blank

Lab ID#: 2108513-15B

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**a083106d**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 8/31/21 12:36 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Chloroform	0.50	Not Detected	2.4	Not Detected
Carbon Tetrachloride	0.50	Not Detected	3.1	Not Detected
1,2-Dichloroethane	0.50	Not Detected	2.0	Not Detected
1,2-Dichloropropane	0.50	Not Detected	2.3	Not Detected
Tetrachloroethene	0.50	Not Detected	3.4	Not Detected
1,4-Dioxane	2.0	Not Detected	7.2	Not Detected

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
Toluene-d8	98	70-130
1,2-Dichloroethane-d4	84	70-130
4-Bromofluorobenzene	93	70-130

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Client Sample ID: CCV

Lab ID#: 2108513-16A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**a083019**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 8/30/21 06:34 PM**	

Compound	**%Recovery**
Chloroform	84
Carbon Tetrachloride	93
1,2-Dichloroethane	89
1,2-Dichloropropane	86
Tetrachloroethene	100
1,4-Dioxane	100

Container Type: NA - Not Applicable

Surrogates	**%Recovery**	**Method Limits**
Toluene-d8	98	70-130
1,2-Dichloroethane-d4	84	70-130
4-Bromofluorobenzene	94	70-130

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Client Sample ID: CCV

Lab ID#: 2108513-16B

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**a083102**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 8/31/21 09:24 AM**	

Compound	%Recovery
Chloroform	83
Carbon Tetrachloride	92
1,2-Dichloroethane	89
1,2-Dichloropropane	87
Tetrachloroethene	98
1,4-Dioxane	100

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
Toluene-d8	99	70-130
1,2-Dichloroethane-d4	82	70-130
4-Bromofluorobenzene	95	70-130

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Client Sample ID: LCS

Lab ID#: 2108513-17A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**a083020**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 8/30/21 07:27 PM**	

Compound	%Recovery	Method Limits
Chloroform	82	70-130
Carbon Tetrachloride	93	70-130
1,2-Dichloroethane	87	70-130
1,2-Dichloropropane	85	70-130
Tetrachloroethene	98	70-130
1,4-Dioxane	97	70-130

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
Toluene-d8	98	70-130
1,2-Dichloroethane-d4	84	70-130
4-Bromofluorobenzene	93	70-130

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Client Sample ID: LCSD

Lab ID#: 2108513-17AA

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**a083021**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 8/30/21 07:53 PM**	

Compound	%Recovery	Method Limits
Chloroform	84	70-130
Carbon Tetrachloride	96	70-130
1,2-Dichloroethane	86	70-130
1,2-Dichloropropane	85	70-130
Tetrachloroethene	99	70-130
1,4-Dioxane	97	70-130

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
Toluene-d8	99	70-130
1,2-Dichloroethane-d4	86	70-130
4-Bromofluorobenzene	94	70-130

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Client Sample ID: LCS

Lab ID#: 2108513-17B

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**a083103**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 8/31/21 10:24 AM**	

Compound	%Recovery	Method Limits
Chloroform	80	70-130
Carbon Tetrachloride	90	70-130
1,2-Dichloroethane	85	70-130
1,2-Dichloropropane	86	70-130
Tetrachloroethene	97	70-130
1,4-Dioxane	96	70-130

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
Toluene-d8	99	70-130
1,2-Dichloroethane-d4	83	70-130
4-Bromofluorobenzene	94	70-130

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Client Sample ID: LCSD

Lab ID#: 2108513-17BB

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**a083104**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 8/31/21 11:03 AM**	

Compound	%Recovery	Method Limits
Chloroform	80	70-130
Carbon Tetrachloride	93	70-130
1,2-Dichloroethane	86	70-130
1,2-Dichloropropane	85	70-130
Tetrachloroethene	98	70-130
1,4-Dioxane	97	70-130

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
Toluene-d8	100	70-130
1,2-Dichloroethane-d4	84	70-130
4-Bromofluorobenzene	96	70-130

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Analysis Request /Canister Chain of Custody

For Laboratory Use Only

PID: _____ Workorder #: 2108513

180 Blue Ravine Rd. Suite B, Folsom, CA 95630
Phone (800) 985-5955; Fax (916) 351-8279

Client: Resolute Env.
Project Name: Milledge Avenue
Project Manager: Tommy Jordan Project # 0
Sampler: Jim Finels ↳ 404-516-3172
Site Name: Milledge Avenue

Special Instructions/Notes:
Report only: Chloroform, Carbon Tetrachloride, 1,2 - Dichloroethane 1,2 - Dichloropropane Tetra Chloro ethene; 1-4 Dioxane

Turnaround Time (Rush surcharges may apply)
Standard X Rush _____ (specify)

Lab ID	Field Sample Identification(Location)	Can #	Flow Controller #	Start Sampling Information		Stop Sampling Information		Canister Vacuum/Pressure		Lab Use Only		Requested Analyses
				Date	Time	Date	Time	Initial (in Hg)	Final (in Hg)	Receipt	Final (psig) Gas: N_2 / He	TO15
01A	B2 - SV1	1L1575	23614	8/20/21	0942	8/20/21	0953	29	Ø			X
02A	B1 - SV2	1L2108	24003		0958		1003	29	Ø			X
03A	B1 - SV3	1L3297	24053		1012		1019	29	Ø			X
04A	B1 - SV4	1L2437	23605		1024		1040	29	5			X
05A	B1 - SV5	1L2509	23614		1043		1050	29	Ø			X
06A	A - SV6	1L3121	23463		1054		1100	29	Ø			X
07A	A - SV7	1L1862	23787		1105		1113	29	Ø			X
08A	A - SV8	1L1594	24720		1118		1124	29	Ø			X
09A	B3 - SV9	1L1555	23652		1132		1139	29	Ø			X
10A	B3 - SV10	1L1853	23699		1142		1152	29	Ø			X
11A	B3 - SV11	1L1788	24343		1145		1152	29	Ø			X
12A	C - SV12	1L1516	24285		1203		1210	29	Ø			X
13A	C - SV13	1L1912	0000		1213		1220	29	Ø			X
14A	C - SV14	1L3136	23381		1225		1233	29	Ø			X

	Date	Time		Date	Time
Relinquished by: (Signature/Affiliation)	8/20/21	1235	Received by: (Signature/Affiliation)	8/20/21	1235
Relinquished by: (Signature/Affiliation)	Date	Time	Received by: (Signature/Affiliation)	8/20/21	1435
Relinquished by: (Signature/Affiliation)	8/20/21	1435	Received by: (Signature/Affiliation)	8/21/21	0935

Lab Use Only

Shipper Name: Fedex | Custody Seals Intact? | Yes | No | None | no signature & date

Sample Transportation Notice: Relinquishing signature on this document indicates that samples are shipped in compliance with all applicable local, State, Federal, and international laws, regulations, and ordinances of any kind. Relinquishing signature also indicates agreement to hold harmless, defend, and indemnify Eurofins Air Toxics against any claim, demand, or action, of any kind, related to the collection, handling, of shipping of samples. D.O.T Hotline (800) 467-4922

F. – ANALYSIS OF MASW REPORT

Analysis of MASW @ Milledge Avenue Landfill (Lines 1 – 4)

Prepared by

Choon Park, Ph.D.
Principal Geophysicist

Disclaimer

Park Seismic LLC does not guarantee this report to be free from errors or inaccuracies and disclaims any responsibility or liability for decisions made based on the information provided in this report.

Compact Report

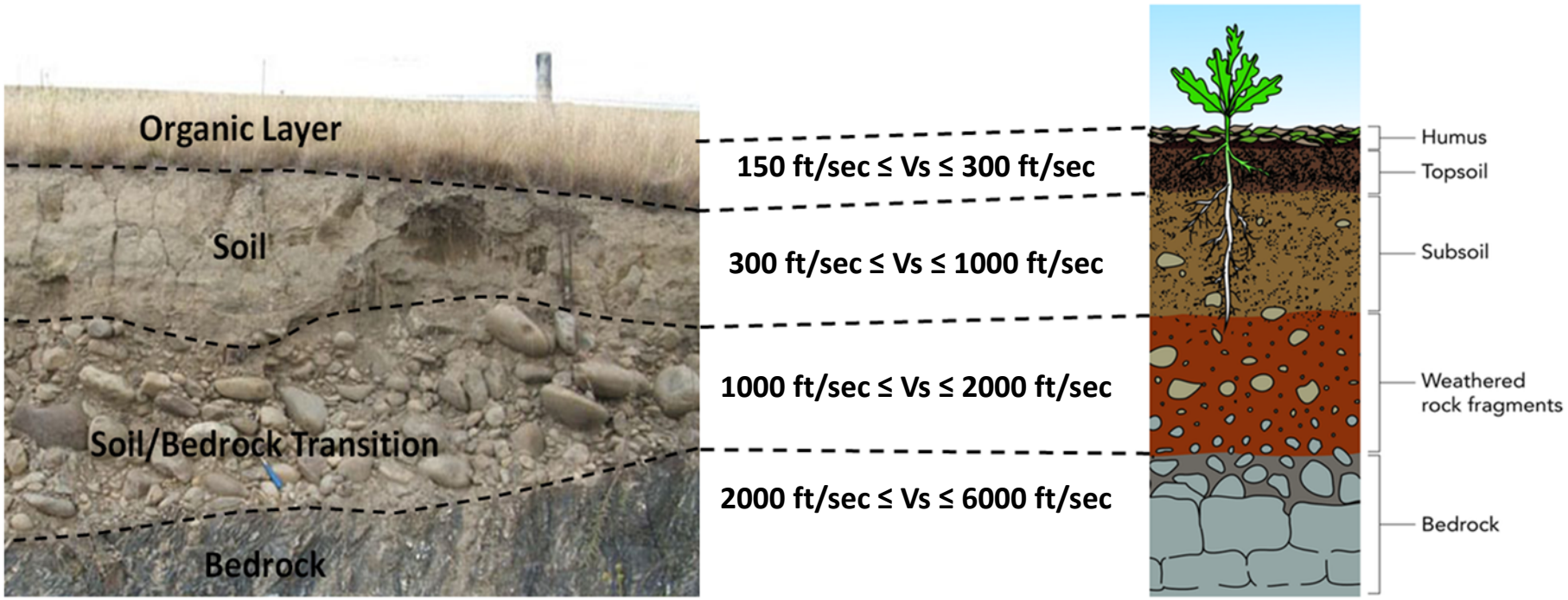
To

Tommy Jordan, P.G. PMP
Sr. Project Manager
Resolute Environmental & Water Resources Consulting

September 13, 2021

Near-Surface Materials and "Approximate" Seismic Velocity (Vs) (ft/sec)

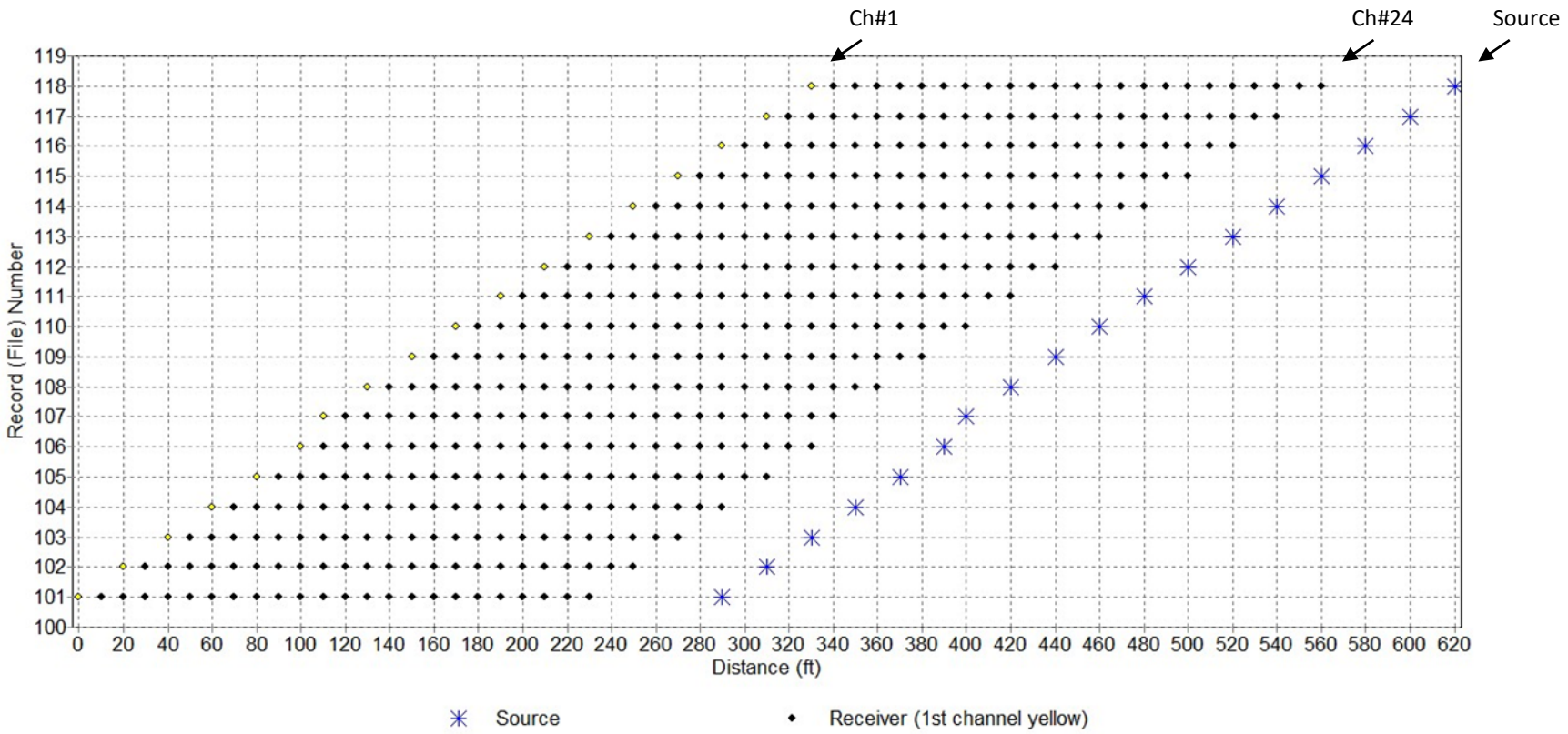
- Vs ≤ 300 ft/sec – **"extremely soft" soil**
- 300 ft/sec ≤ Vs ≤ 600 ft/sec – **"soft" soil**
- 600 ft/sec ≤ Vs ≤ 1000 ft/sec – **"stiff" soil**
- 1000 ft/sec ≤ Vs ≤ 2000 ft/sec – **"weathered" zone**
- 2000 ft/sec ≤ Vs – **"rock"**
- 3000 ft/sec ≤ Vs – **"competent" rock**



Source/Receiver (SR) Setup* – Line 1

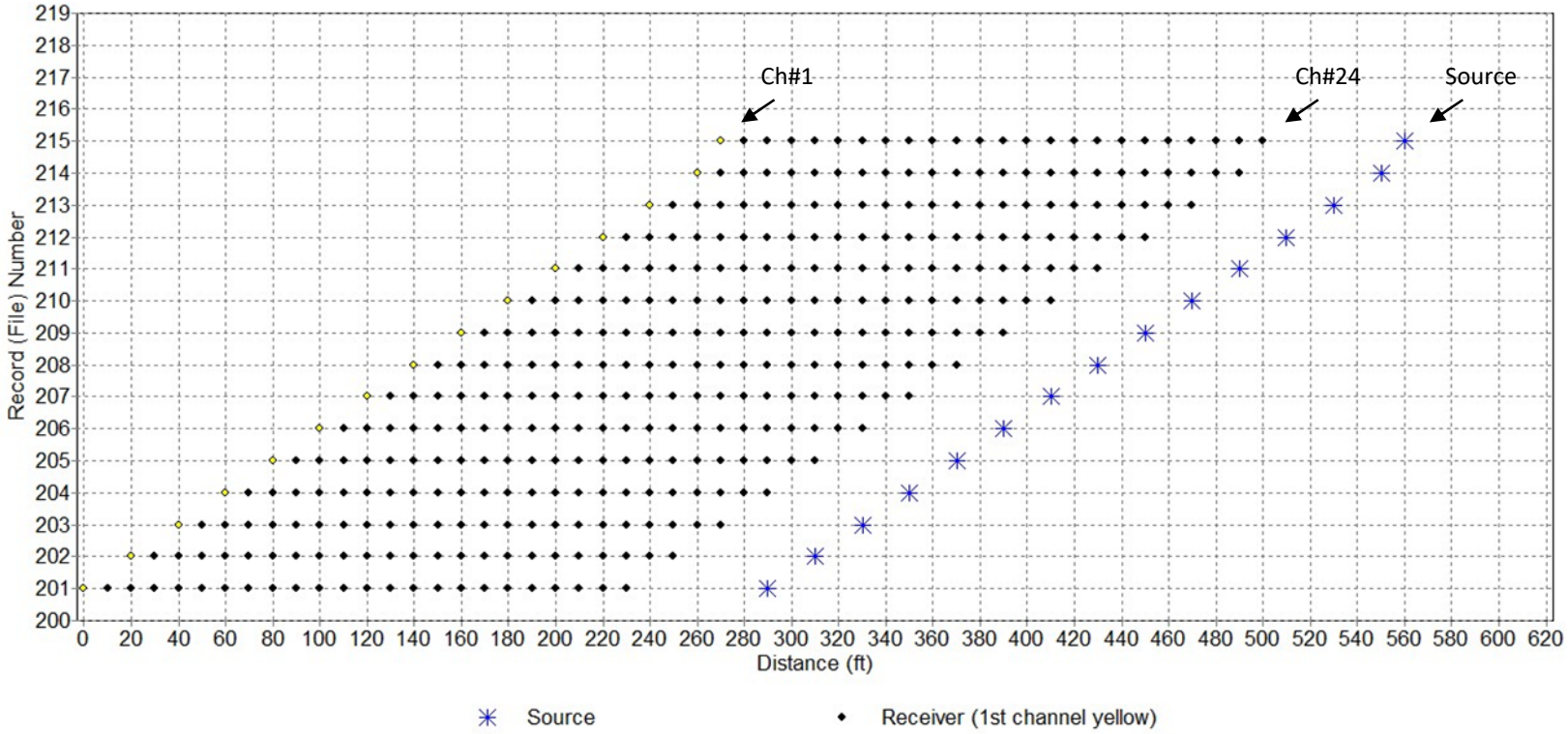
Table of file renaming: *original files were renamed for processing purposes so that their numeric names become consecutive.*

Original File Name (*.dat)	17	18	19	20	21	22	23	6	7	8	9	10	11	12	13	14	15	16
Renamed File (*.dat)	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118



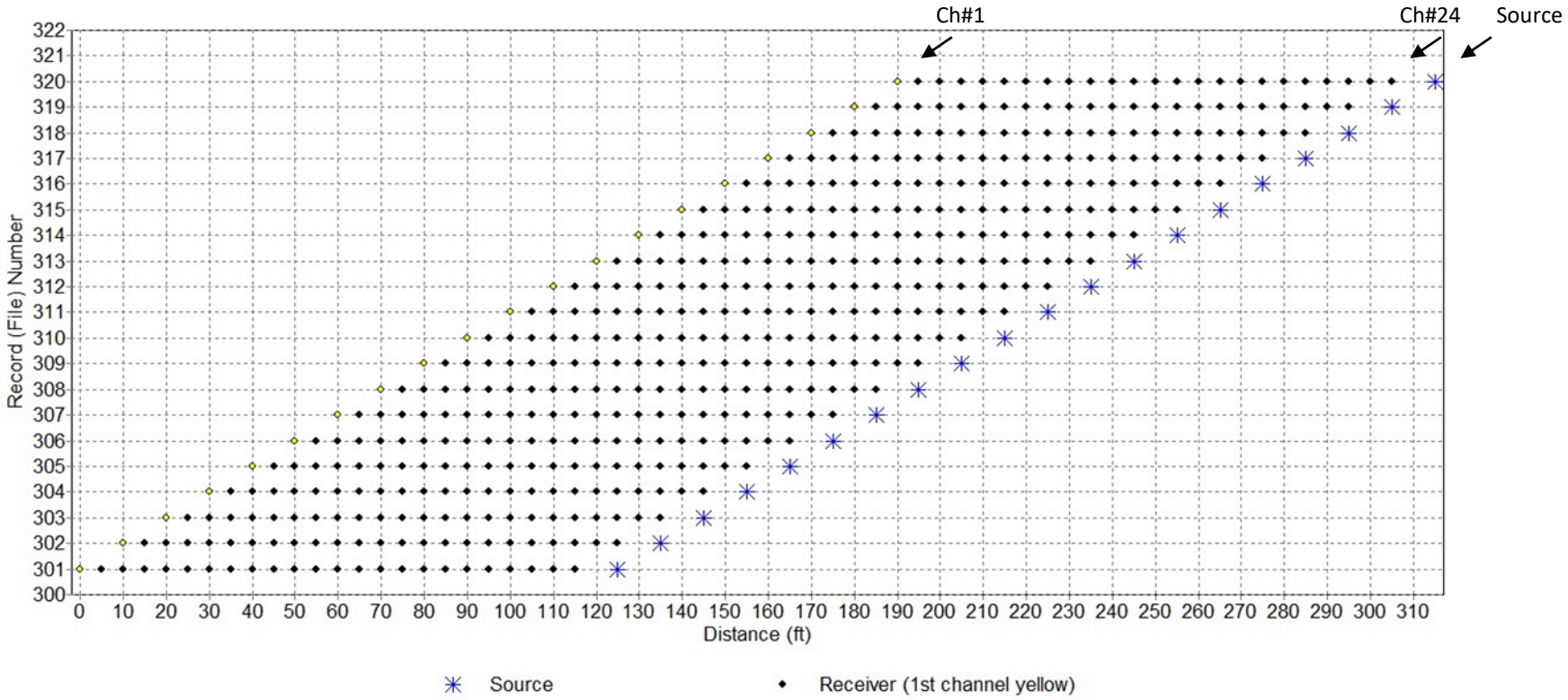
**Setup specified in the field notes*

Source/Receiver (SR) Setup* – Line 2



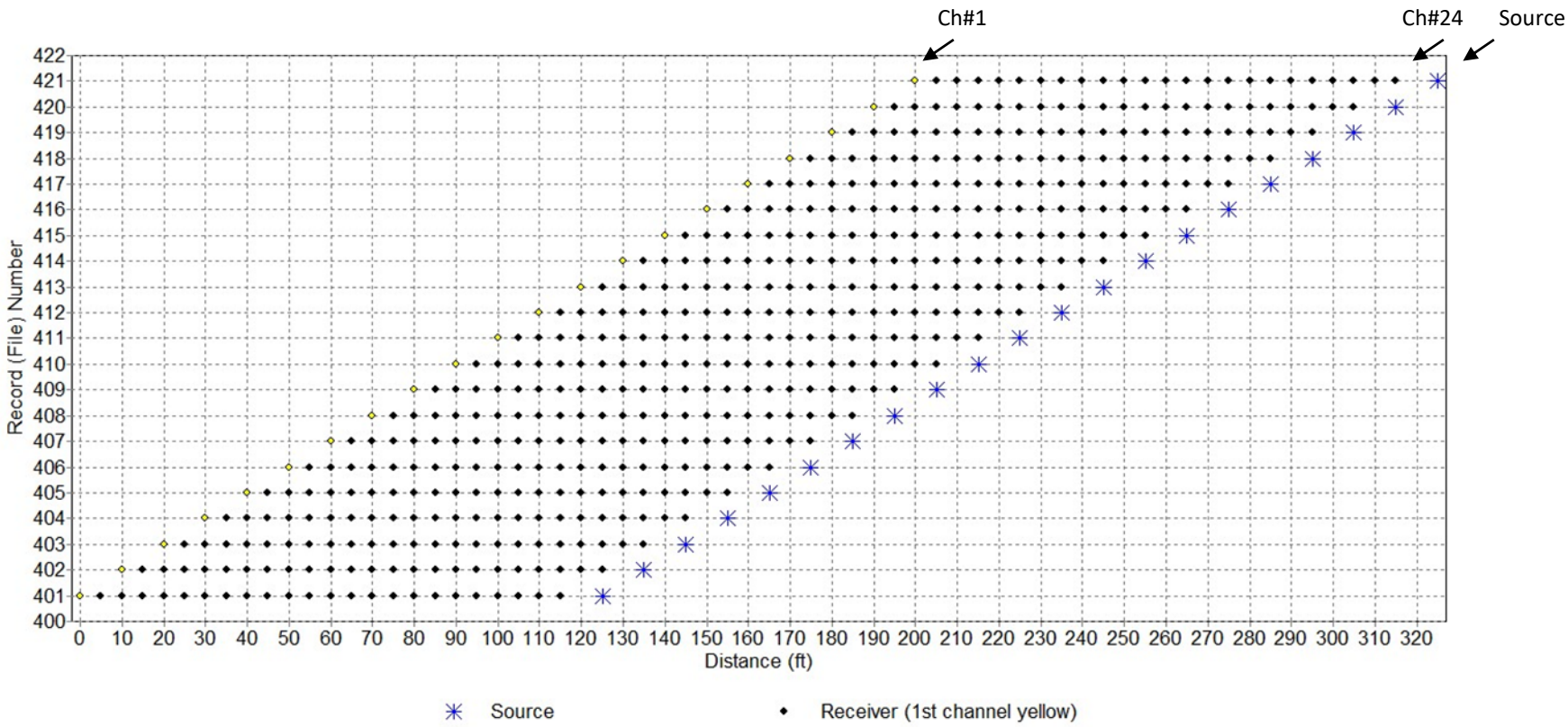
**Setup specified in the field notes*

Source/Receiver (SR) Setup* – Line 3



**Setup specified in the field notes*

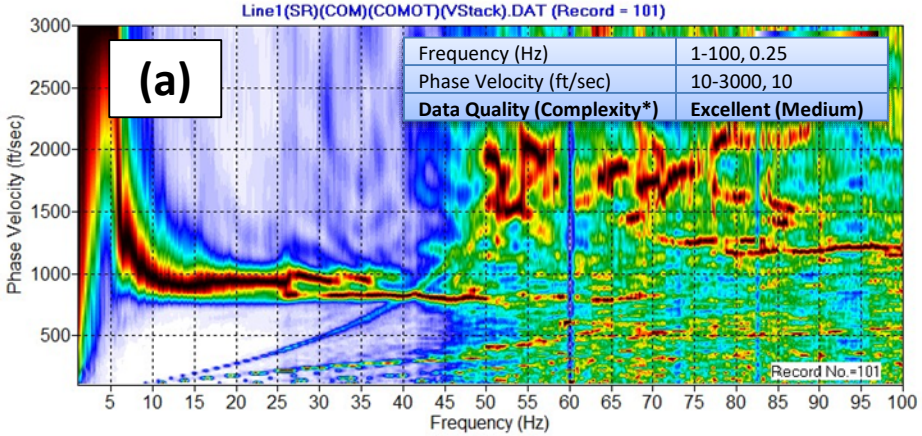
Source/Receiver (SR) Setup* – Line 4

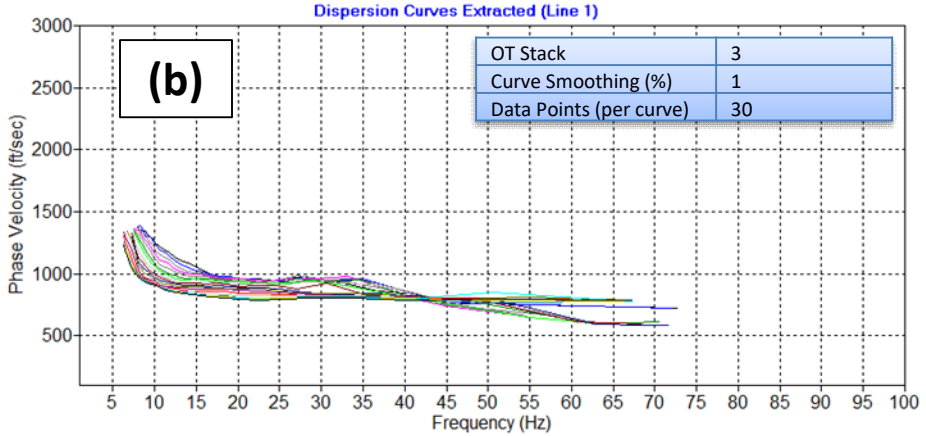


**Setup specified in the field notes*

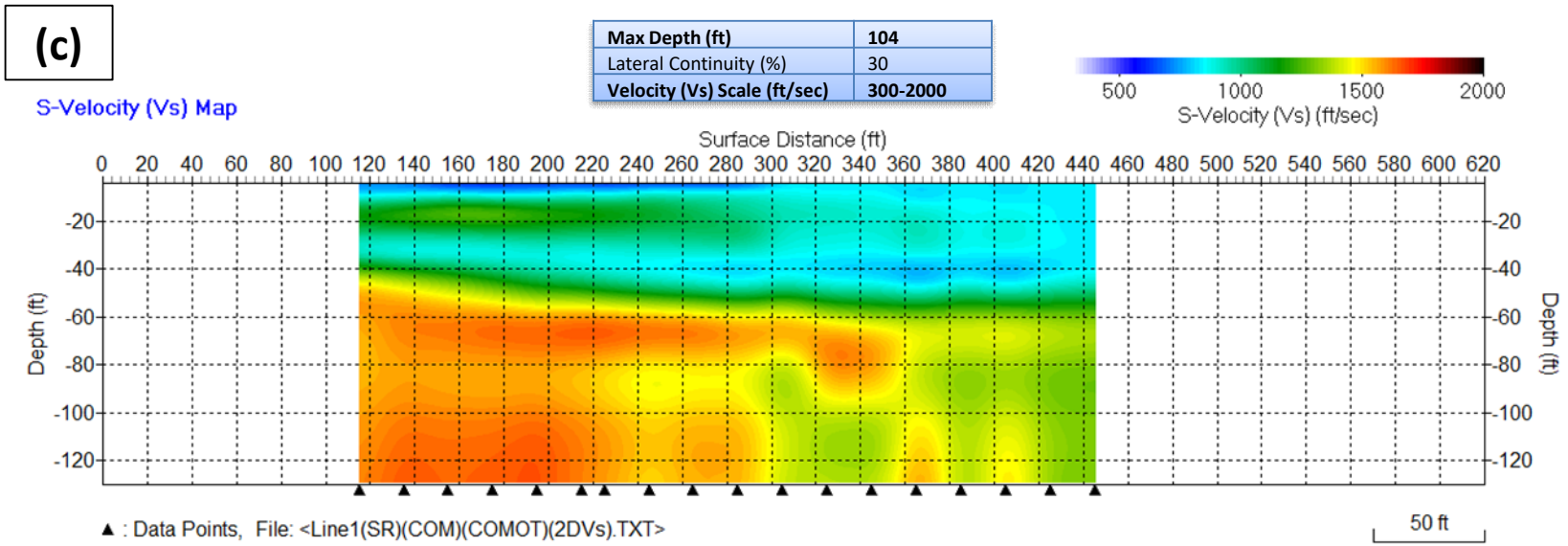
Results – Line 1

(a) Average Dispersion Image, (b) Extracted Dispersion Curves, (c) Shear-Velocity (Vs) Cross Section



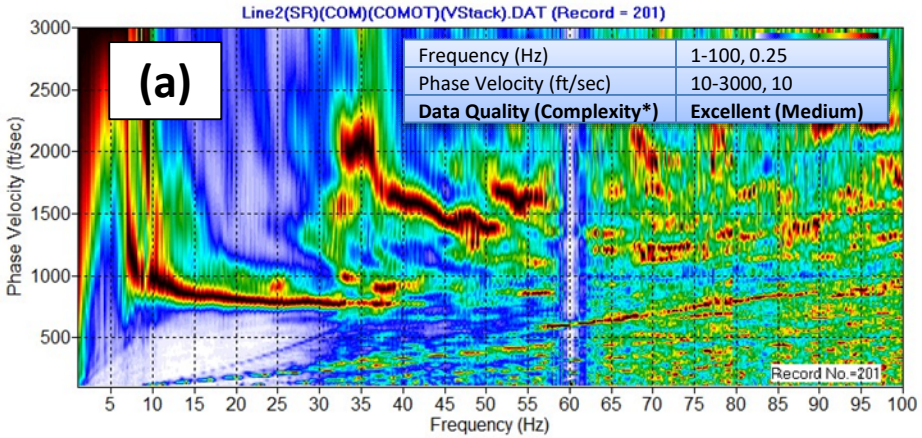


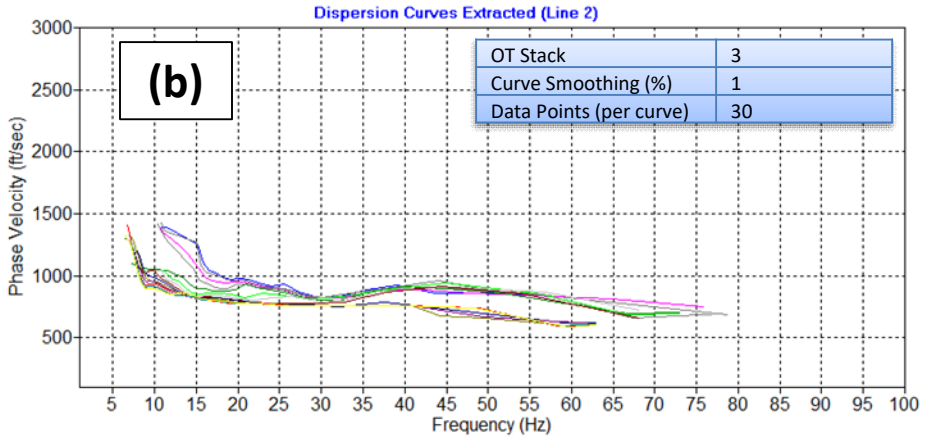
Complexity of the overall dispersion patterns indicative of the complexity of the subsurface velocity (Vs) distributions.



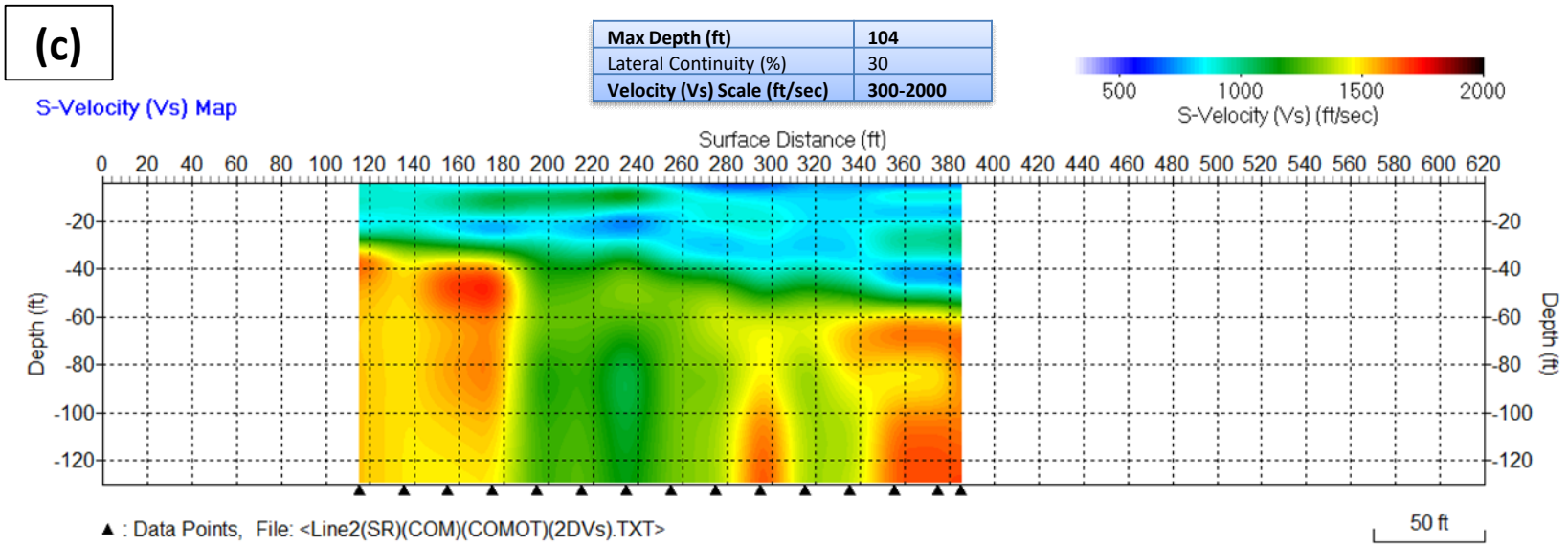
Results – Line 2

(a) Average Dispersion Image, (b) Extracted Dispersion Curves, (c) Shear-Velocity (Vs) Cross Section



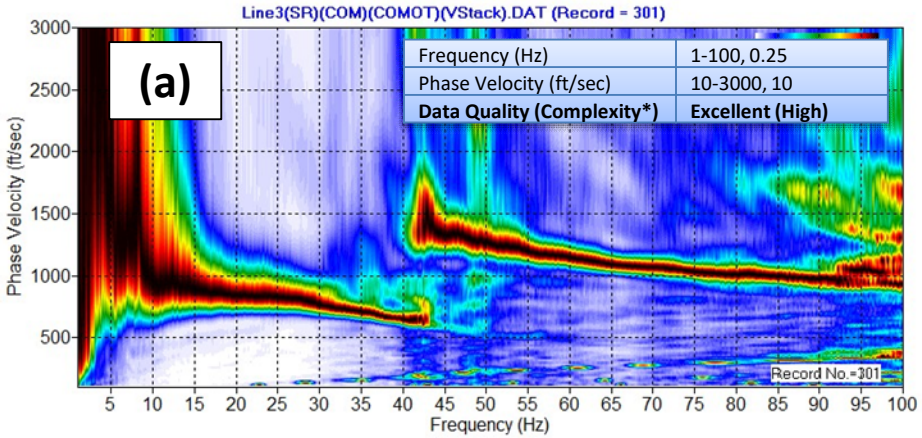


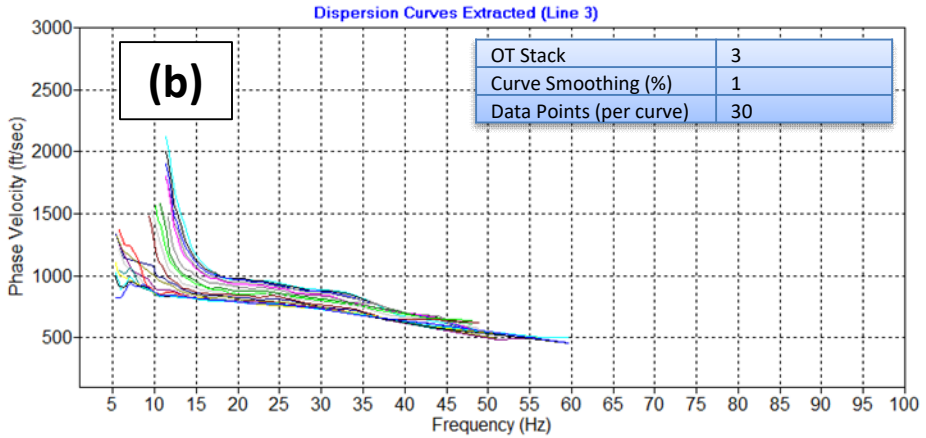
***Complexity of the overall dispersion patterns indicative of the complexity of the subsurface velocity (Vs) distributions.**



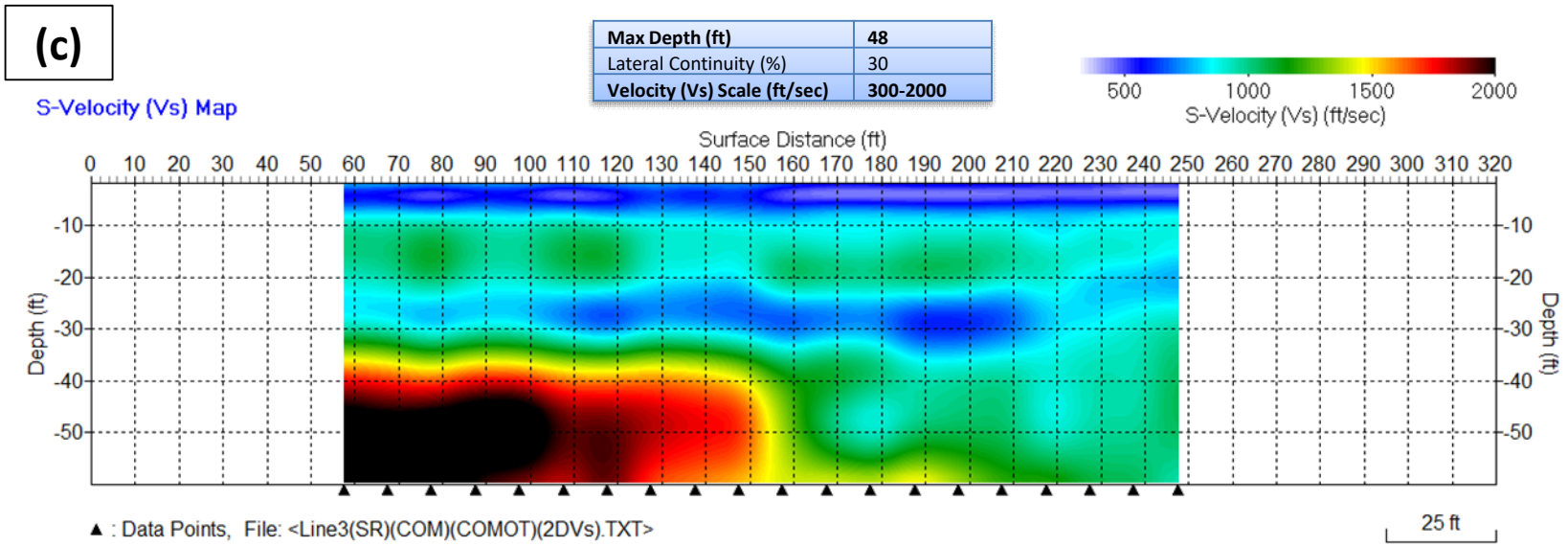
Results – Line 3

(a) Average Dispersion Image, (b) Extracted Dispersion Curves, (c) Shear-Velocity (Vs) Cross Section



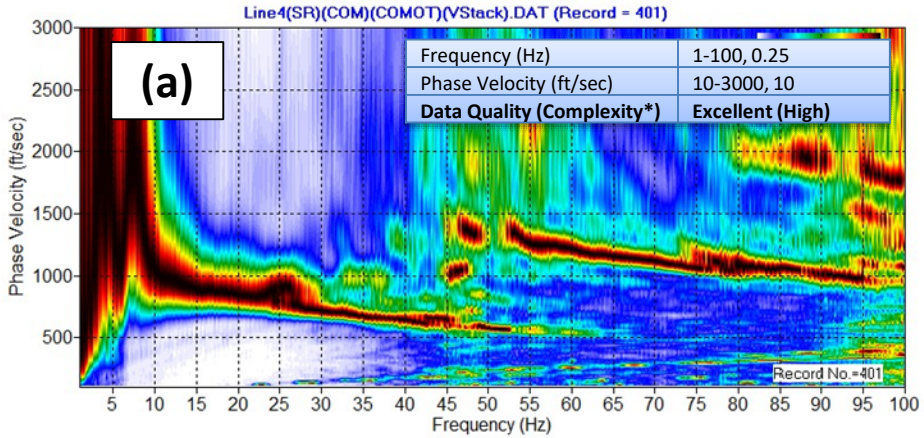


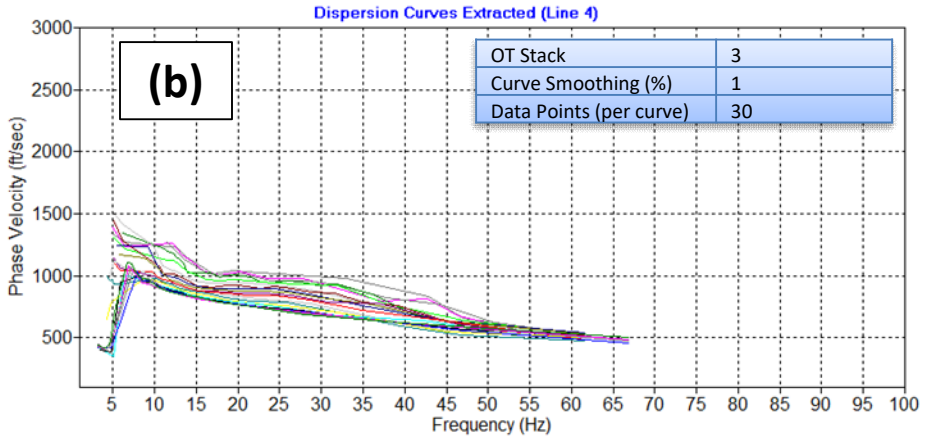
***Complexity of the overall dispersion patterns indicative of the complexity of the subsurface velocity (Vs) distributions.**



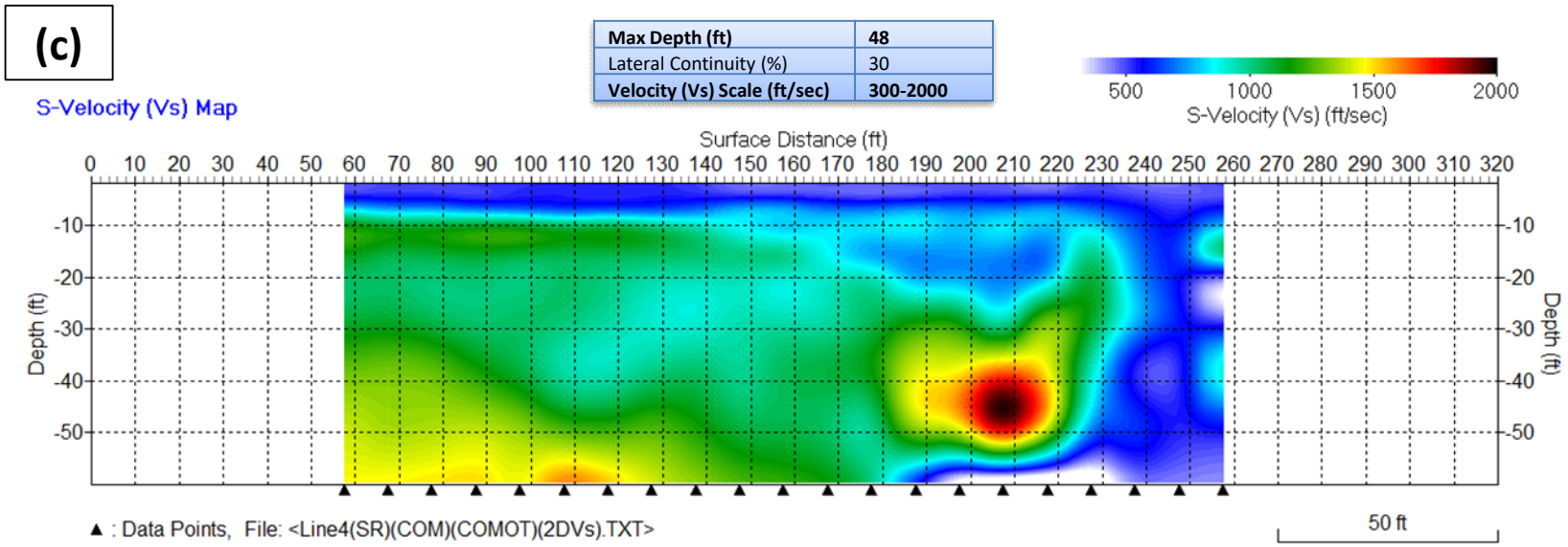
Results – Line 4

(a) Average Dispersion Image, (b) Extracted Dispersion Curves, (c) Shear-Velocity (Vs) Cross Section





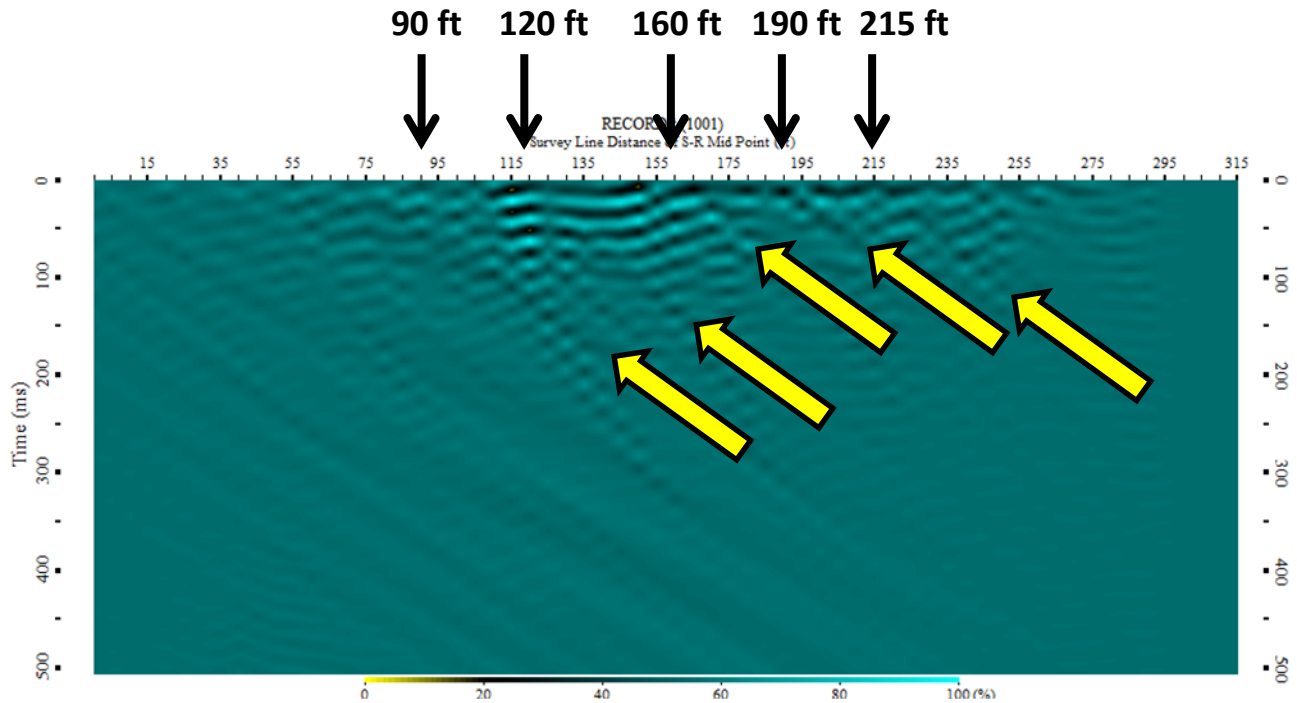
***Complexity of the overall dispersion patterns indicative of the complexity of the subsurface velocity (Vs) distributions.**



Back Scattering Analysis (BSA)* – Line 3

: *a back-scattering feature identified*

: *the corresponding surface location of the responsible subsurface anomaly*

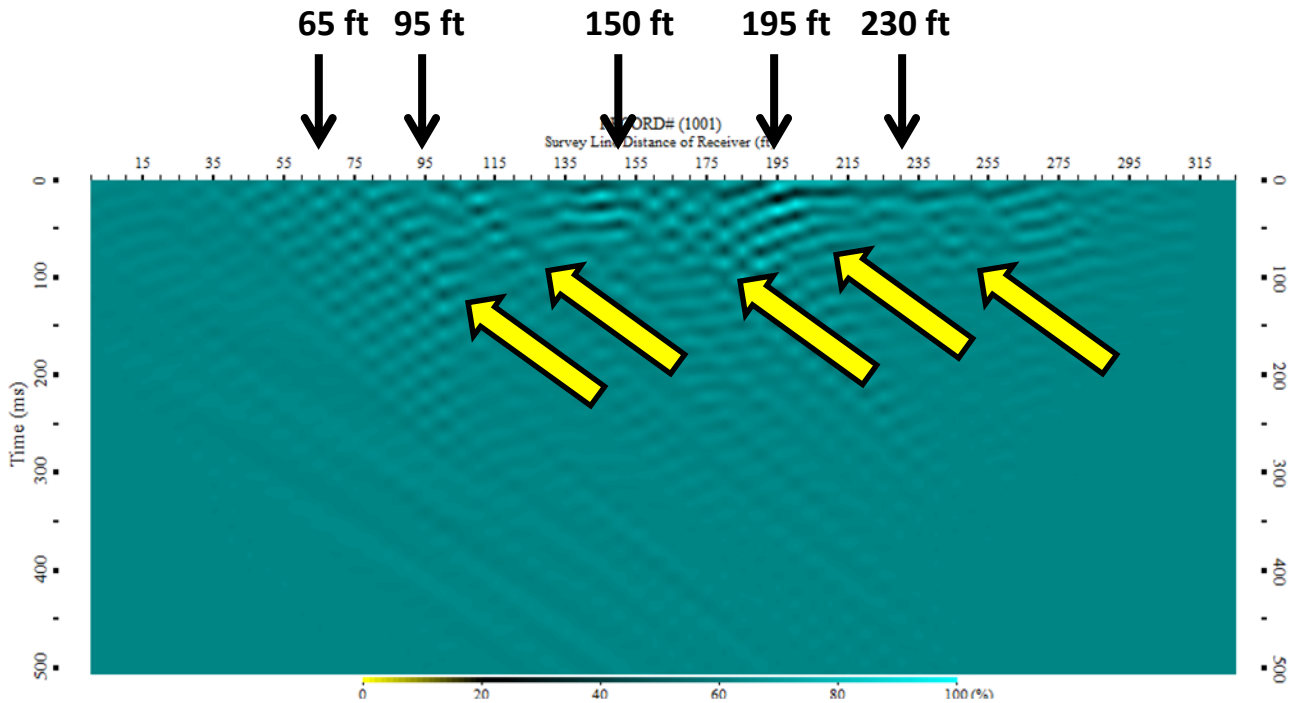


Depth of response is approximately between 3 ft and 30 ft. All identified features have relatively low-energy (e.g., < 50%) characteristics that may be indicative of small-scale origins (e.g., boulders, utility structures, etc.). A highly conspicuous feature would have high-energy (e.g., > 80%) characteristics that may indicate a strong and large-scale subsurface anomaly (e.g., a void).

Back Scattering Analysis (BSA) – Line 4

: *a back-scattering feature identified*

: *the corresponding surface location of the responsible subsurface anomaly*



Depth of response is approximately between 3 ft and 30 ft. All identified features have relatively low-energy (e.g., < 50%) characteristics that may be indicative of small-scale origins (e.g., boulders, utility structures, etc.). A highly conspicuous feature would have high-energy (e.g., > 80%) characteristics that may indicate a strong and large-scale subsurface anomaly (e.g., a void).

G. DISCRETE SAMPLING ANALYTICAL REPORT

ANALYTICAL REPORT

September 21, 2021

Revised Report

Resolute Environmental & Water Resources

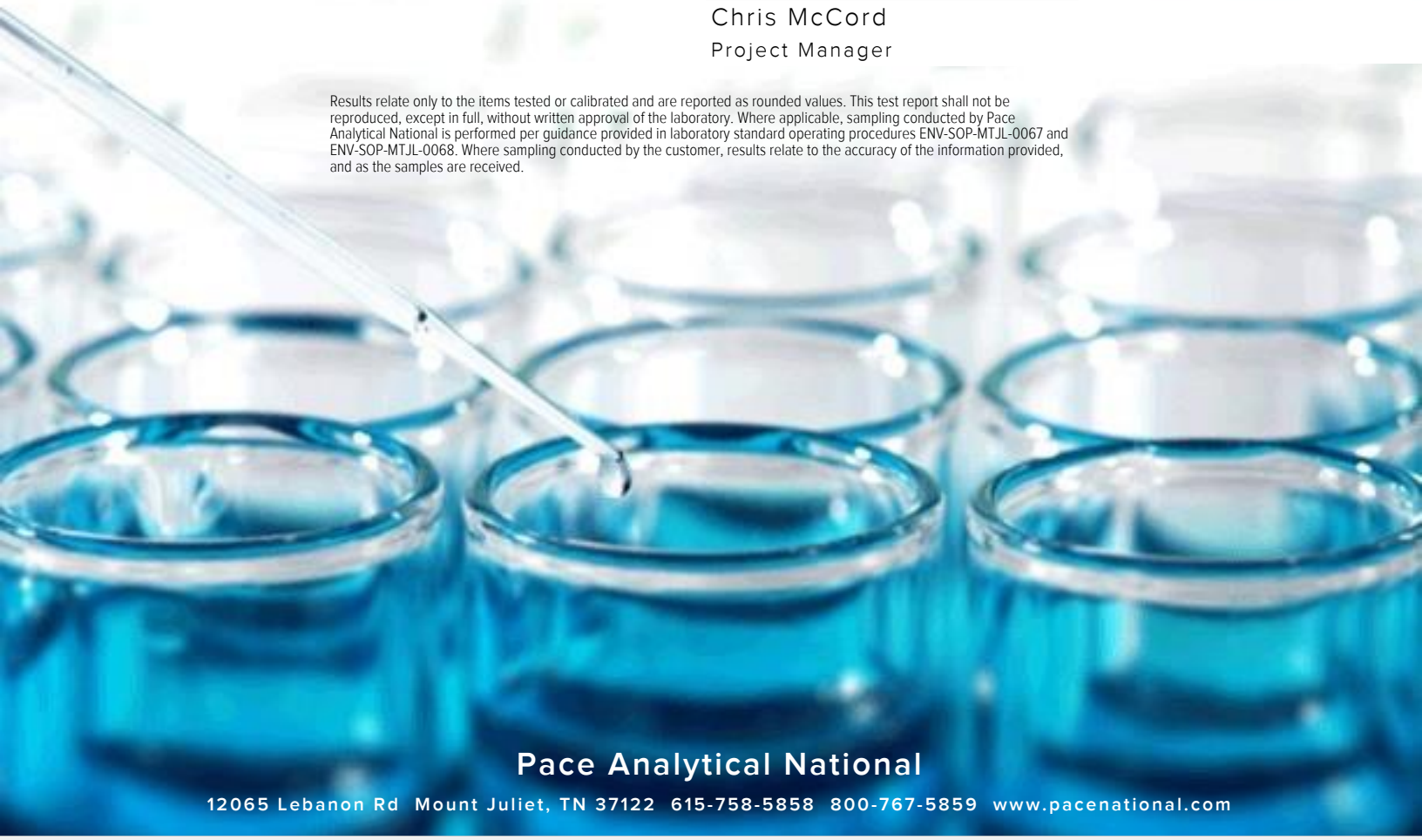
Sample Delivery Group:	L1398643
Samples Received:	09/02/2021
Project Number:	
Description:	UGA (Milledge Avenue Site)

Report To:

Tommy Jordan
1003 Weatherstone Parkway
Suite 320
Woodstock, GA 30188

Entire Report Reviewed By:

Chris McCord
Project Manager



Pace Analytical National
12065 Lebanon Rd Mount Juliet, TN 37122 615-758-5858 800-767-5859 www.pacenational.com

TABLE OF CONTENTS

T1-0GWS L1398643-01 GW

Collected by: Joe Booth | Collected date/time: 08/31/21 12:20 | Received date/time: 09/02/21 09:15

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1735568	1	09/06/21 13:11	09/06/21 13:11	JCP	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B-SIM	WG1735491	1	09/05/21 16:05	09/05/21 16:05	ACG	Mt. Juliet, TN
Pesticides (GC) by Method 8081	WG1734599	1	09/04/21 06:27	09/04/21 18:39	MTJ	Mt. Juliet, TN

T1-1GWS L1398643-02 GW

Collected by: Joe Booth | Collected date/time: 08/31/21 16:15 | Received date/time: 09/02/21 09:15

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1735568	1	09/06/21 13:32	09/06/21 13:32	JCP	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B-SIM	WG1735491	1	09/05/21 16:25	09/05/21 16:25	ACG	Mt. Juliet, TN
Pesticides (GC) by Method 8081	WG1734599	1	09/04/21 06:27	09/04/21 18:52	MTJ	Mt. Juliet, TN

T1-2GWS L1398643-03 GW

Collected by: Joe Booth | Collected date/time: 09/01/21 08:45 | Received date/time: 09/02/21 09:15

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1735568	2	09/06/21 13:55	09/06/21 13:55	JCP	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B-SIM	WG1735491	1	09/05/21 16:44	09/05/21 16:44	ACG	Mt. Juliet, TN
Pesticides (GC) by Method 8081	WG1735440	10	09/05/21 16:06	09/06/21 18:29	MTJ	Mt. Juliet, TN

A-T1-B1-48'-GWS L1398643-04 GW

Collected by: Joe Booth | Collected date/time: 09/01/21 10:29 | Received date/time: 09/02/21 09:15

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1735568	1	09/06/21 14:17	09/06/21 14:17	JCP	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B-SIM	WG1735491	1	09/05/21 17:04	09/05/21 17:04	ACG	Mt. Juliet, TN
Pesticides (GC) by Method 8081	WG1734599	1	09/04/21 06:27	09/04/21 19:05	MTJ	Mt. Juliet, TN

A-T2-B5-41'-GWS L1398643-05 GW

Collected by: Joe Booth | Collected date/time: 09/01/21 11:27 | Received date/time: 09/02/21 09:15

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1735568	1	09/06/21 14:39	09/06/21 14:39	JCP	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B-SIM	WG1735491	1	09/05/21 17:24	09/05/21 17:24	ACG	Mt. Juliet, TN
Pesticides (GC) by Method 8081	WG1734599	1	09/04/21 06:27	09/04/21 19:19	MTJ	Mt. Juliet, TN

A-T2-B3-54'-GWS L1398643-06 GW

Collected by: Joe Booth | Collected date/time: 09/01/21 13:43 | Received date/time: 09/02/21 09:15

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1735568	1	09/06/21 15:00	09/06/21 15:00	JCP	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B-SIM	WG1735491	1	09/05/21 17:44	09/05/21 17:44	ACG	Mt. Juliet, TN
Pesticides (GC) by Method 8081	WG1734599	1	09/04/21 06:27	09/04/21 19:32	MTJ	Mt. Juliet, TN

A-T2-B2-28'-GWS L1398643-07 GW

Collected by: Joe Booth | Collected date/time: 09/01/21 14:35 | Received date/time: 09/02/21 09:15

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1735568	1	09/06/21 15:23	09/06/21 15:23	JCP	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B-SIM	WG1735491	1	09/05/21 18:04	09/05/21 18:04	ACG	Mt. Juliet, TN
Pesticides (GC) by Method 8081	WG1734599	1	09/04/21 06:27	09/04/21 19:45	MTJ	Mt. Juliet, TN

B2-T1-20'-30' GWS L1398643-08 GW

Collected by: Joe Booth | Collected date/time: 09/01/21 15:31 | Received date/time: 09/02/21 09:15

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1735568	1	09/06/21 15:45	09/06/21 15:45	JCP	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B-SIM	WG1735491	1	09/05/21 18:24	09/05/21 18:24	ACG	Mt. Juliet, TN
Pesticides (GC) by Method 8081	WG1735440	1	09/05/21 16:06	09/06/21 18:42	MTJ	Mt. Juliet, TN

P3-35'-GWS L1398643-09 GW

Collected by: Joe Booth | Collected date/time: 09/01/21 15:58 | Received date/time: 09/02/21 09:15

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1735568	1	09/06/21 16:07	09/06/21 16:07	JCP	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1737653	25	09/10/21 03:08	09/10/21 03:08	ACG	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B-SIM	WG1735491	1	09/05/21 18:44	09/05/21 18:44	ACG	Mt. Juliet, TN
Pesticides (GC) by Method 8081	WG1735440	1	09/05/21 16:06	09/06/21 18:55	MTJ	Mt. Juliet, TN

CASE NARRATIVE

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

Chris McCord
Project Manager

Report Revision History

Level II Report - Version 1: 09/10/21 17:30
Level II Report - Version 2: 09/13/21 15:52

Project Narrative

Revised sample ID,

Revised VOC compounds reporting.

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Carbon tetrachloride	U		0.128	1.00	1	09/06/2021 13:11	WG1735568
Chloroform	2.57	J	0.111	5.00	1	09/06/2021 13:11	WG1735568
1,2-Dichloroethane	U		0.0819	1.00	1	09/06/2021 13:11	WG1735568
1,2-Dichloropropane	U		0.149	1.00	1	09/06/2021 13:11	WG1735568
Tetrachloroethene	U		0.300	1.00	1	09/06/2021 13:11	WG1735568
(S) Toluene-d8	*106*			*80.0-120*		*09/06/2021 13:11*	WG1735568
(S) 4-Bromofluorobenzene	*99.7*			*77.0-126*		*09/06/2021 13:11*	WG1735568
(S) 1,2-Dichloroethane-d4	*101*			*70.0-130*		*09/06/2021 13:11*	WG1735568

Volatile Organic Compounds (GC/MS) by Method 8260B-SIM

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
1,4-Dioxane	U		0.597	3.00	1	09/05/2021 16:05	WG1735491
(S) Toluene-d8	*97.0*			*77.0-127*		*09/05/2021 16:05*	WG1735491

Pesticides (GC) by Method 8081

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Gamma BHC	U		0.0209	0.0500	1	09/04/2021 18:39	WG1734599
(S) Decachlorobiphenyl	*5.64*	J2		*10.0-128*		*09/04/2021 18:39*	WG1734599
(S) Tetrachloro-m-xylene	*45.5*			*10.0-127*		*09/04/2021 18:39*	WG1734599

Sample Narrative:

L1398643-01 WG1734599: Duplicate Analysis performed due to surrogate failure. Results confirm; reporting in hold data

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 ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Carbon tetrachloride	U		0.128	1.00	1	09/06/2021 13:32	WG1735568
Chloroform	2.50	J	0.111	5.00	1	09/06/2021 13:32	WG1735568
1,2-Dichloroethane	U		0.0819	1.00	1	09/06/2021 13:32	WG1735568
1,2-Dichloropropane	U		0.149	1.00	1	09/06/2021 13:32	WG1735568
Tetrachloroethene	U		0.300	1.00	1	09/06/2021 13:32	WG1735568
(S) Toluene-d8	*104*			*80.0-120*		*09/06/2021 13:32*	WG1735568
(S) 4-Bromofluorobenzene	*99.1*			*77.0-126*		*09/06/2021 13:32*	WG1735568
(S) 1,2-Dichloroethane-d4	*102*			*70.0-130*		*09/06/2021 13:32*	WG1735568

Volatile Organic Compounds (GC/MS) by Method 8260B-SIM

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
1,4-Dioxane	U		0.597	3.00	1	09/05/2021 16:25	WG1735491
(S) Toluene-d8	*97.2*			*77.0-127*		*09/05/2021 16:25*	WG1735491

Pesticides (GC) by Method 8081

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Gamma BHC	U		0.0209	0.0500	1	09/04/2021 18:52	WG1734599
(S) Decachlorobiphenyl	*2.37*	J2		*10.0-128*		*09/04/2021 18:52*	WG1734599
(S) Tetrachloro-m-xylene	*29.5*			*10.0-127*		*09/04/2021 18:52*	WG1734599

Sample Narrative:

L1398643-02 WG1734599: Duplicate Analysis performed due to surrogate failure. Results confirm; reporting in hold data

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 ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Carbon tetrachloride	U		0.256	2.00	2	09/06/2021 13:55	WG1735568
Chloroform	0.969	J	0.222	10.0	2	09/06/2021 13:55	WG1735568
1,2-Dichloroethane	U		0.164	2.00	2	09/06/2021 13:55	WG1735568
1,2-Dichloropropane	U		0.298	2.00	2	09/06/2021 13:55	WG1735568
Tetrachloroethene	U		0.600	2.00	2	09/06/2021 13:55	WG1735568
(S) Toluene-d8	*103*			*80.0-120*		*09/06/2021 13:55*	WG1735568
(S) 4-Bromofluorobenzene	*100*			*77.0-126*		*09/06/2021 13:55*	WG1735568
(S) 1,2-Dichloroethane-d4	*103*			*70.0-130*		*09/06/2021 13:55*	WG1735568

Volatile Organic Compounds (GC/MS) by Method 8260B-SIM

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
1,4-Dioxane	U		0.597	3.00	1	09/05/2021 16:44	WG1735491
(S) Toluene-d8	*97.0*			*77.0-127*		*09/05/2021 16:44*	WG1735491

Pesticides (GC) by Method 8081

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Gamma BHC	U		0.209	0.500	10	09/06/2021 18:29	WG1735440
(S) Decachlorobiphenyl	*25.3*			*10.0-128*		*09/06/2021 18:29*	WG1735440
(S) Tetrachloro-m-xylene	*108*			*10.0-127*		*09/06/2021 18:29*	WG1735440

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Carbon tetrachloride	U		0.128	1.00	1	09/06/2021 14:17	WG1735568
Chloroform	0.271	J	0.111	5.00	1	09/06/2021 14:17	WG1735568
1,2-Dichloroethane	U		0.0819	1.00	1	09/06/2021 14:17	WG1735568
1,2-Dichloropropane	U		0.149	1.00	1	09/06/2021 14:17	WG1735568
Tetrachloroethene	U		0.300	1.00	1	09/06/2021 14:17	WG1735568
(S) Toluene-d8	*101*			*80.0-120*		*09/06/2021 14:17*	WG1735568
(S) 4-Bromofluorobenzene	*99.6*			*77.0-126*		*09/06/2021 14:17*	WG1735568
(S) 1,2-Dichloroethane-d4	*103*			*70.0-130*		*09/06/2021 14:17*	WG1735568

Volatile Organic Compounds (GC/MS) by Method 8260B-SIM

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
1,4-Dioxane	U		0.597	3.00	1	09/05/2021 17:04	WG1735491
(S) Toluene-d8	*97.0*			*77.0-127*		*09/05/2021 17:04*	WG1735491

Pesticides (GC) by Method 8081

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Gamma BHC	U		0.0209	0.0500	1	09/04/2021 19:05	WG1734599
(S) Decachlorobiphenyl	*13.2*			*10.0-128*		*09/04/2021 19:05*	WG1734599
(S) Tetrachloro-m-xylene	*47.2*			*10.0-127*		*09/04/2021 19:05*	WG1734599

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	ug/l		ug/l	ug/l		date / time	
Carbon tetrachloride	U		0.128	1.00	1	09/06/2021 14:39	WG1735568
Chloroform	0.445	J	0.111	5.00	1	09/06/2021 14:39	WG1735568
1,2-Dichloroethane	U		0.0819	1.00	1	09/06/2021 14:39	WG1735568
1,2-Dichloropropane	U		0.149	1.00	1	09/06/2021 14:39	WG1735568
Tetrachloroethene	U		0.300	1.00	1	09/06/2021 14:39	WG1735568
(S) Toluene-d8	*104*			*80.0-120*		*09/06/2021 14:39*	WG1735568
(S) 4-Bromofluorobenzene	*98.4*			*77.0-126*		*09/06/2021 14:39*	WG1735568
(S) 1,2-Dichloroethane-d4	*103*			*70.0-130*		*09/06/2021 14:39*	WG1735568

Volatile Organic Compounds (GC/MS) by Method 8260B-SIM

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	ug/l		ug/l	ug/l		date / time	
1,4-Dioxane	U		0.597	3.00	1	09/05/2021 17:24	WG1735491
(S) Toluene-d8	*97.5*			*77.0-127*		*09/05/2021 17:24*	WG1735491

Pesticides (GC) by Method 8081

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	ug/l		ug/l	ug/l		date / time	
Gamma BHC	U		0.0209	0.0500	1	09/04/2021 19:19	WG1734599
(S) Decachlorobiphenyl	*31.9*			*10.0-128*		*09/04/2021 19:19*	WG1734599
(S) Tetrachloro-m-xylene	*66.0*			*10.0-127*		*09/04/2021 19:19*	WG1734599

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Carbon tetrachloride	U		0.128	1.00	1	09/06/2021 15:00	WG1735568
Chloroform	2.37	J	0.111	5.00	1	09/06/2021 15:00	WG1735568
1,2-Dichloroethane	U		0.0819	1.00	1	09/06/2021 15:00	WG1735568
1,2-Dichloropropane	U		0.149	1.00	1	09/06/2021 15:00	WG1735568
Tetrachloroethene	U		0.300	1.00	1	09/06/2021 15:00	WG1735568
(S) Toluene-d8	*104*			*80.0-120*		*09/06/2021 15:00*	WG1735568
(S) 4-Bromofluorobenzene	*99.2*			*77.0-126*		*09/06/2021 15:00*	WG1735568
(S) 1,2-Dichloroethane-d4	*102*			*70.0-130*		*09/06/2021 15:00*	WG1735568

Volatile Organic Compounds (GC/MS) by Method 8260B-SIM

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
1,4-Dioxane	U		0.597	3.00	1	09/05/2021 17:44	WG1735491
(S) Toluene-d8	*96.6*			*77.0-127*		*09/05/2021 17:44*	WG1735491

Pesticides (GC) by Method 8081

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Gamma BHC	U		0.0209	0.0500	1	09/04/2021 19:32	WG1734599
(S) Decachlorobiphenyl	*10.9*			*10.0-128*		*09/04/2021 19:32*	WG1734599
(S) Tetrachloro-m-xylene	*71.1*			*10.0-127*		*09/04/2021 19:32*	WG1734599

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Carbon tetrachloride	U		0.128	1.00	1	09/06/2021 15:23	WG1735568
Chloroform	41.5		0.111	5.00	1	09/06/2021 15:23	WG1735568
1,2-Dichloroethane	1.60		0.0819	1.00	1	09/06/2021 15:23	WG1735568
1,2-Dichloropropane	U		0.149	1.00	1	09/06/2021 15:23	WG1735568
Tetrachloroethene	0.303	J	0.300	1.00	1	09/06/2021 15:23	WG1735568
(S) Toluene-d8	*106*			*80.0-120*		*09/06/2021 15:23*	WG1735568
(S) 4-Bromofluorobenzene	*101*			*77.0-126*		*09/06/2021 15:23*	WG1735568
(S) 1,2-Dichloroethane-d4	*104*			*70.0-130*		*09/06/2021 15:23*	WG1735568

Volatile Organic Compounds (GC/MS) by Method 8260B-SIM

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
1,4-Dioxane	49.7		0.597	3.00	1	09/05/2021 18:04	WG1735491
(S) Toluene-d8	*96.4*			*77.0-127*		*09/05/2021 18:04*	WG1735491

Pesticides (GC) by Method 8081

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Gamma BHC	U		0.0209	0.0500	1	09/04/2021 19:45	WG1734599
(S) Decachlorobiphenyl	*12.8*			*10.0-128*		*09/04/2021 19:45*	WG1734599
(S) Tetrachloro-m-xylene	*56.7*			*10.0-127*		*09/04/2021 19:45*	WG1734599

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Carbon tetrachloride	U		0.128	1.00	1	09/06/2021 15:45	WG1735568
Chloroform	1.16	J	0.111	5.00	1	09/06/2021 15:45	WG1735568
1,2-Dichloroethane	U		0.0819	1.00	1	09/06/2021 15:45	WG1735568
1,2-Dichloropropane	U		0.149	1.00	1	09/06/2021 15:45	WG1735568
Tetrachloroethene	U		0.300	1.00	1	09/06/2021 15:45	WG1735568
(S) Toluene-d8	*104*			*80.0-120*		*09/06/2021 15:45*	WG1735568
(S) 4-Bromofluorobenzene	*97.8*			*77.0-126*		*09/06/2021 15:45*	WG1735568
(S) 1,2-Dichloroethane-d4	*101*			*70.0-130*		*09/06/2021 15:45*	WG1735568

Volatile Organic Compounds (GC/MS) by Method 8260B-SIM

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
1,4-Dioxane	U		0.597	3.00	1	09/05/2021 18:24	WG1735491
(S) Toluene-d8	*97.0*			*77.0-127*		*09/05/2021 18:24*	WG1735491

Pesticides (GC) by Method 8081

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Gamma BHC	U		0.0209	0.0500	1	09/06/2021 18:42	WG1735440
(S) Decachlorobiphenyl	*15.1*			*10.0-128*		*09/06/2021 18:42*	WG1735440
(S) Tetrachloro-m-xylene	*100*			*10.0-127*		*09/06/2021 18:42*	WG1735440

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 ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Carbon tetrachloride	9.30		0.128	1.00	1	09/06/2021 16:07	WG1735568
Chloroform	1150		2.78	125	25	09/10/2021 03:08	WG1737653
1,2-Dichloroethane	1.66		0.0819	1.00	1	09/06/2021 16:07	WG1735568
1,2-Dichloropropane	8.53		0.149	1.00	1	09/06/2021 16:07	WG1735568
Tetrachloroethene	0.407	J	0.300	1.00	1	09/06/2021 16:07	WG1735568
(S) Toluene-d8	*103*			*80.0-120*		*09/06/2021 16:07*	WG1735568
(S) Toluene-d8	*104*			*80.0-120*		*09/10/2021 03:08*	WG1737653
(S) 4-Bromofluorobenzene	*101*			*77.0-126*		*09/06/2021 16:07*	WG1735568
(S) 4-Bromofluorobenzene	*107*			*77.0-126*		*09/10/2021 03:08*	WG1737653
(S) 1,2-Dichloroethane-d4	*104*			*70.0-130*		*09/06/2021 16:07*	WG1735568
(S) 1,2-Dichloroethane-d4	*98.4*			*70.0-130*		*09/10/2021 03:08*	WG1737653

Volatile Organic Compounds (GC/MS) by Method 8260B-SIM

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
1,4-Dioxane	77.1		0.597	3.00	1	09/05/2021 18:44	WG1735491
(S) Toluene-d8	*97.0*			*77.0-127*		*09/05/2021 18:44*	WG1735491

Pesticides (GC) by Method 8081

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Gamma BHC	U		0.0209	0.0500	1	09/06/2021 18:55	WG1735440
(S) Decachlorobiphenyl	*89.5*			*10.0-128*		*09/06/2021 18:55*	WG1735440
(S) Tetrachloro-m-xylene	*93.8*			*10.0-127*		*09/06/2021 18:55*	WG1735440

Method Blank (MB)

(MB) R3702229-2 09/06/21 10:40

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Carbon tetrachloride	U		0.128	1.00
Chloroform	U		0.111	5.00
1,2-Dichloroethane	U		0.0819	1.00
1,2-Dichloropropane	U		0.149	1.00
Tetrachloroethene	U		0.300	1.00
(S) Toluene-d8	*106*			*80.0-120*
(S) 4-Bromofluorobenzene	*102*			*77.0-126*
(S) 1,2-Dichloroethane-d4	*101*			*70.0-130*

Laboratory Control Sample (LCS)

(LCS) R3702229-1 09/06/21 09:56

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Carbon tetrachloride	5.00	5.11	102	68.0-126	
Chloroform	5.00	5.06	101	73.0-120	
1,2-Dichloroethane	5.00	4.96	99.2	70.0-128	
1,2-Dichloropropane	5.00	5.00	100	77.0-125	
Tetrachloroethene	5.00	4.94	98.8	72.0-132	
(S) Toluene-d8			*104*	*80.0-120*	
(S) 4-Bromofluorobenzene			*100*	*77.0-126*	
(S) 1,2-Dichloroethane-d4			*98.6*	*70.0-130*	

Method Blank (MB)

(MB) R3702669-3 09/09/21 21:19

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Chloroform	U		0.111	5.00
(S) Toluene-d8	*105*			*80.0-120*
(S) 4-Bromofluorobenzene	*103*			*77.0-126*
(S) 1,2-Dichloroethane-d4	*98.2*			*70.0-130*

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

(LCS) R3702669-1 09/09/21 20:20 • (LCSD) R3702669-2 09/09/21 20:39

Analyte	Spike Amount ug/l	LCS Result ug/l	LCSD Result ug/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Chloroform	5.00	4.85	4.96	97.0	99.2	73.0-120			2.24	20
(S) Toluene-d8				*102*	*101*	*80.0-120*				
(S) 4-Bromofluorobenzene				*98.6*	*98.9*	*77.0-126*				
(S) 1,2-Dichloroethane-d4				*99.4*	*103*	*70.0-130*				

Method Blank (MB)

(MB) R3702265-2 09/05/21 14:24

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
1,4-Dioxane	U		0.597	3.00
(S) Toluene-d8	*96.6*			*77.0-127*

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

(LCS) R3702265-1 09/05/21 13:44 • (LCSD) R3702265-3 09/05/21 14:43

Analyte	Spike Amount ug/l	LCS Result ug/l	LCSD Result ug/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
1,4-Dioxane	50.0	35.9	42.5	71.8	85.0	55.0-138			16.8	24
(S) Toluene-d8				*97.4*	*97.5*	*77.0-127*				

QUALITY CONTROL SUMMARY

L1398643-01,02,04,05,06,07

Method Blank (MB)

(MB) R3700836-1 09/04/21 16:54

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Gamma BHC	U		0.0209	0.0500
(S) Decachlorobiphenyl	*46.9*			*10.0-128*
(S) Tetrachloro-m-xylene	*81.5*			*10.0-127*

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

(LCS) R3700836-2 09/04/21 17:07 • (LCSD) R3700836-3 09/04/21 17:20

Analyte	Spike Amount ug/l	LCS Result ug/l	LCSD Result ug/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Gamma BHC	1.00	0.870	0.807	87.0	80.7	55.0-129			7.51	20
(S) Decachlorobiphenyl				*18.7*	*20.7*	*10.0-128*				
(S) Tetrachloro-m-xylene				*83.9*	*77.3*	*10.0-127*				

Method Blank (MB)

(MB) R3701222-1 09/06/21 16:04

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Gamma BHC	U		0.0209	0.0500
(S) Decachlorobiphenyl	*105*			*10.0-128*
(S) Tetrachloro-m-xylene	*98.8*			*10.0-127*

Laboratory Control Sample (LCS)

(LCS) R3701222-2 09/06/21 16:17

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Gamma BHC	1.00	0.993	99.3	55.0-129	
(S) Decachlorobiphenyl			*98.5*	*10.0-128*	
(S) Tetrachloro-m-xylene			*110*	*10.0-127*	

L1397923-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1397923-01 09/06/21 16:44 • (MS) R3701222-3 09/06/21 16:57 • (MSD) R3701222-4 09/06/21 17:10

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MSD Result ug/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Gamma BHC	1.00	U	0.934	0.913	93.4	91.3	1	14.0-141			2.27	40
(S) Decachlorobiphenyl					*53.2*	*51.5*		*10.0-128*				
(S) Tetrachloro-m-xylene					*108*	*104*		*10.0-127*				

GLOSSARY OF TERMS

Guide to Reading and Understanding Your Laboratory Report

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

Results Disclaimer - Information that may be provided by the customer, and contained within this report, include Permit Limits, Project Name, Sample ID, Sample Matrix, Sample Preservation, Field Blanks, Field Spikes, Field Duplicates, On-Site Data, Sampling Collection Dates/Times, and Sampling Location. Results relate to the accuracy of this information provided, and as the samples are received.

Abbreviations and Definitions

MDL	Method Detection Limit.
RDL	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
(S)	Surrogate (Surrogate Standard) - Analytes added to every blank, sample, Laboratory Control Sample/Duplicate and Matrix Spike/Duplicate; used to evaluate analytical efficiency by measuring recovery. Surrogates are not expected to be detected in all environmental media.
U	Not detected at the Reporting Limit (or MDL where applicable).
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state “ND” (Not Detected) or “BDL” (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Uncertainty (Radiochemistry)	Confidence level of 2 sigma.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

Qualifier	Description
J	The identification of the analyte is acceptable; the reported value is an estimate.
J2	Surrogate recovery limits have been exceeded; values are outside lower control limits.

ACCREDITATIONS & LOCATIONS

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A2LA – ISO 17025 [5]	1461.02	DOD	1461.01
Canada	1461.01	USDA	P330-15-00234
EPA–Crypto	TN00003		

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

* Not all certifications held by the laboratory are applicable to the results reported in the attached report.

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Company Name/Address:
Resolute Environmental & Water Resources

1003 Weatherstone Parkway

Billing Information:
Accounts Payable
1003 Weatherstone Pkwy., Ste. 320
Woodstock, GA 30188

Pres Chk

Report to: **Tommy Jordan**

Email To: **tommy.jordan@resoluteenv.com**

Project Description: **UGA (Milledge Avenue Site)**

City/State Collected:

Please Circle: PT MT CT ET

Phone: **404-358-8469**

Client Project #

Lab Project # **RESENVWGA-MILLEDGE**

Collected by (print): ~~Tommy Jordan~~ TAJ & Joe Bost

Site/Facility ID #

P.O. #

Collected by (signature):

Immediately Packed on Ice N ___ Y ✓

Rush? (Lab MUST be Notified)
___ Same Day X Five Day
___ Next Day ___ 5 Day (Rad Only)
___ Two Day ___ 10 Day (Rad Only)
___ Three Day

Date Results Needed

Quote #

Analysis / Container / Preservative

Chain of Custody Page ___ of ___

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SDG # 398643

D019

Acctnum: **RESENVWGA**

Template: **T193989**

Prelogin: **P868736**

PM: **526 - Chris McCord**

PB: 8/23/21 dod

Shipped Via: **FedEX Ground**

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	8081 100ml Amb-NoPres	V8260 40mlAmb-HCl	V8260LL14D 40mlAmb-HCl	Remarks	Sample # (lab only)
T1-0GWS	G	GW	97'	8/31	1220	7	X	X	X		-01
T1-1GWS	G	GW	91'	8/31	1615	7	X	X	X		-02
T1-2GWS	G	GW	89'	9/1	0845	7	X	X	X		-03
A-T1-B1-48'-GWS	G	GW	48'	9/1/21	1029	7	X	X	X		-04
A-T2-B5-41'-GWS	G	GW	41'	9/1/21	1127	7	X	X	X		-05
A-T2-B3-54'-GWS	G	GW	54'	9/1/21	1343	7	X	X	X		-06
A-T2-B2-28'-GWS	G	GW	28'	9/1/21	1435	7	X	X	X		-07
B2-T1-20'-35'GWS	G	GW	20'-35'	9/1/21	1531	7	X	X	X		-08
P3-~~35~~ 35'-GWS	G	GW	35'	9/1/21	1568	7	X	X	X		-09
	G	GW									

* Matrix:
SS - Soil **AIR** - Air **F** - Filter
GW - Groundwater **B** - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other_____

Remarks:

pH _____ Temp _____

Flow _____ Other _____

Samples returned via:
__ UPS ✓ FedEx __ Courier _____

Tracking # 5163 7719 9401

Sample Receipt Checklist

COC Seal Present/Intact:	NP	Y N
COC Signed/Accurate:		Y N
Bottles arrive intact:		Y N
Correct bottles used:		Y N
Sufficient volume sent:		Y N
If Applicable		
VOA Zero Headspace:		Y N
Preservation Correct/Checked:		Y N
RAD Screen <0.5 mR/hr:		Y N

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Trip Blank Received: Yes / No HCL / MeoH TBR	If preservation required by Login: Date/Time
	9/1/21	1730			
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Temp: °C Bottles Received:	
				2.9+0=2.9 62	
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)	Date: Time:	Hold: Condition: NCF / OK
				9/2/21 0915	

9/2-NCF-L1398643-RESENVWGA PM

R5

Time estimate: oh **Time spent:** oh

Members

Paul Minnich (responsible)

- [ ] Parameter(s) past holding time
- [ ] Temperature not in range
- [ ] Improper container type
- [ ] pH not in range
- [ ] Insufficient sample volume
- [ ] Sample is biphasic
- [ ] Vials received with headspace
- [x] Broken container
- [x] Sufficient sample remains
- [ ] If broken container: Insufficient packing material around container
- [ ] If broken container: Insufficient packing material inside cooler
- [ ] If broken container: Improper handling by carrier:_____
- [ ] If broken container: Sample was frozen
- [ ] If broken container: Container lid not intact
- [ ] Client informed by Call
- [ ] Client informed by Email
- [ ] Client informed by Voicemail
- [ ] Date/Time:_____
- [ ] PM initials:_____
- [ ] Client Contact:_____

Comments

Paul Minnich *2 September 2021 10:16 PM*

One vial for V8260 for sample T1-0GWS received broken.

H. – GROUNDWATER MODELING REPORT

SIMULATION GROUNDWATER FLOW WITHIN IN THE MILLEDGE AVENUE SITE

UNIVERISTY OF GEORGIA, ATHENS, GEORGIA

December 31, 2021

By: Morris L. Maslia, P.E.[1] and Tommy A. Jordan, P.G.[2]

December 31, 2021

[1] M.L. Maslia Consulting Engineer
[2] Project Manager, Resolute Environmental and Water Resources Consulting

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COVERSION FACTORS

Multiply	By	To obtain
Length		
inch (in.)	2.54	centimeter (cm)
inch (in.)	25.4	millimeter (mm)
foot (ft)	0.3048	meter (m)
mile (mi)	1.609	kilometer (km)
mile, nautical (nmi)	1.852	kilometer (km)
yard (yd)	0.9144	meter (m)
Area		
acres	4,047	square meter (m^2)
acre	0.4047	hectare (ha)
acre	0.004047	square kilometer (km^2)
square foot (ft^2)	929.0	square centimeter (cm^2)
square foot (ft^2)	0.09290	square meter (m^2)
square yard (yd^2)	0.8361	square meter (m^2)
Volume		
gallon (gal)	3.785	liter (L)
gallon (gal)	0.003785	cubic meter (m^3)
million gallons (Mgal)	3,785	cubic meter (m^3)
Cubic yard (yd^3)	0.7646	cubic meter (m^3)
Flow rate		
foot per day (ft/d)	0.3048	meter per day (m/d)
gallon per minute (gpm)	0.06309	liter per second (L/s)
Gallon per year (gal/yr)	0.003785	cubic meter per year (m^3/yr)
million gallons per day (MGD)	0.04381	cubic meter per second (m^3/s)
inch per year (in/yr)	25.4	millimeter per year (mm/yr)

Multiply	By	To obtain
Hydraulic conductivity		
foot per day (ft/d)	0.3048	meter per day (m/d)
foot per day (ft/d)	3.5278×10^{-4}	centimeter per second (cm/s)
Hydraulic gradient		
foot per foot (ft/ft)	0.3048	meter per meter (m/m)
Infiltration		
inch per day (in./d)	2.54	centimeter per day (cm/d)
foot per day (ft/d)	0.3048	meter per day (m/d)

CONCENTRATION CONVERSION FACTORS

Unit	To convert to	Multiply by
microgram per liter (□g/L)	milligram per liter (mg/L)	0.001
microgram per liter (□g/L)	milligram per cubic meter (mg/m^3)	1
microgram per liter (□g/L)	microgram per cubic meter ($□g/m^3$)	1,000
Parts per billion by volume (ppbv)	Parts per million by volume (ppmv)	1,000

GLOSSARY AND ABREVIATIONS

bgs	Below ground surface
CAP	Corrective Action Plan
COC	Contaminants of concern
Darcy velocity	Also known as specific discharge; defined as the hydraulic conductivity multiplied by the hydraulic gradient
Ephemeral stream	A stream that has flowing water only during, and for a short duration after, precipitation events in a typical year. Groundwater is not a source of water for the stream. Runoff from rainfall is the primary source of water for stream flow
GAEPD	Georgia Environmental Protection Division
GANDR	Georgia Department of Natural Resources
ft	Foot or feet
Groundwater velocity	Also known as average velocity or velocity; used for determining the movement and direction of groundwater and contaminants; defined as the specific discharge divided by the effective porosity
gpm	Gallon per minute
GMS	Groundwater Modeling System developed by Aquaveo
GWTS	Groundwater treatment system
HMTF	Hazardous Material Treatment Facility
in.	Inch or inches
Kh	Horizontal hydraulic conductivity
MCL	Maximum contaminant level; a legal threshold limit set by the USEPA on the amount of a hazardous substance that is allowed in drinking water under the Safe Drinking Water Act; usually expressed as a concentration in milligrams or micrograms per liter
µg/L	Micrograms per liter
MODFLOW	The U.S. Geological Survey's modular finite-difference groundwater-flow model
NGVD	Vertical coordinate information referenced to the National Geodetic Vertical Datum of 1929 (NGVD 29)

NOAA/NWS	National Oceanic and Atmospheric Administration, National Weather Service. A US Government agency that collects, assembles, and disseminates climatic and weather-related data
Perennial stream	A stream that has a constant flow of water throughout the year during years of normal rainfall. Groundwater is the primary source of water for the stream
Porosity	Ratio of the volume of void spaces in soil or rocks to the total volume of the soil or rock, expressed as a percent; also referred to as total porosity
Porosity, effective	The ratio of the volume of void spaces in soil or rock through which fluids can travel to the total volume of the soil or rock; expressed as a percent
PRB	Permeable reactive barrier; also referred to as a permeable reactive treatment zone. A subsurface emplacement of reactive materials through which a dissolved contaminant plume must move as it flows, typically under natural gradient. Treated water exits the other side of the PRB. This in situ method for remediating dissolved-phase contaminants in groundwater combines a passive chemical or biological treatment zone with subsurface fluid flow management.
RCH	MODFLOW-2005 recharge package
RCRA	Resource Conservation and Recovery Act
RFA	RCRA Facilities Assessment
RFI	The RCRA Facilities Investigation
RMS	Root-mean-square
SMU	Solid waste management unit
SSQ	Sum of squares
ST	Shelby Tube
STR	MODFLOW-2005 streamflow package
TOC	Top of well casing
UGA	University of Georgia, Athens, GA
USEPA	U.S. Environmental Protection Agency
USGS	U.S. Geological Survey

1.0 INTRODUCTION

The Milledge Avenue Site ("Site") is a former landfill located near Milledge Avenue and Will Hunter Road, in Athens, Georgia. The Site is one (#1) of four Solid Waste Management Units (SWMUs) regulated by the Georgia Environmental Protection Division (GAEPD) under the Resource Conservation and Recovery Act (RCRA) and has been the subject of significant prior assessment and interim remedial measures. On December 17, 2019, GAEPD issued Hazardous Waste Facility Permit No. HW-041 [CA] ("the Permit") for the investigation and corrective action of releases from the former landfill. A Corrective Action Plan (CAP) has been developed to meet the requirements of the Permit and the RCRA regulatory process. A report for the CAP has been previously developed and published; the reader should refer to that report for details (Resolute 2020). Part of the CAP is the identification, development, and implementation of a corrective action measure or measures to prevent and remediate releases of contaminants from the Site. This requires, in part, the understanding and prediction of the magnitude and direction of groundwater flow in the vicinity of the landfill area, prior and subsequent to implementing corrective action measures. This Appendix report, therefore, describes the development of a three-dimensional groundwater-flow model that is used to assess a number of correction action measures utilizing a permeable reactive barrier (PRB) approach (Blowes, et al. 1995; USEPA 1998; ITRC 2011).

2.0 BACKGROUND AND PURPOSE OF MODELING ANALYSIS

The Site is located on the State Botanical Garden of Georgia on property owned by the University of Georgia, Board of Regents, in Athens (UGA) (Figure 1). The Site consists of the former landfill and an adjacent area of impacted groundwater to the north/northwest that is both topographically and hydraulically downgradient of the former landfill. The former landfill portion of the Site is a sloping parcel of land that is fenced and covered in grass. The latter is the covering for a two-layer, engineered landfill cap with drainage pipes between the layers. The fence isolates the capped former landfill from the remainder of the State Botanical Garden property. The adjacent land slopes downward, approximately 200-300 feet (ft), to the northwest, crossing a cleared electrical power easement and extending into wooded terrain used by the State Botanical Garden as part of their walking trail system.

Figure 1. Location of investigation area, Milledge Avenue Site, Athens, GA.

The purpose of the modeling analysis described in this Appendix A report is to describe the development of a groundwater-flow model of the Site using the U.S. Geological Survey's (USGS) MODFLOW-2005 groundwater-flow model (Harbaugh 2005). The groundwater-flow model of the Site is used to assess groundwater-flow conditions for 2021 based on measured groundwater elevations during January and July 2021. Simulation results of two PRB design scenarios are presented in terms of the impact of the PRB designs on (1) groundwater elevations within the landfill and (2) groundwater velocity magnitudes and directions. The modeling analyses will assess the impact and effectiveness of the PRB design scenarios under the precipitation and groundwater recharge conditions occurring during 2021.

3.0 SUMMARY OF PREVIOUS INVESTIGATIONS

From 1969 to 1979, the landfill was utilized as an active disposal site for laboratory waste from the UGA campus. Various types of wastes were placed in the landfill including laboratory specimens, chemicals, and radioactive materials. Historical records indicate that wastes were placed approximately 10 to 12 ft below ground surface and wastes were filled to approximately three to four feet below the ground surface. Native soil was used as backfill, and the backfill was compacted in place (Brown and Caldwell 1996).

The Preliminary Site Evaluation was performed in 1986. UGA was issued Hazardous Material Treatment Facility (HMTF) Permit # HW-041 (S&T) in June of 1987. The RCRA Facilities Assessment (RFA) was conducted in 1988. The RCRA Facilities Investigation (RFI) was completed 1989. Both these activities were completed pursuant to the facility RCRA Permit, and several Solid Waste Management Units (SWMUs) were identified. The Bedrock Characterization Study was performed in 1996 to determine the downgradient impacts of the contaminants of concern from the landfill (Brown and Caldwell 1996).

A Groundwater Treatment System (GWTS) was initially installed in 1999 as an interim measure to protect the unnamed creek from potential discharge of contaminated groundwater. The GWTS consisted of five recovery wells (RW-1 through RW-5) each pumping approximately 1 gallon per minute (gpm). The wells were 4-inch (in.) in diameter with 10-ft long screens and were set near the top of the bedrock. Extracted groundwater was piped to the treatment system building located nearby, where it was treated to concentrations below regulatory requirements using bag filters and an air stripper. The treated water was returned to the stream. No air abatement equipment was required for the GWTS due to the low concentrations of volatile compounds (GADNR 2018).

In 2020, a RCRA CAP was submitted to the GAEPD that described the Site geology, hydrogeology, groundwater contamination, and remedial action plan. Much of the data used in the groundwater modeling analysis were obtained from this report and follow-up field investigations at the Site during 2020 and 2021 (Resolute 2020, 2021). A map showing the locations monitor wells and piezometers used for geophysical sampling and water-level measurements in the shallow overburden and bedrock is presented in Figure 2; construction data for monitor wells, recovery wells, and piezometers are listed in Table 1. A hydrogeologic cross-section traversing the Site along a southeast to northwest transect (Cross-Section A-A') is shown in Figure 3.

Figure 2. Locations of monitor wells, piezometers, well points and Shelby Tube borings used for water-level measurements and geotechnical sampling for hydraulic and aquifer properties.

Figure 3. Cross-section A-A' showing monitor wells, piezometers, and geotechnical sampling locations.

Table 1. Summary of well construction data, Milledge Avenue Site, Athens, GA.

3.1 Hydrogeology

The groundwater at the Site generally flows from the southeast to the northwest towards an unnamed creek that flows to the west, into the Middle Oconee River approximately 0.35 mile downstream. Potentiometric surface maps of the shallow overburden and bedrock for January 2021 and July 2021 are presented in Figures 4-7, respectively. Contaminated groundwater beneath the Site extends along the narrow drainage basin of the unnamed creek and terminates within the State Botanical Garden. The Site is encompassed by the State Botanical Garden.

Groundwater flow on Site originates from the infiltration of precipitation into the overburden (shallow residual soils) on topographically higher ground southeast of the landfill, flows to the northwest, under the landfill cap, and toward the unnamed creek as shown in Figures 3-7. As it flows through the overburden, it moves downward into fractured bedrock, as shown by downward hydraulic gradients in well pairs such as MW-5b and MW-5c. (Groundwater elevation data are presented on Table 2). As the groundwater approaches the creek, the vertical gradient turns upward from the shallow bedrock to the overburden, as illustrated in groundwater elevations in wells MW-9b and MW-9a, respectively (Table 1). A downward gradient is present between wells MW-9b and deeper well MW-9c; however, the limited interconnectivity of fractures appears to limit groundwater flow in deeper bedrock.

In the vicinity of the former landfill, groundwater is present at depths that have varied significantly since 1990. In monitoring well MW-1, on the hydraulically upgradient side of the landfill (Figure 2 and Figure 3), the depth to groundwater has been measured at about 37 to 40 ft below the top of the well casing (TOC; Table 2). However, since 1990, depth to groundwater has ranged from a high of 33 ft below TOC to a low of 50 ft below TOC. In monitoring wells MW-2 through MW-4 on the hydraulically downgradient side of the landfill, the depths to groundwater have been measured at about 10 ft shallower at 27 to 29 ft below TOC, with similar historical fluctuations.

The potentiometric surface maps for January 2021 and July 2021 for the overburden show groundwater discharging to surface water in the creeks in the northwestern parts of the Site. As the overburden is some 50 ft to 100 ft above the bedrock, there appears to be no influence of the creek on groundwater flow in the deep bedrock. Thus, with the exception of the creek in the northwestern part of the Site, the potentiometric surfaces for the bedrock (Figures 5 and 7) are a subdued replica of the potentiometric surfaces for the overburden (Figures 4 and 6), based on the January 2021 and July 2021 water-level measurements.

Table 2. Measured water-level data for January 2021 and July 2021 in the overburden and bedrock, Milledge Avenue Site, Athens, GA.

Figure 4. Potentiometric surface and generalized direction of groundwater flow in the overburden, January 2021 conditions.

Figure 5. Potentiometric surface and generalized direction of groundwater flow in the overburden, July 2021 conditions.

3.2 Groundwater Contamination

Although the GWTS interim measure was successful in protecting the surface water from exceedances of the Georgia Instream Water Quality Standards, contaminants of concern (COCs) had reached an equilibrium in the groundwater treatment zone. Moreover, the GWTS was an interim measure to protect local surface waters and not a remediation alternative for the Site. UGA discontinued use the GWTS system on May 1, 2019, as approved the GAEPD. To confirm that the shutdown of the GWTS does not result in adverse impacts to the stream, UGA conducts an enhanced surface water and sediment sampling program semiannually.

Although the known wastes placed in this landfill were believed to be contained within the trenches, the entire area around the landfill site was capped with a geo/composite - clay layer and covered with soil and vegetation. A drainage system was installed between the two cap layers to remove standing water. This landfill cap was installed on the landfill in 2002 (GADNR 2018).

On December 17, 2019, GAEPD issued Hazardous Waste Permit No. HW-041 [CA] (EPA ID. No. GAD07346094) to the University of Georgia, Athens, Georgia (UGA) for the facility at Will Hunter Road, Athens (GADNR 2019). This Permit for the UGA Hazardous Waste facility requires UGA to conduct investigation and corrective action to remediate the release of hazardous constituents into the environment at the Milledge Avenue Site (also known as SWMU #1 and formerly called the Botanical Gardens Landfill). According to the Permit, the other SWMUs at this Site (SWMU #2, #3, #4, and Structure D) require no further action at the present time, and the Area of Concern, the HMTF Ditch, requires institutional controls.

3.3 Contaminants of Concern (COCs) in Groundwater

At the request of the GAEPD, the list of site-specific COCs in groundwater was expanded during September 2019 after sampling monitoring well MW-4, located immediately downgradient of the former landfill (Figure 2). Lindane (Gamma BHC) and 1,4 dioxane were detected at concentrations exceeding their respective U.S. Environmental Protection Agency (USEPA) Maximum Contaminant Levels (MCLs). Other BHC compounds (alpha-BHC, beta-BHC, delta-BHC) were also detected at concentrations similar to or less than Lindane, but these BHC compounds do not have MCLs. As a result of this September 2019 sampling, lindane and 1,4 dioxane were added to the list of site-specific COC analytes for the January 2020 semiannual sampling event. The analytical results from the groundwater samples collected in a January 2020 sampling event are presented below. Similar concentrations and distributions of COCs were detected in the prior sampling event during September 2019.

- Carbon tetrachloride was detected above the MCL of 5 micrograms per liter (ug/L) for wells MW-2 (5.6 ug/L), MW-3 (34.2 ug/L), and MW-4 (17.9 ug/L);
- Chloroform was above the MCL of 80 ug/L (MCL for total trihalomethanes) in MW-2 (326 ug/L), MW-3 (1,870 ug/L), MW-4 (925 ug/L), MW-9b (126 ug/L), and MW-13 (219 ug/L);
- 1,2-Dichloroethane was above the MCL of 5 ug/L in MW-3 (6.17 ug/L) in September 2019, and very close to the MCL (4.58 ug/L) in January 2020;
- 1,2-Dichloropropane was above the MCL of 5 ug/L in MW-3 (7.18 ug/L);
- Tetrachloroethene (PCE) was above the MCL of 5 ug/L In MW-4 (12.3 ug/L);

- Lindane (Gamma BHC) was above the MCL of 0.2 ug/L in MW-4 (0.311 ug/L); and
- 1,4-Dioxane was above the USEPA screening level of 0.46 ug/l in wells MW-2 (12 ug/L), MW-3 (69.7 ug/L), MW-4 (202 ug/L), MW-6b (3.02 ug/L), MW-7a (18.6 ug/L), MW-7b (39.4 ug/L), MW-9a (22.6 ug/L), MW9b (37.6 ug/L), MW-13 (10.7 ug/L), MW-14a (4.88 ug/L).

The most frequently detected COC at the site was 1,4-dioxane for the January 2020 sampling event, which was detected above the USEPA Screening level of 0.46 ug/L in 10 of 33 sampling locations (Resolute 2021). As described above, the greatest number of COCs and the highest concentrations of COCs were detected in monitoring wells MW-3 and MW-4, immediately downgradient of the former landfill. Lines of equal concentration (Isoconcentration) maps showing the distributions of COCs, as well as the horizontal and vertical extents, have previously been presented in the RCRA Corrective Action Plan report (Resolute 2020, Figures 5 through 12). Based on the two recent sampling events in September 2019 and January 2020, the COCs, which exceed MCLs at this Site were: carbon tetrachloride, chloroform, 1,2-dichloroethane, 1,2-dichloropropane, tetrachloroethene (PCE), lindane (Gamma BHC), and 1,4-dioxane (Resolute 2020).

4.0 GEOTECHNICAL AND HYDRAULIC PROPERTIES

Sampling events were conducted at the Site during 2021 to quantify geotechnical and hydraulic properties (total porosity, moisture content, and hydraulic conductivity) in the vicinity and downgradient of the landfill. Two of the properties, porosity and hydraulic conductivity are needed as data input for the groundwater-flow model. These properties are listed in Table 3. Note that for groundwater-flow modeling, an estimate of effective porosity, typically less than the total porosity is needed, because not all pore space, especially at dead-ends of soil or rock volume, are filled with fluid. Laboratory determined hydraulic conductivity, derived from Shelby Tube sampling ranged from a low of $1.3x10^{-6}$ cm/s ($3.7x10^{-3}$ ft/d) for sample ST-12 to a high of $2.9x10^{-4}$ cm/s ($8.2x10^{-1}$ ft/d) for sample ST-5. The geometric mean of hydraulic conductivity for the Shelby Tube samples is $4.3x10^{-5}$ cm/s ($1.2x10^{-1}$ ft/d)., which is in the range of and consistent with hydraulic conductivity for silty clays and clayey sands (Freeze and Cherry 1979, Fetter 1988), typical of the overburden at the Site. The areal distribution of hydraulic conductivities, derived from the laboratory analysis of Shelby-Tube sampling is shown in Figure 4.

Laboratory determined total porosity ranged from a low of 33.3% (sample ST-9) to a high of 43.9% (sample ST-6), with a mean of 39%. Laboratory determined moisture content ranged from a low of 27.5% (sample ST-9) to a high of 36.9% (sample ST-6), with a mean of 32.0%.

Three samples were obtained from Monitor Well (MW-9), which is drilled into the bedrock. Laboratory results for hydraulic conductivity for samples MW-9A, MW-9B, MW-9C are $5.1x10^{-4}$ cm/s (1.44 ft/d), $5.1x10^{-4}$ cm/s (1.44 ft/d), and $4.5x10^{-4}$ cm/s (1.28 ft/d), respectively, typical for fractured and weathered rock. Total porosity for samples MW-9a, MW-9b, and MW-9c are 2.9%, 1.5% and 0.5%, respectively. Laboratory determined moisture content for samples MW-9a, MW-9b, and MW-9c are 0.5%, 0.4%, and 0.5%, respectively.

Table 3. Field samples and laboratory determined geotechnical and hydraulic property values for hydraulic conductivity, porosity, and moisture content, Milledge Avenue Site, Athens, GA.

Figure 4. Geotechnical sampling locations in the overburden and bedrock and laboratory determined horizontal hydraulic conductivity.

5.0 CONCEPTUAL MODEL OF GROUNDWATER FLOW

Groundwater flow in the vicinity of the landfill (Figures 3, 5, and 6) originates from the infiltration of precipitation on topographically higher ground southeast of the landfill, flows to the northwest, under the landfill cap, where it becomes impacted by COCs (Resolute 2020, Figures 5–12). As it flows farther northwest, topographically and hydraulically downgradient of the landfill, toward the unnamed creek, the impacted groundwater moves into bedrock between monitoring wells MW-5b/c and MW-13 (Figure 7) and moves with the highest horizontal velocity through the upper 25 feet of bedrock, as monitored by wells MW-13, MW-9b, and MW-20. As the groundwater reaches the creek, the vertical gradient turns upward from the shallow bedrock to the overburden, as shown in groundwater elevations in wells MW-9b and MW-9a, respectively (Table 2). A downward gradient is present between wells MW-9b and deeper well MW-9c; however, the limited interconnectivity of fractures appears to limit COC concentrations extending substantially deeper than the upper 70 ft of bedrock. The highest concentrations of chloroform (Resolute 2020, Figure 7) have moved the farthest downgradient in the upper 20 to 25 ft of fractured bedrock and have moved shorter distances in the groundwater in the overburden (soil) and deeper fractures. The extent of impacted groundwater narrows in the creek drainage as it moves farther downgradient (Resolute 2020, Figures 5–6). Within the Site and surrounding area, there are no domestic or municipal water-supply wells that impact and change the movement and direction of groundwater flow. Therefore, changes to groundwater flow, in terms of direction, movement, and velocity, are a result of changing infiltration of precipitation into the overburden and subsequent vertical flow into the underlying bedrock.

Figure 5. Map showing potentiometric surface and generalized direction of groundwater flow in the overburden, January 2021 conditions.

Figure 6. Map showing potentiometric surface and generalized direction of groundwater flow in the overburden, July 2021 conditions.

6.0 MATHEMATICS OF THREE-DIMENSIONAL GROUNDWATER FLOW[3]

A partial differential equation based on the principles of ass balance can be used to describe the groundwater-flow system at the Site, previously descried in the conceptual model. The derivation of the generalized governing equation of groundwater flow in saturated media has been described in many references including those by Bear (1979), Anderson and Woessner (1992), Kresic (1997), and Schwartz and Zhang (2003). The partial differential equation can be written as:

$$\frac{\partial}{\partial x}\left(K_{xx}\frac{\partial h}{\partial x}\right)+\frac{\partial}{\partial y}\left(K_{yy}\frac{\partial h}{\partial y}\right)+\frac{\partial}{\partial z}\left(K_{zz}\frac{\partial h}{\partial z}\right)+W=S_s\frac{\partial h}{\partial t} \quad (1)$$

[3] The ensuing discussion on the mathematics of three-dimensional groundwater flow is taken from Suarez-Sotó, et al. (2013), where the primary author of this Appendix A was a co-author.

where

K_{xx}, K_{yy}, and K_{zz} equal horizontal hydraulic conductivity along the *x*, *y*, and *z* axes [LT^{-1}];

h equals the potentiometric head [L];

W equals the sources or sinks of water (volumetric rate per unit volume) [LT^{-3}];

S_s equals the specific storage of the porous media [L^{-1}]; and

t equals time [T][4].

Predevelopment or steady-state conditions, such as those that exist at the Site, are represented by setting the right-hand-side of Equation 1 to zero, thereby yield the following equation:

$$\frac{\partial}{\partial x}\left(K_{xx}\frac{\partial h}{\partial x}\right)+\frac{\partial}{\partial y}\left(K_{yy}\frac{\partial h}{\partial y}\right)+\frac{\partial}{\partial z}\left(K_{zz}\frac{\partial h}{\partial z}\right)=0 \quad (2)$$

Because conditions at the Site indicate that potentiometric levels generally fluctuate solely due to changes in infiltration of precipitation (no domestic or municipal water-supply wells within the vicinity of the Site), over the long term, conditions at the Site and for the purpose of this investigation, are assumed to be approximately steady state.

6.1 Boundary Conditions

Three types of boundary conditions are applied to the groundwater-flow model of the Site and are described below.

Type 1. Specified head boundary (Direchlet condition) in which the hydraulic head or potentiometric level is specified. When the hydraulic head is a constant value, such as a boundary representing sea level, this boundary is also referred to as *constant-head* boundary condition in model applications.

Type 2. Specified flow boundary (Neumann condition) in which the gradient of the head (or flux) across a boundary is given. When the flux is specified as zero, this represents a *no-flow* boundary condition in model applications.

Type 3. Head-dependent flow boundary (Cauchy or mixed boundary) in which the flux over a boundary is calculated given a head-value at the boundary. This boundary condition type is also known as a generalized-head boundary in model applications.

[4]L represents length units; T represents time units.

6.2 Initial Conditions

Under steady-state conditions, such as those that characterize the Site (Equation 2), initial conditions do not need to be specified. However, specifying initial hydraulic head values that are in reasonable proximity of field conditions, can help reduce the number of iterations for convergence to a solution of Equation 2 during model simulation. For transient or unsteady-state conditions, initial conditions supply the hydraulic head or potentiometric level everywhere within the domain of interest at some initial time such as steady-state (i.e., time = 0). In the case where water-supply wells are pumping, initial conditions are represented by pre-development or steady-state conditions existing prior to the onset of pumping.

The system represented by Equations 1 and 2 and the respective boundary and initial conditions can be solved using analytical and numerical methods. Analytical solutions are only available for simple systems, while complex systems require numerical methods (e.g., finite-difference or finite-element methods). The numerical code used in this investigation (e.g., MODFLOW-2005) uses a finite-difference method to solve Equations 1 and 2 along with associated boundary and initial conditions. Details of the solution methodology are described in Harbaugh (2005)[5].

7.0 THREE-DIMENSIONAL GROUDWATER-FLOW MODEL

The code used to simulate three-dimensional groundwater flow within the Site is the USGS MODFLOW-2005 model (Harbaugh 2005). The code simulates groundwater flow in a three-dimensional, heterogeneous, anisotropic porous media. The model grid and parameter value arrays were constructed and manipulated using the graphical user interface software Groundwater Modeling System (GMS) by Aquaveo (2021). Described below are the model domain and discretization and estimates of model input data for hydraulic and aquifer properties, precipitation and recharge, and creeks.

7.1 Domain and Discretization

A finite-difference grid was used to discretize the Site area and is shown in Figure 7. Coordinate locations for the four corners bounding the groundwater-flow model domain (upper left, lower left, upper right, and lower right corners of the finite-difference grid) are listed in Table 4. The groundwater-flow domain for the Site was discretized by using 41 layers, 125 rows, and 122 columns. Layer 1 represents the uppermost layer of the model and the approximate elevation of the water table or saturated zone in the overburden. Layer 41 represents the approximate elevation of the bottom of the overburden or top of the bedrock. The dimensions of the cells in the X-Y plane (or areal direction) are approximately 10 ft by 10 ft. Thicknesses of the layers in the vertical direction vary from a maximum of approximately 10 ft to a minimum of approximately 2.5 ft. The domain and other model parameters (e.g., potentiometric heads, hydraulic conductivity, etc.) were discretized using the GMS graphical user interface software (Aquaveo, 2021).

Figure 7. Map showing groundwater-flow model domain, active model grid, and boundary conditions.

[5] MODFLOW is a family of three-dimensional groundwater flow models developed by the U.S. Geological Survey. The specific MODFLOW model code applied to the Site is MODFLOW-2005.

Table 4. Coordinate locations for the corners of the groundwater-flow model domain, Milledge Avenue Site, Athens, GA.

The three boundary condition types, as previously discussed, were applied to the model domain. Specified heads (Type 1 boundary condition) were assigned along the southern and northern boundaries (Figure 7) and corresponded to the estimated potentiometric level in the overburden for model Layer 1 along these locations. The western boundary was assigned as a generalized-head boundary condition (Type 3 boundary condition). Estimated elevations of the potentiometric heads in the overburden along this boundary were used as the aquifer head along this boundary. The eastern boundary of the model domain was assigned a zero flux or no-flow condition (Type 2 boundary condition) as it coincided with a topographic divide along this model boundary. Applying these boundary conditions to model Layer 1, results in the active model domain being defined within the four corners of the finite-difference model grid for the Site. Location and identification of the model boundary conditions are also shown inf Figure 7.

7.2 Hydraulic and Aquifer Properties

For the simulation of three-dimensional groundwater flow at the Site, horizontal hydraulic conductivity is required to be assigned to all active model cells. Model Layer 1 is characterized as unconfined. Therefore, horizontal hydraulic conductivity was estimated using field data gathered at the Site from Shelby-Tube cores (Figure 4, Table 3). These data were interpolated by GMS and assigned to the active model domain cells. The underlying model layers (2–41) are characterized as confined. Therefore, the required aquifer hydraulic property, transmissivity, is computed using GMS by applying the hydraulic conductivity from Site field data (i.e., Figure 4, Table 3) and multiplying it by the corresponding thickness of each of the confined model layers. The thickness of the model layers is computed using GMS by taking the difference between the elevation of one layer and the elevation of the next layer below underlying it (e.g., Layers 2–3, Layers 3–4, . . ., Layers 40–41). The initial values of horizontal hydraulic conductivity assigned to the active model domain cells were increased and decreased during the iterative, trial and error method of adjusting model parameter values to achieve a minimum difference between measured groundwater elevations in the overburden and simulated groundwater elevations at 27 monitor-well, piezometer, and well-point locations listed in Table 2 and Table 5 (this difference is referred to as the water-level residual).[6]

Table 5. Mean groundwater elevation 2021, elevation of well screen mid-points, and corresponding groundwater-flow model identification and cell location, Milledge Avenue Site, Athens, GA

Effective porosity in needed by the three-dimensional groundwater-flow model to compute groundwater velocity using the Darcy velocity or specific discharge for each active model cell. Thus,

$$V_{gw} = \frac{V_D}{n} \quad (3)$$

[6] Groundwater flow is simulated solely in the overburden, with the bedrock being the bottom of the model. Therefore, monitor wells drilled solely into the overburden are compared with simulated water levels at these locations. Table 2 lists all monitor wells drilled into the overburden and bedrock (a total of 35 wells) compared to wells drilled solely into the overburden listed in Table 5 (27 wells).

where

V_{gw} equals the groundwater velocity [LT^{-1}];
V_D equals the specific discharge or Darcy velocity [LT^{-1}];
n equals the effective porosity (percent).

In MODFLOW-2005, a single value of effective porosity can be assigned to the entire active model domain. Values for total porosity obtained from Shelby-Tube cores are listed in Table 3. These ranged from about 35% to 44%, which is consistent with typical values published for clays, silts, and sands (Freeze and Cherry 1979, Fetter 1980). Therefore, effective porosity based on Site data was estimated to be 39%, and a value of 0.39 was assigned in GMS to the entire active model domain.

7.3 Precipitation and Recharge

Infiltration derived from precipitation, or recharge in modeling terminology, was assigned to model Layer 1 cells within the active model domain. Recharge is modeled in MODFLOW-2005 with a flux condition using the RCH package. Monthly precipitation data are available online for the Athens, GA, area from the National Oceanic and Atmospheric Administration (NOAA) online weather data (NOWData 2021). However, long-term historical water-level measurements in the overburden and bedrock for the Site are not available. Therefore, quantifying recharge using published methods based on long-term monitor-well data was not possible. Initial estimates for recharge were, however, estimated to be 15% of precipitation that infiltrates into the shallow groundwater system, such as the overburden at the Site. Based on the NOWData (2021) data for Athens, GA, the mean precipitation for the period 1990-2021 is 49.04 inches per year or 0.0112 ft/d in terms of modeling units. The aforementioned precipitation value was multiplied by 0.15 to obtain the initial input value for recharge assigned to all active model cells for model Layer 1 (0.0112 ft/d x 0.15 or 0.00167 ft/d). These values were increased and decreased within the active model domain during the iterative, trial and error method of adjusting model parameter values to achieve a minimum difference between measured groundwater elevations in the overburden and bedrock and simulated groundwater elevations at the 27 monitor well, piezometer, and well point locations listed in Table 5.

7.4 Streams and Creeks

As previously discussed in the section on hydrogeology (Section 3.1), groundwater at the Site generally flows from the southeast to the northwest towards an unnamed creek. This creek is both ephemeral (i.e., an ephemeral stream) and perennial with the ephemeral sections being in the southern areas of the Site and the perennial sections being located in the northern and northwestern parts of the Site (Figure 2). The creeks are conceptualized in the active model domain (Figure 7) by using the MODFLOW-2005 streamflow or STR package and assigning estimated values for elevations of the creek water surface (stage), creek bottom elevation, and a creek bed conductance value (see Aquaveo 2021 and Harbaugh 2005 and for specific details). The perennial sections of the creeks are “gaining streams,” meaning that groundwater elevation is generally higher than the stage of the creek, thereby causing groundwater from the overburden to discharge into the creeks. As previously described for the horizontal hydraulic conductivity and recharge parameter values, streambed conductance values assigned to the creeks in the active model domain were modified from initial estimates during the iterative, trial and error method of

adjusting model parameter values to achieve a minimum difference for groundwater elevation residuals at the 27 monitor well, piezometer and well point locations (Table 5 and Table 6).

8.0 MODEL RESULTS

Because a steady-state groundwater-flow model of the Site was developed, it was decided that a potentiometric surface map of the mean conditions for 2021 should be used for assessing the "goodness of fit" of model simulations. Therefore, a potentiometric surface map representing the mean groundwater elevations of January 2021 and July 2021 was developed using the January 2021 and July 2021 measured water-level data (Table 6). The mean 2021 potentiometric surface of groundwater elevations in the overburden are shown in Figure 8.

Table 6. Measured and simulated water levels and residuals in the overburden, January and July 2021, Milledge Avenue Site, Athens, GA.

Figure 8. Map showing potentiometric surface in the overburden, mean January-July 2021 conditions.

Model parameter values for horizontal hydraulic conductivity, recharge, and creek bed conductance were adjusted by trial and error to achieve a best fit between the 2021 mean of measured groundwater elevations and simulated groundwater elevations at 27 model locations that coincided with the locations for monitor wells, piezometers, and well points (Table 6). Simulations were conducted using the mean 2021 water-level conditions by imposing the specified-head boundary conditions (Type 1) along the southern and northern boundaries of the active model domain, the no-flow boundary condition (Type 2) along the eastern boundary, and the generalized-head boundary condition (Type 3) along the western model boundary (Figure 7). A map of the simulated steady-state potentiometric surface in the overburden, computed residuals, and directions of groundwater flow derived from the three-dimensional groundwater-flow model for January-July mean 2021 conditions is shown in Figure 9. Residuals for the 27 observation locations (mean 2021 groundwater elevations minus simulated groundwater elevations) are also listed in Table 6.

Figure 9. Map showing simulated steady-state potentiometric surface, residuals, and directions of groundwater flow, derived from three-dimensional groundwater-flow model, mean January-July 2021 conditions.

A measure of the goodness of fit between measured (observed) and simulated groundwater elevations is quantified using the sum of squares of residuals (SSQ) and computing a root-means square (RMS) as follows:

$$SSQ = \sum_{i=1}^{Nobs}(Hobs - Hsim)^2 \quad (4)$$

$$RMS = \sqrt{SSQ/_{Nobs}} \quad (5)$$

where

SSQ equals the sum of residuals square, [L^2];
Nobs equals the number of observation points [—];
Hobs equals the observed or measured groundwater elevation (mean 2021, Table 6), [L],
Hsim equals the simulated groundwater elevation (Table 6), [L], and
RMS equals the root-mean-square, [L].

Equations (4) and (5) essentially represent a Euclidean norm that provides a measure of the offset or residual over the domain of the model based on available measured (observed) data at the monitor wells, piezometers, and well points. Utilizing the data listed in Table 6, the sum of squares (SSQ) and root-mean square (RMS) for mean 2021 conditions were computed to be 71.52 ft^2 and 1.63 ft, respectively. Given the paucity of hydrogeologic Site data, (e.g., lack of measured streamflow, long-term water-level data for estimating recharge), model results are considered to provide an acceptable fit between measured (observed) mean 2021 groundwater elevations and simulated groundwater elevations.

The "goodness of fit" based on comparing measured and simulated groundwater elevations and corresponding residuals at the 27 observation points can also be shown graphically. Graphs of the steady-state groundwater-flow model results are constructed showing observed versus simulated water levels and observed versus corresponding residuals (Figure 10 and 11, respectively). Overall, there is a good fit between observed and simulated groundwater elevations, as most of the points in Figure 10 coincide with the line of equality. Additionally, residuals are typically within or less than a +/- 2 ft range as shown in Figure 11. Locations where residuals exceed +/- 2 ft (MW-10a, MW-1b, MW-14b, and WP-1; Table 6) are located north of the area of interest at the Site (the landfill) and in the northern most area of the model domain, where substantial paucity of hydrogeologic field data exists.

Figure 10. Graph showing steady-state groundwater-flow model results, January-July 2021 conditions.

Figure 11. Graph showing observed mean groundwater elevations and simulated residuals, January-July 2021 conditions.

Based on simulated groundwater flow at the Site, groundwater velocities (V_{gw}, Equation 3) are computed in MODFLOW-2005. Groundwater velocities at selected locations of interest at the Site are listed in Table 7. The velocity magnitudes are lowest in the area about 40 ft south of the landfill near MW-1, about $5.0x10^{-2}$ ft/d ($1.8x10^{-5}$ cm/s). Just north of the landfill's northern fence line, velocity magnitudes are about $1.5x10^{-1}$ ft/d ($5.6x10^{-5}$ cm/s). The highest magnitudes of groundwater velocity are located more than 650 ft northwest of the landfill's northern fence line in the interstream (creek) areas where groundwater discharges to the creeks. These values are in the range of 1 ft/d ($4.0 x10^{-4}$ cm/s).

Table 7. Magnitude of groundwater velocity in the overburden at selected locations, mean January-July 2021 conditions, Milledge Avenue Site, Athens, GA.

9.0 SIMULATION OF PERMEABLE REACTIVE BARRRIER

A permeable reactive barrier or "PRB" is a wall installed below ground surface to treat and clean up contaminated groundwater. The wall is permeable so groundwater can flow through it as it is being treated. The reactive materials that comprise the wall can typically trap contaminants, treat them with specialized compounds, and thus and make them less harmful to the environment. Details on the PRB technology and design are provided in USEPA (1998, 2021), ITRC (2011), and Naidu and Birke (2015). A conceptual model depicting the PRB technology treating a contaminated groundwater plume is shown in Figure 12. For the PRB design at the Site, two objectives need to be met: (1) groundwater velocities must not exceed $2.8x10^{-1}$ ft/d ($1.0x10^{-4}$ cm/s) after installation of the PRB and (2) any groundwater elevation rise in the landfill should be less than 3 ft (1 m) after installation of the PRB.

Figure 12. Conceptual model of permeable reactive barrier treatment of a groundwater contaminant plume (from USEPA 1998)

9.1 Description of Geometry and Location of Permeable Reactive Barrier

For the area of interest at the Site—the northern fence line of the landfill—two PRB designs (referred to as PRB1 and PRB3 in this report) were investigated. Both designs are referred to as a "funnel and gate" system. In this system very low to impermeable walls are constructed below ground surface and these walls "funnel" groundwater (and hence contaminants) through a high permeability reactive "gate," also constructed below ground surface. The two PRB designs for the Site (PRB1 and PRB3), their relative locations to the landfill fence line, and their schematic geometries are shown in Figure 13. For the wing walls ("funnel"), the hydraulic conductivity was assigned to be $2.8x10^{-8}$ ft/d ($1.0x10^{-11}$ cm/s). For the PRB ("gate"), the hydraulic conductivity was assigned to be $6.8x10^{-1}$ ft/d ($2.4x10^{-4}$ cm/s). To assess the impact of the PRB structures on groundwater flow in the area of the landfill, a very conservative PRB design was simulated, wherein the depth of the PRB would go from ground surface to the top of bedrock. In the landfill area at the Site, this would be approximately 100 ft deep. Because the water table (and top of saturated zone) in the landfill area is about 20 ft below ground surface, the PRB configurations were simulated to a depth of 80 ft below the water table. In terms of elevations (referenced to NGVD), this design would result in the hydraulic conductivities for the PRB geometries being assigned to active model domain cells model cells corresponding to the PRB locations from elevation 615 ft to elevation 535 ft.

Figure 13. Schematic drawings showing permeable reactive barrier (PRB) designs PRB1 and PRB3 in the vicinity of the landfill.

9.2 Simulation Results for Permeable Reactive Barrier Designs

Steady-state groundwater-flow model simulations were conducted for PRB1 and PRB3 designs. The results of the simulations are presented in terms of groundwater elevation changes at monitor wells MW-2, MW-3, and MW-4 when compared with the mean January-July 2021 simulated groundwater elevations (i.e., prior to the PRB design). Results for simulated groundwater elevations at the aforementioned

monitor wells for the two PRB design scenarios are listed in Table 8. Results show that for PRB1 design, the average groundwater elevation rise is 2.6 ft. For the PRB3 design scenario, which has extended low-permeability walls in each section (Figure 13), the average groundwater elevation rise is 2.5 ft.

Another groundwater-flow model output parameter value that is of critical interest pertinent to the funnel and gate PRB design is the magnitude of the groundwater velocity (Equation 3). Simulated groundwater velocities at selected locations within the PRB, identified for PRB sections A, B, and C in Figure 13, are listed for the PRB design scenarios PRB1 and PRB3 at different depths (model layers) in Table 9. It is noted that velocity magnitudes in the wing walls (sections A and C in Figure 13) are all on the order of $1x10^{-3}$ ft/d ($5x10^{-7}$ cm/s). In the high-permeable section B of the PRB (Figure 13), the velocity magnitudes are on the order of $1x10^{-1}$ ft/d ($5x10^{-5}$ cm/s). Therefore, based on simulation of steady-state groundwater flow for 2021 conditions, velocities in the vicinity of the landfill and specifically within the funnel and gate PRB design do not exceed $2.8x10^{-1}$ ft/d ($1x10^{-4}$ cm/s).

Table 8. Changes in simulated groundwater elevations in the vicinity of the landfill for permeable reactive barrier (PRB) scenarios, Milledge Avenue Site, Athens, GA.

Table 9. Magnitudes of simulated groundwater-flow velocities at selected locations in the vicinity of the landfill for permeable reactive barrier (PRB) scenarios, Milledge Avenue Site, Athens, GA.

10.0 DISCUSSION

A three-dimensional, steady-state groundwater-flow model has been developed for the Milledge Avenue Site, in Athens, Georgia. The modeling software package used is the Groundwater Modeling System (Aquaveo 2021) and the USGS's MODFLOW-2005 groundwater-flow model (Harbaugh 2005). The objective of the modeling analysis was to determine the impact of constructing a PRB using a funnel and gate system on groundwater elevations in the landfill and groundwater velocities within the PRB system at depth. Model input parameter values were obtained from field measurements of water levels during 2021 and laboratory determined geotechnical properties (hydraulic conductivity and porosity) using Shelby Tube cores. Based on modeling results, groundwater elevations at three monitor-well locations in the landfill (MW-2, MW-3, and MW-3) rise 3 ft or less when the PRB designs are simulated (Table 8). Velocity magnitudes at different depths within the PFB designs never exceed $2.8x10^{-1}$ ft/d ($1.0x10^{-4}$ cm/s), and in fact, are substantially lower (Table 9). Three topics pertinent to the development of the groundwater-flow model, the modeling of PRB designs, and model limitations are discussed below.

10.1 Measured Water-Level Data

Synoptic water-level measurements were conducted during January and July 2021 at 31 monitor wells, 12 piezometers, and 4 well points (Table 1). Eighteen monitor wells were drilled into the overburden and 15 monitor wells were drilled into bedrock. All piezometers and well points were drilled into the overburden. Assessment of the groundwater elevation data indicated very little change from the January 2021 measurements to the July 2021 measurements in either the overburden or bedrock (Table 1 and Table 6). This is because there is no long-term stress on local or regional groundwater flow owing to the absence of nearby domestic or municipal wells. Because the focus of the modeling effort was on the overburden and the impact of constructing a funnel and gate PRB system on groundwater flow in the vicinity of the landfill, steady-state conditions were assumed and could be justified. Therefore, simulated steady-state

groundwater elevations are compared with the mean of the January 2021 and July 2021 measured groundwater elevations for an assessment of "goodness of fit" of the model simulation.

10.2 Permeable Reactive Barrier (PRB) Simulations

The groundwater-flow model was developed with the objective of assessing the viability of installing a funnel and gate PRB system to treat contaminated groundwater originating from the landfill at the Site. The two PRB design scenarios (PRB1 and PRB3, Figure 13) were assigned hydraulic conductivities typical of very-low permeability walls and higher-permeability PRBs. The approach to the PRB simulations was to simulate the most conservative design scenario—the depth of the funnel and gate system would go down to bedrock (about elevation 635 ft NGVD). For both PRB design simulations using the groundwater-flow model indicate that groundwater elevations at three monitor-well locations in the landfill (MW-2, MW-3, and MW-3) rise 3 ft or less (Table 8). Velocity magnitudes at different depths within the PRB designs never exceed 2.8×10^{-1} ft/d (1.0×10^{-4} cm/s) and are substantially lower (Table 9). Thus, based on the three-dimensional, steady-state groundwater-flow model described herein and its limitations (see Section 10.3 below), the funnel and gate PRB design can be considered appropriate at the Site for treatment of contaminated groundwater originating from the landfill.

10.3 Model Limitations

A groundwater-flow model is a simplified representation of a very complex three-dimensional world. To develop the model, certain simplifying assumptions have been made. For example, based on available groundwater elevation data for 2021, there is little change in groundwater elevations. Therefore, steady-state conditions were assumed. Horizontal hydraulic conductivity and porosity were measured in a laboratory based on 12 Shelby Tube core samples. These data were then applied to the model domain using different zones of equal hydraulic conductivity—spatially and at depth. In the real world, however, subsurface conditions are very heterogeneous and are rarely, if ever, uniform or homogenous. As the focus of the modeling effort was the vicinity of the landfill and just north of the landfill, this is the area where the model is judged to be most reliable. Owing to boundary condition considerations, the active model domain extends north and northwest of the landfill. Because of a paucity of hydrogeologic data, including streamflow data, in this area, model results should be considered approximate.

If additional analyses are needed in the future for more detailed PRB assessment and design, or contaminant transport analyses pertinent to specific contaminant concentrations, consideration should be given to developing a model that may more accurately represent and depict real-world conditions. This would include using geostatistical and stochastic analyses and parameter estimation techniques for automatic model calibration.

Finally, it should be noted that the groundwater-flow model described herein was not intended to be a geotechnical or engineering design model. Rather, the groundwater-flow model was developed and used to analyze and assess PRB designs that might be constructed at the Site. The specific geotechnical and engineering design geometries needed in the field for the funnel and gate system can only be crudely approximated by the groundwater-flow model.

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12.0 TABLES

13.0 FIGURES

Table 1. Summary of well construction data, Milledge Avenue Site, Athens, GA

Well ID[1]	Formation type	Depth from TOC[2], ft	Total depth BGS[3], ft	Screened interval, ft BGS	Elevation, ft NGVD[4]	
					Top of Casing	Ground Surface
Monitor wells						
MW-1	Overburden	50.28	48.60	40.2-50.1	661.16	659.48
MW-2	Overburden	44.66	42.39	31.2-41.1	638.76	636.49
MW-3	Overburden	42.96	40.78	30.4-40.3	638.06	635.88
MW-4	Overburden	42.71	40.36	30 - 40	637.78	635.43
MW-5b	Bedrock	79.53	78.40	66 - 76	635.93	634.8
MW-5c	Bedrock	97.31	94.95	87.5 - 97.5	636.66	634.3
MW-6a	Overburden	32.53	30.00	18 - 28	618.98	616.45
MW-6b	Bedrock	47.32	43.64	34.5 - 44.5	620.64	616.96
MW-7a	Overburden	37.73	33.90	22 - 32	617.23	613.4
MW-7b	Bedrock	67.80	65.77	53 - 63	615.26	613.23
MW-8a	Overburden	57.22	54.96	48 - 58	633.89	631.63
MW-8b	Overburden	82.63	80.38	70.5 - 80.5	633.18	630.93
MW-9a	Overburden	24.39	21.82	12.5 - 22.5	588.85	586.28
MW-9b	Bedrock	49.98	47.86	38.5 - 48.5	588.98	586.86
MW-9c	Bedrock	140.00	138.00	130-140	581.3	580.19
MW-10a	Overburden	25.10	23.52	11 - 21	576.21	574.63
MW-10b	Overburden	47.36	44.89	32.5 - 42.5	578.07	575.6
MW-11	Overburden	44.86	41.94	32 - 42	596.73	593.81
MW-12a	Overburden	37.67	34.49	22 - 32	629.88	626.7
MW-12b	Bedrock	50.23	47.74	37.5 - 47.5	628.81	626.32
MW-13	Bedrock	87.88	85.13	75 - 85	614.43	611.68
MW-14a	Overburden	20.49	18.80	8 - 18	585.44	583.75
MW-14b	Overburden	53.21	50.65	40 - 50	586.27	583.71
MW-14c	Bedrock	82.38	80.11	70 - 80	587.45	585.18
MW-15	Bedrock	88.60	85.86	75 - 85	602.66	599.92
MW-16a	Overburden	23.10	21.35	13 - 23	590.89	589.14
MW-16b	Overburden	62.17	60.56	50 - 60	590.11	588.5
MW-17	Bedrock	55.41	53.39	44 - 54	568.84	566.82
MW-18	Bedrock	124.21	121.54	111.5 - 121.5	584.90	582.23
MW-19	Overburden	50.98	48.23	39 - 49	668.00	665.25
MW-20	Bedrock	72.44	69.56	62.44-72.44	559.14	556.26
Piezometers						
P-1	Overburden	26.31	28.51	16 - 26	637.9	635.7
P-3	Overburden	37.36	39.56	28 - 38	629.66	627.46
P-4	Overburden	48.94	50.34	38.5 - 48.5	627.21	625.81
P-6	Overburden	56.16	57.75	43.5 - 53.5	639.39	637.8
P-7	Overburden	54.57	55.22	45 - 55	620.74	620.09
P-8	Overburden	14.49	15.34	3.5 - 13.5	582.57	581.72
P-9	Overburden	23.91	25.31	13.5 - 23.5	587.75	586.35
P-10	Overburden	28.12	30.33	18.5 - 28.5	584.87	582.66

Well ID[1]	Formation type	Depth from TOC[2], ft	Total depth BGS[3], ft	Screened interval, ft BGS	Elevation, ft NGVD[4]	
					Top of Casing	Ground Surface
P-11	Overburden	22.974	25.28	13.5 - 23.5	567.68	565.37
P-12	Overburden	28.6	30.26	18.5 - 28.5	572.34	570.68
Well points						
WP-1	Overburden	10.42	8.00	3 - 8	571.61	569.37
WP-2	Overburden	11.90	8.00	3 - 8	571.33	567.91
WP-3	Overburden	11.36	10.00	5-10	562.94	559.46
WP-4	Overburden	11.01	10.00	5-10	558.63	555.27

[1]ID, identification
[2]TOC, top of casing
[3]BGS, below ground surface
[4]NGVD, Vertical coordinate information referenced to the National Geodetic Vertical Datum of 1929 (NGVD 29)

Table 2. Measured water-level data for January 2021 and July 2021 in the overburden and bedrock, Milledge Avenue Site, Athens, GA

Well ID[1]	Formation type	Coordinates[2], ft		TOC[3] Elev., ft NGVD	Measured groundwater level, ft			
					January 2021[4]		July 2021[5]	
		Easting	Northing		TOC Depth	Elevation	TOC Depth	Elevation
Monitor wells								
MW-1	Overburden	2533769.062	1421498.646	661.16	38.15	623.01	37.29	623.87
MW-2	Overburden	2533756.044	1421715.985	638.76	26.95	611.81	27.72	611.04
MW-3	Overburden	2533712.602	1421715.937	638.06	26.43	611.63	27.03	611.03
MW-4	Overburden	2533650.466	1421710.659	637.78	27.43	610.35	28.03	609.75
MW-5b	Bedrock	2533647.055	1421717.879	635.93	26.37	609.56	26.80	609.13
MW-5c	Bedrock	2533654.635	1421722.742	636.66	25.53	611.13	26.01	610.65
MW-6a	Overburden	2533685.848	1421868.969	618.98	16.80	602.18	17.95	601.03
MW-6b	Bedrock	2533683.809	1421855.596	620.64	19.74	600.9	20.80	599.84
MW-7a	Overburden	2533495.279	1421843.947	617.23	22.55	594.68	23.08	594.15
MW-7b	Bedrock	2533504.307	1421846.507	615.26	21.88	593.38	22.41	592.85
MW-8a	Overburden	2533309.48	1421819.557	633.89	42.14	591.75	41.51	592.38
MW-8b	Overburden	2533303.269	1421825.321	633.18	43.05	590.13	42.77	590.41
MW-9a	Overburden	2533434.681	1422016.2	588.85	7.62	581.23	7.90	580.95
MW-9b	Bedrock	2533432.932	1422024.414	588.98	8.26	580.72	8.55	580.43
MW-9c	Bedrock	2533450.432	1422014.115	581.30	9.58	581.72	11.09	579.54
MW-10a	Overburden	2533321.475	1422322.264	576.21	12.93	563.28	13.69	562.52
MW-10b	Overburden	2533330.585	1422319.965	578.07	15.31	562.76	15.92	562.15
MW-11	Overburden	2533067.033	1422289.911	596.73	33.87	562.86	33.84	562.89
MW-12a	Overburden	2533811.486	1421794.9	629.88	22.72	607.16	23.86	606.02
MW-12b	Bedrock	2533808.089	1421803.25	628.81	22.39	606.42	23.47	605.34
MW-13	Bedrock	2533543.917	1421870.636	614.43	23.94	590.49	24.68	589.75
MW-14a	Overburden	2533422.805	1422155.616	585.44	10.73	574.71	11.10	574.34
MW-14b	Overburden	2533420.862	1422162.469	586.27	15.21	571.06	16.03	570.24
MW-14c	Bedrock	2533430.327	1422155.024	587.45	17.36	570.09	18.54	568.91
MW-15	Bedrock	2533589.899	1422140.695	602.66	20.30	582.36	22.49	580.17
MW-16a	Overburden	2533483.61	1422182.838	590.89	11.69	579.20	13.50	577.39
MW-16b	Overburden	2533470.221	1422179.453	590.11	14.38	575.73	16.11	574.00
MW-17	Bedrock	2533280.411	1422353.001	568.84	9.00	559.84	9.45	559.39
MW-18	Bedrock	2533387.228	1422236.575	584.90	22.20	562.70	22.69	562.21
MW-19	Overburden	2534068.128	1421393.073	668.00	29.36	638.64	31.04	636.96
MW-20	Bedrock	2533004.135	1422545.676	559.14	2.88	556.26	3.70	558.24
Piezometers								
P-1	Overburden	2533719.9	1421784.459	637.9	13.05	624.85	15.18	622.72
P-3	Overburden	2533465.048	1421787.997	629.66	24.36	605.30	25.24	604.42
P-4	Overburden	2533273.365	1421722.83	627.21	32.94	594.27	33.08	594.13
P-6	Overburden	2533153.561	1422036.915	639.39	35.84	603.55	34.11	605.28
P-7	Overburden	2533395.084	1421982.233	620.74	35.11	585.63	37.94	582.80
P-8	Overburden	2533441.102	1422224.76	582.57	2.80	579.77	2.85	579.72
P-9	Overburden	2533489.712	1422375.516	587.75	14.37	573.38	17.58	570.17
P-10	Overburden	2533014.206	1422643.236	584.87	17.96	566.91	18.73	566.14
P-11	Overburden	2532949.723	1422460.333	567.68	10.00	557.68	10.83	556.85
P-12	Overburden	2533719.9	1421784.459	572.34	17.59	554.75	18.04	554.30
Well points[6]								
WP-1	Overburden	2533321.842	1422157.066	571.61	3.30	568.31	3.36	568.25
WP-2	Overburden	2533275.366	1422233.912	571.33	4.87	566.46	5.24	566.09
WP-3	Overburden	2533075.926	1422465.947	562.94	5.81	557.13	5.98	556.96
WP-4	Overburden	2532867.711	1422585.139	558.63	6.80	551.83	6.97	551.66

[1]ID, identification
[2]Coordinates, State Plane Coordinate System 1983, Georgia, West, FIPS 1002
[3]TOC, Top of casing; NGVD, Vertical coordinate information referenced to the National Geodetic Vertical Datum of 1929 (NGVD 29)
[4]Measured January 12–13, 2021.
[5]Measured July 12–14, 2021.
[6]Well points are shallow monitor wells, less than 10 ft below ground surface, used to monitor for the presence of contaminants of concern (COCs)

Table 3. Field samples and laboratory determined geotechnical and hydraulic property values for hydraulic conductivity, porosity, and moisture content, Milledge Avenue Site, Athens, GA

Sample ID[1]	Sample Type	Depth bgs, feet[2]	Hydraulic Conductivity, cm/s (ft/d)[3]	Porosity, Percent (%)[4]	Moisture Content, Percent (%)
Overburden					
ST-1	Undisturbed soil	45.5 – 46	$7.1x10^{-5}$ ($2.0x10^{-1}$)	40.7	32.0
ST-2	Undisturbed soil	44.5 – 45	$2.3x10^{-4}$ ($6.5x10^{-1}$)	37.5	25.3
ST-3	Undisturbed soil	21 – 21.5	$6.3x10^{-5}$ ($1.8x10^{-1}$)	38.8	33.3
ST-4	Undisturbed soil	27.5 – 28	$2.2x10^{-5}$ ($6.2x10^{-2}$)	38.6	30.0
ST-5	Undisturbed soil	31.5 – 32	$2.9x10^{-4}$ ($8.2x10^{-1}$)	42.4	31.6
ST-6	Undisturbed soil	37 –37.5	$2.4x10^{-4}$ ($6.8x10^{-1}$)	43.9	36.9
ST-7	Undisturbed soil	69.5 – 70	$6.7x10^{-6}$ ($1.0x10^{-1)}$)	35.0	28.9
ST-8	Undisturbed soil	54.5 – 55	$3.3x10^{-6}$ ($9.4x10^{-3}$)	36.3	36.0
ST-9	Undisturbed soil	39 – 39.5	$7.0x10^{-5}$ ($2.0x10^{-1}$)	33.3	27.5
ST-10	Undisturbed soil	24 – 24.5	$1.5x10^{-4}$ ($4.3x10^{-1}$)	38.7	31.0
ST-11	Undisturbed soil	15.5 – 16	$9.3x10^{-5}$ ($2.6x10^{-1}$)	43.5	39.2
ST-12	Undisturbed soil	21 – 21.5	$1.3x10^{-6}$ ($3.7x10^{-3}$)	39.2	32.2
Bedrock					
MW-9A	Bedrock core	49–55	$5.1x10^{-4}$ (1.44)	2.9	0.5
MW-9B	Bedrock core	59–69	$5.1x10^{-4}$ (1.44)	1.5	0.6
MW-9C	Bedrock core	69–140	$4.5x10^{-4}$ (1.28)	0.5	0.4

[1]ST, Shelby Tube; MW, monitor well

[2]bgs, below ground surface

[3]1 cm/s = 2,834.646 ft/d

[4]Represents total porosity

Table 4. Coordinate locations for the corners of the groundwater-flow model domain, Milledge Avenue Site, Athens, GA

Corner Position	Latitude, decimal degrees	Longitude, decimal degrees	State Plane Coordinates[1], ft	
			Easting	Northing
Upper Left (northwestern)	33.9082820	-83.38767200	2532928.5	1422582.4
Lower Left (southwestern)	33.90456519	-83.38769947	2532928.6	1421340.3
Upper Right (northeastern)	33.90825664	-83.38366670	2534144.11	1422582.83
Lower Right (southeastern)	33.90483683	-83.38370127	2534144.4	1421430.1

[1]State Plane Coordinate System 1983, Georgia West, FIPS 1002

Table 5. Mean groundwater elevation 2021, elevation of well screen mid-points, and corresponding groundwater-flow model identification and cell location, Milledge Avenue Site, Athens, GA

Well ID[1]	Formation type	Mean, measured groundwater elevation, January 2021 and July 2021[2], ft	Screen mid-point elevation[3], ft	Model variable name[4]	Model cell location: Layer, Row, Column (i, j, k)
Monitor wells					
MW-1	Overburden	623.44	614.33	hed1	1, 109, 85
MW-2	Overburden	611.43	600.34	hed3	1, 88, 84
MW-3	Overburden	611.33	600.53	hed4	1, 88, 79
MW-4	Overburden	610.05	600.43	hed5	1, 88, 73
MW-6a	Overburden	601.61	593.45	hed8	1, 72, 76
MW-7a	Overburden	594.42	586.40	hed9	1, 75, 57
MW-8a	Overburden	592.07	578.63	hed12	2, 77, 39
MW-8b	Overburden	590.27	555.43	hed13	10, 77, 38
MW-9a	Overburden	581.09	568.78	hed16	3, 57, 51
MW-10a	Overburden	562.90	558.63	hed26	1, 27, 40
MW-10b	Overburden	562.46	538.10	hed25	8, 27, 41
MW-11	Overburden	562.88	556.81	hed27	1, 30, 14
MW-12a	Overburden	606.59	599.70	hed7	1, 80, 89
MW-14a	Overburden	574.53	570.75	hed20	1, 43, 50
MW-14b	Overburden	570.65	538.71	hed19	10, 43, 50
MW-16a	Overburden	578.30	571.14	hed17	1, 41, 56
MW-16b	Overburden	574.87	533.50	hed18	12, 41, 55
Piezometers					
P-1	Overburden	623.79	614.70	hed2	1, 95, 103
P-3	Overburden	604.86	594.46	hed6	1, 81, 80
P-4	Overburden	594.20	582.31	hed10	1, 80, 54
P-6	Overburden	604.42	589.30	hed11	2, 87, 35
P-7	Overburden	584.22	570.09	hed14	2, 55, 23
P-8	Overburden	579.75	573.22	hed15	1, 60, 48
P-9	Overburden	571.78	567.85	hed22	1, 36, 52
P-10	Overburden	566.53	559.16	hed24	2, 21, 57
Well points[5]					
WP-1	Overburden	568.28	563.87	hed21	1, 43, 40
WP-2	Overburden	566.28	562.41	hed23	1, 35, 35

[1]ID, identification

[2]Measured groundwater elevation data for January 12-13, 2021, and July 12-14, 2021, as listed in Table 2.

[3]Screen mid-point elevation computed by subtracting depth of well screen mid-point from the elevation of ground surface

[4]MODFLOW-2005 groundwater-flow model variable name assigned to location of well located in a specific model cell

[5]Well points are shallow monitor wells, less than 10 ft below ground surface, used to monitor for the presence of contaminants of concern (COCs)

Table 6. Measured and simulated groundwater elevations and residuals in the overburden January and July 2021, Milledge Avenue Site, Athens, GA

Mode variable name[1]	Well ID[2]	Measured groundwater elevation, ft		Mean of measured, January and July 2021, ft	Simulated, ft	
		January 2021	July 2021		Mean 2021 groundwater elevation	Residual[3]
hed1	MW-1	623.01	623.87	623.44	623.96	-0.52
hed2	P-1	624.85	622.72	623.79	623.22	0.57
hed3	MW-2	611.81	611.04	611.43	612.36	-0.93
hed4	MW-3	611.63	611.03	611.33	611.26	0.07
hed5	MW-4	610.35	609.75	610.05	610.13	-0.08
hed6	P-3	605.30	604.42	604.86	606.73	-1.87
hed7	MW-12a	607.16	606.02	606.59	608.05	-1.46
hed8	MW-6a	602.18	601.03	601.61	600.13	1.48
hed9	MW-7a	594.68	594.15	594.42	593.46	0.96
hed10	P-4	594.27	594.13	594.20	596.17	-1.97
hed11	P-6	603.55	605.28	604.42	605.04	-0.62
hed12	MW-8a	591.75	592.38	592.07	592.33	-0.26
hed13	MW-8b	590.13	590.41	590.27	591.92	-1.65
hed14	P-7	585.63	582.80	584.22	583.75	0.47
hed15	P-8	579.77	579.72	579.75	580.63	-0.88
hed16	MW-9a	581.23	580.95	581.09	581.03	0.06
hed17	MW-16a	579.20	577.39	578.30	577.46	0.84
hed18	MW-16b	575.73	574.00	574.87	576.52	-1.65
hed19	MW-14b	571.06	570.24	570.65	574.53	-3.88
hed20	MW-14a	574.71	574.34	574.53	574.03	0.50
hed21	WP-1	568.31	568.25	568.28	571.11	-2.83
hed22	P-9	573.38	570.17	571.78	571.43	0.35
hed23	WP-2	566.46	566.09	566.28	567.60	-1.32
hed24	P-10	566.91	566.14	566.53	567.71	-1.18
hed25	MW-10b	562.76	562.15	562.46	565.96	-3.50
hed26	MW-10a	563.28	562.52	562.90	565.72	-2.82
hed27	MW-11	562.86	562.89	562.88	564.64	-1.76

[1]MODFLOW-2005 groundwater-flow model variable name assigned to location of well located in a specific model cell

[2]ID, identification; MW, monitor well; P, piezometer; WP, well point

[3]Residual, defined as the mean of measured groundwater elevation minus simulated groundwater elevation; a positive residual indicates mean measured groundwater elevation is higher than simulated groundwater elevation; a negative residual indicates mean measured groundwater elevation is lower than simulated groundwater elevation

Table 7. Magnitude of groundwater velocity in the overburden at selected locations, mean January-July 2021 conditions, Milledge Avenue Site, Athens, GA

Location ID	Description	Velocity[1], ft/d	Velocity[1], cm/s
MW-1	Approximately 40 ft south of landfill area	5.0×10^{-2}	1.8×10^{-5}
MW-2, MW-3, MW-4	Northern fence line of landfill	1.5×10^{-1}	5.6×10^{-5}
P3	Approximately 20 ft east of landfill fence line	9.5×10^{-2}	3.0×10^{-5}
MW-6a	Approximately 135 ft north of landfill	1.4×10^{-1}	5.0×10^{-5}
MW-9a	Approximately 330 ft northwest of northwestern corner of landfill	1.5×10^{-1}	5.3×10^{-5}
MW-10a MW-10b	Approximately 650 ft northwest of landfill in the interstream area	1.0	4.0×10^{-4}

[1]Groudnwater velocity (V_{gw}) is defined in Equation 3 and is the Darcy velocity (V_D) or specific discharge (q) divided by effective porosity (n).

Table 8. Changes in simulated groundwater elevations in the vicinity of the landfill for permeable reactive barrier scenarios, Milledge Avenue Site, Athens, GA.

Monitor Well	Jan-July 2021 mean groundwater elevation, ft	PRB1 Design groundwater elevation, ft	[1]Change, feet	PRB3 Design groundwater elevation, ft	[2]Change, feet
MW-2	612.36	615.11	-2.75	614.38	-2.02
MW-3	611.26	614.38	-3.02	614.08	-2.72
MW-4	610.13	612.18	-2.05	612.79	-2.66

[1]Change is defined as the simulated Jan-July 2021 mean groundwater elevation minus the PRB1 Design simulated groundwater elevation; a negative value indicates an increase in water level

[2]Change is defined as the simulated Jan-July 2021 mean groundwater elevation minus the PRB3 Design simulated groundwater elevation; a negative value indicates an increase in water level

Table 9. Magnitudes of simulated groundwater-flow velocities at selected locations in the vicinity of the landfill for permeable reactive barrier (PRB) scenarios, Milledge Avenue Site, Athens, GA.

Model Layer (Elevation, ft)	[1]V_A ft/d (cm/s)	[2]V_B ft/d (cm/s)	[3]V_C ft/d (cm/s)
PRB Design Scenario PRB1			
1 (610)	0.0013 ($4.5x10^{-7}$)	0.1348 ($4.8x10^{-5}$)	0.0008 ($2.8x10^{-7}$)
5 (580)	0.0017 ($6.0x10^{-7}$)	0.1808 ($6.4x10^{-5}$)	0.0011 ($3.9x10^{-7}$)
10 (560)	0.0017 ($6.0x10^{-7}$)	0.1405 ($5.0x10^{-5}$)	0.0011 ($3.9x10^{-7}$)
17 (535)	0.0017 ($6.0x10^{-7}$)	0.0866 ($3.1x10^{-5}$)	0.0011 ($3.9x10^{-7}$)
PRB Design Scenario PRB3			
1 (610)	0.0008 ($2.8x10^{-7}$)	0.1412 ($5.0x10^{-5}$)	0.0005 ($1.8x10^{-7}$)
5 (580)	0.0011 ($3.9x10^{-7}$)	0.1422 ($5.0x10^{-5}$)	0.0006 ($2.1x10^{-7}$)
10 (560)	0.0011 ($3.9x10^{-7}$)	0.1219 ($4.3x10^{-5}$)	0.0006 ($2.1x10^{-7}$)
17 (535)	0.0011 ($3.9x10^{-7}$)	0.0913 ($3.0x10^{-5}$)	0.0006 ($2.1x10^{-7}$)

[1]See Figure 13 for locations of V_A within the funnel and gate PRB system; effective porosity is 0.39

[2]See Figure 13 for locations of V_B within the funnel and gate PRB system; effective porosity is 0.39

[3]See Figure 13 for locations of V_C within the funnel and gate PRB system; effective porosity is 0.39

Figure 1
Location of Investigation Area

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Milledge Avenue Site
Athens, Georgia

December 2021

N

0 75 150 300 450 600
Feet

A'

A

P-11
WP-4
MW-20
P-12
WP-3
MW-11
MW-17
MW-10a
MW-10b
ST-11
P-10
WP-2
MW-18
P-9
ST-10
MW-16a
MW-14b
MW-16b
WP-1
MW-14a
MW-14c
MW-15
P-7
MW-9a
ST-12
MW-9b
MW-9c
P-8
ST-9
MW-13
ST-8
MW-7a
MW-6a
MW-6b
MW-8b
MW-8a
MW-7b
P-4
P-3
MW-12b
MW-12a
ST-7
ST-4
ST-3
ST-6
P-6
MW-3
MW-2
MW-5c
MW-4
MW-5b
ST-5
P-1
ST-2
MW-1
ST-1
MW-19

Legend

- Monitoring Well (Bedrock)
- Monitoring Well (Overburden)
- Piezometer
- Shelby Tube Sample Locations
- Landfill_vents
- Perennial Stream
- Drainage Ditch/Ephemeral Stream
- Unpaved Road
- Trail
- Fence Around Capped Landfill

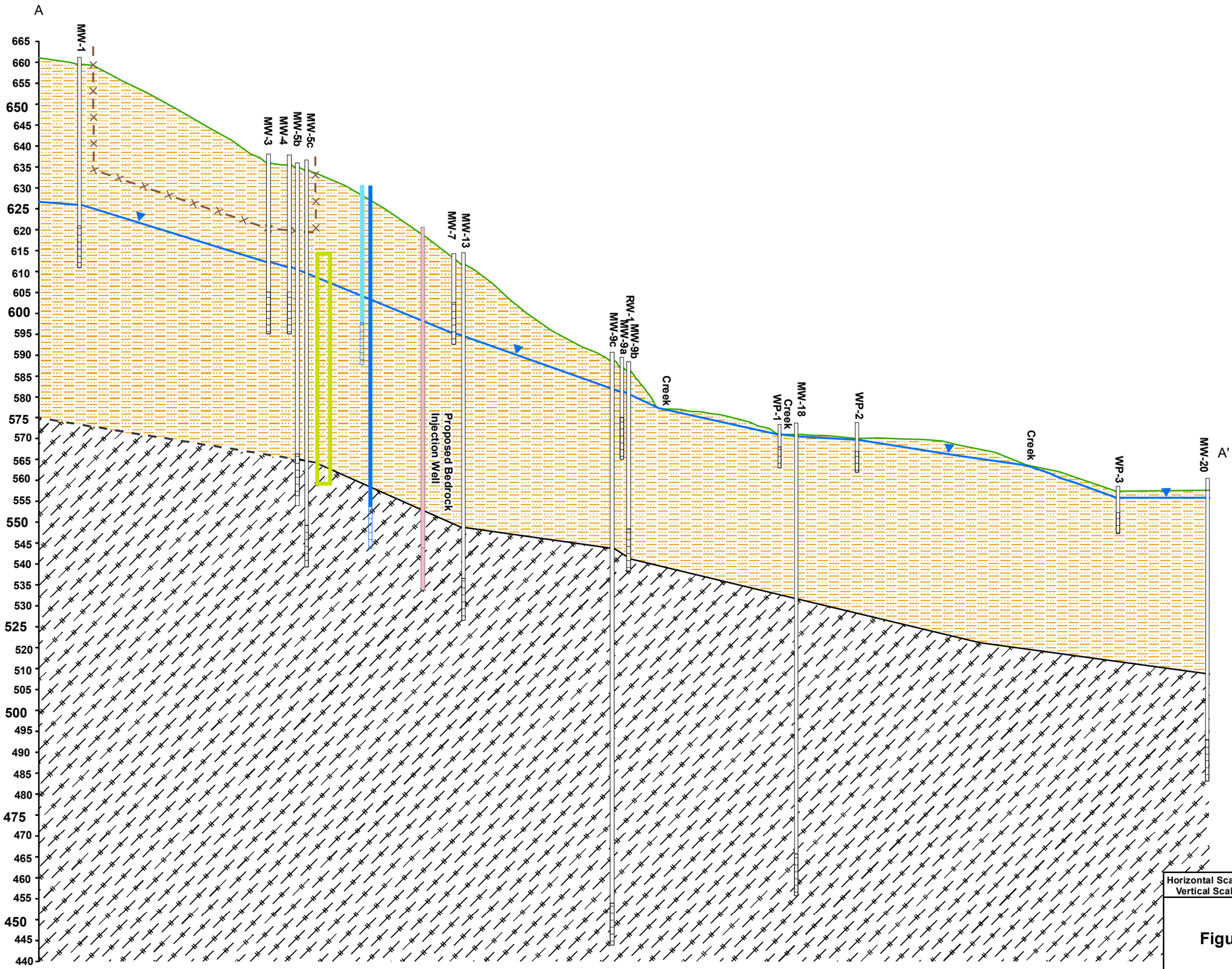
Resolute
Environmental & Water Resources Consulting

Woodstock, GA | December 2021

Milledge Avenue Site
Locations of monitor wells, piezometers, well points, and Shelby Tube borings used for water-level measurements and geotechnical sampling for hydraulic and aquifer properties
Athens, GA

Figure
2

Document Path: C:\Users\R2remote\Resolute Environmental\RE_SP - Environmental\ArcGIS\University of Georgia\MLM-Figures-Maps\MLM_Figure 2 - Location of Monitoring Wells and Sample Locations.mxd



Legend

- Well Riser
- Well Screen
- Cross-Section Grid
- Ground Surface
- Geology Contact
- Inferred Contact
- Groundwater Surface
- Landfill Boundary
- Bedrock Monitoring Well
- Proposed Pilot PRB
- Screened Interval
- Overburden Monitoring Well
- Proposed Injection Well
- Overburden - Silty Sand to Saprolite
- Bedrock - Gneiss

Notes:
MW-18 is projected 40 feet off of cross-section profile. Creek runs parrallel to profile line, with creek crossings indicated in cross-section

Horizontal Scale = 1:120
Vertical Scale = 1:25

Milledge Avenue Site
Cross-Section A-A'
showing monitor wells, well points, creeks, groundwater surface, and approximate thickness of overburden

Athens, GA

Figure

3

Resolute
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Woodstock, GA | May 2020

N

0 75 150 300 450 600
Feet

P-11
P-12
P-10
ST-11
P-9
ST-10
P-7
MW-9a
ST-12
MW-9b
MW-9c
P-8
ST-9
ST-8
P-4
P-3
ST-7
ST-4
ST-3
ST-6
P-6
ST-5
P-1
ST-2
ST-1

Sample ID	Depth of Sample, ft	Horizontal Hydraulic Conductivity, cm/sec (ft/d)
Overburden Samples		
ST-1	45.5-46	$7.1x10^{-5}$ ($2.0x10^{-1}$)
ST-2	44.5-45	$2.3x10^{-4}$ ($6.5x10^{-1}$)
ST-3	21-21.5	$6.3x10^{-5}$ ($1.8x10^{-1}$)
ST-4	27.5-28	$2.2x10^{-5}$ ($6.2x10^{-2}$)
ST-5	31.5-32	$2.9x10^{-4}$ ($8.2x10^{-1}$)
ST-6	37-37.5	$2.4x10^{-4}$ ($6.8x10^{-1}$)
ST-7	69.5-70	$6.7x10^{-6}$ ($1.0x10^{-1}$)
ST-8	54.5-55	$3.3x10^{-6}$ ($9.4x10^{-3}$)
ST-9	39-39.5	$7.0x10^{-5}$ ($2.0x10^{-1}$)
ST-10	24-24.5	$1.5x10^{-4}$ ($4.3x10^{-1}$)
ST-11	15.5-16	$9.3x10^{-5}$ ($2.6x10^{-1}$)
ST-12	21-21.5	$1.3x10^{-6}$ ($3.7x10^{-3}$)
Bedrock Samples		
MW-9a	49-55	$5.1x10^{-4}$ (1.44)
MW-9b	59-69	$5.1x10^{-4}$ (1.44)
MW-9c	69-140	$4.5x10^{-4}$ (1.28)

Legend

- Monitoring Well (Bedrock)
- Monitoring Well (Overburden)
- Piezometer
- Shelby Tube Sample Locations
- Landfill_vents
- Perennial Stream
- Drainage Ditch/Ephemeral Stream
- Unpaved Road
- Trail
- Fence Around Capped Landfill

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Woodstock, GA | December 2021

Milledge Avenue Site
Geotechnical sampling locations in the overburden and bedrock and laboratory determined horizontal hydraulic conductivity
Athens, GA

Figure
4

Document Path: C:\Users\R2remote\Resolute Environmental\RE_SP - Environmental\ArcGIS\University of Georgia\MLM-Figures-Maps\MLM_Figure 6 - Sample Locations for Kh.mxd

N

0 90 180 360 540 720
Feet

P-11
WP-4
MW-20
P-12
WP-3
MW-17
MW-10a
MW-10b
P-10
MW-11
WP-2
MW-18
P-9
MW-16a
MW-14b
MW-16b
WP-1
MW-14a
MW-15
MW-14c
P-7
MW-9b
MW-9a
P-8
MW-9c
MW-6a
MW-7a
MW-13
MW-6b
MW-8b
MW-8a
MW-7b
MW-12a
P-4
P-3
MW-12b
P-6
MW-5c
MW-4
MW-2
MW-5b
MW-3
P-1
MW-1
MW-19

Legend

- Monitoring Well (Bedrock)
- Monitoring Well (Overburden)
- Piezometer
- Perennial Stream
- Drainage Ditch/Ephemeral Stream
- Trail
- Elevation Contours
- Fence Around Capped Landfill
- Active Model Domain
- Groundwater-Flow Model Grid
- Specified-Head Boundary Condition (Type 1)
- No-Flow Boundary Condition (Type 2)
- Generalized-Head Boundarty Condition (Type 3)

Document Path: C:\Users\R2remote\Resolute Environmental\RE_SP - Environmental\ArcGIS\University of Georgia\MLM-Figures-Maps\MLM_Figure 7 - Groundwater Flow Model Boundary.mxd

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Woodstock, GA | December 2021

Milledge Avenue Site
Groundwater flow model domain, active model grid, and boundary conditions
Athens, GA

Figure
7

N

0 75 150 300 450 600
Feet

P-11 556.85
WP-4 551.66
P-12 554.30
WP-3 556.96
P-10 566.14
MW-10a 562.52
MW-11 562.89
MW-10b 562.15
WP-2 566.09
P-9 570.17
MW-16a 577.39
MW-14b 570.24
MW-16b 574.00
WP-1 568.25
MW-14a 574.34
P-7 582.80
P-8 579.72
MW-9a 580.95
MW-6a 601.03
MW-7a 594.15
MW-8a 592.38
MW-8b 590.41
P-4 594.13
P-3 604.42
MW-12a 606.02
P-6 605.28
MW-4 609.75
MW-3 611.03
MW-2 611.04
P-1 622.72
MW-1 623.87
MW-19 636.96

555 560 565 570 575 580 585 590 595 600 605 610 615 620 625 630 635

Legend

- Monitoring Well (Bedrock)
- Monitoring Well (Overburden)
- Piezometer
- Groundwater Potentiometric Contour
- Inferred Groundwater Potentiometric Contour
- General Direction of Groundwater Flow
- Perennial Stream
- Drainage Ditch/Ephemeral Stream
- Unpaved Road
- Trail
- Elevation Contours
- Landfill Vents
- Fence Around Capped Landfill

MW-7a 594.15 Groundwater Elevation (Monitoring Well)

P-6 605.28 Groundwater Elevation (Piezometer)

Notes:
Potentiometric surface elevations shown in ft NVGD 83.

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Woodstock, GA | September 2021

Milledge Avenue Site
Potentiometric surface and generalized direction of groundwater flow in the overburden, July 12, 2021 conditions
Athens, GA

Figure
6

Document Path: C:\Users\R2remote\Resolute Environmental\RE_SP - Environmental\ArcGIS\University of Georgia\MLM-Figures-Maps\MLM_Figure 5 - Groundwater Potentiometric Surface, Overburden, July 2021.mxd

N

0 75 150 300 450 600
Feet

P-11
557.68

WP-4
551.83

555

P-12
554.75

WP-3
557.13

560

MW-11
562.86

565

WP-2
566.46

570

WP-1
568.31

P-10
566.91

MW-10a
563.28

MW-10b
562.76

P-9
573.38

575

MW-16a
579.2

MW-14b
571.06

MW-16b
575.73

580

MW-14a
574.71

585

P-7
585.63

P-8
579.77

MW-9a
581.23

590

MW-6a
602.18

MW-7a
594.68

MW-8a
591.75

MW-8b
590.13

P-4
594.27

595

P-6
603.55

600

P-3
605.3

MW-12a
607.16

MW-4
610.35

MW-3
611.63

MW-2
611.81

610

605

P-1
624.85

615

MW-1
623.01

620

625

630

635

MW-19
638.64

Legend

- Monitoring Well (Bedrock)
- Monitoring Well (Overburden)
- Piezometer
- Groundwater Potentiometric Contour
- Inferred Groundwater Potentiometric Contour
- General Direction of Groundwater Flow
- Perennial Stream
- Drainage Ditch/Ephemeral Stream
- Unpaved Road
- Trail
- Elevation Contours
- Landfill Vents
- Fence Around Capped Landfill

MW-7a 594.68 Groundwater Elevation (Monitoring Well)

P-6 603.55 Groundwater Elevation (Piezometer)

Notes:
Potentiometric surface elevations shown in ft NVGD 83.

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Woodstock, GA | January 2021

Milledge Avenue Site
Potentiometric surface and generalized direction of groundwater flow in the overburden, January 11, 2021 conditions
Athens, GA

Figure
5

Document Path: C:\Users\R2remote\Resolute Environmental\RE_SP - Environmental\ArcGIS\University of Georgia\MLM-Figures-Maps\MLM_Figure 4 - G

N

0 75 150 300 450 600
Feet

P-11
557.27

WP-4
551.75

P-12
554.53

WP-3
557.05

555

560

P-10
566.53

MW-10a
562.90

MW-10b
562.46

MW-11
562.88

565

WP-2
566.28

P-9
571.78

MW-16a
578.30

MW-16b
574.87

570

WP-1
568.28

MW-14a
574.53

MW-14b
570.65

580

585

575

P-7
584.22

590

P-8
579.75

MW-9a
581.09

MW-6a
601.61

MW-7a
594.42

MW-8b
590.27

MW-8a
592.07

595

P-4
594.20

600

P-3
604.86

MW-12a
606.59

P-6
604.42

605

MW-4
610.05

MW-2
611.43

MW-3
611.33

P-1
623.79

610

615

620

MW-1
623.44

625

630

635

MW-19
637.80

Legend

- Monitoring Well (Bedrock)
- Monitoring Well (Overburden)
- Piezometer
- Mean Groundwater Potentiometric Contour
- Inferred Groundwater Potentiometric Contour
- Perennial Stream
- Drainage Ditch/Ephemeral Stream
- Unpaved Road
- Trail
- Elevation Contours
- Landfill Vents
- Fence Around Capped Landfill

MW-7a 594.42 — Groundwater Elevation (Monitoring Well)

WP-2 566.28 — Groundwater Elevation (Well Point)

P-6 604.42 — Groundwater Elevation (Piezometer)

Notes:
Potentiometric surface elevations shown in ft NVGD 83.

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Woodstock, GA | December 2021

Milledge Avenue Site
Groundwater Potentiometric Surface in the Overburden, Mean January-July 2021 conditions
Athens, GA

Figure
8

Document Path: C:\Users\R2remote\Resolute Environmental\RE_SP - Environmental\ArcGIS\University of Georgia\MLM-Figures-Maps\MLM_Figure 8 - Groundwater Potentiometric Surface, Overburden, Mean January-July 2021.mxd

N

0 75 150 300 450 600
Feet

P-11
WP-4
P-12
WP-3
P-10
-1.184
MW-10a
-2.818
MW-10b
-3.502
MW-11
-1.767
WP-2
-1.327
P-9
0.341
MW-16b
-1.659
MW-16a
0.832
WP-1
-2.828
MW-14a
0.492
MW-14b
-3.881
P-7
0.467
P-8
-0.881
MW-9a
0.057
MW-6a
1.479
MW-7a
0.951
MW-8b
-1.652
MW-8a
-0.264
P-4
-1.966
P-3
-1.875
MW-12a
-1.456
P-6
-0.624
MW-4
-0.084
MW-2
-0.933
MW-3
0.067
P-1
0.568
MW-1
-0.518
MW-19

Legend

- Monitoring Well (Bedrock)
- Monitoring Well (Overburden)
- Piezometer
- Simulated Mean Groundwater Potentiometric Contour
- Simulated Groundwater Flow
- Model Boundary
- Elevation Contours
- Perennial Stream
- Drainage Ditch/Ephemeral Stream
- Unpaved Road
- Trail
- Fence Around Capped Landfill

MW-7a 0.951 — Residual Mean Groundwater Elevation (Monitoring Well)

WP-2 -1.327 — Residual Mean Groundwater Elevation (Well Point)

P-6 -0.624 — Residual Mean Groundwater Elevation (Piezometer)

Notes:
Potentiometric surface elevations shown in ft NVGD 83.

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Woodstock, GA | December 2021

Milledge Avenue Site
Simulated steady-state potentiometric surface and directions of groundwater flow in the overburden, mean January-July 2021 conditions
Athens, GA

Figure
9

Document Path: C:\Data2\Resolute Environmental\RE_SP - Environmental\ArcGIS\University of Georgia\WLM-Figures-Maps\WLM_Figure 9 (Revised) - Simulated Groundwater Potentiometric Surface, Overburden, Mean January-July 2021.mxd

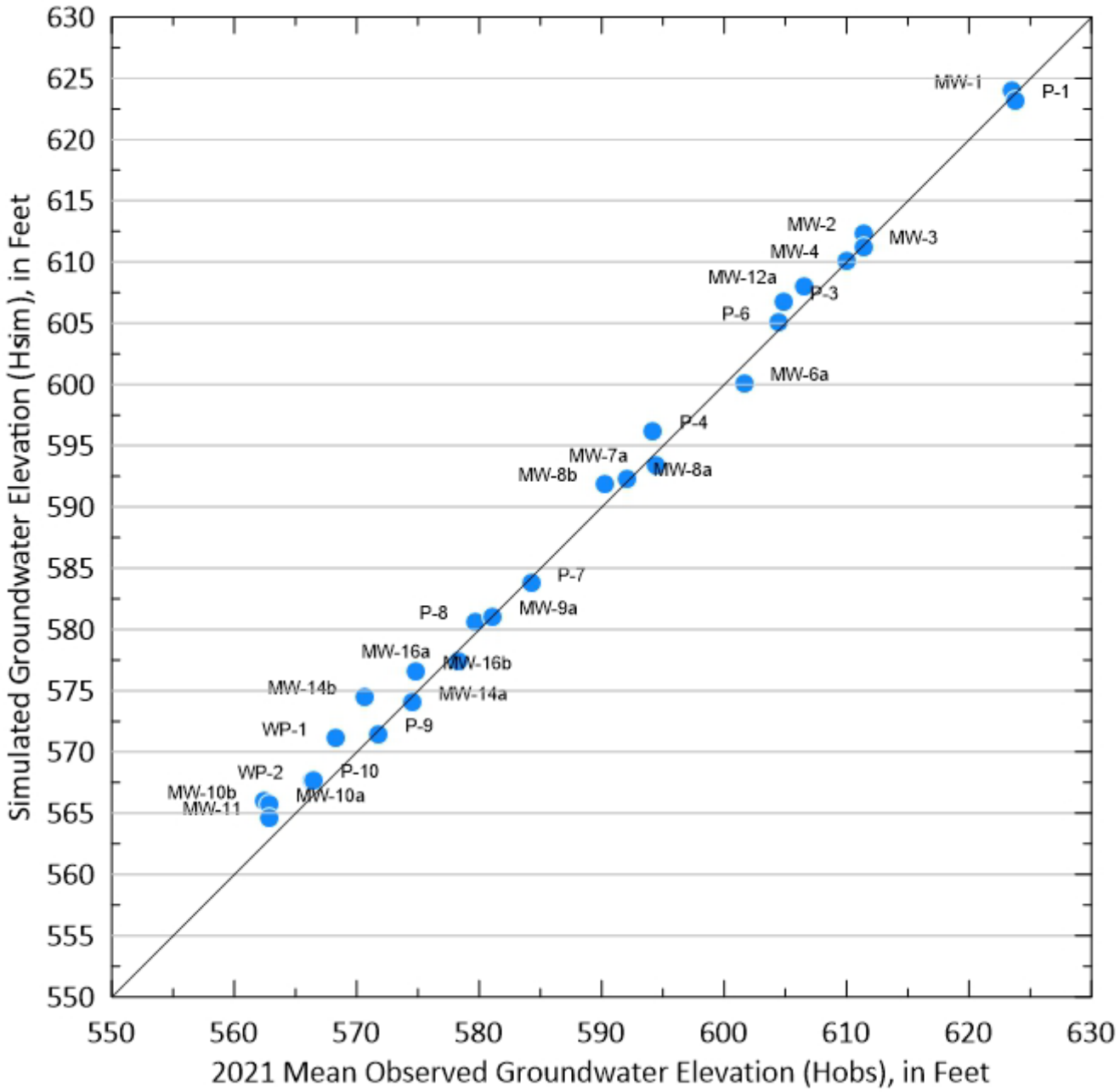

Figure 10
Steady-state groundwater-flow model results, January-July 2021 conditions

Resolute
Environmental & Water Resources Consulting

Milledge Avenue Site
Athens, Georgia

December 2021

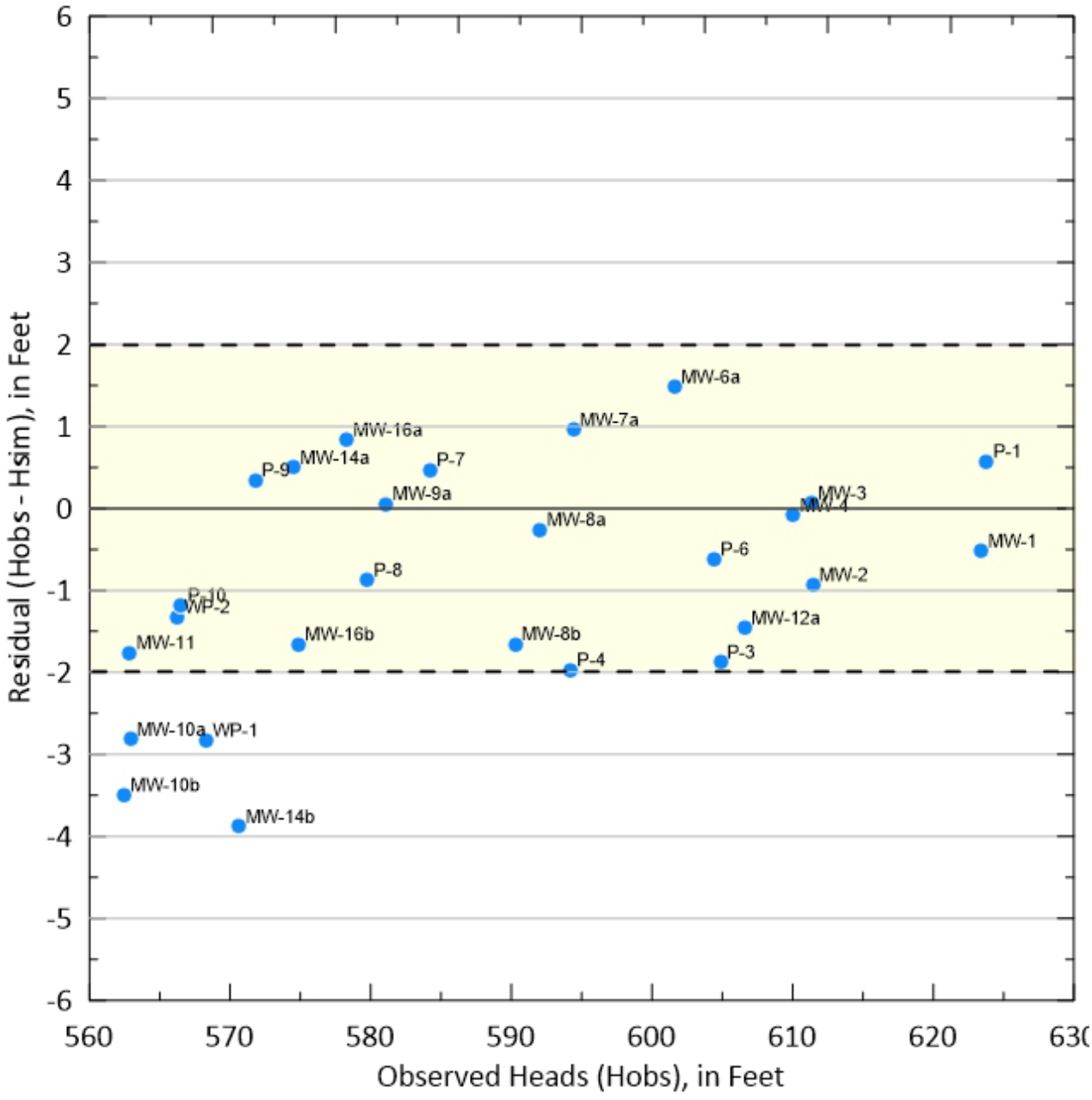

Figure 11
Observed mean groundwater elevations and simulated residuals, January-July 2021 conditions

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Milledge Avenue Site
Athens, Georgia

December 2021

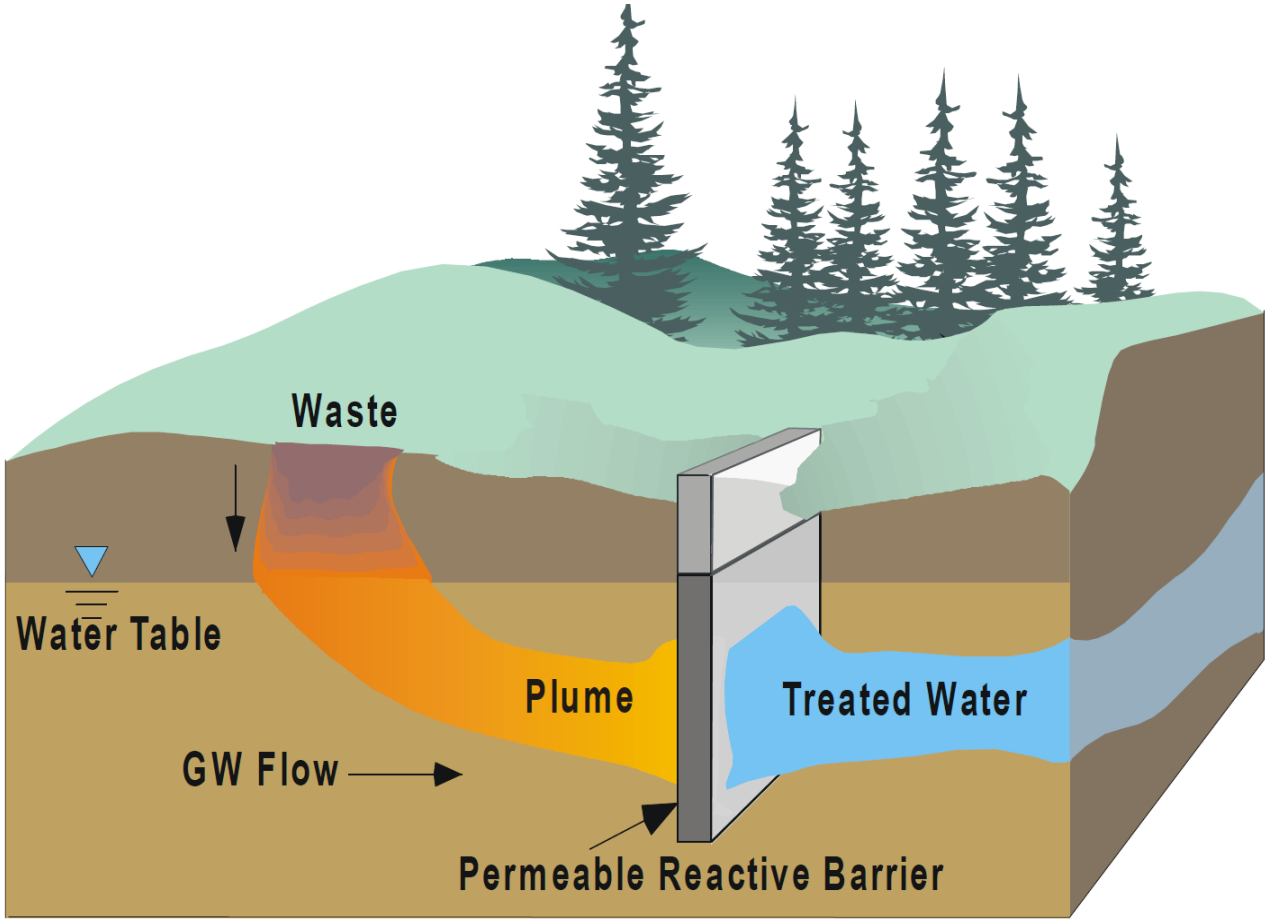
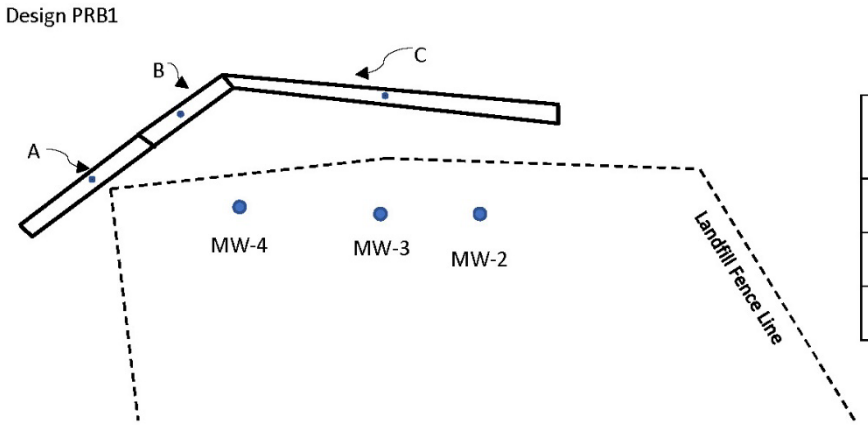


Figure 12
Conceptual model of permeable reactive barrier treatment of a groundwater contaminant plume (from USEPA 1998)

Resolute
Environmental & Water Resources Consulting

Milledge Avenue Site
Athens, Georgia

December 2021



Zone	Hydraulic conductivity, ft/d	Hydraulic conductivity, cm/s
A	2.8×10^{-8}	1.0×10^{-11}
B	6.8×10^{-1}	2.4×10^{-4}
C	2.8×10^{-8}	1.0×10^{-11}

Simulated groundwater velocity at this location is discussed in text and referred to as V_A, V_B, and V_C

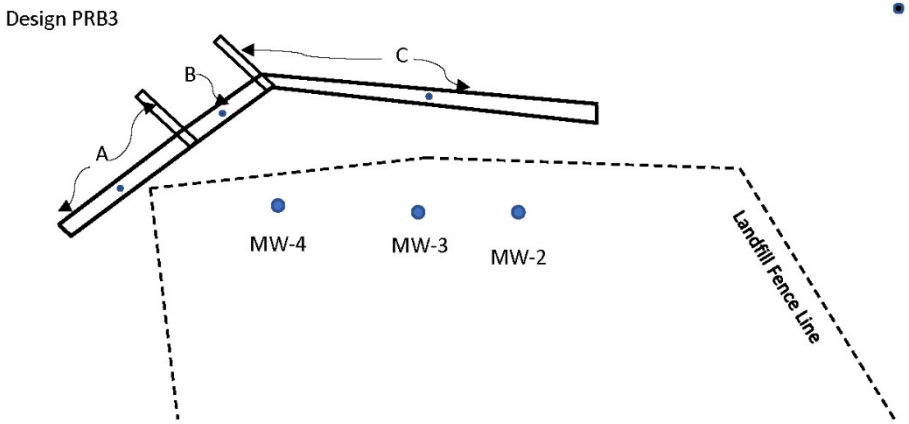


Figure 13
Schematic drawing showing permeable reactive barrier (PRB) designs PRB1 and PRB3 in the vicinity of the landfill

Resolute
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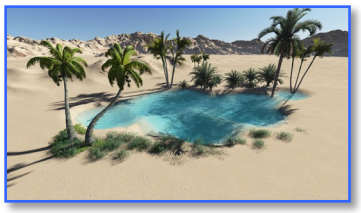
Milledge Avenue Site
Athens, Georgia

December 2021



M. L. Maslia Consulting Engineer

3360 Norfolk Chase Drive, Peachtree Corners, GA 30092
Mobile: +1 (404) 431-0035 • Email: H2OBoy54@gmail.com

March 17, 2022

Mr. Tommy Jordan, P.G., Sr. Project Manager (PMP)
Resolute Environmental & Water Resources Consulting, LLC
1001 Weatherstone Pkwy STE 410
Woodstock, GA 30188

RE: Letter-Report

Dear Mr. Jordan:

This letter presents a summary report pertinent to groundwater-flow modeling simulations conducted for additional permeable reactive barrier (PRB) scenarios at the Milledge Avenue Site, Athens, GA. Specifically, two additional scenarios (identified as PRB Design Scenarios PRB4 and PRB5) are described and results presented.

Should you or anyone at Resolute Environmental & Water Resources Consulting have any questions or need to discuss these additional scenarios, please do not hesitate to contact me.

Thank you for the opportunity to be part of the Resolute team and this important project.

Sincerely,

Morris L. Maslia

Morris L. Maslia, P.E

Summary of Permeable Reactive Barrier (PRB) Design Scenarios

Design Scenario PRB1:

Hydraulic conductivity in the PRB:
Layers 1–7: 6.8×10^{-1} ft/d (2.4×10^{-4} cm/s)

Design Scenario PRB4:

PRB is simulated as "impermeable" for depths of 45 ft – 100 ft below ground surface (BGS)
Hydraulic conductivity in PRB for Model Layers 1–3: 6.8×10^{-1} ft/d (2.4×10^{-4} cm/s)
Hydraulic conductivity in PRB for Model Layers 4–19: 2.8×10^{-8} ft/d (1.0×10^{-11} cm/s)

Design Scenario PRB5:

Hydraulic conductivity of Model Layers 1–3 is 100 times that of Design Scenario PRB4
PRB simulated as "impermeable" for depths of 45 ft – 100 ft BGS
Hydraulic conductivity in PRB for Model Layers 1–3: 68 ft/d (2.4×10^{-2} cm/s)
Hydraulic conductivity in PRB for Model Layers 4–19: 2.8×10^{-8} ft/d (1.0×10^{-11} cm/s)

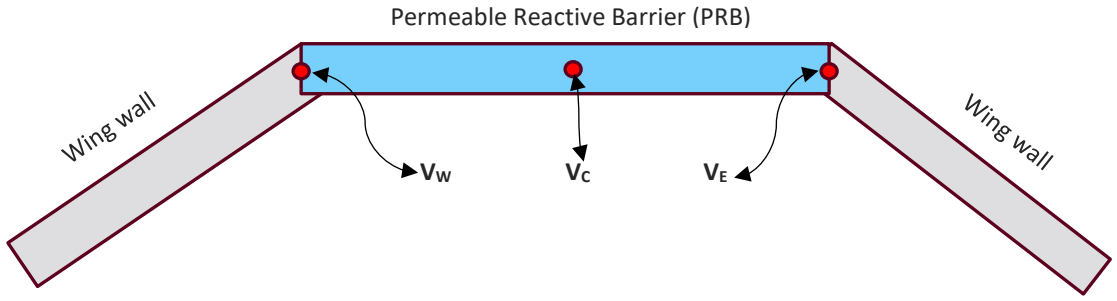


Figure 1. Generalized schematic diagram of permeable reactive barrier for conducting additional groundwater-flow modeling simulations, Milledge Avenue Site, Athens, GA. [V_w, V_c, V_E represent simulated groundwater velocities at the westernmost, center, and easternmost points of the PRB].

The hydraulic properties described above were applied to the Milledge Avenue Site groundwater-flow model for Design Scenarios PRB4 and PRB5. Table 1 lists simulated groundwater elevations and changes in groundwater elevations for monitor wells MW-2, MW-3, and MW-4 (refer to Figure 13 of Appendix A Groundwater Modeling Report for locations of MW-2, MW-3, and MW-4).

Table 1. Simulated groundwater elevations and changes in groundwater elevations for monitor wells within the landfill for permeable reactive barrier scenarios, Milledge Avenue Site, Athens, GA.

Monitor Well	Simulated Jan-July 2021 mean groundwater elevation, ft	PRB1 Design groundwater elevation, ft	[1]Change, feet	PRB4 Design groundwater elevation, ft	[2]Change, feet	PRB5 Design groundwater elevation, ft	[3]Change, feet
MW-2	612.36	615.11	-2.75	615.48	-3.12	615.32	-2.96
MW-3	611.26	614.38	-3.12	614.95	-3.69	614.71	-3.45
MW-4	610.13	612.48	-2.27	613.41	-3.28	613.00	-2.87

[1]Change is defined as the simulated Jan-July 2021 mean groundwater elevation minus the PRB1 Design simulated groundwater elevation; a negative value indicates an increase in water level

[2]Change is defined as the simulated Jan-July 2021 mean groundwater elevation minus the PRB4 Design simulated groundwater elevation; a negative value indicates an increase in water level

[3]Change is defined as the simulated Jan-July 2021 mean groundwater elevation minus the PRB5 Design simulated groundwater elevation; a negative value indicates an increase in water level

The simulated groundwater-flow velocity magnitudes for model layers at the westernmost, center, and easternmost points of the PRB (Figure 1) are listed in Table 2. Groundwater-flow velocity is defined as the Darcy velocity (or specific discharge) divided by the effective porosity. For all simulations, the effective porosity is 39 percent (0.39).

Table 2. Hydraulic properties and magnitudes of simulated groundwater-flow velocities at selected locations within the permeable reactive barrier (PRB) for PRB Design Scenarios, Milledge Avenue Site, Athens, GA.

Model Layer[1]	Top Elevation, in ft	Bottom Elevation, in ft	Hydraulic conductivity, ft/d (cm/sec)	[2]V_W, ft/d	[3]V_C, ft/d	[4]V_E, ft/d
PRB Design Scenario PRB1[5]						
1	610	594	$6.8x10^{-1}$ ($2.4x10^{-4}$)	0.165	0.135	0.270
2	594	590	$6.8x10^{-1}$ ($2.4x10^{-4}$)	0.175	0.178	0.356
3	590	586	$6.8x10^{-1}$ ($2.4x10^{-4}$)	0.146	0.180	0.360
4–7	586	570	$6.8x10^{-1}$ ($2.4x10^{-4}$)	—	—	—
PRB Design Scenario PRB4						
1	610	594	$6.8x10^{-1}$ ($2.4x10^{-4}$)	0.286	0.288	0.500
2	594	590	$6.8x10^{-1}$ ($2.4x10^{-4}$)	0.333	0.418	0.665
3	590	586	$6.8x10^{-1}$ ($2.4x10^{-4}$)	0.320	0.460	0.724
4–19	586	530	$2.8x10^{-8}$ ($1.0x10^{-11}$)	—	—	—
PRB Design Scenario PRB5						
1	610	594	$6.8x10^{1}$ ($2.4x10^{-2}$)	0.366	0.240	0.426
2	594	590	$6.8x10^{1}$ ($2.4x10^{-2}$)	0.324	0.676	0.832
3	590	586	$6.8x10^{1}$ ($2.4x10^{-2}$)	0.505	1.103	1.239
4–19	586	530	$2.8x10^{-8}$ ($1.0x10^{-11}$)	—	—	—

[1]Model layer 1 is to top layer and is unconfined; model layers 2–19 assumed to be fully saturated and confined.

[2]V_W = Groundwater velocity at Westernmost edge of PRB; effective porosity = 0.39

[3]V_C = Groundwater velocity at Center point of PRB; effective porosity = 0.39

[4]V_E = Groundwater velocity at Easternmost edge of PRB; effective porosity = 0.39

[5]Design Scenario PRB1 is described in Appendix A report on simulation of groundwater flow.

I. – PHASE III DPT BORING LOGS AND ANALYTICAL SAMPLING REPORT

BORING NUMBER -A-6

Resolute Environmental & Water Resources Consulting, LLC
1003 Weatherstone Parkway, Suite 320
Woodstock, GA 30188

CLIENT University of Georgia
PROJECT NAME Milledge Avenue Site
PROJECT NUMBER Task 10C
PROJECT LOCATION Athens, GA
DATE STARTED 10/18/21 **COMPLETED** 10/18/21
GROUND ELEVATION 582.9 ft **HOLE SIZE** 2 in
DRILLING CONTRACTOR Geolab
GROUND WATER LEVELS:
DRILLING METHOD DPT
AT TIME OF DRILLING ---
LOGGED BY J. Booth **CHECKED BY** R. Mull
AT END OF DRILLING 5.50 ft / Elev 577.40 ft
NOTES
24hrs AFTER DRILLING 3.46 ft / Elev 579.44 ft

DEPTH (ft)	SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	
0					
		SC		(SC) Brown to tan to orange brown, fine to medium CLAYEY SAND, contains mica Hand Auger 0-5'	
5				5.0	577.9
				No Recovery	
				7.0	575.9
		SC		7.5 (SC) Brown, fine CLAYEY SAND, wet	575.4
		CL		(CL) Gray, SANDY CLAY, wet	
10				10.0	572.9
				No Recovery	
				13.0	569.9
		SP		(SP) Gray white, fine to medium SAND, contains mica, wet	
				14.0	568.9
		SP-SM		(SP-SM) White and black bands, SAND, orange pockets, SILTY SAND, partially weathered rock, saprolite, wet	
15				15.0	567.9

Bottom of borehole at 15.0 feet.

BORING NUMBER D-4

Resolute Environmental & Water Resources Consulting, LLC
1003 Weatherstone Parkway, Suite 320
Woodstock, GA 30188

CLIENT University of Georgia
PROJECT NAME Milledge Avenue Site
PROJECT NUMBER Task 10C
PROJECT LOCATION Athens, GA
DATE STARTED 10/18/21 **COMPLETED** 10/18/21
GROUND ELEVATION 583.97 ft **HOLE SIZE** 2 in
DRILLING CONTRACTOR Geolab
GROUND WATER LEVELS:
DRILLING METHOD DPT
AT TIME OF DRILLING ---
LOGGED BY J. Booth **CHECKED BY** R. Mull
AT END OF DRILLING 3.00 ft / Elev 580.97 ft
NOTES
24hrs AFTER DRILLING 4.76 ft / Elev 579.21 ft

DEPTH (ft)	SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	
0				No Recovery	
				3.0 ▼	581.0
		SP		(SP) Brown, fine SAND, contains organic material	
				3.5	580.5
		SC		(SC) Orange brown, fine CLAYEY SAND, contains SILT, wet	
				4.0	580.0
		SC		(SC) Tan, fine CLAYEY SAND, wet	
5				5.0 ▼	579.0
		CH		(CH) Orange, gray, CLAY, wet	
10				10.0	574.0
		SC		(SC) Gray, fine to medium CLAYEY SAND, contains SILT and mica, wet	
				12.0	572.0
		SP		(SP) Light gray, fine to medium SAND, contains mica, wet	
				13.0	571.0
		SP-SM		(SP-SM) Dark gray, fine to medium SAND, contains SILT and mica, wet	
15				15.0	569.0
				No Recovery	
				17.0	567.0
		SC		(SC) Tan gray, fine CLAYEY SAND, wet	
				18.0	566.0
		SP-SM		(SP-SM) White and black bands, SAND, orange pockets, SILTY SAND, partially weathered rock, saprolite, wet	
20				20.0	564.0

Bottom of borehole at 20.0 feet.

BORING NUMBER F-3.5

Resolute Environmental & Water Resources Consulting, LLC
1003 Weatherstone Parkway, Suite 320
Woodstock, GA 30188

CLIENT University of Georgia
PROJECT NAME Milledge Avenue Site
PROJECT NUMBER Task 10C
PROJECT LOCATION Athens, GA
DATE STARTED 10/18/21 **COMPLETED** 10/18/21
GROUND ELEVATION 585.02 ft **HOLE SIZE** 2 in
DRILLING CONTRACTOR Geolab
GROUND WATER LEVELS:
DRILLING METHOD DPT
AT TIME OF DRILLING ---
LOGGED BY J. Booth **CHECKED BY** R. Mull
AT END OF DRILLING ---
NOTES
24hrs AFTER DRILLING 6.04 ft / Elev 578.98 ft

DEPTH (ft)	SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	
0		SP-SM		(SP-SM) Brown, fine SAND with SILT	
				1.0	584.0
		CH		(CH) Orange brown, CLAY	
				3.0	582.0
		CL		(CL) Gray, orange, CLAY lenses with SAND	
5					
10				10.0	575.0
		CL		(CL) Gray, SANDY CLAY, contains mica	
				12.5	572.5
		SM		(SM) Orange brown, medium SILTY SAND, contains mica	
15				15.0	570.0
				Bottom of borehole at 15.0 feet.	

BORING NUMBER H-2

Resolute Environmental & Water Resources Consulting, LLC
1003 Weatherstone Parkway, Suite 320
Woodstock, GA 30188

CLIENT University of Georgia
PROJECT NAME Milledge Avenue Site
PROJECT NUMBER Task 10C
PROJECT LOCATION Athens, GA
DATE STARTED 10/18/21 **COMPLETED** 10/18/21
GROUND ELEVATION 582.45 ft **HOLE SIZE** 2 in
DRILLING CONTRACTOR Geolab
GROUND WATER LEVELS:
DRILLING METHOD DPT
AT TIME OF DRILLING ---
LOGGED BY J. Booth **CHECKED BY** R. Mull
AT END OF DRILLING ---
NOTES
24hrs AFTER DRILLING 2.89 ft / Elev 579.56 ft

DEPTH (ft)	SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	
0				No Recovery	
				2.0	580.5
		SC		(SC) Brown, CLAYEY SAND, wet	
				3.0	579.5
5		CL		(CL) Orange tan, gray, SANDY CLAY, wet	
10				10.0	572.5
				No Recovery	
				14.0	568.5
15		SP-SM		(SP-SM) White and black bands, SAND, orange pockets, SILTY SAND, partially weathered rock, saprolite, wet	
				15.0	567.5

Bottom of borehole at 15.0 feet.

BORING NUMBER H-4.5

Resolute Environmental & Water Resources Consulting, LLC
1003 Weatherstone Parkway, Suite 320
Woodstock, GA 30188

CLIENT University of Georgia
PROJECT NAME Milledge Avenue Site
PROJECT NUMBER Task 10C
PROJECT LOCATION Athens, GA
DATE STARTED 10/18/21 **COMPLETED** 10/18/21
GROUND ELEVATION 584.62 ft **HOLE SIZE** 2 in
DRILLING CONTRACTOR Geolab
GROUND WATER LEVELS:
DRILLING METHOD DPT
AT TIME OF DRILLING ---
LOGGED BY J. Booth **CHECKED BY** R. Mull
AT END OF DRILLING ---
NOTES
24hrs AFTER DRILLING 4.63 ft / Elev 579.99 ft

DEPTH (ft)	SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	
0				No recovery	
				1.0	583.6
		SP		(SP) Brown, fine SAND	
				2.0	582.6
		SC		(SC) Orange tan, fine to medium CLAYEY SAND	
5					
				6.5	578.1
		CL		(CL) Gray orange, SANDY CLAY	
10				10.0	574.6
				No Recovery	
				12.5	572.1
		SP		(SP) Gray tan, fine SAND, contains mica	
				14.5	570.1
15		SP-SM		15.0 (SP-SM) White and black bands, SAND, orange pockets, SILTY SAND, partially weathered rock, saprolite	569.6

Bottom of borehole at 15.0 feet.

BORING NUMBER H-7

Resolute Environmental & Water Resources Consulting, LLC
1003 Weatherstone Parkway, Suite 320
Woodstock, GA 30188

CLIENT University of Georgia
PROJECT NAME Milledge Avenue Site
PROJECT NUMBER Task 10C
PROJECT LOCATION Athens, GA
DATE STARTED 10/18/21 **COMPLETED** 10/18/21
GROUND ELEVATION 587.55 ft **HOLE SIZE** 2 in
DRILLING CONTRACTOR Geolab
GROUND WATER LEVELS:
DRILLING METHOD DPT
AT TIME OF DRILLING ---
LOGGED BY J. Booth **CHECKED BY** R. Mull
AT END OF DRILLING ---
NOTES
24hrs AFTER DRILLING 7.17 ft / Elev 580.38 ft

DEPTH (ft)	SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	
0				No Recovery	
				1.0	586.6
		SP		(SP) Brown, fine to medium SAND, contains organic material	
				1.5	586.1
		CL		(CL) Orange, brown, SANDY CLAY, dry	
5				5.0	582.6
		CL		(CL) Orange, gray, SANDY CLAY, wet	
10				10.0	577.6
		SM		(SM) Gray, orange, fine SILTY SAND, wet	
				13.0	574.6
		CL		(CL) Orange, gray, CLAY, contains fine SAND, wet	
15				15.0	572.6
				No Recovery	
				16.5	571.1
		SP		(SP) Brown, gray, fine SAND, contains mica, wet	
				18.0	569.6
		SP-SM		(SP-SM) White and black bands, SAND, orange pockets, SILTY SAND, partially weathered rock, saprolite	
20				20.0	567.6

Bottom of borehole at 20.0 feet.

BORING NUMBER H-9

Resolute Environmental & Water Resources Consulting, LLC
1003 Weatherstone Parkway, Suite 320
Woodstock, GA 30188

CLIENT University of Georgia
PROJECT NAME Milledge Avenue Site
PROJECT NUMBER Task 10C
PROJECT LOCATION Athens, GA
DATE STARTED 10/18/21 **COMPLETED** 10/18/21
GROUND ELEVATION 590.08 ft **HOLE SIZE** 2 in
DRILLING CONTRACTOR Geolab
GROUND WATER LEVELS:
DRILLING METHOD DPT
AT TIME OF DRILLING ---
LOGGED BY J. Booth **CHECKED BY** R. Mull
AT END OF DRILLING 16.80 ft / Elev 573.28 ft
NOTES
24hrs AFTER DRILLING 8.99 ft / Elev 581.09 ft

DEPTH (ft)	SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	
0				No Recovery	
					4.0 586.1
5		SW		(SW) Tan orange, fine to coarse SAND, contains mica	
					8.0 582.1
		CL		(CL) Gray orange, SANDY CLAY	
					9.0 581.1
		SP		(SP) Orange brown, fine SAND, dry	
10					10.0 580.1
		SC		(SC) Orange brown, fine to medium CLAYEY SAND, contains mica, wet	
					13.0 577.1
		SM		(SM) Tan orange, SILTY SAND, contains mica, wet	
15					15.0 575.1
				No Recovery	
					18.0 572.1
		SM		(SM) Brown red, SILTY SAND, contains mica, wet	
					19.5 570.6
20		SP-SM		(SP-SM) White and black bands, SAND, orange pockets, SILTY SAND, partially weathered rock, saprolite, wet	20.0 570.1

Bottom of borehole at 20.0 feet.

BORING NUMBER H-12

Resolute Environmental & Water Resources Consulting, LLC
1003 Weatherstone Parkway, Suite 320
Woodstock, GA 30188

CLIENT University of Georgia
PROJECT NAME Milledge Avenue Site
PROJECT NUMBER Task 10C
PROJECT LOCATION Athens, GA
DATE STARTED 10/18/21 **COMPLETED** 10/18/21
GROUND ELEVATION 595 ft **HOLE SIZE** 2 in
DRILLING CONTRACTOR Geolab
GROUND WATER LEVELS:
DRILLING METHOD DPT
AT TIME OF DRILLING ---
LOGGED BY J. Booth **CHECKED BY** R. Mull
AT END OF DRILLING 17.50 ft / Elev 577.50 ft
NOTES
24hrs AFTER DRILLING 11.84 ft / Elev 583.16 ft

DEPTH (ft)	SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	
0				No Recovery	
					593.5
		SP		(SP) Brown, fine SAND, contains organic material	593.0
		SP		(SP) Orange, fine to medium SAND, contains mica	
5					590.0
				No recovery	
					587.0
		SP		(SP) Orange, fine to medium SAND, dry	
					586.0
10		CL		(CL) Gray, fine SANDY CLAY, dry to moist	
				(CL) Orange gray, fine SANDY CLAY, wet	
15		CL			
					575.5
20		SP-SM		(SP-SM) White and black bands, SAND, orange pockets, SILTY SAND, partially weathered rock, saprolite, wet	575.0

Bottom of borehole at 20.0 feet.

BORING NUMBER H-15

Resolute Environmental & Water Resources Consulting, LLC
1003 Weatherstone Parkway, Suite 320
Woodstock, GA 30188

CLIENT University of Georgia
PROJECT NAME Milledge Avenue Site
PROJECT NUMBER Task 10C
PROJECT LOCATION Athens, GA
DATE STARTED 10/18/21 **COMPLETED** 10/18/21
GROUND ELEVATION 598.51 ft **HOLE SIZE** 2 in
DRILLING CONTRACTOR Geolab
GROUND WATER LEVELS:
DRILLING METHOD DPT
AT TIME OF DRILLING ---
LOGGED BY J. Booth **CHECKED BY** R. Mull
AT END OF DRILLING 13.50 ft / Elev 585.01 ft
NOTES
24hrs AFTER DRILLING 12.78 ft / Elev 585.73 ft

DEPTH (ft)	SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	
0				No Recovery	
					3.0 / 595.5
		SM		(SM) Brown red, fine SILTY SAND, contains mica, dry	
5					5.0 / 593.5
				No Recovery	
					7.5 / 591.0
		SM		(SM) Red, fine to medium SILTY SAND, contains mica, dry	
					9.0 / 589.5
		CL		(CL) Orange tan, fine SANDY CLAY, dry	
10					10.0 / 588.5
				No Recovery	
					12.0 / 586.5
		CL		(CL) Gray tan, fine SANDY CLAY, dry	
					13.0 / 585.5
		SC		(SC) Gray, CLAYEY SAND, wet	
15					15.0 / 583.5
		CL		(CL) Gray, SANDY CLAY, wet	
					17.5 / 581.0
		SP		(SP) Tan to gray, fine to coarse SAND, wet	
20					20.0 / 578.5

Bottom of borehole at 20.0 feet.

BORING NUMBER I-8

Resolute Environmental & Water Resources Consulting, LLC
1003 Weatherstone Parkway, Suite 320
Woodstock, GA 30188

CLIENT University of Georgia
PROJECT NAME Milledge Avenue Site
PROJECT NUMBER Task 10C
PROJECT LOCATION Athens, GA
DATE STARTED 10/18/21 **COMPLETED** 10/18/21
GROUND ELEVATION 587.82 ft **HOLE SIZE** 2 in
DRILLING CONTRACTOR Geolab
GROUND WATER LEVELS:
DRILLING METHOD DPT
AT TIME OF DRILLING 8.00 ft / Elev 579.82 ft
LOGGED BY J. Booth **CHECKED BY** R. Mull
AT END OF DRILLING ---
NOTES
24hrs AFTER DRILLING 7.07 ft / Elev 580.75 ft

DEPTH (ft)	SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	
0				No Recovery	
					1.5 / 586.3
		SP		(SP) Brown, fine to medium SAND, contains organic material, dry	2.0 / 585.8
		CL		(CL) Brown orange, fine SANDY CLAY, dry	4.5 / 583.3
5		CL		(CL) Orange, gray, fine to medium SANDY CLAY, dry	9.0 / 578.8
10		SM		(SM) Gray, orange, fine to medium SILTY SAND, contains mica, wet	12.5 / 575.3
		SP		(SP) Gray, brown, fine to medium SAND, contains mica, wet	15.0 / 572.8
15				No Recovery	18.0 / 569.8
		SP-SM		(SP-SM) White and black bands, SAND, orange pockets, SILTY SAND, partially weathered rock, saprolite, wet	20.0 / 567.8
20				Bottom of borehole at 20.0 feet.	

BORING NUMBER J-2

Resolute Environmental & Water Resources Consulting, LLC
1003 Weatherstone Parkway, Suite 320
Woodstock, GA 30188

CLIENT University of Georgia
PROJECT NAME Milledge Avenue Site
PROJECT NUMBER Task 10C
PROJECT LOCATION Athens, GA
DATE STARTED 10/18/21 **COMPLETED** 10/18/21
GROUND ELEVATION 583.02 ft **HOLE SIZE** 2 in
DRILLING CONTRACTOR Geolab
GROUND WATER LEVELS:
DRILLING METHOD DPT
AT TIME OF DRILLING ---
LOGGED BY J. Booth **CHECKED BY** R. Mull
AT END OF DRILLING 3.00 ft / Elev 580.02 ft
NOTES
24hrs AFTER DRILLING 2.95 ft / Elev 580.07 ft

DEPTH (ft)	SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	
0				No recovery	
				2.5	580.5
		SM		(SM) Brown, fine to medium SILTY SAND	
				3.0	580.0
		SM		(SM) Red brown, SILTY SAND, wet	
				4.5	578.5
5		SP		(SP) Gray brown, medium to coarse SAND	
				5.0	578.0
				No Recovery	
				7.0	576.0
		SM		(SM) Dark gray, fine to medium SILTY SAND, wet	
				8.0	575.0
		CL-ML		(CL-ML) Gray, CLAYEY SILT with fine SAND, wet	
				9.5	573.5
10		SW		(SW) Gray to tan, fine to coarse SAND, wet	
				10.0	573.0
				No Recovery	
				14.0	569.0
		SP-SM		(SP-SM) White and black bands, SAND, orange pockets, SILTY SAND, partially weathered rock, saprolite, wet	
15				15.0	568.0

Bottom of borehole at 15.0 feet.

BORING NUMBER J-3.5

Resolute Environmental & Water Resources Consulting, LLC
1003 Weatherstone Parkway, Suite 320
Woodstock, GA 30188

CLIENT University of Georgia
PROJECT NAME Milledge Avenue Site
PROJECT NUMBER Task 10C
PROJECT LOCATION Athens, GA
DATE STARTED 10/18/21 **COMPLETED** 10/18/21
GROUND ELEVATION 584.69 ft **HOLE SIZE** 2 in
DRILLING CONTRACTOR Geolab
GROUND WATER LEVELS:
DRILLING METHOD DPT
AT TIME OF DRILLING ---
LOGGED BY J. Booth **CHECKED BY** R. Mull
AT END OF DRILLING 9.20 ft / Elev 575.49 ft
NOTES
AFTER DRILLING 3.02 ft / Elev 581.67 ft

DEPTH (ft)	SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	
0				No Recovery	
					2.0 582.7
		SM		(SM) Brown, fine SILTY SAND, dry to moist	
					3.0 581.7
		SC		(SC) Red brown, fine CLAYEY SAND, wet	
5					5.0 579.7
				No recovery	
					7.0 577.7
		SC		(SC) Orange tan, fine CLAYEY SAND, wet	
					8.0 576.7
		CL		(CL) Gray orange, fine SANDY CLAY, wet	
					9.5 575.2
10		SP-SM		(SP-SM) White and black bands, SAND, orange pockets, SILTY SAND, partially weathered rock, saprolite, wet	
15					15.0 569.7

Bottom of borehole at 15.0 feet.

BORING NUMBER J-7

Resolute Environmental & Water Resources Consulting, LLC
1003 Weatherstone Parkway, Suite 320
Woodstock, GA 30188

CLIENT University of Georgia
PROJECT NAME Milledge Avenue Site
PROJECT NUMBER Task 10C
PROJECT LOCATION Athens, GA
DATE STARTED 10/18/21 **COMPLETED** 10/18/21
GROUND ELEVATION 586.47 ft **HOLE SIZE** 2 in
DRILLING CONTRACTOR Geolab
GROUND WATER LEVELS:
DRILLING METHOD DPT
AT TIME OF DRILLING ---
LOGGED BY J. Booth **CHECKED BY** R. Mull
AT END OF DRILLING 9.80 ft / Elev 576.67 ft
NOTES
24hrs AFTER DRILLING 5.21 ft / Elev 581.26 ft

DEPTH (ft)	SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	
0				No Recovery	
				1.5	585.0
		SP		(SP) Brown, fine to medium SAND, contains organics	
				2.0	584.5
		CL		(CL) Orange, fine SANDY CLAY	
				4.0	582.5
5		SC		(SC) Gray, orange, fine to medium CLAYEY SAND, wet	
10				10.0	576.5
				No Recovery	
				13.0	573.5
		SM		(SM) Orange brown, SILTY SAND, wet	
				14.0	572.5
15		SP-SM		(SP-SM) White and black bands, SAND, orange pockets, SILTY SAND, partially weathered rock, saprolite, wet	
				15.0	571.5

Bottom of borehole at 15.0 feet.

BORING NUMBER J-9

Resolute Environmental & Water Resources Consulting, LLC
1003 Weatherstone Parkway, Suite 320
Woodstock, GA 30188

CLIENT University of Georgia
PROJECT NAME Milledge Avenue Site
PROJECT NUMBER Task 10C
PROJECT LOCATION Athens, GA
DATE STARTED 10/18/21 **COMPLETED** 10/18/21
GROUND ELEVATION 590.08 ft **HOLE SIZE** 2 in
DRILLING CONTRACTOR Geolab
GROUND WATER LEVELS:
DRILLING METHOD DPT
AT TIME OF DRILLING ---
LOGGED BY J. Booth **CHECKED BY** R. Mull
AT END OF DRILLING 13.30 ft / Elev 576.78 ft
NOTES
24hrs AFTER DRILLING 8.02 ft / Elev 582.06 ft

DEPTH (ft)	SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	
0				No Recovery	
				1.0	589.1
		SP		(SP) Brown, SAND, contains organic material	
				1.5	588.6
		CL		(CL) Orange brown, fine SANDY CLAY, dry	
				4.5	585.6
5		CL		(CL) Gray, orange, fine SANDY CLAY, dry	
				8.0 ▼	582.1
		SM		(SM) Orange, gray, medium to fine SILTY SAND, contains mica, wet	
10				10.0	580.1
				No Recovery	
				12.0	578.1
		ML		(ML) Tan to orange, SILT, wet	
				▼ 14.0	576.1
15		SP-SM		(SP-SM) White and black bands, SAND, orange pockets, SILTY SAND, partially weathered rock, saprolite, wet	
				15.0	575.1

Bottom of borehole at 15.0 feet.

BORING NUMBER L-4.5

Resolute Environmental & Water Resources Consulting, LLC
1003 Weatherstone Parkway, Suite 320
Woodstock, GA 30188

CLIENT University of Georgia
PROJECT NAME Milledge Avenue Site
PROJECT NUMBER Task 10C
PROJECT LOCATION Athens, GA
DATE STARTED 10/18/21 **COMPLETED** 10/18/21
GROUND ELEVATION 584.87 ft **HOLE SIZE** 2 in
DRILLING CONTRACTOR Geolab
GROUND WATER LEVELS:
DRILLING METHOD DPT
AT TIME OF DRILLING ---
LOGGED BY J. Booth **CHECKED BY** R. Mull
AT END OF DRILLING 6.65 ft / Elev 578.22 ft
NOTES
24hrs AFTER DRILLING 2.91 ft / Elev 581.96 ft

DEPTH (ft)	SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	
0				No Recovery	
				3.0	581.9
		SP		(SP) Brown, medium to coarse SAND, dry to moist	
				4.0	580.9
		CL		(CL) Tan brown, fine SANDY CLAY, moist	
5				5.0	579.9
				No recovery	
				8.0	576.9
		CL		(CL) Light brown, fine SANDY CLAY, wet	
				9.0	575.9
		SM		(SM) Gray, SILTY SAND, wet	
10				10.0	574.9
				No Recovery	
				13.5	571.4
		SP-SM		(SP-SM) White and black bands, SAND, orange pockets, SILTY SAND, partially weathered rock, saprolite, wet	
15				15.0	569.9

Bottom of borehole at 15.0 feet.

BORING NUMBER L-7

Resolute Environmental & Water Resources Consulting, LLC
1003 Weatherstone Parkway, Suite 320
Woodstock, GA 30188

CLIENT University of Georgia
PROJECT NAME Milledge Avenue Site
PROJECT NUMBER Task 10C
PROJECT LOCATION Athens, GA
DATE STARTED 10/18/21 **COMPLETED** 10/18/21
GROUND ELEVATION 588.17 ft **HOLE SIZE** 2 in
DRILLING CONTRACTOR Geolab
GROUND WATER LEVELS:
DRILLING METHOD DPT
AT TIME OF DRILLING ---
LOGGED BY J. Booth **CHECKED BY** R. Mull
AT END OF DRILLING 7.70 ft / Elev 580.47 ft
NOTES
24hrs AFTER DRILLING 6.20 ft / Elev 581.97 ft

DEPTH (ft)	SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	
0				No recovery	
				2.0	586.2
		SP		(SP) Brown, fine to medium SAND, contains organics	
				2.5	585.7
		CL		(CL) Orange, gray, fine SANDY CLAY, dry	
				4.0	584.2
		SP		(SP) Gray brown, fine to medium SAND, contains mica	
5				5.0	583.2
				No Recovery	
				7.5	580.7
		SW		(SW) Gray, orange, brown, fine to coarse SAND, moist	
				9.0	579.2
10		SP-SM		(SP-SM) White and black bands, SAND, orange pockets, SILTY SAND, partially weathered rock, saprolite, wet	
15				15.0	573.2
				Bottom of borehole at 15.0 feet.	

DENSITY AND POROSITY DETERMINATION

DATA SHEET

PROJECT:	Milledge Avenue Site
PROJECT No.:	Phase III Investigation
SAMPLE No.:	F3.5 (Sandy Clay)
TESTING DATE:	10/18/21
TESTED BY:	TAJ
TRACKING CODE:	NA

UNIT WEIGHT (DENSITY)		
1. SAMPLE NO.	A	
2. WT OF MOLD (tare weight)	0.00	g
3. WT OF MOLD + SOIL	77.24	g
4. WT OF WET SOIL, W	77.24	g
5. DIAMETER OF SPECIMEN, D	1.30	in
6. HEIGHT OF SPECIMEN, H	1.50	in
7. VOLUME OF SPECIMEN	1.99	in^3
8. WET DENSITY	**147.8**	**pcf**
9. DRY DENSITY	**119.5**	**pcf**

1. MOISTURE TIN NO.	A	
2. WT MOISTURE TIN (tare weight)	0.00	g
3. WT WET SOIL + TARE	77.24	g
4. WT DRY SOIL + TARE	62.48	g
5. WT WATER, Ww	14.76	g
6. WT DRY SOIL, Ws	62.48	g
7. ASTM MOISTURE CONTENT, W	**23.62**	%

1. Bulk Density	147.8	lbs/ft3
2. Moisture Content	23.62	%
3. Specific Gravity	2.66	-
4. Dry Density	119.55	lbs/ft3
6. Weight of Solids(1)	1.92	g
7. Volume of Solids(1)	0.72	cm3
8. Volume of Voids(1)	0.28	cm3
9. Total Porosity (n)	**27.98**	**%**

Resolute
Environmental & Water Resources Consulting

DENSITY AND POROSITY DETERMINATION

DATA SHEET

PROJECT:	Milledge Avenue Site
PROJECT No.:	Phase III Investigation
SAMPLE No.:	H2 (PWR)
TESTING DATE:	10/18/21
TESTED BY:	TAJ
TRACKING CODE:	NA

UNIT WEIGHT (DENSITY)		
1. SAMPLE NO.	A	
2. WT OF MOLD (tare weight)	13.17	g
3. WT OF MOLD + SOIL	117.61	g
4. WT OF WET SOIL, W	104.44	g
5. DIAMETER OF SPECIMEN, D	1.30	in
6. HEIGHT OF SPECIMEN, H	2.50	in
7. VOLUME OF SPECIMEN	3.32	in^3
8. WET DENSITY	**119.9**	**pcf**
9. DRY DENSITY	**103.5**	**pcf**

1. MOISTURE TIN NO.	A	
2. WT MOISTURE TIN (tare weight)	90.65	g
3. WT WET SOIL + TARE	195.09	g
4. WT DRY SOIL + TARE	180.80	g
5. WT WATER, Ww	14.29	g
6. WT DRY SOIL, Ws	90.15	g
7. ASTM MOISTURE CONTENT, W	**15.85**	%

1. Bulk Density	119.9	lbs/ft3
2. Moisture Content	15.85	%
3. Specific Gravity	2.66	-
4. Dry Density	103.50	lbs/ft3
6. Weight of Solids(1)	1.66	g
7. Volume of Solids(1)	0.62	cm3
8. Volume of Voids(1)	0.38	cm3
9. Total Porosity (n)	**37.65**	**%**

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Environmental & Water Resources Consulting

DENSITY AND POROSITY DETERMINATION

DATA SHEET

PROJECT:	Milledge Avenue Site
PROJECT No.:	Phase III Investigation
SAMPLE No.:	H7 @ 10.5 (Clay)
TESTING DATE:	10/18/21
TESTED BY:	TAJ
TRACKING CODE:	NA

UNIT WEIGHT (DENSITY)		
1. SAMPLE NO.	A	
2. WT OF MOLD (tare weight)	0.00	g
3. WT OF MOLD + SOIL	59.46	g
4. WT OF WET SOIL, W	59.46	g
5. DIAMETER OF SPECIMEN, D	1.30	in
6. HEIGHT OF SPECIMEN, H	2.00	in
7. VOLUME OF SPECIMEN	2.65	in^3
8. WET DENSITY	**85.3**	**pcf**
9. DRY DENSITY	**66.6**	**pcf**

1. MOISTURE TIN NO.	A	
2. WT MOISTURE TIN (tare weight)	0.00	g
3. WT WET SOIL + TARE	59.46	g
4. WT DRY SOIL + TARE	46.39	g
5. WT WATER, Ww	13.07	g
6. WT DRY SOIL, Ws	46.39	g
7. ASTM MOISTURE CONTENT, W	**28.17**	%

1. Bulk Density	85.3	lbs/ft3
2. Moisture Content	28.17	%
3. Specific Gravity	2.66	-
4. Dry Density	66.57	lbs/ft3
6. Weight of Solids(1)	1.07	g
7. Volume of Solids(1)	0.40	cm3
8. Volume of Voids(1)	0.60	cm3
9. Total Porosity (n)	**59.89**	**%**

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DENSITY AND POROSITY DETERMINATION

DATA SHEET

PROJECT:	Milledge Avenue Site
PROJECT No.:	Phase III Investigation
SAMPLE No.:	I 8 @10.2' Silty SAND
TESTING DATE:	10/18/21
TESTED BY:	TAJ
TRACKING CODE:	NA

UNIT WEIGHT (DENSITY)		
1. SAMPLE NO.	A	
2. WT OF MOLD (tare weight)	0.00	g
3. WT OF MOLD + SOIL	78.13	g
4. WT OF WET SOIL, W	78.13	g
5. DIAMETER OF SPECIMEN, D	1.30	in
6. HEIGHT OF SPECIMEN, H	2.00	in
7. VOLUME OF SPECIMEN	2.65	in^3
8. WET DENSITY	**112.1**	**pcf**
9. DRY DENSITY	**85.5**	**pcf**

1. MOISTURE TIN NO.	A	
2. WT MOISTURE TIN (tare weight)	0.00	g
3. WT WET SOIL + TARE	78.13	g
4. WT DRY SOIL + TARE	59.58	g
5. WT WATER, Ww	18.55	g
6. WT DRY SOIL, Ws	59.58	g
7. ASTM MOISTURE CONTENT, W	**31.13**	%

1. Bulk Density	112.1	lbs/ft3
2. Moisture Content	31.13	%
3. Specific Gravity	2.66	-
4. Dry Density	85.50	lbs/ft3
6. Weight of Solids(1)	1.37	g
7. Volume of Solids(1)	0.52	cm3
8. Volume of Voids(1)	0.48	cm3
9. Total Porosity (n)	**48.49**	**%**

Resolute
Environmental & Water Resources Consulting

ANALYTICAL REPORT

November 01, 2021

Resolute Environmental & Water Resources

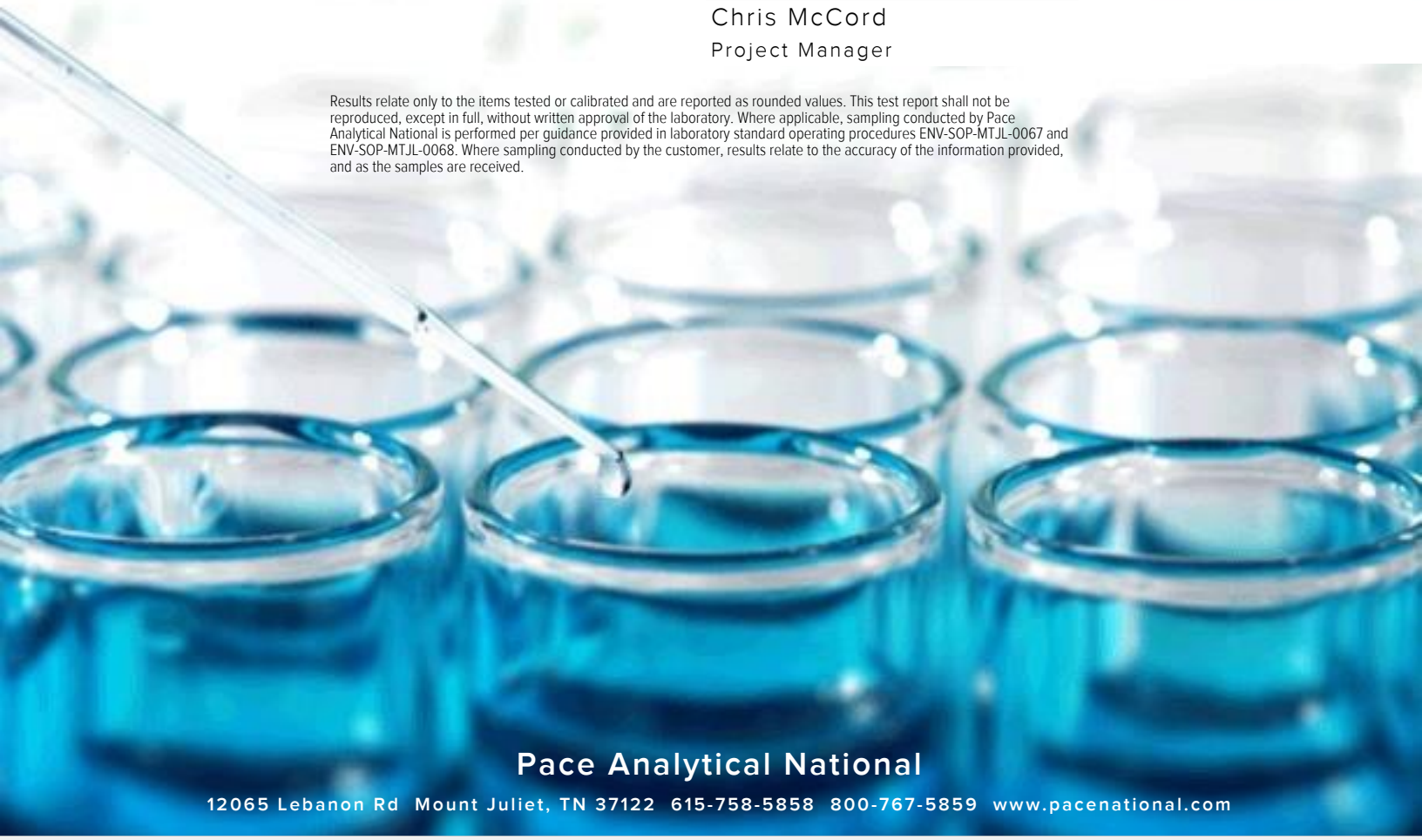
Sample Delivery Group:	L1420526
Samples Received:	10/20/2021
Project Number:	
Description:	Milledge Ave Phase III

Report To:

Tommy Jordan
1003 Weatherstone Parkway
Suite 320
Woodstock, GA 30188

Entire Report Reviewed By:

Chris McCord
Project Manager



Pace Analytical National
12065 Lebanon Rd Mount Juliet, TN 37122 615-758-5858 800-767-5859 www.pacenational.com

TABLE OF CONTENTS

A6 L1420526-01 GW

Collected by: Joe Booth | Collected date/time: 10/19/21 10:18 | Received date/time: 10/20/21 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1763282	1	10/26/21 01:17	10/26/21 01:17	JCP	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B-SIM	WG1763673	1	10/28/21 14:57	10/28/21 14:57	JAH	Mt. Juliet, TN

H2 L1420526-02 GW

Collected by: Joe Booth | Collected date/time: 10/19/21 10:39 | Received date/time: 10/20/21 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1763282	1	10/26/21 01:37	10/26/21 01:37	JCP	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B-SIM	WG1763673	1	10/28/21 15:16	10/28/21 15:16	JAH	Mt. Juliet, TN

P-8 L1420526-03 GW

Collected by: Joe Booth | Collected date/time: 10/19/21 11:02 | Received date/time: 10/20/21 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1763282	1	10/26/21 01:57	10/26/21 01:57	JCP	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B-SIM	WG1763673	1	10/28/21 15:36	10/28/21 15:36	JAH	Mt. Juliet, TN

L7 L1420526-04 GW

Collected by: Joe Booth | Collected date/time: 10/19/21 11:25 | Received date/time: 10/20/21 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1763282	1	10/26/21 02:16	10/26/21 02:16	JCP	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B-SIM	WG1763673	1	10/28/21 15:56	10/28/21 15:56	JAH	Mt. Juliet, TN

I8 L1420526-05 GW

Collected by: Joe Booth | Collected date/time: 10/19/21 12:12 | Received date/time: 10/20/21 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1763282	1	10/26/21 02:36	10/26/21 02:36	JCP	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B-SIM	WG1763673	1	10/28/21 16:16	10/28/21 16:16	JAH	Mt. Juliet, TN

SW-D1 L1420526-06 GW

Collected by: Joe Booth | Collected date/time: 10/19/21 09:09 | Received date/time: 10/20/21 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Volatile Organic Compounds (GC/MS) by Method 8260B-SIM	WG1763673	1	10/28/21 16:36	10/28/21 16:36	JAH	Mt. Juliet, TN

SW-H0 L1420526-07 GW

Collected by: Joe Booth | Collected date/time: 10/19/21 09:13 | Received date/time: 10/20/21 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Volatile Organic Compounds (GC/MS) by Method 8260B-SIM	WG1763673	1	10/28/21 16:56	10/28/21 16:56	JAH	Mt. Juliet, TN

SAMPLE SUMMARY

SW-L1 L1420526-08 GW

Collected by: Joe Booth
Collected date/time: 10/19/21 09:19
Received date/time: 10/20/21 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Volatile Organic Compounds (GC/MS) by Method 8260B-SIM	WG1763673	1	10/28/21 17:15	10/28/21 17:15	JAH	Mt. Juliet, TN

CASE NARRATIVE

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

Chris McCord
Project Manager

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Chloroform	ND		5.00	1	10/26/2021 01:17	WG1763282
(S) Toluene-d8	*106*		*80.0-120*		*10/26/2021 01:17*	WG1763282
(S) 4-Bromofluorobenzene	*94.4*		*77.0-126*		*10/26/2021 01:17*	WG1763282
(S) 1,2-Dichloroethane-d4	*111*		*70.0-130*		*10/26/2021 01:17*	WG1763282

Volatile Organic Compounds (GC/MS) by Method 8260B-SIM

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
1,4-Dioxane	ND		3.00	1	10/28/2021 14:57	WG1763673
(S) Toluene-d8	*97.9*		*77.0-127*		*10/28/2021 14:57*	WG1763673

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Chloroform	ND		5.00	1	10/26/2021 01:37	WG1763282
(S) Toluene-d8	*109*		*80.0-120*		*10/26/2021 01:37*	WG1763282
(S) 4-Bromofluorobenzene	*96.6*		*77.0-126*		*10/26/2021 01:37*	WG1763282
(S) 1,2-Dichloroethane-d4	*107*		*70.0-130*		*10/26/2021 01:37*	WG1763282

Volatile Organic Compounds (GC/MS) by Method 8260B-SIM

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
1,4-Dioxane	14.2		3.00	1	10/28/2021 15:16	WG1763673
(S) Toluene-d8	*98.2*		*77.0-127*		*10/28/2021 15:16*	WG1763673

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Chloroform	6.25		5.00	1	10/26/2021 01:57	WG1763282
(S) Toluene-d8	*110*		*80.0-120*		*10/26/2021 01:57*	WG1763282
(S) 4-Bromofluorobenzene	*98.8*		*77.0-126*		*10/26/2021 01:57*	WG1763282
(S) 1,2-Dichloroethane-d4	*112*		*70.0-130*		*10/26/2021 01:57*	WG1763282

Volatile Organic Compounds (GC/MS) by Method 8260B-SIM

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
1,4-Dioxane	28.0		3.00	1	10/28/2021 15:36	WG1763673
(S) Toluene-d8	*97.9*		*77.0-127*		*10/28/2021 15:36*	WG1763673

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Chloroform	ND		5.00	1	10/26/2021 02:16	WG1763282
(S) Toluene-d8	*110*		*80.0-120*		*10/26/2021 02:16*	WG1763282
(S) 4-Bromofluorobenzene	*98.1*		*77.0-126*		*10/26/2021 02:16*	WG1763282
(S) 1,2-Dichloroethane-d4	*110*		*70.0-130*		*10/26/2021 02:16*	WG1763282

Volatile Organic Compounds (GC/MS) by Method 8260B-SIM

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
1,4-Dioxane	5.46		3.00	1	10/28/2021 15:56	WG1763673
(S) Toluene-d8	*98.4*		*77.0-127*		*10/28/2021 15:56*	WG1763673

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Chloroform	ND		5.00	1	10/26/2021 02:36	WG1763282
(S) Toluene-d8	*111*		*80.0-120*		*10/26/2021 02:36*	WG1763282
(S) 4-Bromofluorobenzene	*93.9*		*77.0-126*		*10/26/2021 02:36*	WG1763282
(S) 1,2-Dichloroethane-d4	*113*		*70.0-130*		*10/26/2021 02:36*	WG1763282

Volatile Organic Compounds (GC/MS) by Method 8260B-SIM

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
1,4-Dioxane	11.5		3.00	1	10/28/2021 16:16	WG1763673
(S) Toluene-d8	*98.3*		*77.0-127*		*10/28/2021 16:16*	WG1763673

Volatile Organic Compounds (GC/MS) by Method 8260B-SIM

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
1,4-Dioxane	11.8		3.00	1	10/28/2021 16:36	WG1763673
(S) Toluene-d8	*98.7*		*77.0-127*		*10/28/2021 16:36*	WG1763673

Volatile Organic Compounds (GC/MS) by Method 8260B-SIM

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	ug/l		ug/l		date / time	
1,4-Dioxane	ND		3.00	1	10/28/2021 16:56	WG1763673
(S) Toluene-d8	*98.5*		*77.0-127*		*10/28/2021 16:56*	WG1763673

Volatile Organic Compounds (GC/MS) by Method 8260B-SIM

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	ug/l		ug/l		date / time	
1,4-Dioxane	ND		3.00	1	10/28/2021 17:15	WG1763673
(S) Toluene-d8	*98.2*		*77.0-127*		*10/28/2021 17:15*	WG1763673

Method Blank (MB)

(MB) R3722143-2 10/25/21 19:35

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Chloroform	U		0.111	5.00
(S) Toluene-d8	*111*			*80.0-120*
(S) 4-Bromofluorobenzene	*97.9*			*77.0-126*
(S) 1,2-Dichloroethane-d4	*113*			*70.0-130*

Laboratory Control Sample (LCS)

(LCS) R3722143-1 10/25/21 18:56

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Chloroform	5.00	5.02	100	73.0-120	
(S) Toluene-d8			*107*	*80.0-120*	
(S) 4-Bromofluorobenzene			*94.6*	*77.0-126*	
(S) 1,2-Dichloroethane-d4			*112*	*70.0-130*	

Method Blank (MB)

(MB) R3723803-3 10/28/21 11:52

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
1,4-Dioxane	U		0.597	3.00
(S) Toluene-d8	*97.9*			*77.0-127*

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

(LCS) R3723803-1 10/28/21 10:53 • (LCSD) R3723803-2 10/28/21 11:12

Analyte	Spike Amount ug/l	LCS Result ug/l	LCSD Result ug/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
1,4-Dioxane	50.0	50.9	50.6	102	101	55.0-138			0.591	24
(S) Toluene-d8				*97.5*	*97.4*	*77.0-127*				

GLOSSARY OF TERMS

Guide to Reading and Understanding Your Laboratory Report

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

Results Disclaimer - Information that may be provided by the customer, and contained within this report, include Permit Limits, Project Name, Sample ID, Sample Matrix, Sample Preservation, Field Blanks, Field Spikes, Field Duplicates, On-Site Data, Sampling Collection Dates/Times, and Sampling Location. Results relate to the accuracy of this information provided, and as the samples are received.

Abbreviations and Definitions

MDL	Method Detection Limit.
ND	Not detected at the Reporting Limit (or MDL where applicable).
RDL	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
(S)	Surrogate (Surrogate Standard) - Analytes added to every blank, sample, Laboratory Control Sample/Duplicate and Matrix Spike/Duplicate; used to evaluate analytical efficiency by measuring recovery. Surrogates are not expected to be detected in all environmental media.
U	Not detected at the Reporting Limit (or MDL where applicable).
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state “ND” (Not Detected) or “BDL” (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Uncertainty (Radiochemistry)	Confidence level of 2 sigma.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

Qualifier Description

The remainder of this page intentionally left blank, there are no qualifiers applied to this SDG.

ACCREDITATIONS & LOCATIONS

Pace Analytical National 12065 Lebanon Rd Mount Juliet, TN 37122

Alabama	40660	Nebraska	NE-OS-15-05
Alaska	17-026	Nevada	TN000032021-1
Arizona	AZ0612	New Hampshire	2975
Arkansas	88-0469	New Jersey–NELAP	TN002
California	2932	New Mexico [1]	TN00003
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina [1]	DW21704
Georgia	NELAP	North Carolina [3]	41
Georgia [1]	923	North Dakota	R-140
Idaho	TN00003	Ohio–VAP	CL0069
Illinois	200008	Oklahoma	9915
Indiana	C-TN-01	Oregon	TN200002
Iowa	364	Pennsylvania	68-02979
Kansas	E-10277	Rhode Island	LAO000356
Kentucky [1 6]	KY90010	South Carolina	84004002
Kentucky [2]	16	South Dakota	n/a
Louisiana	AI30792	Tennessee [1 4]	2006
Louisiana	LA018	Texas	T104704245-20-18
Maine	TN00003	Texas [5]	LAB0152
Maryland	324	Utah	TN000032021-11
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	110033
Minnesota	047-999-395	Washington	C847
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	998093910
Montana	CERT0086	Wyoming	A2LA
A2LA – ISO 17025	1461.01	AIHA-LAP,LLC EMLAP	100789
A2LA – ISO 17025 [5]	1461.02	DOD	1461.01
Canada	1461.01	USDA	P330-15-00234
EPA–Crypto	TN00003		

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

* Not all certifications held by the laboratory are applicable to the results reported in the attached report.

* Accreditation is only applicable to the test methods specified on each scope of accreditation held by Pace Analytical.

Resolute Environmental & Water Resources

1003 Weatherstone Parkway

Accounts Payable
1003 Weatherstone Pkwy., Ste. 320
Woodstock, GA 30188

Report to: Joe Booth

Email To: ~~tjordan~~ tommy.jordan@resolute joe.booth@resoluteenv.com;~~ken.brooke@resol~~

Project Description: Milledge Ave Phase III

City/State Collected: Athens GA

Please Circle: PT MT CT ET

Phone: 404-358-8469

Client Project #

Lab Project # RESENVWGA-UGA MAS

Collected by (print): Joe Booth

Site/Facility ID #

P.O. #

Collected by (signature):

Immediately Packed on Ice N ___ Y ✓

Rush? (Lab MUST Be Notified)
___ Same Day X Five Day
___ Next Day ___ 5 Day (Rad Only)
~~___~~ Two Day ___ 10 Day (Rad Only)
___ Three Day

Quote #

Date Results Needed

TAT

Pace Analytical® National Center for Testing & Innovation

12065 Lebanon Road Mt Juliet, TN 37122
Phone: 615-758-5858 Alt: 800-767-5859
Submitting a sample via this chain of custody constitutes acknowledgment and acceptance of the Pace Terms and Conditions found at: https://info.pacelabs.com/hubfs/pas-standard-terms.pdf

SDG # L1420526

J169

Acctnum: RESENVWGA

Template: T181712

Prelogin: P826768

PM: 526 Chris McCord

PB

Shipped Via: FedEX Ground

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	V8260LL14D 40mlAmb-HCl	V8260 TCL 40ml Amb-HCl								Remarks	Sample # (lab only)
-Ab	G	GW		10/19/21	1018	5	X	X									-01
H2	G	GW		10/19/21	1039	5	X	X									-02
P-8	G	GW		10/19/21	1102	5	X	X									-03
L7	G	GW		10/19/21	1125	4	X	X									-04
I8	G	GW		10/19/21	1212	5	X	X									-05
SW-D1	G	GW		10/19/21	0909	2	X										-06
SW-H8	G	GW		10/19/21	0913	2	X										-07
SW-L1	G	GW		10/19/21	0919	2	X										-08
	G																

* Matrix:
SS - Soil AIR - Air F - Filter
GW - Groundwater B - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other_____

Remarks: REPORT ONLY CHLOROFORM for 8260 TCL.
REPORT RL's only

pH _____ Temp _____
Flow _____ Other _____

Samples returned via: __ UPS ✓ FedEx __ Courier _____

Tracking # 951758578867

Sample Receipt Checklist
COC Seal Present/Intact: __NP ✓Y __N
COC Signed/Accurate: ✓Y __N
Bottles arrive intact: ✓Y __N
Correct bottles used: ✓Y __N
Sufficient volume sent: ✓Y __N
If Applicable
VOA Zero Headspace: ✓Y __N
Preservation Correct/Checked: __Y __N
RAD Screen <0.5 mR/hr: ✓Y __N

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Trip Blank Received: Yes / No HCl / MeoH TBR	If preservation required by Login: Date/Time
	10/19/21	1445			
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Temp: 1.7 °C Bottles Received: 30	
				1.7+0=1.7	
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)	Date: 10/20/21 Time: 900	Hold: / Condition: NCF / (OK)

J. PRB PILOT STUDY FIELD REPORT AND ANALYTICAL REPORTS

11 Princess Road, Suite A
Lawrenceville, New Jersey 08648
(609) 275-8500 phone
(609) 275-9608 fax

January 27, 2022

Resolute Environmental & Water Resources Consulting
1003 Weatherstone Parkway, Suite 320
Woodstock, Georgia 30188
Attention: Tommy Jordan

RE: Installation PRB Test and MFR Treatment Test
Milledge Avenue Site, Athens, Georgia
ISOTEC Proposal #802914

Dear Mr. Jordan:

On behalf of Resolute Environmental & Water Resources Consulting (Resolute), ISOTEC Remediation Technologies (ISOTEC) completed installation of the proposed permeable reactive barrier (PRB) pilot test and Modified Fenton's Reagent (MFR) treatment area borings and reagent injection December 9 through 14, 2021. Figures illustrating PRB and MFR injection point locations are attached for reference. The ISOTEC field daily summaries and event summary tables area are also attached. Potassium persulfate (KP) and sodium persulfate (SP) were supplied by Evonik/PeroxyChem, hydrated lime (HL) by Carmeuse, 30 percent hydrogen peroxide by Harcros, and catalysts and stabilizers by ISOTEC. Product Safety Data Sheets (SDS) for all chemical reagents used are attached.

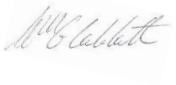
The PRB area received approximately 3,485 gallons of potassium persulfate (KP), sodium persulfate (SP), hydrated lime (HL) as slurry mixture with an approximate ratio (pounds/gallon) of 1.85 : 0.55 : 0.96, respectively. The slurry volume was distributed across 11 injection points (IPs) forming the PRB. Target treatment interval was approximately 19 to 46 feet below ground surface (bgs). Refusal was met at depths as shallow as 38 feet bgs using 2.25-inch standard ISOTEC slurry injection tooling using direct push technology. Subsequent attempts to reach target depths using smaller diameter 1.5-inch injection tooling did not achieve target depths. Information provided by the on-site driller indicated that refusal could be anticipated using DPT rods setups at the depths encountered, based on their previous site experience. Within the PRB, a former deep (~100+ feet bgs) boring approximately 3-inches in diameter immediately adjacent to injection locations IP5, IP6, and IP7 was a route of short-circuiting and frequent daylighting to surface of reagents while injecting in the vicinity, regardless of injection depth. Unused chemical reagents were stored on-site for anticipated future use per the direction of Resolute.

Injections in the MFR area were performed generally as planned. MFR, consisting of hydrogen peroxide that was diluted to 8% concentration with ISOTEC stabilizer added and ISOTEC catalyst solution was sequentially injected for a target volume of 18 gallons and 9 gallons per point respectively with potable chase water injected between reagents. Approximately 945 gallons of 8% MFR solution was injected into 33 IPs installed at shallow depths ranging from 0.5 to 9 feet bgs and two IPs installed adjacent to monitor well MW-9a over the 13 to 17 foot and 18-to-22-foot intervals, respectively. Approximately 27 gallons of MFR were applied to each location. Daylighting was occasionally observed via pre-existing boreholes, tree roots, rocks and other surface features. Point relocations from plan to adjust for inaccessibility due to trees, slope or other factors were made as necessary.

We appreciate the opportunity to work on this important project with Resolute and look forward to working together again. If you have any questions or need additional information, please feel free to contact Will Caldicott at (617) 964-0945 or myself at 470-925-6728.

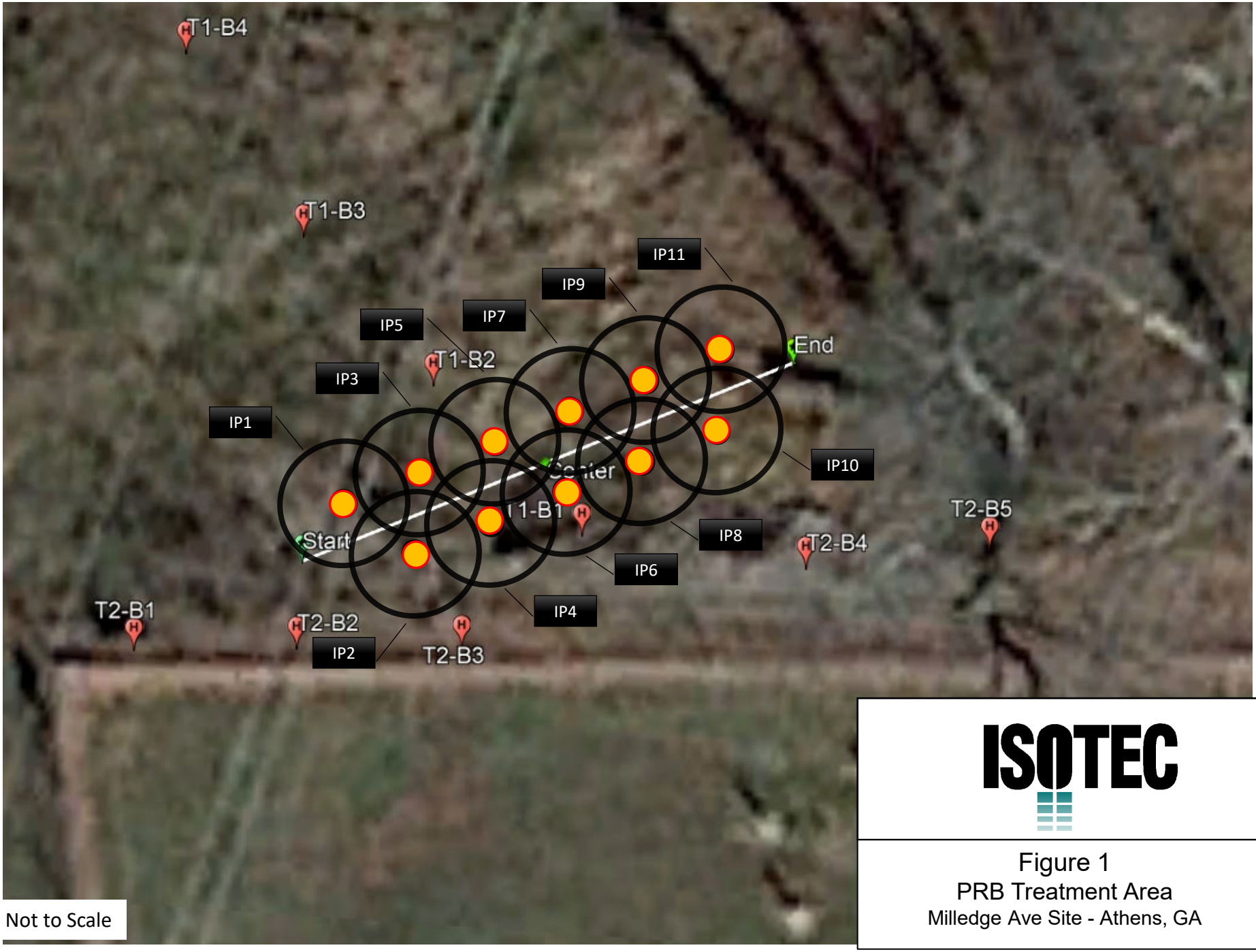
Very truly yours,
In-Situ Oxidative Technologies, Inc.

Scott Pittenger
Southeast Manager



Will Caldicott
Director of Remediation Technologies

Attachments
Figures
Field Summary Tables
Safety Data Sheets



ISOTEC

Figure 1
PRB Treatment Area
Milledge Ave Site - Athens, GA

N

0 5 10 20 30 40 Feet

B1 AB 2 RW-5 BC 1.5 B 3 RW-4 BC 2.5 RW-3 C 2 B 4 BC 3.5 D1 C 3 C 4 D 3 E 2 D 4 DE 3.5 E 3 F 2 E 4 F 3 G 2 F 4 RW-2 FG 3.5 G 3 MW-9b GH 2.5 H 2 G 4 GH 3.5 MW-9c MW-9a 9A S H 3 HI 2.5 9A D I 2 HI 3.5 H 4(H 4.5) I 3 I 4 RW-1 P-8

590 580

Legend

- Surface Water Sample
- MFR Injection Locations
- Approximate Saturated Ground Surface
- Bedrock Monitoring Well
- Monitoring Well
- Recovery Well
- Piezometer
- Elevation_Contours
- Perennial Stream
- Drainage Ditch/Ephemeral Stream
- Groundwater Treatment System

Resolute
Environmental & Water Resources Consulting

Woodstock, GA | January 2022

Milledge Avenue Site
Modified Fenton's Reagent Injection Location Map
Athens, GA

Figure 2

11 Princess Road, Suite A Lawrenceville, NJ 08648 609-275-8500			Treatment Program Daily Report								ISOTEC
Date:	12/7/2021		**Client:**	Resolute/UGA/Milledge Ave Site					**Personnel:**	MR, JT, BH, SP	
Project #:	802914		**Location:**	Athens, GA					**Weather:**	60	
Personnel	**Time**		**Mobilization**	**Safety**	**Equipment**	**Injection**	**Sampling**	**Equipment**	**Data**	**Lunch**	**Work**
	Start	**Stop**	**To/From Site**	**Meeting**	**Preparation**	**Time**	**Time**	**Breakdown**	**Entry**	**Break**	**Delay(s)**
Total Hours On Site:			10.00	**Total Injection Hours:**							

Major Work Activities Performed:

Mobilize to site; Document starting site conditions; Daily tailgate safety meeting; Setup all of injection equipment for the PRB area and MFR area. Discuss the injection process with client and driller.

Health and Safety Items Covered:

Injection pressures

11 Princess Road, Suite A Lawrenceville, NJ 08648 609-275-8500			Treatment Program Daily Report								ISOTEC
Date:	12/8/2021		**Client:**	Resolute/UGA/Milledge Ave Site					**Personnel:**	MR, JT, BH, SP	
Project #:	802914		**Location:**	Athens, GA					**Weather:**	45, light rain	
Personnel	**Time**		**Mobilization**	**Safety**	**Equipment**	**Injection**	**Sampling**	**Equipment**	**Data**	**Lunch**	**Work**
	Start	**Stop**	**To/From Site**	**Meeting**	**Preparation**	**Time**	**Time**	**Breakdown**	**Entry**	**Break**	**Delay(s)**
Total Hours On Site:			11.00	**Total Injection Hours:**							

Major Work Activities Performed:

Daily tailgate safety meeting; Received generator and compressor from Sunbelt. Setup injection equipment, received 7,078 lbs of Potassium Persulfate , 2,086 lbs of Sodium Persulfate, and 3,725 lbs of Hydrated Lime. Received 1,500 lbs 30% JHydrogen Peroxide. Due to the time we received the chemicals we decided it was best to start injections first thing in the morning. Mark MFR injecton locations.

Health and Safety Items Covered:

Slips and falls due to uneven surfaces within the treatment area.

11 Princess Road, Suite A Lawrenceville, NJ 08648 609-275-8500	Treatment Program Daily Report	ISOTEC

Date:	12/9/2021	Client:	Resolute/UGA/Milledge Ave Site	Personnel:	MR, JT, BH, SP
Project #:	802914	Location:	Athens, GA	Weather:	45

Personnel	Time		Mobilization	Safety	Equipment	Sampling	Equipment	Data	Lunch	Work
	Start	Stop	To/From Site	Meeting	Preparation	Time	Breakdown	Entry	Break	Delay(s)
Total Hours On Site:			11.00	Total Injection Hours:						

Major Work Activities Performed:

Daily tailgate safety meeting; Setup injection equipment, start preparing batches for injections into PRB. Inject a total of 1,435 gallons of KP/SP/LIME slurry. While performing injections at IP-05 and IP-07, frequent daylighting / short-circuiting were observed to an adjacent existing large diameter borehole located in the middle of the IP-05, -06, -07 injection cluster, but the daylighting was fairly minor. We were able to use some dirt on site to create small berms to prevent anything from moving outside of the treatment area.

Dosage Reagent (lbs/gal): KP (1.85) : SP (0.55) : Lime (0.96)

Health and Safety Items Covered:

Discuss chemicals characteristices, handling safety, line leak awareness & alerting

Date Completed	Injection Area	Injection Point ID	Screen Interval (ft bgs)	KP/SP/LIME Injection Start time	KP/SP/LIME Volume (gal)	Pump Pressure (psi)	Comments
9-Dec-21	PRB	IP-05	20	9:07	25	1000	Double Pump, 3/16" tip
9-Dec-21	PRB	IP-05	22	9:10	25	1000	
9-Dec-21	PRB	IP-05	24	9:12	25	1000	Daylighting at large diameter borehole, 3' away
9-Dec-21	PRB	IP-05	26	9:18	15	700	
9-Dec-21	PRB	IP-05	28	9:20	15	900	SAA
9-Dec-21	PRB	IP-05	30	9:24	15	900	SAA
9-Dec-21	PRB	IP-05	32	9:33	15	900	SAA
9-Dec-21	PRB	IP-05	34	9:40	20	900	SAA
9-Dec-21	PRB	IP-05	36	9:44	15	980	SAA
9-Dec-21	PRB	IP-05	38	9:52	15	980	SAA
9-Dec-21	PRB	IP-05	40	9:55	10	1000	SAA, Refusal at 40'
9-Dec-21	PRB	IP-11	19	10:57	25	1000	Double Pump, 3/16" tip
9-Dec-21	PRB	IP-11	21	10:59	25	1000	
9-Dec-21	PRB	IP-11	23	11:01	25	1000	
9-Dec-21	PRB	IP-11	25	11:02	25	1000	
9-Dec-21	PRB	IP-11	27	11:05	25	1000	
9-Dec-21	PRB	IP-11	29	11:07	25	1000	
9-Dec-21	PRB	IP-11	31	11:11	25	900	
9-Dec-21	PRB	IP-11	33	11:13	25	900	
9-Dec-21	PRB	IP-11	35	11:17	25	900	
9-Dec-21	PRB	IP-11	37	11:19	25	960	
9-Dec-21	PRB	IP-11	39	11:23	25	960	
9-Dec-21	PRB	IP-11	41	11:25	25	980	
9-Dec-21	PRB	IP-11	43	11:28	25	980	
9-Dec-21	PRB	IP-11	45	11:30	25	980	
9-Dec-21	PRB	IP-08	20	12:29	25	900	Double Pump, 3/16" tip
9-Dec-21	PRB	IP-08	22	12:32	25	1000	
9-Dec-21	PRB	IP-08	24	12:33	25	1100	
9-Dec-21	PRB	IP-08	26	12:35	25	1000	
9-Dec-21	PRB	IP-08	28	12:37	25	1000	
9-Dec-21	PRB	IP-08	30	12:39	25	1000	Daylighting noted near upgradient well, 4' away
9-Dec-21	PRB	IP-08	32	12:48	25	800	SAA
9-Dec-21	PRB	IP-08	34	12:52	25	1000	SAA
9-Dec-21	PRB	IP-08	36	12:59	25	600	SAA
9-Dec-21	PRB	IP-08	38	13:03	25	900	SAA, Refusal at 38'
9-Dec-21	PRB	IP-07	19	14:58	25	400	Single pump, 5/32" tip
9-Dec-21	PRB	IP-07	21	15:01	25	350	
9-Dec-21	PRB	IP-07	23	15:04	25	350	

11 Princess Road, Suite A Lawrenceville, NJ 08648 609-275-8500	Treatment Program Daily Report	ISOTEC

Date:	12/9/2021	Client:	Resolute/UGA/Milledge Ave Site	Personnel:	MR, JT, BH, SP
Project #:	802914	Location:	Athens, GA	Weather:	45

Personnel	Time		Mobilization	Safety	Equipment	Sampling	Equipment	Data	Lunch	Work
	Start	Stop	To/From Site	Meeting	Preparation	Time	Breakdown	Entry	Break	Delay(s)
Total Hours On Site:			11.00	Total Injection Hours:						

Major Work Activities Performed:

Daily tailgate safety meeting; Setup injection equipment, start preparing batches for injections into PRB. Inject a total of 1,435 gallons of KP/SP/LIME slurry. While performing injections at IP-05 and IP-07, frequent daylighting / short-circuiting were observed to an adjacent existing large diameter borehole located in the middle of the IP-05, -06, -07 injection cluster, but the daylighting was fairly minor. We were able to use some dirt on site to create small berms to prevent anything from moving outside of the treatment area.

Dosage Reagent (lbs/gal): KP (1.85) : SP (0.55) : Lime (0.96)

Health and Safety Items Covered:

Discuss chemicals characteristices, handling safety, line leak awareness & alerting

Date Completed	Injection Area	Injection Point ID	Screen Interval (ft bgs)	KP/SP/LIME Injection Start time	KP/SP/LIME Volume (gal)	Pump Pressure (psi)	Comments
9-Dec-21	PRB	IP-07	25	15:06	25	360	
9-Dec-21	PRB	IP-07	27	15:12	25	350	Daylighting from large diameter borehole
9-Dec-21	PRB	IP-07	29				Skipped interval due to daylighting
9-Dec-21	PRB	IP-07	31	15:18	25	360	Daylighting from large diameter borehole
9-Dec-21	PRB	IP-07	33	15:23	15	320	Stopped due to daylighting issues
9-Dec-21	PRB	IP-10	20	16:23	25	300	
9-Dec-21	PRB	IP-10	22	16:25	25	400	
9-Dec-21	PRB	IP-10	24	16:27	25	400	
9-Dec-21	PRB	IP-10	26	16:29	25	500	
9-Dec-21	PRB	IP-10	28	16:31	25	400	
9-Dec-21	PRB	IP-10	30	16:33	25	400	
9-Dec-21	PRB	IP-10	32	16:37	25	400	
9-Dec-21	PRB	IP-10	34	16:39	25	400	
9-Dec-21	PRB	IP-10	36	16:44	25	400	
9-Dec-21	PRB	IP-10	38	16:47	25	400	
9-Dec-21	PRB	IP-10	40	16:50	25	400	
9-Dec-21	PRB	IP-10	42	16:55	25	400	
9-Dec-21	PRB	IP-01	19	17:46	25	400	
9-Dec-21	PRB	IP-01	21	17:49	25	400	
9-Dec-21	PRB	IP-01	23	17:51	25	400	
9-Dec-21	PRB	IP-01	25	17:53	25	600	
9-Dec-21	PRB	IP-01	27	17:56	25	500	
9-Dec-21	PRB	IP-01	29	17:58	25	400	
9-Dec-21	PRB	IP-01	31	18:03	25	400	To dark to continue injections.
					1,435		

KP = Sodium Persulfate
SP = Potassium Persulfate
LIME = Hydrated Lime

ft = Feet
bgs = Below Ground Surface
min = Minutes

11 Princess Road, Suite A Lawrenceville, NJ 08648 609-275-8500	Treatment Program Daily Report	ISOTEC

Date:	12/10/2021	Client:	Resolute/UGA/Milledge Ave Site	Personnel:	MR, JT, BH
Project #:	802914	Location:	Athens, GA	Weather:	42

Personnel	Time		Mobilization	Safety	Equipment	Sampling	Equipment	Data	Lunch	Work
	Start	Stop	To/From Site	Meeting	Preparation	Time	Breakdown	Entry	Break	Delay(s)
Total Hours On Site:			10.00	Total Injection Hours:						

Major Work Activities Performed:

Daily tailgate safety meeting; Setup injection equipment, start preparing batches for injections into PRB. Inject a total of 1,280 gallons of KP/SP/LIME slurry. Minor daylighting was noted while performing injections into the PRB. Any daylighting that occurred contained using small dirt berms to prevent anything from moving outside of the treatment area. At the end of the day we broke down all of the PRB injection equipment and stored in trailer for the weekend while we perform the MFR injections into a different area of the site over the weekend. PRB injections will continue on Tuesday 12/14 when Mark Ratner returns to the site.

Dosage Reagent (lbs/gal): KP (1.85) : SP (0.55) : Lime (0.96)

Health and Safety Items Covered:

High pressure injections

Date Completed	Injection Area	Injection Point ID	Screen Interval (ft bgs)	KP/SP/LIME Injection Start time	KP/SP/LIME Volume (gal)	Pump Pressure (psi)	Comments
10-Dec-21	PRB	IP-01	33	8:26	25	350	
10-Dec-21	PRB	IP-01	35	8:27	25	600	
10-Dec-21	PRB	IP-01	37	8:30	25	300	
10-Dec-21	PRB	IP-01	39	8:33	25	300	
10-Dec-21	PRB	IP-01	41	8:37	25	300	
10-Dec-21	PRB	IP-01	43	8:40	25	300	
10-Dec-21	PRB	IP-01	45	8:45	25	300	
10-Dec-21	PRB	IP-04	20	9:50	25	300	
10-Dec-21	PRB	IP-04	22	9:54	25	300	Daylighting noted from large diameter borehole
10-Dec-21	PRB	IP-04	24	9:59	25	300	SAA
10-Dec-21	PRB	IP-04	26	10:02	15	300	SAA
10-Dec-21	PRB	IP-04	28	10:07	15	300	SAA, Stopped due to daylighting
10-Dec-21	PRB	IP-09	19	11:42	25	300	
10-Dec-21	PRB	IP-09	21	11:45	25	325	
10-Dec-21	PRB	IP-09	23	11:47	25	500	
10-Dec-21	PRB	IP-09	25	11:49	25	475	
10-Dec-21	PRB	IP-09	27	11:51	25	525	
10-Dec-21	PRB	IP-09	29	11:53	25	375	
10-Dec-21	PRB	IP-09	31	11:56	25	375	
10-Dec-21	PRB	IP-09	33	11:58	25	400	
10-Dec-21	PRB	IP-09	35	12:00	25	400	
10-Dec-21	PRB	IP-09	37	12:03	25	400	
10-Dec-21	PRB	IP-09	39	12:05	25	500	
10-Dec-21	PRB	IP-09	41	12:10	25	400	
10-Dec-21	PRB	IP-09	43	12:16	50	400	
10-Dec-21	PRB	IP-03	19	14:00	25	300	
10-Dec-21	PRB	IP-03	21	14:02	25	325	
10-Dec-21	PRB	IP-03	23	14:05	25	400	
10-Dec-21	PRB	IP-03	25	14:08	25	400	
10-Dec-21	PRB	IP-03	27	14:11	25	400	Daylighting noted from down gradient well
10-Dec-21	PRB	IP-03	29	14:13	25	400	
10-Dec-21	PRB	IP-03	31	14:19	25	380	
10-Dec-21	PRB	IP-03	33	14:21	25	500	
10-Dec-21	PRB	IP-03	35	14:24	25	400	
10-Dec-21	PRB	IP-03	37	14:31	25	400	
10-Dec-21	PRB	IP-03	39	14:34	25	400	minor daylighting noted 15' away
10-Dec-21	PRB	IP-03	41	14:42	25	400	Refusal at 41'
10-Dec-21	PRB	IP-02	20	15:45	25	400	
10-Dec-21	PRB	IP-02	22	15:48	25	400	

11 Princess Road, Suite A Lawrenceville, NJ 08648 609-275-8500	Treatment Program Daily Report	ISOTEC

Date:	12/10/2021	Client:	Resolute/UGA/Milledge Ave Site	Personnel:	MR, JT, BH
Project #:	802914	Location:	Athens, GA	Weather:	42

Personnel	Time		Mobilization	Safety	Equipment	Sampling	Equipment	Data	Lunch	Work
	Start	Stop	To/From Site	Meeting	Preparation	Time	Breakdown	Entry	Break	Delay(s)
Total Hours On Site:			10.00	Total Injection Hours:						

Major Work Activities Performed:

Daily tailgate safety meeting; Setup injection equipment, start preparing batches for injections into PRB. Inject a total of 1,280 gallons of KP/SP/LIME slurry. Minor daylighting was noted while performing injections into the PRB. Any daylighting that occurred contained using small dirt berms to prevent anything from moving outside of the treatment area. At the end of the day we broke down all of the PRB injection equipment and stored in trailer for the weekend while we perform the MFR injections into a different area of the site over the weekend. PRB injections will continue on Tuesday 12/14 when Mark Ratner returns to the site.

Dosage Reagent (lbs/gal): KP (1.85) : SP (0.55) : Lime (0.96)

Health and Safety Items Covered:

High pressure injections

Date Completed	Injection Area	Injection Point ID	Screen Interval (ft bgs)	KP/SP/LIME Injection Start time	KP/SP/LIME Volume (gal)	Pump Pressure (psi)	Comments
10-Dec-21	PRB	IP-02	24	15:53	25	400	
10-Dec-21	PRB	IP-02	26	15:55	25	500	
10-Dec-21	PRB	IP-02	28	15:58	25	350	
10-Dec-21	PRB	IP-02	30	16:05	25	400	
10-Dec-21	PRB	IP-02	32	16:08	25	480	
10-Dec-21	PRB	IP-02	34	16:10	25	480	
10-Dec-21	PRB	IP-02	36	16:11	25	480	
10-Dec-21	PRB	IP-02	38	16:13	25	480	
10-Dec-21	PRB	IP-02	40	16:15	25	480	
10-Dec-21	PRB	IP-02	42	16:19	25	450	
10-Dec-21	PRB	IP-02	44	16:25	25	400	
10-Dec-21	PRB	IP-02	46	16:33	25	420	
					1,280		

KP = Sodium Persulfate
SP = Potassium Persulfate
LIME = Hydrated Lime

ft = Feet
bgs = Below Ground Surface
min = Minutes

11 Princess Road, Suite A Lawrenceville, NJ 08648 609-275-8500	Treatment Program Daily Report	ISOTEC

Date:	12/11/2021	Client:	Resolute/UGA/Milledge Ave Site	Personnel:	JT, BH
Project #:	802914	Location:	Athens, GA	Weather:	52

Personnel	Time		Mobilization	Safety	Equipment	Injection	Sampling	Equipment	Data	Lunch	Work
	Start	Stop	To/From Site	Meeting	Preparation	Time	Time	Breakdown	Entry	Break	Delay(s)
Total Hours On Site:				Total Injection Hours:							

Major Work Activities Performed:

Daily tailgate H&S meeting, set up injection and chemical preparation equipment, mix chemicals for injection, inject reagents into temporary direct push locations. Inject a total of 270 gallons of MFR.

MFR volume per IP = 18 gals of 8% hydrogen peroxide : 9 gals ISOTEC catalyst

Health and Safety Items Covered:

Slips and falls

Date Completed	Injection Point ID	Screen Interval (ft bgs)	Catalyst Injection Time (mins)	Catalyst Volume (gal)	Catalyst Flow Rate (gpm)	H_2O_2 Injection Time (mins)	H_2O_2 Volume (gal)	H_2O_2 Flow Rate (gpm)	Well Head Pressures (psi)	Comments
11-Dec-21	H-02	4-8'				12	9	0.75	4	Minor DL from old borehole
11-Dec-21	H-02	4-8'	15	9	0.60				4	
11-Dec-21	H-02	4-8'				13	9	0.69	4	
11-Dec-21	B-01	1-5'				6	9	1.50	2	DL noted around B-01
11-Dec-21	B-01	1-5'	18	9	0.50				2	
11-Dec-21	B-01	1-5'				22	9	0.41	2	
11-Dec-21	GH-3-5	5-9'				9	9	1.00	18	
11-Dec-21	GH-3-5	5-9'	13	9	0.69				6	
11-Dec-21	GH-3-5	5-9'				17	9	0.53	6	
11-Dec-21	BC-1-5	1-5'				20	9	0.45	2	
11-Dec-21	BC-1-5	1-5'	25	9	0.36				2	
11-Dec-21	BC-1-5	1-5'				16	9	0.56	2	Minor DL around IP
11-Dec-21	GH-2-5	4-8'				10	9	0.90	16	
11-Dec-21	GH-2-5	4-8'	12	9	0.75				10	
11-Dec-21	GH-2-5	4-8'				14	9	0.64	10	
11-Dec-21	C-02	3-7'				7	9	1.29	6	
11-Dec-21	C-02	3-7'	10	9	0.90				6	
11-Dec-21	C-02	3-7'				9	9	1.00	6	
11-Dec-21	H-03	4-8'				14	9	0.64	20	
11-Dec-21	H-03	4-8'	11	9	0.82				14	
11-Dec-21	H-03	4-8'				12	9	0.75	16	DL noted from GH-3-5
11-Dec-21	BC-2-5	3-7'				8	9	1.13	4	DL noted 2' east at ground level
11-Dec-21	BC-2-5	3-7'	13	9	0.69				4	
11-Dec-21	BC-2-5	3-7'				13	9	0.69	4	
11-Dec-21	C-03	3-7'				8	9	1.13	2	
11-Dec-21	C-03	3-7'	7	9	1.29				2	
11-Dec-21	C-03	3-7'				12	9	0.75	2	
11-Dec-21	H-4-5	5-9'				12	9	0.75	4	
11-Dec-21	H-4-5	5-9'	5	9	1.80				4	
11-Dec-21	H-4-5	5-9'				7	9	1.29	4	
Totals					0.84			0.84	Injection Total:	270

H_2O_2 = hydrogen peroxide
Catalyst = ISOTEC Catalyst-4260
ft = feet
bgs = below ground surface

gal = gallons
gpm = gallons per minute
psi = pounds per square inch
mins = minutes

DL = daylighting
IP= Injection point

11 Princess Road, Suite A
Lawrenceville, NJ 08648
609-275-8500

Treatment Program Daily Report

ISOTEC

Date:	12/12/2021	**Client:**	Resolute/UGA/Milledge Ave Site
Project #:	802914	**Location:**	Athens, GA
Personnel:	JT, BH	**Weather:**	57 Sunny

Personnel	Time		Mobilization To/From Site	Safety Meeting	Equipment Preparation	Injection Time	Sampling Time	Equipment Breakdown	Data Entry	Lunch Break	Work Delay(s)
	Start	Stop									

Total Hours On Site: | Total Injection Hours:

Major Work Activities Performed:

Daily tailgate H&S meeting, set up injection and chemical preparation equipment, mix chemicals for injection, inject reagents into temporary direct push locations. Inject a total of 432 gallons of MFR. F-02 and E-02 was hand augered and injected on through PVC peizometer stick due to inaccessibility for the drill rig.

MFR volume per IP = 18 gals of 8% hydrogen peroxide : 9 gals ISOTEC catalyst

Health and Safety Items Covered:

Staying hydrated

Date Completed	Injection Point ID	Screen Interval (ft bgs)	Catalyst Injection Time (mins)	Catalyst Volume (gal)	Catalyst Flow Rate (gpm)	H_2O_2 Injection Time (mins)	H_2O_2 Volume (gal)	H_2O_2 Flow Rate (gpm)	Well Head Pressures (psi)	Comments
12-Dec-21	G-04	5.5-9.5				13	9	0.69	20	
12-Dec-21	G-04	5.5-9.5	6	9	1.50				16	
12-Dec-21	G-04	5.5-9.5				9	9	1.00	16	
12-Dec-21	G-03	4.5-8.5				12	9	0.75	16	
12-Dec-21	G-03	4.5-8.5	4	9	2.25				10	
12-Dec-21	G-03	4.5-8.5				5	9	1.80	10	
12-Dec-21	FG-3-5	4.5-8.5				11	9	0.82	18	
12-Dec-21	FG-3-5	4.5-8.5	8	9	1.13				14	
12-Dec-21	FG-3-5	4.5-8.5				7	9	1.29	14	daylighting noted 2' west
12-Dec-21	B-03	3-7'				7	9	1.29	2	minor DL around IP
12-Dec-21	B-03	3-7'	8	9	1.13				2	
12-Dec-21	B-03	3-7'				12	9	0.75	4	
12-Dec-21	B-04	3-7'				10	9	0.90	6	
12-Dec-21	B-04	3-7'	16	9	0.56				6	
12-Dec-21	B-04	3-7'				20	9	0.45	6	
12-Dec-21	BC-3-5	3-7'				15	9	0.60	6	
12-Dec-21	BC-3-5	3-7'	6	9	1.50				6	
12-Dec-21	BC-3-5	3-7'				6	9	1.50	6	
12-Dec-21	AB-02	3-7'				17	9	0.53	4	minor DL around IP
12-Dec-21	AB-02	3-7'	7	9	1.29				4	
12-Dec-21	AB-02	3-7'				10	9	0.90	4	
12-Dec-21	F-02	.5-4.5'				10	9	0.90	2	Hand-auger temp PVC-piezometer
12-Dec-21	F-02	.5-4.5'	3	9	3.00				2	injection pt.
12-Dec-21	F-02	.5-4.5'				7	9	1.29	2	DL noted near source seep
12-Dec-21	F-03	5-9'				17	9	0.53	8	
12-Dec-21	F-03	5-9'	10	9	0.90				12	
12-Dec-21	F-03	5-9'				10	9	0.90	12	
12-Dec-21	DE-3-5	5-9'				10	9	0.90	4	
12-Dec-21	DE-3-5	5-9'	9	9	1.00				2	
12-Dec-21	DE-3-5	5-9'				8	9	1.13	2	
12-Dec-21	D-04	5-9'				6	9	1.50	2	
12-Dec-21	D-04	5-9'	6	9	1.50				2	
12-Dec-21	D-04	5-9'				6	9	1.50	2	
12-Dec-21	E-03	4.5-8.5'				10	9	0.90	4	DL noted around E-4
12-Dec-21	E-03	4.5-8.5'	6	9	1.50				4	
12-Dec-21	E-03	4.5-8.5'				10	9	0.90	2	
12-Dec-21	F-04	5.5-9.5'				20	9	0.45	26	
12-Dec-21	F-04	5.5-9.5'	20	9	0.45				16	
12-Dec-21	F-04	5.5-9.5'				8	9	1.13	22	DL noted 3' east
12-Dec-21	E-02	0.5-4.5'				15	9	0.60	2	
12-Dec-21	E-02	0.5-4.5'	10	9	0.90				2	
12-Dec-21	E-02	0.5-4.5'				8	9	1.13	2	DL noted 1' west
12-Dec-21	D-03	3-7'				6	9	1.50	2	DL noted @ gw level 3' west
12-Dec-21	D-03	3-7'	4	9	2.25				2	towards seepage area
12-Dec-21	D-03	3-7'				5	9	1.80	2	
12-Dec-21	C-04	3-7'				9	9	1.00	2	
12-Dec-21	C-04	3-7'	6	9	1.50				2	
12-Dec-21	C-04	3-7'				12	9	0.75	2	
Totals					1.40			1.00	Injection Total:	432

H_2O_2 = hydrogen peroxide
Catalyst = ISOTEC Catalyst-4260
ft = feet
bgs = below ground surface

gal = gallons
gpm = gallons per minute
psi = pounds per square inch
mins = minutes

DL = daylighting
IP= Injection point

11 Princess Road, Suite A Lawrenceville, NJ 08648 609-275-8500	**Treatment Program Daily Report**	ISOTEC

Date:	12/13/2021	Client:	Resolute/UGA/Milledge Ave Site	Personnel:	JT, BH
Project #:	802914	Location:	Athens, GA	Weather:	28-35

Personnel	Time		Mobilization	Safety	Equipment	Injection	Sampling	Equipment	Data	Lunch	Work
	Start	Stop	To/From Site	Meeting	Preparation	Time	Time	Breakdown	Entry	Break	Delay(s)
Total Hours On Site:				Total Injection Hours:							

Major Work Activities Performed:

Daily tailgate H&S meeting, set up injection and chemical preparation equipment, mix chemicals for injection, inject reagents into temporary direct push locations. Inject a total of 243 gallons of MFR.

MFR volume per IP = 18 gals of 8% hydrogen peroxide : 9 gals ISOTEC catalyst

Health and Safety Items Covered:

Freezing conditions

Date Completed	Injection Point ID	Screen Interval (ft bgs)	Catalyst Injection Time (mins)	Catalyst Volume (gal)	Catalyst Flow Rate (gpm)	H_2O_2 Injection Time (mins)	H_2O_2 Volume (gal)	H_2O_2 Flow Rate (gpm)	Well Head Pressures (psi)	Comments
13-Dec-21	E-04	6-10'				9	9	1.00	2	Minor DL from annulus (plugged bentonite)
13-Dec-21	E-04	6-10'	9	9	1.00				4	
13-Dec-21	E-04	6-10'				8	9	1.13	8	
13-Dec-21	G-02	2-6'				15	9	0.60	2	Minor DL from adjacent old boring (plugged bentonite)
13-Dec-21	G-02	2-6'	10	9	0.90				2	
13-Dec-21	G-02	2-6'				8	9	1.13	2	
13-Dec-21	I-02	3-7'				7	9	1.29	2	
13-Dec-21	I-02	3-7'	9	9	1.00				2	
13-Dec-21	I-02	3-7'				3	9	3.00	2	
13-Dec-21	HI-3-5	4.5-8.5'				4	9	2.25	14	DL from H-4; pause inj, plug H-4 additional bentonite
13-Dec-21	HI-3-5	4.5-8.5'	26	9	0.35				10	
13-Dec-21	HI-3-5	4.5-8.5'				10	9	0.90	10	
13-Dec-21	I-03	4.5-8.5'				13	9	0.69	14	DL noted 17' west towards source seep
13-Dec-21	I-03	4.5-8.5'	10	9	0.90				14	
13-Dec-21	I-03	4.5-8.5'				10	9	0.90	14	
13-Dec-21	HI-2-5	4-8'				11	9	0.82	10	DL downgradient of IP location at old boring (plugged bentonite)
13-Dec-21	HI-2-5	4-8'	15	9	0.60				4	
13-Dec-21	HI-2-5	4-8'				5	9	1.80	8	
13-Dec-21	I-04	5-9'				15	9	0.60	12	
13-Dec-21	I-04	5-9'	20	9	0.45				12	
13-Dec-21	I-04	5-9'				5	9	1.80	12	
13-Dec-21	AD-09	18-22'				11	9	0.82	24	
13-Dec-21	AD-09	18-22'	14	9	0.64				16	
13-Dec-21	AD-09	18-22'				16	9	0.56	18	
13-Dec-21	AS-09	13-17'				14	9	0.64	34	
13-Dec-21	AS-09	13-17'	14	9	0.64				34	
13-Dec-21	AS-09	13-17'				15	9	0.60	36	DL 3' west towards MW-9a
Totals					0.72			1.14	Injection Total:	243

H_2O_2 = hydrogen peroxide
Catalyst = ISOTEC Catalyst-4260
ft = feet
bgs = below ground surface

gal = gallons
gpm = gallons per minute
psi = pounds per square inch
mins = minutes

DL = daylighting
IP= Injection point

11 Princess Road, Suite A Lawrenceville, NJ 08648 609-275-8500	Treatment Program Daily Report	ISOTEC

Date:	12/14/2021	Client:	Resolute/UGA/Milledge Ave Site	Personnel:	MR, JT, BH
Project #:	802914	Location:	Athens, GA	Weather:	60

Personnel	Time		Mobilization	Safety	Equipment	Sampling	Equipment	Data	Lunch	Work
	Start	Stop	To/From Site	Meeting	Preparation	Time	Breakdown	Entry	Break	Delay(s)
Total Hours On Site:			10.00	Total Injection Hours:						

Major Work Activities Performed:

Daily tailgate safety meeting; Setup injection equipment, start preparing batches for injections into PRB. Inject a total of 770 gallons of KP/SP/LIME slurry. The objective of today was to go back to previous injection points where met refusal using 2.25" tooling, and use 1.5" tooling with goal of reaching the target depth of 45-46' bgs. We were able to get a little deeper with the smaller tooling but we were not able to reach target depth at all locations. After discussing the overall objective with Tommy, we as a team decided it was best to stop injections into the PRB area and store the remaining chemicals at the site for furture use. Reagent stored was 605 lbs KP (11 bags), 165.3 lbs SP (3 bags), and 350 lbs LIME (7 bags).

Dosage Reagent (lbs/gal): KP (1.85) : SP (0.55) : Lime (0.96)

Health and Safety Items Covered:

Staying hydrated

Date Completed	Injection Area	Injection Point ID	Screen Interval (ft bgs)	KP/SP/LIME Injection Start time	KP/SP/LIME Volume (gal)	Pump Pressure (psi)	Comments
14-Dec-21	PRB	IP-06	36	9:32	35	300	
14-Dec-21	PRB	IP-06	34	9:37	35	300	
14-Dec-21	PRB	IP-06	32	9:39	35	300	
14-Dec-21	PRB	IP-06	30	9:42	35	300	
14-Dec-21	PRB	IP-06	28	9:46	30	300	
14-Dec-21	PRB	IP-06	26	9:49	25	300	
14-Dec-21	PRB	IP-06	24	9:51	25	300	
14-Dec-21	PRB	IP-06	22	9:56	25	300	
14-Dec-21	PRB	IP-06	20	9:59	25	300	
14-Dec-21	PRB	IP-07	45	11:09	35	400	
14-Dec-21	PRB	IP-07	43	11:14	35	400	
14-Dec-21	PRB	IP-07	41	11:17	35	350	
14-Dec-21	PRB	IP-07	39	11:20	35	340	
14-Dec-21	PRB	IP-07	37	11:25	35	320	
14-Dec-21	PRB	IP-07	35	11:26	35	320	
14-Dec-21	PRB	IP-07	33	11:28	35	320	
14-Dec-21	PRB	IP-04	46	12:57	30	320	
14-Dec-21	PRB	IP-04	44	13:00	30	320	
14-Dec-21	PRB	IP-04	42	13:03	30	320	minor daylighting 3-4' north
14-Dec-21	PRB	IP-04	40	13:11	15	320	SAA
14-Dec-21	PRB	IP-04	38	13:15	15	320	SAA
14-Dec-21	PRB	IP-04	36	13:23	10	320	SAA
14-Dec-21	PRB	IP-04	34	13:29	10	320	SAA
14-Dec-21	PRB	IP-04	32	13:35	10	320	SAA
14-Dec-21	PRB	IP-04	30	13:38	10	320	SAA
14-Dec-21	PRB	IP-04	28	13:39	10	320	SAA
14-Dec-21	PRB	IP-04	26	13:43	10	320	SAA
14-Dec-21	PRB	IP-08	40	14:24	25	320	daylighting 10' northeast
14-Dec-21	PRB	IP-08	38	14:28	25	320	
14-Dec-21	PRB	IP-08	36	14:33	25	320	
					770		

KP = Sodium Persulfate
SP = Potassium Persulfate
LIME = Hydrated Lime

ft = Feet
bgs = Below Ground Surface
min = Minutes

Pilot Study Treatment Program
Master Injection List
Athens, GA

Date Completed	Injection Area	Injection Point ID	Screen Interval (ft bgs)	Start Time	KP/SP/LIME Volume (gal)	Well Head Pressure (psi)	Comments
9-Dec-21	PRB	IP-05	20	9:07	25	1000	Double Pump, 3/16" tip
9-Dec-21	PRB	IP-05	22	9:10	25	1000	
9-Dec-21	PRB	IP-05	24	9:12	25	1000	DL noted for boring location 3' away
9-Dec-21	PRB	IP-05	26	9:18	15	700	SAA
9-Dec-21	PRB	IP-05	28	9:20	15	900	SAA
9-Dec-21	PRB	IP-05	30	9:24	15	900	SAA
9-Dec-21	PRB	IP-05	32	9:33	15	900	SAA
9-Dec-21	PRB	IP-05	34	9:40	20	900	SAA
9-Dec-21	PRB	IP-05	36	9:44	15	980	SAA
9-Dec-21	PRB	IP-05	38	9:52	15	980	SAA
9-Dec-21	PRB	IP-05	40	9:55	10	1000	SAA, Refusal at 40'
9-Dec-21	PRB	IP-11	19	10:57	25	1000	Double Pump, 3/16" tip
9-Dec-21	PRB	IP-11	21	10:59	25	1000	
9-Dec-21	PRB	IP-11	23	11:01	25	1000	
9-Dec-21	PRB	IP-11	25	11:02	25	1000	
9-Dec-21	PRB	IP-11	27	11:05	25	1000	
9-Dec-21	PRB	IP-11	29	11:07	25	1000	
9-Dec-21	PRB	IP-11	31	11:11	25	900	
9-Dec-21	PRB	IP-11	33	11:13	25	900	
9-Dec-21	PRB	IP-11	35	11:17	25	900	
9-Dec-21	PRB	IP-11	37	11:19	25	960	
9-Dec-21	PRB	IP-11	39	11:23	25	960	
9-Dec-21	PRB	IP-11	41	11:25	25	980	
9-Dec-21	PRB	IP-11	43	11:28	25	980	
9-Dec-21	PRB	IP-11	45	11:30	25	980	
9-Dec-21	PRB	IP-08	20	12:29	25	900	Double Pump, 3/16" tip
9-Dec-21	PRB	IP-08	22	12:32	25	1000	
9-Dec-21	PRB	IP-08	24	12:33	25	1100	
9-Dec-21	PRB	IP-08	26	12:35	25	1000	

Pilot Study Treatment Program
Master Injection List
Athens, GA

Date Completed	Injection Area	Injection Point ID	Screen Interval (ft bgs)	Start Time	KP/SP/LIME Volume (gal)	Well Head Pressure (psi)	Comments
9-Dec-21	PRB	IP-08	28	12:37	25	1000	
9-Dec-21	PRB	IP-08	30	12:39	25	1000	DL noted near upgradient well, 4' away
9-Dec-21	PRB	IP-08	32	12:48	25	800	SAA
9-Dec-21	PRB	IP-08	34	12:52	25	1000	SAA
9-Dec-21	PRB	IP-08	36	12:59	25	600	SAA
9-Dec-21	PRB	IP-08	38	13:03	25	900	SAA, Refusal at 38'
9-Dec-21	PRB	IP-07	19	14:58	25	400	Single pump, 5/32" tip
9-Dec-21	PRB	IP-07	21	15:01	25	350	
9-Dec-21	PRB	IP-07	23	15:04	25	350	
9-Dec-21	PRB	IP-07	25	15:06	25	360	
9-Dec-21	PRB	IP-07	27	15:12	25	350	DL from large borehole
9-Dec-21	PRB	IP-07	29				Skipped interval due to DL
9-Dec-21	PRB	IP-07	31	15:18	25	360	DL from large borehole
9-Dec-21	PRB	IP-07	33	15:23	15	320	Stopped due to DL issues
9-Dec-21	PRB	IP-10	20	16:23	25	300	
9-Dec-21	PRB	IP-10	22	16:25	25	400	
9-Dec-21	PRB	IP-10	24	16:27	25	400	
9-Dec-21	PRB	IP-10	26	16:29	25	500	
9-Dec-21	PRB	IP-10	28	16:31	25	400	
9-Dec-21	PRB	IP-10	30	16:33	25	400	
9-Dec-21	PRB	IP-10	32	16:37	25	400	
9-Dec-21	PRB	IP-10	34	16:39	25	400	
9-Dec-21	PRB	IP-10	36	16:44	25	400	
9-Dec-21	PRB	IP-10	38	16:47	25	400	
9-Dec-21	PRB	IP-10	40	16:50	25	400	
9-Dec-21	PRB	IP-10	42	16:55	25	400	
9-Dec-21	PRB	IP-01	19	17:46	25	400	
9-Dec-21	PRB	IP-01	21	17:49	25	400	
9-Dec-21	PRB	IP-01	23	17:51	25	400	
9-Dec-21	PRB	IP-01	25	17:53	25	600	
9-Dec-21	PRB	IP-01	27	17:56	25	500	
9-Dec-21	PRB	IP-01	29	17:58	25	400	

Pilot Study Treatment Program
Master Injection List
Athens, GA

Date Completed	Injection Area	Injection Point ID	Screen Interval (ft bgs)	Start Time	KP/SP/LIME Volume (gal)	Well Head Pressure (psi)	Comments
9-Dec-21	PRB	IP-01	31	18:03	25	400	To dark to continue injections
10-Dec-21	PRB	IP-01	33	8:26	25	350	
10-Dec-21	PRB	IP-01	35	8:27	25	600	
10-Dec-21	PRB	IP-01	37	8:30	25	300	
10-Dec-21	PRB	IP-01	39	8:33	25	300	
10-Dec-21	PRB	IP-01	41	8:37	25	300	
10-Dec-21	PRB	IP-01	43	8:40	25	300	
10-Dec-21	PRB	IP-01	45	8:45	25	300	
10-Dec-21	PRB	IP-04	20	9:50	25	300	
10-Dec-21	PRB	IP-04	22	9:54	25	300	DL noted from deep bore hole
10-Dec-21	PRB	IP-04	24	9:59	25	300	SAA
10-Dec-21	PRB	IP-04	26	10:02	15	300	SAA
10-Dec-21	PRB	IP-04	28	10:07	15	300	SAA, Stopped due to DL
10-Dec-21	PRB	IP-09	19	11:42	25	300	
10-Dec-21	PRB	IP-09	21	11:45	25	325	
10-Dec-21	PRB	IP-09	23	11:47	25	500	
10-Dec-21	PRB	IP-09	25	11:49	25	475	
10-Dec-21	PRB	IP-09	27	11:51	25	525	
10-Dec-21	PRB	IP-09	29	11:53	25	375	
10-Dec-21	PRB	IP-09	31	11:56	25	375	
10-Dec-21	PRB	IP-09	33	11:58	25	400	
10-Dec-21	PRB	IP-09	35	12:00	25	400	
10-Dec-21	PRB	IP-09	37	12:03	25	400	
10-Dec-21	PRB	IP-09	39	12:05	25	500	
10-Dec-21	PRB	IP-09	41	12:10	25	400	
10-Dec-21	PRB	IP-09	43	12:16	50	400	
10-Dec-21	PRB	IP-03	19	14:00	25	300	
10-Dec-21	PRB	IP-03	21	14:02	25	325	
10-Dec-21	PRB	IP-03	23	14:05	25	400	
10-Dec-21	PRB	IP-03	25	14:08	25	400	

Pilot Study Treatment Program
Master Injection List
Athens, GA

Date Completed	Injection Area	Injection Point ID	Screen Interval (ft bgs)	Start Time	KP/SP/LIME Volume (gal)	Well Head Pressure (psi)	Comments
10-Dec-21	PRB	IP-03	27	14:11	25	400	DL noted from down gradient well
10-Dec-21	PRB	IP-03	29	14:13	25	400	
10-Dec-21	PRB	IP-03	31	14:19	25	380	
10-Dec-21	PRB	IP-03	33	14:21	25	500	
10-Dec-21	PRB	IP-03	35	14:24	25	400	
10-Dec-21	PRB	IP-03	37	14:31	25	400	
10-Dec-21	PRB	IP-03	39	14:34	25	400	minor DL noted 15' away
10-Dec-21	PRB	IP-03	41	14:42	25	400	Refusal at 41'
10-Dec-21	PRB	IP-02	20	15:45	25	400	
10-Dec-21	PRB	IP-02	22	15:48	25	400	
10-Dec-21	PRB	IP-02	24	15:53	25	400	
10-Dec-21	PRB	IP-02	26	15:55	25	500	
10-Dec-21	PRB	IP-02	28	15:58	25	350	
10-Dec-21	PRB	IP-02	30	16:05	25	400	
10-Dec-21	PRB	IP-02	32	16:08	25	480	
10-Dec-21	PRB	IP-02	34	16:10	25	480	
10-Dec-21	PRB	IP-02	36	16:11	25	480	
10-Dec-21	PRB	IP-02	38	16:13	25	480	
10-Dec-21	PRB	IP-02	40	16:15	25	480	
10-Dec-21	PRB	IP-02	42	16:19	25	450	
10-Dec-21	PRB	IP-02	44	16:25	25	400	
10-Dec-21	PRB	IP-02	46	16:33	25	420	
14-Dec-21	PRB	IP-06	36	9:32	35	300	
14-Dec-21	PRB	IP-06	34	9:37	35	300	
14-Dec-21	PRB	IP-06	32	9:39	35	300	
14-Dec-21	PRB	IP-06	30	9:42	35	300	
14-Dec-21	PRB	IP-06	28	9:46	30	300	
14-Dec-21	PRB	IP-06	26	9:49	25	300	
14-Dec-21	PRB	IP-06	24	9:51	25	300	
14-Dec-21	PRB	IP-06	22	9:56	25	300	

Pilot Study Treatment Program
Master Injection List
Athens, GA

Date Completed	Injection Area	Injection Point ID	Screen Interval (ft bgs)	Start Time	KP/SP/LIME Volume (gal)	Well Head Pressure (psi)	Comments
14-Dec-21	PRB	IP-06	20	9:59	25	300	
14-Dec-21	PRB	IP-07	45	11:09	35	400	
14-Dec-21	PRB	IP-07	43	11:14	35	400	
14-Dec-21	PRB	IP-07	41	11:17	35	350	
14-Dec-21	PRB	IP-07	39	11:20	35	340	
14-Dec-21	PRB	IP-07	37	11:25	35	320	
14-Dec-21	PRB	IP-07	35	11:26	35	320	
14-Dec-21	PRB	IP-07	33	11:28	35	320	
14-Dec-21	PRB	IP-04	46	12:57	30	320	
14-Dec-21	PRB	IP-04	44	13:00	30	320	
14-Dec-21	PRB	IP-04	42	13:03	30	320	minor DL 3-4' north
14-Dec-21	PRB	IP-04	40	13:11	15	320	SAA
14-Dec-21	PRB	IP-04	38	13:15	15	320	SAA
14-Dec-21	PRB	IP-04	36	13:23	10	320	SAA
14-Dec-21	PRB	IP-04	34	13:29	10	320	SAA
14-Dec-21	PRB	IP-04	32	13:35	10	320	SAA
14-Dec-21	PRB	IP-04	30	13:38	10	320	SAA
14-Dec-21	PRB	IP-04	28	13:39	10	320	SAA
14-Dec-21	PRB	IP-04	26	13:43	10	320	SAA
14-Dec-21	PRB	IP-08	40	14:24	25	320	DL 10' northeast
14-Dec-21	PRB	IP-08	38	14:28	25	320	
14-Dec-21	PRB	IP-08	36	14:33	25	320	
Project Injection Totals:			KP/SP/LIME		3485		

Notes:

KP = Sodium Persulfate
SP = Potassium Persulfate
LIME = Hydrated Lime

ft = Feet
bgs = Below Ground Surface
min = Minutes

SAA = Same as Above
DL = Daylighting
IP = Injection Point

Total Volume Injected: 3,485

Pilot Study Treatment Program
Master Injection List
Athens, GA

Date Completed	Injection Area	Injection Point ID	Screen Interval (ft bgs)	Catalyst Injection Time (mins)	Catalyst Volume (gal)	Catalyst Flow Rate (gpm)	H_2O_2 Injection Time (mins)	H_2O_2 Volume (gal)	H_2O_2 Flow Rate (gpm)	Well Head Pressures (psi)	Comments
11-Dec-21	MFR	H-02	4-8'				12	9	0.75	4	Minor DL from old borehole
11-Dec-21	MFR	H-02	4-8'	15	9	0.60				4	
11-Dec-21	MFR	H-02	4-8'				13	9	0.69	4	
11-Dec-21	MFR	B-01	1-5'				6	9	1.50	2	DL noted around B-01
11-Dec-21	MFR	B-01	1-5'	18	9	0.50				2	
11-Dec-21	MFR	B-01	1-5'				22	9	0.41	2	
11-Dec-21	MFR	GH-3-5	5-9'				9	9	1.00	18	
11-Dec-21	MFR	GH-3-5	5-9'	13	9	0.69				6	
11-Dec-21	MFR	GH-3-5	5-9'				17	9	0.53	6	
11-Dec-21	MFR	BC-1-5	1-5'				20	9	0.45	2	
11-Dec-21	MFR	BC-1-5	1-5'	25	9	0.36				2	
11-Dec-21	MFR	BC-1-5	1-5'				16	9	0.56	2	Minor DL around IP
11-Dec-21	MFR	GH-2-5	4-8'				10	9	0.90	16	
11-Dec-21	MFR	GH-2-5	4-8'	12	9	0.75				10	
11-Dec-21	MFR	GH-2-5	4-8'				14	9	0.64	10	
11-Dec-21	MFR	C-02	3-7'				7	9	1.29	6	
11-Dec-21	MFR	C-02	3-7'	10	9	0.90				6	
11-Dec-21	MFR	C-02	3-7'				9	9	1.00	6	
11-Dec-21	MFR	H-03	4-8'				14	9	0.64	20	
11-Dec-21	MFR	H-03	4-8'	11	9	0.82				14	
11-Dec-21	MFR	H-03	4-8'				12	9	0.75	16	DL noted from GH-3-5
11-Dec-21	MFR	BC-2-5	3-7'				8	9	1.13	4	DL noted 2' east at ground level
11-Dec-21	MFR	BC-2-5	3-7'	13	9	0.69				4	
11-Dec-21	MFR	BC-2-5	3-7'				13	9	0.69	4	
11-Dec-21	MFR	C-03	3-7'				8	9	1.13	2	
11-Dec-21	MFR	C-03	3-7'	7	9	1.29				2	
11-Dec-21	MFR	C-03	3-7'				12	9	0.75	2	
11-Dec-21	MFR	H-4-5	5-9'				12	9	0.75	4	
11-Dec-21	MFR	H-4-5	5-9'	5	9	1.80				4	
11-Dec-21	MFR	H-4-5	5-9'				7	9	1.29	4	
12-Dec-21	MFR	G-04	5.5-9.5				13	9	0.69	20	

Pilot Study Treatment Program
Master Injection List
Athens, GA

Date Completed	Injection Area	Injection Point ID	Screen Interval (ft bgs)	Catalyst Injection Time (mins)	Catalyst Volume (gal)	Catalyst Flow Rate (gpm)	H_2O_2 Injection Time (mins)	H_2O_2 Volume (gal)	H_2O_2 Flow Rate (gpm)	Well Head Pressures (psi)	Comments
12-Dec-21	MFR	G-04	5.5-9.5	6	9	1.50				16	
12-Dec-21	MFR	G-04	5.5-9.5				9	9	1.00	16	
12-Dec-21	MFR	G-03	4.5-8.5				12	9	0.75	16	
12-Dec-21	MFR	G-03	4.5-8.5	4	9	2.25				10	
12-Dec-21	MFR	G-03	4.5-8.5				5	9	1.80	10	
12-Dec-21	MFR	FG-3-5	4.5-8.5				11	9	0.82	18	
12-Dec-21	MFR	FG-3-5	4.5-8.5	8	9	1.13				14	
12-Dec-21	MFR	FG-3-5	4.5-8.5				7	9	1.29	14	DL noted 2' west
12-Dec-21	MFR	B-03	3-7'				7	9	1.29	2	
12-Dec-21	MFR	B-03	3-7'	8	9	1.13				2	
12-Dec-21	MFR	B-03	3-7'				12	9	0.75	4	
12-Dec-21	MFR	B-04	3-7'				10	9	0.90	6	
12-Dec-21	MFR	B-04	3-7'	16	9	0.56				6	
12-Dec-21	MFR	B-04	3-7'				20	9	0.45	6	
12-Dec-21	MFR	BC-3-5	3-7'				15	9	0.60	6	
12-Dec-21	MFR	BC-3-5	3-7'	6	9	1.50				6	
12-Dec-21	MFR	BC-3-5	3-7'				6	9	1.50	6	
12-Dec-21	MFR	AB-02	3-7'				17	9	0.53	4	
12-Dec-21	MFR	AB-02	3-7'	7	9	1.29				4	
12-Dec-21	MFR	AB-02	3-7'				10	9	0.90	4	
12-Dec-21	MFR	F-02	.5-4.5'				10	9	0.90	2	
12-Dec-21	MFR	F-02	.5-4.5'	3	9	3.00				2	
12-Dec-21	MFR	F-02	.5-4.5'				7	9	1.29	2	DL noted near coc source
12-Dec-21	MFR	F-03	5-9'				17	9	0.53	8	
12-Dec-21	MFR	F-03	5-9'	10	9	0.90				12	
12-Dec-21	MFR	F-03	5-9'				10	9	0.90	12	
12-Dec-21	MFR	DE-3-5	5-9'				10	9	0.90	4	
12-Dec-21	MFR	DE-3-5	5-9'	9	9	1.00				2	
12-Dec-21	MFR	DE-3-5	5-9'				8	9	1.13	2	
12-Dec-21	MFR	D-04	5-9'				6	9	1.50	2	
12-Dec-21	MFR	D-04	5-9'	6	9	1.50				2	

Pilot Study Treatment Program
Master Injection List
Athens, GA

Date Completed	Injection Area	Injection Point ID	Screen Interval (ft bgs)	Catalyst Injection Time (mins)	Catalyst Volume (gal)	Catalyst Flow Rate (gpm)	H_2O_2 Injection Time (mins)	H_2O_2 Volume (gal)	H_2O_2 Flow Rate (gpm)	Well Head Pressures (psi)	Comments
12-Dec-21	MFR	D-04	5-9'				6	9	1.50	2	
12-Dec-21	MFR	E-03	4.5-8.5'				10	9	0.90	4	DL noted around E-4
12-Dec-21	MFR	E-03	4.5-8.5'	6	9	1.50				4	
12-Dec-21	MFR	E-03	4.5-8.5'				10	9	0.90	2	
12-Dec-21	MFR	F-04	5.5-9.5'				20	9	0.45	26	
12-Dec-21	MFR	F-04	5.5-9.5'	20	9	0.45				16	
12-Dec-21	MFR	F-04	5.5-9.5'				8	9	1.13	22	DL noted 3' east
12-Dec-21	MFR	E-02	0.5-4.5'				15	9	0.60	2	
12-Dec-21	MFR	E-02	0.5-4.5'	10	9	0.90				2	
12-Dec-21	MFR	E-02	0.5-4.5'				8	9	1.13	2	DL noted 1' west
12-Dec-21	MFR	D-03	3-7'				6	9	1.50	2	DL noted @ gw level 3' west
12-Dec-21	MFR	D-03	3-7'	4	9	2.25				2	towards seepage area
12-Dec-21	MFR	D-03	3-7'				5	9	1.80	2	
12-Dec-21	MFR	C-04	3-7'				9	9	1.00	2	
12-Dec-21	MFR	C-04	3-7'	6	9	1.50				2	
12-Dec-21	MFR	C-04	3-7'				12	9	0.75	2	
13-Dec-21	MFR	E-04	6-10'				9	9	1.00	2	Minor DL from annulus
13-Dec-21	MFR	E-04	6-10'	9	9	1.00				4	
13-Dec-21	MFR	E-04	6-10'				8	9	1.13	8	
13-Dec-21	MFR	G-02	2-6'				15	9	0.60	2	
13-Dec-21	MFR	G-02	2-6'	10	9	0.90				2	
13-Dec-21	MFR	G-02	2-6'				8	9	1.13	2	
13-Dec-21	MFR	I-02	3-7'				7	9	1.29	2	
13-Dec-21	MFR	I-02	3-7'	9	9	1.00				2	
13-Dec-21	MFR	I-02	3-7'				3	9	3.00	2	
13-Dec-21	MFR	HI-3-5	4.5-8.5'				4	9	2.25	14	
13-Dec-21	MFR	HI-3-5	4.5-8.5'	26	9	0.35				10	
13-Dec-21	MFR	HI-3-5	4.5-8.5'				10	9	0.90	10	
13-Dec-21	MFR	I-03	4.5-8.5'				13	9	0.69	14	DL noted 17' west towards seepage
13-Dec-21	MFR	I-03	4.5-8.5'	10	9	0.90				14	
13-Dec-21	MFR	I-03	4.5-8.5'				10	9	0.90	14	

Pilot Study Treatment Program
Master Injection List
Athens, GA

Date Completed	Injection Area	Injection Point ID	Screen Interval (ft bgs)	Catalyst Injection Time (mins)	Catalyst Volume (gal)	Catalyst Flow Rate (gpm)	H_2O_2 Injection Time (mins)	H_2O_2 Volume (gal)	H_2O_2 Flow Rate (gpm)	Well Head Pressures (psi)	Comments
13-Dec-21	MFR	HI-2-5	4-8'				11	9	0.82	10	DL downgradient of IP location
13-Dec-21	MFR	HI-2-5	4-8'	15	9	0.60				4	
13-Dec-21	MFR	HI-2-5	4-8'				5	9	1.80	8	
13-Dec-21	MFR	I-04	5-9'				15	9	0.60	12	
13-Dec-21	MFR	I-04	5-9'	20	9	0.45				12	
13-Dec-21	MFR	I-04	5-9'				5	9	1.80	12	
13-Dec-21	MFR	AD-09	18-22'				11	9	0.82	24	
13-Dec-21	MFR	AD-09	18-22'	14	9	0.64				16	
13-Dec-21	MFR	AD-09	18-22'				16	9	0.56	18	
13-Dec-21	MFR	AS-09	13-17'				14	9	0.64	34	
13-Dec-21	MFR	AS-09	13-17'	14	9	0.64				34	
13-Dec-21	MFR	AS-09	13-17'				15	9	0.60	36	DL 3' west towards mw-9a
					315			630		Total	945

bgs = below ground surface
ft = feet
mins = minutes
H2O2 = Stabilized Hydrogen Peroxide (8.5%)

psi = pounds per square inch
gpm = gallons per minute
gal = gallons

DL = Daylighting
IP - Injection point

SAFETY DATA SHEET
Klozur KP

SDS # : 7727-21-1-12EU
Revision date: 2018-01-24
Version 1

1. IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

1.1. Dipotassium peroxodisulfate

Chemical name	Dipotassium peroxodisulfate
Product Name	Klozur KP
Synonyms	Potassium Peroxydisulfate; Dipotassium Peroxydisulfate; Peroxydisulfuric acid, dipotassium salt; Peroxydisulfuric acid, potassium salt
CAS-No	7727-21-1
EC-No	231-781-8
REACH registration number	01-2119495676-19-0001
Formula	K2O8S2 and $K_2 S_2 O_8$

1.2. Relevant identified uses of the substance or mixture and uses advised against

Recommended Use:	In situ and ex situ chemical oxidation of contaminants and compounds of concern for environmental remediation applications
Restrictions on Use	Consumer uses: Water treatment chemical, Metal surface treatment products

1.3. Details of the supplier of the safety data sheet

Manufacturer/Supplier

PeroxyChem LCC
Only Representative: PeroxyChem Spain s.l.u.
C/ Afueras s/n 50784 La Zaida (Zaragoza) Spain
Tel: +34 976 179600

Contact point Email: sdsinfo-emea@peroxychem.com

1.4. Emergency telephone numbers

La Zaida:
Tel: +34 976 17 96 00
Fax: +34 976 17 96 01

2. HAZARDS IDENTIFICATION

2.1. Classification of the substance or mixture

Regulation (EC) No 1272/2008

Acute oral toxicity	Category 4
Skin corrosion/irritation	Category 2
Serious eye damage/eye irritation	Category 2
Respiratory sensitization	Category 1
Skin sensitization	Category 1
Specific target organ systemic toxicity (single exposure)	Category 3
Acute aquatic toxicity	Category 3
Oxidizing Solids	Category 3

For the full text of the H- and EUH- phrases mentioned in this Section, see Section 16.

2.2. Label Elements

Signal word: DANGER

Hazard Statements

H302 - Harmful if swallowed
H315 - Causes skin irritation
H319 - Causes serious eye irritation
H317 - May cause an allergic skin reaction
H334 - May cause allergy or asthma symptoms or breathing difficulties if inhaled
H335 - May cause respiratory irritation
H402 - Harmful to aquatic life

H272 - May intensify fire; oxidizer

Precautionary statements

P220 - Keep/Store away from clothing/ combustible materials
P280 - Wear protective gloves/ protective clothing/ eye protection/ face protection
P302 + P352 - IF ON SKIN: Wash with plenty of soap and water
P305 + P351 + P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
P304 + P341 - IF INHALED: If breathing is difficult, remove to fresh air and keep at rest in a position comfortable for breathing

Precautionary statements

P302 + P352 - IF ON SKIN: Wash with plenty of water/ water
P305 + P351 + P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
P304 + P341 - IF INHALED: If breathing is difficult, remove to fresh air and keep at rest in a position comfortable for breathing
P312 - Call a POISON CENTER or doctor/ physician if you feel unwell

2.3. OTHER INFORMATION

General Hazards
Risk of decomposition by heat or by contact with incompatible materials

3. COMPOSITION/INFORMATION ON INGREDIENTS

Substance/preparation Substance

Dipotassium peroxodisulfate

Chemical name	EC-No	CAS-No	Weight %	Classification according to Regulation (EC) No. 1272/2008 [CLP]	REACH registration number
Potassium Persulfate	Present	7727-21-1	>98	Acute Tox. 4 (H302) Skin Irrit. 2 (H315) Eye Irrit. 2 (H319) Resp. Sens. 1 (H334) Skin Sens. 1 (H317) STOT SE 3 (H335) Ox. Sol. 3 (H272)	01-2119495676-19-0001

For the full text of the H- and EUH- phrases mentioned in this Section, see Section 16

4. FIRST AID MEASURES

4.1. Description of first-aid measures

General Advice Remove from exposure, lie down. Show this material safety data sheet to the doctor in attendance.

Skin Contact Wash off immediately with soap and plenty of water while removing all contaminated clothes and shoes. Get medical attention if irritation develops and persists.

Eye Contact Rinse thoroughly with plenty of water for at least 15 minutes, lifting lower and upper eyelids intermittently. Consult a physician. In case of contact, immediately flush eyes with plenty of water. If symptoms persist, call a physician.

Inhalation Remove from exposure, lie down. If breathing is irregular or stopped, administer artificial respiration. Call a physician immediately.

Ingestion Do NOT induce vomiting. Call a physician or poison control center immediately. Rinse mouth. Drink 1 or 2 glasses of water.

4.2. Most important symptoms and effects, both acute and delayed

Most important symptoms and effects, both acute and delayed Itching; Redness; Coughing and/ or wheezing

4.3. Indication of immediate medical attention and special treatment needed, if necessary

Indication of immediate medical attention and special treatment needed, if necessary Treat symptomatically.

5. FIRE-FIGHTING MEASURES

5.1. Extinguishing media

Suitable Extinguishing Media
Water, Cool containers with flooding quantities of water until well after fire is out.

Extinguishing media which shall not be used for safety reasons
Do NOT use water jet.

5.2. Special hazards arising from the substance or mixture

Special exposure hazards arising from the substance or preparation itself, combustion products, resulting gases
In case of fire, formation of sulphur oxides, nitrogen oxides, toxic pyrolysis products.

5.3. Advice for firefighters

Special protective equipment for fire-fighters
As in any fire, wear self-contained breathing apparatus and full protective gear.

OTHER INFORMATION
The product is not combustible. Contact with combustible materials may intensify fires. Adjust fire fighting measures to surrounding fire, if possible. Cool endangered containers with water spray and move out of danger area. Collect contaminated fire extinguishing water separately. This must not be discharged into drains. Fire residues and contaminated fire extinguishing water must be disposed of in accordance with local regulations.

6. ACCIDENTAL RELEASE MEASURES

6.1. Personal precautions, protective equipment and emergency procedures

Keep off any unprotected persons. Avoid contact with the skin and the eyes. Avoid breathing dust. Wear personal protective equipment.

6.2. Environmental Precautions

See Section 12 for additional Ecological Information.

6.3. Methods and materials for containment and cleaning up

Vacuum, shovel or pump waste into a drum and label contents for disposal. Avoid dust formation. Store in closed container. Clean up spill area and treat as special waste Dispose of waste as indicated in Section 13
Never add other substances or combustible waste to product residues.

6.4. Reference to other sections.

Dispose of waste as indicated in Section 13

7. HANDLING AND STORAGE

7.1. Precautions for Safe Handling

Wear personal protective equipment. Use only in area provided with appropriate exhaust ventilation. Avoid dust formation. Handle product only in closed system or provide appropriate exhaust ventilation at machinery. Avoid contact with skin and eyes. Avoid breathing dust. Remove and wash contaminated clothing before re-use. Reference to other sections.

Additional information
Use clean plastic or stainless steel scoops only

7.2. Conditions for safe storage, including any incompatibilities

Storage
Keep containers tightly closed in a dry, cool and well-ventilated place. Keep away from heat. Do not store near combustible materials. Avoid contamination of opened product. Keep away from food, drink and animal feedingstuffs. Avoid formation and deposition of dust.

Materials to avoid
Acids, Bases, Halides, Oxidizing agents, Strong reducing agents, Combustible materials,

7.3. Specific end uses

Refer to Section 1 and the Annex.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1. Control parameters

Exposure Limits Ingredients with workplace control parameters

Chemical name	European Union	The United Kingdom	Ireland
Potassium Persulfate 7727-21-1			TWA 0.1 mg/m³ STEL 0.3 mg/m³

			Sensitizer
Chemical name	**France**	**Spain**	**Portugal**
Potassium Persulfate 7727-21-1		TWA 0.1 mg/m³ S+	
Chemical name	**Denmark**	**Finland**	**Norway**
Potassium Persulfate 7727-21-1	TWA 2 mg/m³		
Chemical name	**Slovakia**	**Switzerland**	**Belgium**
Potassium Persulfate 7727-21-1			TWA 0.1 mg/m³
Chemical name	**Luxembourg**	**Poland**	**Estonia**
Potassium Persulfate 7727-21-1		TWA 0.1 mg/m³	

Derived No Effect Level (DNEL)

DNELs - Workers				
Potassium Persulfate (7727-21-1)				
Exposure pattern	Route of Exposure	Description	DNEL/DMEL	Most Sensitive Endpoint
Acute - systemic	dermal	LD0	400 mg/kg bw	Acute toxicity
Acute - systemic	Inhalation	LC0	590 mg/m³	Acute toxicity
Acute - local	dermal	LC0	2.248 mg/cm3	Acute toxicity
Acute - local	Inhalation	LC0	590 mg/m³	Acute toxicity
Long term - systemic	dermal	NOAEL	18.2 mg/kg bw/day	repeated dose toxicity
Long term - systemic	Inhalation	NOAEC	2.06 mg/m³	repeated dose toxicity
Long term - local	dermal	NOAEL	0.102 mg/cm3	repeated dose toxicity
Long term - local	Inhalation	NOAEC	2.06 mg/m³	repeated dose toxicity

DNELs - General Population				
Potassium Persulfate (7727-21-1)				
Exposure pattern	Route of Exposure	Description	DNEL/DMEL	Most Sensitive Endpoint
Acute - systemic	dermal	LD0	200 mg/kg bw	Acute toxicity
Acute - systemic	Inhalation	LC0	295 mg/m³	Acute toxicity
Acute - systemic	oral	LD0	30 mg/kg bw	Acute toxicity
Acute - local	dermal	LD0	1.124 mg/cm3	Acute toxicity
Acute - local	Inhalation	LC0	295 mg/m³	Acute toxicity
Long term - systemic	dermal	NOAEL	9.1 mg/kg bw/day	repeated dose toxicity
Long term - systemic	Inhalation	NOAEC	1.03 mg/m³	repeated dose toxicity
Long term - systemic	oral	NOAEL	9.1 mg/kg bw/day	repeated dose toxicity
Long term - local	dermal	NOAEL	0.051 mg/cm3	repeated dose toxicity
Long term - local	Inhalation	NOAEC	1.03 mg/m³	repeated dose toxicity

Predicted No Effect Concentration (PNEC)

8.2. Exposure Controls

Engineering measures Provide local exhaust or general ventilation adequate to maintain exposures below permissable exposure limits.

Personal protective equipment

General information Protective engineering solutions should be implemented and in use before personal protective equipment is considered.
Respiratory Protection P2 Dust mask when airborne dust concentrations elevated.
Eye/Face Protection Eye protection recommended. Chemical goggles consistent with EN 166 or equivalent.
Skin and Body Protection Wear suitable protective clothing.
Hand Protection Protective gloves: Neoprene gloves, Polyvinylchloride, Natural Rubber.

Hygiene measures Keep away from food, drink and animal feeding stuffs. Do not eat, drink or smoke when using this product. Wash hands before breaks and after shifts. Keep work clothes separate, remove contaminated clothing - launder after open handling of product.

Environmental exposure controls The product should not be allowed to enter drains, water courses or the soil.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1. Information on basic physical and chemical properties

Appearance	Crystalline solid
Color	White
Physical State	Solid
Odor	odorless
Odor threshold	Not applicable
pH	6.4 (1% solution)
Flash point	Not flammable
Melting Point/Range	> 100 °C
Freezing Point	Not applicable
Boiling Point/Range	Decomposes Decomposes upon heating
Autoignition temperature	No evidence of combustion up to 600°C
Explosive properties	Not explosive
Vapor pressure	6.07E-30 mm Hg at 25ºC
Vapor density	No information available
Density	2.48 g/cm³ (crystal density)
Relative Density	1.39
Partition coefficient	No information available (inorganic)
Water solubility	60 g/l @ 25 °C
Viscosity	No information available (Solid)
Evaporation Rate	No information available
Decomposition temperature	> 100 °C (assume)

9.2. OTHER INFORMATION

Bulk Density	1.30 g/cm³ (loose)
Molecular weight	270.31

10. STABILITY AND REACTIVITY

10.1. Reactivity

Strong oxidizer

10.2. Chemical Stability

Stable under recommended storage conditions. Unstable if heated. Unstable on exposure to moisture. Unstable in presence of contamination.

10.3. Possibility of Hazardous Reactions

Use of persulfates in chemical reactions requires appropriate precautions and design considerations for pressure and thermal relief.

Decomposing persulfates will evolve large volumes of gas and/or vapor, can accelerate exponentially with heat generation, and create significant and hazardous pressures if contained and not properly controlled or mitigated.

Use with alcohols in the presence of water has been demonstrated to generate conditions that require rigorous adherence to process safety methods and standards to prevent escalation to an uncontrolled reaction.

10.4. Conditions to avoid

Moisture; Heat. (decomposes at temperatures >100 °C).

10.5. incompatible materials

Acids, Bases, Halides, Oxidizing agents, Strong reducing agents, Combustible materials,

10.6. Hazardous Decomposition Products

Incomplete combustion and thermolysis may produce gases of varying toxicity such as carbon monoxide, carbon dioxide, various hydrocarbons, aldehydes and soot.

11. TOXICOLOGICAL INFORMATION

11.1. Information on toxicological effects

Acute toxicity

LD50 Dermal	> 10000 mg/kg (rat) (Potassium Persulfate)
LD50 Oral	1130 mg/kg (rat) (Potassium Persulfate)
LC50 Inhalation	> 42.9 mg/L (rat) (Potassium Persulfate)
Skin Contact	Non-irritating (rabbit). Persulfates in general, specifically diammonium persulfate and dipotassium persulfate, exhibited skin irritation properties in human case reports, following occupational exposure and consumer use.
Eye Contact	Irritating to eyes. Has been shown to exhibit eye irritation properties in human case reports following occupational exposure and consumer use. Slightly or non-irritating (rabbit).
Inhalation	May cause irritation of respiratory tract. Respiratory irritation has been seen in workers exposed to persulfates. In animals, diammonium persulfate, produced pathological respiratory irritation in a subchronic study.
Subchronic toxicity	Oral (NOAEL) = 131.5 mg/kg bw (Potassium Persulfate) Inhalation (NOAEC) = 10.3 mg/m^3 (Ammonium Persulfate) Dermal: No data available
Chronic toxicity	
Sensitization	Sensitizing to skin and respiratory system.
Target organ effects	Eyes. Skin. Respiratory System.
Carcinogenicity	Did not show carcinogenic effects in animal experiments.
Mutagenicity	In vivo tests did not show mutagenic effects.
Reproductive toxicity	Diammonium persulfate did not affect fertility or the developing fetus in animal studies (NOAEL: 250 mg/kg bw).

12. ECOLOGICAL INFORMATION

12.1. Toxicity

Ecotoxicity effects

Not expected to have significant environmental effects, based on data for similar substances.

Potassium Persulfate (7727-21-1)				
Active Ingredient(s)	Duration	Species	Value	Units
Potassium persulfate	96 h LC50	Onchorhyncus mykiss	76.3	mg/L
Potassium persulfate	48 h EC50	Water flea	120	mg/L
Potassium persulfate	72 h EC50	Marine algae (Phaeodacttylum tricornutum)	136	mg/L
Potassium persulfate	96 h LC50	Turbot (Scophthalmus maximus)	107.6	mg/L
Potassium persulfate	18 h EC10	Pseudonomas putida	36	mg/L
Potassium persulfate	5 d	Abra Alba	11	mg/L
Potassium persulfate	96 h LC50	Grass shrimp	391	mg/L
Potassium persulfate	24 h EC50	Daphnia magna	635.7	mg/L

12.2. Persistence and degradability

Biodegradability does not pertain to inorganic substances.

12.3. Bioaccumulative potential

Does not bioaccumulate.

12.4. Mobility in soil

Dissociates into ions.

12.5. Results of PBT and vPvB assessment

PBT/vPvB assessment is not required for inorganic substances.

12.6. Other Adverse Effects

None known.

13. DISPOSAL CONSIDERATIONS

13.1. Waste treatment methods

Product / Packaging disposal	Dispose of as hazardous waste in compliance with local and national regulations
Contaminated Packaging	Empty containers should be taken to an approved waste handling site for recycling or disposal

14. TRANSPORT INFORMATION

ADR/RID

UN/ID no	1492
Proper Shipping Name	Potassium persulfate
Hazard class	5.1
Packing Group	III

IMDG/IMO

UN/ID no	1492
Proper Shipping Name	Potassium persulfate
Hazard class	5.1
Packing Group	III

ICAO/IATA

UN/ID no	1492
Proper Shipping Name	Potassium persulfate
Hazard class	5.1
Packing Group	III

ADN

UN/ID no	1492
Proper Shipping Name	Potassium persulfate
Hazard class	5.1
Packing Group	III

Transport Symbol

Environmental Hazards This product contains no chemical substance that is listed as a marine pollutant according to DOT

Special Precautions for users According to United Nations "Recommendations on the transport of dangerous goods"

Transport in bulk according to MARPOL 73/78 and the IBC Code See IMDG above

15. REGULATORY INFORMATION

15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture

International Inventories

Chemical name	TSCA (United States)	DSL (Canada)	EINECS/ELINCS (Europe)	ENCS (Japan)	China (IECSC)	KECL (Korea)	PICCS (Philippines)	AICS (Australia)	NZIoC (New Zealand)
Potassium Persulfate 7727-21-1	X	X	X	X	X	X	X	X	X

Directive 2008/98/EC on waste
Applicable
Major Accidents (Directive 2012/18/EU)
Included for storage of quantities exceeding 50 Tm
CWC (Chemical Weapons Convention) - Annex on Chemicals
Not applicable

15.2. Chemical Safety Report

A Chemical Safety Assessment has been carried out for this substance.

16. OTHER INFORMATION

Full text of H-phrases referred to in sections 2 and 3
H272 - May intensify fire; oxidizer
H302 - Harmful if swallowed
H315 - Causes skin irritation
H319 - Causes serious eye irritation
H334 - May cause allergy or asthma symptoms or breathing difficulties if inhaled
H317 - May cause an allergic skin reaction
H335 - May cause respiratory irritation

Restrictions on Use
Consumer uses: Water treatment chemical, Metal surface treatment products.
This product's foreseen or recommended applications are: In situ and ex situ chemical oxidation of contaminants and compounds of concern for environmental remediation applications

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Revision note (M)SDS sections updated: 1, 16

List of Abbreviations and Acronyms
ATE Acute Toxicity Estimate
ADR European Agreement concerning the International Carriage of Dangerous Goods by Road
AND European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways
CE50 Concentración Efectiva MediaCEN European Committee for Standardisation
C&L Classification and Labelling
CLP Classification Labelling Packaging Regulation; Regulation (EC) No 1272/2008
CLV Ceiling Limit Value Par CAS# Chemical Abstracts Service number
CMR Carcinogen, Mutagen, or Reproductive Toxicant
CSA Chemical Safety Assessment
CSR Chemical Safety Report
DNEL Derived No Effect Level
DOT Department of Transportation
DPD Dangerous Preparations Directive 1999/45/EC

DSD Dangerous Substances Directive 67/548/EEC
DU Downstream User
EC European Community
ECHA European Chemicals Agency
EC-Number EINECS and ELINCS Number (see also EINECS and ELINCS)
EEA European Economic Area (EU + Iceland, Liechtenstein and Norway)
EEC European Economic Community
EINECS European Inventory of Existing Commercial Substances
ELINCS European List of notified Chemical Substances
EN European Standard
EQS Environmental Quality Standard
EU European Union
Euphrac European Phrase Catalogue EWC
European Waste Catalogue (replaced by LoW –see below)FDS Ficha de Datos de Seguridad
GES Generic Exposure Scenario
GHS Globally Harmonized System
IATA International Air Transport Association
ICAO-TI Technical Instructions for the Safe Transport of Dangerous Goods by Air
IMDG International Maritime Dangerous Goods
IMO International Maritime Organization
IMSBC International Maritime Solid Bulk Cargoes
IT Information Technology
IUCLID International Uniform Chemical Information Database
IUPAC International Union for Pure Applied Chemistry
JRC Joint Research Centre
Kow octanol-water partition coefficient
LC50 Lethal Concentration to 50 % of a test population Lethal Dose to 50% of a test population (Median Lethal Dose)
LE Legal Entity
LLV Level Limit Value
LoW List of Wastes (see http://ec.europa.eu/environment/waste/framework/list.htm)
LR Lead RegistrantM/I Manufacturer / Importer MS Member States
MSDS Material Safety Data Sheet
NOEC No observed effect concentration
OC Operational Conditions
OECD Organization for Economic Co-operation and Development
OEL Occupational Exposure Limit
OJ Official Journal
OR Only Representative
OSHA European Agency for Safety and Health at work
PBT Persistent, Bioaccumulative and Toxic substance
PEC Predicted Effect ConcentrationPNEC(s) Predicted No Effect Concentration(s)
PPE Personal Protection Equipment(Q)SAR Qualitative Structure Activity Relationship
REACH Registration, Evaluation, Authorisation and Restriction of Chemicals Regulation (EC) No 1907/2006
RID Regulations concerning the International Carriage of Dangerous Goods by Rail
RIP REACH Implementation Project
RMM Risk Management Measure
SCBA Self-Contained Breathing Apparatus
SDS Safety data sheet
SIEF Substance Information Exchange Forum
SME Small and Medium sized Enterprises
STEL Short-term exposure limit
STOT Specific Target Organ Toxicity (STOT)
RE Repeated Exposure(STOT)
SE Single Exposure Par SVHC Substances of Very High Concern
TSCA Toxic Substances Control Act
TWA Time Weighed Average
UN United Nations
vPvB Very Persistent and Very Bioaccumulative / mPmB Muy Persistente y Muy Bioacumulativo
WGK Wassergefährdungsklassen

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Prepared By:

PeroxyChem

End of Safety Data Sheet

Exposure scenario

1. Short title of exposure scenario 0
Industrial manufacturing, Manufacturing, transfer and packaging

2. Descriptions of activities and processes covered in the exposure scenario	
Sector of use (SU)	SU3 - Industrial Manufacturing (all)
Product category (PC)	Not applicable
Process category (PROC)	**PROC1** Use in closed process, no likelihood of exposure **PROC2** Use in closed, continuous process with occasional controlled exposure **PROC3** Use in closed batch process (synthesis or formulation) **PROC4** Use in batch and other process (synthesis) where opportunity for exposure arises **PROC5** Mixing or blending in batch processes for formulation of mixtures and articles (multistage and/or significant contact) **PROC8a** Transfer of substance or mixture (charging/discharging) from/to vessels/large containers at non dedicated facilities **PROC8b** Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities **PROC9** Transfer of subtance or preparation into small containers (dedicated filling line, including weighing) **PROC14** Production of mixtures or articles by tabletting, compression, extrusion, pelletization
Article category (AC)	Not applicable
Environmental release category (ERC)	**ERC1** - Manufacture of substances

3. Operational conditions for which the exposure scenario ensures control of risk	
3.1 Operational conditions related with substance/product	
Physical form of product in which the substance is contained	Solid
Concentration of substance in mixture or article	ca. 100%
Categorisation of dust grades	dustiness max. 13% of particles below 10 µm

3.2 Operational conditions related with frequency and quantities of use	
Duration of exposure at workplace	max. 24 hours/day (for one worker)
Frequency of exposure at workplace	Max. 360 days/year (for one worker) Continuous release: 300 days/year (environmental exposure)
Regional tonnage per year	30000 t/year
Emissions days per site	max 360 days/year

3.3 Other operational conditions determining exposure	
Fraction released to air	There is practically no disposal or run-off into soil, wastewater, drains and sewers. Substance release to air or soil can be practically excluded. Formulation occurs to a large extent in closed systems (exception: bagging).
Packaging	moisture-resistant, dust-tight packaging: 25 and 50 kg polyethylene bags, 1 ton big bag (polypropylene coated textile)
Human factors not influenced by risk management	Respiration volume under conditions of use: 10 m^3/8 h-day (light activity) Area of potential skin contact under conditions of use: two hands and face (480 cm^2) Body weight: 70 kg (worker)
Dilution factor (freshwater)	Rivers = 100 (default = 10)
Dilution factor (seawater)	Coastal zones = 1000 (default = 100)

4. RMMs that, in combination with the operational conditions of use, ensure control of risk	
4.1 RMMs related to workers	
Organizational measures	All personnel are trained. Wearing of protective clothing/personal protective equipment is mandatory. Storage measures to avoid dispersion towards workers: Keep container tightly closed in a cool dry place. Storage away from foodstuffs, reducing agents, heavy-metal compounds, acids and alkalis, protected from humidity and water. Protect from sources of hear. Store not together with inflammable substances.

Technical measures	Local exhaust ventilation is installed, with exhaust air scrubbers/filters (99.9% removal efficiency). Waste water neutralisation (99.9% removal efficiency)
Respiratory Protection	Breathing equipment (according to EN 143). In case of brief exposure or low pollution use breathing filter apparatus (half mask P2 APF 10).
Eye Protection	Wearing of eye/face protection is required. Chemical goggles should be consistent with EN 166 or equivalent.
Skin and Body Protection	Hands protection according to EN 374: material: rubber or PVC or other plastic materal gloves, glove thickness: 0.5 mm, break through time: >= 8 h. Body Protection: light weight protective clothing, rubber or neoprene footwear.
Hygiene measures	Keep away from foodstuffs, beverages and food. Take off immediately all contaminated clothing Clean skin thoroughly immediately after handling the product. Clean skin thoroughly immediately after handling the product. Avoid contact with the eyes and skin Do not breathe dust

4.2 Environment related measures	
Abatement measures related with wastewater	Waste water is recycled in production process (i.e. wash water from gas washer/filter cake) or neutralised and detoxified (99.9% removal efficiency).
Abatement measures related with air emissions	Local exhaust ventilation is installed, with exhaust air scrubbers/filters (99.9% removal efficiency).
Abatement measures related to soil	There is no direct release to soil.

4.3 Waste related measures	
Disposal technique	Normally there is no waste, as batches out of specifications are blended. If this is not possible, wastes such as cleaning solutions collected and disposed of as hazardous waste according to official regulations.

5. Prediction of exposure resulting from the conditions described above and the substance properties

Summary of long term exposure concentration to workers (worst cases) Calculated with ECETOC TRA

routes of exposure	Concentrations
Dermal local exposure (mg/cm^2)	0.1399
Dermal systemic exposure (mg/kg bw/day)	0.9599
Inhalation exposure (mg/m^3/8h workday)	0.5000
Combined systemic exposure (mg/kg bw/day)	1.0099

Indirect exposure of humans via the environment (oral), Calculated using EUSES (v2.1) - ERC2

Route of Exposure	Estimated Exposure Concentrations
Wet Fish (mg/kg/day)	2.75E-05
Drinking water (mg/L/day)	9.62E-04
Meat (mg/kg/day)	1.51E-08
Leafy Crops (mg/kg/day)	5.85E-04
Root Crops (mg/kg/day)	1.72E-04
Milk (mg/kg/day)	2.81E-07
Air (mg/m^3)	6.85E-04
Total daily dose (via local concentration) (mg/kg/day)	1.94E-03

Environment - Predicted Exposure Concentrations (PEC), Calculated using EUSES (v2.1)

compartment	PEC Local	PEC Local + Regional
Freshwater (mg/L)	0.0122	0.0104
Marine water (mg/L)	2.76E-03	9.66E-04
Freshwater sediments (mg/kg wwt)	--	0.0104
Marine water sediments (mg/kg wwt)	--	2.35E-03
Agricultural soil averaged - 30 days (mg/kg wwt)	6.38E-0.3	7.09E-03
Agricultural soil averaged - 180 days (mg/kg wwt)	5.13E-03	5.84E-03
Grassland averaged (mg/kg wwt)	6.01E-03	6.72E-03
Groundwater (mg/L)	--	0.0337
Air - During emission (mg/m^3)	8.34E-04	--
Air - Annual average (mg/m^3)	6.85E-04	6.85E-04
Air - Annual deposition (mg/m^3)	0.0246	--
Sewage (PECSTP; mg/L)	1.79	--
Sewage Sludge (mg/kg dw)	1.8	--

Secondary poisoning - PECoral predator (mg/kg wwt)	0.0157	2.61E-02
Secondary poisoning - PECoral top predator (mg/kg wwt)	1.57E-03	2.54E-03
Secondary poisoning -Concentration earthworm (mg/kg wwt)	0.0142	1.47E-02

Exposure scenario

1. Short title of exposure scenario 1
Formulation, mixing/blending in batch processes, transfer and packaging

2. Descriptions of activities and processes covered in the exposure scenario	
Sector of use (SU)	SU3 - Industrial uses: Uses of substances as such or in mixtures at industrial sites
Product category (PC)	Not applicable
Process category (PROC)	PROC1 - Use in closed process, no likelihood of exposure PROC2 - Use in closed, continuous process with occasional controlled exposure PROC3 - Use in closed batch process (synthesis or formulation) PROC4 - Use in batch and other process (synthesis) where opportunity for exposure arises PROC5 - Mixing or blending in batch processes for formulation of mixtures and articles (multistage and/or significant contact) PROC6 - Calendering operations PROC8a - Transfer of substance or mixture (charging/discharging) from/to vessels/large containers at non dedicated facilities PROC8b - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities PROC9 - Transfer of substance or mixture into small containers (dedicated filling line, including weighing) PROC13 - Treatment of articles by dipping and pouring PROC14 - Production of mixtures or articles by tabletting, compression, extrusion, pelletization
Article category (AC)	Not applicable
Environmental release category (ERC)	ERC2 - Formulation of mixtures

3. Operational conditions for which the exposure scenario ensures control of risk	
3.1 Operational conditions related with substance/product	
Physical form of product in which the substance is contained	Solid and liquid
Concentration of substance in mixture or article	Solid: up to 100% Liquid: max 25% (teir I concentrations up to 100%)
Categorisation of dust grades	dustiness max. 13% of particles below 10 µm

3.2 Operational conditions related with frequency and quantities of use	
Duration of exposure at workplace	max. 24 hours/day (for one worker)
Frequency of exposure at workplace	Max. 360 days/year (for one worker) Continuous release: 300 days/year (environmental exposure)
Regional tonnage per year	40000 t/year
Emissions days per site	max 300 days/year

3.3 Other operational conditions determining exposure	
Fraction released to air	Substance release to air or soil can be practically excluded. Formulation occurs to a large extent in closed systems (exception: bagging).
Packaging	moisture-resistant, dust-tight packaging: 25 and 50 kg polyethylene bags, 1 ton big bag (polypropylene coated textile)
Human factors not influenced by risk management	Respiration volume under conditions of use: 10 m^3/8 h-day (light activity) Area of potential skin contact under conditions of use: two hands and face (480 cm^2) Body weight: 70 kg (worker)
Dilution factor (freshwater)	Rivers = 100 (default = 10)
Dilution factor (seawater)	Coastal zones = 1000 (default = 100)

4. RMMs that, in combination with the operational conditions of use, ensure control of risk	
4.1 RMMs related to workers	
Organizational measures	All personnel are trained. Wearing of protective clothing/personal protective equipment is mandatory. Storage measures to avoid dispersion towards workers: Keep container tightly closed in a cool dry place. Storage away from foodstuffs, reducing agents, heavy-metal compounds, acids and alkalis, protected from humidity and water. Protect from sources of hear. Store not together with

	inflammable substances.
Technical measures	Local exhaust ventilation is installed, with exhaust air scrubbers/filters (99% removal efficiency). Waste water neutralisation (99% removal efficiency).
Respiratory Protection	Breathing equipment (according to EN 143). In case of brief exposure or low pollution use breathing filter apparatus (half mask P2 APF 10).
Eye Protection	Wearing of eye/face protection is required. Chemical goggles should be consistent with EN 166 or equivalent.
Skin and Body Protection	Hands protection according to EN 374: material: rubber or PVC or other plastic materal gloves, glove thickness: 0.5 mm, break through time: >= 8 h. Body Protection: light weight protective clothing, rubber or neoprene footwear.
Hygiene measures	Keep away from foodstuffs, beverages and food. Take off immediately all contaminated clothing Do not breathe dust Clean skin thoroughly immediately after handling the product. Clean skin thoroughly immediately after handling the product. Avoid contact with the eyes and skin

4.2 Environment related measures	
Abatement measures related with wastewater	Waste water and discharge is monitored periodically. Waste water is neutralised and detoxified (99% removal efficiency).
Abatement measures related with air emissions	Local exhaust ventilation is installed, with exhaust air scrubbers/filters (99% removal efficiency).
Abatement measures related to soil	Release to soil is practically negligible and emission prevention installed (99% removal efficiency).

4.3 Waste related measures	
Disposal technique	Normally there is no waste, as batches out of specifications are blended. If this is not possible, wastes such as cleaning solutions collected and disposed of as hazardous waste according to official regulations.

5. Prediction of exposure resulting from the conditions described above and the substance properties

Summary of long term exposure concentration to workers (worst cases) Calculated with ECETOC TRA

routes of exposure	Concentrations
Dermal local exposure (mg/cm^2)	0.1400
Dermal systemic exposure (mg/kg bw/day)	0.9600
Inhalation exposure (mg/m^3/8h workday)	0.5000
Combined systemic exposure (mg/kg bw/day)	1.0099

Indirect exposure of humans via the environment (oral), Calculated using EUSES (v2.1) - ERC2

Route of Exposure	Estimated Exposure Concentrations
Wet Fish (mg/kg/day)	4.94E-05
Drinking water (mg/L/day)	1.01E-03
Meat (mg/kg/day)	1.62E-08
Leafy Crops (mg/kg/day)	6.31E-04
Root Crops (mg/kg/day)	1.8E-04
Milk (mg/kg/day)	3.02E-07
Air (mg/m^3)	7.62E-04
Total daily dose (via local concentration) (mg/kg/day)	2.08E-03
Total daily dose (via local and regional concentration) (mg/kg/day)	2.44E-04

Environment - Predicted Exposure Concentrations (PEC), Calculated using EUSES (v2.1)

compartment	PEC Local	PEC Local + Regional
Freshwater (mg/L)	0.0133	0.0237
Marine water (mg/L)	1.33E-03	2.3E-03
Freshwater sediments (mg/kg wwt)	23	0.0201
Marine water sediments (mg/kg wwt)	--	1.96E-03
Agricultural soil averaged - 30 days (mg/kg wwt)	6.32E-03	7.03E-03
Agricultural soil averaged - 180 days (mg/kg wwt)	5.39E-03	6.1E-03
Grassland averaged (mg/kg wwt)	6.59E-03	7.3E-03
Groundwater (mg/L)	--	0.0352
Air - During emission (mg/m^3)	9.27E-04	--
Air - Annual average (mg/m^3)	7.62E-04	7.62E-03
Air - Annual deposition (mg/m^3)	0.0273	--

Sewage (PECSTP; mg/L)	1.33	--
Sewage Sludge (mg/kg dw)	1.33	--
Secondary poisoning - PECoral predator (mg/kg wwt)	0.0224	0.0328
Secondary poisoning - PECoral top predator (mg/kg wwt)	1.52E-03	2.49E-03
Secondary poisoning -Concentration earthworm (mg/kg wwt)	0.0133	0.0237

Exposure scenario

1. Short title of exposure scenario 2
Industrial use, End uses of subtances in preparations at industrial sites

2. Descriptions of activities and processes covered in the exposure scenario	
Sector of use (SU)	SU3 - Industrial uses: Uses of substances as such or in mixtures at industrial sites
Product category (PC)	Not applicable
Process category (PROC)	PROC1 - Use in closed process, no likelihood of exposure PROC2 - Use in closed, continuous process with occasional controlled exposure PROC3 - Use in closed batch process (synthesis or formulation) PROC4 - Use in batch and other process (synthesis) where opportunity for exposure arises PROC7 - Industrial spraying PROC8a - Transfer of substance or mixture (charging/discharging) from/to vessels/large containers at non dedicated facilities PROC8b - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities PROC9 - Transfer of substance or mixture into small containers (dedicated filling line, including weighing) PROC10 - Roller application or brushing PROC13 - Treatment of articles by dipping and pouring PROC14 - Production of mixtures or articles by tabletting, compression, extrusion, pelletization PROC15 - Use as a laboratory reagent PROC22 - Potentially closed processing operations with minerals/metals at elevated temperature; industrial setting PROC23 - Open processing and transfer operations with minerals/metals at elevated temperature
Article category (AC)	Not applicable
Environmental release category (ERC)	ERC6a - Industrial use resulting in manufacture of another substance (use of intermediates) ERC6b - Industrial use of reactive processing aids ERC6d - Industrial use of process regulators for polymerization processes in production of resins, rubbers, polymers

3. Operational conditions for which the exposure scenario ensures control of risk	
3.1 Operational conditions related with substance/product	
Physical form of product in which the substance is contained	Solid and liquid
Concentration of substance in mixture or article	Solid: up to 100% Liquid: max 25% (teir I concentrations up to 100%)
Categorisation of dust grades	dustiness max. 13% of particles below 10 µm

3.2 Operational conditions related with frequency and quantities of use	
Duration of exposure at workplace	max. 8 hours/day (for one worker)
Frequency of exposure at workplace	Max. 300 days/year (for one worker) Continuous release: 300 days/year (environmental exposure)
Regional tonnage per year	40000 t/year
Emissions days per site	max 300 days/year

3.3 Other operational conditions determining exposure	
Fraction released to air	Substance release to air or soil can be practically excluded. Formulation occurs to a large extent in closed systems (exception: bagging).
Packaging	moisture-resistant, dust-tight packaging: 25 and 50 kg polyethylene bags, 1 ton big bag (polypropylene coated textile)
Human factors not influenced by risk management	Respiration volume under conditions of use: 10 m^3/8 h-day (light activity) Area of potential skin contact under conditions of use: two hands and face (480 cm^2) Body weight: 70 kg (worker)
Dilution factor (freshwater)	Rivers = 100 (default = 10)
Dilution factor (seawater)	Coastal zones = 1000 (default = 100)

4. RMMs that, in combination with the operational conditions of use, ensure control of risk	
4.1 RMMs related to workers	
Organizational measures	All personnel are trained. Wearing of protective clothing/personal protective equipment is mandatory. Storage measures to avoid dispersion towards workers: Keep container tightly closed in a cool dry place. Storage away from foodstuffs, reducing agents, heavy-metal compounds, acids and alkalis, protected from humidity and water. Protect from sources of hear. Store not together with inflammable substances.
Technical measures	Local exhaust ventilation is installed, with exhaust air scrubbers/filters (90% removal efficiency).
Respiratory Protection	Breathing equipment (according to EN 143). In case of brief exposure or low pollution use breathing filter apparatus (half mask P2 APF 10).
Hand Protection	Wear suitable gloves (tested to EN374)
Eye Protection	Wearing of eye/face protection is required. Chemical goggles should be consistent with EN 166 or equivalent.
Skin and Body Protection	Hands protection according to EN 374: material: rubber or PVC or other plastic materal gloves, glove thickness: 0.5 mm, break through time: >= 8 h. Body Protection: light weight protective clothing, rubber or neoprene footwear.
Hygiene measures	Keep away from foodstuffs, beverages and food. Take off immediately all contaminated clothing Clean skin thoroughly immediately after handling the product. Clean skin thoroughly immediately after handling the product. Avoid contact with the eyes and skin Do not breathe dust

4.2 Environment related measures	
Abatement measures related with wastewater	This substance is completely consumed during use and therefore there is practically no release to wastewater.
Abatement measures related with air emissions	Local exhaust ventilation is installed, with - ERC 6a min. 99% imissions reduction - ERC 6b min 90% emission reduction - ERC 6d min 99.9 emission reduction
Abatement measures related to soil	This substance is completely consumed during use and therefore there is practically no release to soil.

4.3 Waste related measures	
Disposal technique	Normally there is no waste. No unreacted persulfate remains.

5. Prediction of exposure resulting from the conditions described above and the substance properties

Summary of long term exposure concentration to workers (worst cases) Calculated with ECETOC TRA

routes of exposure	Concentrations
Dermal local exposure (mg/cm^2)	0.5190
Dermal systemic exposure (mg/kg bw/day)	3.5600 (Consexpo (v4.1, RIVM, 2005) - Tier II)
Inhalation exposure (mg/m^3/8h workday)	0.6940
Combined systemic exposure (mg/kg bw/day)	1.9251* (Consexpo (v4.1, RIVM, 2005) - Tier II)

Indirect exposure of humans via the environment (oral), Calculated using EUSES (v2.1)
Total daily dose for oral exposure via the environment (mg/kg bw/d)

ERC	Exposed via local concentration	Exposed via local and regional concentration
6A	3.62E-03	3.98E-03
6B	8.81E-04	1.24E-03
6D	2.59E-03	2.95E-03

Environment - Predicted Exposure Concentrations (PEC), Calculated using EUSES (v2.1)

compartment	PEC Local	PEC Local + Regional
Freshwater (mg/L)	0	0.0104
Marine water (mg/L)	0	9.66E-04
Freshwater sediments (mg/kg wwt)	0	8.82E-03
Marine water sediments (mg/kg wwt)	0	0
Agricultural soil averaged - 30 days (mg/kg wwt)	ERC6A: 9.55E-03 ERC6B: 1.91E-03 ERC6D: 6.68E-03	ERC6A: 0.0103 ERC6B: 2.62E-03 ERC6D: 7.39E-03
Agricultural soil averaged - 180 days (mg/kg wwt)	ERC6A: 9.55E-03 ERC6B: 1.91E-03	ERC6A: 0.0103 ERC6B: 2.62E-03

	ERC6D: 6.68E-03	ERC6D: 7.39E-03
Grassland averaged (mg/kg wwt)	ERC6A: 0.0128 ERC6B: 2.57E-03 ERC6D: 8.99E-03	ERC6A: 0.0135 ERC6B: 3.28E-03 ERC6D: 9.70E-03
Groundwater (mg/L)	0	ERC6A: 0.0591 ERC6B: 0.0151 ERC6D: 0.0426
Air - During emission (mg/m^3)	ERC6A: 1.85E-03 ERC6B: 3.71E-04 ERC6D: 1.30E-03	0
Air - Annual average (mg/m^3)	ERC6A: 1.52E-03 ERC6B: 3.05E-03 ERC6D: 1.07E-03	ERC6A: 1.52E-03 ERC6B: 3.05E-03 ERC6D: 1.07E-03
Air - Annual deposition (mg/m^3)	ERC6A: 0.546 ERC6B: 0.0109 ERC6D: 0.0382	0
Sewage	0	0
Secondary poisoning - PECoral predator (mg/kg wwt)	0.0146	0.025
Secondary poisoning - PECoral top predator (mg/kg wwt)	1.36E-03	2.33E-03
Secondary poisoning -Concentration earthworm (mg/kg wwt)	ERC6A: 0.024 ERC6B: 7.01E-03 ERC6D: 0.0177	ERC6A: 2.45E-02 ERC6B: 7.54E-03 ERC6D: 1.82E-02

Exposure scenario

1. Short title of exposure scenario 3
Profesional Use, End uses of subtances in preparations for professional use.

2. Descriptions of activities and processes covered in the exposure scenario	
Sector of use (SU)	SU22 - Professional uses: Public domain (administration, education, entertainment, services, craftsmen)
Product category (PC)	Not applicable
Process category (PROC)	PROC8a - Transfer of substance or mixture (charging/discharging) from/to vessels/large containers at non dedicated facilities PROC8b - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities PROC9 - Transfer of substance or mixture into small containers (dedicated filling line, including weighing) PROC10 - Roller application or brushing PROC11 - Non industrial spraying PROC13 - Treatment of articles by dipping and pouring PROC14 - Production of mixtures or articles by tabletting, compression, extrusion, pelletization PROC15 - Use as a laboratory reagent PROC19 - Hand-mixing with intimate contact and only PPE available PROC23 - Open processing and transfer operations with minerals/metals at elevated temperature
Article category (AC)	Not applicable
Environmental release category (ERC)	ERC8b - Wide dispersive indoor use of reactive substances in open systems ERC8e - Wide dispersive outdoor use of reactive substances in open systems

3. Operational conditions for which the exposure scenario ensures control of risk	
3.1 Operational conditions related with substance/product	
Physical form of product in which the substance is contained	Solid and liquid
Concentration of substance in mixture or article	Solid: up to 100% Liquid: max 25% (teir I concentrations up to 100%)
Categorisation of dust grades	dustiness max. 13% of particles below 10 µm

3.2 Operational conditions related with frequency and quantities of use	
Duration of exposure at workplace	max. 6-8 hours/day (for one worker)
Frequency of exposure at workplace	Max. 365 days/year (for one worker) Continuous release: 300 days/year (environmental exposure)
Regional tonnage per year	40000 t/year
Emissions days per site	max 365 days/year
Fraction of the main local source	0.002

3.3 Other operational conditions determining exposure	
Fraction released to air	Substance release to the environment can be practically excluded. The substance is complete consumed in the reaction. No unreacted substance is present in the final product.
Packaging	moisture-resistant, dust-tight packaging: 25 and 50 kg polyethylene bags, 1 ton big bag (polypropylene coated textile)
Human factors not influenced by risk management	Respiration volume under conditions of use: 10 m^3/8 h-day (light activity) Area of potential skin contact under conditions of use: two hands and face (480 cm^2) Body weight: 70 kg (worker)
Dilution factor (freshwater)	Rivers = 100 (default = 10)
Dilution factor (seawater)	Coastal zones = 1000 (default = 100)

4. RMMs that, in combination with the operational conditions of use, ensure control of risk	
4.1 RMMs related to workers	
Organizational measures	All personnel are trained. Wearing of protective clothing/personal protective equipment is mandatory. Storage measures to avoid dispersion towards workers: Keep container tightly closed in a cool dry place. Storage away from foodstuffs, reducing agents, heavy-metal compounds, acids and

	alkalis, protected from humidity and water. Protect from sources of hear. Store not together with inflammable substances.
Technical measures	Good general ventilation should be provided
Respiratory Protection	Breathing equipment (according to EN 143). In case of brief exposure or low pollution use breathing filter apparatus (half mask P2 APF 10).
Hand Protection	Wear suitable gloves (tested to EN374)
Eye Protection	Wearing of eye/face protection is required. Chemical goggles should be consistent with EN 166 or equivalent.
Skin and Body Protection	Hands protection according to EN 374: material: rubber or PVC or other plastic materal gloves, glove thickness: 0.5 mm, break through time: >= 8 h. Body Protection: light weight protective clothing, rubber or neoprene footwear.
Hygiene measures	Keep away from foodstuffs, beverages and food. Take off immediately all contaminated clothing Clean skin thoroughly immediately after handling the product. Clean skin thoroughly immediately after handling the product. Avoid contact with the eyes and skin Do not breathe dust

4.2 Environment related measures	
Abatement measures related with wastewater	Substance emissions can be practically excluded.
Abatement measures related with air emissions	Substance emissions can be practically excluded.
Abatement measures related to soil	Substance emissions can be practically excluded.

4.3 Waste related measures	
Disposal technique	Normally there is no waste. No unreacted persulfate remains.

5. Prediction of exposure resulting from the conditions described above and the substance properties

Summary of long term exposure concentration to workers (worst cases) Calculated with ECETOC TRA

***Consexpo (v4.1, RIVM, 2005) - (Tier II)**

routes of exposure	Concentrations
Dermal local exposure (mg/cm^2)	0.2311
Dermal systemic exposure (mg/kg bw/day)	3.17100*
Inhalation exposure (mg/m^3/8h workday)	0.6940*
Combined systemic exposure (mg/kg bw/day)	3.1700*

Indirect exposure of humans via the environment (oral), Calculated using EUSES (v2.1) - ERC8B and ERC 8E	
Route of Exposure	Estimated Exposure Concentrations
Wet Fish (mg/kg/day)	7.48E-05
Drinking water (mg/L/day)	9.21E-04
Meat (mg/kg/day)	6.54E-09
Leafy Crops (mg/kg/day)	3.95E-05
Root Crops (mg/kg/day)	2.39E-05
Milk (mg/kg/day)	1.22E-07
Air (mg/m^3)	7.45E-11
Total daily dose (via local concentration) (mg/kg/day)	1.06E-03
Total daily dose (via local and regional concentration) (mg/kg/day)	1.42E-03

Environment - Predicted Exposure Concentrations (PEC), Calculated using EUSES (v2.1)

compartment	PEC Local	PEC Local + Regional
Freshwater (mg/L)	0.0219	0.0322
Marine water (mg/L)	2.19E-03	3.16E-03
Freshwater sediments (mg/kg wwt)	--	0.0274
Marine water sediments (mg/kg wwt)	--	2.69E-03
Agricultural soil averaged - 30 days (mg/kg wwt)	2.54E-04	9.63E-04
Agricultural soil averaged - 180 days (mg/kg wwt)	1.02E-04	8.11E-04
Grassland averaged (mg/kg wwt)	2.83E-05	7.38E-04
Groundwater (mg/L)	--	4.68E-03
Air - During emission (mg/m^3)	2.24E-10	--
Air - Annual average (mg/m^3)	2.24E-10	2.61E-10

Air - Annual deposition (mg/m^3)	8.02E-09	--
Sewage (PECSTP; mg/L)	0.219	--
Sewage Sludge (mg/kg dw)	0.219	--
Secondary poisoning - PECoral predator (mg/kg wwt)	0.0301	4.05E-02
Secondary poisoning - PECoral top predator (mg/kg wwt)	1.67E-03	2.64E-03
Secondary poisoning -Concentration earthworm (mg/kg wwt)	2.98E-03	3.51E-02

SAFETY DATA SHEET
Klozur® SP

SDS # : 7775-27-1-12
Revision date: 2016-08-01
Format: NA
Version 1.03

1. PRODUCT AND COMPANY IDENTIFICATION

Product Identifier

Product Name Klozur® SP

Other means of identification

CAS-No 7775-27-1
Synonyms Sodium Persulfate; Sodium Peroxydisulfate; Disodium Peroxydisulfate; Peroxydisulfuric acid, disodium salt; Peroxydisulfuric acid, sodium salt.

Alternate Commercial Name Klozur® Persulfate

Recommended use of the chemical and restrictions on use

Recommended Use: In situ and ex situ chemical oxidation of contaminants and compounds of concern for environmental remediation applications

Restrictions on Use No uses to be advised against were identified.

Manufacturer/Supplier

PeroxyChem LLC
2005 Market Street
Suite 3200
Philadelphia, PA 19103
Phone: +1 267/ 422-2400 (General Information)
E-Mail: sdsinfo@peroxychem.com

Emergency telephone numbers

For leak, fire, spill or accident emergencies, call:
1 800 / 424 9300 (CHEMTREC - U.S.A.)
1 703 / 527 3887 (CHEMTREC - Collect - All Other Countries)
1 303/ 389-1409 (Medical - U.S. - Call Collect)

2. HAZARDS IDENTIFICATION

Classification

OSHA Regulatory Status
This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200)

Acute toxicity - Oral	Category 4
Skin corrosion/irritation	Category 2
Serious eye damage/eye irritation	Category 2B
Respiratory sensitization	Category 1
Skin sensitization	Category 1
Specific target organ toxicity (single exposure)	Category 3
Oxidizing Solids	Category 3

GHS Label elements, including precautionary statements

EMERGENCY OVERVIEW

Danger

Hazard Statements
H334 - May cause allergy or asthma symptoms or breathing difficulties if inhaled
H335 - May cause respiratory irritation
H320 - Causes eye irritation
H315 - Causes skin irritation
H317 - May cause an allergic skin reaction
H302 - Harmful if swallowed
H272 - May intensify fire; oxidizer

Precautionary Statements - Prevention
P261 - Avoid breathing dust.
P285 - In case of inadequate ventilation wear respiratory protection
P271 - Use only outdoors or in a well-ventilated area
P280 - Wear protective gloves/ protective clothing
P264 - Wash face, hands and any exposed skin thoroughly after handling
P210 - Keep away from heat/sparks/open flames/hot surfaces. - No smoking
P220 - Keep/Store away from clothing/combustible materials
P221 - Take any precaution to avoid mixing with combustibles

Precautionary Statements - Response
P305 + P351 + P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
P337 + P313 - If eye irritation persists: Get medical advice/ attention
P302 + P352 - IF ON SKIN: Wash with plenty of water.
P333 + P313 - If skin irritation or rash occurs: Get medical advice/ attention
P304 + P341 - IF INHALED: If breathing is difficult, remove to fresh air and keep at rest in a position comfortable for breathing
P342 + P311 - If experiencing respiratory symptoms: Call a POISON CENTER or doctor
P301 + P312 - IF SWALLOWED: Call a POISON CENTER or doctor if you feel unwell
P330 - Rinse mouth
P370 + P378 - In case of fire: Use water spray for extinction

Precautionary Statements - Storage
P403 + P233 - Store in a well-ventilated place. Keep container tightly closed

Hazards not otherwise classified (HNOC)
No hazards not otherwise classified were identified.

Other Information Risk of decomposition by heat or by contact with incompatible materials

Unknown acute toxicity
0% of the mixture consists of ingredient(s) of unknown toxicity

3. COMPOSITION/INFORMATION ON INGREDIENTS

Formula Na2O8S2

Chemical name	CAS-No	Weight %
Sodium Persulfate	7775-27-1	> 99

4. FIRST AID MEASURES

General Advice May produce an allergic reaction.

Eye Contact Rinse thoroughly with plenty of water for at least 15 minutes, lifting lower and upper eyelids intermittently. Consult a physician. If symptoms persist, call a physician.

Skin Contact Wash off immediately with soap and plenty of water while removing all contaminated clothes and shoes. Get medical attention if irritation develops and persists.

Inhalation Remove from exposure, lie down. If breathing is irregular or stopped, administer artificial respiration. Call a physician immediately.

Ingestion Do NOT induce vomiting. Call a physician or poison control center immediately. Rinse mouth. Drink 1 or 2 glasses of water.

Most important symptoms and effects, both acute and delayed Itching; Redness; Coughing and/ or wheezing.

Indication of immediate medical attention and special treatment needed, if necessary Treat symptomatically

5. FIRE-FIGHTING MEASURES

Suitable Extinguishing Media Water. Cool containers with flooding quantities of water until well after fire is out.

Unsuitable extinguishing media Do not use carbon dioxide or other gas filled fire extinguishers; they will have little effect on decomposing persulfate.

Specific Hazards Arising from the Chemical Decomposes under fire conditions to release oxygen that intensifies the fire.

Flammable properties Contact with combustible material may cause fire

Explosion data
Sensitivity to Mechanical Impact Not sensitive.
Sensitivity to Static Discharge Not sensitive.

Protective equipment and precautions for firefighters As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

6. ACCIDENTAL RELEASE MEASURES

Personal Precautions Keep off any unprotected persons. Avoid contact with the skin and the eyes. Avoid breathing dust. Wear personal protective equipment.

Other Never add other substances or combustible waste to product residues.

Environmental Precautions Prevent material from entering into soil, ditches, sewers, waterways, and/or groundwater. See Section 12, Ecological Information for more detailed information.

Methods for Containment Vacuum, shovel or pump waste into a drum and label contents for disposal. Avoid dust formation. Store in closed container.

Methods for cleaning up Clean up spill area and treat as special waste. Dispose of waste as indicated in Section 13.

7. HANDLING AND STORAGE

Handling Wear personal protective equipment. Use only in area provided with appropriate exhaust ventilation. Avoid dust formation. Handle product only in closed system or provide appropriate exhaust ventilation at machinery. Avoid contact with skin and eyes. Avoid breathing dust. Remove and wash contaminated clothing before re-use. Reference to other sections.

Storage Keep containers tightly closed in a dry, cool and well-ventilated place. Keep away from heat. Do not store near combustible materials. Avoid contamination of opened product. Keep away from food, drink and animal feedingstuffs. Avoid formation and deposition of dust.

Incompatible products Acids, Alkalis, Halides, Combustible materials, Organic material, Reducing agents. Acids, alkalis, halides (fluorides, chlorides, bromides), combustible materials, reducing agents and organic compounds.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Control parameters

Exposure Guidelines .

Chemical name	ACGIH TLV	OSHA PEL	NIOSH	Mexico
Sodium Persulfate 7775-27-1	TWA: 0.1 mg/m³	-	-	-
Chemical name	**British Columbia**	**Quebec**	**Ontario TWAEV**	**Alberta**
Sodium Persulfate 7775-27-1	TWA: 0.1 mg/m³	-	TWA: 0.1 mg/m³	TWA: 0.1 mg/m³

Appropriate engineering controls

Engineering measures Provide local exhaust or general ventilation adequate to maintain exposures below permissable exposure limits.

Individual protection measures, such as personal protective equipment

Eye/Face Protection Eye protection recommended. Chemical goggles consistent with EN 166 or equivalent.

Skin and Body Protection Wear long-sleeved shirt, long pants, socks, and shoes.

Hand Protection Protective gloves: Neoprene gloves, Polyvinylchloride, Natural Rubber.

Respiratory Protection If exposure limits are exceeded or irritation is experienced, NIOSH/MSHA approved respiratory protection should be worn: particulate filtering facepiece respirators.

Hygiene measures Keep away from food, drink and animal feeding stuffs. Do not eat, drink or smoke when using this product. Wash hands before breaks and after shifts. Keep work clothes separate, remove contaminated clothing - launder after open handling of product.

General information Protective engineering solutions should be implemented and in use before personal protective equipment is considered.

9. PHYSICAL AND CHEMICAL PROPERTIES

Information on basic physical and chemical properties

Appearance	Crystalline solid
Physical State	Solid
Color	White
Odor	odorless
Odor threshold	Not applicable
pH	6.0 (1% solution)
Melting point/freezing point	180 °C (Decomposes)
Boiling Point/Range	Decomposes upon heating
Flash point	Not flammable
Evaporation Rate	No information available
Flammability (solid, gas)	Not flammable
Flammability Limit in Air	Not applicable
Upper flammability limit:	No information available
Lower flammability limit:	No information available
Vapor pressure	6.07E-30 mm Hg at 25ºC
Vapor density	No information available
Density	2.59 g/cm³ (crystal density)
Specific gravity	No information available
Water solubility	42 % @ 25 °C
Solubility in other solvents	No information available
Partition coefficient	No information available (inorganic)
Autoignition temperature	No evidence of combustion up to 600°C No evidence of combustion up to 600 °C
Decomposition temperature	> 100 °C (assume)
Viscosity, kinematic	No information available (Solid)
Viscosity, dynamic	No information available
Explosive properties	Not explosive
Oxidizing properties	oxidizer
Molecular weight	238.1
VOC content (%)	Not applicable
Bulk density	1.12 g/cm³ (loose)

10. STABILITY AND REACTIVITY

Reactivity None under normal use condtions. Oxidizer. Contact with other material may cause fire

Chemical Stability Stable.

Possibility of Hazardous Reactions None under normal processing.

Hazardous polymerization Hazardous polymerization does not occur.

Conditions to avoid Heat. Moisture.

Incompatible materials Acids, alkalis, halides (fluorides, chlorides, bromides), combustible materials, reducing agents and organic compounds. . Acids, Alkalis, Halides, Combustible materials, Organic material, Reducing agents.

Hazardous Decomposition Products Oxygen which supports combustion

11. TOXICOLOGICAL INFORMATION

Product Information

Unknown acute toxicity 0% of the mixture consists of ingredient(s) of unknown toxicity

LD50 Oral	Sodium Persulfate: 895 mg/kg (rat)
LD50 Dermal	Sodium Persulfate: > 10 g/kg
LC50 Inhalation	Sodium Persulfate: >5.10 mg/L (4h) (rat)

Serious eye damage/eye irritation Irritating to eyes.
Skin corrosion/irritation Minimally irritating.

Sensitization Sodium Persulfate:. May cause sensitization by inhalation and skin contact.

Information on toxicological effects

Symptoms Symptoms of allergic reaction may include rash, itching, swelling and trouble breathing.

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Irritation Irritating to eyes, respiratory system and skin.
corrosivity None.

Carcinogenicity Contains no ingredient listed as a carcinogen.

Mutagenicity Did not show mutagenic effects in animal experiments

Neurological effects Not neurotoxic

Reproductive toxicity This product is not recognized as reprotox by Research Agencies.
Developmental toxicity None known.
Teratogenicity Not teratogenic in animal studies.

STOT - single exposure May cause respiratory irritation.
STOT - repeated exposure Not classified.

Target organ effects Eyes, Lungs.

Aspiration hazard No information available.

12. ECOLOGICAL INFORMATION

Ecotoxicity

Ecotoxicity effects

Sodium Persulfate (7775-27-1)				
Active Ingredient(s)	Duration	Species	Value	Units
Sodium Persulfate	96 h LC50	Rainbow trout	163	mg/L
Sodium Persulfate	48 h LC50	Daphnia magna	133	mg/L
Sodium Persulfate	96 h LC50	Grass shrimp	519	mg/L
Sodium Persulfate	72 h EC50	Algae Selenastrum capricornutum	116	mg/L

Persistence and degradability Biodegradability does not pertain to inorganic substances.

Bioaccumulation Does not bioaccumulate.

Mobility Dissociates into ions.

Other Adverse Effects None known.

13. DISPOSAL CONSIDERATIONS

Waste disposal methods This material, as supplied, is a hazardous waste according to federal regulations (40 CFR 261). It must undergo special treatment, e.g. at suitable disposal site, to comply with local regulations.

Contaminated Packaging Empty remaining contents. Dispose of in accordance with local regulations.

14. TRANSPORT INFORMATION

DOT

UN/ID no	UN 1505
Proper Shipping Name	SODIUM PERSULFATE
Hazard class	5.1
Packing Group	III

TDG

UN/ID no	UN 1505
Proper Shipping Name	SODIUM PERSULFATE
Hazard class	5.1
Packing Group	III

MEX

UN/ID no	UN 1505
Proper Shipping Name	SODIUM PERSULFATE
Hazard class	5.1
Packing Group	III

ICAO

UN/ID no	UN 1505
Proper Shipping Name	SODIUM PERSULFATE
Hazard class	5.1
Packing Group	III

ICAO/IATA

UN/ID no	UN 1505
Proper Shipping Name	SODIUM PERSULFATE
Hazard class	5.1
Packing Group	III

IMDG/IMO

UN/ID no	UN 1505
Proper Shipping Name	SODIUM PERSULFATE
Hazard class	5.1
Packing Group	III

ADR/RID

UN/ID no	UN 1505
Proper Shipping Name	SODIUM PERSULFATE
Hazard class	5.1
Packing Group	III

ADN

Proper Shipping Name	SODIUM PERSULFATE
Hazard class	5.1
Packing Group	III

15. REGULATORY INFORMATION

U.S. Federal Regulations

SARA 313
Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product does not contain any chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372

SARA 311/312 Hazard Categories
This product is not subject to reporting under the Emergency Planning and Community Right-to-Know rule.

Clean Water Act
This product does not contain any substances regulated as pollutants pursuant to the Clean Water Act (40 CFR 122.21 and 40

CFR 122.42)

CERCLA/EPCRA
This material, as supplied, does not contain any substances regulated as hazardous substances under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302) or the Superfund Amendments and Reauthorization Act (SARA) (40 CFR 355). There may be specific reporting requirements at the local, regional, or state level pertaining to releases of this material

US State Regulations

U.S. State Right-to-Know Regulations
This product contains the following substances regulated under state Right-to-Know laws:

Chemical name	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Sodium Persulfate		X			

California Proposition 65
This product does not contain any Proposition 65 chemicals

CANADA

Environmental Emergencies
This product contains no substances listed under Canada's Environmental Emergency regulations.

Canadian National Pollutant Release Inventory
This product contains no substances reportable under Canada's National Pollutant Release Inventory regulations.

International Inventories

Mexico

Mexico - Grade Slight risk, Grade 1

16. OTHER INFORMATION

NFPA	**Health Hazards** 1	**Flammability** 0	**Stability** 1	**Special Hazards** OX
HMIS	**Health Hazards** 1	**Flammability** 0	**Physical hazard** 1	**Special precautions** J

NFPA/HMIS Ratings Legend Special Hazards: OX = Oxidizer
Protection=J (Safety goggles, gloves, apron, combination dust and vapor respirator)

Revision date: 2016-08-01
Revision note Initial Release
Issuing Date: 2017-03-17

Disclaimer
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Prepared By:

PeroxyChem

Safety Data Sheet

Hydrated Lime

Revision date:
June 24, 2015

1. Identification

Product Name: Hydrated Lime

Synonyms:
Chemical Hydrate
Commercial Hydrate
Hyd Chem SS,
Hyd Lime Chem,
Hydrate Tailings,
Hydrated Lime Kiln Dust,
Industrial Hydrate,
Pink Hydrate,

Recommended Uses: Water treatment, steel flux, caustic agent, pH adjustment, acid gas absorption, construction

Manufacturer: Carmeuse Lime & Stone

US Office
11 Stanwix Street, 21st Floor
Pittsburgh, PA 15222
Phone: (412) 995-5500
Fax: (412) 995-5594

Canadian Office
PO Box 190
Ingersoll, ON N5C 3K5
Phone: (519) 423-6283
Fax: (519) 423-6545

Emergency Contact: Infotrac: (800) 535-5053 (24 hrs a day, 7 days a week)

2. Hazards Identification

GHS classification

Physical Hazards

None

Health Hazards

Skin Irritation	Category 2
Eye Damage	Category 1
Carcinogenicity	Category 1A
Specific Target Organ Toxicity – Single Exposure	Category 3

GHS Label Elements:

Signal Word: Danger

Hazard Statements:
Causes skin irritation.
Causes serious eye damage.
May cause respiratory irritation.
May cause cancer through inhalation

Precautionary Statements:
Obtain special instructions before use.
Do not handle until all safety precautions have been read and understood.
Keep container tightly closed
Do not breathe dust.
Wash thoroughly after handling.
Do not eat, drink or smoke when using this product.
Use only outdoors or in well-ventilated area
Wear protective gloves, clothing and eye protection

Pictograms:

3. Composition

Chemical name	% by weight	CAS#
Calcium hydroxide	> 85	1305-62-0
Silica-crystalline quartz	< 1	14808-60-7

4. First Aid Measures

Eyes: Immediately flush eyes with generous amounts of water for at least 15 minutes. Pull back the eyelid to ensure that all lime dust has been washed out. Seek medical attention immediately. Do not rub eyes.

Skin: Wash exposed area with large amounts of water. Seek medical attention immediately.

Ingestion: Do not induce vomiting. Seek medical attention immediately. Never give anything by mouth unless instructed to do so by medical personnel.

Inhalation: Move victim to fresh air. Seek medical attention if necessary. If breathing has stopped, give artificial respiration

Most Important Symptoms: Irritation of skin, eyes, gastrointestinal tract or respiratory tract.

Immediate medical attention / special treatment? See first aid information above. Note to Physicians: Provide general supportive measures and treat symptomatically.

5. Fire Fighting Measures

Suitable (and unsuitable) fire extinguishing media: Use dry chemical fire extinguisher. Do not use water or halogenated compounds, except that large amounts of water may be used to deluge small quantities of this product.

Specific hazards arising from the product Inhalation, skin or eye contact, can result in serious injury. This product is not combustible or flammable. This product is not considered to be an

explosion hazard, although reaction with water or other incompatible materials may rupture containers. When this product is wet, it can be very slippery and can result in a slip hazard. Hazardous Combustion Products: None.

Special protective equipment and precautions for fire fighters

Wear full fire-fighting turn-out gear (full Bunker gear), and respiratory protection (SCBA) to prevent inhalation, skin or eye contact.

6. Accidental Release Measures

Personal precautions, protective equipment, emergency procedures:

Avoid inhalation, eye and skin contact. Avoid generating airborne dust. Wear appropriate protective clothing as described in section 8.

Methods and materials for containment and clean up:

Utilize cleanup methods that minimize generating dust: vacuum. Avoid dry sweeping. Residue on surfaces may be removed with copious amount of water or vinegar.

7. Handling & Storage

Safe Handling: Avoid inhalation, skin and eye contact. Avoid generating airborne dust. An eye wash station should be readily available when this product is handled.

Safe Storage: Keep in tightly closed containers. Protect containers from physical damage. Store in a cool, dry, and well-ventilated location. Do not store near incompatible materials (see Section 10 below). Keep away from moisture. Long-term storage in aluminum containers is not recommended, as calcium oxide may corrode aluminum over long periods of time

8. Exposure Controls/Personal Protection

Occupational Exposure Limits

	OSHA PEL (mg/m^3)	ACGIH TLV (mg/m^3)	Ont. Reg. 833 TWAEV (mg/m^3)
Calcium hydroxide	15 (total) 5 (respirable)	5	5
silica - crystalline quartz	30 / (% silica +2) (total) 10 / (% silica +2) (respirable)	0.025 (respirable)	0.1

Engineering Controls: Use with adequate general or local exhaust ventilation and to maintain exposure below occupational exposure limits.

Individual Protection Measures (Personal Protective Equipment):

Specific Eye / Face Protection:	Safety glasses with side shields. In windy conditions, or if work activity generates elevated airborne dust levels, dust proof or chemical goggles are recommended. Contact lenses should not be worn.
Specific Skin Protection:	When there is a risk of skin contact, wear appropriate clothing and gloves to prevent contact.

Specific Respiratory Protection:	If exposure limits are exceeded, an approved particulate respirator, or supplied air respirator, appropriate for the airborne concentrations, should be used. Selection and use of the respiratory protective equipment must be in accordance with applicable regulations and good industrial hygiene practices.
Other:	An emergency eye wash fountain and shower are recommended.

9. Physical & Chemical Properties

Appearance:	White powder
Odor:	Odorless
Odor threshold:	Not Applicable
pH at 25 degrees C:	12.45
Melting Point:	1076 °F (580 °C)
Boiling Point and range:	5162 °F (2850 °C)
Flash Point:	Not Applicable
Evaporation Rate:	Not Applicable
Flammability:	Not Applicable
Upper/lower flammability or explosive limits	Not Applicable
Vapor pressure/density:	Non Volatile
Relative density:	2.24
Solubility:	Slightly soluble in water: 0.2% @ 0 °C. Soluble in acids, glycerin, and sugar solutions
Partition coefficient: n-octanol/water	Not applicable
Auto-ignition temperature:	Not Available
Decomposition temperature:	Not available
Viscosity:	Not Applicable

10. Stability & Reactivity

Reactivity:	Reacts with acids to form calcium salts, releasing heat. Reacts with carbon dioxide in air to form calcium carbonate. See also Incompatibility below.
Chemical stability:	Stable under normal storage and handling conditions.
Possibility of Hazardous Reactions:	See “reactivity” above.
Conditions to avoid:	Vicinity of incompatible materials.

Incompatibility: This product should not be mixed or stored with the following materials, due to the potential for violent reaction and release of heat:

- acids
- reactive fluoridated compounds
- reactive brominated compounds
- reactive powdered metals
- reactive phosphorous compounds
- aluminum powder
- organic acid anhydrides
- nitro-organic compounds
- interhalogenated compounds

Hazardous decomposition products: None

11. Toxicological Information

Likely routes of exposure & symptoms:

Eyes: Contact can cause severe irritation or burning of eyes, including permanent damage.

Skin: Contact can cause severe irritation or burning of skin, especially in the presence of moisture.

Ingestion: This product can cause severe irritation or burning of gastrointestinal tract if swallowed.

Inhalation: This product can cause severe irritation of the respiratory system.

Chronic health effects: This product contains trace amounts of crystalline silica. Prolonged or repeated inhalation of respirable crystalline silica can cause silicosis, as serious lung disease.

Respiratory or skin sensitization: This material is not known to cause sensitization

Germ cell mutagenicity: No data available.

Carcinogenicity: This product is not listed as carcinogenic by OSHA, IARC, NTP, ACGIH, or the EU Directives. This product may contain trace amounts of crystalline silica quartz which is listed by IARC as “Carcinogenic to Humans” (Group 1) and “Known to be a Human Carcinogen" by NTP (National Toxicology Program).

Reproductive toxicity: No Data Available.

Numerical Measures of Toxicity Crystalline Silica: Oral Rat LD_{50} > 22,500 mg/kg
Calcium Hydroxide: Oral (rat) LD_{50}: 7340 mg/kg

12. Ecological Information

Because of the elevated pH of this product, it might be expected to produce some ecotoxicity upon exposure to certain aquatic organisms and aquatic systems in high concentrations
This material shows no bioaccumulation effect or food chain concentration toxicity.

13. Disposal Considerations

Dispose of contents in accordance with federal, state, provincial and local regulations.

14. Transport Information

Not regulated by Department of Transportation, Transport of Dangerous Goods

15. Regulatory Information

CERCLA Hazardous Substances	Not listed
SARA Toxic Chemical (40 CFR 372.65)	Not listed
SARA Section 302 Extremely Hazardous Substances (40 CFR 355)	Not listed
SARA 311/312	Not listed
SARA Section 313 Toxic Chemicals reporting requirements	None
Threshold planning quantity (TPQ)	Not listed
RCRA Hazardous Waste Classification (40 CFR 261)	Not Classified
EPA Toxic Substances Control Act (TSCA) Status	All of the components of this product are listed on the TSCA
California Proposition 65	Airborne crystalline silica particulates of respirable size are known to the State of California to cause cancer.
NFPA ratings	Health: 3 Fire: 0 Reactivity: 0
HMIS Ratings	Health: 3 Fire: 0 Reactivity: 0 Personal protection: E
OSHA Specifically regulated substance (29 CFR 1910)	Not listed
OSHA Air contaminant (29 CFR 1910.1000, Table Z-1, Z-1-A)	Listed
MSHA	Not listed
Canada DSL	Listed
Canadian WHMIS Classification	D2A, Materials Causing other toxic effects. E, Corrosive Material

Canada CPR This product has been classified in accordance with the hazard criteria of the Controlled Products Regulation of a Canada and this SDS contains all the required information.

16. Other Information

List of GHS Hazard Statements:	H315: Causes skin irritation H318: Causes serious eye damage H335: May cause respiratory irritation. H350: May cause cancer through inhalation
List of GHS Precautionary Statements:	P201: Obtain special instructions before use. P202: Do not handle until all safety precautions have been read and understood. P233: Keep container tightly closed P260: Do not breathe dust. P264: Wash thoroughly after handling. P270: Do not eat, drink or smoke when using this product. P271: Use only outdoors or in well-ventilated area P280: Wear protective gloves, clothing and eye protection

Abbreviations

CERCLA	Comprehensive Environmental Response, Compensation and Liability Act	RCRA	Resource Conservation and Recovery Act
SARA	Superfund Amendments and Reauthorization Act	IARC	International Agency for Research on Cancer
NTP	National Toxicology Program		

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SAFETY DATA SHEET

1. Identification

Product identifier	**Hydrogen Peroxide 30% Standard Grade**
Other means of identification	
SDS Number	320868-05
Recommended use	Bleaching agent; oxidizer.
Recommended restrictions	None known.
Manufacturer/Importer/Supplier/Distributor information	
Company name	Harcros Chemicals Inc
Address	5200 Speaker Rd. Kansas City, KS 66106 United States
Main Telephone Number	1-913-321-3131
Website	www.harcros.com
E-mail	custserv@harcros.com
Emergency #: CHEMTREC	1-800-424-9300
Emergency #: CHEMTREC	1-703-741-5970 (International Number - Call collect)

2. Hazard(s) identification

Physical hazards	Oxidizing liquids	Category 2
Health hazards	Acute toxicity, oral	Category 4
	Skin corrosion/irritation	Category 1B
	Serious eye damage/eye irritation	Category 1
	Specific target organ toxicity, single exposure	Category 3 respiratory tract irritation
Environmental hazards	Not classified.	
OSHA defined hazards	Not classified.	

Label elements

Signal word	Danger
Hazard statement	May intensify fire; oxidizer. Harmful if swallowed. Causes severe skin burns and eye damage. Causes serious eye damage. May cause respiratory irritation.
Precautionary statement	
Prevention	Keep away from heat. Keep/Store away from clothing and other combustible materials. Take any precaution to avoid mixing with combustibles. Do not breathe mist/vapors. Wash thoroughly after handling. Do not eat, drink or smoke when using this product. Use only outdoors or in a well-ventilated area. Wear protective gloves/protective clothing/eye protection/face protection.
Response	If swallowed: Rinse mouth. Do NOT induce vomiting. If on skin (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower. If inhaled: Remove person to fresh air and keep comfortable for breathing. If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a poison center/doctor. Take off contaminated clothing and wash it before reuse. In case of fire: Use appropriate media to extinguish.
Storage	Store away from incompatible materials. Store in a well-ventilated place. Keep container tightly closed. Store locked up. Store in accordance with local,regional,national, and international regulations.
Disposal	Dispose of contents and container in accordance with local, regional, national, and international regulations.

Hazard(s) not otherwise classified (HNOC)	None known.
Supplemental information	30% of the mixture consists of component(s) of unknown acute hazards to the aquatic environment. 30% of the mixture consists of component(s) of unknown long-term hazards to the aquatic environment.

3. Composition/information on ingredients

Mixtures

Chemical name	Common name and synonyms	CAS number	%
Water		7732-18-5	68 - 72
Hydrogen Peroxide		7722-84-1	28 - 32

4. First-aid measures

Inhalation	Remove victim to fresh air and keep at rest in a position comfortable for breathing. Call a poison center or doctor/physician if you feel unwell.
Skin contact	If on clothing: Rinse immediately contaminated clothing and skin with plenty of water before removing clothes. Rinse skin with water/shower. Call a physician or poison control center immediately. Chemical burns must be treated by a physician. Wash contaminated clothing before reuse.
Eye contact	Immediately flush eyes with plenty of water for at least 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Call a physician or poison control center immediately.
Ingestion	Call a physician or poison control center immediately. Rinse mouth. Do not induce vomiting. If vomiting occurs, keep head low so that stomach content doesn't get into the lungs.
Most important symptoms/effects, acute and delayed	Burning pain and severe corrosive skin damage. Causes serious eye damage. Symptoms may include stinging, tearing, redness, swelling, and blurred vision. Permanent eye damage including blindness could result. May cause respiratory irritation.
Indication of immediate medical attention and special treatment needed	Provide general supportive measures and treat symptomatically. Chemical burns: Flush with water immediately. While flushing, remove clothes which do not adhere to affected area. Call an ambulance. Continue flushing during transport to hospital. Keep victim warm. Keep victim under observation. Symptoms may be delayed.
General information	Take off all contaminated clothing immediately. Contact with combustible material may cause fire. If you feel unwell, seek medical advice (show the label where possible). Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves. Show this safety data sheet to the doctor in attendance. Wash contaminated clothing before reuse.

5. Fire-fighting measures

Suitable extinguishing media	Water fog. Foam. Dry chemical powder. Carbon dioxide (CO2).
Unsuitable extinguishing media	Do not use water jet as an extinguisher, as this will spread the fire.
Specific hazards arising from the chemical	Greatly increases the burning rate of combustible materials. Containers may explode when heated. During fire, gases hazardous to health may be formed.
Special protective equipment and precautions for firefighters	Self-contained breathing apparatus and full protective clothing must be worn in case of fire.
Fire fighting equipment/instructions	In case of fire and/or explosion do not breathe fumes. In case of fire: Stop leak if safe to do so. Move containers from fire area if you can do so without risk.
Specific methods	Use standard firefighting procedures and consider the hazards of other involved materials.
General fire hazards	May intensify fire; oxidizer. Contact with combustible material may cause fire.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures	Keep unnecessary personnel away. Keep people away from and upwind of spill/leak. Keep away from clothing and other combustible materials. Wear appropriate protective equipment and clothing during clean-up. Do not breathe mist/vapors. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Ensure adequate ventilation. Local authorities should be advised if significant spillages cannot be contained. For personal protection, see section 8 of the SDS.
Methods and materials for clean-up	Absorb/clean with appropriate and compatible material. Stop flow of material if without risk. Never return spills to original containers for re-use. For waste disposal, see section 13 of the SDS.
Environmental precautions	Avoid discharge into drains, water courses or onto the ground.

7. Handling and storage

Precautions for safe handling

Keep away from heat. Take any precaution to avoid mixing with combustibles. Keep away from clothing and other combustible materials. Do not breathe mist/vapors. Do not get in eyes, on skin, or on clothing. Do not taste or swallow. Avoid prolonged exposure. When using, do not eat, drink or smoke. Provide adequate ventilation. Wear appropriate personal protective equipment. Wash hands thoroughly after handling. Observe good industrial hygiene practices.

Conditions for safe storage, including any incompatibilities

Store locked up. Keep away from heat. Store in a cool, dry place out of direct sunlight. Store in tightly closed container. Store in a well-ventilated place. Do not store near combustible materials. Store away from incompatible materials (see Section 10 of the SDS).

8. Exposure controls/personal protection

Occupational exposure limits

The following constituents are the only constituents of the product which have a PEL, TLV or other recommended exposure limit. At this time, the other constituents have no known exposure limits.

US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000)

Components	Type	Value
Hydrogen Peroxide (CAS 7722-84-1)	PEL	1.4 mg/m3
		1 ppm

US. ACGIH Threshold Limit Values

Components	Type	Value
Hydrogen Peroxide (CAS 7722-84-1)	TWA	1 ppm

US. NIOSH: Pocket Guide to Chemical Hazards

Components	Type	Value
Hydrogen Peroxide (CAS 7722-84-1)	TWA	1.4 mg/m3
		1 ppm

Biological limit values

No biological exposure limits noted for the ingredient(s).

Appropriate engineering controls

Good general ventilation should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level. Eye wash facilities and emergency shower must be available when handling this product.

Individual protection measures, such as personal protective equipment

General

It is recommended that users of this product perform a risk assessment to determine the appropriate PPE.

Eye/face protection

Wear safety glasses with side shields (or goggles) and a face shield.

Skin protection

Hand protection

Wear appropriate chemical resistant gloves. Be aware that the liquid may penetrate the gloves. Frequent change is advisable.

Other

Wear appropriate chemical resistant clothing. Use of an impervious apron is recommended.

Respiratory protection

When workers are facing concentrations above the exposure limit they must use appropriate certified respirators. Chemical respirator with organic vapor cartridge.

Thermal hazards

Wear appropriate thermal protective clothing, when necessary.

General hygiene considerations

Keep from contact with clothing and other combustible materials. Remove and wash contaminated clothing promptly. Keep away from food and drink. Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants.

9. Physical and chemical properties

Appearance

Clear.

Physical state

Liquid.

Form

Liquid.

Color

Colorless

Odor

Odorless.

Odor threshold	Not available.
pH	4.5 - 5.5
Melting point/freezing point	-18.4 °F (-28 °C)
Initial boiling point and boiling range	> 212 °F (> 100 °C)
Flash point	Not available.
Evaporation rate	Not available.
Flammability (solid, gas)	Not applicable.
Upper/lower flammability or explosive limits	
Flammability limit - lower (%)	Not available.
Flammability limit - upper (%)	Not available.
Explosive limit - lower (%)	Not available.
Explosive limit - upper (%)	Not available.
Vapor pressure	Not available.
Vapor density	Not available.
Relative density	Not available.
Solubility(ies)	
Solubility (water)	Complete.
Partition coefficient (n-octanol/water)	Not available.
Auto-ignition temperature	Not available.
Decomposition temperature	Not available.
Viscosity	Not available.
Other information	
Explosive properties	Not explosive.
Flash point class	Non-flammable.
Oxidizing properties	May intensify fire; oxidizer.
Percent volatile	100
pH in aqueous solution	5 - 6
Specific gravity	1.111 @ 20°C

10. Stability and reactivity

Reactivity	Greatly increases the burning rate of combustible materials.
Chemical stability	Material is stable under normal conditions.
Possibility of hazardous reactions	Hazardous polymerization does not occur.
Conditions to avoid	Heat. Avoid temperatures exceeding the decomposition temperature. Contact with incompatible materials.
Incompatible materials	Combustible material. Reducing agents.
Hazardous decomposition products	No hazardous decomposition products are known.

11. Toxicological information

Information on likely routes of exposure

Inhalation	May cause irritation to the respiratory system. Prolonged inhalation may be harmful.
Skin contact	Causes severe skin burns.
Eye contact	Causes serious eye damage.
Ingestion	Causes digestive tract burns. Harmful if swallowed.
Symptoms related to the physical, chemical and toxicological characteristics	Burning pain and severe corrosive skin damage. Causes serious eye damage. Symptoms may include stinging, tearing, redness, swelling, and blurred vision. Permanent eye damage including blindness could result. May cause respiratory irritation.

Information on toxicological effects

Acute toxicity In high concentrations, vapors are anesthetic and may cause headache, fatigue, dizziness and central nervous system effects. Harmful if swallowed.

Components	Species	Test Results
Hydrogen Peroxide (CAS 7722-84-1)		
Acute		
Dermal		
LD50	Rat	4060 mg/kg
Inhalation		
LC50	Rat	1418 mg/l, 4 hours
Oral		
LD50	Rat	560 mg/kg bw/day

Skin corrosion/irritation Causes severe skin burns and eye damage.

Serious eye damage/eye irritation Causes serious eye damage.

Respiratory or skin sensitization

Respiratory sensitization Not a respiratory sensitizer.

Skin sensitization This product is not expected to cause skin sensitization.

Germ cell mutagenicity No data available to indicate product or any components present at greater than 0.1% are mutagenic or genotoxic.

Carcinogenicity Not classifiable as to carcinogenicity to humans.

IARC Monographs. Overall Evaluation of Carcinogenicity

Hydrogen Peroxide (CAS 7722-84-1) 3 Not classifiable as to carcinogenicity to humans.

OSHA Specifically Regulated Substances (29 CFR 1910.1001-1053)

Not listed.

US. National Toxicology Program (NTP) Report on Carcinogens

Not listed.

Reproductive toxicity This product is not expected to cause reproductive or developmental effects.

Specific target organ toxicity - single exposure May cause respiratory irritation.

Specific target organ toxicity - repeated exposure Not classified.

Aspiration hazard Not an aspiration hazard.

Chronic effects Prolonged inhalation may be harmful.

12. Ecological information

Ecotoxicity The product is not classified as environmentally hazardous. However, this does not exclude the possibility that large or frequent spills can have a harmful or damaging effect on the environment.

Persistence and degradability No data is available on the degradability of any ingredients in the mixture.

Bioaccumulative potential No data available.

Mobility in soil No data available.

Other adverse effects No other adverse environmental effects (e.g. ozone depletion, photochemical ozone creation potential, endocrine disruption, global warming potential) are expected from this component.

13. Disposal considerations

Disposal instructions Collect and reclaim or dispose in sealed containers at licensed waste disposal site. Incinerate the material under controlled conditions in an approved incinerator. Do not incinerate sealed containers. If discarded, this product is considered a RCRA ignitable waste, D001. Dispose of contents/container in accordance with local/regional/national/international regulations.

Waste from residues / unused products Dispose of in accordance with local regulations. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe manner (see: Disposal instructions).

Contaminated packaging Since emptied containers may retain product residue, follow label warnings even after container is emptied. Empty containers should be taken to an approved waste handling site for recycling or disposal.

14. Transport information

DOT

UN number	UN2014
UN proper shipping name	Hydrogen peroxide, aqueous solution 20 to 40%
Transport hazard class(es)	
Class	5.1
Subsidiary risk	8
Label(s)	5.1, 8
Packing group	II
Special precautions for user	Read safety instructions, SDS and emergency procedures before handling.
Special provisions	12, B53, B80, B81, B85, IB2, IP5, T7, TP2, TP6, TP24, TP37
Packaging exceptions	None
Packaging non bulk	202
Packaging bulk	243

IATA

UN number	UN2014
UN proper shipping name	Hydrogen peroxide, aqueous solution 20 to 40%
Transport hazard class(es)	
Class	5.1
Subsidiary risk	8
Packing group	II
Environmental hazards	No.
ERG Code	5C
Special precautions for user	Read safety instructions, SDS and emergency procedures before handling.
Other information	
Passenger and cargo aircraft	Forbidden
Cargo aircraft only	Forbidden

IMDG

UN number	UN2014
UN proper shipping name	Hydrogen peroxide, aqueous solution 20 to 40%
Transport hazard class(es)	
Class	5.1
Subsidiary risk	8
Label(s)	5.1, 8
Packing group	II
Environmental hazards	
Marine pollutant	No.
EmS	Not available.
Special precautions for user	Read safety instructions, SDS and emergency procedures before handling.

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code Not established.

DOT

IATA; IMDG

15. Regulatory information

US federal regulations This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

Toxic Substances Control Act (TSCA) All components of the mixture on the TSCA 8(b) inventory are designated “active”.

TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)

Not regulated.

CERCLA Hazardous Substance List (40 CFR 302.4)

Not listed.

SARA 304 Emergency release notification

HYDROGEN PEROXIDE (CONC.> 52%) (CAS 7722-84-1) 1000 LBS

OSHA Specifically Regulated Substances (29 CFR 1910.1001-1053)

Not listed.

Superfund Amendments and Reauthorization Act of 1986 (SARA)

SARA 302 Extremely hazardous substance

Not listed.

SARA 311/312 Hazardous chemical Yes

Classified hazard categories
Oxidizer (liquid, solid, or gas)
Acute toxicity (any route of exposure)
Skin corrosion or irritation
Serious eye damage or eye irritation
Specific target organ toxicity (single or repeated exposure)

SARA 313 (TRI reporting)

Not regulated.

US state regulations

California Proposition 65

California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65): This material is not known to contain any chemicals currently listed as carcinogens or reproductive toxins. For more information go to www.P65Warnings.ca.gov.

International Inventories

Country(s) or region	Inventory name	On inventory (yes/no)*
Australia	Australian Inventory of Chemical Substances (AICS)	Yes
Canada	Domestic Substances List (DSL)	Yes
Canada	Non-Domestic Substances List (NDSL)	No
China	Inventory of Existing Chemical Substances in China (IECSC)	Yes
Europe	European Inventory of Existing Commercial Chemical Substances (EINECS)	Yes
Europe	European List of Notified Chemical Substances (ELINCS)	No
Japan	Inventory of Existing and New Chemical Substances (ENCS)	Yes
Korea	Existing Chemicals List (ECL)	Yes
New Zealand	New Zealand Inventory	Yes
Philippines	Philippine Inventory of Chemicals and Chemical Substances (PICCS)	Yes

Country(s) or region	Inventory name	On inventory (yes/no)*
Taiwan	Taiwan Chemical Substance Inventory (TCSI)	Yes
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	Yes

*A "Yes" indicates that all components of this product comply with the inventory requirements administered by the governing country(s)
A "No" indicates that one or more components of the product are not listed or exempt from listing on the inventory administered by the governing country(s).

16. Other information, including date of preparation or last revision

Issue date 12-17-2014

Revision date 07-28-2021

Material ID 4417

Version # 06

HMIS® ratings
Health: 3
Flammability: 0
Physical hazard: 2

NFPA ratings
Health: 3
Flammability: 0
Instability: 0
Special hazards: OX

Disclaimer
The information provided in this Safety Data Sheet has been obtained from sources believed to be reliable. Harcros Chemicals Inc., provides no warranties, either expressed or implied and assumes no responsibility for the accuracy or completeness of the data contained herein. This information is offered for your information, consideration, and investigation. You should satisfy yourself that you have all current data relevant to your particular use. Harcros Chemicals Inc., knows of no medical condition, other than those noted on this Safety Data Sheet, which are generally recognized as being aggravated by exposure to this product.

Revision information
Product and Company Identification: Product and Company Identification
Hazard(s) identification: Response
First-aid measures: Inhalation
GHS: Classification

SECTION 1 – IDENTIFICATION OF MATERIAL AND SUPPLIER

Product Name: ISOTEC[SM] Catalyst Series 4260 Component-A Powder Mix
Recommended Use: Environmental Remediation
Uses advised against: No information available
Details of the supplier of the safety data sheet:

Supplier Name: ISOTEC Remediation Technologies, LLC
Supplier Address: 11 Princess Rd, Suite A
Lawrenceville, NJ 08648, USA

EMERGENCY TELEPHONE NUMBER(S): **(609) 275-8500 (USA)**

C.A.S. CHEMICAL NAME:	-
SYNONYMS:	Iron Catalyst
CHEMICAL FAMILY:	Not Applicable
EMPIRICAL FORMULA:	MIXT (Proprietary)
INTENDED USE:	Catalyst

SECTION 2 – HAZARDS IDENTIFICATION

Classification

Acute Toxicity, Oral	Category 4
Skin irritation	Category 2
Eye Irritation	Category 2A

Pictogram:

Signal Word
Warning

Hazard Statement
Harmful if swallowed
Causes skin irritation
May cause serious eye irritation

Appearance/Odor: Light green powder with metallic odor.
Precautionary statement(s): Wash skin thoroughly after handling. Do not eat, drink, or smoke when using this product. Wear protective gloves, eye protection/face protection.

IF SWALLOWED: Call a POISON CENTER or doctor/ physician if you feel unwell. Rinse mouth.
IF ON SKIN: Wash with plenty of soap and water. If skin irritation occurs: Get medical advice/attention. Take off contaminated clothing and wash before reuse.
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical advice/attention.
Hazards not otherwise classified (HNOC): None
Specific treatment (see section 4 for more information).

Applicable properties are relevant to the mixture as a whole when certain proprietary ingredients present at their highest concentrations. Please note that the effects are normally lower for a typical mixture with smaller concentrations of these ingredients present.

SECTION 3 – COMPOSITION/ INFORMATION ON INGREDIENTS

Components	CAS Number	Proportion	Risk Phrases
Iron Compound	-	>60%	-

SECTION 4 – FIRST AID MEASURES

EYE CONTACT: Hold eyelids apart and immediately flush eyes with plenty of water for at least 15 minutes. Call a physician if irritations persist.
SKIN CONTACT: Wash affected area immediately with soap and water.
INHALATION: In case of inhalation or suspected inhalation, move patient at once to fresh air and call a physician. Keep patient absolutely quiet. If breathing has stopped or is labored, give assisted respiration (e.g., mouth-to-mouth). Supplemental oxygen may be indicated.
INGESTION: If swallowed, call a physician immediately. Induce vomiting or remove stomach contents by gastric suction only as directed by medical personnel. Wash mouth with plenty of water. Never give anything by mouth to an unconscious person.
Most important symptoms and effects, both acute and delayed: The most important known symptoms and effects are described in the labeling (see Section 2.2) and/or in Section 11.
Indication of any immediate medical attention and special treatment needed: No data available.

SECTION 5 – FIRE FIGHTING MEASURES

CHARACTERISTICS:

Flash Point	No Data Available
Upper Explosive Limit (UEL)	No Data Available
Lower Explosive Limit (LEL)	No Data Available
Autoignition Temperature	No Data Available
Flash Point Method(s)	No Data Available
Unusual Fire & Explosion Hazards	No Data Available
Fire Hazard Classification (OSHA/NFPA)	No Data Available

EXTINGUISHING MEDIA: Product is noncombustible. Use extinguishing method suitable for surrounding fire.

UNSUITABLE EXTINGUISHING MEDIA: None Known

SPECIFIC HAZARDS ARISING FROM THE CHEMICAL: Sulphur oxides, Iron oxides

SPECIAL FIRE FIGHTING PROCEDURES Firefighters should wear full-face, self contained breathing apparatus and impervious protective clothing, butyl rubber boots, and gloves.

SPECIAL FIRE FIGHTING PROCEDURES: Use water spray to cool all affected containers. Avoid skin contact. Contain runoff water in dikes. Prevent stream contamination. Expended liquids from fire fighting should be diverted to an active sanitary sewer line.

UNUSUAL FIRE AND EXPLOSION HAZARDS: May emit sulfur oxide vapors under burning conditions. See Section 6 for hazardous combustion products.

Hazchem Code: Not applicable

SECTION 6 – ACCIDENTAL RELEASE MEASURES

CLEAN-UP PROCEDURES: Sweep up and repackage or place in receptacle for future disposal.

OTHER EMERGENCY ADVICE: Avoid eye and skin contact. Wear protective clothing including nitrile gloves, safety goggles, dust mask/face covering and Tyvek apron when handling. Stored materials should be placed in a dry and reasonably temperature area, preferably below 24^{o}C.

WASTE DISPOSAL: Remove to properly designated landfill. Observe all federal, state and local environmental regulations.

ENVIRONMENTAL EFFECTS: Data not yet available

SECTION 7 – HANDLING AND STORAGE

Precautions for safe handling: Avoid contact with skin and eyes. Avoid formation of dust and aerosols. Provide appropriate exhaust ventilation at places where dust is formed. For precautions see Section 2.

Conditions for safe storage: Keep container tightly closed in a dry and well-ventilated place. Air Sensitive. Hygroscopic. Store in original container. Isolate from strong oxidizers.
Specific end use(s): Apart from the uses mentioned in Section 1 no other specific uses are stipulated.
Signage: Signs will be attached to each drum containing ISOTEC^{SM} Catalyst Series 4260 Component-A Powder Mix. SDS sheets will be provided at the site.

SECTION 8 – PERSONAL PROTECTION/ EXPOSURE CONTROLS

EYE PROTECTION: Splash proof goggles or safety glasses.
HAND PROTECTION: Impermeable gloves made of Nitrile or rubber.
RESPIRATORY PROTECTION: Wear appropriate full-face respirator with HEPA cartridges for protection against excessive particulate dust during bagging in the warehouse. Dust mask or face covering may also be worn during batching in the field if windy conditions exist.
PROTECTIVE CLOTHING: Long sleeved clothing (e.g., cotton coveralls or Tyvek). Do not wear short trousers
ENGINEERING CONTROLS: Avoid drafts that may disperse material beyond the work area. Use light water spray for dust suppression
WORK AND HYGIENIC PRACTICES: Provide readily accessible eye wash stations. Wash at the end of each work shift and before eating, smoking or using the toilet

SECTION 9 – PHYSICAL AND CHEMICAL PROPERTIES

Physical Properties:

PHYSICAL FORM	Powder
COLOR	Light Green
ODOR	Metallic
TYPICAL PHYSICAL DATA:	
pH (10% aqueous)	3.5-3.9
VAPOR PRESSURE (mm Hg)	0
VAPOR DENSITY (Air = 1)	Not Applicable
BOILING POINT	Decomposition at 300^{o}C
FREEZING/MELTING POINT	Not Applicable
SOLUBILITY IN WATER	57% by weight @ 158^{o}C
SPECIFIC GRAVITY (Water = 1)	1.899 @ 14^{o}/ 8^{o}C
EVAPORATION RATE (Butylacetate = 1)	Non Volatile
VISCOSITY (CPS)	Not Evaluated

SECTION 10 – STABILITY AND REACTIVITY

Reactivity: No data available.
Chemical Stability: Stable under recommended storage conditions.
Possibility of Hazardous Reactions: No data available.
Hazardous: Polymerization: No data available.
Conditions to Avoid: No data available.
Incompatible Materials: Strong oxidizing agents.
Hazardous Decomposition Products: Other decomposition products – no data available.

SECTION 11 –TOXICOLOGICAL INFORMATION

Information on likely routes of exposure

Product Information:

Inhalation:	No data available
Eye Contact:	No data available
Skin Contact:	No data available
Ingestion:	Harmful if swallowed

Component Information:

Symptoms:	No data available

Delayed and immediate effects as well as chronic effects from short & long-term exposure:

Sensitization:	No data available
Mutagenic effects:	No data available
Carcinogenicity:	No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC
STOT-single exposure:	No data available.
STOT-repeated exposure:	No data available.
Chronic toxicity:	No data available.
Target organ exposure:	No data available.
Aspiration hazard:	No data available

Numerical measure of toxicity product information

The following values are calculated based on Section 3 of the GHS document: No data available.

SECTION 12 – ECOLOGICAL INFORMATION

Ecotoxicity:	No data available
Persistence and degradability:	No data available

Bioaccumulation: No data available
Other adverse effects: No data available
Mobility in soil: No data available

SECTION 13 – DISPOSAL CONSIDERATIONS

Waste treatment methods

Disposal methods: Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.
Contaminated packaging: Dispose of as unused product

SECTION 14 – TRANSPORTATION INFORMATION

UN No.: Not Regulated
DOT SHIPPING NAME: Not Regulated
IMO SHIPPING NAME: Not Regulated as dangerous goods
LATA SHIPPING NAME: Not Regulated as dangerous goods
IMDG: Not dangerous goods
IATA: Not dangerous goods
ADG Code: Not dangerous goods

SECTION 15 – REGULATORY INFORMATION

Federal and State Regulations: No products were found.
Other Classifications:
WHMIS (Canada): Not controlled under WHMIS (Canada).
DSCL (EEC): R36/38- Irritating to eyes and skin. S2- Keep out of the reach of children. S46- If swallowed, seek medical advice immediately
HMIS (U.S.A.): Health Hazard: 2, Fire Hazard: 0, Reactivity: 0, Personal Protection: E
National Fire Protection Association (U.S.A.): Health: 2, Flammability: 0, Reactivity: 0, Specific hazard:0
Protective Equipment: Nitrile gloves (disposable), Tyvek apron, safety glasses or goggles during batching in the field. Dust mask or face covering may also be worn during batching if windy conditions exist. When bagging occurs in a closed warehouse room, be sure to use an approved/certified respirator or equivalent.

SECTION 16 – OTHER INFORMATION

OSHA Compliance Statement:
The SDS was prepared to comply with OSHA Hazard Communication Standard (29 CFR 1910.1200 HazCom 2012).

Further Information:
This SDS summarizes to the best of our knowledge at the date of issue, the chemical health and safety hazards of the material and general guidance on how to safely handle the material for the set purpose of environmental remediation. The information and recommendations contained herein are based upon data believed to be correct. However, no guarantee or warranty implied is made with respect to the information contained herein. The information is provided solely for your information and consideration and ISOTEC Remediation Technologies, LLC. assumes no legal responsibility for use or reliance thereon.

Issuing Date: NEW

Revision Date: March 2021-Rev. 4

SECTION 1 – IDENTIFICATION OF MATERIAL AND SUPPLIER

Product Name: ISOTEC[SM] Catalyst Series 4260 Chelopolychempremox-B-2
Recommended Use: Environmental Remediation
Uses advised against: No information available
Details of the supplier of the safety data sheet:

Supplier Name:	ISOTEC Remediation Technologies, LLC
Supplier Address:	11 Princess Rd, Suite A Lawrenceville, NJ 08648, USA

EMERGENCY TELEPHONE NUMBER(S): **(609) 275-8500 (USA)**

C.A.S. CHEMICAL NAME:	-
SYNONYMS:	Chelating agent
CHEMICAL FAMILY:	Not Applicable
EMPIRICAL FORMULA:	MIXT (Proprietary)
INTENDED USE:	Catalyst

SECTION 2 – HAZARDS IDENTIFICATION

Classification

Acute Toxicity, Oral	Category 4
Skin irritation	Category 2
Eye Irritation	Category 2A

Pictogram:

Signal Word
Warning

Hazard Statement
Harmful if swallowed
Causes skin irritation
Causes serious eye irritation

Appearance/Odor: White powder, odorless.
Precautionary statement(s): Wash skin thoroughly after handling. Do not eat, drink, or smoke when using this product. Wear protective gloves/eye protection/face protection.
IF SWALLOWED: Call a POISON CENTER or doctor/ physician if you feel unwell.
IF ON SKIN: Wash with plenty of soap and water.
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
Hazards not otherwise classified (HNOC): None
Specific treatment (see section 4 for more information).

Applicable properties are relevant to the mixture as a whole when certain proprietary ingredients present at their highest concentrations. Please note that the effects are normally lower for a typical mixture with smaller concentrations of these ingredients present.

SECTION 3 – COMPOSITION/ INFORMATION ON INGREDIENTS

Components	CAS Number	Proportion	Risk Phrases
Amino poly carboxylic acid	-	>60%	-

SECTION 4 – FIRST AID MEASURES

EYE CONTACT: Hold eyelids apart and immediately flush eyes with plenty of water for at least 15 minutes. Call a physician if irritations persist.
SKIN CONTACT: Wash affected area immediately with soap and water. If skin irritation occurs: Get medical advice/attention. Take off contaminated clothing and wash before reuse.
INHALATION: In case of inhalation or suspected inhalation, move patient at once to fresh air and call a physician. Keep patient absolutely quiet. If breathing has stopped or is labored, give assisted respiration (e.g., mouth-to-mouth). Supplemental oxygen may be indicated.
INGESTION: If swallowed, give several glasses of water. If vomiting occurs, keep head below hips to reduce risk of aspiration. Give fluids again. Seek medical attention if health effects occur. Never give anything by mouth to an unconscious person.
Most important symptoms and effects, both acute and delayed: The most important known symptoms and effects are described in the labeling (see Section 2.2) and/or in Section 11.
Indication of any immediate medical attention and special treatment needed: No data available.

SECTION 5 – FIRE FIGHTING MEASURES

CHARACTERISTICS:

Flash Point	No Data Available
Upper Explosive Limit (UEL)	Not Applicable
Lower Explosive Limit (LEL)	Not Applicable
Autoignition Temperature	Not Applicable
Flash Point Method(s)	No Data Available
Unusual Fire & Explosion Hazards	No Data Available
Fire Hazard Classification (OSHA/NFPA)	No Data Available

EXTINGUISHING MEDIA: Use water spray, alcohol-resistant foam, dry chemical or Polyvalent foam. ABC powder. Carbon dioxide.

UNSUITABLE EXTINGUISHING MEDIA: None Known

SPECIFIC HAZARDS ARISING FROM THE CHEMICAL: Carbon oxides, nitrogen oxides (NOx), Sodium oxides

SPECIAL FIRE FIGHTING PROCEDURES: Firefighters should wear butyl rubber boots, gloves, body suit and self-containing breathing apparatus. Use water spray to cool all affected containers. Avoid skin contact. Contain runoff water in dikes. Prevent stream contamination. Expended liquids from fire fighting should be diverted to an active sanitary sewer line.

UNUSUAL FIRE AND EXPLOSION HAZARDS: None

Hazchem Code: Not applicable

SECTION 6 – ACCIDENTAL RELEASE MEASURES

CLEAN-UP PROCEDURES: Sweep up and repackage or place in receptacle for future disposal.

OTHER EMERGENCY ADVICE: Avoid eye and skin contact. Wear protective clothing including nitrile gloves, safety goggles, dust mask/face covering and Tyvek apron when handling. Stored materials should be placed in a dry and reasonably temperature area, preferably below 24^{o}C.

WASTE DISPOSAL: Remove to properly designated landfill. Observe all federal, state and local environmental regulations.

ENVIRONMENTAL EFFECTS: Data not yet available

SECTION 7 – HANDLING AND STORAGE

Precautions for safe handling: Avoid contact with skin and eyes. Avoid formation of dust and aerosols. Provide appropriate exhaust ventilation at places where dust is formed. For precautions see Section 2.

Conditions for safe storage: Keep container tightly closed in a dry and well-ventilated

place. Isolate from strong oxidizing agents. Do not store in metal containers.
Specific end use(s): Apart from the uses mentioned in Section 1 no other specific uses are stipulated.
Signage: Signs will be attached to each drum containing ISOTEC[SM] Catalyst Series 4260 Chelopolychempremox-B-2. SDS sheets will be provided at the site.

SECTION 8 – PERSONAL PROTECTION/ EXPOSURE CONTROLS

EYE PROTECTION: Splash proof goggles or safety glasses.
HAND PROTECTION: Impermeable gloves made of Nitrile or rubber.
RESPIRATORY PROTECTION: Wear appropriate full-face respirator with HEPA cartridges for protection against excessive particulate dust during bagging in the warehouse. Dust mask of face covering may also be worn during batching in the field if windy conditions exist.
PROTECTIVE CLOTHING: Long sleeved clothing (e.g. cotton coveralls or Tyvek). Do not wear short trousers
ENGINEERING CONTROLS: Avoid drafts that may disperse material beyond the work area. Use light water spray for dust suppression
WORK AND HYGIENIC PRACTICES: Provide readily accessible eye wash stations. Wash at the end of each work shift and before eating, smoking or using the toilet

SECTION 9 – PHYSICAL AND CHEMICAL PROPERTIES

Physical Properties:

PHYSICAL FORM	Powder
COLOR	White
ODOR	None
TYPICAL PHYSICAL DATA:	
pH (10% aqueous)	4.0-5.0
VAPOR PRESSURE (mm Hg)	0
VAPOR DENSITY (Air = 1)	Not Applicable
BOILING POINT	Not Applicable
FREEZING/MELTING POINT	Not Applicable
SOLUBILITY IN WATER	10g/100g @ 25°C
SPECIFIC GRAVITY (Water = 1)	1.03
EVAPORATION RATE (Butylacetate = 1)	Non Volatile
VISCOSITY (CPS)	Not Evaluated

SECTION 10 – STABILITY AND REACTIVITY

Reactivity: No data available.
Chemical Stability: Stable under recommended storage conditions.
Possibility of Hazardous Reactions: No data available.
Hazardous: Polymerization: No data available.
Conditions to Avoid: No data available.
Incompatible Materials: Strong oxidizing agents.
Hazardous Decomposition Products: Other decomposition products – no data available.

SECTION 11 –TOXICOLOGICAL INFORMATION

Information on likely routes of exposure

Product Information:

Inhalation:	No data available
Eye Contact:	No data available
Skin Contact:	No data available
Ingestion:	Harmful if swallowed

Component Information:

Symptoms:	No data available

Delayed and immediate effects as well as chronic effects from short & long-term exposure:

Sensitization:	No data available
Mutagenic effects:	No data available
Carcinogenicity:	No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC
STOT-single exposure:	No data available.
STOT-repeated exposure:	No data available.
Chronic toxicity:	No data available.
Target organ exposure:	No data available.
Aspiration hazard:	No data available

Numerical measure of toxicity product information

The following values are calculated based on Section 3 of the GHS document: No data available.

SECTION 12 – ECOLOGICAL INFORMATION

Ecotoxicity:	No data available
Persistence and degradability:	No data available

Bioaccumulation:	No data available
Other adverse effects:	No data available
Mobility in soil:	No data available

SECTION 13 – DISPOSAL CONSIDERATIONS

Waste treatment methods

Disposal methods: Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

Contaminated packaging: Dispose of as unused product

SECTION 14 – TRANSPORTATION INFORMATION

UN No.:	Not Regulated
DOT SHIPPING NAME:	Not Regulated
IMO SHIPPING NAME:	Not Regulated as dangerous goods
LATA SHIPPING NAME:	Not Regulated as dangerous goods
IMDG:	Not dangerous goods
IATA:	Not dangerous goods
ADG Code:	Not dangerous goods

SECTION 15 – REGULATORY INFORMATION

Federal and State Regulations: No products were found.

Other Regulations: This product does not contain any products considered hazardous under the federal OSHA HazCom.Standard 29 CFR 1.910.1200

Other Classifications:

WHMIS (Canada): Not controlled under WHMIS (Canada).

DSCL (EEC): R36/38- Irritating to eyes and skin. S2- Keep out of the reach of children. S46- If swallowed, seek medical advice immediately.

HMIS (U.S.A.): Health Hazard: 0, Fire Hazard: 0, Reactivity: 0, Personal Protection: E

National Fire Protection Association (U.S.A.): Health: 0, Flammability: 0, Reactivity: 0, Specific hazard: 0

Protective Equipment: Nitrile gloves (disposable), Tyvek apron, safety glasses or goggles during batching in the field. Dust mask or face covering may also be worn during batching if windy conditions exist. When bagging occurs in a closed warehouse room, be sure to use an approved/certified respirator or equivalent.

SECTION 16 – OTHER INFORMATION

OSHA Compliance Statement:
The SDS was prepared to comply with OSHA Hazard Communication Standard (29 CFR 1910.1200 HazCom 2012).

Further Information:
This SDS summarizes to the best of our knowledge at the date of issue, the chemical health and safety hazards of the material and general guidance on how to safely handle the material for the set purpose of environmental remediation. The information and recommendations contained herein are based upon data believed to be correct. However, no guarantee or warranty implied is made with respect to the information contained herein. The information is provided solely for your information and consideration and ISOTEC Remediation Technologies, LLC. assumes no legal responsibility for use or reliance thereon.

Issuing Date: NEW

Revision Date: March 2021-Rev. 5

SECTION 1 – IDENTIFICATION OF MATERIAL AND SUPPLIER

Product Name: ISOTEC[SM] Catalyst-4260 Chelopolychempremox-B-4
Recommended Use: Environmental Remediation
Uses advised against: No information available
Details of the supplier of the safety data sheet:

Supplier Name:	ISOTEC Remediation Technologies, LLC
Supplier Address:	11 Princess Rd, Suite A Lawrenceville, NJ 08648, USA

EMERGENCY TELEPHONE NUMBER(S): **(609) 275-8500 (USA)**

C.A.S. CHEMICAL NAME:	-
SYNONYMS:	Chelating agent
CHEMICAL FAMILY:	Not Applicable
EMPIRICAL FORMULA:	MIXT (Proprietary)
INTENDED USE:	Catalyst

SECTION 2 – HAZARDS IDENTIFICATION

Classification

Acute Toxicity, Oral	Category 4
Skin irritation	Category 2
Eye Irritation	Category 1

Pictogram:

Signal Word
Danger

Hazard Statement
Harmful if swallowed
Causes skin irritation
May cause serious eye irritation

Appearance/Odor: White powder, odorless.
Precautionary statement(s): Wash skin thoroughly after handling. Do not eat, drink, or smoke when using this product. Wear protective gloves/eye protection/face protection.

IF SWALLOWED: Call a POISON CENTER or doctor/ physician if you feel unwell.
IF ON SKIN: Wash with plenty of soap and water. If skin irritation occurs: Get medical advice/attention. Take off contaminated clothing and wash before reuse.
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical advice/attention.
Hazards not otherwise classified (HNOC): None
Specific treatment (see section 4 for more information).

Applicable properties are relevant to the mixture as a whole when certain proprietary ingredients present at their highest concentrations. Please note that the effects are normally lower for a typical mixture with smaller concentrations of these ingredients present.

SECTION 3 – COMPOSITION/ INFORMATION ON INGREDIENTS

Components	CAS Number	Proportion	Risk Phrases
Amino poly carboxylate	-	>60%	-

SECTION 4 – FIRST AID MEASURES

EYE CONTACT: Hold eyelids apart and immediately flush eyes with plenty of water for at least 15 minutes. Call a physician if irritations persist.
SKIN CONTACT: Wash affected area immediately with soap and water.
INHALATION: In case of inhalation or suspected inhalation, move patient at once to fresh air and call a physician. Keep patient absolutely quiet. If breathing has stopped or is labored, give assisted respiration (e.g., mouth-to-mouth). Supplemental oxygen may be indicated.
INGESTION: If swallowed, call a physician immediately. Induce vomiting or remove stomach contents by gastric suction only as directed by medical personnel. Wash mouth with plenty of water. Never give anything by mouth to an unconscious person.

Most important symptoms and effects, both acute and delayed: The most important known symptoms and effects are described in the labeling (see Section 2.2) and/or in Section 11.
Indication of any immediate medical attention and special treatment needed: No data available.

SECTION 5 – FIRE FIGHTING MEASURES

CHARACTERISTICS:

Flash Point	No Data Available
Upper Explosive Limit (UEL)	Not Applicable
Lower Explosive Limit (LEL)	Not Applicable
Autoignition Temperature	Not Applicable
Flash Point Method(s)	No Data Available
Unusual Fire & Explosion Hazards	No Data Available
Fire Hazard Classification (OSHA/NFPA)	No Data Available

EXTINGUISHING MEDIA: In case of fire, flood with water.
UNSUITABLE EXTINGUISHING MEDIA: Carbon dioxide
SPECIFIC HAZARDS ARISING FROM THE CHEMICAL: Harmful vapors, fumes, carbon oxides, nitrogen oxides (NOx), Sodium oxides
SPECIAL FIRE FIGHTING PROCEDURES: Firefighters should wear butyl rubber boots, gloves, body suit and self-containing breathing apparatus. Use water spray to cool all affected containers. Avoid skin contact. Contain runoff water in dikes. Prevent stream contamination. Expended liquids from fire fighting should be diverted to an active sanitary sewer line.
UNUSUAL FIRE AND EXPLOSION HAZARDS: None
Hazchem Code: Not applicable

SECTION 6 – ACCIDENTAL RELEASE MEASURES

CLEAN-UP PROCEDURES: Sweep up and repackage or place in receptacle for future disposal.
OTHER EMERGENCY ADVICE: Avoid eye and skin contact. Wear protective clothing including nitrile gloves, safety goggles, dust mask/face covering and Tyvek apron when handling. Stored materials should be placed in a dry and reasonably temperature area, preferably below 24^{o}C.
WASTE DISPOSAL: Remove to properly designated landfill. Observe all federal, state and local environmental regulations.
ENVIRONMENTAL EFFECTS: Data not yet available

SECTION 7 – HANDLING AND STORAGE

Precautions for safe handling: Avoid contact with skin and eyes. Avoid formation of dust and aerosols. Provide appropriate exhaust ventilation at places where dust is formed. For precautions see Section 2.
Conditions for safe storage: Keep container tightly closed in a dry and well-ventilated place. Isolate from strong oxidizers.

Specific end use(s): Apart from the uses mentioned in Section 1 no other specific uses are stipulated.
Signage: Signs will be attached to each drum containing ISOTEC^{SM} Catalyst-4260 Chelopolychempremox-B-4. SDS sheets will be provided at the site.

SECTION 8 – PERSONAL PROTECTION/ EXPOSURE CONTROLS

EYE PROTECTION: Splash proof goggles or safety glasses.
HAND PROTECTION: Impermeable gloves made of Nitrile or rubber.
RESPIRATORY PROTECTION: Wear appropriate full-face respirator with HEPA cartridges for protection against excessive particulate dust during bagging in the warehouse. Dust mask or face covering may also be worn during batching in the field if windy conditions exist.
PROTECTIVE CLOTHING: Long sleeved clothing (e.g. cotton coveralls or Tyvek). Do not wear short trousers
ENGINEERING CONTROLS: Avoid drafts that may disperse material beyond the work area. Use light water spray for dust suppression
WORK AND HYGIENIC PRACTICES: Provide readily accessible eye wash stations. Wash at the end of each work shift and before eating, smoking or using the toilet

SECTION 9 – PHYSICAL AND CHEMICAL PROPERTIES

Physical Properties:

PHYSICAL FORM	Powder
COLOR	White
ODOR	None
TYPICAL PHYSICAL DATA:	
pH (10% aqueous)	~11
VAPOR PRESSURE (mm Hg)	Non-Volatile
VAPOR DENSITY (Air = 1)	Non-Volatile
BOILING POINT	Not Applicable
FREEZING/MELTING POINT	~300°C
SOLUBILITY IN WATER	Soluble
SPECIFIC GRAVITY (Water = 1)	1.07
EVAPORATION RATE (Butylacetate = 1)	Non Volatile
VISCOSITY (CPS)	Not Evaluated

SECTION 10 – STABILITY AND REACTIVITY

Reactivity: No data available.
Chemical Stability: Stable

Possibility of Hazardous Reactions: No data available.
Hazardous: Polymerization: Will not occur
Conditions to Avoid: No data available.
Incompatible Materials: Strong oxidizing agents.
Hazardous Decomposition Products: Other decomposition products – no data available. In the event of a fire see Section 5

SECTION 11 –TOXICOLOGICAL INFORMATION

Information on likely routes of exposure

Product Information:

Inhalation:	No data available
Eye Contact:	No data available
Skin Contact:	No data available
Ingestion:	Harmful if swallowed

Component Information:

Symptoms:	No data available

Delayed and immediate effects as well as chronic effects from short & long-term exposure:

Sensitization:	No data available
Mutagenic effects:	No data available
Carcinogenicity:	No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC
STOT-single exposure:	No data available.
STOT-repeated exposure:	No data available.
Chronic toxicity:	No data available.
Target organ exposure:	No data available.
Aspiration hazard:	No data available

Numerical measure of toxicity product information

The following values are calculated based on Section 3 of the GHS document: No data available.

SECTION 12 – ECOLOGICAL INFORMATION

Ecotoxicity:	No data available
Persistence and degradability:	No data available
Bioaccumulation:	No data available
Other adverse effects:	No data available
Mobility in soil:	No data available

SECTION 13 – DISPOSAL CONSIDERATIONS

Waste treatment methods

Disposal methods: Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

Contaminated packaging: Dispose of as unused product

SECTION 14 – TRANSPORTATION INFORMATION

UN No.:	Not Regulated
DOT SHIPPING NAME:	Not Regulated
IMO SHIPPING NAME:	Not Regulated as dangerous goods
LATA SHIPPING NAME:	Not Regulated as dangerous goods
IMDG:	Not dangerous goods
IATA:	Not dangerous goods
ADG Code:	Not dangerous goods

SECTION 15 – REGULATORY INFORMATION

Federal and State Regulations: No products were found.

Other Regulations: This product does not contain any products considered hazardous under the federal OSHA HazCom.Standard 29 CFR 1.910.1200

Other Classifications:

WHMIS (Canada): Not controlled under WHMIS (Canada).

DSCL (EEC): R36/38- Irritating to eyes and skin. S2- Keep out of the reach of children. S46- If swallowed, seek medical advice immediately.

HMIS (U.S.A.): Health Hazard: 0, Fire Hazard: 0, Reactivity: 0, Personal Protection: E

National Fire Protection Association (U.S.A.): Health: 0, Flammability: 0, Reactivity: 0, Specific hazard:

Protective Equipment: Nitrile gloves (disposable), Tyvek apron, safety glasses or goggles during batching in the field. Dust mask or face covering may also be worn during batching if windy conditions exist. When bagging occurs in a closed warehouse room, be sure to use an approved/certified respirator or equivalent.

SECTION 16 – OTHER INFORMATION

OSHA Compliance Statement:
The SDS was prepared to comply with OSHA Hazard Communication Standard (29 CFR 1910.1200 HazCom 2012).

Further Information:
This SDS summarizes to the best of our knowledge at the date of issue, the chemical health and safety hazards of the material and general guidance on how to safely handle the material for the set purpose of environmental remediation. The information and recommendations contained herein are based upon data believed to be correct. However, no guarantee or warranty implied is made with respect to the information contained herein. The information is provided solely for your information and consideration and ISOTEC Remediation Technologies, LLC. assumes no legal responsibility for use or reliance thereon.

Issuing Date: NEW

Revision Date: March 2021-Rev. 6.

SAFETY DATA SHEET

SECTION 1 – IDENTIFICATION OF MATERIAL AND SUPPLIER

Product Name: ISOTEC[SM] Stabilizer 0875
Recommended Use: Environmental Remediation
Uses advised against: No information available
Details of the supplier of the safety data sheet:

Supplier Name: ISOTEC Remediation Technologies, LLC
Supplier Address: 11 Princess Rd, Suite A
Lawrenceville, NJ 08648, USA

EMERGENCY TELEPHONE NUMBER(S): **(609) 275-8500 (USA)**

C.A.S. CHEMICAL NAME:	Mixture
SYNONYMS:	None
CHEMICAL FAMILY:	Not Applicable
EMPIRICAL FORMULA:	MIXT (Proprietary)
INTENDED USE:	Stabilizing Agent

SECTION 2 – HAZARDS IDENTIFICATION

Classification

Acute Toxicity, Oral	Category 4
Skin irritation	Category 2
Eye Irritation	Category 2A

Pictogram:

Signal Word
Warning

Hazard Statement
Harmful if swallowed
Causes skin irritation
May cause eye irritation

Appearance/Odor: White powder, odorless.

Precautionary statement(s): Wash skin thoroughly after handling. Do not eat, drink, or smoke when using this product. Wear protective gloves/eye protection/face protection.
IF SWALLOWED: Call a POISON CENTER or doctor/ physician if you feel unwell.
IF ON SKIN: Wash with plenty of soap and water. If skin irritation occurs: Get medical advice/attention. Take off contaminated clothing and wash before reuse.
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical advice/attention.
Hazards not otherwise classified (HNOC): None
Specific treatment (see section 4 for more information).

Applicable properties are relevant to the mixture as a whole when certain proprietary ingredients present at their highest concentrations. Please note that the effects are normally lower for a typical mixture with smaller concentrations of these ingredients present.

SECTION 3 – COMPOSITION/ INFORMATION ON INGREDIENTS

Components	CAS Number	Proportion	Risk Phrases
Inorganic phosphates	-	>60%	-

SECTION 4 – FIRST AID MEASURES

EYE CONTACT: Hold eyelids apart and immediately flush eyes with plenty of water for at least 15 minutes. Call a physician if irritations persist.
SKIN CONTACT: Wash affected area immediately with soap and water.
INHALATION: In case of inhalation or suspected inhalation, move patient at once to fresh air and call a physician. Keep patient absolutely quiet. If breathing has stopped or is labored, give assisted respiration (e.g., mouth-to-mouth). Supplemental oxygen may be indicated.
INGESTION: Rinse mouth and dilute stomach contents with water, or preferably with milk if available. Large doses may cause nausea, vomiting and diarrhea. Systematic oral toxicity is extremely rare and has consisted of acidosis and hypocalcemic tetany.

Most important symptoms and effects, both acute and delayed: The most important known symptoms and effects are described in the labeling (see Section 2.2) and/or in Section 11.
Indication of any immediate medical attention and special treatment needed: No data available.

SECTION 5 – FIRE FIGHTING MEASURES

CHARACTERISTICS:

Flash Point	No Data Available
Upper Explosive Limit (UEL)	Not Applicable
Lower Explosive Limit (LEL)	Not Applicable
Autoignition Temperature	Not Applicable
Flash Point Method(s)	No Data Available
Unusual Fire & Explosion Hazards	No Data Available
Fire Hazard Classification (OSHA/NFPA)	No Data Available

EXTINGUISHING MEDIA: Product is noncombustible. Use extinguishing method suitable for surrounding fire.

UNSUITABLE EXTINGUISHING MEDIA: None Known

SPECIFIC HAZARDS ARISING FROM THE CHEMICAL: Hazardous combustion products: oxides of phosphorous, oxides of potassium

SPECIAL FIRE FIGHTING PROCEDURES Firefighters should wear full-face, self contained breathing apparatus and impervious protective clothing.

UNUSUAL FIRE AND EXPLOSION HAZARDS None.

Hazchem Code: Not applicable

SECTION 6 – ACCIDENTAL RELEASE MEASURES

CLEAN-UP PROCEDURES: Sweep up and repackage or place in receptacle for future disposal.

OTHER EMERGENCY ADVICE: Avoid eye and skin contact. Wear protective clothing including nitrile gloves, safety goggles, dust mask/face covering and Tyvek apron when handling. Stored materials should be placed in a dry and reasonably temperature area, preferably below 24^{o}C.

WASTE DISPOSAL: Remove to properly designated landfill. Observe all federal, state and local environmental regulations.

ENVIRONMENTAL EFFECTS: Aquatic Toxicity.

SECTION 7 – HANDLING AND STORAGE

Precautions for safe handling: Avoid contact with skin and eyes. Avoid formation of dust and aerosols. Provide appropriate exhaust ventilation at places where dust is formed. For precautions see Section 2.

Conditions for safe storage: Keep container tightly closed in a dry and well-ventilated place. Hygroscopic.

Specific end use(s): Apart from the uses mentioned in Section 1 no other specific uses are stipulated.
Signage: Signs will be attached to each drum containing ISOTEC^{SM} Stabilizer 0875. SDS sheets will be provided at the site.

SECTION 8 – PERSONAL PROTECTION/ EXPOSURE CONTROLS

EYE PROTECTION: Splash proof goggles or safety glasses.
HAND PROTECTION: Impermeable gloves made of Nitrile or rubber.
RESPIRATORY PROTECTION: Wear appropriate full-face respirator with HEPA cartridges for protection against excessive particulate matter/ dust
PROTECTIVE CLOTHING: Long sleeved clothing (e.g. cotton coveralls or Tyvek). Do not wear short trousers
ENGINEERING CONTROLS: Avoid drafts that may disperse material beyond the work area. Use light water spray for dust suppression
WORK AND HYGIENIC PRACTICES: Provide readily accessible eye wash stations. Wash at the end of each work shift and before eating, smoking or using the toilet

SECTION 9 – PHYSICAL AND CHEMICAL PROPERTIES

Physical Properties:

PHYSICAL FORM	Powder
COLOR	White
ODOR	None
TYPICAL PHYSICAL DATA:	
pH (10% aqueous)	4.6
VAPOR PRESSURE (mm Hg)	Non volatile
VAPOR DENSITY (Air = 1)	Non volatile
BOILING POINT	Not applicable
FREEZING/MELTING POINT	253^{o} C
SOLUBILITY IN WATER	20% by weight @ 25^{o}C
SPECIFIC GRAVITY (Water = 1)	1.2
EVAPORATION RATE (Butylacetate = 1)	Non volatile
VISCOSITY (CPS)	No data available

SECTION 10 – STABILITY AND REACTIVITY

Reactivity: No data available.
Chemical Stability: Stable under recommended storage conditions.

Possibility of Hazardous Reactions: No data available.
Hazardous: Polymerization: None.
Conditions to Avoid: No data available.
Incompatible Materials: None.
Hazardous Decomposition Products: Other decomposition products – no data available. In the event of a fire see Section 5.

SECTION 11 –TOXICOLOGICAL INFORMATION

Information on likely routes of exposure

Product Information:

Inhalation:	No data available
Eye Contact:	No data available
Skin Contact:	No data available
Ingestion:	Harmful if swallowed

Component Information:

Symptoms:	No data available

Delayed and immediate effects as well as chronic effects from short & long-term exposure:

Sensitization:	No data available
Mutagenic effects:	No data available
Carcinogenicity:	This product does not contain any substances that are considered by OSHA, NTP, IARC or ACGIH to be "probable" or suspected" human carcinogens.
STOT-single exposure:	No data available.
STOT-repeated exposure:	No data available.
Chronic toxicity:	No data available.
Target organ exposure:	No data available.
Aspiration hazard:	No data available

Numerical measure of toxicity product information

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SECTION 12 – ECOLOGICAL INFORMATION

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Persistence and degradability:	No data available
Bioaccumulation:	No data available
Other adverse effects:	No data available
Mobility in soil:	No data available

SECTION 13 – DISPOSAL CONSIDERATIONS

Waste treatment methods

Disposal methods: This product does not present a danger or hazard for disposal. Except for Food applications, salvage and return to container, process or recycle for other uses. May be disposed of in a properly designated landfill if needed.

Contaminated packaging: Dispose of as unused product

SECTION 14 – TRANSPORTATION INFORMATION

UN No.:	Not Regulated
DOT SHIPPING NAME:	Not Regulated
IMO SHIPPING NAME:	Not Regulated as dangerous goods
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DSCL (EEC): R36/38- Irritating to eyes and skin. S2- Keep out of the reach of children. S46- If swallowed, seek medical advice immediately.

HMIS (U.S.A.): Health Hazard: 0, Fire Hazard: 0, Reactivity: 0, Personal Protection: E

National Fire Protection Association (U.S.A.): Health: 1, Flammability: 0, Reactivity: 0, Specific hazard:

Protective Equipment: Nitrile gloves (disposable), Tyvek apron, safety glasses or goggles during batching in the field. Dust mask or face covering may also be worn during batching if windy conditions exist. When bagging occurs in a closed warehouse room, be sure to use an approved/certified respirator or equivalent.

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Further Information:
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Issuing Date: NEW

Revision Date: March 2021-Rev.6.

Resolute
Environmental & Water Resources Consulting

1003 Weatherstone Parkway
Suite 320
Woodstock, Georgia 30188
Telephone: 678.398.9942

November 8, 2021

Jeff Hopper
Georgia Environmental Protection Division,
Regulatory Support Program- UIC Unit
2 Martin Luther King, Jr. Drive
Suite 1456, East Tower
Atlanta, Georgia, 30334

Subject: Underground Injection Control (UIC) PRB Pilot Test Notification
Milledge Avenue Site
Hazardous Waste Facility No. HW-041 (CA)
Athens, Georgia, 30602

Dear Mr. Hopper:

On behalf of the University of Georgia, Resolute Environmental & Water Resources Consulting, LLC (Resolute) is submitting the attached UIC Pilot Test Notification and supporting documentation for the above reference site. The UGA is currently in the process of evaluating Corrective Action at the site through a Pilot Study as part of the implementation of the EPD approved 50% Remedial Design Report dated October 1, 2021 (hereafter referred to as "*the Report*").

Based on the results of the Additional Remedial Investigations presented in Section 3.1 of *the Report*, the next phase in the Remedial Design for the downgradient edge of the landfill is a Permeable Reactive Barrier Pilot Study to be placed immediately north of the northwest corner of the landfill. This PRB Pilot location is hydraulically downgradient of monitoring wells MW-4 and MW-5, which historically have shown the highest concentrations of COCs, as well as Gama BHC (Lindane).

Resolute will install a total of seven (7) temporary monitoring wells (TMW) to evaluate the performance of the pilot study. One cluster of three 2-inch PVC TMW wells (designator PWD) will be installed immediately downgradient of the PRB. One cluster of two 2-inch PVC TMW wells (designator PWU) will be installed immediately upgradient of the PRB. And one cluster of two 2-inch PVC TMW wells (designator PW-PRB) will be installed within the PRB injection area.

The downgradient well cluster (PWD) will consist of one well screened at 20-25' below ground surface (bgs), one well screened at 35' to 40' bgs, and one well screen at 50'-55' bgs. The upgradient well cluster (PWU) and well cluster within the injection zone (PW-PRB) will both consist of one well screened at 20-25' below ground surface (bgs) and one well screened at 35' to 40' bgs.

Groundwater samples will be collected from the seven (7) temporary monitoring wells prior to the injection activities to serve as baseline values. The groundwater samples will be analyzed for site COCs (VOCs by EPA8260, Lindane by EPA8081, and 1-4 Dioxane by EPA8260SIM,). In addition, Resolute will collect performance parameters (ORP, DO, pH, temperature, sulfate, total organic carbon, persulfate) prior to and after injection. Performance monitoring is planned for in the seven (7) TMWs at 1 week, 6 weeks, 3 months, 6 months, 9 months and 12 months post-injection.

The design, dosage, and location of the PRB has been developed using the information obtained during the Base Activated Persulfate Treatability Study (Section 2.2, of *the Report*). Eleven (11) injection points will be placed hydraulically downgradient of monitoring wells MW-4 and MW-5. Each injection point will be advanced utilizing a DPT rig with injection tooling and injection of the reagent slurry will commence from the groundwater surface, approximately twenty (20) feet bgs, to a total depth of 45 feet bgs. PeroxyChem's Klozur SP® reagent and Klozur KP®, activated with Sodium Hydroxide, will be injected into the groundwater plume (see attached Safety Data Sheets). These reagents will be mixed with water to form to facilitate subsurface distribution. Thirty-three (33) pounds of reagent (Klozur SP® and Klozur KP®) and fourteen (14) pounds Sodium Hydroxide, along with approximately fourteen (14) gallons of water, will be injected per vertical foot in the injection zone of each location, for a total of 840 pounds of reagent and 340 pounds of Sodium Hydroxide per boring (9,200 pounds reagent /4,000 gallons water total for the pilot injection event). Safety Data Sheets for PeroxyChem's Klozur SP® reagent and Klozur KP®, and Sodium Hydroxide are attached.

The location and configuration of the proposed PRB Pilot Study is included as **Figure 3-6**.

If you have any questions concerning this UIC pilot test permit application, please contact Tommy Jordan at (470) 895.0649 or Stephen Wilson at (470) 895.0654.

Sincerely,
Resolute Environmental & Water Resources Consulting, LLC

Tommy A. Jordan, P.G. PMP
Sr. Project Manager

Stephen K. Wilson, P.G.
Principal

Attachment: Pilot Test Notification Form
Figure 3-6, Proposed PRB Pilot Study Map
PeroxyChem Klozur SP® Safety Data Sheet
PeroxyChem Klozur KP® Safety Data Sheet
Hydrated Lime Safety Data Sheet

cc: Mr. Jim Ussery, P.E., University of Georgia
Ms. Emilea Dukes, Program Manager, Hazardous Waste Management, Georgia EPD
Mr. Michael Gillis, Georgia EPD- via email Mike.Gillis@dnr.ga.gov
Ms. Jess Nicholson Georgia EPD- via email jess.nicholson@dnr.ga.gov

GEORGIA
DEPARTMENT OF NATURAL RESOURCES
ENVIRONMENTAL PROTECTION DIVISION

Official Use Only
Identification No.: _____
Authorization Date: _____

Wastewater Regulatory Program
Underground Injection Control (UIC) Program

Pilot Test Notification Form

1.0 Purpose

This procedure allows Class V injection Pilot Test Wells (PTW) to be constructed and operated for up to 90 days prior to obtaining a UIC permit. The attached Pilot Test Notification form must be submitted to the EPD no later than 30 days prior to the proposed injection start date.

2.0 Scope

This procedure applies only to Class V remediation wells. The injected media will meet the Clean Air Act standards for air quality, the Georgia rules for Underground Injection Control, Chapter 391-6-3-.13, the Georgia Rules for Water Quality Control (Revised), and the Georgia Rules for Safe Drinking Water Act (Revised). The procedure does not replace the requirements for obtaining a UIC permit, but allows consultants flexibility in evaluating the most efficient, economical, and effective remediation method for a corrective action plan (CAP). The pilot tests are allowed for up to, but not to exceed 90 days after which time a UIC permit must be applied for per the appropriate UIC regulations.

3.0 Definitions

Class V PTW is a short term (no more than 90 days) experimental injection well related to a proposed remediation plan.

4.0 Procedure

The attached Pilot Test Notification form must be completed in its entirety and submitted to the EPD for review. A brief narrative describing the goal and purpose of the pilot test must accompany the notification from. Upon satisfactory review and concurrence with the pilot test specifications, the EPD will provide written authorization to conduct the pilot test. The EPD reserves the right to request additional information or impose limiting conditions on the pilot test prior to issuing written authorization.

SECTION I. FACILITY INFORMATION		
Facility Name: University of Georgia		
Phone: 706-542-5801	River Basin: Oconee River	
Facility Address: 2450 South Milledge Avenue		
City: Athens	State: GA	Zip Code: 30605
Coordinates (Decimal): 33° 54'20" N, 83° 23' 05" W		County: Clarke
Is the pilot test part of a corrective action or remediation plan?: (check box) ☒ Yes ☐ No HSI File No.: HW File No.: HW-041 (CA) UST File No.: Other:		

SECTION II. OWNER CONTACT INFORMATION		
Name of Owner or Authorized Representative: Jim Ussery		
Title: Environmental Affairs Professional		
Phone: 706-542-0106	E-mail: jussery@uga.edu	Fax:
Owner Mailing Address: 240A Riverbend Road		
City: Athens	State: GA	Zip Code: 30602

SECTION III. DRILLER INFORMATION		
GA Licensed Water Well Contractor or Bonded Environmental Drilling Company Name: Associated Topography LLC		
Phone: 404-599-2605	E-mail: dhoilett@associatedtopography.com	Fax:
Address: 1063 Meadow Grass Lane		
City: Powder Springs	State: Ga	Zip Code: 30127
License No.:	Bond No: Bonded Driller #3	

SECTION IV. INJECTION WELL INFORMATION		
1. No. of injection wells: 11		
2. Well depth (ft): 45	3. Borehole Diameter(in): 2.25	4. Casing. Depth (ft): 5
5. Casing Diameter (in): 2.25	6. Casing Material: Carbon Steel Direct Push Rods	
7. Screen Type: DPT Retractable Injection Points	8. Screen Diameter: 1.25	
9. Screen Interval from 20 to 45	10. Grout Type (if applicable): NA	
11. Grout Interval from (if applicable) NA	12. Grout Thickness (if applicable): NA	

SECTION V. INJECTION SYSTEM DATA
1. Type of Fluid: PeroxyChem Klozur SP and KP activated with Sodium Hydroxide
2. Source of Fluid: Injection specific injection tote
3. Purpose of the Injection/source of the contamination: Impacted GW Remediation
4. Proposed Injection Rate Range (gallons/minute/well) (SCFM for air): 1-5 gpm
5. Proposed Injection Volume (daily max) (gallons/minute/well) (SCFM for air): Daily Max 1,000 to 1,500 gallons
6. Proposed Injection Pressure Range (lbs./sq. inch) (psi): 500-800 psi
7. Dates of proposed pilot test injection: 12/8/21 to 12/15/21

SECTION VI. ADDITIONAL INFORMATION
Groundwater sampling will be performed prior to and subsequent of the Pilot injection activities.

SECTION VII. CERTIFICAITON	
I certify under the penalty of law that I have examined and am familiar with the information contained in this document and attachments and the information is true, accurate and complete. I am aware of the associated penalties for submitting false documentation, including but not limited to monetary penalties and or imprisonment.	
Name of Applicant: Tommy Jordan, P.G.	**Date:** 11/08/2021
Signature of Applicant: 	**Date:** 11/08/2021

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N

0 5 10 20 30 40
Feet

P-3

MW-5c

MW-5b

MW-4

MW-3

MW-2

Legend

- Proposed Injection Point
- Well Cluster
- Monitoring Well (Bedrock)
- Monitoring Well (Overburden)
- Recovery Well
- Peizometer
- Overhead Power Lines
- Groundwater Potentiometric Contour
- Perennial Stream
- Drainage Ditch/Ephemeral Stream
- Unpaved Road
- Trail
- Fence Around Capped Landfill

Resolute
Environmental & Water Resources Consulting

Woodstock, GA | September 2021

Milledge Avenue Site
Proposed PRB
Pilot Study Map

Athens, GA

Figure

3-6

Document Path: C:\Data\Resolute Environmental\RE_SP - Environmental\ArcGIS\University of Georgia\Task 12 - Remediation Design\50% design\Figure 3-6 - Proposed PRB Pilot Study Map.mxd

SAFETY DATA SHEET
Klozur® SP

SDS # : 7775-27-1-12
Revision date: 2021-02-19
Format: NA
Version 1.05

1. PRODUCT AND COMPANY IDENTIFICATION

Product Identifier

Product Name Klozur® SP

CAS-No 7775-27-1

Synonyms Sodium Peroxydisulfate; Disodium Peroxydisulfate; Peroxydisulfuric acid, disodium salt; Peroxydisulfuric acid, sodium salt.

Recommended use of the chemical and restrictions on use

Recommended Use: Polymerization initiator; Etchant and cleaner for printed circuit boards; Hair bleaching formulations; Secondary oil recovery; Oxidizing agent for a variety of organic reactions.

Restrictions on Use No uses to be advised against were identified.

Manufacturer/Supplier

PeroxyChem LLC
2005 Market Street
Suite 3200
Philadelphia, PA 19103
267/422-2400 (General Information)
sdsinfo-pxc@evonik.com (E-Mail General Information)

Emergency telephone numbers

For leak, fire, spill or accident emergencies, call:
1 800 / 424 9300 (CHEMTREC - U.S.A.)
1 703 / 527 3887 (CHEMTREC - Collect - All Other Countries)
+1 303/ 389-1409 (Medical - U.S. - Call Collect)

2. HAZARDS IDENTIFICATION

Classification

OSHA Regulatory Status
This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200)

Acute toxicity - Oral	Category 4
Skin corrosion/irritation	Category 2
Serious eye damage/eye irritation	Category 2B
Respiratory sensitization	Category 1
Skin sensitization	Category 1
Specific target organ toxicity (single exposure)	Category 3
Oxidizing Solids	Category 3

GHS Label elements, including precautionary statements

EMERGENCY OVERVIEW

Danger

Hazard Statements
H334 - May cause allergy or asthma symptoms or breathing difficulties if inhaled
H335 - May cause respiratory irritation
H320 - Causes eye irritation
H315 - Causes skin irritation
H317 - May cause an allergic skin reaction
H302 - Harmful if swallowed
H272 - May intensify fire; oxidizer

Precautionary Statements - Prevention
P261 - Avoid breathing dust/ fume/ gas/ mist/ vapors/ spray
P285 - In case of inadequate ventilation wear respiratory protection
P271 - Use only outdoors or in a well-ventilated area
P280 - Wear protective gloves/ protective clothing
P264 - Wash face, hands and any exposed skin thoroughly after handling
P210 - Keep away from heat/sparks/open flames/hot surfaces. - No smoking
P220 - Keep/Store away from clothing/combustible materials
P221 - Take any precaution to avoid mixing with combustibles

Precautionary Statements - Response
P305 + P351 + P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
P337 + P313 - If eye irritation persists: Get medical advice/ attention
P302 + P352 - IF ON SKIN: Wash with plenty of water.
P333 + P313 - If skin irritation or rash occurs: Get medical advice/ attention
P362 - Take off contaminated clothing and wash before reuse
P304 + P340 - IF INHALED: Remove person to fresh air and keep comfortable for breathing
P342 + P311 - If experiencing respiratory symptoms: Call a POISON CENTER or doctor
P301 + P312 - IF SWALLOWED: Call a POISON CENTER or doctor if you feel unwell
P330 - Rinse mouth

P370 + P378 - In case of fire: Use water for extinction

Precautionary Statements - Storage
P403 + P233 - Store in a well-ventilated place. Keep container tightly closed
P405 - Store locked up

Precautionary Statements - Disposal
P501 - Dispose of contents/ container to an approved waste disposal plant

Hazards not otherwise classified (HNOC)
No information available

Other Information
Risk of decomposition by heat or by contact with incompatible materials

Unknown acute toxicity
0% of the mixture consists of ingredient(s) of unknown toxicity

3. COMPOSITION/INFORMATION ON INGREDIENTS

Formula Na2O8S2

Chemical name	CAS-No	Weight %
Sodium Persulfate	7775-27-1	> 99
Sodium sulfate	7757-82-6	< 1

4. FIRST AID MEASURES

General Advice Remove from exposure, lie down. Show this material safety data sheet to the doctor in attendance.

Eye Contact Rinse thoroughly with plenty of water for at least 15 minutes, lifting lower and upper eyelids intermittently. Consult a physician. In case of contact, immediately flush eyes with plenty of water. If symptoms persist, call a physician.

Skin Contact Wash off immediately with soap and plenty of water while removing all contaminated clothes and shoes. Get medical attention if irritation develops and persists.

Inhalation Remove from exposure, lie down. If breathing is irregular or stopped, administer artificial respiration. Call a physician immediately.

Ingestion Do NOT induce vomiting. Call a physician or poison control center immediately. Rinse mouth. Drink 1 or 2 glasses of water.

Most important symptoms and effects, both acute and delayed Itching; Redness; Coughing and/ or wheezing.

Indication of immediate medical attention and special treatment needed, if necessary Treat symptomatically

5. FIRE-FIGHTING MEASURES

Suitable Extinguishing Media Water. Cool containers with flooding quantities of water until well after fire is out.

Unsuitable extinguishing media Do not use carbon dioxide or other gas filled fire extinguishers; they will have little effect on decomposing persulfate.

Specific Hazards Arising from the Chemical Decomposes under fire conditions to release oxygen that intensifies the fire.

Explosion data
Sensitivity to Mechanical Impact Not sensitive.
Sensitivity to Static Discharge Not sensitive.

Protective equipment and precautions for firefighters As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

6. ACCIDENTAL RELEASE MEASURES

Personal Precautions Keep off any unprotected persons. Avoid contact with the skin and the eyes. Avoid breathing dust. Wear personal protective equipment.

Other Never add other substances or combustible waste to product residues.

Environmental Precautions Knock down dust with water spray. Avoid penetration into waterways, sewers, soil or groundwater. Local authorities should be advised if significant spillages cannot be contained.

Methods for Containment Vacuum, shovel or pump waste into a drum and label contents for disposal. Avoid dust formation. Store in closed container.

Methods for cleaning up Clean up spill area and treat as special waste. Dispose of waste as indicated in Section 13.

7. HANDLING AND STORAGE

Handling Wear personal protective equipment. Avoid breathing dust. Handle product only in closed system or provide appropriate exhaust ventilation at machinery. Avoid contact with skin and eyes. Remove and wash contaminated clothing before re-use.

Storage Keep containers tightly closed in a dry, cool and well-ventilated place. Keep away from heat. Do not store near combustible materials. Avoid contamination of opened product. Keep away from food, drink and animal feedingstuffs. Avoid formation and deposition of dust.

Incompatible products Bases, Halides, Oxidizing agents, Strong reducing agents, Combustible materials.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Control parameters

Exposure Guidelines .

Chemical name	ACGIH TLV	OSHA PEL	NIOSH	Mexico
Sodium Persulfate 7775-27-1	TWA: 0.1 mg/m³	-	-	-
Chemical name	**British Columbia**	**Quebec**	**Ontario TWAEV**	**Alberta**
Sodium Persulfate 7775-27-1	TWA: 0.1 mg/m³	-	TWA: 0.1 mg/m³	TWA: 0.1 mg/m³

Appropriate engineering controls

Engineering measures Ensure adequate ventilation, especially in confined areas.

Individual protection measures, such as personal protective equipment

Eye/Face Protection	Eye protection recommended. Chemical goggles consistent with EN 166 or equivalent.
Skin and Body Protection	Wear long-sleeved shirt, long pants, socks, and shoes.
Hand Protection	Protective gloves: Neoprene gloves, Polyvinylchloride, Natural Rubber.
Respiratory Protection	If exposure limits are exceeded or irritation is experienced, NIOSH/MSHA approved respiratory protection should be worn: particulate filtering facepiece respirators.
Hygiene measures	Keep away from food, drink and animal feeding stuffs. Do not eat, drink or smoke when using this product. Wash hands before breaks and after shifts. Keep work clothes separate, remove contaminated clothing - launder after open handling of product.
General information	Protective engineering solutions should be implemented and in use before personal protective equipment is considered.

9. PHYSICAL AND CHEMICAL PROPERTIES

Information on basic physical and chemical properties

Appearance	Crystalline solid
Physical State	Solid
Color	White
Odor	odorless
Odor threshold	Not applicable
pH	6.0 (1% solution)
Melting point/freezing point	180 °C (Decomposes)
Boiling Point/Range	Decomposes on heating
Flash point	Not flammable
Evaporation Rate	Not applicable
Flammability (solid, gas)	Not flammable
Flammability Limit in Air	Not applicable
Upper flammability limit:	No information available
Lower flammability limit:	No information available
Vapor pressure	6.07E-30 mm Hg at 25ºC
Vapor density	No information available
Density	2.59 g/cm³ (crystal density)
Specific gravity	No information available
Water solubility	42 % @ 25 °C
Solubility in other solvents	No information available
Partition coefficient	No information available
Autoignition temperature	No evidence of combustion up to 600°C
Decomposition temperature	> 100 °C (assume)
Viscosity, kinematic	No information available (Solid)
Viscosity, dynamic	No information available
Explosive properties	Not explosive
Oxidizing properties	oxidizer

Other Information

Molecular weight	238.1
VOC content (%)	Not applicable
Bulk density	1.12 g/cm³ (loose)

10. STABILITY AND REACTIVITY

Reactivity Strong oxidizer. Oxidizer. Contact with other material may cause fire.

Chemical Stability Decomposition can occur on exposure to heat or moisture.

Possibility of Hazardous Reactions Use of persulfates in chemical reactions requires appropriate precautions and design considerations for pressure and thermal relief.

Decomposing persulfates will evolve large volumes of gas and/or vapor, can accelerate exponentially with heat generation, and create significant and hazardous pressures if contained and not properly controlled or mitigated.

Use with alcohols in the presence of water has been demonstrated to generate conditions that require rigorous adherence to process safety methods and standards to prevent escalation to an uncontrolled reaction.

Hazardous polymerization Hazardous polymerization does not occur.

Conditions to avoid Heat. (decomposes at 275 °C); Moisture.

Incompatible materials Bases, Halides, Oxidizing agents, Strong reducing agents, Combustible materials.

Hazardous Decomposition Products Oxygen which supports combustion; Sulfur oxides.

11. TOXICOLOGICAL INFORMATION

Product Information

Unknown acute toxicity 0% of the mixture consists of ingredient(s) of unknown toxicity

LD50 Oral 895 mg/kg (rat) (Sodium Persulfate)
LD50 Dermal > 10,000 mg/kg (rabbit) (Sodium Persulfate)
LC50 Inhalation > 5.1 mg/L (rat) (4-hr) (Sodium Persulfate)

Serious eye damage/eye irritation Irritating to eyes.
Skin corrosion/irritation Minimally irritating.

Sensitization Sensitizing to skin and respiratory system.

Component Information

Chemical name	LD50 Oral	LD50 Dermal	LC50 Inhalation	NOAEL Oral Value
Sodium sulfate (7757-82-6)	> 10000 mg/kg (Rat)			

Information on toxicological effects

Symptoms Symptoms of allergic reaction may include rash, itching, swelling and trouble breathing.

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Irritation Irritating to eyes, respiratory system and skin.
corrosivity None.

Carcinogenicity Did not show carcinogenic effects in animal experiments.

Mutagenicity In vivo tests did not show mutagenic effects.

Reproductive toxicity This product is not recognized as reprotox by Research Agencies.

STOT - single exposure May cause respiratory irritation.
STOT - repeated exposure Not classified.
Subchronic toxicity Oral (NOAEL) = 131.5 mg/kg bw (Sodium Persulfate)
Inhalation (NOAEC) = 10.3 mg/m³ (Ammonium Persulfate) Dermal: No data available

Target organ effects Eyes, Skin, Respiratory System.

Aspiration hazard Not applicable.

12. ECOLOGICAL INFORMATION

Ecotoxicity

Ecotoxicity effects

Sodium Persulfate (7775-27-1)				
Active Ingredient(s)	Duration	Species	Value	Units
Sodium Persulfate	96 h LC50	Rainbow trout	163	mg/L
Sodium Persulfate	48 h LC50	Daphnia magna	133	mg/L
Sodium Persulfate	96 h LC50	Grass shrimp	519	mg/L
Sodium Persulfate	72 h EC50	Algae Selenastrum capricornutum	116	mg/L

Persistence and degradability Biodegradability does not pertain to inorganic substances.

Bioaccumulation Does not bioaccumulate.

Mobility Dissociates into ions.

Other Adverse Effects None known.

13. DISPOSAL CONSIDERATIONS

Waste disposal methods This material, as supplied, is a hazardous waste according to federal regulations (40 CFR 261). It must undergo special treatment, e.g. at suitable disposal site, to comply with local regulations.

US EPA Waste Number D001.

Contaminated Packaging Dispose of in accordance with local regulations.

14. TRANSPORT INFORMATION

DOT

UN/ID no UN 1505
Proper Shipping Name SODIUM PERSULFATE
Hazard class 5.1
Packing Group III

TDG

UN/ID no	UN 1505
Proper Shipping Name	SODIUM PERSULFATE
Hazard class	5.1
Packing Group	III

MEX

UN/ID no	UN 1505
Proper Shipping Name	SODIUM PERSULFATE
Hazard class	5.1
Packing Group	III

ICAO/IATA

UN/ID no	1505
Proper Shipping Name	SODIUM PERSULFATE
Hazard class	5.1
Packing Group	III

IMDG/IMO

UN/ID no	1505
Proper Shipping Name	SODIUM PERSULFATE
Hazard class	5.1
Packing Group	III

ADR/RID

UN/ID no	UN 1505
Proper Shipping Name	SODIUM PERSULFATE
Hazard class	5.1
Packing Group	III

ADN

Proper Shipping Name	SODIUM PERSULFATE
Hazard class	5.1
Packing Group	III

15. REGULATORY INFORMATION

U.S. Federal Regulations

SARA 313

Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product does not contain any chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372

SARA 311/312 Hazard Categories

This product has the following hazards that are reportable under The Emergency Planning and Community Right-to-Know rule (EPCRA Tier II):

- Oxidizer
- Acute toxicity
- Skin corrosion/irritation
- Serious eye damage/eye irritation
- Respiratory/skin sensitization
- Specific Target Organ Toxicity (STOT) - Single Exposure

Clean Water Act

This product does not contain any substances regulated as pollutants pursuant to the Clean Water Act (40 CFR 122.21 and 40 CFR 122.42)

CERCLA/EPCRA

This material, as supplied, does not contain any substances regulated as hazardous substances under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302) or the Superfund Amendments and Reauthorization Act (SARA) (40 CFR 355). There may be specific reporting requirements at the local, regional, or state level

pertaining to releases of this material

CWC (Chemical Weapons Convention) - Annex on Chemicals Not applicable

US State Regulations

U.S. State Right-to-Know Regulations
This product contains the following substances regulated under state Right-to-Know laws:

Chemical name	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Sodium sulfate	X		X		
Sodium Persulfate		X			

California Proposition 65
This product does not contain any Proposition 65 chemicals

CANADA

Environmental Emergencies
This product contains no substances listed under Canada's Environmental Emergency regulations.

Canadian National Pollutant Release Inventory
This product contains no substances reportable under Canada's National Pollutant Release Inventory regulations.

International Inventories

Chemical name	TSCA (United States)	DSL (Canada)	EINECS/ELINCS (Europe)	ENCS (Japan)	China (IECSC)	KECL (Korea)	PICCS (Philippines)	AICS (Australia)	NZIoC (New Zealand)
Sodium sulfate 7757-82-6	X	X	231-820-9	X	X	X	X	X	X
Sodium Persulfate 7775-27-1	X	X	231-892-1	X	X	X	X	X	X

All ingredients are directly listed on the active TSCA Inventory

Mexico

Mexico - Grade Slight risk, Grade 1

16. OTHER INFORMATION

NFPA	**Health Hazards** 1	**Flammability** 0	**Stability** 1	**Special Hazards** OX
HMIS	**Health Hazards** 1	**Flammability** 0	**Physical hazard** 1	**Special precautions** J

NFPA/HMIS Ratings Legend Severe = 4; Serious = 3; Moderate = 2; Slight = 1; Minimal = 0
OX = Oxidizer
Protection=J (Safety goggles, gloves, apron, combination dust and vapor respirator)

Revision date: 2021-02-19
Revision note SDS sections updated: 1.

Issuing Date: 2021-02-09

Disclaimer
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Prepared By:

PeroxyChem

End of Safety Data Sheet

SAFETY DATA SHEET
Klozur KP

SDS # : 7727-21-1-12EU
Revision date: 2021-10-13
Version 1.04

1. IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

1.1. Dipotassium peroxodisulfate

Chemical name	Dipotassium peroxodisulfate
Product Name	Klozur KP
Synonyms	Potassium Peroxydisulfate; Dipotassium Peroxydisulfate; Peroxydisulfuric acid, dipotassium salt; Peroxydisulfuric acid, potassium salt
CAS-No	7727-21-1
EC-No	231-781-8
REACH registration number	01-2119495676-19-0001
Formula	K2O8S2 and $K_2 S_2 O_8$

1.2. Relevant identified uses of the substance or mixture and uses advised against

Recommended Use:	In situ and ex situ chemical oxidation of contaminants and compounds of concern for environmental remediation applications
Restrictions on Use	Consumer uses: Water treatment chemical, Metal surface treatment products

1.3. Details of the supplier of the safety data sheet

Manufacturer/Supplier

Evonik Active Oxygens, LLC
2005 Market Street
Suite 3200
Philadelphia, PA 19103
Phone: +1 267/ 422-2400 (General Information)
E-Mail: Product-regulatory-services@evonik.com

Responsible Persons

Evonik Operations GmbH
Rellinghauser Str. 1-11
45128 Essen
Germany
Tel: +49 6181 59 4787
E-mail: sds-hu@evonik.com

1.4. Emergency telephone numbers

24-Hour Health Emergency: +49 2365 49 2232

2. HAZARDS IDENTIFICATION

2.1. Classification of the substance or mixture

Regulation (EC) No 1272/2008

Acute oral toxicity	Category 4, H302
Skin corrosion/irritation	Category 2; H315
Serious eye damage/eye irritation	Category 2; H319
Respiratory sensitization	Category 1; H334
Skin sensitization	Category 1; H317
Specific target organ systemic toxicity (single exposure)	Category 3; H335
Oxidizing Solids	Category 3; H272

For the full text of the H- and EUH- phrases mentioned in this Section, see Section 16.

2.2. Label Elements

Signal word: DANGER

Hazard Statements
H302 - Harmful if swallowed
H315 - Causes skin irritation
H319 - Causes serious eye irritation
H317 - May cause an allergic skin reaction
H334 - May cause allergy or asthma symptoms or breathing difficulties if inhaled
H335 - May cause respiratory irritation
H272 - May intensify fire; oxidizer

Precautionary statements
P220 - Keep/Store away from clothing/ combustible materials
P280 - Wear protective gloves/ protective clothing/ eye protection/ face protection
P302 + P352 - IF ON SKIN: Wash with plenty of soap and water
P305 + P351 + P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
P304 + P340 - IF INHALED: Remove person to fresh air and keep comfortable for breathing

Precautionary statements water

2.3. OTHER INFORMATION

General Hazards
Risk of decomposition by heat or by contact with incompatible materials

3. COMPOSITION/INFORMATION ON INGREDIENTS

Substance

Dipotassium peroxodisulfate

Chemical name	EC-No	CAS-No	Weight %	Classification according to Regulation (EC) No. 1272/2008 [CLP]	REACH registration number
Potassium Persulfate	231-781-8	7727-21-1	>98	Acute Tox. 4 (H302) Skin Irrit. 2 (H315) Eye Irrit. 2 (H319) Resp. Sens. 1 (H334) Skin Sens. 1 (H317) STOT SE 3 (H335) Ox. Sol. 3 (H272)	01-2119495676-19-0001
Potassium Sulfate	231-915-5	7778-80-5	<2		-

For the full text of the H- and EUH- phrases mentioned in this Section, see Section 16

4. FIRST AID MEASURES

4.1. Description of first-aid measures

General Advice Remove from exposure, lie down. Show this material safety data sheet to the doctor in attendance.

Skin Contact Wash off immediately with soap and plenty of water while removing all contaminated clothes and shoes. Get medical attention if irritation develops and persists.

Eye Contact Rinse thoroughly with plenty of water for at least 15 minutes, lifting lower and upper eyelids intermittently. Consult a physician. In case of contact, immediately flush eyes with plenty of water. If symptoms persist, call a physician.

Inhalation Remove from exposure, lie down. If breathing is irregular or stopped, administer artificial respiration. Call a physician immediately.

Ingestion Do NOT induce vomiting. Call a physician or poison control center immediately. Rinse mouth. Drink 1 or 2 glasses of water.

4.2. Most important symptoms and effects, both acute and delayed

Itching; Redness; Coughing and/ or wheezing

4.3. Indication of immediate medical attention and special treatment needed, if necessary

Indication of immediate medical attention and special treatment needed, if necessary Treat symptomatically.

5. FIRE-FIGHTING MEASURES

5.1. Extinguishing media

Suitable Extinguishing Media
Water, Cool containers with flooding quantities of water until well after fire is out.

Extinguishing media which shall not be used for safety reasons
Do NOT use water jet.

5.2. Special hazards arising from the substance or mixture

Special exposure hazards arising from the substance or preparation itself, combustion products, resulting gases
In case of fire, formation of sulphur oxides, nitrogen oxides, toxic pyrolysis products.

5.3. Advice for firefighters

Special protective equipment for fire-fighters
As in any fire, wear self-contained breathing apparatus and full protective gear.

OTHER INFORMATION
The product is not combustible. Contact with combustible materials may intensify fires. Adjust fire fighting measures to surrounding fire, if possible. Cool endangered containers with water spray and move out of danger area. Collect contaminated fire extinguishing water separately. This must not be discharged into drains. Fire residues and contaminated fire extinguishing water must be disposed of in accordance with local regulations.

6. ACCIDENTAL RELEASE MEASURES

6.1. Personal precautions, protective equipment and emergency procedures

Keep off any unprotected persons. Avoid contact with the skin and the eyes. Avoid breathing dust. Wear personal protective equipment.

6.2. Environmental Precautions

See Section 12 for additional Ecological Information.

6.3. Methods and materials for containment and cleaning up

Vacuum, shovel or pump waste into a drum and label contents for disposal. Avoid dust formation. Store in closed container. Clean up spill area and treat as special waste Dispose of waste as indicated in Section 13

Never add other substances or combustible waste to product residues.

6.4. Reference to other sections.

Dispose of waste as indicated in Section 13

7. HANDLING AND STORAGE

7.1. Precautions for Safe Handling

Wear personal protective equipment. Use only in area provided with appropriate exhaust ventilation. Avoid dust formation. Handle product only in closed system or provide appropriate exhaust ventilation at machinery. Avoid contact with skin and eyes. Avoid breathing dust. Remove and wash contaminated clothing before re-use. Reference to other sections.

Additional information
Use clean plastic or stainless steel scoops only

7.2. Conditions for safe storage, including any incompatibilities

Storage
Keep containers tightly closed in a dry, cool and well-ventilated place. Keep away from heat. Do not store near combustible materials. Avoid contamination of opened product. Keep away from food, drink and animal feedingstuffs. Avoid formation and deposition of dust.

Materials to avoid
Acids, Bases, Halides, Oxidizing agents, Strong reducing agents, Combustible materials,

7.3. Specific end uses

Refer to Section 1 and the Annex.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1. Control parameters

Exposure Limits Ingredients with workplace control parameters

Chemical name	European Union	The United Kingdom	Ireland
Potassium Persulfate 7727-21-1			TWA 0.1 mg/m ^{3} STEL 0.3 mg/m ^{3} Sensitizer
Chemical name	**France**	**Spain**	**Portugal**
Potassium Persulfate 7727-21-1		TWA 0.1 mg/m ^{3} S+	
Chemical name	**Denmark**	**Finland**	**Norway**
Potassium Persulfate 7727-21-1	TWA 2 mg/m ^{3}		
Chemical name	**Slovakia**	**Switzerland**	**Belgium**
Potassium Persulfate 7727-21-1			TWA 0.1 mg/m ^{3}
Chemical name	**Luxembourg**	**Poland**	**Estonia**
Potassium Persulfate 7727-21-1		TWA 0.1 mg/m ^{3}	
Chemical name	**Latvia**	**Lithuania**	**Czech Republic**
Potassium Sulfate 7778-80-5	TWA 10 mg/m ^{3}	TWA 10 mg/m ^{3}	
Chemical name	**Romania**	**Bulgaria**	**Russia**
Potassium Sulfate 7778-80-5		TWA 10.0 mg/m ^{3}	MAC 10 mg/m ^{3}

Derived No Effect Level (DNEL)

DNELs - General Population				
Potassium Persulfate (7727-21-1)				
Exposure pattern	Route of Exposure	Description	DNEL/DMEL	Most Sensitive Endpoint
Acute - systemic	dermal	LD0	200 mg/kg bw	Acute toxicity
Acute - systemic	Inhalation	LC0	295 mg/m³	Acute toxicity
Acute - systemic	oral	LD0	30 mg/kg bw	Acute toxicity
Acute - local	dermal	LD0	1.124 mg/cm3	Acute toxicity
Acute - local	Inhalation	LC0	295 mg/m³	Acute toxicity
Long term - systemic	dermal	NOAEL	9.1 mg/kg bw/day	repeated dose toxicity
Long term - systemic	Inhalation	NOAEC	1.03 mg/m³	repeated dose toxicity
Long term - systemic	oral	NOAEL	9.1 mg/kg bw/day	repeated dose toxicity
Long term - local	dermal	NOAEL	0.051 mg/cm3	repeated dose toxicity
Long term - local	Inhalation	NOAEC	1.03 mg/m³	repeated dose toxicity

Predicted No Effect Concentration (PNEC)

8.2. Exposure Controls

Engineering measures Provide local exhaust or general ventilation adequate to maintain exposures below permissable exposure limits.

Personal protective equipment

General information Protective engineering solutions should be implemented and in use before personal protective equipment is considered.

Respiratory Protection P2 Dust mask when airborne dust concentrations elevated.

Eye/Face Protection Eye protection recommended. Chemical goggles consistent with EN 166 or equivalent.

Skin and Body Protection Wear suitable protective clothing.

Hand Protection Protective gloves: Neoprene gloves, Polyvinylchloride, Natural Rubber.

Hygiene measures Keep away from food, drink and animal feeding stuffs. Do not eat, drink or smoke when using this product. Wash hands before breaks and after shifts. Keep work clothes separate, remove

contaminated clothing - launder after open handling of product.

Environmental exposure controls The product should not be allowed to enter drains, water courses or the soil.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1. Information on basic physical and chemical properties

Appearance	Crystalline solid
Color	White
Physical State	Solid
Odor	odorless
Odor threshold	Not applicable
pH	6.4 (1% solution)
Flash point	Not flammable
Melting Point/Range	> 100 °C
Freezing Point	Not applicable
Boiling Point/Range	Decomposes Decomposes upon heating
Autoignition temperature	No evidence of combustion up to 600°C
Explosive properties	Not explosive
Vapor pressure	6.07E-30 mm Hg at 25ºC
Vapor density	No information available
Density	2.48 g/cm³ (crystal density)
Relative Density	1.39
Partition coefficient	No information available (inorganic)
Water solubility	5.6 % @ 25 °C
Viscosity	No information available (Solid)
Evaporation Rate	No information available
Decomposition temperature	> 100 °C (assume)

9.2. OTHER INFORMATION

Bulk Density	1.30 g/cm³ (loose)
Molecular weight	270.31

10. STABILITY AND REACTIVITY

10.1. Reactivity

Strong oxidizer

10.2. Chemical Stability

Stable under recommended storage conditions. Unstable if heated. Unstable on exposure to moisture. Unstable in presence of contamination.

10.3. Possibility of Hazardous Reactions

Use of persulfates in chemical reactions requires appropriate precautions and design considerations for pressure and thermal relief.

Decomposing persulfates will evolve large volumes of gas and/or vapor, can accelerate exponentially with heat generation, and create significant and hazardous pressures if contained and not properly controlled or mitigated.

Use with alcohols in the presence of water has been demonstrated to generate conditions that require rigorous adherence to process safety methods and standards to prevent escalation to an uncontrolled reaction.

10.4. Conditions to avoid

Moisture; Heat. (decomposes at temperatures >100 °C).

10.5. incompatible materials

Acids, Bases, Halides, Oxidizing agents, Strong reducing agents, Combustible materials,

10.6. Hazardous Decomposition Products

Incomplete combustion and thermolysis may produce gases of varying toxicity such as carbon monoxide, carbon dioxide, various hydrocarbons, aldehydes and soot.

11. TOXICOLOGICAL INFORMATION

11.1. Information on toxicological effects

Acute toxicity

LD50 Dermal	> 10000 mg/kg (rat) (Potassium Persulfate)
LD50 Oral	1130 mg/kg (rat) (Potassium Persulfate)
LC50 Inhalation	> 42.9 mg/L (rat) (Potassium Persulfate)
Skin Contact	Non-irritating (rabbit). Persulfates in general, specifically diammonium persulfate and dipotassium persulfate, exhibited skin irritation properties in human case reports, following occupational exposure and consumer use.
Eye Contact	Irritating to eyes. Has been shown to exhibit eye irritation properties in human case reports following occupational exposure and consumer use. Slightly or non-irritating (rabbit).
Inhalation	May cause irritation of respiratory tract. Respiratory irritation has been seen in workers exposed to persulfates. In animals, diammonium persulfate, produced pathological respiratory irritation in a subchronic study.
Subchronic toxicity	Oral (NOAEL) = 131.5 mg/kg bw (Potassium Persulfate) Inhalation (NOAEC) = 10.3 mg/m^3 (Ammonium Persulfate) Dermal: No data available
Chronic toxicity	
Sensitization	Sensitizing to skin and respiratory system.
Target organ effects	Eyes. Skin. Respiratory System.
Carcinogenicity	Did not show carcinogenic effects in animal experiments.
Mutagenicity	In vivo tests did not show mutagenic effects.
Reproductive toxicity	Diammonium persulfate did not affect fertility or the developing fetus in animal studies (NOAEL: 250 mg/kg bw).

12. ECOLOGICAL INFORMATION

12.1. Toxicity

Ecotoxicity effects

Not expected to have significant environmental effects, based on data for similar substances.

Potassium Persulfate (7727-21-1)				
Active Ingredient(s)	Duration	Species	Value	Units
Potassium persulfate	96 h LC50	Onchorhyncus mykiss	76.3	mg/L
Potassium persulfate	48 h EC50	Water flea	120	mg/L
Potassium persulfate	72 h EC50	Marine algae (Phaeodacttylum tricornutum)	136	mg/L
Potassium persulfate	96 h LC50	Turbot (Scophthalmus maximus)	107.6	mg/L
Potassium persulfate	18 h EC10	Pseudonomas putida	36	mg/L

Potassium persulfate	5 d	Abra Alba	11	mg/L
Potassium persulfate	96 h LC50	Grass shrimp	391	mg/L
Potassium persulfate	24 h EC50	Daphnia magna	635.7	mg/L

12.2. Persistence and degradability

Biodegradability does not pertain to inorganic substances.

12.3. Bioaccumulative potential

Does not bioaccumulate.

12.4. Mobility in soil

Dissociates into ions.

12.5. Results of PBT and vPvB assessment

PBT/vPvB assessment is not required for inorganic substances.

12.6. Other Adverse Effects

None known.

13. DISPOSAL CONSIDERATIONS

13.1. Waste treatment methods

Product / Packaging disposal Dispose of as hazardous waste in compliance with local and national regulations.

Contaminated Packaging Empty containers should be taken to an approved waste handling site for recycling or disposal.

14. TRANSPORT INFORMATION

ADR/RID

UN/ID no 1492
Proper Shipping Name Potassium persulfate
Hazard class 5.1
Packing Group III

IMDG/IMO

UN/ID no 1492
Proper Shipping Name Potassium persulfate
Hazard class 5.1
Packing Group III

ICAO/IATA

UN/ID no 1492
Proper Shipping Name Potassium persulfate
Hazard class 5.1
Packing Group III

ADN

UN/ID no	1492
Proper Shipping Name	Potassium persulfate
Hazard class	5.1
Packing Group	III

Transport Symbol

Environmental Hazards This product contains no chemical substance that is listed as a marine pollutant according to DOT

Special Precautions for users According to United Nations "Recommendations on the transport of dangerous goods"

Transport in bulk according to MARPOL 73/78 and the IBC Code See IMDG above

15. REGULATORY INFORMATION

15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture

International Inventories

Chemical name	TSCA (United States)	DSL (Canada)	EINECS/ELINCS (Europe)	ENCS (Japan)	China (IECSC)	KECL (Korea)	PICCS (Philippines)	AICS (Australia)	NZIoC (New Zealand)
Potassium Persulfate 7727-21-1	X	X	231-781-8	X	X	X	X	X	X
Potassium Sulfate 7778-80-5	X	X	231-915-5	X	X	X	X	X	X

Directive 2008/98/EC on waste
Applicable
Major Accidents (Directive 2012/18/EU)
Included for storage of quantities exceeding 50 Tm
CWC (Chemical Weapons Convention) - Annex on Chemicals
Not applicable

15.2. Chemical Safety Report

A Chemical Safety Assessment has been carried out for this substance.

16. OTHER INFORMATION

Full text of H-phrases referred to in sections 2 and 3
H272 - May intensify fire; oxidizer
H302 - Harmful if swallowed
H315 - Causes skin irritation
H319 - Causes serious eye irritation
H334 - May cause allergy or asthma symptoms or breathing difficulties if inhaled
H317 - May cause an allergic skin reaction
H335 - May cause respiratory irritation

Restrictions on Use
Consumer uses: Water treatment chemical, Metal surface treatment products.
This product's foreseen or recommended applications are: In situ and ex situ chemical oxidation of contaminants and compounds of concern for environmental remediation applications

Sources of key data used to compile the datasheet
Evonik

Additional information
This Safety Data Sheet has been prepared according to Regulation (EC) 1907/2006 and Regulation (EU) 453/2010

Revision date:
2021-10-13
Revision note
Manufacturer name changed.

List of Abbreviations and Acronyms
ATE Acute Toxicity Estimate
ADR European Agreement concerning the International Carriage of Dangerous Goods by Road
AND European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways
CE50 Concentración Efectiva MediaCEN European Committee for Standardisation
C&L Classification and Labelling
CLP Classification Labelling Packaging Regulation; Regulation (EC) No 1272/2008
CLV Ceiling Limit Value Par CAS# Chemical Abstracts Service number
CMR Carcinogen, Mutagen, or Reproductive Toxicant
CSA Chemical Safety Assessment
CSR Chemical Safety Report
DNEL Derived No Effect Level
DOT Department of Transportation
DPD Dangerous Preparations Directive 1999/45/EC
DSD Dangerous Substances Directive 67/548/EEC
DU Downstream User
EC European Community
ECHA European Chemicals Agency
EC-Number EINECS and ELINCS Number (see also EINECS and ELINCS)
EEA European Economic Area (EU + Iceland, Liechtenstein and Norway)
EEC European Economic Community
EINECS European Inventory of Existing Commercial Substances
ELINCS European List of notified Chemical Substances
EN European Standard
EQS Environmental Quality Standard
EU European Union
Euphrac European Phrase Catalogue EWC
European Waste Catalogue (replaced by LoW –see below)
FDS Ficha de Datos de Seguridad
GES Generic Exposure Scenario
GHS Globally Harmonized System
IATA International Air Transport Association
ICAO-TI Technical Instructions for the Safe Transport of Dangerous Goods by Air
IMDG International Maritime Dangerous Goods
IMO International Maritime Organization
IMSBC International Maritime Solid Bulk Cargoes
IT Information Technology
IUCLID International Uniform Chemical Information Database
IUPAC International Union for Pure Applied Chemistry
JRC Joint Research Centre
Kow octanol-water partition coefficient
LC50 Lethal Concentration to 50 % of a test population Lethal Dose to 50% of a test population (Median Lethal Dose)
LE Legal Entity
LLV Level Limit Value
LoW List of Wastes (see http://ec.europa.eu/environment/waste/framework/list.htm)
LR Lead RegistrantM/I Manufacturer / Importer MS Member States
MSDS Material Safety Data Sheet
NOEC No observed effect concentration
OC Operational Conditions
OECD Organization for Economic Co-operation and Development

OEL Occupational Exposure Limit
OJ Official Journal
OR Only Representative
OSHA European Agency for Safety and Health at work
PBT Persistent, Bioaccumulative and Toxic substance
PEC Predicted Effect Concentration
PNEC(s) Predicted No Effect Concentration(s)
PPE Personal Protection Equipment
(Q)SAR Qualitative Structure Activity Relationship
RCR Risk Characterization ratio
REACH Registration, Evaluation, Authorisation and Restriction of Chemicals Regulation (EC) No 1907/2006
RID Regulations concerning the International Carriage of Dangerous Goods by Rail
RIP REACH Implementation Project
RMM Risk Management Measure
SADT Self-accelerating decomposition temperature
SCBA Self-Contained Breathing Apparatus
SDS Safety data sheet
SIEF Substance Information Exchange Forum
SME Small and Medium sized Enterprises
STEL Short-term exposure limit
STOT Specific Target Organ Toxicity (STOT)
RE Repeated Exposure(STOT)
SE Single Exposure Par SVHC Substances of Very High Concern
TSCA Toxic Substances Control Act
TWA Time Weighed Average
UN United Nations
vPvB Very Persistent and Very Bioaccumulative / mPmB Muy Persistente y Muy Bioacumulativo
WGK Wassergefährdungsklassen

Disclaimer

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Prepared By:

Evonik

End of Safety Data Sheet

SAFETY DATA SHEET

SECTION 1	IDENTIFICATION

Product

Name: Hydrated Lime

Other Names: Hydrate; High-Calcium Hydrated Lime

Recommended Uses: Water Treatment; pH adjustment; FGT; Construction

Company Identification:

US Operations:

Lhoist North America, Inc.
5600 Clearfork Main St, Ste. 300
Fort Worth, TX 76109
817-732-8164

Canadian Operations:

Lhoist North America of Canada, Inc.
20303-102B Ave.
Langley, BC V1M 3H1
604-888-4333

Emergency Phone Number:

Chemtrec 1-800-424-9300

SECTION 2	HAZARDS(S) IDENTIFICATION

Classification

Eye Damage – Category 1

Carcinogen – Category 1

Skin Irritation – Category 2

Specific Target Organ Toxicity Single Exposure – Category 3 (Respiratory System)

Specific Target Organ Toxicity Repeat Exposure – Category 1 (Respiratory System)

Labeling:

Pictograms:

Signal Word(s): Danger

Hazard Statements: Causes serious eye damage.

Causes skin irritation.

May cause respiratory irritation.

Causes damage to lungs through prolonged or repeated exposure when inhaled.

May cause cancer through inhalation.

Precautionary Statements:

Wear protective gloves and eye protection. Wash exposed skin thoroughly after handling. Do not breathe dust. Use only outdoors or in a well-ventilated area. Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Do not eat, drink or smoke when using this product.

If on skin: wash exposed skin with plenty of water. If skin irritation occurs: Get medical attention. Take off contaminated clothing and wash it before reuse.

If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses if present and easy to do. Continue rinsing. Seek medical attention immediately. If inhaled: Remove person to fresh air and keep comfortable for breathing. Seek medical attention if you feel unwell.

If exposed or concerned: Get medical advice

Dispose of contents or containers in accordance with applicable regulations.

Other Hazards: None.

SECTION 3	COMPOSITION/ INFORMATION ON INGREDIENTS

Chemical Name: Calcium hydroxide

Common names and synonyms: Hydrate; High-Calcium Hydrated Lime

Chemical Identity	CAS #	Concentration, % Wt.
Calcium Hydroxide	1305-62-0	> 90%
Magnesium Oxide	1309-48-4	< 3%
Crystalline Silica	14808-60-7	< 2%

SECTION 4	FIRST AID MEASURES

Eye Contact: Contact can cause severe irritation or burning of eyes, including permanent damage. Immediately flush eyes with generous amounts of water for as long as needed. This may take several minutes. Pull back the eyelid to ensure that all lime dust has been washed out. Seek medical attention immediately. Do not rub eyes.

Inhalation: This product can cause severe irritation of the respiratory system. Move victim to fresh air. Seek medical attention if necessary. If breathing has stopped, give artificial respiration.

Skin Contact: Contact can cause severe irritation or burning of skin, especially in the presence of moisture. Wash exposed area with large amounts of water. Seek medical attention immediately.

Ingestion: This product can cause severe irritation or burning of gastrointestinal tract if swallowed. Do not induce vomiting. Seek medical attention immediately. Never give anything by mouth unless instructed to do so by medical personnel.

Most important symptoms and effects, both acute and delayed: Irritation of skin, eyes, gastrointestinal tract or respiratory tract. Long-term exposure by inhalation may cause permanent damage. This product contains crystalline silica, which has been classified by IARC as (Group I) carcinogenic to humans when inhaled. Inhalation of silica can also cause a chronic lung disorder, silicosis.

Note to Physician: Provide general supportive measures and treat symptomatically.

SECTION 5	FIREFIGHTING MEASURES

Extinguishing Media

Appropriate Extinguishing Media: Use dry chemical fire extinguisher

Inappropriate Extinguishing Media: Do not use halogenated compounds.

Firefighting

Fire Hazards: Hydrated Lime is not combustible or flammable. Hydrated Lime is not considered to be an explosive hazard, although reaction with incompatible materials may rupture containers.

Hazardous Combustion Products: None

Special Protective Equipment and Fire Fighting Instructions: Keep personnel away from and upwind of fire. Wear full fire-fighting turn-out gear (full Bunker gear), and respiratory protection (SCBA).

SECTION 6	ACCIDENTAL RELEASE MEASURES

Personal Precautions: Use proper protective equipment.

Environmental Precautions: For large spills, as much as possible, avoid the generation of dusts. Prevent release to sewers or waterways.

Methods and Materials for Containment and Cleaning Up:

Small Spills: Use dry methods to collect spilled materials. Avoid generating dust. Do not clean up with compressed air. Store collected materials in dry, sealed plastic or metal containers. Residue on surfaces may be washed with water or dilute vinegar.

Large Spills: Use dry methods to collect spilled materials. Evacuate area downwind of clean-up operations to minimize dust exposure. Store spilled materials in dry, sealed plastic or metal containers.

SECTION 7	HANDLING AND STORAGE

Precautions for Safe Handling: Keep in tightly closed containers. Protect containers from physical damage. Avoid direct skin contact with the material.

Conditions for Safe Storage, Including any Incompatibilities: Store in a cool, dry, and well-ventilated location. Do not store near incompatible materials (see Section 10 below). Keep away from moisture. Do not store or ship in aluminum containers.

SECTION 8	EXPOSURE CONTROLS/ PERSONAL PROTECTION

Control Parameters:

Component	CAS #	Exposure Limits
Calcium Hydroxide	1305-62-0	OSHA PEL: 15 mg/m3 (total) 5 mg/m3 (respirable) ACGIH TLV: 5 mg/m3
Magnesium Oxide	1309-48-4	OSHA PEL: 15 mg/m3 ACGIH TLV: 10 mg/m3
Crystalline Silica	14808-60-7	OSHA PEL: 0.050 mg/m3 as an 8 hr. TWA (respirable) ACGIH TLV: 0.025 mg/m3 (respirable)

Appropriate Engineering Controls: Provide ventilation adequate to maintain PELs.

Personal Protection

Respiratory Protection: Use NIOSH approved respirators if airborne concentration exceeds PEL.

Eye Protection: Use safety glasses with side shields or safety goggles. Contact lenses should not be worn when working with lime products.

Skin Protection: If there is a risk of skin contact, wear appropriate clothing and gloves to prevent contact.

Other: Eye wash fountain and emergency showers are recommended.

SECTION 9	PHYSICAL AND CHEMICAL PROPERTIES

Appearance

Physical State: Solid

Color: White

Odor: Odorless

Odor Threshold: N/ A

pH: 12.44 @ 25^{o} C when made into a saturated solution

Melting Point: N/ AF

Initial Boiling Point: N/ A

Freezing Point: N/ A

Flash Point: N/ A

Evaporation Rate: N/ A

Flammability (solid, gas): Non-flammable

Explosion Limits: N/ A

Vapor Pressure: N/ A

Vapor Density: N/ A

Relative Density: 0.4 – 0.7 g/ cm^3 (apparent)

Solubility(ies): Solubility is 1.6 g/L at 25^{o} C

Partition coefficient: Relatively insoluble

Auto-ignition Temperature: N/ A

Decomposition Temperature: 580^{o} C / 1076^{o} F

Viscosity: N/A

SECTION 10	STABILITY AND REACTIVITY

Reactivity:

Chemical Stability: Hydrated Lime is chemically stable.

Possibility of Hazardous Reactions: See reactivity above

Conditions to Avoid: Do not allow Hydrated Lime to come into contact with incompatible materials.

Incompatible Materials: Hydrated Lime should not be mixed or stored with the following materials, due to the potential for violent reaction and release of heat:

Acids (unless in a controlled process)
Reactive Fluoridated Compounds
Reactive Brominated Compounds
Reactive Powdered Metals
Organic Acid Anhydrides
Nitro-Organic Compounds
Reactive Phosphorous Compounds
Interhalogenated Compounds

Hazardous Decomposition Products: None

SECTION 11	TOXICOLOGICAL INFORMATION

Health Effects: see First Aid discussion in Section 4

Routes of Exposure: see First Aid discussion in Section 4

Symptoms Related to Exposure: see First Aid discussion in Section 4

Carcinogen Listing: Hydrated Lime is not listed by MSHA, OSHA, or IARC as a carcinogen, but this product contains crystalline silica, which has been classified by IARC as (Group I) carcinogenic to humans when inhaled.

SECTION 12	ECOLOGICAL INFORMATION

Ecotoxicity: Because of the high pH of this product, it would be expected to produce significant ecotoxicity upon exposure to aquatic organisms and aquatic systems in high concentrations.

Persistence and Degradability: Reacts with atmospheric CO_2 over time to form calcium carbonate

Bioaccumulation Potential: This material shows no bioaccumulation effect or food chain concentration toxicity.

Mobility in Soil: Minimal mobility in soil. Reacts with clay portion of soil to form calcium silicates and calcium aluminates

Other Adverse Effects: This material is alkaline and if released into water or moist soil will cause an increase in pH

SECTION 13	DISPOSAL CONSIDERATIONS

Disposal Recommendations: Dispose of in accordance with all applicable federal, state, and local environmental regulations.

Regulatory Disposal Information: If this product as supplied, and unmixed, becomes a waste, it will not meet the criteria of a hazardous waste as defined under the Resource Conservation and Recovery Act.

SECTION 14	TRANSPORT INFORMATION

UN Number: Not Regulated

UN Proper Shipping Name: Not Regulated

Transport Hazard Class(es): Not Regulated

Packing Group: Not Regulated

Marine Pollutant (y/n): This material is alkaline and if released into water or moist soil will cause an increase in pH.

Special Precautions: None

SECTION 15	REGULATORY INFORMATION

National Chemical Inventory Listings:

All chemical ingredients are listed on the USEPA TSCA Inventory List.

US Regulations:

RCRA Hazardous Waste Number: not listed (40 CFR 261.33)
RCRA Hazardous Waste Classification (40 CFR 261): not classified
CERCLA Hazardous Substance (40 CFR 302.4) unlisted specific per RCRA, Sec. 3001; CWA, Sec. 311 (b) (4); CWA, Sec. 307(a), CAA, Sec. 112
CERCLA Reportable Quantity (RQ) not listed.
SARA 311/312 Codes: not listed.
SARA Toxic Chemical (40 CFR 372.65): not listed.
SARA EHS (Extremely Hazardous Substance) (40 CFR 355): Not listed, Threshold Planning Quantity (TPQ): not listed

Specific State Regulations: ⚠WARNING: This product can expose you to chemicals, including crystalline silica, which is known to the State of California to cause cancer. For more information, go to www.P65Warnings.ca.gov
These naturally occurring impurities may also be regulated by other States.

Canadian DSL: Listed

Canadian NPRI: None of the components are listed

CEPA Toxic Substances: None of the components are listed

SECTION 16	OTHER INFORMATION

Prepared By: Lhoist North America Technical Services

Date Prepared: January 27, 2020

Revision: 2020-1

Abbreviations:

N/A	Not Available or Not Applicable
IARC	International Agency for Research on Cancer
IATA	International Air Transport Association
ACGIH	ACGIH American Conference of Governmental Industrial Hygienists
TWA	Time Weighted Average
PEL	Permissible Exposure Limit
TLV	Threshold Limit Value
REL	Recommended Exposure Limit

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Resolute
Environmental & Water Resources Consulting

1003 Weatherstone Parkway
Suite 320
Woodstock, Georgia 30188
Telephone: 678.398.9942

November 16, 2021

Jeff Hopper
Georgia Environmental Protection Division,
Regulatory Support Program- UIC Unit
2 Martin Luther King, Jr. Drive
Suite 1456, East Tower
Atlanta, Georgia, 30334

Subject: Underground Injection Control (UIC) Pilot Test Notification Rev1
Milledge Avenue Site
Hazardous Waste Facility No. HW-041 (CA)
Athens, Georgia, 30602

Dear Mr. Hopper:

On behalf of the University of Georgia, Resolute Environmental & Water Resources Consulting, LLC (Resolute) is submitting this revised UIC Pilot Test Notification and supporting documentation for the above reference site. This revised notification significantly reduces the number of injection points to the agreed upon number based on a telephone conversation with yourself, the UGA representative, Jim Ussery, and Resolute representative, Tommy Jordan on November 15, 2021. The UGA is currently in the process of evaluating Corrective Action at the site through a Pilot Study as part of the implementation of the EPD approved 50% Remedial Design Report dated October 1, 2021 (hereafter referred to as "*the Report*").

As presented in Section 4 of *the Report* approved by the EPA in November 2021, Resolute proposed to evaluate the ability of In-Situ Chemical Oxidation to protect the sensitive receptor (on site creek) from impacts of site COCs by conducting an In-situ Chemical Oxidation pilot study for treatment to the groundwater/surface water transition zone in the upgradient of the creek. This groundwater transition zone is believed to be the source to the gaining creek.

Hydrogen Peroxide (oxidant) will be injected in thirty-five (35) injection points hydraulically up-gradient of the creek. Each injection point will be advanced utilizing a DPT rig with injection tooling and injection of the reagent will commence at the groundwater surface. The groundwater surface in the pilot area ranges from approximately three (3) to eight (8) feet below ground surface (bgs). Hydrogen Peroxide catalyzed with a Modified Fenton's Reagent (a proprietary blend of Iron Catalyst, stabilizers, and chelating agent) will be injected into the upper zone of the impacted groundwater plume (see attached Safety Data Sheets). These reagents will be mixed with water prior to injection to facilitate subsurface distribution. Approximately 24 gallons of an 8% solution of Hydrogen Peroxide catalyzed with modified Fenton's reagent will be injected per boring (a total of 840 gallons of 8% Hydrogen Peroxide for the entire injection event). The injection area is depicted in the attached Figure 1. Based on injection parameters at the time of injection such as injection pressure, radius of influence, and injection volume, Resolute may adjust the amount of oxidant injected during the pilot event to maximize the effectiveness of the pilot study.

One surface water sample immediately downgradient of the injection area and one groundwater sample from the injection area will be collected from the injection zone within 1 week of injection and analyzed for Volatile Organic Compounds (VOCs) by EPA 8260 and 1-4 Dioxane by EPA8260 SIM.

If you have any questions concerning this UIC pilot test permit application, please contact Tommy Jordan at (470) 895.0649 or Stephen Wilson at (470) 895.0654.

Sincerely,
Resolute Environmental & Water Resources Consulting, LLC

Tommy A. Jordan, P.G. PMP
Sr. Project Manager

Stephen K. Wilson, P.G.
Principal

Attachment: Pilot Test Notification Form
Figure 1, Conceptual 5-Day MFR Treatment
Hydrogen Peroxide Safety Data Sheet (SDS)
ISOTEC Catalyst Series 4260 Component A Powder Mix (Iron Catalyst) SDS
ISOTEC Catalyst Series 4260 Chelopolychempremox B-2 SDS
ISOTEC Stabilizer 0875 SDS

cc: Mr. Jim Ussery, P.E., University of Georgia
Ms. Emilea Dukes, Program Manager, Hazardous Waste Management, Georgia EPD
Mr. Michael Gillis, Georgia EPD- via email Mike.Gillis@dnr.ga.gov
Ms. Jess Nicholson Georgia EPD- via email jess.nicholson@dnr.ga.gov

GEORGIA
DEPARTMENT OF NATURAL RESOURCES
ENVIRONMENTAL PROTECTION DIVISION

Official Use Only
Identification No.: _____
Authorization Date: _____

Wastewater Regulatory Program
Underground Injection Control (UIC) Program

Pilot Test Notification Form

1.0 Purpose

This procedure allows Class V injection Pilot Test Wells (PTW) to be constructed and operated for up to 90 days prior to obtaining a UIC permit. The attached Pilot Test Notification form must be submitted to the EPD no later than 30 days prior to the proposed injection start date.

2.0 Scope

This procedure applies only to Class V remediation wells. The injected media will meet the Clean Air Act standards for air quality, the Georgia rules for Underground Injection Control, Chapter 391-6-3-.13, the Georgia Rules for Water Quality Control (Revised), and the Georgia Rules for Safe Drinking Water Act (Revised). The procedure does not replace the requirements for obtaining a UIC permit, but allows consultants flexibility in evaluating the most efficient, economical, and effective remediation method for a corrective action plan (CAP). The pilot tests are allowed for up to, but not to exceed 90 days after which time a UIC permit must be applied for per the appropriate UIC regulations.

3.0 Definitions

Class V PTW is a short term (no more than 90 days) experimental injection well related to a proposed remediation plan.

4.0 Procedure

The attached Pilot Test Notification form must be completed in its entirety and submitted to the EPD for review. A brief narrative describing the goal and purpose of the pilot test must accompany the notification from. Upon satisfactory review and concurrence with the pilot test specifications, the EPD will provide written authorization to conduct the pilot test. The EPD reserves the right to request additional information or impose limiting conditions on the pilot test prior to issuing written authorization.

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SECTION I. FACILITY INFORMATION		
Facility Name: University of Georgia		
Phone: 706-542-5801	River Basin: Oconee River	
Facility Address: 2450 South Milledge Avenue		
City: Athens	State: GA	Zip Code: 30605
Coordinates (Decimal): 33° 54'20" N, 83° 23' 05" W		County: Clarke
Is the pilot test part of a corrective action or remediation plan?: (check box) ☒ Yes ☐ No HSI File No.: HW File No.: HW-041 (CA) UST File No.: Other:		

SECTION II. OWNER CONTACT INFORMATION		
Name of Owner or Authorized Representative: Jim Ussery		
Title: Environmental Affairs Professional		
Phone: 706-542-0106	E-mail: jussery@uga.edu	Fax:
Owner Mailing Address: 240A Riverbend Road		
City: Athens	State: GA	Zip Code: 30602

SECTION III. DRILLER INFORMATION		
GA Licensed Water Well Contractor or Bonded Environmental Drilling Company Name: Associated Topography LLC		
Phone: 404-599-2605	E-mail: dhoilett@associatedtopography.com	Fax:
Address: 1063 Meadow Grass Lane		
City: Powder Springs	State: Ga	Zip Code: 30127
License No.:	Bond No: Bonded Driller #3	

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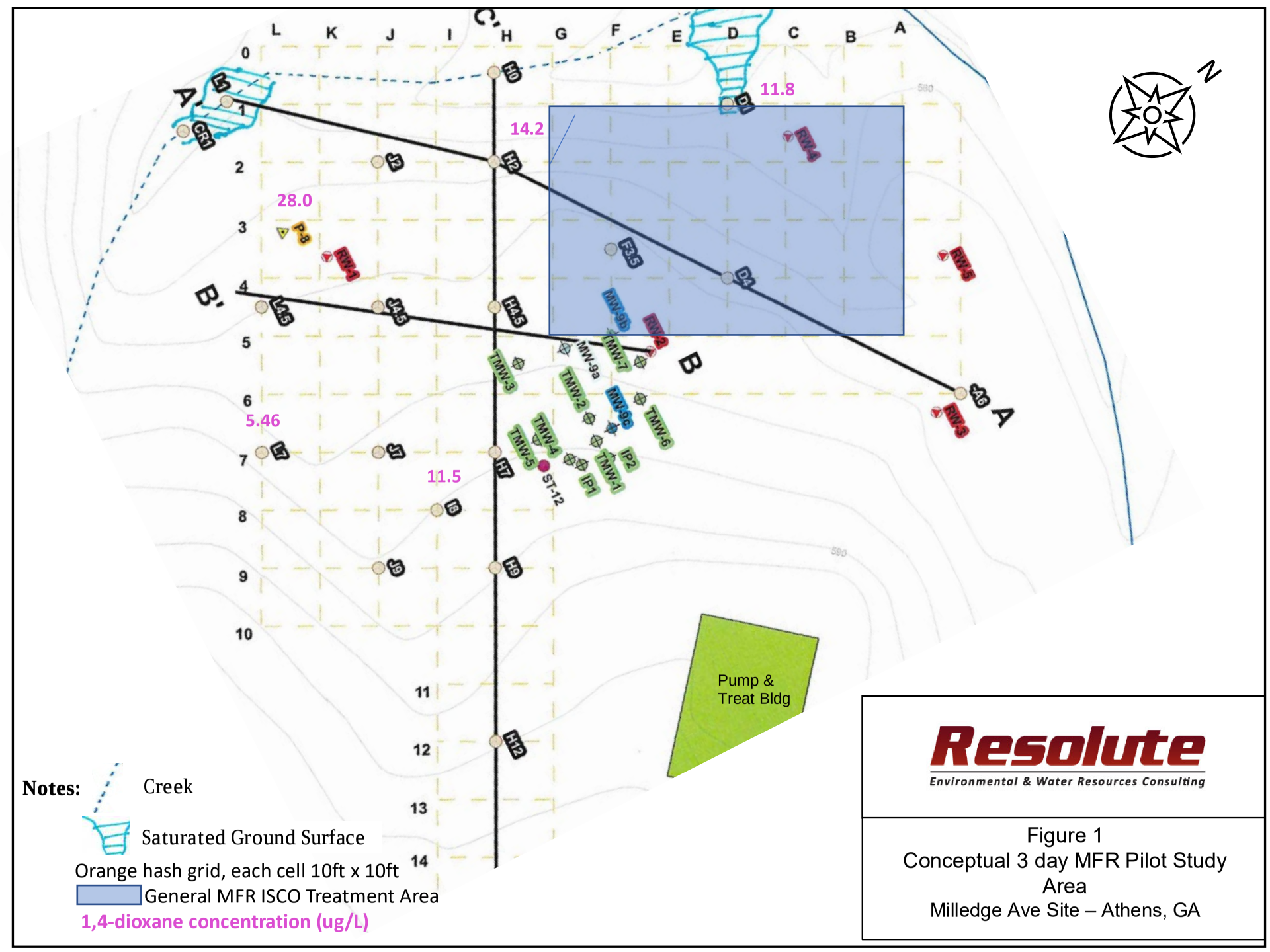
ENVIRONMENTAL PROTECTION DIVISION

SECTION IV. INJECTION WELL INFORMATION		
1. No. of injection wells: 35 DPT injection points		
2. Well depth (ft): varies 5 ft to 12 feet.	3. Borehole Diameter(in): 2.25	4. Casing. Depth (ft): varies 5 feet to 12 feet
5. Casing Diameter (in): 2.25	6. Casing Material: Carbon Steel Direct Push Rods	
7. Screen Type: Retractable Injection Points	8. Screen Diameter: 1.25	
9. Screen Interval: 2 feet	10. Grout Type (if applicable): NA	
11. Grout Interval from (if applicable) NA	12. Grout Thickness (if applicable): NA	

SECTION V. INJECTION SYSTEM DATA
1. Type of Fluid: Hydrogen Peroxide catalyzed with Modified Fenton's Reagent
2. Source of Fluid: Injection specific injection tote
3. Purpose of the Injection/source of the contamination: Assess full scale implementation design parameters and requirements.
4. Proposed Injection Rate Range (gallons/minute/well) (SCFM for air): 1- 5 gpm
5. Proposed Injection Volume (daily max) (gallons/minute/well) (SCFM for air): Daily Max 300-400 gallons total
6. Proposed Injection Pressure Range (lbs./sq. inch) (psi): 1-40 psi
7. Dates of proposed pilot test injection: Three days between 12/8/21 to 12/15/21

SECTION VI. ADDITIONAL INFORMATION
Groundwater sampling will be performed prior to and subsequent of the Pilot injection activities.

SECTION VII. CERTIFICAITON	
I certify under the penalty of law that I have examined and am familiar with the information contained in this document and attachments and the information is true, accurate and complete. I am aware of the associated penalties for submitting false documentation, including but not limited to monetary penalties and or imprisonment.	
Name of Applicant: Tommy Jordan, P.G.	**Date:** 11/16/2021
Signature of Applicant: 	**Date:** 11/16/2021


L K J I H G F E D C B A
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L5
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J9
I8
D1
D4
A6
GR1
P-8
RW-1
RW-2
RW-3
RW-4
RW-5
F3.5
MW-9a
MW-9b
MW-9c
TMW-1
TMW-2
TMW-3
TMW-4
TMW-5
TMW-6
TMW-7
IP1
IP2
ST-12
11.8
14.2
28.0
5.46
11.5
Pump &
Treat Bldg
N
Notes:
Creek
Saturated Ground Surface
Orange hash grid, each cell 10ft x 10ft
General MFR ISCO Treatment Area
1,4-dioxane concentration (ug/L)
Resolute
Environmental & Water Resources Consulting
Figure 1
Conceptual 3 day MFR Pilot Study Area
Milledge Ave Site – Athens, GA

SDS # : 7722-84-1-34-10
Revision date: 2020-04-23
Format: NA
Version 1.03

1. PRODUCT AND COMPANY IDENTIFICATION

Product Identifier

Product Name Hydrogen Peroxide 34% Standard

CAS-No 7722-84-1

Recommended use of the chemical and restrictions on use

Recommended Use: Industrial bleaching, processing, pollution abatement and general oxidation reactions

Restrictions on Use Use as recommended by the label.

Manufacturer/Supplier

PeroxyChem LLC
2005 Market Street
Suite 3200
Philadelphia, PA 19103
Phone: +1 267/ 422-2400 (General Information)
E-Mail: sdsinfo@peroxychem.com

Emergency telephone numbers

For leak, fire, spill or accident emergencies, call:
1 800 / 424 9300 (CHEMTREC - U.S.A.)
1 703 / 527 3887 (CHEMTREC - Collect - All Other Countries)
+1 303/ 389-1409 (Medical - U.S. - Call Collect)

1 281 / 474-8750 (Bayport, Texas Plant)

2. HAZARDS IDENTIFICATION

Classification

OSHA Regulatory Status
This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200)

Acute toxicity - Oral	Category 4
Serious eye damage/eye irritation	Category 1
Oxidizing Liquids	Category 2

GHS Label elements, including precautionary statements

EMERGENCY OVERVIEW

Danger

Hazard Statements
H318 - Causes serious eye damage
H302 - Harmful if swallowed
H272 - May intensify fire; oxidizer

Precautionary Statements - Prevention
P264 - Wash face, hands and any exposed skin thoroughly after handling
P280 - Wear protective gloves/ protective clothing/ eye protection/ face protection
P210 - Keep away from heat/sparks/open flames/hot surfaces. - No smoking
P220 - Keep/Store away from clothing/flammable materials/combustibles
P221 - Take any precaution to avoid mixing with combustibles/flammables

Precautionary Statements - Response
P305 + P351 + P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
P310 - Immediately call a POISON CENTER or doctor
P301 + P312 - IF SWALLOWED: Call a POISON CENTER or doctor if you feel unwell
P330 - Rinse mouth
P370 + P378 - In case of fire: Use water for extinction

Hazards not otherwise classified (HNOC)

No hazards not otherwise classified were identified.

Other Information

Supplemental Information
IF INHALED: Remove person to fresh air and keep comfortable for breathing. Get medical attention if symptoms occur. IF ON SKIN OR CLOTHING: Wash with plenty of water. Take off contaminated clothing and wash before reuse. If skin irritation occurs: Get medical advice/attention.
Keep container in a cool place out of direct sunlight. Store only in vented containers. Do not store on wooden pallets. Do not return unused material to its original container. Avoid contamination - Contamination could cause decomposition and generation of oxygen which may result in high pressure and possible container rupture. Empty drums should be triple rinsed with water before discarding.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Formula HO - OH

Chemical name	CAS-No	Weight %
Hydrogen peroxide	7722-84-1	34
Water	7732-18-5	66

4. FIRST AID MEASURES

Eye Contact
Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Remove contact lenses, if present, after the first 5 minutes, then continue rinsing. Seek immediate medical attention/advice.

Skin Contact
Take off contaminated clothing. Rinse skin immediately with plenty of water for 15-20 minutes. Call a poison control center or doctor for further treatment advice.

Inhalation
Move to fresh air. If person is not breathing, contact emergency medical services, then give artificial respiration, preferably mouth-to-mouth if possible. Call a poison control center or doctor for further treatment advice.

Ingestion
Rinse mouth. Do not induce vomiting. If conscious, give 2 glasses of water. Get immediate medical attention. Never give anything by mouth to an unconscious person.

Most important symptoms and effects, both acute and delayed
Hydrogen Peroxide irritates respiratory system and, if inhaled, may cause inflammation and pulmonary edema. The effects may not be immediate. Overexposure symptoms are coughing, giddiness and sore throat. . In case of accidental ingestion, necrosis may result from mucous membrane burns (mouth, esophagus and stomach). Oxygen rapid release may cause stomach swelling and hemorrhaging, which may product major, or even fatal, injury to organs if a large amount has been ingested.
In case of skin contact, may cause burns, erythema, blisters or even necrosis.

Indication of immediate medical attention and special treatment needed, if necessary
Hydrogen peroxide at these concentrations is a strong oxidant. Direct contact with the eye is likely to cause corneal damage especially if not washed immediately. Careful opthalmologic evaluation is recommended and the possibility of local corticosteroid therapy should be considered. Because of the likelihood of corrosive effects on the gastrointestinal tract after ingestion, and the unlikelihood of systemic effects, attemps at evacuating the stomach via emesis induction or gastric lavage should be avoided. There is a remote possibility, however, that a nasogastric or orogastric tube may be required for the reduction of severe distension due to gas formation.

5. FIRE-FIGHTING MEASURES

Suitable Extinguishing Media
Water. Do not use any other substance.

Specific Hazards Arising from the Chemical
In closed unventilated containers, risk of rupture due to the increased pressure from decomposition.

Flammable properties
Contact with combustible material may cause fire

Hazardous Combustion Products
On decomposition product releases oxygen which may intensify fire.

Explosion data
Sensitivity to Mechanical Impact Not sensitive.
Sensitivity to Static Discharge Not sensitive.

Protective equipment and precautions for firefighters

Use water spray to cool fire exposed surfaces and protect personnel. Move containers from fire area if you can do it without risk. As in any fire, wear self-contained breathing apparatus and full protective gear.

6. ACCIDENTAL RELEASE MEASURES

Personal Precautions

Avoid contact with skin, eyes and clothing. Wear personal protective equipment. Isolate and post spill area. Keep people away from and upwind of spill/leak. Eliminate all sources of ignition and remove combustible materials.

Other

Combustible materials exposed to hydrogen peroxide should be immediately submerged in or rinsed with large amounts of water to ensure that all hydrogen peroxide is removed. Residual hydrogen peroxide that is allowed to dry (upon evaporation hydrogen peroxide can concentrate) on organic materials such as paper, fabrics, cotton, leather, wood or other combustibles can cause the material to ignite and result in fire.

Environmental Precautions

See Section 12 for additional Ecological Information.

Methods for Containment

Dike to collect large liquid spills. Stop leak and contain spill if this can be done safely. Small spillage: Dilute with large quantities of water.

Methods for cleaning up

Flush area with flooding quantities of water. Hydrogen peroxide may be decomposed by adding sodium metabisulfite or sodium sulfite after diluting to about 5%.

7. HANDLING AND STORAGE

Handling

Keep/Store away from clothing/ combustible materials. Wear personal protective equipment. Reference to other sections. Never return unused hydrogen peroxide to original container. Contamination may cause decomposition and generation of oxygen gas which could result in high pressures and possible container rupture. Empty drums should be triple rinsed with water before discarding. Utensils used for handling hydrogen peroxide should only be made of glass, stainless steel, aluminum or plastic. Pipes and equipment should be passivated before first use. Use only in well-ventilated areas. Hydrogen peroxide should be stored only in vented containers and transferred only in a prescribed manner.

Storage

Keep containers in cool areas out of direct sunlight and away from combustibles. Provide mechanical general and/or local exhaust ventilation to prevent release of vapor or mist into work environment. Containers must be vented. Keep/store only in original container. Store rooms or warehouses should be made of non-combustible materials with impermeable floors. In case of release, spillage should flow to safe area. Containers should be visually inspected on a regular basis to detect any abnormalities (swollen drums, increases in temperature, etc.).

Incompatible products

Combustible materials. Copper alloys, galvanized iron. Strong reducing agents. Heavy metals. Iron. Copper alloys. Contact with metals, metallic ions, alkalis, reducing agents and organic matter (such as alcohols or terpenes) may produce self-accelerated thermal decomposition.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Control parameters

Exposure Guidelines

Ingredients with workplace control parameters.

Chemical name	ACGIH TLV	OSHA PEL	NIOSH	Mexico
Hydrogen peroxide 7722-84-1	TWA: 1 ppm	TWA: 1 ppm TWA: 1.4 mg/m^3	IDLH: 75 ppm TWA: 1 ppm TWA: 1.4 mg/m^3	Mexico: TWA 1 ppm
Chemical name	**British Columbia**	**Quebec**	**Ontario TWAEV**	**Alberta**

Hydrogen peroxide 7722-84-1	TWA: 1 ppm	TWA: 1 ppm TWA: 1.4 mg/m³	TWA: 1 ppm	TWA: 1 ppm TWA: 1.4 mg/m³

Appropriate engineering controls

Engineering measures Ensure that eyewash stations and safety showers are close to the workstation location. Ensure adequate ventilation.

Individual protection measures, such as personal protective equipment

Eye/Face Protection Use chemical splash-type monogoggles and a full-face shield made of polycarbonate, acetate, polycarbonate/acetate, PETG or thermoplastic.

Skin and Body Protection For body protection wear impervious clothing such as an approved splash protective suit made of SBR rubber, PVC (PVC Outershell w/Polyester Substrate), Gore-Tex (Polyester trilaminate w/Gore-Tex), or a specialized HAZMAT Splash or Protective Suite (Level A, B, or C). For foot protection, wear approved boots made of NBR, PVC, Polyurethane, or neoprene. Overboots made of Latex or PVC, as well as firefighter boots or specialized HAZMAT boots are also permitted. DO NOT wear any form of boot or overboot made of nylon or nylon blends. DO NOT USE cotton, wool or leather as these materials react rapidly with higher concentrations of hydrogen peroxide. Completely submerge hydrogen peroxide contaminated clothing or other materials in water prior to drying. Residual hydrogen peroxide, if allowed to dry on materials such as paper, fabrics, cotton, leather, wood or other combustibles, can cause the material to ignite and result in a fire.

Hand Protection For hand protection, wear approved gloves made of nitrile, PVC, or neoprene. DO NOT use cotton, wool or leather for these materials react RAPIDLY with higher concentrations of hydrogen peroxide. Thoroughly rinse the outside of gloves with water prior to removal. Inspect regularly for leaks.

Respiratory Protection If concentrations in excess of 10 ppm are expected, use NIOSH/DHHS approved self-contained breathing apparatus (SCBA) or other approved air-supplied respirator (ASR) equipment (e.g., a full-face airline respirator (ALR)). DO NOT use any form of air-purifying respirator (APR) or filtering facepiece (dust mask), especially those containing oxidizable sorbants such as activated carbon.

Hygiene measures Avoid breathing vapors, mist or gas. Clean water should be available for washing in case of eye or skin contamination. .

General information Protective engineering solutions should be implemented and in use before personal protective equipment is considered.

9. PHYSICAL AND CHEMICAL PROPERTIES

Bulk density

Information on basic physical and chemical properties

Appearance	Clear, colorless liquid
Physical State	Liquid
Color	Colorless
Odor	odorless
Odor threshold	Not applicable
pH	<= 3.7
Melting point/freezing point	-32 °C
Boiling Point/Range	108 °C
Flash point	Not flammable
Evaporation Rate	> 1 (n-butyl acetate=1)
Flammability (solid, gas)	Not flammable
Flammability Limit in Air	Not applicable
Upper flammability limit:	No information available
Lower flammability limit:	No information available

Vapor pressure	24 mm Hg @ 30 °C
Vapor density	No information available
Density	1.13 g/cm³ @ 20ºC
Specific gravity	1.13
Water solubility	completely soluble
Solubility in other solvents	No information available
Partition coefficient	log Kow = -1.5 @ 20 °C
Autoignition temperature	Not combustible
Decomposition temperature	100 °C
Viscosity, kinematic	1.06 cP @ 20 °C
Viscosity, dynamic	No information available
Explosive properties	No information available
Oxidizing properties	Strong oxidizer
Other Information	
Molecular weight	34

10. STABILITY AND REACTIVITY

Reactivity Reactive and oxidizing agent.

Chemical Stability Stable under normal conditions. Decomposes on heating. Stable under recommended storage conditions.

Possibility of Hazardous Reactions Contact with organic substances may cause fire or explosion. Contact with metals, metallic ions, alkalis, reducing agents and organic matter (such as alcohols or terpenes) may produce self-accelerated thermal decomposition.

Hazardous polymerization Hazardous polymerization does not occur.

Conditions to avoid Excessive heat; Contamination; Exposure to UV-rays; pH variations.

Incompatible materials Combustible materials. Copper alloys, galvanized iron. Strong reducing agents. Heavy metals. Iron. Copper alloys. Contact with metals, metallic ions, alkalis, reducing agents and organic matter (such as alcohols or terpenes) may produce self-accelerated thermal decomposition.

Hazardous Decomposition Products Oxygen which supports combustion. Liable to produce overpressure in container.

11. TOXICOLOGICAL INFORMATION

Product Information

LD50 Oral	50% solution: LD50 > 225 mg/kg bw (rat) 35 % solution:LD50 1193 mg/kg bw (rat) 70 % solution: LD50 1026 mg/kg bw (rat)
LD50 Dermal	35% solution: LD50 > 2000 mg/kg bw (rabbit) 70 % solution: LD50 9200 mg/kg bw (rabbit)
LC50 Inhalation	50% solution: LC50 > 170 mg/m ³ (rat) (4-hr) Hydrogen Peroxide vapors: LC0 9400 mg/m³ (mouse) (5 - 15 minutes) Hydrogen Peroxide vapors: LC50 > 2160 mg/m³ (mouse)
Serious eye damage/eye irritation	Corrosive. Severely irritating to the eyes.
Skin corrosion/irritation	Moderately irritating (rabbit).
Sensitization	Did not cause sensitization on laboratory animals.

Information on toxicological effects

Symptoms

Vapors, mists, or aerosols of hydrogen peroxide can cause upper airway irritation, inflammation of the nose, hoarseness, shortness of breath, and a sensation of burning or tightness in the chest. Prolonged exposure to concentrated vapor or to dilute solutions can cause irritation and temporary bleaching of skin and hair. Exposure to vapor, mist, or aerosol can cause stinging pain and tearing of eyes.

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Carcinogenicity

This product contains hydrogen peroxide. The International Agency for Research on Cancer (IARC) has concluded that there is inadequate evidence for carcinogenicity of hydrogen peroxide in humans, but limited evidence in experimental animals (Group 3 - not classifiable as to its carcinogenicity to humans). The American Conference of Governmental Industrial Hygienists (ACGIH) has concluded that hydrogen peroxide is a 'Confirmed Animal Carcinogen with Unknown Relevance to Humans' (A3).

Chemical name	ACGIH	IARC	NTP	OSHA
Hydrogen peroxide 7722-84-1	A3	3		

Mutagenicity

This product is not recognized as mutagenic by Research Agencies
In vivo tests did not show mutagenic effects

Reproductive toxicity

This product is not recognized as reprotox by Research Agencies. No toxicity to reproduction in animal studies.

STOT - single exposure
Not classified.

STOT - repeated exposure
Not classified.

Target organ effects

Eyes, Respiratory System, Skin.

Aspiration hazard

No information available.

12. ECOLOGICAL INFORMATION

Ecotoxicity

Ecotoxicity effects Hydrogen peroxide is naturally produced by sunlight (between 0.1 and 4 ppb in air and 0.001 to 0.1 mg/L in water). Not expected to have significant environmental effects.

Hydrogen peroxide (7722-84-1)				
Active Ingredient(s)	Duration	Species	Value	Units
Hydrogen peroxide	96 h LC50	Fish Pimephales promelas	16.4	mg/L
Hydrogen peroxide	72 h LC50	Fish Leuciscus idus	35	mg/L
Hydrogen peroxide	48 h EC50	Daphnia pulex	2.4	mg/L
Hydrogen peroxide	24 h EC50	Daphnia magna	7.7	mg/L
Hydrogen peroxide	72 h EC50	Algae Skeletonema costatum	1.38	mg/L
Hydrogen peroxide	21 d NOEC	Daphnia magna	0.63	mg/L
Hydrogen peroxide	72 h LC50	Fish Leuciscus idus	35	mg/L

Persistence and degradability Hydrogen peroxide in the aquatic environment is subject to various reduction or oxidation processes and decomposes into water and oxygen. Hydrogen peroxide half-life in freshwater ranged from 8 hours to 20 days, in air from 10 - 20 hours, and in soils from minutes to hours depending upon microbiological activity and metal contamination.

Bioaccumulation Material may have some potential to bioaccumulate but will likely degrade in most environments before accumulation can occur.

Mobility Will likely be mobile in the environment due to its water solubility but will likely degrade over time.

Other Adverse Effects Decomposes into oxygen and water. No adverse effects.

13. DISPOSAL CONSIDERATIONS

Waste disposal methods Dispose of in accordance with local regulations. Can be disposed as waste water, when in compliance with local regulations.

US EPA Waste Number D001.

Contaminated Packaging Dispose of in accordance with local regulations.
Drums - Empty as thoroughly as possible. Triple rinse drums before disposal. Avoid contamination; impurities accelerate decomposition. Never return product to original container.

14. TRANSPORT INFORMATION

DOT

UN/ID no 2014
Proper Shipping Name HYDROGEN PEROXIDE, AQUEOUS SOLUTION
Hazard class 5.1
Subsidiary class 8
Packing Group II

TDG

UN/ID no UN 2014
Proper Shipping Name HYDROGEN PEROXIDE, AQUEOUS SOLUTION

Hazard class	5.1
Subsidiary class	8
Packing Group	II

ICAO/IATA

Air regulation permit shipment of Hydrogen Peroxide (<=40%) in non-vented containers for Air Cargo Only aircraft, as well as for Passenger and Cargo aircraft. HOWEVER, all PeroxyChem Hydrogen Peroxide containers are vented and therefore, air shipments of PeroxyChem H2O2 are not permitted. IATA air regulations state that venting of packages containing oxidizing substances is not permitted for air transport.

IMDG/IMO

UN/ID no	UN 2014
Proper Shipping Name	HYDROGEN PEROXIDE, AQUEOUS SOLUTION
Hazard class	5.1
Subsidiary Hazard Class	8
Packing Group	II

OTHER INFORMATION

Protect from physical damage. Keep drums in upright position. Drums should not be stacked in transit. Do not store drums on wooden pallets.

15. REGULATORY INFORMATION

U.S. Federal Regulations

SARA 313

Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product does not contain any chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372

SARA 311/312 Hazard Categories

This product has the following hazards that are reportable under The Emergency Planning and Community Right-to-Know rule (EPCRA Tier II):

- Oxidizer
- Acute toxicity
- Serious eye damage/eye irritation

Clean Water Act

This product does not contain any substances regulated as pollutants pursuant to the Clean Water Act (40 CFR 122.21 and 40 CFR 122.42)

CERCLA/EPCRA

This material, as supplied, contains one or more substances regulated as a hazardous substance under the Comprehensive Response Compensation and Liability Act (CERCLA) or as an extremely hazardous substance (EHS) under the Emergency Planning and Community Right to Know Act (EPCRA) / Superfund Amendments and Reauthorization Act (SARA).

Hydrogen Peroxide RQ is for concentrations of > 52% only

US State Regulations

U.S. State Right-to-Know Regulations

This product contains the following substances regulated under state Right-to-Know laws:

Chemical name	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Hydrogen peroxide	X	X	X		X

California Proposition 65

This product does not contain any Proposition 65 chemicals

CANADA

Environmental Emergencies

.

Chemical name	Canada - Environmental Emergencies - Part 1 Substances - Substances Likely to Explode - Minimum Threshold Quantities	Canada - Environmental Emergencies - Part 1 Substances - Substances Likely to Explode - Minimum Mixture Concentrations	Canada - Environmental Emergencies - Part 2 Substances - Substances Hazardous When Inhaled - Minimum Threshold Quantities	Canada - Environmental Emergencies - Part 2 Substances - Substances Hazardous When Inhaled - Minimum Mixture Concentrations
Hydrogen peroxide 7722-84-1			3.40 tonnes Minimum quantity ([2-011])	52

Canadian National Pollutant Release Inventory

This product contains no substances reportable under Canada's National Pollutant Release Inventory regulations.

International Inventories

Chemical name	TSCA (United States)	DSL (Canada)	EINECS/ELINCS (Europe)	ENCS (Japan)	China (IECSC)	KECL (Korea)	PICCS (Philippines)	AICS (Australia)	NZIoC (New Zealand)
Hydrogen peroxide 7722-84-1	X	X	231-765-0	X	X	X	X	X	X

All ingredients are directly listed on the active TSCA Inventory

Mexico

Mexico - Grade Serious risk, Grade 3

16. OTHER INFORMATION

NFPA	**Health Hazards** 3	**Flammability** 0	**Stability** 1	**Special Hazards** OX
HMIS	**Health Hazards** 3	**Flammability** 0	**Physical hazard** 1	**Special precautions** H

NFPA/HMIS Ratings Legend Severe = 4; Serious = 3; Moderate = 2; Slight = 1; Minimal = 0
Special Hazards: OX = Oxidizer
Protection = H (Safety goggles, gloves, apron, the use of supplied air or SCBA respirator is required in lieu of a vapor cartridge respirator)

Uniform Fire Code Oxidizer: Class 2--Liquid

Revision date: 2020-04-23
Revision note SDS sections updated: 1.

Disclaimer

PeroxyChem believes that the information and recommendations contained herein (including data and statements) are accurate as of the date hereof. NO WARRANTY OF FITNESS FOR ANY PARTICULAR PURPOSE, WARRANTY OF MERCHANTABILITY OR ANY OTHER WARRANTY, EXPRESSED OR IMPLIED, IS MADE CONCERNING THE INFORMATION PROVIDED HEREIN. The information provided herein relates only to the specified product designated and may not be applicable where such product is used in combination with any other materials or in any process. Further, since the conditions and methods of use are beyond the control of PeroxyChem, PeroxyChem expressly disclaims any and all liability as to any results obtained or arising from any use of the products or reliance on such information.

Prepared By:

PeroxyChem

End of Safety Data Sheet

SECTION 1 – IDENTIFICATION OF MATERIAL AND SUPPLIER

Product Name: ISOTEC[SM] Catalyst Series 4260 Component-A Powder Mix
Recommended Use: Environmental Remediation
Uses advised against: No information available
Details of the supplier of the safety data sheet:

Supplier Name: ISOTEC Remediation Technologies, LLC
Supplier Address: 11 Princess Rd, Suite A
Lawrenceville, NJ 08648, USA

EMERGENCY TELEPHONE NUMBER(S): **(609) 275-8500 (USA)**

C.A.S. CHEMICAL NAME:	-
SYNONYMS:	Iron Catalyst
CHEMICAL FAMILY:	Not Applicable
EMPIRICAL FORMULA:	MIXT (Proprietary)
INTENDED USE:	Catalyst

SECTION 2 – HAZARDS IDENTIFICATION

Classification

Acute Toxicity, Oral	Category 4
Skin irritation	Category 2
Eye Irritation	Category 2A

Pictogram:

Signal Word
Warning

Hazard Statement
Harmful if swallowed
Causes skin irritation
May cause serious eye irritation

Appearance/Odor: Light green powder with metallic odor.
Precautionary statement(s): Wash skin thoroughly after handling. Do not eat, drink, or smoke when using this product. Wear protective gloves, eye protection/face protection.

IF SWALLOWED: Call a POISON CENTER or doctor/ physician if you feel unwell. Rinse mouth.
IF ON SKIN: Wash with plenty of soap and water. If skin irritation occurs: Get medical advice/attention. Take off contaminated clothing and wash before reuse.
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical advice/attention.
Hazards not otherwise classified (HNOC): None
Specific treatment (see section 4 for more information).

Applicable properties are relevant to the mixture as a whole when certain proprietary ingredients present at their highest concentrations. Please note that the effects are normally lower for a typical mixture with smaller concentrations of these ingredients present.

SECTION 3 – COMPOSITION/ INFORMATION ON INGREDIENTS

Components	CAS Number	Proportion	Risk Phrases
Iron Compound	-	>60%	-

SECTION 4 – FIRST AID MEASURES

EYE CONTACT: Hold eyelids apart and immediately flush eyes with plenty of water for at least 15 minutes. Call a physician if irritations persist.
SKIN CONTACT: Wash affected area immediately with soap and water.
INHALATION: In case of inhalation or suspected inhalation, move patient at once to fresh air and call a physician. Keep patient absolutely quiet. If breathing has stopped or is labored, give assisted respiration (e.g., mouth-to-mouth). Supplemental oxygen may be indicated.
INGESTION: If swallowed, call a physician immediately. Induce vomiting or remove stomach contents by gastric suction only as directed by medical personnel. Wash mouth with plenty of water. Never give anything by mouth to an unconscious person.
Most important symptoms and effects, both acute and delayed: The most important known symptoms and effects are described in the labeling (see Section 2.2) and/or in Section 11.
Indication of any immediate medical attention and special treatment needed: No data available.

SECTION 5 – FIRE FIGHTING MEASURES

CHARACTERISTICS:

Flash Point	No Data Available
Upper Explosive Limit (UEL)	No Data Available
Lower Explosive Limit (LEL)	No Data Available
Autoignition Temperature	No Data Available
Flash Point Method(s)	No Data Available
Unusual Fire & Explosion Hazards	No Data Available
Fire Hazard Classification (OSHA/NFPA)	No Data Available

EXTINGUISHING MEDIA: Product is noncombustible. Use extinguishing method suitable for surrounding fire.

UNSUITABLE EXTINGUISHING MEDIA: None Known

SPECIFIC HAZARDS ARISING FROM THE CHEMICAL: Sulphur oxides, Iron oxides

SPECIAL FIRE FIGHTING PROCEDURES Firefighters should wear full-face, self contained breathing apparatus and impervious protective clothing, butyl rubber boots, and gloves.

SPECIAL FIRE FIGHTING PROCEDURES: Use water spray to cool all affected containers. Avoid skin contact. Contain runoff water in dikes. Prevent stream contamination. Expended liquids from fire fighting should be diverted to an active sanitary sewer line.

UNUSUAL FIRE AND EXPLOSION HAZARDS: May emit sulfur oxide vapors under burning conditions. See Section 6 for hazardous combustion products.

Hazchem Code: Not applicable

SECTION 6 – ACCIDENTAL RELEASE MEASURES

CLEAN-UP PROCEDURES: Sweep up and repackage or place in receptacle for future disposal.

OTHER EMERGENCY ADVICE: Avoid eye and skin contact. Wear protective clothing including nitrile gloves, safety goggles, dust mask/face covering and Tyvek apron when handling. Stored materials should be placed in a dry and reasonably temperature area, preferably below 24^{o}C.

WASTE DISPOSAL: Remove to properly designated landfill. Observe all federal, state and local environmental regulations.

ENVIRONMENTAL EFFECTS: Data not yet available

SECTION 7 – HANDLING AND STORAGE

Precautions for safe handling: Avoid contact with skin and eyes. Avoid formation of dust and aerosols. Provide appropriate exhaust ventilation at places where dust is formed. For precautions see Section 2.

Conditions for safe storage: Keep container tightly closed in a dry and well-ventilated place. Air Sensitive. Hygroscopic. Store in original container. Isolate from strong oxidizers.
Specific end use(s): Apart from the uses mentioned in Section 1 no other specific uses are stipulated.
Signage: Signs will be attached to each drum containing ISOTEC^{SM} Catalyst Series 4260 Component-A Powder Mix. SDS sheets will be provided at the site.

SECTION 8 – PERSONAL PROTECTION/ EXPOSURE CONTROLS

EYE PROTECTION: Splash proof goggles or safety glasses.
HAND PROTECTION: Impermeable gloves made of Nitrile or rubber.
RESPIRATORY PROTECTION: Wear appropriate full-face respirator with HEPA cartridges for protection against excessive particulate dust during bagging in the warehouse. Dust mask or face covering may also be worn during batching in the field if windy conditions exist.
PROTECTIVE CLOTHING: Long sleeved clothing (e.g., cotton coveralls or Tyvek). Do not wear short trousers
ENGINEERING CONTROLS: Avoid drafts that may disperse material beyond the work area. Use light water spray for dust suppression
WORK AND HYGIENIC PRACTICES: Provide readily accessible eye wash stations. Wash at the end of each work shift and before eating, smoking or using the toilet

SECTION 9 – PHYSICAL AND CHEMICAL PROPERTIES

Physical Properties:

PHYSICAL FORM	Powder
COLOR	Light Green
ODOR	Metallic
TYPICAL PHYSICAL DATA:	
pH (10% aqueous)	3.5-3.9
VAPOR PRESSURE (mm Hg)	0
VAPOR DENSITY (Air = 1)	Not Applicable
BOILING POINT	Decomposition at 300^{o}C
FREEZING/MELTING POINT	Not Applicable
SOLUBILITY IN WATER	57% by weight @ 158^{o}C
SPECIFIC GRAVITY (Water = 1)	1.899 @ 14^{o}/ 8^{o}C
EVAPORATION RATE (Butylacetate = 1)	Non Volatile
VISCOSITY (CPS)	Not Evaluated

SECTION 10 – STABILITY AND REACTIVITY

Reactivity: No data available.
Chemical Stability: Stable under recommended storage conditions.
Possibility of Hazardous Reactions: No data available.
Hazardous: Polymerization: No data available.
Conditions to Avoid: No data available.
Incompatible Materials: Strong oxidizing agents.
Hazardous Decomposition Products: Other decomposition products – no data available.

SECTION 11 –TOXICOLOGICAL INFORMATION

Information on likely routes of exposure

Product Information:

Inhalation:	No data available
Eye Contact:	No data available
Skin Contact:	No data available
Ingestion:	Harmful if swallowed

Component Information:

Symptoms:	No data available

Delayed and immediate effects as well as chronic effects from short & long-term exposure:

Sensitization:	No data available
Mutagenic effects:	No data available
Carcinogenicity:	No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC
STOT-single exposure:	No data available.
STOT-repeated exposure:	No data available.
Chronic toxicity:	No data available.
Target organ exposure:	No data available.
Aspiration hazard:	No data available

Numerical measure of toxicity product information

The following values are calculated based on Section 3 of the GHS document: No data available.

SECTION 12 – ECOLOGICAL INFORMATION

Ecotoxicity:	No data available
Persistence and degradability:	No data available

Bioaccumulation: No data available
Other adverse effects: No data available
Mobility in soil: No data available

SECTION 13 – DISPOSAL CONSIDERATIONS

Waste treatment methods

Disposal methods: Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.
Contaminated packaging: Dispose of as unused product

SECTION 14 – TRANSPORTATION INFORMATION

UN No.: Not Regulated
DOT SHIPPING NAME: Not Regulated
IMO SHIPPING NAME: Not Regulated as dangerous goods
LATA SHIPPING NAME: Not Regulated as dangerous goods
IMDG: Not dangerous goods
IATA: Not dangerous goods
ADG Code: Not dangerous goods

SECTION 15 – REGULATORY INFORMATION

Federal and State Regulations: No products were found.
Other Classifications:
WHMIS (Canada): Not controlled under WHMIS (Canada).
DSCL (EEC): R36/38- Irritating to eyes and skin. S2- Keep out of the reach of children. S46- If swallowed, seek medical advice immediately
HMIS (U.S.A.): Health Hazard: 2, Fire Hazard: 0, Reactivity: 0, Personal Protection: E
National Fire Protection Association (U.S.A.): Health: 2, Flammability: 0, Reactivity: 0, Specific hazard:0
Protective Equipment: Nitrile gloves (disposable), Tyvek apron, safety glasses or goggles during batching in the field. Dust mask or face covering may also be worn during batching if windy conditions exist. When bagging occurs in a closed warehouse room, be sure to use an approved/certified respirator or equivalent.

SECTION 16 – OTHER INFORMATION

OSHA Compliance Statement:
The SDS was prepared to comply with OSHA Hazard Communication Standard (29 CFR 1910.1200 HazCom 2012).

Further Information:
This SDS summarizes to the best of our knowledge at the date of issue, the chemical health and safety hazards of the material and general guidance on how to safely handle the material for the set purpose of environmental remediation. The information and recommendations contained herein are based upon data believed to be correct. However, no guarantee or warranty implied is made with respect to the information contained herein. The information is provided solely for your information and consideration and ISOTEC Remediation Technologies, LLC. assumes no legal responsibility for use or reliance thereon.

Issuing Date: NEW

Revision Date: March 2021-Rev. 4

SECTION 1 – IDENTIFICATION OF MATERIAL AND SUPPLIER

Product Name: ISOTEC[SM] Catalyst-4260 Chelopolychempremox-B-4
Recommended Use: Environmental Remediation
Uses advised against: No information available
Details of the supplier of the safety data sheet:

Supplier Name:	ISOTEC Remediation Technologies, LLC
Supplier Address:	11 Princess Rd, Suite A Lawrenceville, NJ 08648, USA

EMERGENCY TELEPHONE NUMBER(S): **(609) 275-8500 (USA)**

C.A.S. CHEMICAL NAME:	-
SYNONYMS:	Chelating agent
CHEMICAL FAMILY:	Not Applicable
EMPIRICAL FORMULA:	MIXT (Proprietary)
INTENDED USE:	Catalyst

SECTION 2 – HAZARDS IDENTIFICATION

Classification

Acute Toxicity, Oral	Category 4
Skin irritation	Category 2
Eye Irritation	Category 1

Pictogram:

Signal Word
Danger

Hazard Statement
Harmful if swallowed
Causes skin irritation
May cause serious eye irritation

Appearance/Odor: White powder, odorless.
Precautionary statement(s): Wash skin thoroughly after handling. Do not eat, drink, or smoke when using this product. Wear protective gloves/eye protection/face protection.

IF SWALLOWED: Call a POISON CENTER or doctor/ physician if you feel unwell.
IF ON SKIN: Wash with plenty of soap and water. If skin irritation occurs: Get medical advice/attention. Take off contaminated clothing and wash before reuse.
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical advice/attention.
Hazards not otherwise classified (HNOC): None
Specific treatment (see section 4 for more information).

Applicable properties are relevant to the mixture as a whole when certain proprietary ingredients present at their highest concentrations. Please note that the effects are normally lower for a typical mixture with smaller concentrations of these ingredients present.

SECTION 3 – COMPOSITION/ INFORMATION ON INGREDIENTS

Components	CAS Number	Proportion	Risk Phrases
Amino poly carboxylate	-	>60%	-

SECTION 4 – FIRST AID MEASURES

EYE CONTACT: Hold eyelids apart and immediately flush eyes with plenty of water for at least 15 minutes. Call a physician if irritations persist.
SKIN CONTACT: Wash affected area immediately with soap and water.
INHALATION: In case of inhalation or suspected inhalation, move patient at once to fresh air and call a physician. Keep patient absolutely quiet. If breathing has stopped or is labored, give assisted respiration (e.g., mouth-to-mouth). Supplemental oxygen may be indicated.
INGESTION: If swallowed, call a physician immediately. Induce vomiting or remove stomach contents by gastric suction only as directed by medical personnel. Wash mouth with plenty of water. Never give anything by mouth to an unconscious person.

Most important symptoms and effects, both acute and delayed: The most important known symptoms and effects are described in the labeling (see Section 2.2) and/or in Section 11.
Indication of any immediate medical attention and special treatment needed: No data available.

SECTION 5 – FIRE FIGHTING MEASURES

CHARACTERISTICS:

Flash Point	No Data Available
Upper Explosive Limit (UEL)	Not Applicable
Lower Explosive Limit (LEL)	Not Applicable
Autoignition Temperature	Not Applicable
Flash Point Method(s)	No Data Available
Unusual Fire & Explosion Hazards	No Data Available
Fire Hazard Classification (OSHA/NFPA)	No Data Available

EXTINGUISHING MEDIA: In case of fire, flood with water.
UNSUITABLE EXTINGUISHING MEDIA: Carbon dioxide
SPECIFIC HAZARDS ARISING FROM THE CHEMICAL: Harmful vapors, fumes, carbon oxides, nitrogen oxides (NOx), Sodium oxides
SPECIAL FIRE FIGHTING PROCEDURES: Firefighters should wear butyl rubber boots, gloves, body suit and self-containing breathing apparatus. Use water spray to cool all affected containers. Avoid skin contact. Contain runoff water in dikes. Prevent stream contamination. Expended liquids from fire fighting should be diverted to an active sanitary sewer line.
UNUSUAL FIRE AND EXPLOSION HAZARDS: None
Hazchem Code: Not applicable

SECTION 6 – ACCIDENTAL RELEASE MEASURES

CLEAN-UP PROCEDURES: Sweep up and repackage or place in receptacle for future disposal.
OTHER EMERGENCY ADVICE: Avoid eye and skin contact. Wear protective clothing including nitrile gloves, safety goggles, dust mask/face covering and Tyvek apron when handling. Stored materials should be placed in a dry and reasonably temperature area, preferably below 24^{o}C.
WASTE DISPOSAL: Remove to properly designated landfill. Observe all federal, state and local environmental regulations.
ENVIRONMENTAL EFFECTS: Data not yet available

SECTION 7 – HANDLING AND STORAGE

Precautions for safe handling: Avoid contact with skin and eyes. Avoid formation of dust and aerosols. Provide appropriate exhaust ventilation at places where dust is formed. For precautions see Section 2.
Conditions for safe storage: Keep container tightly closed in a dry and well-ventilated place. Isolate from strong oxidizers.

Specific end use(s): Apart from the uses mentioned in Section 1 no other specific uses are stipulated.
Signage: Signs will be attached to each drum containing ISOTEC^{SM} Catalyst-4260 Chelopolychempremox-B-4. SDS sheets will be provided at the site.

SECTION 8 – PERSONAL PROTECTION/ EXPOSURE CONTROLS

EYE PROTECTION: Splash proof goggles or safety glasses.
HAND PROTECTION: Impermeable gloves made of Nitrile or rubber.
RESPIRATORY PROTECTION: Wear appropriate full-face respirator with HEPA cartridges for protection against excessive particulate dust during bagging in the warehouse. Dust mask or face covering may also be worn during batching in the field if windy conditions exist.
PROTECTIVE CLOTHING: Long sleeved clothing (e.g. cotton coveralls or Tyvek). Do not wear short trousers
ENGINEERING CONTROLS: Avoid drafts that may disperse material beyond the work area. Use light water spray for dust suppression
WORK AND HYGIENIC PRACTICES: Provide readily accessible eye wash stations. Wash at the end of each work shift and before eating, smoking or using the toilet

SECTION 9 – PHYSICAL AND CHEMICAL PROPERTIES

Physical Properties:

PHYSICAL FORM	Powder
COLOR	White
ODOR	None
TYPICAL PHYSICAL DATA:	
pH (10% aqueous)	~11
VAPOR PRESSURE (mm Hg)	Non-Volatile
VAPOR DENSITY (Air = 1)	Non-Volatile
BOILING POINT	Not Applicable
FREEZING/MELTING POINT	~300°C
SOLUBILITY IN WATER	Soluble
SPECIFIC GRAVITY (Water = 1)	1.07
EVAPORATION RATE (Butylacetate = 1)	Non Volatile
VISCOSITY (CPS)	Not Evaluated

SECTION 10 – STABILITY AND REACTIVITY

Reactivity: No data available.
Chemical Stability: Stable

Possibility of Hazardous Reactions: No data available.
Hazardous: Polymerization: Will not occur
Conditions to Avoid: No data available.
Incompatible Materials: Strong oxidizing agents.
Hazardous Decomposition Products: Other decomposition products – no data available. In the event of a fire see Section 5

SECTION 11 –TOXICOLOGICAL INFORMATION

Information on likely routes of exposure

Product Information:

Inhalation:	No data available
Eye Contact:	No data available
Skin Contact:	No data available
Ingestion:	Harmful if swallowed

Component Information:

Symptoms:	No data available

Delayed and immediate effects as well as chronic effects from short & long-term exposure:

Sensitization:	No data available
Mutagenic effects:	No data available
Carcinogenicity:	No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC
STOT-single exposure:	No data available.
STOT-repeated exposure:	No data available.
Chronic toxicity:	No data available.
Target organ exposure:	No data available.
Aspiration hazard:	No data available

Numerical measure of toxicity product information

The following values are calculated based on Section 3 of the GHS document: No data available.

SECTION 12 – ECOLOGICAL INFORMATION

Ecotoxicity:	No data available
Persistence and degradability:	No data available
Bioaccumulation:	No data available
Other adverse effects:	No data available
Mobility in soil:	No data available

SECTION 13 – DISPOSAL CONSIDERATIONS

Waste treatment methods

Disposal methods: Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

Contaminated packaging: Dispose of as unused product

SECTION 14 – TRANSPORTATION INFORMATION

UN No.:	Not Regulated
DOT SHIPPING NAME:	Not Regulated
IMO SHIPPING NAME:	Not Regulated as dangerous goods
LATA SHIPPING NAME:	Not Regulated as dangerous goods
IMDG:	Not dangerous goods
IATA:	Not dangerous goods
ADG Code:	Not dangerous goods

SECTION 15 – REGULATORY INFORMATION

Federal and State Regulations: No products were found.

Other Regulations: This product does not contain any products considered hazardous under the federal OSHA HazCom.Standard 29 CFR 1.910.1200

Other Classifications:

WHMIS (Canada): Not controlled under WHMIS (Canada).

DSCL (EEC): R36/38- Irritating to eyes and skin. S2- Keep out of the reach of children. S46- If swallowed, seek medical advice immediately.

HMIS (U.S.A.): Health Hazard: 0, Fire Hazard: 0, Reactivity: 0, Personal Protection: E

National Fire Protection Association (U.S.A.): Health: 0, Flammability: 0, Reactivity: 0, Specific hazard:

Protective Equipment: Nitrile gloves (disposable), Tyvek apron, safety glasses or goggles during batching in the field. Dust mask or face covering may also be worn during batching if windy conditions exist. When bagging occurs in a closed warehouse room, be sure to use an approved/certified respirator or equivalent.

SECTION 16 – OTHER INFORMATION

OSHA Compliance Statement:
The SDS was prepared to comply with OSHA Hazard Communication Standard (29 CFR 1910.1200 HazCom 2012).

Further Information:
This SDS summarizes to the best of our knowledge at the date of issue, the chemical health and safety hazards of the material and general guidance on how to safely handle the material for the set purpose of environmental remediation. The information and recommendations contained herein are based upon data believed to be correct. However, no guarantee or warranty implied is made with respect to the information contained herein. The information is provided solely for your information and consideration and ISOTEC Remediation Technologies, LLC. assumes no legal responsibility for use or reliance thereon.

Issuing Date: NEW

Revision Date: March 2021-Rev. 6.

SAFETY DATA SHEET

SECTION 1 – IDENTIFICATION OF MATERIAL AND SUPPLIER

Product Name: ISOTEC[SM] Stabilizer 0875
Recommended Use: Environmental Remediation
Uses advised against: No information available
Details of the supplier of the safety data sheet:

Supplier Name: ISOTEC Remediation Technologies, LLC
Supplier Address: 11 Princess Rd, Suite A
Lawrenceville, NJ 08648, USA

EMERGENCY TELEPHONE NUMBER(S): **(609) 275-8500 (USA)**

C.A.S. CHEMICAL NAME:	Mixture
SYNONYMS:	None
CHEMICAL FAMILY:	Not Applicable
EMPIRICAL FORMULA:	MIXT (Proprietary)
INTENDED USE:	Stabilizing Agent

SECTION 2 – HAZARDS IDENTIFICATION

Classification

Acute Toxicity, Oral	Category 4
Skin irritation	Category 2
Eye Irritation	Category 2A

Pictogram:

Signal Word
Warning

Hazard Statement
Harmful if swallowed
Causes skin irritation
May cause eye irritation

Appearance/Odor: White powder, odorless.

Precautionary statement(s): Wash skin thoroughly after handling. Do not eat, drink, or smoke when using this product. Wear protective gloves/eye protection/face protection.
IF SWALLOWED: Call a POISON CENTER or doctor/ physician if you feel unwell.
IF ON SKIN: Wash with plenty of soap and water. If skin irritation occurs: Get medical advice/attention. Take off contaminated clothing and wash before reuse.
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical advice/attention.
Hazards not otherwise classified (HNOC): None
Specific treatment (see section 4 for more information).

Applicable properties are relevant to the mixture as a whole when certain proprietary ingredients present at their highest concentrations. Please note that the effects are normally lower for a typical mixture with smaller concentrations of these ingredients present.

SECTION 3 – COMPOSITION/ INFORMATION ON INGREDIENTS

Components	CAS Number	Proportion	Risk Phrases
Inorganic phosphates	-	>60%	-

SECTION 4 – FIRST AID MEASURES

EYE CONTACT: Hold eyelids apart and immediately flush eyes with plenty of water for at least 15 minutes. Call a physician if irritations persist.
SKIN CONTACT: Wash affected area immediately with soap and water.
INHALATION: In case of inhalation or suspected inhalation, move patient at once to fresh air and call a physician. Keep patient absolutely quiet. If breathing has stopped or is labored, give assisted respiration (e.g., mouth-to-mouth). Supplemental oxygen may be indicated.
INGESTION: Rinse mouth and dilute stomach contents with water, or preferably with milk if available. Large doses may cause nausea, vomiting and diarrhea. Systematic oral toxicity is extremely rare and has consisted of acidosis and hypocalcemic tetany.

Most important symptoms and effects, both acute and delayed: The most important known symptoms and effects are described in the labeling (see Section 2.2) and/or in Section 11.
Indication of any immediate medical attention and special treatment needed: No data available.

SECTION 5 – FIRE FIGHTING MEASURES

CHARACTERISTICS:

Flash Point	No Data Available
Upper Explosive Limit (UEL)	Not Applicable
Lower Explosive Limit (LEL)	Not Applicable
Autoignition Temperature	Not Applicable
Flash Point Method(s)	No Data Available
Unusual Fire & Explosion Hazards	No Data Available
Fire Hazard Classification (OSHA/NFPA)	No Data Available

EXTINGUISHING MEDIA: Product is noncombustible. Use extinguishing method suitable for surrounding fire.

UNSUITABLE EXTINGUISHING MEDIA: None Known

SPECIFIC HAZARDS ARISING FROM THE CHEMICAL: Hazardous combustion products: oxides of phosphorous, oxides of potassium

SPECIAL FIRE FIGHTING PROCEDURES Firefighters should wear full-face, self contained breathing apparatus and impervious protective clothing.

UNUSUAL FIRE AND EXPLOSION HAZARDS None.

Hazchem Code: Not applicable

SECTION 6 – ACCIDENTAL RELEASE MEASURES

CLEAN-UP PROCEDURES: Sweep up and repackage or place in receptacle for future disposal.

OTHER EMERGENCY ADVICE: Avoid eye and skin contact. Wear protective clothing including nitrile gloves, safety goggles, dust mask/face covering and Tyvek apron when handling. Stored materials should be placed in a dry and reasonably temperature area, preferably below 24^{o}C.

WASTE DISPOSAL: Remove to properly designated landfill. Observe all federal, state and local environmental regulations.

ENVIRONMENTAL EFFECTS: Aquatic Toxicity.

SECTION 7 – HANDLING AND STORAGE

Precautions for safe handling: Avoid contact with skin and eyes. Avoid formation of dust and aerosols. Provide appropriate exhaust ventilation at places where dust is formed. For precautions see Section 2.

Conditions for safe storage: Keep container tightly closed in a dry and well-ventilated place. Hygroscopic.

Specific end use(s): Apart from the uses mentioned in Section 1 no other specific uses are stipulated.
Signage: Signs will be attached to each drum containing ISOTEC^{SM} Stabilizer 0875. SDS sheets will be provided at the site.

SECTION 8 – PERSONAL PROTECTION/ EXPOSURE CONTROLS

EYE PROTECTION: Splash proof goggles or safety glasses.
HAND PROTECTION: Impermeable gloves made of Nitrile or rubber.
RESPIRATORY PROTECTION: Wear appropriate full-face respirator with HEPA cartridges for protection against excessive particulate matter/ dust
PROTECTIVE CLOTHING: Long sleeved clothing (e.g. cotton coveralls or Tyvek). Do not wear short trousers
ENGINEERING CONTROLS: Avoid drafts that may disperse material beyond the work area. Use light water spray for dust suppression
WORK AND HYGIENIC PRACTICES: Provide readily accessible eye wash stations. Wash at the end of each work shift and before eating, smoking or using the toilet

SECTION 9 – PHYSICAL AND CHEMICAL PROPERTIES

Physical Properties:

PHYSICAL FORM	Powder
COLOR	White
ODOR	None
TYPICAL PHYSICAL DATA:	
pH (10% aqueous)	4.6
VAPOR PRESSURE (mm Hg)	Non volatile
VAPOR DENSITY (Air = 1)	Non volatile
BOILING POINT	Not applicable
FREEZING/MELTING POINT	253^{o} C
SOLUBILITY IN WATER	20% by weight @ 25^{o}C
SPECIFIC GRAVITY (Water = 1)	1.2
EVAPORATION RATE (Butylacetate = 1)	Non volatile
VISCOSITY (CPS)	No data available

SECTION 10 – STABILITY AND REACTIVITY

Reactivity: No data available.
Chemical Stability: Stable under recommended storage conditions.

Possibility of Hazardous Reactions: No data available.
Hazardous: Polymerization: None.
Conditions to Avoid: No data available.
Incompatible Materials: None.
Hazardous Decomposition Products: Other decomposition products – no data available. In the event of a fire see Section 5.

SECTION 11 –TOXICOLOGICAL INFORMATION

Information on likely routes of exposure

Product Information:

Inhalation:	No data available
Eye Contact:	No data available
Skin Contact:	No data available
Ingestion:	Harmful if swallowed

Component Information:

Symptoms:	No data available

Delayed and immediate effects as well as chronic effects from short & long-term exposure:

Sensitization:	No data available
Mutagenic effects:	No data available
Carcinogenicity:	This product does not contain any substances that are considered by OSHA, NTP, IARC or ACGIH to be "probable" or suspected" human carcinogens.
STOT-single exposure:	No data available.
STOT-repeated exposure:	No data available.
Chronic toxicity:	No data available.
Target organ exposure:	No data available.
Aspiration hazard:	No data available

Numerical measure of toxicity product information

The following values are calculated based on Section 3 of the GHS document: No data available.

SECTION 12 – ECOLOGICAL INFORMATION

Ecotoxicity:	No data available
Persistence and degradability:	No data available
Bioaccumulation:	No data available
Other adverse effects:	No data available
Mobility in soil:	No data available

SECTION 13 – DISPOSAL CONSIDERATIONS

Waste treatment methods

Disposal methods: This product does not present a danger or hazard for disposal. Except for Food applications, salvage and return to container, process or recycle for other uses. May be disposed of in a properly designated landfill if needed.

Contaminated packaging: Dispose of as unused product

SECTION 14 – TRANSPORTATION INFORMATION

UN No.:	Not Regulated
DOT SHIPPING NAME:	Not Regulated
IMO SHIPPING NAME:	Not Regulated as dangerous goods
LATA SHIPPING NAME:	Not Regulated as dangerous goods
IMDG:	Not dangerous goods
IATA:	Not dangerous goods
ADG Code:	Not dangerous goods

SECTION 15 – REGULATORY INFORMATION

Federal and State Regulations: No products were found.

Other Regulations: This product does not contain any products considered hazardous under the federal OSHA HazCom.Standard 29 CFR 1.910.1200

Other Classifications:

WHMIS (Canada): Not controlled under WHMIS (Canada).

DSCL (EEC): R36/38- Irritating to eyes and skin. S2- Keep out of the reach of children. S46- If swallowed, seek medical advice immediately.

HMIS (U.S.A.): Health Hazard: 0, Fire Hazard: 0, Reactivity: 0, Personal Protection: E

National Fire Protection Association (U.S.A.): Health: 1, Flammability: 0, Reactivity: 0, Specific hazard:

Protective Equipment: Nitrile gloves (disposable), Tyvek apron, safety glasses or goggles during batching in the field. Dust mask or face covering may also be worn during batching if windy conditions exist. When bagging occurs in a closed warehouse room, be sure to use an approved/certified respirator or equivalent.

SECTION 16 – OTHER INFORMATION

OSHA Compliance Statement:

The SDS was prepared to comply with OSHA Hazard Communication Standard (29 CFR 1910.1200 HazCom 2012).

Further Information:
This SDS summarizes to the best of our knowledge at the date of issue, the chemical health and safety hazards of the material and general guidance on how to safely handle the material for the set purpose of environmental remediation. The information and recommendations contained herein are based upon data believed to be correct. However, no guarantee or warranty implied is made with respect to the information contained herein. The information is provided solely for your information and consideration and ISOTEC Remediation Technologies, LLC. assumes no legal responsibility for use or reliance thereon.

Issuing Date: NEW

Revision Date: March 2021-Rev.6.

Tommy Jordan

From: Hopper, Jeff <jeff.hopper@dnr.ga.gov>
Sent: Tuesday, November 23, 2021 3:56 PM
To: Tommy Jordan
Cc: Nicholson, Jess; Gillis, Michael; Dukes, Emilea; Stephen Wilson; Billy Ussery
Subject: RE: MFR Pilot Notification R1 Milledge Avenue Site No. HW-041 (CA)

Hi Tommy,

Thank you for the Pilot Test Notifications regarding remediation activities at UGA's Milledge Avenue site. Your proposed Hydrogen Peroxide (35 DPT) and Klozur SP/KP (11 DPT) injections as described in the Pilot Test Notifications are acceptable to the UIC Program as limited Pilot Tests with a 90-day duration. Please let me know of the start date of the Pilot Tests so that I can note the test duration dates. Please copy/forward any reports or memos resulting from the injections to the UIC program, and don't hesitate to contact me with any questions, comments, or concerns.

Thanks,

Jefferson Hopper, Geologist
Industrial Permitting Unit
GA EPD Watershed Protection Branch
2 Martin Luther King Jr. Drive, Suite 1152E
Atlanta, GA 30334
NEW Phone: 470-524-0746

Did you know you can now sign up to receive electronic public notices for wastewater permits and GEFA projects currently under consideration from the Watershed Protection Branch? Please visit our website at https://epd.georgia.gov/watershed-protection-branch-public-announcements to sign up now!

Did you know starting October 1, 2018 you may complete your wastewater and underground injection control applications online using the Georgia EPD Online System? You can access the site at the following link: https://geos.epd.georgia.gov/GA/GEOS/Public/GovEnt/Shared/Pages/Main/Login.aspx

---

From: Tommy Jordan <tommy.jordan@resoluteenv.com>
Sent: Tuesday, November 16, 2021 7:50 PM
To: Hopper, Jeff <jeff.hopper@dnr.ga.gov>
Cc: Nicholson, Jess <jess.nicholson@dnr.ga.gov>; Gillis, Michael <Mike.Gillis@dnr.ga.gov>; Dukes, Emilea <emilea.dukes@dnr.ga.gov>; Stephen Wilson <stephen.wilson@resoluteenv.com>; Billy Ussery <jussery@uga.edu>
Subject: MFR Pilot Notification R1 Milledge Avenue Site No. HW-041 (CA)

Hi Jeff,
Per our discussion on Monday 11/15/21, the MFR Pilot Notification has been revised. Thank you again for working with us to move this project forward.
Also, per your request, below is a link to the 50% Remedial Design report for your download.

https://www.dropbox.com/s/fdnhfe0n33g9d0d/50%20%25%20Remedial%20Design-Final.pdf?dl=0

Please let me know if you have any further questions or trouble with the link.
Tommy

Tommy Jordan, P.G. PMP
Sr. Project Manager

Resolute
Environmental & Water Resources Consulting

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1003 Weatherstone Parkway, Suite 320
Woodstock, Georgia 30188

678.398.9942 Office
470-895-0649 Mobile
888.881.8219 Fax

www.ResoluteEnv.com

From: Tommy Jordan
Sent: Monday, November 8, 2021 5:04 PM
To: jeff.hopper@dnr.ga.gov
Cc: Nicholson, Jess <jess.nicholson@dnr.ga.gov>; Gillis, Michael <Mike.Gillis@dnr.ga.gov>; emilea.dukes@dnr.ga.gov; Stephen Wilson <stephen.wilson@resoluteenv.com>; Billy Ussery <jussery@uga.edu>
Subject: Pilot Notification Milledge Avenue Site No. HW-041 (CA)

Hi Jeff,
On behalf of the UGA, please find attached notifications for 2 pilot studies to be performed at the Milledge Avenue Site. A hard copy of each notification is being sent by mail to your attention. Please let me know if you have any questions or concerns.

Yours,
Tommy

Tommy Jordan, P.G. PMP
Sr. Project Manager

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Environmental & Water Resources Consulting

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ANALYTICAL REPORT

December 14, 2021

Resolute Environmental & Water Resources

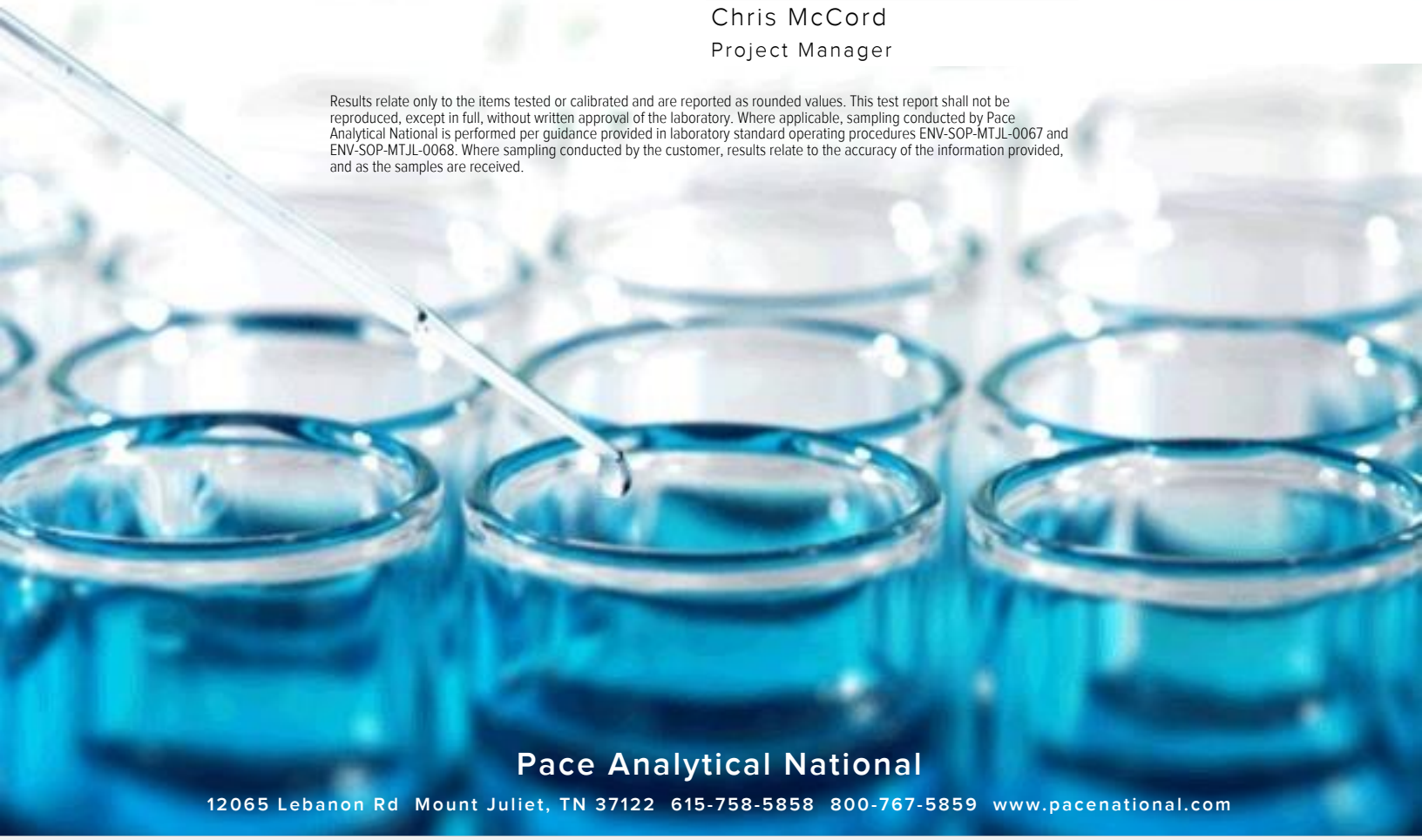
Sample Delivery Group:	L1433192
Samples Received:	11/18/2021
Project Number:	
Description:	UGA (Milledge Avenue Site) Pre-Injection

Report To:

Tommy Jordan
1003 Weatherstone Parkway
Suite 320
Woodstock, GA 30188

Entire Report Reviewed By:

Chris McCord
Project Manager



Pace Analytical National
12065 Lebanon Rd Mount Juliet, TN 37122 615-758-5858 800-767-5859 www.pacenational.com

TABLE OF CONTENTS

PW-UA L1433192-01 GW

Collected by: Robert Mull | Collected date/time: 11/17/21 10:49 | Received date/time: 11/18/21 09:30

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 9056A	WG1788151	1	12/12/21 23:22	12/12/21 23:22	ELN	Mt. Juliet, TN
Wet Chemistry by Method 9060A	WG1779036	1	11/23/21 22:49	11/23/21 22:49	MJA	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1780029	1	11/24/21 19:56	11/24/21 19:56	ADM	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1780416	5	11/26/21 17:37	11/26/21 17:37	ADM	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B-SIM	WG1778521	1	11/22/21 17:41	11/22/21 17:41	BMB	Mt. Juliet, TN
Pesticides (GC) by Method 8081	WG1778039	1	11/22/21 19:21	11/23/21 10:17	AO	Mt. Juliet, TN

PW-UB L1433192-02 GW

Collected by: Robert Mull | Collected date/time: 11/17/21 11:56 | Received date/time: 11/18/21 09:30

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 9056A	WG1788151	1	12/12/21 23:33	12/12/21 23:33	ELN	Mt. Juliet, TN
Wet Chemistry by Method 9060A	WG1779036	1	11/23/21 23:01	11/23/21 23:01	MJA	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1780416	1	11/26/21 14:27	11/26/21 14:27	ADM	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1780665	10	11/27/21 12:24	11/27/21 12:24	JAH	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B-SIM	WG1778521	1	11/22/21 18:00	11/22/21 18:00	BMB	Mt. Juliet, TN
Pesticides (GC) by Method 8081	WG1778039	1	11/22/21 19:21	11/23/21 10:26	AO	Mt. Juliet, TN

PW-PRBA L1433192-03 GW

Collected by: Robert Mull | Collected date/time: 11/17/21 08:35 | Received date/time: 11/18/21 09:30

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 9056A	WG1788151	5	12/13/21 02:53	12/13/21 02:53	ELN	Mt. Juliet, TN
Wet Chemistry by Method 9060A	WG1779036	1	11/23/21 23:15	11/23/21 23:15	MJA	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1780416	1	11/26/21 14:48	11/26/21 14:48	ADM	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1780665	10	11/27/21 12:46	11/27/21 12:46	JAH	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B-SIM	WG1778521	1	11/22/21 18:21	11/22/21 18:21	BMB	Mt. Juliet, TN
Pesticides (GC) by Method 8081	WG1778039	1	11/22/21 19:21	11/23/21 10:35	AO	Mt. Juliet, TN

PW-PRBB L1433192-04 GW

Collected by: Robert Mull | Collected date/time: 11/17/21 10:05 | Received date/time: 11/18/21 09:30

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 9056A	WG1788151	1	12/12/21 23:57	12/12/21 23:57	ELN	Mt. Juliet, TN
Wet Chemistry by Method 9060A	WG1779036	1	11/23/21 23:29	11/23/21 23:29	MJA	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1780029	1	11/24/21 21:01	11/24/21 21:01	ADM	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B-SIM	WG1778521	1	11/22/21 18:40	11/22/21 18:40	BMB	Mt. Juliet, TN
Pesticides (GC) by Method 8081	WG1778039	1	11/22/21 19:21	11/23/21 10:44	AO	Mt. Juliet, TN

PW-DA L1433192-05 GW

Collected by: Robert Mull | Collected date/time: 11/17/21 15:20 | Received date/time: 11/18/21 09:30

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 9056A	WG1788151	1	12/13/21 00:09	12/13/21 00:09	ELN	Mt. Juliet, TN
Wet Chemistry by Method 9060A	WG1779036	1	11/23/21 23:42	11/23/21 23:42	MJA	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1780029	1	11/24/21 21:22	11/24/21 21:22	ADM	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B-SIM	WG1778521	1	11/22/21 19:00	11/22/21 19:00	BMB	Mt. Juliet, TN
Pesticides (GC) by Method 8081	WG1778039	1	11/22/21 19:21	11/23/21 10:52	AO	Mt. Juliet, TN

PW-DB L1433192-06 GW

Collected by: Robert Mull
Collected date/time: 11/17/21 13:20
Received date/time: 11/18/21 09:30

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 9056A	WG1788151	1	12/13/21 00:20	12/13/21 00:20	ELN	Mt. Juliet, TN
Wet Chemistry by Method 9060A	WG1779036	1	11/24/21 00:31	11/24/21 00:31	MJA	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1780416	1	11/26/21 15:09	11/26/21 15:09	ADM	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B-SIM	WG1780167	1	11/25/21 11:01	11/25/21 11:01	BMB	Mt. Juliet, TN
Pesticides (GC) by Method 8081	WG1778039	1	11/22/21 19:21	11/23/21 11:01	AO	Mt. Juliet, TN

PW-DC L1433192-07 GW

Collected by: Robert Mull
Collected date/time: 11/17/21 14:35
Received date/time: 11/18/21 09:30

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 9056A	WG1788151	1	12/13/21 00:32	12/13/21 00:32	ELN	Mt. Juliet, TN
Wet Chemistry by Method 9060A	WG1779036	1	11/24/21 00:45	11/24/21 00:45	MJA	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1780029	1	11/24/21 22:06	11/24/21 22:06	ADM	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B-SIM	WG1778521	1	11/22/21 19:40	11/22/21 19:40	BMB	Mt. Juliet, TN
Pesticides (GC) by Method 8081	WG1778273	1	11/23/21 07:49	11/24/21 13:46	JMB	Mt. Juliet, TN

CASE NARRATIVE

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

Chris McCord
Project Manager

Wet Chemistry by Method 9056A

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Sulfate	81000		5000	1	12/12/2021 23:22	WG1788151

Wet Chemistry by Method 9060A

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
TOC (Total Organic Carbon)	1640	B	1000	1	11/23/2021 22:49	WG1779036

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Acetone	ND		50.0	1	11/24/2021 19:56	WG1780029
Benzene	ND		1.00	1	11/24/2021 19:56	WG1780029
Carbon tetrachloride	4.23		1.00	1	11/24/2021 19:56	WG1780029
Chlorobenzene	ND		1.00	1	11/24/2021 19:56	WG1780029
Chloroethane	ND		5.00	1	11/24/2021 19:56	WG1780029
Chloroform	356		25.0	5	11/26/2021 17:37	WG1780416
1,2-Dibromo-3-Chloropropane	ND		5.00	1	11/24/2021 19:56	WG1780029
1,2-Dichloroethane	ND		1.00	1	11/24/2021 19:56	WG1780029
1,1-Dichloroethene	ND		1.00	1	11/24/2021 19:56	WG1780029
cis-1,2-Dichloroethene	ND		1.00	1	11/24/2021 19:56	WG1780029
trans-1,2-Dichloroethene	ND		1.00	1	11/24/2021 19:56	WG1780029
1,2-Dichloropropane	ND		1.00	1	11/24/2021 19:56	WG1780029
Ethylbenzene	ND		1.00	1	11/24/2021 19:56	WG1780029
Methylene Chloride	ND		5.00	1	11/24/2021 19:56	WG1780029
1,1,2,2-Tetrachloroethane	1.28		1.00	1	11/24/2021 19:56	WG1780029
Tetrachloroethene	1.53		1.00	1	11/24/2021 19:56	WG1780029
Toluene	ND		1.00	1	11/24/2021 19:56	WG1780029
Trichloroethene	ND		1.00	1	11/24/2021 19:56	WG1780029
Vinyl chloride	ND		1.00	1	11/24/2021 19:56	WG1780029
o-Xylene	ND		1.00	1	11/24/2021 19:56	WG1780029
m&p-Xylene	ND		2.00	1	11/24/2021 19:56	WG1780029
(S) Toluene-d8	*96.4*		*80.0-120*		*11/24/2021 19:56*	WG1780029
(S) Toluene-d8	*118*		*80.0-120*		*11/26/2021 17:37*	WG1780416
(S) 4-Bromofluorobenzene	*97.9*		*77.0-126*		*11/24/2021 19:56*	WG1780029
(S) 4-Bromofluorobenzene	*112*		*77.0-126*		*11/26/2021 17:37*	WG1780416
(S) 1,2-Dichloroethane-d4	*99.7*		*70.0-130*		*11/24/2021 19:56*	WG1780029
(S) 1,2-Dichloroethane-d4	*108*		*70.0-130*		*11/26/2021 17:37*	WG1780416

Volatile Organic Compounds (GC/MS) by Method 8260B-SIM

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
1,4-Dioxane	42.0		3.00	1	11/22/2021 17:41	WG1778521
(S) Toluene-d8	*99.5*		*77.0-127*		*11/22/2021 17:41*	WG1778521

Pesticides (GC) by Method 8081

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Gamma BHC	ND		0.0500	1	11/23/2021 10:17	WG1778039
(S) Decachlorobiphenyl	*80.3*		*10.0-128*		*11/23/2021 10:17*	WG1778039
(S) Tetrachloro-m-xylene	*112*		*10.0-127*		*11/23/2021 10:17*	WG1778039

Wet Chemistry by Method 9056A

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Sulfate	42800		5000	1	12/12/2021 23:33	WG1788151

Wet Chemistry by Method 9060A

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
TOC (Total Organic Carbon)	ND		1000	1	11/23/2021 23:01	WG1779036

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Acetone	ND		50.0	1	11/26/2021 14:27	WG1780416
Benzene	ND		1.00	1	11/26/2021 14:27	WG1780416
Carbon tetrachloride	ND		1.00	1	11/26/2021 14:27	WG1780416
Chlorobenzene	1.60		1.00	1	11/26/2021 14:27	WG1780416
Chloroethane	ND		5.00	1	11/26/2021 14:27	WG1780416
Chloroform	493		50.0	10	11/27/2021 12:24	WG1780665
1,2-Dibromo-3-Chloropropane	ND		5.00	1	11/26/2021 14:27	WG1780416
1,2-Dichloroethane	2.23		1.00	1	11/26/2021 14:27	WG1780416
1,1-Dichloroethene	ND		1.00	1	11/26/2021 14:27	WG1780416
cis-1,2-Dichloroethene	ND		1.00	1	11/26/2021 14:27	WG1780416
trans-1,2-Dichloroethene	ND		1.00	1	11/26/2021 14:27	WG1780416
1,2-Dichloropropane	ND		1.00	1	11/26/2021 14:27	WG1780416
Ethylbenzene	ND		1.00	1	11/26/2021 14:27	WG1780416
Methylene Chloride	ND		5.00	1	11/26/2021 14:27	WG1780416
1,1,2,2-Tetrachloroethane	19.6		1.00	1	11/26/2021 14:27	WG1780416
Tetrachloroethene	3.18		1.00	1	11/26/2021 14:27	WG1780416
Toluene	ND		1.00	1	11/26/2021 14:27	WG1780416
Trichloroethene	2.04		1.00	1	11/26/2021 14:27	WG1780416
Vinyl chloride	ND		1.00	1	11/26/2021 14:27	WG1780416
o-Xylene	ND		1.00	1	11/26/2021 14:27	WG1780416
m&p-Xylene	ND		2.00	1	11/26/2021 14:27	WG1780416
(S) Toluene-d8	*118*		*80.0-120*		*11/26/2021 14:27*	WG1780416
(S) Toluene-d8	*114*		*80.0-120*		*11/27/2021 12:24*	WG1780665
(S) 4-Bromofluorobenzene	*110*		*77.0-126*		*11/26/2021 14:27*	WG1780416
(S) 4-Bromofluorobenzene	*95.6*		*77.0-126*		*11/27/2021 12:24*	WG1780665
(S) 1,2-Dichloroethane-d4	*107*		*70.0-130*		*11/26/2021 14:27*	WG1780416
(S) 1,2-Dichloroethane-d4	*127*		*70.0-130*		*11/27/2021 12:24*	WG1780665

Volatile Organic Compounds (GC/MS) by Method 8260B-SIM

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
1,4-Dioxane	157		3.00	1	11/22/2021 18:00	WG1778521
(S) Toluene-d8	*99.2*		*77.0-127*		*11/22/2021 18:00*	WG1778521

Pesticides (GC) by Method 8081

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Gamma BHC	ND		0.0500	1	11/23/2021 10:26	WG1778039
(S) Decachlorobiphenyl	*66.5*		*10.0-128*		*11/23/2021 10:26*	WG1778039
(S) Tetrachloro-m-xylene	*95.6*		*10.0-127*		*11/23/2021 10:26*	WG1778039

Wet Chemistry by Method 9056A

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Sulfate	106000		25000	5	12/13/2021 02:53	WG1788151

Wet Chemistry by Method 9060A

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
TOC (Total Organic Carbon)	ND		1000	1	11/23/2021 23:15	WG1779036

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Acetone	ND		50.0	1	11/26/2021 14:48	WG1780416
Benzene	ND		1.00	1	11/26/2021 14:48	WG1780416
Carbon tetrachloride	1.86		1.00	1	11/26/2021 14:48	WG1780416
Chlorobenzene	ND		1.00	1	11/26/2021 14:48	WG1780416
Chloroethane	ND		5.00	1	11/26/2021 14:48	WG1780416
Chloroform	225		50.0	10	11/27/2021 12:46	WG1780665
1,2-Dibromo-3-Chloropropane	ND		5.00	1	11/26/2021 14:48	WG1780416
1,2-Dichloroethane	ND		1.00	1	11/26/2021 14:48	WG1780416
1,1-Dichloroethene	ND		1.00	1	11/26/2021 14:48	WG1780416
cis-1,2-Dichloroethene	ND		1.00	1	11/26/2021 14:48	WG1780416
trans-1,2-Dichloroethene	ND		1.00	1	11/26/2021 14:48	WG1780416
1,2-Dichloropropane	ND		1.00	1	11/26/2021 14:48	WG1780416
Ethylbenzene	ND		1.00	1	11/26/2021 14:48	WG1780416
Methylene Chloride	ND		5.00	1	11/26/2021 14:48	WG1780416
1,1,2,2-Tetrachloroethane	6.85		1.00	1	11/26/2021 14:48	WG1780416
Tetrachloroethene	1.47		1.00	1	11/26/2021 14:48	WG1780416
Toluene	ND		1.00	1	11/26/2021 14:48	WG1780416
Trichloroethene	ND		1.00	1	11/26/2021 14:48	WG1780416
Vinyl chloride	ND		1.00	1	11/26/2021 14:48	WG1780416
o-Xylene	ND		1.00	1	11/26/2021 14:48	WG1780416
m&p-Xylene	ND		2.00	1	11/26/2021 14:48	WG1780416
(S) Toluene-d8	*116*		*80.0-120*		*11/26/2021 14:48*	WG1780416
(S) Toluene-d8	*121*	J1	*80.0-120*		*11/27/2021 12:46*	WG1780665
(S) 4-Bromofluorobenzene	*105*		*77.0-126*		*11/26/2021 14:48*	WG1780416
(S) 4-Bromofluorobenzene	*96.4*		*77.0-126*		*11/27/2021 12:46*	WG1780665
(S) 1,2-Dichloroethane-d4	*106*		*70.0-130*		*11/26/2021 14:48*	WG1780416
(S) 1,2-Dichloroethane-d4	*122*		*70.0-130*		*11/27/2021 12:46*	WG1780665

Volatile Organic Compounds (GC/MS) by Method 8260B-SIM

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
1,4-Dioxane	25.0		3.00	1	11/22/2021 18:21	WG1778521
(S) Toluene-d8	*98.6*		*77.0-127*		*11/22/2021 18:21*	WG1778521

Pesticides (GC) by Method 8081

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Gamma BHC	ND		0.0500	1	11/23/2021 10:35	WG1778039
(S) Decachlorobiphenyl	*82.3*		*10.0-128*		*11/23/2021 10:35*	WG1778039
(S) Tetrachloro-m-xylene	*101*		*10.0-127*		*11/23/2021 10:35*	WG1778039

Wet Chemistry by Method 9056A

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Sulfate	51000		5000	1	12/12/2021 23:57	WG1788151

Wet Chemistry by Method 9060A

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
TOC (Total Organic Carbon)	ND		1000	1	11/23/2021 23:29	WG1779036

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Acetone	ND		50.0	1	11/24/2021 21:01	WG1780029
Benzene	ND		1.00	1	11/24/2021 21:01	WG1780029
Carbon tetrachloride	ND		1.00	1	11/24/2021 21:01	WG1780029
Chlorobenzene	ND		1.00	1	11/24/2021 21:01	WG1780029
Chloroethane	ND		5.00	1	11/24/2021 21:01	WG1780029
Chloroform	130		5.00	1	11/24/2021 21:01	WG1780029
1,2-Dibromo-3-Chloropropane	ND		5.00	1	11/24/2021 21:01	WG1780029
1,2-Dichloroethane	1.70		1.00	1	11/24/2021 21:01	WG1780029
1,1-Dichloroethene	ND		1.00	1	11/24/2021 21:01	WG1780029
cis-1,2-Dichloroethene	ND		1.00	1	11/24/2021 21:01	WG1780029
trans-1,2-Dichloroethene	1.40		1.00	1	11/24/2021 21:01	WG1780029
1,2-Dichloropropane	ND		1.00	1	11/24/2021 21:01	WG1780029
Ethylbenzene	ND		1.00	1	11/24/2021 21:01	WG1780029
Methylene Chloride	ND		5.00	1	11/24/2021 21:01	WG1780029
1,1,2,2-Tetrachloroethane	17.5		1.00	1	11/24/2021 21:01	WG1780029
Tetrachloroethene	2.90		1.00	1	11/24/2021 21:01	WG1780029
Toluene	ND		1.00	1	11/24/2021 21:01	WG1780029
Trichloroethene	2.42		1.00	1	11/24/2021 21:01	WG1780029
Vinyl chloride	ND		1.00	1	11/24/2021 21:01	WG1780029
o-Xylene	ND		1.00	1	11/24/2021 21:01	WG1780029
m&p-Xylene	ND		2.00	1	11/24/2021 21:01	WG1780029
(S) Toluene-d8	*99.8*		*80.0-120*		*11/24/2021 21:01*	WG1780029
(S) 4-Bromofluorobenzene	*100*		*77.0-126*		*11/24/2021 21:01*	WG1780029
(S) 1,2-Dichloroethane-d4	*102*		*70.0-130*		*11/24/2021 21:01*	WG1780029

Volatile Organic Compounds (GC/MS) by Method 8260B-SIM

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
1,4-Dioxane	86.4		3.00	1	11/22/2021 18:40	WG1778521
(S) Toluene-d8	*98.7*		*77.0-127*		*11/22/2021 18:40*	WG1778521

Pesticides (GC) by Method 8081

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Gamma BHC	ND		0.0500	1	11/23/2021 10:44	WG1778039
(S) Decachlorobiphenyl	*82.7*		*10.0-128*		*11/23/2021 10:44*	WG1778039
(S) Tetrachloro-m-xylene	*98.2*		*10.0-127*		*11/23/2021 10:44*	WG1778039

Wet Chemistry by Method 9056A

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Sulfate	82800		5000	1	12/13/2021 00:09	WG1788151

Wet Chemistry by Method 9060A

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
TOC (Total Organic Carbon)	ND		1000	1	11/23/2021 23:42	WG1779036

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Acetone	ND		50.0	1	11/24/2021 21:22	WG1780029
Benzene	ND		1.00	1	11/24/2021 21:22	WG1780029
Carbon tetrachloride	ND		1.00	1	11/24/2021 21:22	WG1780029
Chlorobenzene	ND		1.00	1	11/24/2021 21:22	WG1780029
Chloroethane	ND		5.00	1	11/24/2021 21:22	WG1780029
Chloroform	110		5.00	1	11/24/2021 21:22	WG1780029
1,2-Dibromo-3-Chloropropane	ND		5.00	1	11/24/2021 21:22	WG1780029
1,2-Dichloroethane	ND		1.00	1	11/24/2021 21:22	WG1780029
1,1-Dichloroethene	ND		1.00	1	11/24/2021 21:22	WG1780029
cis-1,2-Dichloroethene	ND		1.00	1	11/24/2021 21:22	WG1780029
trans-1,2-Dichloroethene	ND		1.00	1	11/24/2021 21:22	WG1780029
1,2-Dichloropropane	ND		1.00	1	11/24/2021 21:22	WG1780029
Ethylbenzene	ND		1.00	1	11/24/2021 21:22	WG1780029
Methylene Chloride	ND		5.00	1	11/24/2021 21:22	WG1780029
1,1,2,2-Tetrachloroethane	1.08		1.00	1	11/24/2021 21:22	WG1780029
Tetrachloroethene	ND		1.00	1	11/24/2021 21:22	WG1780029
Toluene	ND		1.00	1	11/24/2021 21:22	WG1780029
Trichloroethene	ND		1.00	1	11/24/2021 21:22	WG1780029
Vinyl chloride	ND		1.00	1	11/24/2021 21:22	WG1780029
o-Xylene	ND		1.00	1	11/24/2021 21:22	WG1780029
m&p-Xylene	ND		2.00	1	11/24/2021 21:22	WG1780029
(S) Toluene-d8	*98.8*		*80.0-120*		*11/24/2021 21:22*	WG1780029
(S) 4-Bromofluorobenzene	*101*		*77.0-126*		*11/24/2021 21:22*	WG1780029
(S) 1,2-Dichloroethane-d4	*99.2*		*70.0-130*		*11/24/2021 21:22*	WG1780029

Volatile Organic Compounds (GC/MS) by Method 8260B-SIM

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
1,4-Dioxane	ND		3.00	1	11/22/2021 19:00	WG1778521
(S) Toluene-d8	*95.8*		*77.0-127*		*11/22/2021 19:00*	WG1778521

Pesticides (GC) by Method 8081

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Gamma BHC	ND		0.0500	1	11/23/2021 10:52	WG1778039
(S) Decachlorobiphenyl	*85.6*		*10.0-128*		*11/23/2021 10:52*	WG1778039
(S) Tetrachloro-m-xylene	*100*		*10.0-127*		*11/23/2021 10:52*	WG1778039

Wet Chemistry by Method 9056A

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Sulfate	62800		5000	1	12/13/2021 00:20	WG1788151

Wet Chemistry by Method 9060A

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
TOC (Total Organic Carbon)	ND		1000	1	11/24/2021 00:31	WG1779036

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Acetone	ND		50.0	1	11/26/2021 15:09	WG1780416
Benzene	ND		1.00	1	11/26/2021 15:09	WG1780416
Carbon tetrachloride	ND		1.00	1	11/26/2021 15:09	WG1780416
Chlorobenzene	ND		1.00	1	11/26/2021 15:09	WG1780416
Chloroethane	ND		5.00	1	11/26/2021 15:09	WG1780416
Chloroform	ND		5.00	1	11/26/2021 15:09	WG1780416
1,2-Dibromo-3-Chloropropane	ND		5.00	1	11/26/2021 15:09	WG1780416
1,2-Dichloroethane	1.37		1.00	1	11/26/2021 15:09	WG1780416
1,1-Dichloroethene	ND		1.00	1	11/26/2021 15:09	WG1780416
cis-1,2-Dichloroethene	ND		1.00	1	11/26/2021 15:09	WG1780416
trans-1,2-Dichloroethene	2.75		1.00	1	11/26/2021 15:09	WG1780416
1,2-Dichloropropane	ND		1.00	1	11/26/2021 15:09	WG1780416
Ethylbenzene	ND		1.00	1	11/26/2021 15:09	WG1780416
Methylene Chloride	ND		5.00	1	11/26/2021 15:09	WG1780416
1,1,2,2-Tetrachloroethane	19.6		1.00	1	11/26/2021 15:09	WG1780416
Tetrachloroethene	5.53		1.00	1	11/26/2021 15:09	WG1780416
Toluene	ND		1.00	1	11/26/2021 15:09	WG1780416
Trichloroethene	3.63		1.00	1	11/26/2021 15:09	WG1780416
Vinyl chloride	ND		1.00	1	11/26/2021 15:09	WG1780416
o-Xylene	ND		1.00	1	11/26/2021 15:09	WG1780416
m&p-Xylene	ND		2.00	1	11/26/2021 15:09	WG1780416
(S) Toluene-d8	*117*		*80.0-120*		*11/26/2021 15:09*	WG1780416
(S) 4-Bromofluorobenzene	*105*		*77.0-126*		*11/26/2021 15:09*	WG1780416
(S) 1,2-Dichloroethane-d4	*108*		*70.0-130*		*11/26/2021 15:09*	WG1780416

Volatile Organic Compounds (GC/MS) by Method 8260B-SIM

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
1,4-Dioxane	209		3.00	1	11/25/2021 11:01	WG1780167
(S) Toluene-d8	*113*		*77.0-127*		*11/25/2021 11:01*	WG1780167

Pesticides (GC) by Method 8081

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Gamma BHC	ND		0.0500	1	11/23/2021 11:01	WG1778039
(S) Decachlorobiphenyl	*71.1*		*10.0-128*		*11/23/2021 11:01*	WG1778039
(S) Tetrachloro-m-xylene	*113*		*10.0-127*		*11/23/2021 11:01*	WG1778039

Wet Chemistry by Method 9056A

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Sulfate	20000		5000	1	12/13/2021 00:32	WG1788151

Wet Chemistry by Method 9060A

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
TOC (Total Organic Carbon)	ND		1000	1	11/24/2021 00:45	WG1779036

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Acetone	ND		50.0	1	11/24/2021 22:06	WG1780029
Benzene	ND		1.00	1	11/24/2021 22:06	WG1780029
Carbon tetrachloride	ND		1.00	1	11/24/2021 22:06	WG1780029
Chlorobenzene	ND		1.00	1	11/24/2021 22:06	WG1780029
Chloroethane	ND		5.00	1	11/24/2021 22:06	WG1780029
Chloroform	22.9		5.00	1	11/24/2021 22:06	WG1780029
1,2-Dibromo-3-Chloropropane	ND		5.00	1	11/24/2021 22:06	WG1780029
1,2-Dichloroethane	ND		1.00	1	11/24/2021 22:06	WG1780029
1,1-Dichloroethene	ND		1.00	1	11/24/2021 22:06	WG1780029
cis-1,2-Dichloroethene	ND		1.00	1	11/24/2021 22:06	WG1780029
trans-1,2-Dichloroethene	ND		1.00	1	11/24/2021 22:06	WG1780029
1,2-Dichloropropane	ND		1.00	1	11/24/2021 22:06	WG1780029
Ethylbenzene	ND		1.00	1	11/24/2021 22:06	WG1780029
Methylene Chloride	ND		5.00	1	11/24/2021 22:06	WG1780029
1,1,2,2-Tetrachloroethane	1.18		1.00	1	11/24/2021 22:06	WG1780029
Tetrachloroethene	ND		1.00	1	11/24/2021 22:06	WG1780029
Toluene	ND		1.00	1	11/24/2021 22:06	WG1780029
Trichloroethene	ND		1.00	1	11/24/2021 22:06	WG1780029
Vinyl chloride	ND		1.00	1	11/24/2021 22:06	WG1780029
o-Xylene	ND		1.00	1	11/24/2021 22:06	WG1780029
m&p-Xylene	ND		2.00	1	11/24/2021 22:06	WG1780029
(S) Toluene-d8	*100*		*80.0-120*		*11/24/2021 22:06*	WG1780029
(S) 4-Bromofluorobenzene	*101*		*77.0-126*		*11/24/2021 22:06*	WG1780029
(S) 1,2-Dichloroethane-d4	*99.9*		*70.0-130*		*11/24/2021 22:06*	WG1780029

Volatile Organic Compounds (GC/MS) by Method 8260B-SIM

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
1,4-Dioxane	7.01		3.00	1	11/22/2021 19:40	WG1778521
(S) Toluene-d8	*98.6*		*77.0-127*		*11/22/2021 19:40*	WG1778521

Pesticides (GC) by Method 8081

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Gamma BHC	ND		0.0500	1	11/24/2021 13:46	WG1778273
(S) Decachlorobiphenyl	*87.0*		*10.0-128*		*11/24/2021 13:46*	WG1778273
(S) Tetrachloro-m-xylene	*78.8*		*10.0-127*		*11/24/2021 13:46*	WG1778273

Method Blank (MB)

(MB) R3740196-1 12/12/21 17:31

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Sulfate	U		594	5000

L1433179-20 Original Sample (OS) • Duplicate (DUP)

(OS) L1433179-20 12/12/21 21:25 • (DUP) R3740196-3 12/12/21 21:36

Analyte	Original Result ug/l	DUP Result ug/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Sulfate	17500	17500	1	0.0109		15

L1433717-02 Original Sample (OS) • Duplicate (DUP)

(OS) L1433717-02 12/13/21 00:55 • (DUP) R3740196-6 12/13/21 01:30

Analyte	Original Result ug/l	DUP Result ug/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Sulfate	30400	30400	1	0.0435		15

Laboratory Control Sample (LCS)

(LCS) R3740196-2 12/12/21 17:43

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Sulfate	40000	40500	101	80.0-120	

L1433179-20 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1433179-20 12/12/21 21:25 • (MS) R3740196-4 12/12/21 21:48 • (MSD) R3740196-5 12/12/21 22:00

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MSD Result ug/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Sulfate	50000	17500	66800	67400	98.6	99.8	1	80.0-120			0.922	15

L1433717-02 Original Sample (OS) • Matrix Spike (MS)

(OS) L1433717-02 12/13/21 00:55 • (MS) R3740196-7 12/13/21 01:42

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Sulfate	50000	30400	76600	92.6	1	80.0-120	

Method Blank (MB)

(MB) R3733586-2 11/23/21 18:12

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
TOC (Total Organic Carbon)	346	J	102	1000

Laboratory Control Sample (LCS)

(LCS) R3733586-1 11/23/21 17:56

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
TOC (Total Organic Carbon)	75000	76200	102	85.0-115	

L1433179-17 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1433179-17 11/23/21 18:52 • (MS) R3733586-3 11/23/21 19:14 • (MSD) R3733586-4 11/23/21 19:34

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MSD Result ug/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
TOC (Total Organic Carbon)	50000	ND	52100	53600	103	106	1	80.0-120			2.97	20

L1433179-24 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1433179-24 11/23/21 21:35 • (MS) R3733586-6 11/23/21 21:57 • (MSD) R3733586-7 11/23/21 22:19

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MSD Result ug/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
TOC (Total Organic Carbon)	50000	ND	52500	55900	103	110	1	80.0-120			6.18	20

Method Blank (MB)

(MB) R3734032-3 11/24/21 18:52

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Acetone	U		11.3	50.0
Benzene	U		0.0941	1.00
Carbon tetrachloride	U		0.128	1.00
Chlorobenzene	U		0.116	1.00
Chloroethane	U		0.192	5.00
Chloroform	U		0.111	5.00
1,2-Dibromo-3-Chloropropane	U		0.276	5.00
1,2-Dichloroethane	U		0.0819	1.00
1,1-Dichloroethene	U		0.188	1.00
cis-1,2-Dichloroethene	U		0.126	1.00
trans-1,2-Dichloroethene	U		0.149	1.00
1,2-Dichloropropane	U		0.149	1.00
Ethylbenzene	U		0.137	1.00
Methylene Chloride	U		0.430	5.00
1,1,2,2-Tetrachloroethane	U		0.133	1.00
Tetrachloroethene	U		0.300	1.00
Toluene	U		0.278	1.00
Trichloroethene	U		0.190	1.00
Vinyl chloride	U		0.234	1.00
o-Xylene	U		0.174	1.00
m&p-Xylenes	U		0.430	2.00
(S) Toluene-d8	*98.4*			*80.0-120*
(S) 4-Bromofluorobenzene	*99.7*			*77.0-126*
(S) 1,2-Dichloroethane-d4	*100*			*70.0-130*

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

(LCS) R3734032-1 11/24/21 16:00 • (LCSD) R3734032-2 11/24/21 16:22

Analyte	Spike Amount ug/l	LCS Result ug/l	LCSD Result ug/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Acetone	25.0	20.7	23.4	82.8	93.6	19.0-160			12.2	27
Benzene	5.00	4.36	4.92	87.2	98.4	70.0-123			12.1	20
Carbon tetrachloride	5.00	4.84	5.55	96.8	111	68.0-126			13.7	20
Chlorobenzene	5.00	4.34	4.94	86.8	98.8	80.0-121			12.9	20
Chloroethane	5.00	4.45	5.18	89.0	104	47.0-150			15.2	20
Chloroform	5.00	4.56	5.10	91.2	102	73.0-120			11.2	20
1,2-Dibromo-3-Chloropropane	5.00	4.13	4.31	82.6	86.2	58.0-134			4.27	20
1,2-Dichloroethane	5.00	4.69	5.02	93.8	100	70.0-128			6.80	20
1,1-Dichloroethene	5.00	4.52	5.00	90.4	100	71.0-124			10.1	20

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

(LCS) R3734032-1 11/24/21 16:00 • (LCSD) R3734032-2 11/24/21 16:22

Analyte	Spike Amount ug/l	LCS Result ug/l	LCSD Result ug/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
cis-1,2-Dichloroethene	5.00	4.56	5.06	91.2	101	73.0-120			10.4	20
trans-1,2-Dichloroethene	5.00	4.54	5.14	90.8	103	73.0-120			12.4	20
1,2-Dichloropropane	5.00	4.40	5.08	88.0	102	77.0-125			14.3	20
Ethylbenzene	5.00	4.51	5.02	90.2	100	79.0-123			10.7	20
Methylene Chloride	5.00	4.55	4.82	91.0	96.4	67.0-120			5.76	20
1,1,2,2-Tetrachloroethane	5.00	4.44	4.91	88.8	98.2	65.0-130			10.1	20
Tetrachloroethene	5.00	4.42	4.84	88.4	96.8	72.0-132			9.07	20
Toluene	5.00	4.53	5.13	90.6	103	79.0-120			12.4	20
Trichloroethene	5.00	4.27	4.95	85.4	99.0	78.0-124			14.8	20
Vinyl chloride	5.00	4.45	4.93	89.0	98.6	67.0-131			10.2	20
o-Xylene	5.00	4.51	5.05	90.2	101	80.0-122			11.3	20
m&p-Xylenes	10.0	8.94	9.83	89.4	98.3	80.0-122			9.48	20
(S) Toluene-d8				*97.7*	*98.5*	*80.0-120*				
(S) 4-Bromofluorobenzene				*97.9*	*100*	*77.0-126*				
(S) 1,2-Dichloroethane-d4				*104*	*101*	*70.0-130*				

Method Blank (MB)

(MB) R3734249-3 11/26/21 10:36

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Acetone	U		11.3	50.0
Benzene	U		0.0941	1.00
Carbon tetrachloride	U		0.128	1.00
Chlorobenzene	U		0.116	1.00
Chloroethane	U		0.192	5.00
Chloroform	U		0.111	5.00
1,2-Dibromo-3-Chloropropane	U		0.276	5.00
1,2-Dichloroethane	U		0.0819	1.00
1,1-Dichloroethene	U		0.188	1.00
cis-1,2-Dichloroethene	U		0.126	1.00
trans-1,2-Dichloroethene	U		0.149	1.00
1,2-Dichloropropane	U		0.149	1.00
Ethylbenzene	U		0.137	1.00
Methylene Chloride	0.485	J	0.430	5.00
1,1,2,2-Tetrachloroethane	U		0.133	1.00
Tetrachloroethene	U		0.300	1.00
Toluene	U		0.278	1.00
Trichloroethene	U		0.190	1.00
Vinyl chloride	U		0.234	1.00
o-Xylene	U		0.174	1.00
m&p-Xylenes	U		0.430	2.00
(S) Toluene-d8	*118*			*80.0-120*
(S) 4-Bromofluorobenzene	*109*			*77.0-126*
(S) 1,2-Dichloroethane-d4	*105*			*70.0-130*

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

(LCS) R3734249-1 11/26/21 09:33 • (LCSD) R3734249-2 11/26/21 09:54

Analyte	Spike Amount ug/l	LCS Result ug/l	LCSD Result ug/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Acetone	25.0	23.4	25.7	93.6	103	19.0-160			9.37	27
Benzene	5.00	4.98	4.83	99.6	96.6	70.0-123			3.06	20
Carbon tetrachloride	5.00	4.31	4.56	86.2	91.2	68.0-126			5.64	20
Chlorobenzene	5.00	4.63	4.81	92.6	96.2	80.0-121			3.81	20
Chloroethane	5.00	4.93	4.80	98.6	96.0	47.0-150			2.67	20
Chloroform	5.00	4.85	4.63	97.0	92.6	73.0-120			4.64	20
1,2-Dibromo-3-Chloropropane	5.00	4.54	4.63	90.8	92.6	58.0-134			1.96	20
1,2-Dichloroethane	5.00	4.52	4.41	90.4	88.2	70.0-128			2.46	20
1,1-Dichloroethene	5.00	5.07	4.79	101	95.8	71.0-124			5.68	20

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

(LCS) R3734249-1 11/26/21 09:33 • (LCSD) R3734249-2 11/26/21 09:54

Analyte	Spike Amount ug/l	LCS Result ug/l	LCSD Result ug/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
cis-1,2-Dichloroethene	5.00	4.77	4.51	95.4	90.2	73.0-120			5.60	20
trans-1,2-Dichloroethene	5.00	5.17	5.18	103	104	73.0-120			0.193	20
1,2-Dichloropropane	5.00	4.70	4.85	94.0	97.0	77.0-125			3.14	20
Ethylbenzene	5.00	4.88	4.95	97.6	99.0	79.0-123			1.42	20
Methylene Chloride	5.00	4.92	4.84	98.4	96.8	67.0-120			1.64	20
1,1,2,2-Tetrachloroethane	5.00	4.92	4.74	98.4	94.8	65.0-130			3.73	20
Tetrachloroethene	5.00	4.58	4.91	91.6	98.2	72.0-132			6.95	20
Toluene	5.00	4.75	4.88	95.0	97.6	79.0-120			2.70	20
Trichloroethene	5.00	4.74	4.29	94.8	85.8	78.0-124			9.97	20
Vinyl chloride	5.00	5.58	5.16	112	103	67.0-131			7.82	20
o-Xylene	5.00	4.74	4.97	94.8	99.4	80.0-122			4.74	20
m&p-Xylenes	10.0	9.81	10.0	98.1	100	80.0-122			1.92	20
(S) Toluene-d8				*115*	*118*	*80.0-120*				
(S) 4-Bromofluorobenzene				*107*	*111*	*77.0-126*				
(S) 1,2-Dichloroethane-d4				*107*	*109*	*70.0-130*				

Method Blank (MB)

(MB) R3734644-2 11/27/21 07:34

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Chloroform	U		0.111	5.00
(S) Toluene-d8	*115*			*80.0-120*
(S) 4-Bromofluorobenzene	*97.8*			*77.0-126*
(S) 1,2-Dichloroethane-d4	*123*			*70.0-130*

Laboratory Control Sample (LCS)

(LCS) R3734644-1 11/27/21 06:50

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Chloroform	5.00	5.04	101	73.0-120	
(S) Toluene-d8			*116*	*80.0-120*	
(S) 4-Bromofluorobenzene			*103*	*77.0-126*	
(S) 1,2-Dichloroethane-d4			*127*	*70.0-130*	

Method Blank (MB)

(MB) R3733822-3 11/22/21 11:26

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	ug/l		ug/l	ug/l
1,4-Dioxane	U		0.597	3.00
(S) Toluene-d8	*99.4*			*77.0-127*

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

(LCS) R3733822-1 11/22/21 10:27 • (LCSD) R3733822-2 11/22/21 10:46

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	ug/l	ug/l	ug/l	%	%	%			%	%
1,4-Dioxane	50.0	48.0	48.1	96.0	96.2	55.0-138			0.208	24
(S) Toluene-d8				*99.4*	*99.0*	*77.0-127*				

L1432929-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1432929-01 11/22/21 15:42 • (MS) R3733822-4 11/22/21 20:00 • (MSD) R3733822-5 11/22/21 20:20

Analyte	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
	ug/l	ug/l	ug/l	ug/l	%	%		%			%	%
1,4-Dioxane	50.0	ND	37.9	36.0	75.8	72.0	1	13.0-160			5.14	31
(S) Toluene-d8					*98.6*	*98.4*		*77.0-127*				

Method Blank (MB)

(MB) R3734342-3 11/25/21 09:05

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
1,4-Dioxane	U		0.597	3.00
(S) Toluene-d8	*90.8*			*77.0-127*

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

(LCS) R3734342-1 11/25/21 08:06 • (LCSD) R3734342-2 11/25/21 08:26

Analyte	Spike Amount ug/l	LCS Result ug/l	LCSD Result ug/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
1,4-Dioxane	50.0	41.5	48.2	83.0	96.4	55.0-138			14.9	24
(S) Toluene-d8				*99.6*	*94.8*	*77.0-127*				

Method Blank (MB)

(MB) R3733580-1 11/23/21 08:32

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Gamma BHC	U		0.0209	0.0500
(S) Decachlorobiphenyl	*96.8*			*10.0-128*
(S) Tetrachloro-m-xylene	*115*			*10.0-127*

Laboratory Control Sample (LCS)

(LCS) R3733580-2 11/23/21 08:41

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Gamma BHC	1.00	1.05	105	55.0-129	
(S) Decachlorobiphenyl			*90.1*	*10.0-128*	
(S) Tetrachloro-m-xylene			*99.0*	*10.0-127*	

L1433026-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1433026-01 11/23/21 11:36 • (MS) R3733580-3 11/23/21 11:45 • (MSD) R3733580-4 11/23/21 11:54

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MSD Result ug/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Gamma BHC	1.00	ND	1.04	0.999	104	99.9	1	14.0-141			4.02	40
(S) Decachlorobiphenyl					*97.0*	*92.5*		*10.0-128*				
(S) Tetrachloro-m-xylene					*101*	*94.8*		*10.0-127*				

Method Blank (MB)

(MB) R3734190-1 11/24/21 10:52

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Gamma BHC	U		0.0209	0.0500
(S) Decachlorobiphenyl	*121*			*10.0-128*
(S) Tetrachloro-m-xylene	*93.1*			*10.0-127*

Laboratory Control Sample (LCS)

(LCS) R3734190-2 11/24/21 11:02

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Gamma BHC	1.00	1.03	103	55.0-129	
(S) Decachlorobiphenyl			*100*	*10.0-128*	
(S) Tetrachloro-m-xylene			*91.0*	*10.0-127*	

L1433272-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1433272-01 11/24/21 11:21 • (MS) R3734190-3 11/24/21 11:31 • (MSD) R3734190-4 11/24/21 11:40

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MSD Result ug/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Gamma BHC	0.910	ND	0.947	0.832	104	91.4	1	14.0-141			12.9	40
(S) Decachlorobiphenyl					*113*	*101*		*10.0-128*				
(S) Tetrachloro-m-xylene					*92.6*	*78.9*		*10.0-127*				

GLOSSARY OF TERMS

Guide to Reading and Understanding Your Laboratory Report

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

Results Disclaimer - Information that may be provided by the customer, and contained within this report, include Permit Limits, Project Name, Sample ID, Sample Matrix, Sample Preservation, Field Blanks, Field Spikes, Field Duplicates, On-Site Data, Sampling Collection Dates/Times, and Sampling Location. Results relate to the accuracy of this information provided, and as the samples are received.

Abbreviations and Definitions

MDL	Method Detection Limit.
ND	Not detected at the Reporting Limit (or MDL where applicable).
RDL	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
(S)	Surrogate (Surrogate Standard) - Analytes added to every blank, sample, Laboratory Control Sample/Duplicate and Matrix Spike/Duplicate; used to evaluate analytical efficiency by measuring recovery. Surrogates are not expected to be detected in all environmental media.
U	Not detected at the Reporting Limit (or MDL where applicable).
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state “ND” (Not Detected) or “BDL” (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Uncertainty (Radiochemistry)	Confidence level of 2 sigma.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

Qualifier	Description
B	The same analyte is found in the associated blank.
J	The identification of the analyte is acceptable; the reported value is an estimate.
J1	Surrogate recovery limits have been exceeded; values are outside upper control limits.

ACCREDITATIONS & LOCATIONS

Pace Analytical National 12065 Lebanon Rd Mount Juliet, TN 37122

Alabama	40660	Nebraska	NE-OS-15-05
Alaska	17-026	Nevada	TN000032021-1
Arizona	AZ0612	New Hampshire	2975
Arkansas	88-0469	New Jersey–NELAP	TN002
California	2932	New Mexico [1]	TN00003
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina [1]	DW21704
Georgia	NELAP	North Carolina [3]	41
Georgia [1]	923	North Dakota	R-140
Idaho	TN00003	Ohio–VAP	CL0069
Illinois	200008	Oklahoma	9915
Indiana	C-TN-01	Oregon	TN200002
Iowa	364	Pennsylvania	68-02979
Kansas	E-10277	Rhode Island	LAO000356
Kentucky [1 6]	KY90010	South Carolina	84004002
Kentucky [2]	16	South Dakota	n/a
Louisiana	AI30792	Tennessee [1 4]	2006
Louisiana	LA018	Texas	T104704245-20-18
Maine	TN00003	Texas [5]	LAB0152
Maryland	324	Utah	TN000032021-11
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	110033
Minnesota	047-999-395	Washington	C847
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	998093910
Montana	CERT0086	Wyoming	A2LA
A2LA – ISO 17025	1461.01	AIHA-LAP,LLC EMLAP	100789
A2LA – ISO 17025 [5]	1461.02	DOD	1461.01
Canada	1461.01	USDA	P330-15-00234
EPA–Crypto	TN00003		

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

* Not all certifications held by the laboratory are applicable to the results reported in the attached report.

* Accreditation is only applicable to the test methods specified on each scope of accreditation held by Pace Analytical.

Company Name/Address:
Resolute Environmental & Water Resources

1003 Weatherstone Parkway

Billing Information:
Accounts Payable
1003 Weatherstone Pkwy., Ste. 320
Woodstock, GA 30188

Pres Chk

Report to:
Tommy Jordan

Email To: **tommy.jordan@resoluteenv.com**

Project Description:
UGA (Milledge Avenue Site) Pre-Injection

City/State Collected: Athens, GA

Please Circle: PT MT CT ET

Phone: **404-358-8469**

Client Project #

Lab Project #
RESENVWGA-MILLEDGE

Collected by (print):
Robert Mull

Site/Facility ID #

P.O. #

Collected by (signature):
Robert B Mull
Immediately Packed on Ice N ___ Y ✓

Rush? (Lab MUST Be Notified)
___ Same Day ___ Five Day
___ Next Day ___ 5 Day (Rad Only)
___ Two Day ___ 10 Day (Rad Only)
___ Three Day Standard ✓

Quote #

Date Results Needed

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	8081 100ml Amb-NoPres	SULFATE 125mlHDPE-NoPres	TOC 250mlHDPE-HCl	V8260LL14D 40mlAmb-HCl	V8260TCL 40mlAmb-HCl					Remarks	Sample # (lab only)
PW-Va	Grab	GW		11/17/21	1049	9	X	X	X	X	X						-01
PW-Vb	Grab	GW		11/17/21	1156	9	X	X	X	X	X						-02
PW-PRBa	Grab	GW		11/17/21	0835	9	X	X	X	X	X						-03
PW-PRBb	Grab	GW		11/17/21	1005	9	X	X	X	X	X						-04
PW-Da	Grab	GW		11/16/21	1510	9	X	X	X	X	X						-05
PW-Db	Grab	GW		11/16/21	1320	9	X	X	X	X	X						-06
PW-Dc	Grab	GW		11/16/21	1435	9	X	X	X	X	X						-07
Trip Blank	—	GW		—	—	1											-08
		GW															
		GW															

Analysis / Container / Preservative

Chain of Custody Page 1 of 1

Pace Analytical®

12065 Lebanon Rd Mount Juliet, TN 37122
Submitting a sample via this chain of custody constitutes acknowledgment and acceptance of the Pace Terms and Conditions found at: https://info.pacelabs.com/hubfs/pas-standard-terms.pdf

SDG # 143192
G243

Acctnum: **RESENVWGA**
Template: **T199232**
Prelogin: **P886760**
PM: **526 - Chris McCord**
PB: BF 11/16/21
Shipped Via: **FedEX Ground**

* Matrix:
SS - Soil **AIR** - Air **F** - Filter
GW - Groundwater **B** - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other_____

Remarks:

pH _____ Temp _____
Flow _____ Other _____

Samples returned via:
__ UPS __ FedEx __ Courier _____

Tracking # 5433 8383 5431

Sample Receipt Checklist
COC Seal Present/Intact: __NP ✓Y __N
COC Signed/Accurate: ✓Y __N
Bottles arrive intact: ✓Y __N
Correct bottles used: ✓Y __N
Sufficient volume sent: ✓Y __N
If Applicable
VOA Zero Headspace: ✓Y __N
Preservation Correct/Checked: __Y __N
RAD Screen <0.5 mR/hr: ✓Y __N

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Trip Blank Received: (Yes) / No (HCl) / MeoH TBR	If preservation required by Login: Date/Time
Robert B Mull	11/17/21	1315			
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Temp: 0.7 +0.4 = 1.1 °C Bottles Received: 13	
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature) Madelle Mc	Date: 11/18/21 Time: 0930	Hold: Condition: NCF / (OK)

ANALYTICAL REPORT

January 06, 2022

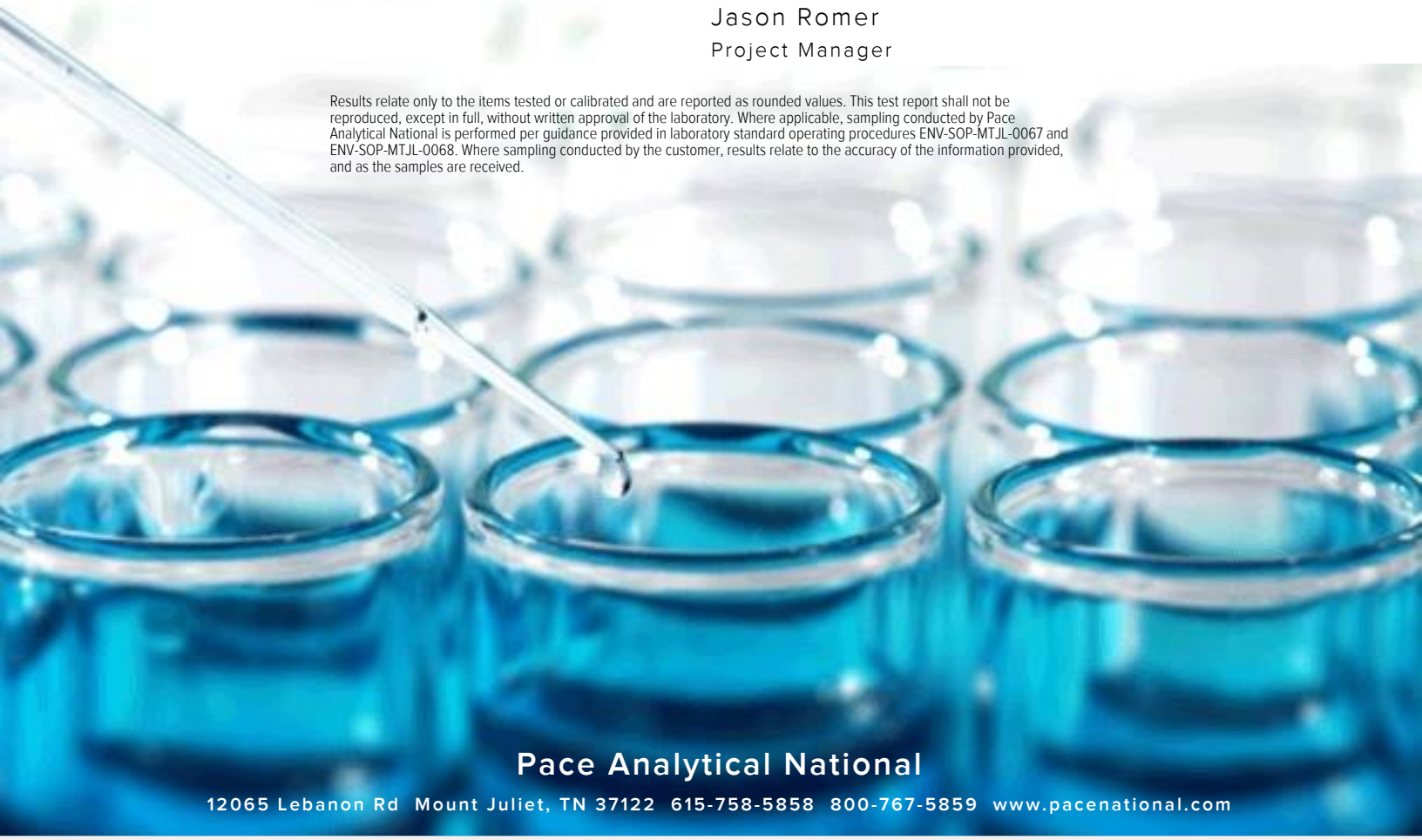
Resolute Environmental & Water Resources

Sample Delivery Group:	L1444886
Samples Received:	12/21/2021
Project Number:	
Description:	UGA (Milledge Avenue Site) PRB Pilot Post Sampling - 1 week
Report To:	Tommy Jordan
	1003 Weatherstone Parkway
	Suite 320
	Woodstock, GA 30188

Entire Report Reviewed By:

Jason Romer
Project Manager

Results relate only to the items tested or calibrated and are reported as rounded values. This test report shall not be reproduced, except in full, without written approval of the laboratory. Where applicable, sampling conducted by Pace Analytical National is performed per guidance provided in laboratory standard operating procedures ENV-SOP-MTJL-0067 and ENV-SOP-MTJL-0068. Where sampling conducted by the customer, results relate to the accuracy of the information provided, and as the samples are received.



Pace Analytical National
12065 Lebanon Rd Mount Juliet, TN 37122 615-758-5858 800-767-5859 www.pacenational.com

TABLE OF CONTENTS

PW-UA L1444886-01 GW

Collected by: Robert Mull | Collected date/time: 12/20/21 11:22 | Received date/time: 12/21/21 10:15

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 9056A	WG1796871	10	01/05/22 12:23	01/05/22 12:23	LBR	Mt. Juliet, TN
Wet Chemistry by Method 9060A	WG1795177	1	12/28/21 08:03	12/28/21 08:03	VRP	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1795041	1	12/27/21 16:57	12/27/21 16:57	JCP	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1795795	20	12/29/21 13:02	12/29/21 13:02	BMB	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B-SIM	WG1793484	1	12/22/21 19:38	12/22/21 19:38	BMB	Mt. Juliet, TN
Pesticides (GC) by Method 8081	WG1794142	1	12/23/21 13:16	12/24/21 15:09	MTJ	Mt. Juliet, TN

PW-UB L1444886-02 GW

Collected by: Robert Mull | Collected date/time: 12/20/21 12:38 | Received date/time: 12/21/21 10:15

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 9056A	WG1796871	10	01/05/22 12:40	01/05/22 12:40	LBR	Mt. Juliet, TN
Wet Chemistry by Method 9060A	WG1795177	1	12/28/21 08:29	12/28/21 08:29	VRP	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1795041	1	12/27/21 17:18	12/27/21 17:18	JCP	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B-SIM	WG1793484	1	12/22/21 19:57	12/22/21 19:57	BMB	Mt. Juliet, TN
Pesticides (GC) by Method 8081	WG1793541	1	12/22/21 21:59	12/23/21 18:48	AMM	Mt. Juliet, TN

PW-PRBB L1444886-03 GW

Collected by: Robert Mull | Collected date/time: 12/20/21 14:48 | Received date/time: 12/21/21 10:15

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 9056A	WG1796871	1	01/04/22 12:35	01/04/22 12:35	LBR	Mt. Juliet, TN
Wet Chemistry by Method 9060A	WG1795177	1	12/28/21 09:50	12/28/21 09:50	VRP	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1795041	1	12/27/21 13:48	12/27/21 13:48	JCP	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B-SIM	WG1793484	1	12/22/21 20:17	12/22/21 20:17	BMB	Mt. Juliet, TN
Pesticides (GC) by Method 8081	WG1793541	1	12/22/21 21:59	12/23/21 18:58	AMM	Mt. Juliet, TN

PW-DA L1444886-04 GW

Collected by: Robert Mull | Collected date/time: 12/20/21 14:45 | Received date/time: 12/21/21 10:15

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 9056A	WG1796871	100	01/05/22 15:12	01/05/22 15:12	LBR	Mt. Juliet, TN
Wet Chemistry by Method 9060A	WG1795177	1	12/28/21 10:16	12/28/21 10:16	VRP	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1795041	1	12/27/21 14:09	12/27/21 14:09	JCP	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B-SIM	WG1793484	1	12/22/21 20:37	12/22/21 20:37	BMB	Mt. Juliet, TN
Pesticides (GC) by Method 8081	WG1793541	1	12/22/21 21:59	12/23/21 19:07	AMM	Mt. Juliet, TN

PW-DB L1444886-05 GW

Collected by: Robert Mull | Collected date/time: 12/20/21 11:50 | Received date/time: 12/21/21 10:15

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 9056A	WG1796871	20	01/05/22 13:13	01/05/22 13:13	LBR	Mt. Juliet, TN
Wet Chemistry by Method 9060A	WG1795177	1	12/28/21 10:43	12/28/21 10:43	VRP	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1795041	1	12/27/21 14:30	12/27/21 14:30	JCP	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B-SIM	WG1793484	1	12/22/21 20:57	12/22/21 20:57	BMB	Mt. Juliet, TN
Pesticides (GC) by Method 8081	WG1793541	1	12/22/21 21:59	12/23/21 19:17	AMM	Mt. Juliet, TN

SAMPLE SUMMARY

PW-DC L1444886-06 GW

Collected by: Robert Mull
Collected date/time: 12/20/21 13:35
Received date/time: 12/21/21 10:15

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 9056A	WG1796871	1	01/04/22 14:43	01/04/22 14:43	LBR	Mt. Juliet, TN
Wet Chemistry by Method 9060A	WG1795178	1	12/28/21 13:50	12/28/21 13:50	GJA	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1795041	1	12/27/21 14:51	12/27/21 14:51	JCP	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B-SIM	WG1795312	1	12/27/21 21:12	12/27/21 21:12	ACG	Mt. Juliet, TN
Pesticides (GC) by Method 8081	WG1793541	1	12/22/21 21:59	12/23/21 19:27	AMM	Mt. Juliet, TN

TRIP BLANK L1444886-07 GW

Collected by: Robert Mull
Collected date/time: 12/20/21 00:00
Received date/time: 12/21/21 10:15

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1796376	1	12/29/21 18:23	12/29/21 18:23	BMB	Mt. Juliet, TN

CASE NARRATIVE

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

Jason Romer
Project Manager

Wet Chemistry by Method 9056A

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Sulfate	301000		50000	10	01/05/2022 12:23	WG1796871

Wet Chemistry by Method 9060A

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
TOC (Total Organic Carbon)	ND		1000	1	12/28/2021 08:03	WG1795177

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Acetone	ND		50.0	1	12/27/2021 16:57	WG1795041
Benzene	ND		1.00	1	12/27/2021 16:57	WG1795041
Carbon tetrachloride	5.90		1.00	1	12/27/2021 16:57	WG1795041
Chlorobenzene	ND		1.00	1	12/27/2021 16:57	WG1795041
Chloroethane	ND		5.00	1	12/27/2021 16:57	WG1795041
Chloroform	380		100	20	12/29/2021 13:02	WG1795795
1,2-Dibromo-3-Chloropropane	ND		5.00	1	12/27/2021 16:57	WG1795041
1,2-Dichloroethane	ND		1.00	1	12/27/2021 16:57	WG1795041
1,1-Dichloroethene	ND		1.00	1	12/27/2021 16:57	WG1795041
cis-1,2-Dichloroethene	ND		1.00	1	12/27/2021 16:57	WG1795041
trans-1,2-Dichloroethene	ND		1.00	1	12/27/2021 16:57	WG1795041
1,2-Dichloropropane	ND		1.00	1	12/27/2021 16:57	WG1795041
Ethylbenzene	ND		1.00	1	12/27/2021 16:57	WG1795041
Methylene Chloride	ND		5.00	1	12/27/2021 16:57	WG1795041
1,1,2,2-Tetrachloroethane	1.26		1.00	1	12/27/2021 16:57	WG1795041
Tetrachloroethene	1.22		1.00	1	12/27/2021 16:57	WG1795041
Toluene	ND		1.00	1	12/27/2021 16:57	WG1795041
Trichloroethene	ND		1.00	1	12/27/2021 16:57	WG1795041
Vinyl chloride	ND		1.00	1	12/27/2021 16:57	WG1795041
o-Xylene	ND		1.00	1	12/27/2021 16:57	WG1795041
m&p-Xylene	ND		2.00	1	12/27/2021 16:57	WG1795041
(S) Toluene-d8	*101*		*80.0-120*		*12/27/2021 16:57*	WG1795041
(S) Toluene-d8	*100*		*80.0-120*		*12/29/2021 13:02*	WG1795795
(S) 4-Bromofluorobenzene	*102*		*77.0-126*		*12/27/2021 16:57*	WG1795041
(S) 4-Bromofluorobenzene	*92.4*		*77.0-126*		*12/29/2021 13:02*	WG1795795
(S) 1,2-Dichloroethane-d4	*137*	J1	*70.0-130*		*12/27/2021 16:57*	WG1795041
(S) 1,2-Dichloroethane-d4	*94.9*		*70.0-130*		*12/29/2021 13:02*	WG1795795

Volatile Organic Compounds (GC/MS) by Method 8260B-SIM

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
1,4-Dioxane	25.8		3.00	1	12/22/2021 19:38	WG1793484
(S) Toluene-d8	*96.8*		*77.0-127*		*12/22/2021 19:38*	WG1793484

Pesticides (GC) by Method 8081

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Gamma BHC	ND		0.0500	1	12/24/2021 15:09	WG1794142
(S) Decachlorobiphenyl	*69.2*		*10.0-128*		*12/24/2021 15:09*	WG1794142
(S) Tetrachloro-m-xylene	*83.9*		*10.0-127*		*12/24/2021 15:09*	WG1794142

Wet Chemistry by Method 9056A

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Sulfate	672000		50000	10	01/05/2022 12:40	WG1796871

Wet Chemistry by Method 9060A

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
TOC (Total Organic Carbon)	ND		1000	1	12/28/2021 08:29	WG1795177

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Acetone	ND		50.0	1	12/27/2021 17:18	WG1795041
Benzene	ND		1.00	1	12/27/2021 17:18	WG1795041
Carbon tetrachloride	ND		1.00	1	12/27/2021 17:18	WG1795041
Chlorobenzene	ND		1.00	1	12/27/2021 17:18	WG1795041
Chloroethane	ND		5.00	1	12/27/2021 17:18	WG1795041
Chloroform	22.3		5.00	1	12/27/2021 17:18	WG1795041
1,2-Dibromo-3-Chloropropane	ND		5.00	1	12/27/2021 17:18	WG1795041
1,2-Dichloroethane	ND		1.00	1	12/27/2021 17:18	WG1795041
1,1-Dichloroethene	ND		1.00	1	12/27/2021 17:18	WG1795041
cis-1,2-Dichloroethene	ND		1.00	1	12/27/2021 17:18	WG1795041
trans-1,2-Dichloroethene	ND		1.00	1	12/27/2021 17:18	WG1795041
1,2-Dichloropropane	ND		1.00	1	12/27/2021 17:18	WG1795041
Ethylbenzene	ND		1.00	1	12/27/2021 17:18	WG1795041
Methylene Chloride	ND		5.00	1	12/27/2021 17:18	WG1795041
1,1,2,2-Tetrachloroethane	ND		1.00	1	12/27/2021 17:18	WG1795041
Tetrachloroethene	ND		1.00	1	12/27/2021 17:18	WG1795041
Toluene	ND		1.00	1	12/27/2021 17:18	WG1795041
Trichloroethene	ND		1.00	1	12/27/2021 17:18	WG1795041
Vinyl chloride	ND		1.00	1	12/27/2021 17:18	WG1795041
o-Xylene	ND		1.00	1	12/27/2021 17:18	WG1795041
m&p-Xylene	ND		2.00	1	12/27/2021 17:18	WG1795041
(S) Toluene-d8	*106*		*80.0-120*		*12/27/2021 17:18*	WG1795041
(S) 4-Bromofluorobenzene	*98.3*		*77.0-126*		*12/27/2021 17:18*	WG1795041
(S) 1,2-Dichloroethane-d4	*133*	J1	*70.0-130*		*12/27/2021 17:18*	WG1795041

Volatile Organic Compounds (GC/MS) by Method 8260B-SIM

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
1,4-Dioxane	9.69		3.00	1	12/22/2021 19:57	WG1793484
(S) Toluene-d8	*97.3*		*77.0-127*		*12/22/2021 19:57*	WG1793484

Pesticides (GC) by Method 8081

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Gamma BHC	ND		0.0500	1	12/23/2021 18:48	WG1793541
(S) Decachlorobiphenyl	*63.2*		*10.0-128*		*12/23/2021 18:48*	WG1793541
(S) Tetrachloro-m-xylene	*64.6*		*10.0-127*		*12/23/2021 18:48*	WG1793541

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	ug/l		ug/l		date / time	
Sulfate	44800		5000	1	01/04/2022 12:35	WG1796871

Wet Chemistry by Method 9060A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	ug/l		ug/l		date / time	
TOC (Total Organic Carbon)	ND		1000	1	12/28/2021 09:50	WG1795177

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	ug/l		ug/l		date / time	
Acetone	ND		50.0	1	12/27/2021 13:48	WG1795041
Benzene	ND		1.00	1	12/27/2021 13:48	WG1795041
Carbon tetrachloride	ND		1.00	1	12/27/2021 13:48	WG1795041
Chlorobenzene	ND		1.00	1	12/27/2021 13:48	WG1795041
Chloroethane	ND		5.00	1	12/27/2021 13:48	WG1795041
Chloroform	9.45		5.00	1	12/27/2021 13:48	WG1795041
1,2-Dibromo-3-Chloropropane	ND		5.00	1	12/27/2021 13:48	WG1795041
1,2-Dichloroethane	1.88		1.00	1	12/27/2021 13:48	WG1795041
1,1-Dichloroethene	ND		1.00	1	12/27/2021 13:48	WG1795041
cis-1,2-Dichloroethene	ND		1.00	1	12/27/2021 13:48	WG1795041
trans-1,2-Dichloroethene	2.74		1.00	1	12/27/2021 13:48	WG1795041
1,2-Dichloropropane	ND		1.00	1	12/27/2021 13:48	WG1795041
Ethylbenzene	ND		1.00	1	12/27/2021 13:48	WG1795041
Methylene Chloride	ND		5.00	1	12/27/2021 13:48	WG1795041
1,1,2,2-Tetrachloroethane	21.9		1.00	1	12/27/2021 13:48	WG1795041
Tetrachloroethene	4.99		1.00	1	12/27/2021 13:48	WG1795041
Toluene	ND		1.00	1	12/27/2021 13:48	WG1795041
Trichloroethene	4.65		1.00	1	12/27/2021 13:48	WG1795041
Vinyl chloride	ND		1.00	1	12/27/2021 13:48	WG1795041
o-Xylene	ND		1.00	1	12/27/2021 13:48	WG1795041
m&p-Xylene	ND		2.00	1	12/27/2021 13:48	WG1795041
(S) Toluene-d8	*119*		*80.0-120*		*12/27/2021 13:48*	WG1795041
(S) 4-Bromofluorobenzene	*102*		*77.0-126*		*12/27/2021 13:48*	WG1795041
(S) 1,2-Dichloroethane-d4	*133*	J1	*70.0-130*		*12/27/2021 13:48*	WG1795041

Volatile Organic Compounds (GC/MS) by Method 8260B-SIM

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	ug/l		ug/l		date / time	
1,4-Dioxane	131		3.00	1	12/22/2021 20:17	WG1793484
(S) Toluene-d8	*98.3*		*77.0-127*		*12/22/2021 20:17*	WG1793484

Pesticides (GC) by Method 8081

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	ug/l		ug/l		date / time	
Gamma BHC	ND		0.0500	1	12/23/2021 18:58	WG1793541
(S) Decachlorobiphenyl	*73.3*		*10.0-128*		*12/23/2021 18:58*	WG1793541
(S) Tetrachloro-m-xylene	*71.1*		*10.0-127*		*12/23/2021 18:58*	WG1793541

Wet Chemistry by Method 9056A

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Sulfate	776000		500000	100	01/05/2022 15:12	WG1796871

Wet Chemistry by Method 9060A

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
TOC (Total Organic Carbon)	ND		1000	1	12/28/2021 10:16	WG1795177

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Acetone	ND		50.0	1	12/27/2021 14:09	WG1795041
Benzene	ND		1.00	1	12/27/2021 14:09	WG1795041
Carbon tetrachloride	ND		1.00	1	12/27/2021 14:09	WG1795041
Chlorobenzene	ND		1.00	1	12/27/2021 14:09	WG1795041
Chloroethane	ND		5.00	1	12/27/2021 14:09	WG1795041
Chloroform	153		5.00	1	12/27/2021 14:09	WG1795041
1,2-Dibromo-3-Chloropropane	ND		5.00	1	12/27/2021 14:09	WG1795041
1,2-Dichloroethane	ND		1.00	1	12/27/2021 14:09	WG1795041
1,1-Dichloroethene	ND		1.00	1	12/27/2021 14:09	WG1795041
cis-1,2-Dichloroethene	ND		1.00	1	12/27/2021 14:09	WG1795041
trans-1,2-Dichloroethene	ND		1.00	1	12/27/2021 14:09	WG1795041
1,2-Dichloropropane	ND		1.00	1	12/27/2021 14:09	WG1795041
Ethylbenzene	ND		1.00	1	12/27/2021 14:09	WG1795041
Methylene Chloride	ND		5.00	1	12/27/2021 14:09	WG1795041
1,1,2,2-Tetrachloroethane	1.50		1.00	1	12/27/2021 14:09	WG1795041
Tetrachloroethene	ND		1.00	1	12/27/2021 14:09	WG1795041
Toluene	ND		1.00	1	12/27/2021 14:09	WG1795041
Trichloroethene	ND		1.00	1	12/27/2021 14:09	WG1795041
Vinyl chloride	ND		1.00	1	12/27/2021 14:09	WG1795041
o-Xylene	ND		1.00	1	12/27/2021 14:09	WG1795041
m&p-Xylene	ND		2.00	1	12/27/2021 14:09	WG1795041
(S) Toluene-d8	*94.6*		*80.0-120*		*12/27/2021 14:09*	WG1795041
(S) 4-Bromofluorobenzene	*98.7*		*77.0-126*		*12/27/2021 14:09*	WG1795041
(S) 1,2-Dichloroethane-d4	*132*	J1	*70.0-130*		*12/27/2021 14:09*	WG1795041

Volatile Organic Compounds (GC/MS) by Method 8260B-SIM

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
1,4-Dioxane	ND		3.00	1	12/22/2021 20:37	WG1793484
(S) Toluene-d8	*89.4*		*77.0-127*		*12/22/2021 20:37*	WG1793484

Pesticides (GC) by Method 8081

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Gamma BHC	ND		0.0500	1	12/23/2021 19:07	WG1793541
(S) Decachlorobiphenyl	*62.9*		*10.0-128*		*12/23/2021 19:07*	WG1793541
(S) Tetrachloro-m-xylene	*67.0*		*10.0-127*		*12/23/2021 19:07*	WG1793541

Wet Chemistry by Method 9056A

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Sulfate	1310000		100000	20	01/05/2022 13:13	WG1796871

Wet Chemistry by Method 9060A

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
TOC (Total Organic Carbon)	ND		1000	1	12/28/2021 10:43	WG1795177

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Acetone	ND		50.0	1	12/27/2021 14:30	WG1795041
Benzene	ND		1.00	1	12/27/2021 14:30	WG1795041
Carbon tetrachloride	ND		1.00	1	12/27/2021 14:30	WG1795041
Chlorobenzene	ND		1.00	1	12/27/2021 14:30	WG1795041
Chloroethane	ND		5.00	1	12/27/2021 14:30	WG1795041
Chloroform	ND		5.00	1	12/27/2021 14:30	WG1795041
1,2-Dibromo-3-Chloropropane	ND		5.00	1	12/27/2021 14:30	WG1795041
1,2-Dichloroethane	1.32		1.00	1	12/27/2021 14:30	WG1795041
1,1-Dichloroethene	ND		1.00	1	12/27/2021 14:30	WG1795041
cis-1,2-Dichloroethene	ND		1.00	1	12/27/2021 14:30	WG1795041
trans-1,2-Dichloroethene	ND		1.00	1	12/27/2021 14:30	WG1795041
1,2-Dichloropropane	ND		1.00	1	12/27/2021 14:30	WG1795041
Ethylbenzene	ND		1.00	1	12/27/2021 14:30	WG1795041
Methylene Chloride	ND		5.00	1	12/27/2021 14:30	WG1795041
1,1,2,2-Tetrachloroethane	18.5		1.00	1	12/27/2021 14:30	WG1795041
Tetrachloroethene	1.78		1.00	1	12/27/2021 14:30	WG1795041
Toluene	ND		1.00	1	12/27/2021 14:30	WG1795041
Trichloroethene	ND		1.00	1	12/27/2021 14:30	WG1795041
Vinyl chloride	ND		1.00	1	12/27/2021 14:30	WG1795041
o-Xylene	ND		1.00	1	12/27/2021 14:30	WG1795041
m&p-Xylene	ND		2.00	1	12/27/2021 14:30	WG1795041
(S) Toluene-d8	*108*		*80.0-120*		*12/27/2021 14:30*	WG1795041
(S) 4-Bromofluorobenzene	*101*		*77.0-126*		*12/27/2021 14:30*	WG1795041
(S) 1,2-Dichloroethane-d4	*134*	J1	*70.0-130*		*12/27/2021 14:30*	WG1795041

Volatile Organic Compounds (GC/MS) by Method 8260B-SIM

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
1,4-Dioxane	114		3.00	1	12/22/2021 20:57	WG1793484
(S) Toluene-d8	*98.3*		*77.0-127*		*12/22/2021 20:57*	WG1793484

Pesticides (GC) by Method 8081

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Gamma BHC	ND		0.0500	1	12/23/2021 19:17	WG1793541
(S) Decachlorobiphenyl	*42.4*		*10.0-128*		*12/23/2021 19:17*	WG1793541
(S) Tetrachloro-m-xylene	*71.4*		*10.0-127*		*12/23/2021 19:17*	WG1793541

Wet Chemistry by Method 9056A

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Sulfate	54300		5000	1	01/04/2022 14:43	WG1796871

Wet Chemistry by Method 9060A

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
TOC (Total Organic Carbon)	ND		1000	1	12/28/2021 13:50	WG1795178

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Acetone	ND		50.0	1	12/27/2021 14:51	WG1795041
Benzene	ND		1.00	1	12/27/2021 14:51	WG1795041
Carbon tetrachloride	ND		1.00	1	12/27/2021 14:51	WG1795041
Chlorobenzene	ND		1.00	1	12/27/2021 14:51	WG1795041
Chloroethane	ND		5.00	1	12/27/2021 14:51	WG1795041
Chloroform	18.3		5.00	1	12/27/2021 14:51	WG1795041
1,2-Dibromo-3-Chloropropane	ND		5.00	1	12/27/2021 14:51	WG1795041
1,2-Dichloroethane	ND		1.00	1	12/27/2021 14:51	WG1795041
1,1-Dichloroethene	ND		1.00	1	12/27/2021 14:51	WG1795041
cis-1,2-Dichloroethene	ND		1.00	1	12/27/2021 14:51	WG1795041
trans-1,2-Dichloroethene	ND		1.00	1	12/27/2021 14:51	WG1795041
1,2-Dichloropropane	ND		1.00	1	12/27/2021 14:51	WG1795041
Ethylbenzene	ND		1.00	1	12/27/2021 14:51	WG1795041
Methylene Chloride	ND		5.00	1	12/27/2021 14:51	WG1795041
1,1,2,2-Tetrachloroethane	1.28		1.00	1	12/27/2021 14:51	WG1795041
Tetrachloroethene	ND		1.00	1	12/27/2021 14:51	WG1795041
Toluene	ND		1.00	1	12/27/2021 14:51	WG1795041
Trichloroethene	ND		1.00	1	12/27/2021 14:51	WG1795041
Vinyl chloride	ND		1.00	1	12/27/2021 14:51	WG1795041
o-Xylene	ND		1.00	1	12/27/2021 14:51	WG1795041
m&p-Xylene	ND		2.00	1	12/27/2021 14:51	WG1795041
(S) Toluene-d8	*104*		*80.0-120*		*12/27/2021 14:51*	WG1795041
(S) 4-Bromofluorobenzene	*100*		*77.0-126*		*12/27/2021 14:51*	WG1795041
(S) 1,2-Dichloroethane-d4	*133*	J1	*70.0-130*		*12/27/2021 14:51*	WG1795041

Volatile Organic Compounds (GC/MS) by Method 8260B-SIM

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
1,4-Dioxane	4.68		3.00	1	12/27/2021 21:12	WG1795312
(S) Toluene-d8	*98.8*		*77.0-127*		*12/27/2021 21:12*	WG1795312

Pesticides (GC) by Method 8081

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Gamma BHC	ND		0.0500	1	12/23/2021 19:27	WG1793541
(S) Decachlorobiphenyl	*76.0*		*10.0-128*		*12/23/2021 19:27*	WG1793541
(S) Tetrachloro-m-xylene	*69.0*		*10.0-127*		*12/23/2021 19:27*	WG1793541

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Acetone	ND		50.0	1	12/29/2021 18:23	WG1796376
Benzene	ND		1.00	1	12/29/2021 18:23	WG1796376
Carbon tetrachloride	ND		1.00	1	12/29/2021 18:23	WG1796376
Chlorobenzene	ND		1.00	1	12/29/2021 18:23	WG1796376
Chloroethane	ND		5.00	1	12/29/2021 18:23	WG1796376
Chloroform	ND		5.00	1	12/29/2021 18:23	WG1796376
1,2-Dibromo-3-Chloropropane	ND		5.00	1	12/29/2021 18:23	WG1796376
1,2-Dichloroethane	ND		1.00	1	12/29/2021 18:23	WG1796376
1,1-Dichloroethene	ND		1.00	1	12/29/2021 18:23	WG1796376
cis-1,2-Dichloroethene	ND		1.00	1	12/29/2021 18:23	WG1796376
trans-1,2-Dichloroethene	ND		1.00	1	12/29/2021 18:23	WG1796376
1,2-Dichloropropane	ND		1.00	1	12/29/2021 18:23	WG1796376
Ethylbenzene	ND		1.00	1	12/29/2021 18:23	WG1796376
Methylene Chloride	ND		5.00	1	12/29/2021 18:23	WG1796376
1,1,2,2-Tetrachloroethane	ND		1.00	1	12/29/2021 18:23	WG1796376
Tetrachloroethene	ND		1.00	1	12/29/2021 18:23	WG1796376
Toluene	ND		1.00	1	12/29/2021 18:23	WG1796376
Trichloroethene	ND		1.00	1	12/29/2021 18:23	WG1796376
Vinyl chloride	ND		1.00	1	12/29/2021 18:23	WG1796376
o-Xylene	ND		1.00	1	12/29/2021 18:23	WG1796376
m&p-Xylene	ND		2.00	1	12/29/2021 18:23	WG1796376
(S) Toluene-d8	*99.3*		*80.0-120*		*12/29/2021 18:23*	WG1796376
(S) 4-Bromofluorobenzene	*97.8*		*77.0-126*		*12/29/2021 18:23*	WG1796376
(S) 1,2-Dichloroethane-d4	*91.1*		*70.0-130*		*12/29/2021 18:23*	WG1796376

Method Blank (MB)

(MB) R3747715-1 01/04/22 07:23

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Sulfate	U		594	5000

L1444886-03 Original Sample (OS) • Duplicate (DUP)

(OS) L1444886-03 01/04/22 12:35 • (DUP) R3747715-3 01/04/22 12:51

Analyte	Original Result ug/l	DUP Result ug/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Sulfate	44800	43900	1	1.99		15

L1445097-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1445097-01 01/04/22 14:59 • (DUP) R3747715-6 01/04/22 15:15

Analyte	Original Result ug/l	DUP Result ug/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Sulfate	86000	84900	1	1.25		15

Laboratory Control Sample (LCS)

(LCS) R3747715-2 01/04/22 07:39

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Sulfate	40000	41100	103	80.0-120	

L1444886-03 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1444886-03 01/04/22 12:35 • (MS) R3747715-4 01/04/22 13:07 • (MSD) R3747715-5 01/04/22 13:55

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MSD Result ug/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Sulfate	50000	44800	92900	92000	96.2	94.5	1	80.0-120			0.925	15

L1445097-01 Original Sample (OS) • Matrix Spike (MS)

(OS) L1445097-01 01/04/22 14:59 • (MS) R3747715-7 01/04/22 15:30

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Sulfate	50000	86000	130000	88.6	1	80.0-120	E

Method Blank (MB)

(MB) R3745418-2 12/27/21 18:39

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
TOC (Total Organic Carbon)	U		102	1000

L1444413-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1444413-01 12/28/21 02:53 • (DUP) R3745418-5 12/28/21 03:25

Analyte	Original Result ug/l	DUP Result ug/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
TOC	1620	1320	1	20.5	P1	20

L1444784-04 Original Sample (OS) • Duplicate (DUP)

(OS) L1444784-04 12/28/21 05:30 • (DUP) R3745418-6 12/28/21 05:57

Analyte	Original Result ug/l	DUP Result ug/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
TOC	1170	1140	1	2.18		20

Laboratory Control Sample (LCS)

(LCS) R3745418-1 12/27/21 18:12

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
TOC	75000	73000	97.4	85.0-115	

L1444256-11 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1444256-11 12/27/21 21:24 • (MS) R3745418-3 12/27/21 21:55 • (MSD) R3745418-4 12/27/21 22:36

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MSD Result ug/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
TOC	50000	4920	50800	55700	91.7	102	1	80.0-120			9.28	20

L1444886-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1444886-02 12/28/21 08:29 • (MS) R3745418-7 12/28/21 08:56 • (MSD) R3745418-8 12/28/21 09:23

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MSD Result ug/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
TOC	50000	ND	50800	51100	101	101	1	80.0-120			0.462	20

Method Blank (MB)

(MB) R3745782-2 12/28/21 11:47

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
TOC (Total Organic Carbon)	242	J	102	1000

L1444886-06 Original Sample (OS) • Duplicate (DUP)

(OS) L1444886-06 12/28/21 13:50 • (DUP) R3745782-3 12/28/21 14:02

Analyte	Original Result ug/l	DUP Result ug/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
TOC (Total Organic Carbon)	ND	ND	1	5.14		20

L1445084-07 Original Sample (OS) • Duplicate (DUP)

(OS) L1445084-07 12/28/21 18:41 • (DUP) R3745782-8 12/28/21 19:23

Analyte	Original Result ug/l	DUP Result ug/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
TOC (Total Organic Carbon)	ND	ND	1	0.000		20

Laboratory Control Sample (LCS)

(LCS) R3745782-1 12/28/21 11:32

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
TOC (Total Organic Carbon)	75000	74900	99.9	85.0-115	

L1444981-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1444981-02 12/28/21 14:42 • (MS) R3745782-4 12/28/21 15:00 • (MSD) R3745782-5 12/28/21 15:18

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MSD Result ug/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
TOC (Total Organic Carbon)	50000	ND	53400	53000	105	104	1	80.0-120			0.808	20

L1445084-03 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1445084-03 12/28/21 17:04 • (MS) R3745782-6 12/28/21 17:23 • (MSD) R3745782-7 12/28/21 17:42

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MSD Result ug/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
TOC (Total Organic Carbon)	50000	19800	72300	73400	105	107	1	80.0-120			1.43	20

Method Blank (MB)

(MB) R3745666-3 12/27/21 08:02

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Acetone	U		11.3	50.0
Benzene	U		0.0941	1.00
Carbon tetrachloride	U		0.128	1.00
Chlorobenzene	U		0.116	1.00
Chloroethane	U		0.192	5.00
Chloroform	U		0.111	5.00
1,2-Dibromo-3-Chloropropane	U		0.276	5.00
1,2-Dichloroethane	U		0.0819	1.00
1,1-Dichloroethene	U		0.188	1.00
cis-1,2-Dichloroethene	U		0.126	1.00
trans-1,2-Dichloroethene	U		0.149	1.00
1,2-Dichloropropane	U		0.149	1.00
Ethylbenzene	U		0.137	1.00
Methylene Chloride	U		0.430	5.00
1,1,2,2-Tetrachloroethane	U		0.133	1.00
Tetrachloroethene	U		0.300	1.00
Toluene	U		0.278	1.00
Trichloroethene	U		0.190	1.00
Vinyl chloride	U		0.234	1.00
o-Xylene	U		0.174	1.00
m&p-Xylenes	U		0.430	2.00
(S) Toluene-d8	*118*			*80.0-120*
(S) 4-Bromofluorobenzene	*97.4*			*77.0-126*
(S) 1,2-Dichloroethane-d4	*128*			*70.0-130*

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

(LCS) R3745666-1 12/27/21 06:59 • (LCSD) R3745666-2 12/27/21 07:20

Analyte	Spike Amount ug/l	LCS Result ug/l	LCSD Result ug/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Acetone	25.0	25.5	29.7	102	119	19.0-160			15.2	27
Benzene	5.00	4.91	5.24	98.2	105	70.0-123			6.50	20
Carbon tetrachloride	5.00	4.76	5.17	95.2	103	68.0-126			8.26	20
Chlorobenzene	5.00	4.49	4.85	89.8	97.0	80.0-121			7.71	20
Chloroethane	5.00	6.32	7.21	126	144	47.0-150			13.2	20
Chloroform	5.00	5.01	5.44	100	109	73.0-120			8.23	20
1,2-Dibromo-3-Chloropropane	5.00	4.06	4.41	81.2	88.2	58.0-134			8.26	20
1,2-Dichloroethane	5.00	4.87	5.11	97.4	102	70.0-128			4.81	20
1,1-Dichloroethene	5.00	4.57	4.79	91.4	95.8	71.0-124			4.70	20

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

(LCS) R3745666-1 12/27/21 06:59 • (LCSD) R3745666-2 12/27/21 07:20

Analyte	Spike Amount ug/l	LCS Result ug/l	LCSD Result ug/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
cis-1,2-Dichloroethene	5.00	4.58	4.79	91.6	95.8	73.0-120			4.48	20
trans-1,2-Dichloroethene	5.00	4.83	5.11	96.6	102	73.0-120			5.63	20
1,2-Dichloropropane	5.00	4.98	5.10	99.6	102	77.0-125			2.38	20
Ethylbenzene	5.00	4.53	4.89	90.6	97.8	79.0-123			7.64	20
Methylene Chloride	5.00	4.93	5.08	98.6	102	67.0-120			3.00	20
1,1,2,2-Tetrachloroethane	5.00	4.55	4.90	91.0	98.0	65.0-130			7.41	20
Tetrachloroethene	5.00	4.73	4.93	94.6	98.6	72.0-132			4.14	20
Toluene	5.00	4.75	5.06	95.0	101	79.0-120			6.32	20
Trichloroethene	5.00	4.83	5.03	96.6	101	78.0-124			4.06	20
Vinyl chloride	5.00	5.10	5.60	102	112	67.0-131			9.35	20
o-Xylene	5.00	4.37	4.80	87.4	96.0	80.0-122			9.38	20
m&p-Xylenes	10.0	9.44	10.1	94.4	101	80.0-122			6.76	20
(S) Toluene-d8				*117*	*118*	*80.0-120*				
(S) 4-Bromofluorobenzene				*101*	*104*	*77.0-126*				
(S) 1,2-Dichloroethane-d4				*122*	*127*	*70.0-130*				

L1444854-05 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1444854-05 12/27/21 12:03 • (MS) R3745666-4 12/27/21 17:39 • (MSD) R3745666-5 12/27/21 18:00

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MSD Result ug/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Acetone	25.0	ND	ND	ND	133	129	1	10.0-160			2.75	35
Benzene	5.00	ND	6.27	6.43	125	129	1	17.0-158			2.52	27
Carbon tetrachloride	5.00	ND	7.31	7.30	146	146	1	23.0-159			0.137	28
Chlorobenzene	5.00	ND	5.98	5.81	120	116	1	33.0-152			2.88	27
Chloroethane	5.00	ND	9.31	9.35	186	187	1	10.0-160	J5	J5	0.429	30
Chloroform	5.00	8.85	16.2	15.4	147	131	1	29.0-154			5.06	28
1,2-Dibromo-3-Chloropropane	5.00	ND	5.07	ND	101	99.0	1	22.0-151			2.40	34
1,2-Dichloroethane	5.00	ND	6.33	6.50	127	130	1	29.0-151			2.65	27
1,1-Dichloroethene	5.00	ND	6.04	6.74	121	135	1	11.0-160			11.0	29
cis-1,2-Dichloroethene	5.00	ND	6.40	6.05	128	121	1	10.0-160			5.62	27
trans-1,2-Dichloroethene	5.00	ND	6.31	6.86	126	137	1	17.0-153			8.35	27
1,2-Dichloropropane	5.00	ND	6.03	6.36	121	127	1	30.0-156			5.33	27
Ethylbenzene	5.00	ND	5.68	6.05	114	121	1	30.0-155			6.31	27
Methylene Chloride	5.00	ND	6.39	6.14	128	123	1	23.0-144			3.99	28
1,1,2,2-Tetrachloroethane	5.00	ND	6.28	6.24	126	125	1	33.0-150			0.639	28
Tetrachloroethene	5.00	ND	6.08	6.09	122	122	1	10.0-160			0.164	27
Toluene	5.00	ND	6.16	6.21	123	124	1	26.0-154			0.808	28
Trichloroethene	5.00	ND	5.95	6.27	119	125	1	10.0-160			5.24	25

L1444854-05 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1444854-05 12/27/21 12:03 • (MS) R3745666-4 12/27/21 17:39 • (MSD) R3745666-5 12/27/21 18:00

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MSD Result ug/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Vinyl chloride	5.00	ND	7.27	7.59	145	152	1	10.0-160			4.31	27
o-Xylene	5.00	ND	5.24	5.67	105	113	1	45.0-144			7.88	26
m&p-Xylenes	10.0	ND	10.9	11.6	109	116	1	43.0-146			6.22	26
(S) Toluene-d8					*110*	*108*		*80.0-120*				
(S) 4-Bromofluorobenzene					*100*	*103*		*77.0-126*				
(S) 1,2-Dichloroethane-d4					*132*	*131*		*70.0-130*	J1	J1		

Method Blank (MB)

(MB) R3746153-3 12/29/21 11:14

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Chloroform	U		0.111	5.00
(S) Toluene-d8	*108*			*80.0-120*
(S) 4-Bromofluorobenzene	*97.2*			*77.0-126*
(S) 1,2-Dichloroethane-d4	*92.5*			*70.0-130*

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

(LCS) R3746153-1 12/29/21 10:09 • (LCSD) R3746153-2 12/29/21 10:31

Analyte	Spike Amount ug/l	LCS Result ug/l	LCSD Result ug/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Chloroform	5.00	5.06	4.88	101	97.6	73.0-120			3.62	20
(S) Toluene-d8				*102*	*98.2*	*80.0-120*				
(S) 4-Bromofluorobenzene				*94.1*	*94.5*	*77.0-126*				
(S) 1,2-Dichloroethane-d4				*92.8*	*93.5*	*70.0-130*				

Method Blank (MB)

(MB) R3746143-2 12/29/21 14:21

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Acetone	U		11.3	50.0
Benzene	U		0.0941	1.00
Carbon tetrachloride	U		0.128	1.00
Chlorobenzene	U		0.116	1.00
Chloroethane	U		0.192	5.00
Chloroform	U		0.111	5.00
1,2-Dibromo-3-Chloropropane	U		0.276	5.00
1,2-Dichloroethane	U		0.0819	1.00
1,1-Dichloroethene	U		0.188	1.00
cis-1,2-Dichloroethene	U		0.126	1.00
trans-1,2-Dichloroethene	U		0.149	1.00
1,2-Dichloropropane	U		0.149	1.00
Ethylbenzene	U		0.137	1.00
Methylene Chloride	U		0.430	5.00
1,1,2,2-Tetrachloroethane	U		0.133	1.00
Tetrachloroethene	U		0.300	1.00
Toluene	U		0.278	1.00
Trichloroethene	U		0.190	1.00
Vinyl chloride	U		0.234	1.00
o-Xylene	U		0.174	1.00
m&p-Xylenes	U		0.430	2.00
(S) Toluene-d8	*95.0*			*80.0-120*
(S) 4-Bromofluorobenzene	*102*			*77.0-126*
(S) 1,2-Dichloroethane-d4	*96.9*			*70.0-130*

Laboratory Control Sample (LCS)

(LCS) R3746143-1 12/29/21 13:43

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Acetone	25.0	25.0	100	19.0-160	
Benzene	5.00	4.90	98.0	70.0-123	
Carbon tetrachloride	5.00	5.84	117	68.0-126	
Chlorobenzene	5.00	4.83	96.6	80.0-121	
Chloroethane	5.00	5.50	110	47.0-150	
Chloroform	5.00	5.48	110	73.0-120	
1,2-Dibromo-3-Chloropropane	5.00	4.58	91.6	58.0-134	
1,2-Dichloroethane	5.00	4.97	99.4	70.0-128	
1,1-Dichloroethene	5.00	5.59	112	71.0-124	

Laboratory Control Sample (LCS)

(LCS) R3746143-1 12/29/21 13:43

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
cis-1,2-Dichloroethene	5.00	5.83	117	73.0-120	
trans-1,2-Dichloroethene	5.00	6.02	120	73.0-120	
1,2-Dichloropropane	5.00	4.71	94.2	77.0-125	
Ethylbenzene	5.00	4.74	94.8	79.0-123	
Methylene Chloride	5.00	5.81	116	67.0-120	
1,1,2,2-Tetrachloroethane	5.00	4.86	97.2	65.0-130	
Tetrachloroethene	5.00	4.69	93.8	72.0-132	
Toluene	5.00	4.50	90.0	79.0-120	
Trichloroethene	5.00	5.21	104	78.0-124	
Vinyl chloride	5.00	5.15	103	67.0-131	
o-Xylene	5.00	5.23	105	80.0-122	
m&p-Xylenes	10.0	9.65	96.5	80.0-122	
(S) Toluene-d8			*92.4*	*80.0-120*	
(S) 4-Bromofluorobenzene			*100*	*77.0-126*	
(S) 1,2-Dichloroethane-d4			*101*	*70.0-130*	

Method Blank (MB)

(MB) R3745230-3 12/22/21 11:42

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	ug/l		ug/l	ug/l
1,4-Dioxane	U		0.597	3.00
(S) Toluene-d8	*96.8*			*77.0-127*

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

(LCS) R3745230-1 12/22/21 10:43 • (LCSD) R3745230-2 12/22/21 11:02

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	ug/l	ug/l	ug/l	%	%	%			%	%
1,4-Dioxane	50.0	48.1	47.6	96.2	95.2	55.0-138			1.04	24
(S) Toluene-d8				*97.6*	*96.6*	*77.0-127*				

L1444231-05 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1444231-05 12/22/21 15:39 • (MS) R3745230-4 12/22/21 21:17 • (MSD) R3745230-5 12/22/21 21:37

Analyte	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
	ug/l	ug/l	ug/l	ug/l	%	%		%			%	%
1,4-Dioxane	50.0	ND	67.0	61.1	134	122	1	13.0-160			9.21	31
(S) Toluene-d8					*98.3*	*98.2*		*77.0-127*				

Method Blank (MB)

(MB) R3746007-3 12/27/21 20:01

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	ug/l		ug/l	ug/l
1,4-Dioxane	U		0.597	3.00
(S) Toluene-d8	*98.4*			*77.0-127*

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

(LCS) R3746007-1 12/27/21 18:13 • (LCSD) R3746007-2 12/27/21 18:33

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	ug/l	ug/l	ug/l	%	%	%			%	%
1,4-Dioxane	50.0	45.6	46.1	91.2	92.2	55.0-138			1.09	24
(S) Toluene-d8				*99.7*	*99.3*	*77.0-127*				

L1444886-06 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1444886-06 12/27/21 21:12 • (MS) R3746007-4 12/27/21 22:32 • (MSD) R3746007-5 12/27/21 22:51

Analyte	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
	ug/l	ug/l	ug/l	ug/l	%	%		%			%	%
1,4-Dioxane	50.0	4.68	39.6	36.2	69.8	63.0	1	13.0-160			8.97	31
(S) Toluene-d8					*98.6*	*98.1*		*77.0-127*				

Method Blank (MB)

(MB) R3744497-1 12/23/21 11:26

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Gamma BHC	U		0.0209	0.0500
(S) Decachlorobiphenyl	*49.5*			*10.0-128*
(S) Tetrachloro-m-xylene	*74.4*			*10.0-127*

Laboratory Control Sample (LCS)

(LCS) R3744497-3 12/23/21 11:36

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Gamma BHC	1.00	0.931	93.1	55.0-129	
(S) Decachlorobiphenyl			*44.0*	*10.0-128*	
(S) Tetrachloro-m-xylene			*66.0*	*10.0-127*	

Method Blank (MB)

(MB) R3745013-1 12/24/21 11:00

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Gamma BHC	U		0.0209	0.0500
(S) Decachlorobiphenyl	*74.6*			*10.0-128*
(S) Tetrachloro-m-xylene	*77.9*			*10.0-127*

Laboratory Control Sample (LCS)

(LCS) R3745013-2 12/24/21 11:13

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Gamma BHC	1.00	1.12	112	55.0-129	
(S) Decachlorobiphenyl			*79.2*	*10.0-128*	
(S) Tetrachloro-m-xylene			*85.2*	*10.0-127*	

L1445022-07 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1445022-07 12/24/21 16:54 • (MS) R3745013-3 12/24/21 17:07 • (MSD) R3745013-4 12/24/21 17:20

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MSD Result ug/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Gamma BHC	1.00	ND	0.897	0.931	89.7	93.1	1	14.0-141			3.72	40
(S) Decachlorobiphenyl					*38.4*	*63.2*		*10.0-128*				
(S) Tetrachloro-m-xylene					*59.7*	*67.3*		*10.0-127*				

GLOSSARY OF TERMS

Guide to Reading and Understanding Your Laboratory Report

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

Results Disclaimer - Information that may be provided by the customer, and contained within this report, include Permit Limits, Project Name, Sample ID, Sample Matrix, Sample Preservation, Field Blanks, Field Spikes, Field Duplicates, On-Site Data, Sampling Collection Dates/Times, and Sampling Location. Results relate to the accuracy of this information provided, and as the samples are received.

Abbreviations and Definitions

MDL	Method Detection Limit.
ND	Not detected at the Reporting Limit (or MDL where applicable).
RDL	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
(S)	Surrogate (Surrogate Standard) - Analytes added to every blank, sample, Laboratory Control Sample/Duplicate and Matrix Spike/Duplicate; used to evaluate analytical efficiency by measuring recovery. Surrogates are not expected to be detected in all environmental media.
U	Not detected at the Reporting Limit (or MDL where applicable).
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state “ND” (Not Detected) or “BDL” (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Uncertainty (Radiochemistry)	Confidence level of 2 sigma.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

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.
J1	Surrogate recovery limits have been exceeded; values are outside upper control limits.
J5	The sample matrix interfered with the ability to make any accurate determination; spike value is high.
P1	RPD value not applicable for sample concentrations less than 5 times the reporting limit.

ACCREDITATIONS & LOCATIONS

Pace Analytical National 12065 Lebanon Rd Mount Juliet, TN 37122

Alabama	40660	Nebraska	NE-OS-15-05
Alaska	17-026	Nevada	TN000032021-1
Arizona	AZ0612	New Hampshire	2975
Arkansas	88-0469	New Jersey–NELAP	TN002
California	2932	New Mexico [1]	TN00003
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina [1]	DW21704
Georgia	NELAP	North Carolina [3]	41
Georgia [1]	923	North Dakota	R-140
Idaho	TN00003	Ohio–VAP	CL0069
Illinois	200008	Oklahoma	9915
Indiana	C-TN-01	Oregon	TN200002
Iowa	364	Pennsylvania	68-02979
Kansas	E-10277	Rhode Island	LAO000356
Kentucky [1 6]	KY90010	South Carolina	84004002
Kentucky [2]	16	South Dakota	n/a
Louisiana	AI30792	Tennessee [1 4]	2006
Louisiana	LA018	Texas	T104704245-20-18
Maine	TN00003	Texas [5]	LAB0152
Maryland	324	Utah	TN000032021-11
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	110033
Minnesota	047-999-395	Washington	C847
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	998093910
Montana	CERT0086	Wyoming	A2LA
A2LA – ISO 17025	1461.01	AIHA-LAP,LLC EMLAP	100789
A2LA – ISO 17025 [5]	1461.02	DOD	1461.01
Canada	1461.01	USDA	P330-15-00234
EPA–Crypto	TN00003		

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

* Not all certifications held by the laboratory are applicable to the results reported in the attached report.

* Accreditation is only applicable to the test methods specified on each scope of accreditation held by Pace Analytical.

Company Name/Address:
Resolute Environmental & Water Resources

1003 Weatherstone Parkway

Billing Information:
Accounts Payable
1003 Weatherstone Pkwy., Ste. 320
Woodstock, GA 30188

Pres Chk

Report to:
Tommy Jordan

Email To: **tommy.jordan@resoluteenv.com**

Project Description: PRB Pilot Post Sampling - 1 Week
UGA (Milledge Avenue Site)

City/State Collected: Athens, GA

Please Circle: PT MT CT ET

Phone: **404-358-8469**

Client Project #

Lab Project #
RESENVWGA-MILLEDGE

Collected by (print):
Robert Mull

Site/Facility ID #

P.O. #

Collected by (signature):
Robert B Mull
Immediately
Packed on Ice N ___ Y ✓

Rush? (Lab MUST Be Notified)
___ Same Day ___ Five Day
___ Next Day ___ 5 Day (Rad Only)
___ Two Day ___ 10 Day (Rad Only)
___ Three Day

Quote #

Date Results Needed

No. of Cntrs

Analysis / Container / Preservative

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	8081 100ml Amb-NoPres	SULFATE 125mlHDPE-NoPres	TOC 250mlHDPE-HCl	V8260LL14D 40mlAmb-HCl	V8260TCL 40mlAmb-HCl	Remarks	Sample # (lab only)
PW-Ua	G	GW		12/20/21	1122	9	X	X	X	X	X		-01
PW-Ub	G	GW		12/20/21	1238	9	X	X	X	X	X		-02
PW-PRBb	G	GW		12/20/21	1448	9	X	X	X	X	X		-03
PW-Da	G	GW		12/20/21	1445	9	X	X	X	X	X		-04
PW-Db	G	GW		12/20/21	1150	9	X	X	X	X	X		-05
PW-Dc	G	GW		12/20/21	1335	9	X	X	X	X	X		-06
Trip Blank	—	—		—	—	1							-07

Chain of Custody Page 1 of 1

Pace Analytical®

12065 Lebanon Rd Mount Juliet, TN 37122
Submitting a sample via this chain of custody constitutes acknowledgment and acceptance of the Pace Terms and Conditions found at: https://info.pacelabs.com/hubfs/pas-standard-terms.pdf

SDG # 1444886
J036

Acctnum: **RESENVWGA**
Template: **T199232**
Prelogin: **P886760**
PM: **526 - Chris McCord**
PB: BF 11/16/21
Shipped Via: **FedEX Ground**

* Matrix:
SS - Soil **AIR** - Air **F** - Filter
GW - Groundwater **B** - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other_____

Remarks:

pH _____ Temp _____
Flow _____ Other _____

Samples returned via:
__ UPS __ FedEx ✓ Courier _____

Tracking #

Sample Receipt Checklist
COC Seal Present/Intact: __NP ✓Y __N
COC Signed/Accurate: ✓Y __N
Bottles arrive intact: ✓Y __N
Correct bottles used: ✓Y __N
Sufficient volume sent: ✓Y __N
If Applicable
VOA Zero Headspace: ✓Y __N
Preservation Correct/Checked: ✓Y __N
RAD Screen <0.5 mR/hr: ✓Y __N

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Trip Blank Received: Yes / No (HCl / MeoH) TBR
Robert B Mull	12/20/21	1630		
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Temp: 3.9 °C Bottles Received: 54
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)	Date: 12/21/21 Time: 1015

If preservation required by Login: Date/Time

Hold:

Condition: NCF / OK

ANALYTICAL REPORT

February 10, 2022

Resolute Environmental & Water Resources

Sample Delivery Group:	L1453934
Samples Received:	01/22/2022
Project Number:	
Description:	UGA (Milledge Avenue Site) - 6 Week Post

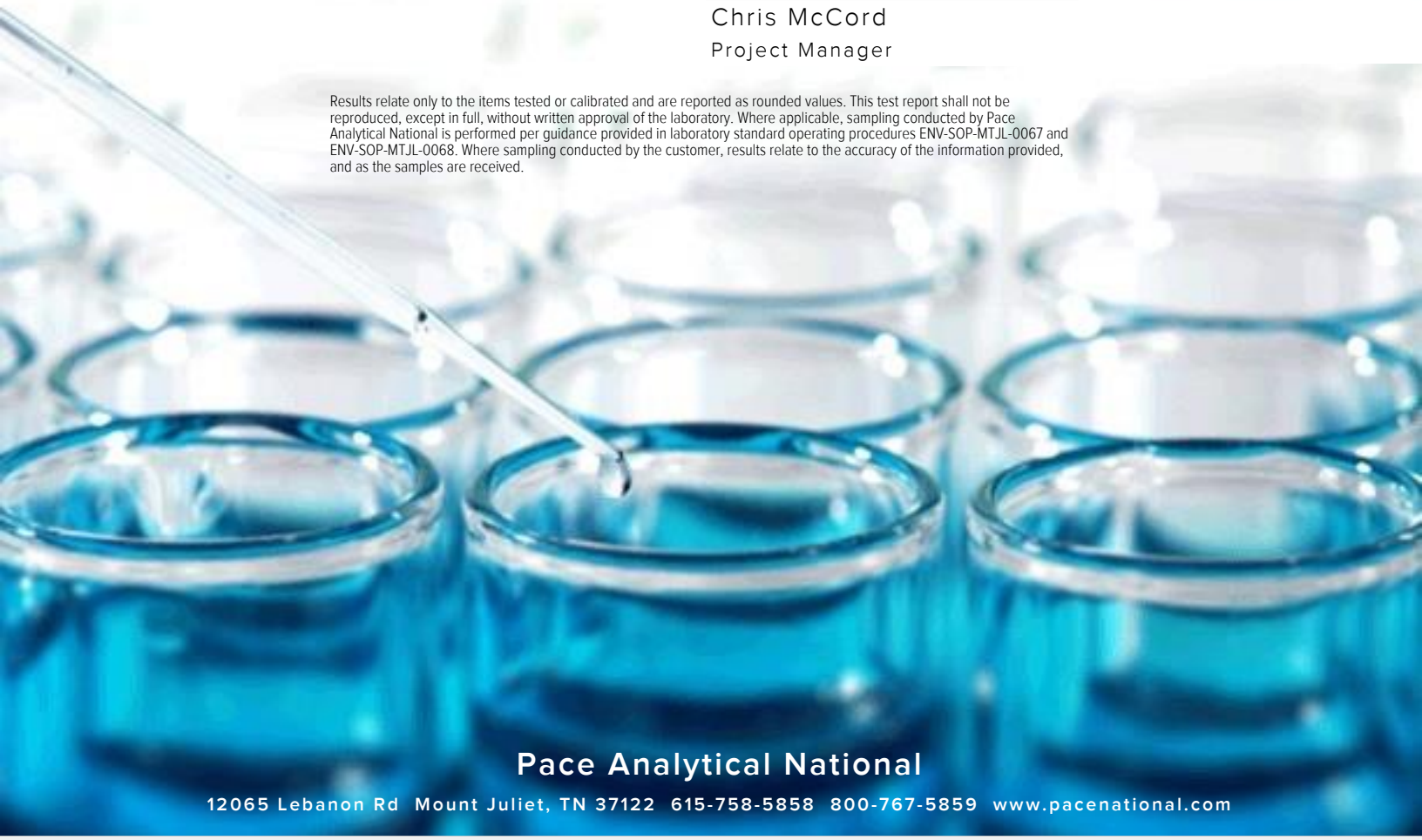
Report To:

Tommy Jordan
1003 Weatherstone Parkway
Suite 320
Woodstock, GA 30188

Entire Report Reviewed By:

Chris McCord
Project Manager

Results relate only to the items tested or calibrated and are reported as rounded values. This test report shall not be reproduced, except in full, without written approval of the laboratory. Where applicable, sampling conducted by Pace Analytical National is performed per guidance provided in laboratory standard operating procedures ENV-SOP-MTJL-0067 and ENV-SOP-MTJL-0068. Where sampling conducted by the customer, results relate to the accuracy of the information provided, and as the samples are received.



Pace Analytical National
12065 Lebanon Rd Mount Juliet, TN 37122 615-758-5858 800-767-5859 www.pacenational.com

TABLE OF CONTENTS

PW-UA L1453934-01 GW

Collected by: Robert Mull | Collected date/time: 01/21/22 10:01 | Received date/time: 01/22/22 09:30

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 9056A	WG1806764	5	01/23/22 22:52	01/23/22 22:52	KEG	Mt. Juliet, TN
Wet Chemistry by Method 9060A	WG1812471	1	02/03/22 21:26	02/03/22 21:26	GJA	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1806607	1	01/23/22 06:00	01/23/22 06:00	JHH	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1807281	5	01/24/22 21:30	01/24/22 21:30	BMB	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B-SIM	WG1807717	1	01/25/22 20:36	01/25/22 20:36	ADM	Mt. Juliet, TN
Pesticides (GC) by Method 8081	WG1806702	1	01/26/22 08:13	01/26/22 15:49	AO	Mt. Juliet, TN

PW-UB L1453934-02 GW

Collected by: Robert Mull | Collected date/time: 01/21/22 11:15 | Received date/time: 01/22/22 09:30

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 9056A	WG1806764	50	01/24/22 00:37	01/24/22 00:37	KEG	Mt. Juliet, TN
Wet Chemistry by Method 9060A	WG1812471	1	02/03/22 22:38	02/03/22 22:38	GJA	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1806607	1	01/23/22 00:57	01/23/22 00:57	JHH	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B-SIM	WG1807717	1	01/25/22 20:56	01/25/22 20:56	ADM	Mt. Juliet, TN
Pesticides (GC) by Method 8081	WG1807559	1	01/25/22 22:36	01/26/22 14:02	AO	Mt. Juliet, TN

PW-PRBB L1453934-03 GW

Collected by: Robert Mull | Collected date/time: 01/21/22 12:17 | Received date/time: 01/22/22 09:30

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 9056A	WG1806764	1	01/23/22 23:15	01/23/22 23:15	KEG	Mt. Juliet, TN
Wet Chemistry by Method 9060A	WG1812471	1	02/04/22 00:36	02/04/22 00:36	GJA	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1806607	1	01/23/22 01:16	01/23/22 01:16	JHH	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B-SIM	WG1807717	1	01/25/22 21:16	01/25/22 21:16	ADM	Mt. Juliet, TN
Pesticides (GC) by Method 8081	WG1807559	1	01/25/22 22:36	01/26/22 14:11	AO	Mt. Juliet, TN

PW-DA L1453934-04 GW

Collected by: Robert Mull | Collected date/time: 01/21/22 10:45 | Received date/time: 01/22/22 09:30

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 9056A	WG1806764	100	01/24/22 00:49	01/24/22 00:49	KEG	Mt. Juliet, TN
Wet Chemistry by Method 9060A	WG1812471	1	02/04/22 01:56	02/04/22 01:56	GJA	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1806607	1	01/23/22 01:35	01/23/22 01:35	JHH	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1807281	5	01/24/22 21:52	01/24/22 21:52	BMB	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B-SIM	WG1807717	1	01/25/22 21:36	01/25/22 21:36	ADM	Mt. Juliet, TN
Pesticides (GC) by Method 8081	WG1807559	1	01/25/22 22:36	01/26/22 14:20	AO	Mt. Juliet, TN

PW-DB L1453934-05 GW

Collected by: Robert Mull | Collected date/time: 01/21/22 09:45 | Received date/time: 01/22/22 09:30

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 9056A	WG1806764	100	01/24/22 01:01	01/24/22 01:01	KEG	Mt. Juliet, TN
Wet Chemistry by Method 9060A	WG1812471	1	02/04/22 02:42	02/04/22 02:42	GJA	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1806607	1	01/23/22 01:54	01/23/22 01:54	JHH	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B-SIM	WG1807717	1	01/25/22 21:56	01/25/22 21:56	ADM	Mt. Juliet, TN
Pesticides (GC) by Method 8081	WG1807559	1	01/25/22 22:36	01/26/22 15:04	AO	Mt. Juliet, TN

SAMPLE SUMMARY

PW-DC L1453934-06 GW

Collected by: Robert Mull
Collected date/time: 01/21/22 14:25
Received date/time: 01/22/22 09:30

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 9056A	WG1806764	10	01/24/22 01:12	01/24/22 01:12	KEG	Mt. Juliet, TN
Wet Chemistry by Method 9060A	WG1812471	1	02/04/22 03:23	02/04/22 03:23	GJA	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1806607	1	01/23/22 02:13	01/23/22 02:13	JHH	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B-SIM	WG1807717	1	01/25/22 22:15	01/25/22 22:15	ADM	Mt. Juliet, TN
Pesticides (GC) by Method 8081	WG1807683	1	01/27/22 04:12	01/27/22 14:29	AO	Mt. Juliet, TN

CASE NARRATIVE

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

Chris McCord
Project Manager

Wet Chemistry by Method 9056A

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Sulfate	179000		25000	5	01/23/2022 22:52	WG1806764

Wet Chemistry by Method 9060A

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
TOC (Total Organic Carbon)	1210	B	1000	1	02/03/2022 21:26	WG1812471

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Acetone	ND		50.0	1	01/23/2022 06:00	WG1806607
Benzene	ND		1.00	1	01/23/2022 06:00	WG1806607
Carbon tetrachloride	2.64		1.00	1	01/23/2022 06:00	WG1806607
Chlorobenzene	ND		1.00	1	01/23/2022 06:00	WG1806607
Chloroethane	ND		5.00	1	01/23/2022 06:00	WG1806607
Chloroform	164		25.0	5	01/24/2022 21:30	WG1807281
1,2-Dibromo-3-Chloropropane	ND		5.00	1	01/23/2022 06:00	WG1806607
1,2-Dichloroethane	ND		1.00	1	01/23/2022 06:00	WG1806607
1,1-Dichloroethene	ND		1.00	1	01/23/2022 06:00	WG1806607
cis-1,2-Dichloroethene	ND		1.00	1	01/23/2022 06:00	WG1806607
trans-1,2-Dichloroethene	ND		1.00	1	01/23/2022 06:00	WG1806607
1,2-Dichloropropane	ND		1.00	1	01/23/2022 06:00	WG1806607
Ethylbenzene	ND		1.00	1	01/23/2022 06:00	WG1806607
Methylene Chloride	ND		5.00	1	01/23/2022 06:00	WG1806607
1,1,2,2-Tetrachloroethane	ND		1.00	1	01/23/2022 06:00	WG1806607
Tetrachloroethene	ND		1.00	1	01/23/2022 06:00	WG1806607
Toluene	ND		1.00	1	01/23/2022 06:00	WG1806607
Trichloroethene	ND		1.00	1	01/23/2022 06:00	WG1806607
Vinyl chloride	ND		1.00	1	01/23/2022 06:00	WG1806607
o-Xylene	ND		1.00	1	01/23/2022 06:00	WG1806607
m&p-Xylene	ND		2.00	1	01/23/2022 06:00	WG1806607
(S) Toluene-d8	*84.8*		*80.0-120*		*01/23/2022 06:00*	WG1806607
(S) Toluene-d8	*91.8*		*80.0-120*		*01/24/2022 21:30*	WG1807281
(S) 4-Bromofluorobenzene	*100*		*77.0-126*		*01/23/2022 06:00*	WG1806607
(S) 4-Bromofluorobenzene	*96.6*		*77.0-126*		*01/24/2022 21:30*	WG1807281
(S) 1,2-Dichloroethane-d4	*124*		*70.0-130*		*01/23/2022 06:00*	WG1806607
(S) 1,2-Dichloroethane-d4	*92.4*		*70.0-130*		*01/24/2022 21:30*	WG1807281

Volatile Organic Compounds (GC/MS) by Method 8260B-SIM

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
1,4-Dioxane	ND		3.00	1	01/25/2022 20:36	WG1807717
(S) Toluene-d8	*97.1*		*77.0-127*		*01/25/2022 20:36*	WG1807717

Pesticides (GC) by Method 8081

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Alpha BHC	ND		0.0500	1	01/26/2022 15:49	WG1806702
Beta BHC	ND		0.0500	1	01/26/2022 15:49	WG1806702
Delta BHC	ND		0.0500	1	01/26/2022 15:49	WG1806702
Gamma BHC	ND		0.0500	1	01/26/2022 15:49	WG1806702
(S) Decachlorobiphenyl	*35.4*		*10.0-128*		*01/26/2022 15:49*	WG1806702
(S) Tetrachloro-m-xylene	*77.8*		*10.0-127*		*01/26/2022 15:49*	WG1806702

Wet Chemistry by Method 9056A

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Sulfate	379000		250000	50	01/24/2022 00:37	WG1806764

Wet Chemistry by Method 9060A

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
TOC (Total Organic Carbon)	ND		1000	1	02/03/2022 22:38	WG1812471

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Acetone	ND		50.0	1	01/23/2022 00:57	WG1806607
Benzene	ND		1.00	1	01/23/2022 00:57	WG1806607
Carbon tetrachloride	ND		1.00	1	01/23/2022 00:57	WG1806607
Chlorobenzene	ND		1.00	1	01/23/2022 00:57	WG1806607
Chloroethane	ND		5.00	1	01/23/2022 00:57	WG1806607
Chloroform	29.4		5.00	1	01/23/2022 00:57	WG1806607
1,2-Dibromo-3-Chloropropane	ND		5.00	1	01/23/2022 00:57	WG1806607
1,2-Dichloroethane	ND		1.00	1	01/23/2022 00:57	WG1806607
1,1-Dichloroethene	ND		1.00	1	01/23/2022 00:57	WG1806607
cis-1,2-Dichloroethene	ND		1.00	1	01/23/2022 00:57	WG1806607
trans-1,2-Dichloroethene	ND		1.00	1	01/23/2022 00:57	WG1806607
1,2-Dichloropropane	ND		1.00	1	01/23/2022 00:57	WG1806607
Ethylbenzene	ND		1.00	1	01/23/2022 00:57	WG1806607
Methylene Chloride	ND		5.00	1	01/23/2022 00:57	WG1806607
1,1,2,2-Tetrachloroethane	ND		1.00	1	01/23/2022 00:57	WG1806607
Tetrachloroethene	ND		1.00	1	01/23/2022 00:57	WG1806607
Toluene	ND		1.00	1	01/23/2022 00:57	WG1806607
Trichloroethene	ND		1.00	1	01/23/2022 00:57	WG1806607
Vinyl chloride	ND		1.00	1	01/23/2022 00:57	WG1806607
o-Xylene	ND		1.00	1	01/23/2022 00:57	WG1806607
m&p-Xylene	ND		2.00	1	01/23/2022 00:57	WG1806607
(S) Toluene-d8	*88.6*		*80.0-120*		*01/23/2022 00:57*	WG1806607
(S) 4-Bromofluorobenzene	*100*		*77.0-126*		*01/23/2022 00:57*	WG1806607
(S) 1,2-Dichloroethane-d4	*127*		*70.0-130*		*01/23/2022 00:57*	WG1806607

Volatile Organic Compounds (GC/MS) by Method 8260B-SIM

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
1,4-Dioxane	10.9		3.00	1	01/25/2022 20:56	WG1807717
(S) Toluene-d8	*98.0*		*77.0-127*		*01/25/2022 20:56*	WG1807717

Pesticides (GC) by Method 8081

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Alpha BHC	ND		0.0500	1	01/26/2022 14:02	WG1807559
Beta BHC	ND		0.0500	1	01/26/2022 14:02	WG1807559
Delta BHC	ND		0.0500	1	01/26/2022 14:02	WG1807559
Gamma BHC	ND		0.0500	1	01/26/2022 14:02	WG1807559
(S) Decachlorobiphenyl	*78.9*		*10.0-128*		*01/26/2022 14:02*	WG1807559
(S) Tetrachloro-m-xylene	*83.4*		*10.0-127*		*01/26/2022 14:02*	WG1807559

Wet Chemistry by Method 9056A

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Sulfate	34500		5000	1	01/23/2022 23:15	WG1806764

Wet Chemistry by Method 9060A

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
TOC (Total Organic Carbon)	ND		1000	1	02/04/2022 00:36	WG1812471

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Acetone	ND		50.0	1	01/23/2022 01:16	WG1806607
Benzene	ND		1.00	1	01/23/2022 01:16	WG1806607
Carbon tetrachloride	ND		1.00	1	01/23/2022 01:16	WG1806607
Chlorobenzene	ND		1.00	1	01/23/2022 01:16	WG1806607
Chloroethane	ND		5.00	1	01/23/2022 01:16	WG1806607
Chloroform	ND		5.00	1	01/23/2022 01:16	WG1806607
1,2-Dibromo-3-Chloropropane	ND		5.00	1	01/23/2022 01:16	WG1806607
1,2-Dichloroethane	2.76		1.00	1	01/23/2022 01:16	WG1806607
1,1-Dichloroethene	ND		1.00	1	01/23/2022 01:16	WG1806607
cis-1,2-Dichloroethene	ND		1.00	1	01/23/2022 01:16	WG1806607
trans-1,2-Dichloroethene	2.68		1.00	1	01/23/2022 01:16	WG1806607
1,2-Dichloropropane	ND		1.00	1	01/23/2022 01:16	WG1806607
Ethylbenzene	ND		1.00	1	01/23/2022 01:16	WG1806607
Methylene Chloride	ND		5.00	1	01/23/2022 01:16	WG1806607
1,1,2,2-Tetrachloroethane	19.3		1.00	1	01/23/2022 01:16	WG1806607
Tetrachloroethene	6.55		1.00	1	01/23/2022 01:16	WG1806607
Toluene	ND		1.00	1	01/23/2022 01:16	WG1806607
Trichloroethene	5.34		1.00	1	01/23/2022 01:16	WG1806607
Vinyl chloride	ND		1.00	1	01/23/2022 01:16	WG1806607
o-Xylene	ND		1.00	1	01/23/2022 01:16	WG1806607
m&p-Xylene	ND		2.00	1	01/23/2022 01:16	WG1806607
(S) Toluene-d8	*94.4*		*80.0-120*		*01/23/2022 01:16*	WG1806607
(S) 4-Bromofluorobenzene	*101*		*77.0-126*		*01/23/2022 01:16*	WG1806607
(S) 1,2-Dichloroethane-d4	*123*		*70.0-130*		*01/23/2022 01:16*	WG1806607

Volatile Organic Compounds (GC/MS) by Method 8260B-SIM

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
1,4-Dioxane	141		3.00	1	01/25/2022 21:16	WG1807717
(S) Toluene-d8	*99.4*		*77.0-127*		*01/25/2022 21:16*	WG1807717

Pesticides (GC) by Method 8081

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Alpha BHC	ND		0.0500	1	01/26/2022 14:11	WG1807559
Beta BHC	ND		0.0500	1	01/26/2022 14:11	WG1807559
Delta BHC	ND		0.0500	1	01/26/2022 14:11	WG1807559
Gamma BHC	ND		0.0500	1	01/26/2022 14:11	WG1807559
(S) Decachlorobiphenyl	*80.9*		*10.0-128*		*01/26/2022 14:11*	WG1807559
(S) Tetrachloro-m-xylene	*77.1*		*10.0-127*		*01/26/2022 14:11*	WG1807559

Wet Chemistry by Method 9056A

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Sulfate	890000		500000	100	01/24/2022 00:49	WG1806764

Wet Chemistry by Method 9060A

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
TOC (Total Organic Carbon)	1500	B	1000	1	02/04/2022 01:56	WG1812471

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Acetone	81.3		50.0	1	01/23/2022 01:35	WG1806607
Benzene	ND		1.00	1	01/23/2022 01:35	WG1806607
Carbon tetrachloride	2.66		1.00	1	01/23/2022 01:35	WG1806607
Chlorobenzene	ND		1.00	1	01/23/2022 01:35	WG1806607
Chloroethane	ND		5.00	1	01/23/2022 01:35	WG1806607
Chloroform	171		25.0	5	01/24/2022 21:52	WG1807281
1,2-Dibromo-3-Chloropropane	ND		5.00	1	01/23/2022 01:35	WG1806607
1,2-Dichloroethane	ND		1.00	1	01/23/2022 01:35	WG1806607
1,1-Dichloroethene	ND		1.00	1	01/23/2022 01:35	WG1806607
cis-1,2-Dichloroethene	ND		1.00	1	01/23/2022 01:35	WG1806607
trans-1,2-Dichloroethene	ND		1.00	1	01/23/2022 01:35	WG1806607
1,2-Dichloropropane	ND		1.00	1	01/23/2022 01:35	WG1806607
Ethylbenzene	ND		1.00	1	01/23/2022 01:35	WG1806607
Methylene Chloride	ND		5.00	1	01/23/2022 01:35	WG1806607
1,1,2,2-Tetrachloroethane	2.44		1.00	1	01/23/2022 01:35	WG1806607
Tetrachloroethene	ND		1.00	1	01/23/2022 01:35	WG1806607
Toluene	ND		1.00	1	01/23/2022 01:35	WG1806607
Trichloroethene	ND		1.00	1	01/23/2022 01:35	WG1806607
Vinyl chloride	ND		1.00	1	01/23/2022 01:35	WG1806607
o-Xylene	ND		1.00	1	01/23/2022 01:35	WG1806607
m&p-Xylene	ND		2.00	1	01/23/2022 01:35	WG1806607
(S) Toluene-d8	*84.1*		*80.0-120*		*01/23/2022 01:35*	WG1806607
(S) Toluene-d8	*94.6*		*80.0-120*		*01/24/2022 21:52*	WG1807281
(S) 4-Bromofluorobenzene	*101*		*77.0-126*		*01/23/2022 01:35*	WG1806607
(S) 4-Bromofluorobenzene	*96.9*		*77.0-126*		*01/24/2022 21:52*	WG1807281
(S) 1,2-Dichloroethane-d4	*121*		*70.0-130*		*01/23/2022 01:35*	WG1806607
(S) 1,2-Dichloroethane-d4	*92.6*		*70.0-130*		*01/24/2022 21:52*	WG1807281

Volatile Organic Compounds (GC/MS) by Method 8260B-SIM

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
1,4-Dioxane	ND		3.00	1	01/25/2022 21:36	WG1807717
(S) Toluene-d8	*93.3*		*77.0-127*		*01/25/2022 21:36*	WG1807717

Pesticides (GC) by Method 8081

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Alpha BHC	ND		0.0500	1	01/26/2022 14:20	WG1807559
Beta BHC	ND		0.0500	1	01/26/2022 14:20	WG1807559
Delta BHC	ND		0.0500	1	01/26/2022 14:20	WG1807559
Gamma BHC	ND		0.0500	1	01/26/2022 14:20	WG1807559
(S) Decachlorobiphenyl	*29.1*		*10.0-128*		*01/26/2022 14:20*	WG1807559
(S) Tetrachloro-m-xylene	*85.3*		*10.0-127*		*01/26/2022 14:20*	WG1807559

Wet Chemistry by Method 9056A

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Sulfate	812000		500000	100	01/24/2022 01:01	WG1806764

Wet Chemistry by Method 9060A

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
TOC (Total Organic Carbon)	1170	B	1000	1	02/04/2022 02:42	WG1812471

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Acetone	ND		50.0	1	01/23/2022 01:54	WG1806607
Benzene	ND		1.00	1	01/23/2022 01:54	WG1806607
Carbon tetrachloride	ND		1.00	1	01/23/2022 01:54	WG1806607
Chlorobenzene	ND		1.00	1	01/23/2022 01:54	WG1806607
Chloroethane	ND		5.00	1	01/23/2022 01:54	WG1806607
Chloroform	ND		5.00	1	01/23/2022 01:54	WG1806607
1,2-Dibromo-3-Chloropropane	ND		5.00	1	01/23/2022 01:54	WG1806607
1,2-Dichloroethane	1.41		1.00	1	01/23/2022 01:54	WG1806607
1,1-Dichloroethene	ND		1.00	1	01/23/2022 01:54	WG1806607
cis-1,2-Dichloroethene	ND		1.00	1	01/23/2022 01:54	WG1806607
trans-1,2-Dichloroethene	ND		1.00	1	01/23/2022 01:54	WG1806607
1,2-Dichloropropane	ND		1.00	1	01/23/2022 01:54	WG1806607
Ethylbenzene	ND		1.00	1	01/23/2022 01:54	WG1806607
Methylene Chloride	ND		5.00	1	01/23/2022 01:54	WG1806607
1,1,2,2-Tetrachloroethane	12.8		1.00	1	01/23/2022 01:54	WG1806607
Tetrachloroethene	1.22		1.00	1	01/23/2022 01:54	WG1806607
Toluene	ND		1.00	1	01/23/2022 01:54	WG1806607
Trichloroethene	ND		1.00	1	01/23/2022 01:54	WG1806607
Vinyl chloride	ND		1.00	1	01/23/2022 01:54	WG1806607
o-Xylene	ND		1.00	1	01/23/2022 01:54	WG1806607
m&p-Xylene	ND		2.00	1	01/23/2022 01:54	WG1806607
(S) Toluene-d8	*91.7*		*80.0-120*		*01/23/2022 01:54*	WG1806607
(S) 4-Bromofluorobenzene	*102*		*77.0-126*		*01/23/2022 01:54*	WG1806607
(S) 1,2-Dichloroethane-d4	*121*		*70.0-130*		*01/23/2022 01:54*	WG1806607

Volatile Organic Compounds (GC/MS) by Method 8260B-SIM

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
1,4-Dioxane	59.3		3.00	1	01/25/2022 21:56	WG1807717
(S) Toluene-d8	*98.2*		*77.0-127*		*01/25/2022 21:56*	WG1807717

Pesticides (GC) by Method 8081

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Alpha BHC	ND		0.0500	1	01/26/2022 15:04	WG1807559
Beta BHC	ND		0.0500	1	01/26/2022 15:04	WG1807559
Delta BHC	ND		0.0500	1	01/26/2022 15:04	WG1807559
Gamma BHC	0.0505	P	0.0500	1	01/26/2022 15:04	WG1807559
(S) Decachlorobiphenyl	*31.5*		*10.0-128*		*01/26/2022 15:04*	WG1807559
(S) Tetrachloro-m-xylene	*83.5*		*10.0-127*		*01/26/2022 15:04*	WG1807559

Wet Chemistry by Method 9056A

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Sulfate	132000		50000	10	01/24/2022 01:12	WG1806764

Wet Chemistry by Method 9060A

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
TOC (Total Organic Carbon)	ND		1000	1	02/04/2022 03:23	WG1812471

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Acetone	ND		50.0	1	01/23/2022 02:13	WG1806607
Benzene	ND		1.00	1	01/23/2022 02:13	WG1806607
Carbon tetrachloride	ND		1.00	1	01/23/2022 02:13	WG1806607
Chlorobenzene	ND		1.00	1	01/23/2022 02:13	WG1806607
Chloroethane	ND		5.00	1	01/23/2022 02:13	WG1806607
Chloroform	9.80		5.00	1	01/23/2022 02:13	WG1806607
1,2-Dibromo-3-Chloropropane	ND		5.00	1	01/23/2022 02:13	WG1806607
1,2-Dichloroethane	ND		1.00	1	01/23/2022 02:13	WG1806607
1,1-Dichloroethene	ND		1.00	1	01/23/2022 02:13	WG1806607
cis-1,2-Dichloroethene	ND		1.00	1	01/23/2022 02:13	WG1806607
trans-1,2-Dichloroethene	ND		1.00	1	01/23/2022 02:13	WG1806607
1,2-Dichloropropane	ND		1.00	1	01/23/2022 02:13	WG1806607
Ethylbenzene	ND		1.00	1	01/23/2022 02:13	WG1806607
Methylene Chloride	ND		5.00	1	01/23/2022 02:13	WG1806607
1,1,2,2-Tetrachloroethane	ND		1.00	1	01/23/2022 02:13	WG1806607
Tetrachloroethene	ND		1.00	1	01/23/2022 02:13	WG1806607
Toluene	ND		1.00	1	01/23/2022 02:13	WG1806607
Trichloroethene	ND		1.00	1	01/23/2022 02:13	WG1806607
Vinyl chloride	ND		1.00	1	01/23/2022 02:13	WG1806607
o-Xylene	ND		1.00	1	01/23/2022 02:13	WG1806607
m&p-Xylene	ND		2.00	1	01/23/2022 02:13	WG1806607
(S) Toluene-d8	*91.0*		*80.0-120*		*01/23/2022 02:13*	WG1806607
(S) 4-Bromofluorobenzene	*102*		*77.0-126*		*01/23/2022 02:13*	WG1806607
(S) 1,2-Dichloroethane-d4	*122*		*70.0-130*		*01/23/2022 02:13*	WG1806607

Volatile Organic Compounds (GC/MS) by Method 8260B-SIM

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
1,4-Dioxane	3.79		3.00	1	01/25/2022 22:15	WG1807717
(S) Toluene-d8	*98.3*		*77.0-127*		*01/25/2022 22:15*	WG1807717

Pesticides (GC) by Method 8081

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Alpha BHC	ND		0.0500	1	01/27/2022 14:29	WG1807683
Beta BHC	ND		0.0500	1	01/27/2022 14:29	WG1807683
Delta BHC	ND		0.0500	1	01/27/2022 14:29	WG1807683
Gamma BHC	ND		0.0500	1	01/27/2022 14:29	WG1807683
(S) Decachlorobiphenyl	*72.5*		*10.0-128*		*01/27/2022 14:29*	WG1807683
(S) Tetrachloro-m-xylene	*71.0*		*10.0-127*		*01/27/2022 14:29*	WG1807683

Method Blank (MB)

(MB) R3753265-1 01/23/22 16:54

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Sulfate	U		594	5000

L1453929-05 Original Sample (OS) • Duplicate (DUP)

(OS) L1453929-05 01/23/22 21:07 • (DUP) R3753265-6 01/23/22 21:18

Analyte	Original Result ug/l	DUP Result ug/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Sulfate	12000	11900	1	0.872		15

Laboratory Control Sample (LCS)

(LCS) R3753265-2 01/23/22 17:06

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Sulfate	40000	41700	104	80.0-120	

L1453929-05 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1453929-05 01/23/22 21:07 • (MS) R3753265-7 01/23/22 21:30 • (MSD) R3753265-8 01/23/22 21:42

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MSD Result ug/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Sulfate	50000	12000	62400	62700	101	101	1	80.0-120			0.553	15

Method Blank (MB)

(MB) R3757001-2 02/03/22 17:06

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
TOC (Total Organic Carbon)	588	J	102	1000

L1453934-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1453934-01 02/03/22 21:26 • (DUP) R3757001-5 02/03/22 21:58

Analyte	Original Result ug/l	DUP Result ug/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
TOC (Total Organic Carbon)	1210	1180	1	2.01		20

L1453934-06 Original Sample (OS) • Duplicate (DUP)

(OS) L1453934-06 02/04/22 03:23 • (DUP) R3757001-8 02/04/22 03:59

Analyte	Original Result ug/l	DUP Result ug/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
TOC (Total Organic Carbon)	ND	ND	1	6.72		20

Laboratory Control Sample (LCS)

(LCS) R3757001-1 02/03/22 16:30

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
TOC (Total Organic Carbon)	75000	68500	91.3	85.0-115	

L1453607-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1453607-02 02/03/22 18:45 • (MS) R3757001-3 02/03/22 19:11 • (MSD) R3757001-4 02/03/22 19:38

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MSD Result ug/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
TOC (Total Organic Carbon)	50000	2260	47700	47600	91.0	90.6	1	80.0-120			0.405	20

L1453934-03 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1453934-03 02/04/22 00:36 • (MS) R3757001-6 02/04/22 01:03 • (MSD) R3757001-7 02/04/22 01:30

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MSD Result ug/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
TOC (Total Organic Carbon)	50000	ND	49300	49900	97.2	98.5	1	80.0-120			1.26	20

Method Blank (MB)

(MB) R3753002-2 01/22/22 22:43

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Acetone	U		11.3	50.0
Benzene	U		0.0941	1.00
Carbon tetrachloride	U		0.128	1.00
Chlorobenzene	U		0.116	1.00
Chloroethane	U		0.192	5.00
Chloroform	U		0.111	5.00
1,2-Dibromo-3-Chloropropane	U		0.276	5.00
1,2-Dichloroethane	U		0.0819	1.00
1,1-Dichloroethene	U		0.188	1.00
cis-1,2-Dichloroethene	U		0.126	1.00
trans-1,2-Dichloroethene	U		0.149	1.00
1,2-Dichloropropane	U		0.149	1.00
Ethylbenzene	U		0.137	1.00
Methylene Chloride	U		0.430	5.00
1,1,2,2-Tetrachloroethane	U		0.133	1.00
Tetrachloroethene	U		0.300	1.00
Toluene	U		0.278	1.00
Trichloroethene	U		0.190	1.00
Vinyl chloride	U		0.234	1.00
o-Xylene	U		0.174	1.00
m&p-Xylenes	U		0.430	2.00
(S) Toluene-d8	*95.3*			*80.0-120*
(S) 4-Bromofluorobenzene	*96.8*			*77.0-126*
(S) 1,2-Dichloroethane-d4	*121*			*70.0-130*

Laboratory Control Sample (LCS)

(LCS) R3753002-1 01/22/22 22:05

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Acetone	25.0	16.1	64.4	19.0-160	
Benzene	5.00	4.53	90.6	70.0-123	
Carbon tetrachloride	5.00	4.93	98.6	68.0-126	
Chlorobenzene	5.00	4.65	93.0	80.0-121	
Chloroethane	5.00	4.07	81.4	47.0-150	
Chloroform	5.00	4.67	93.4	73.0-120	
1,2-Dibromo-3-Chloropropane	5.00	4.63	92.6	58.0-134	
1,2-Dichloroethane	5.00	6.03	121	70.0-128	
1,1-Dichloroethene	5.00	4.67	93.4	71.0-124	

Laboratory Control Sample (LCS)

(LCS) R3753002-1 01/22/22 22:05

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
cis-1,2-Dichloroethene	5.00	4.47	89.4	73.0-120	
trans-1,2-Dichloroethene	5.00	4.35	87.0	73.0-120	
1,2-Dichloropropane	5.00	4.77	95.4	77.0-125	
Ethylbenzene	5.00	4.82	96.4	79.0-123	
Methylene Chloride	5.00	4.51	90.2	67.0-120	
1,1,2,2-Tetrachloroethane	5.00	4.11	82.2	65.0-130	
Tetrachloroethene	5.00	4.99	99.8	72.0-132	
Toluene	5.00	4.57	91.4	79.0-120	
Trichloroethene	5.00	5.28	106	78.0-124	
Vinyl chloride	5.00	4.21	84.2	67.0-131	
o-Xylene	5.00	5.07	101	80.0-122	
m&p-Xylenes	10.0	9.77	97.7	80.0-122	
(S) Toluene-d8			*99.1*	*80.0-120*	
(S) 4-Bromofluorobenzene			*103*	*77.0-126*	
(S) 1,2-Dichloroethane-d4			*122*	*70.0-130*	

Method Blank (MB)

(MB) R3753523-3 01/24/22 20:53

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Chloroform	U		0.111	5.00
(S) Toluene-d8	*94.6*			*80.0-120*
(S) 4-Bromofluorobenzene	*99.4*			*77.0-126*
(S) 1,2-Dichloroethane-d4	*91.3*			*70.0-130*

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

(LCS) R3753523-1 01/24/22 19:49 • (LCSD) R3753523-2 01/24/22 20:10

Analyte	Spike Amount ug/l	LCS Result ug/l	LCSD Result ug/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Chloroform	5.00	4.71	4.72	94.2	94.4	73.0-120			0.212	20
(S) Toluene-d8				*92.6*	*91.8*	*80.0-120*				
(S) 4-Bromofluorobenzene				*99.9*	*99.6*	*77.0-126*				
(S) 1,2-Dichloroethane-d4				*92.2*	*90.6*	*70.0-130*				

Method Blank (MB)

(MB) R3754735-2 01/25/22 17:10

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
1,4-Dioxane	U		0.597	3.00
(S) Toluene-d8	*80.2*			*77.0-127*

Laboratory Control Sample (LCS)

(LCS) R3754735-1 01/25/22 15:02

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
1,4-Dioxane	50.0	29.4	58.8	55.0-138	
(S) Toluene-d8			*78.4*	*77.0-127*	

L1453946-04 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1453946-04 01/25/22 23:35 • (MS) R3754735-3 01/25/22 23:54 • (MSD) R3754735-4 01/26/22 00:14

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MSD Result ug/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
1,4-Dioxane	50.0	ND	45.3	46.7	90.6	93.4	1	13.0-160			3.04	31
(S) Toluene-d8					*98.8*	*97.9*		*77.0-127*				

Method Blank (MB)

(MB) R3753899-1 01/26/22 13:12

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Alpha BHC	U		0.0172	0.0500
Beta BHC	U		0.0208	0.0500
Delta BHC	U		0.0150	0.0500
Gamma BHC	U		0.0209	0.0500
(S) Decachlorobiphenyl	*93.1*			*10.0-128*
(S) Tetrachloro-m-xylene	*80.6*			*10.0-127*

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

(LCS) R3753899-2 01/26/22 13:20 • (LCSD) R3753899-3 01/26/22 13:29

Analyte	Spike Amount ug/l	LCS Result ug/l	LCSD Result ug/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Alpha BHC	1.00	1.08	1.11	108	111	54.0-130			2.74	23
Beta BHC	1.00	1.00	1.03	100	103	53.0-136			2.96	20
Delta BHC	1.00	1.00	1.06	100	106	54.0-133			5.83	20
Gamma BHC	1.00	1.03	1.05	103	105	55.0-129			1.92	20
(S) Decachlorobiphenyl				*96.9*	*81.1*	*10.0-128*				
(S) Tetrachloro-m-xylene				*74.1*	*82.5*	*10.0-127*				

Method Blank (MB)

(MB) R3753701-1 01/26/22 10:38

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Alpha BHC	U		0.0172	0.0500
Beta BHC	U		0.0208	0.0500
Delta BHC	U		0.0150	0.0500
Gamma BHC	U		0.0209	0.0500
(S) Decachlorobiphenyl	*79.9*			*10.0-128*
(S) Tetrachloro-m-xylene	*83.6*			*10.0-127*

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

(LCS) R3753701-4 01/26/22 10:47 • (LCSD) R3753701-5 01/26/22 10:56

Analyte	Spike Amount ug/l	LCS Result ug/l	LCSD Result ug/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Gamma BHC	1.00	1.03	1.01	103	101	55.0-129			1.96	20
(S) Decachlorobiphenyl				*68.4*	*78.9*	*10.0-128*				
(S) Tetrachloro-m-xylene				*84.0*	*85.9*	*10.0-127*				

Method Blank (MB)

(MB) R3754817-1 01/27/22 12:35

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Alpha BHC	U		0.0172	0.0500
Beta BHC	U		0.0208	0.0500
Delta BHC	U		0.0150	0.0500
Gamma BHC	U		0.0209	0.0500
(S) Decachlorobiphenyl	*110*			*10.0-128*
(S) Tetrachloro-m-xylene	*66.2*			*10.0-127*

Laboratory Control Sample (LCS)

(LCS) R3754817-2 01/27/22 12:44

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Alpha BHC	1.00	1.16	116	54.0-130	
Beta BHC	1.00	1.16	116	53.0-136	
Delta BHC	1.00	1.24	124	54.0-133	
Gamma BHC	1.00	1.10	110	55.0-129	
(S) Decachlorobiphenyl			*101*	*10.0-128*	
(S) Tetrachloro-m-xylene			*88.0*	*10.0-127*	

L1454090-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1454090-01 01/27/22 13:19 • (MS) R3754817-3 01/27/22 13:28 • (MSD) R3754817-4 01/27/22 13:37

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MSD Result ug/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Alpha BHC	1.00	ND	0.787	0.806	78.7	80.6	1	10.0-145			2.39	40
Beta BHC	1.00	ND	0.896	0.897	89.6	89.7	1	14.0-146			0.112	35
Delta BHC	1.00	ND	0.872	0.869	87.2	86.9	1	17.0-143			0.345	38
Gamma BHC	1.00	ND	0.838	0.856	83.8	85.6	1	14.0-141			2.13	40
(S) Decachlorobiphenyl					*67.3*	*61.5*		*10.0-128*				
(S) Tetrachloro-m-xylene					*60.9*	*61.8*		*10.0-127*				

GLOSSARY OF TERMS

Guide to Reading and Understanding Your Laboratory Report

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

Results Disclaimer - Information that may be provided by the customer, and contained within this report, include Permit Limits, Project Name, Sample ID, Sample Matrix, Sample Preservation, Field Blanks, Field Spikes, Field Duplicates, On-Site Data, Sampling Collection Dates/Times, and Sampling Location. Results relate to the accuracy of this information provided, and as the samples are received.

Abbreviations and Definitions

MDL	Method Detection Limit.
ND	Not detected at the Reporting Limit (or MDL where applicable).
RDL	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
(S)	Surrogate (Surrogate Standard) - Analytes added to every blank, sample, Laboratory Control Sample/Duplicate and Matrix Spike/Duplicate; used to evaluate analytical efficiency by measuring recovery. Surrogates are not expected to be detected in all environmental media.
U	Not detected at the Reporting Limit (or MDL where applicable).
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state “ND” (Not Detected) or “BDL” (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Uncertainty (Radiochemistry)	Confidence level of 2 sigma.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

Qualifier	Description
B	The same analyte is found in the associated blank.
J	The identification of the analyte is acceptable; the reported value is an estimate.
P	RPD between the primary and confirmatory analysis exceeded 40%.

ACCREDITATIONS & LOCATIONS

Pace Analytical National 12065 Lebanon Rd Mount Juliet, TN 37122

Alabama	40660	Nebraska	NE-OS-15-05
Alaska	17-026	Nevada	TN000032021-1
Arizona	AZ0612	New Hampshire	2975
Arkansas	88-0469	New Jersey–NELAP	TN002
California	2932	New Mexico [1]	TN00003
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina [1]	DW21704
Georgia	NELAP	North Carolina [3]	41
Georgia [1]	923	North Dakota	R-140
Idaho	TN00003	Ohio–VAP	CL0069
Illinois	200008	Oklahoma	9915
Indiana	C-TN-01	Oregon	TN200002
Iowa	364	Pennsylvania	68-02979
Kansas	E-10277	Rhode Island	LAO000356
Kentucky [1 6]	KY90010	South Carolina	84004002
Kentucky [2]	16	South Dakota	n/a
Louisiana	AI30792	Tennessee [1 4]	2006
Louisiana	LA018	Texas	T104704245-20-18
Maine	TN00003	Texas [5]	LAB0152
Maryland	324	Utah	TN000032021-11
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	110033
Minnesota	047-999-395	Washington	C847
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	998093910
Montana	CERT0086	Wyoming	A2LA
A2LA – ISO 17025	1461.01	AIHA-LAP,LLC EMLAP	100789
A2LA – ISO 17025 [5]	1461.02	DOD	1461.01
Canada	1461.01	USDA	P330-15-00234
EPA–Crypto	TN00003		

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

* Not all certifications held by the laboratory are applicable to the results reported in the attached report.

* Accreditation is only applicable to the test methods specified on each scope of accreditation held by Pace Analytical.

Company Name/Address:
Resolute Environmental & Water Resources

1003 Weatherstone Parkway

Billing Information:
Accounts Payable
1003 Weatherstone Pkwy., Ste. 320
Woodstock, GA 30188

Report to: **Tommy Jordan**

Email To: **tommy.jordan@resoluteenv.com**

Project Description: **UGA (Milledge Avenue Site) - 6Week Post**

City/State Collected: **Athens, GA**

Please Circle: PT MT CT ET

Phone: **404-358-8469**

Client Project #

Lab Project # **RESENVWGA-MILLEDGE**

Collected by (print): **Robert Mull**

Site/Facility ID #

P.O. #

Collected by (signature): **Robert B Mull**

Immediately Packed on Ice N ___ Y ✓

Rush? (Lab MUST be Notified)
___ Same Day ___ Five Day
___ Next Day ___ 5 Day (Rad Only)
___ Two Day ___ 10 Day (Rad Only)
___ Three Day

Quote #

Date Results Needed

Chain of Custody Page 1 of 1

Pace PEOPLE ADVANCING SCIENCE

MT JULIET, TN
12065 Lebanon Rd Mount Juliet, TN 37122
Submitting a sample via this chain of custody constitutes acknowledgment and acceptance of the Pace Terms and Conditions found at: https://info.pacelabs.com/hubfs/pas-standard-terms.pdf

SDG # L1453934

G022

Acctnum: **RESENVWGA**
Template: **T202182**
Prelogin: **P899125**
PM: **526 - Chris McCord**
PB: 1-12-22 MW
Shipped Via: **FedEx Priority**

Analysis / Container / Preservative

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	8081 100ml Amb-NoPres	SULFATE 125mlHDPE-NoPres	TOC 250mlHDPE-HCl	V8260LL14D 40mlAmb-HCl	V8260TCL 40mlAmb-HCl	Pres Chk	Remarks	Sample # (lab only)
PW-UA		GW		1/21/21	1001	8	X	X	X	X	X			-01
PW-UB		GW		1/21/21	1115	8	X	X	X	X	X			-02
~~PW-PRBA~~		GW				8	X	X	X	X	X			
PW-PRBB		GW		1/21/21	1217	8	X	X	X	X	X			-03
PW-DA		GW		1/21/21	1045	8	X	X	X	X	X			-04
PW-DB		GW		1/21/21	0945	8	X	X	X	X	X			-05
PW-DC		GW		1/20/21	1425	8	X	X	X	X	X			-06
		GW				8	X	X	X	X	X			

* Matrix:
SS - Soil AIR - Air F - Filter
GW - Groundwater B - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other_____

Remarks:

pH _____ Temp _____

Flow _____ Other _____

Samples returned via: __ UPS ✓ FedEx __ Courier _____

Tracking # 5489 4017 4284

Sample Receipt Checklist
COC Seal Present/Intact: __NP ✓Y __N
COC Signed/Accurate: ✓Y __N
Bottles arrive intact: ✓Y __N
Correct bottles used: ✓Y __N
Sufficient volume sent: ✓Y __N
If Applicable
VOA Zero Headspace: ✓Y __N
Preservation Correct/Checked: ✓Y __N
RAD Screen <0.5 mR/hr: ✓Y __N

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)
Robert B Mull	1/21/21	1330	
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature) Veronica Systmk

Trip Blank Received: (Yes) / No
HCL / MeoH
TBR

Temp: BAA 3.7 t.0=3.7 °C Bottles Received: 48

Date: 1/22/22 Time: 0930

If preservation required by Login: Date/Time

Hold:

Condition: NCF / (OK)

ANALYTICAL REPORT

March 21, 2022

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

Resolute Environmental & Water Resources

Sample Delivery Group:	L1470735
Samples Received:	03/11/2022
Project Number:	
Description:	UGA (Milledge Avenue Site)

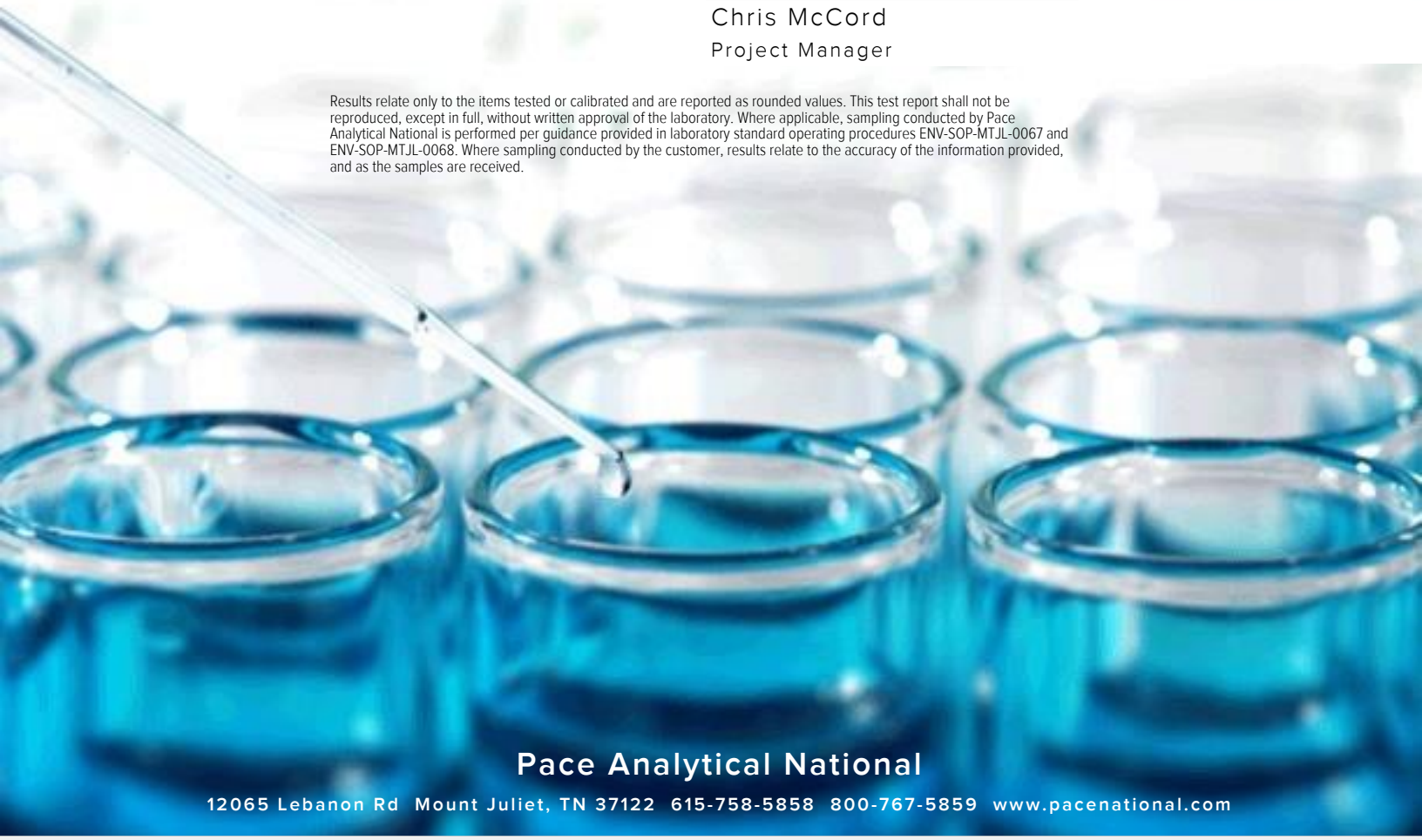
Report To:

Tommy Jordan
1003 Weatherstone Parkway
Suite 320
Woodstock, GA 30188

Entire Report Reviewed By:

Chris McCord
Project Manager

Results relate only to the items tested or calibrated and are reported as rounded values. This test report shall not be reproduced, except in full, without written approval of the laboratory. Where applicable, sampling conducted by Pace Analytical National is performed per guidance provided in laboratory standard operating procedures ENV-SOP-MTJL-0067 and ENV-SOP-MTJL-0068. Where sampling conducted by the customer, results relate to the accuracy of the information provided, and as the samples are received.



Pace Analytical National
12065 Lebanon Rd Mount Juliet, TN 37122 615-758-5858 800-767-5859 www.pacenational.com

TABLE OF CONTENTS

PW-UA L1470735-01 GW

Collected by: Robert Mull | Collected date/time: 03/10/22 11:41 | Received date/time: 03/11/22 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 9056A	WG1832227	5	03/15/22 01:31	03/15/22 01:31	KEG	Mt. Juliet, TN
Wet Chemistry by Method 9060A	WG1832860	1	03/16/22 02:27	03/16/22 02:27	GJA	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1831711	1	03/14/22 03:13	03/14/22 03:13	JAH	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B-SIM	WG1832540	1	03/15/22 15:51	03/15/22 15:51	DWR	Mt. Juliet, TN
Pesticides (GC) by Method 8081	WG1832674	1	03/16/22 14:33	03/17/22 02:56	AMM	Mt. Juliet, TN

PW-UB L1470735-02 GW

Collected by: Robert Mull | Collected date/time: 03/10/22 13:23 | Received date/time: 03/11/22 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 9056A	WG1832227	10	03/15/22 01:44	03/15/22 01:44	KEG	Mt. Juliet, TN
Wet Chemistry by Method 9060A	WG1832860	1	03/16/22 02:48	03/16/22 02:48	GJA	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1831711	1	03/14/22 03:33	03/14/22 03:33	JAH	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B-SIM	WG1832540	1	03/15/22 16:11	03/15/22 16:11	DWR	Mt. Juliet, TN
Pesticides (GC) by Method 8081	WG1832674	1	03/16/22 14:33	03/17/22 03:09	AMM	Mt. Juliet, TN

PW-PRBA L1470735-03 GW

Collected by: Robert Mull | Collected date/time: 03/10/22 12:45 | Received date/time: 03/11/22 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 9056A	WG1832227	50	03/15/22 02:22	03/15/22 02:22	KEG	Mt. Juliet, TN
Wet Chemistry by Method 9060A	WG1832860	1	03/16/22 03:01	03/16/22 03:01	GJA	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1831711	1	03/14/22 03:54	03/14/22 03:54	JAH	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B-SIM	WG1832540	1	03/15/22 16:30	03/15/22 16:30	DWR	Mt. Juliet, TN
Pesticides (GC) by Method 8081	WG1832674	1	03/16/22 14:33	03/17/22 03:21	AMM	Mt. Juliet, TN

PW-PRBB L1470735-04 GW

Collected by: Robert Mull | Collected date/time: 03/10/22 14:08 | Received date/time: 03/11/22 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 9056A	WG1832227	1	03/15/22 02:35	03/15/22 02:35	KEG	Mt. Juliet, TN
Wet Chemistry by Method 9060A	WG1832860	1	03/16/22 03:17	03/16/22 03:17	GJA	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1831711	1	03/14/22 04:14	03/14/22 04:14	JAH	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B-SIM	WG1832540	1	03/15/22 16:50	03/15/22 16:50	DWR	Mt. Juliet, TN
Pesticides (GC) by Method 8081	WG1832674	1	03/16/22 14:33	03/17/22 03:34	AMM	Mt. Juliet, TN

PW-DA L1470735-05 GW

Collected by: Robert Mull | Collected date/time: 03/10/22 15:06 | Received date/time: 03/11/22 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 9056A	WG1833640	20	03/16/22 22:00	03/16/22 22:00	ELN	Mt. Juliet, TN
Wet Chemistry by Method 9060A	WG1832860	1	03/16/22 03:30	03/16/22 03:30	GJA	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1831711	1	03/14/22 04:34	03/14/22 04:34	JAH	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B-SIM	WG1832540	1	03/15/22 17:10	03/15/22 17:10	DWR	Mt. Juliet, TN
Pesticides (GC) by Method 8081	WG1832674	1	03/16/22 14:33	03/17/22 03:47	AMM	Mt. Juliet, TN

PW-DB L1470735-06 GW

Collected by: Robert Mull
Collected date/time: 03/10/22 15:25
Received date/time: 03/11/22 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 9056A	WG1832227	100	03/15/22 03:26	03/15/22 03:26	KEG	Mt. Juliet, TN
Wet Chemistry by Method 9060A	WG1832860	1	03/16/22 03:47	03/16/22 03:47	GJA	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1831711	1	03/14/22 04:55	03/14/22 04:55	JAH	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B-SIM	WG1832540	1	03/15/22 17:30	03/15/22 17:30	DWR	Mt. Juliet, TN
Pesticides (GC) by Method 8081	WG1832674	1	03/16/22 14:33	03/17/22 04:00	AMM	Mt. Juliet, TN

PW-DC L1470735-07 GW

Collected by: Robert Mull
Collected date/time: 03/10/22 13:45
Received date/time: 03/11/22 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 9056A	WG1832227	5	03/15/22 03:39	03/15/22 03:39	KEG	Mt. Juliet, TN
Wet Chemistry by Method 9060A	WG1832860	1	03/16/22 04:00	03/16/22 04:00	GJA	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1831711	1	03/14/22 05:15	03/14/22 05:15	JAH	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B-SIM	WG1832540	1	03/15/22 17:50	03/15/22 17:50	DWR	Mt. Juliet, TN
Pesticides (GC) by Method 8081	WG1832674	1	03/16/22 14:33	03/17/22 04:13	AMM	Mt. Juliet, TN

CASE NARRATIVE

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

Chris McCord
Project Manager

Wet Chemistry by Method 9056A

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Sulfate	152000		25000	5	03/15/2022 01:31	WG1832227

Wet Chemistry by Method 9060A

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
TOC (Total Organic Carbon)	ND		1000	1	03/16/2022 02:27	WG1832860

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Acetone	ND		50.0	1	03/14/2022 03:13	WG1831711
Benzene	ND		1.00	1	03/14/2022 03:13	WG1831711
Carbon tetrachloride	1.45		1.00	1	03/14/2022 03:13	WG1831711
Chlorobenzene	ND		1.00	1	03/14/2022 03:13	WG1831711
Chloroethane	ND		5.00	1	03/14/2022 03:13	WG1831711
Chloroform	98.2		5.00	1	03/14/2022 03:13	WG1831711
1,2-Dibromo-3-Chloropropane	ND		5.00	1	03/14/2022 03:13	WG1831711
1,2-Dichloroethane	ND		1.00	1	03/14/2022 03:13	WG1831711
1,1-Dichloroethene	ND		1.00	1	03/14/2022 03:13	WG1831711
cis-1,2-Dichloroethene	ND		1.00	1	03/14/2022 03:13	WG1831711
trans-1,2-Dichloroethene	ND		1.00	1	03/14/2022 03:13	WG1831711
1,2-Dichloropropane	ND		1.00	1	03/14/2022 03:13	WG1831711
Ethylbenzene	ND		1.00	1	03/14/2022 03:13	WG1831711
Methylene Chloride	ND		5.00	1	03/14/2022 03:13	WG1831711
1,1,2,2-Tetrachloroethane	ND		1.00	1	03/14/2022 03:13	WG1831711
Tetrachloroethene	ND		1.00	1	03/14/2022 03:13	WG1831711
Toluene	ND		1.00	1	03/14/2022 03:13	WG1831711
Trichloroethene	ND		1.00	1	03/14/2022 03:13	WG1831711
Vinyl chloride	ND		1.00	1	03/14/2022 03:13	WG1831711
o-Xylene	ND		1.00	1	03/14/2022 03:13	WG1831711
m&p-Xylene	ND		2.00	1	03/14/2022 03:13	WG1831711
(S) Toluene-d8	*109*		*80.0-120*		*03/14/2022 03:13*	WG1831711
(S) 4-Bromofluorobenzene	*99.2*		*77.0-126*		*03/14/2022 03:13*	WG1831711
(S) 1,2-Dichloroethane-d4	*106*		*70.0-130*		*03/14/2022 03:13*	WG1831711

Volatile Organic Compounds (GC/MS) by Method 8260B-SIM

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
1,4-Dioxane	ND		3.00	1	03/15/2022 15:51	WG1832540
(S) Toluene-d8	*95.8*		*77.0-127*		*03/15/2022 15:51*	WG1832540

Pesticides (GC) by Method 8081

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Alpha BHC	ND		0.0500	1	03/17/2022 02:56	WG1832674
Beta BHC	ND		0.0500	1	03/17/2022 02:56	WG1832674
Delta BHC	ND		0.0500	1	03/17/2022 02:56	WG1832674
Gamma BHC	ND		0.0500	1	03/17/2022 02:56	WG1832674
(S) Decachlorobiphenyl	*64.4*		*10.0-128*		*03/17/2022 02:56*	WG1832674
(S) Tetrachloro-m-xylene	*73.2*		*10.0-127*		*03/17/2022 02:56*	WG1832674

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

Wet Chemistry by Method 9056A

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Sulfate	237000		50000	10	03/15/2022 01:44	WG1832227

Wet Chemistry by Method 9060A

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
TOC (Total Organic Carbon)	ND		1000	1	03/16/2022 02:48	WG1832860

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Acetone	ND		50.0	1	03/14/2022 03:33	WG1831711
Benzene	ND		1.00	1	03/14/2022 03:33	WG1831711
Carbon tetrachloride	ND		1.00	1	03/14/2022 03:33	WG1831711
Chlorobenzene	ND		1.00	1	03/14/2022 03:33	WG1831711
Chloroethane	ND		5.00	1	03/14/2022 03:33	WG1831711
Chloroform	15.5		5.00	1	03/14/2022 03:33	WG1831711
1,2-Dibromo-3-Chloropropane	ND		5.00	1	03/14/2022 03:33	WG1831711
1,2-Dichloroethane	ND		1.00	1	03/14/2022 03:33	WG1831711
1,1-Dichloroethene	ND		1.00	1	03/14/2022 03:33	WG1831711
cis-1,2-Dichloroethene	ND		1.00	1	03/14/2022 03:33	WG1831711
trans-1,2-Dichloroethene	ND		1.00	1	03/14/2022 03:33	WG1831711
1,2-Dichloropropane	ND		1.00	1	03/14/2022 03:33	WG1831711
Ethylbenzene	ND		1.00	1	03/14/2022 03:33	WG1831711
Methylene Chloride	ND		5.00	1	03/14/2022 03:33	WG1831711
1,1,2,2-Tetrachloroethane	ND		1.00	1	03/14/2022 03:33	WG1831711
Tetrachloroethene	ND		1.00	1	03/14/2022 03:33	WG1831711
Toluene	ND		1.00	1	03/14/2022 03:33	WG1831711
Trichloroethene	ND		1.00	1	03/14/2022 03:33	WG1831711
Vinyl chloride	ND		1.00	1	03/14/2022 03:33	WG1831711
o-Xylene	ND		1.00	1	03/14/2022 03:33	WG1831711
m&p-Xylene	ND		2.00	1	03/14/2022 03:33	WG1831711
(S) Toluene-d8	*111*		*80.0-120*		*03/14/2022 03:33*	WG1831711
(S) 4-Bromofluorobenzene	*104*		*77.0-126*		*03/14/2022 03:33*	WG1831711
(S) 1,2-Dichloroethane-d4	*107*		*70.0-130*		*03/14/2022 03:33*	WG1831711

Volatile Organic Compounds (GC/MS) by Method 8260B-SIM

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
1,4-Dioxane	ND		3.00	1	03/15/2022 16:11	WG1832540
(S) Toluene-d8	*96.7*		*77.0-127*		*03/15/2022 16:11*	WG1832540

Pesticides (GC) by Method 8081

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Alpha BHC	ND		0.0500	1	03/17/2022 03:09	WG1832674
Beta BHC	ND		0.0500	1	03/17/2022 03:09	WG1832674
Delta BHC	ND		0.0500	1	03/17/2022 03:09	WG1832674
Gamma BHC	ND		0.0500	1	03/17/2022 03:09	WG1832674
(S) Decachlorobiphenyl	*100*		*10.0-128*		*03/17/2022 03:09*	WG1832674
(S) Tetrachloro-m-xylene	*77.2*		*10.0-127*		*03/17/2022 03:09*	WG1832674

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

Wet Chemistry by Method 9056A

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Sulfate	2110000		250000	50	03/15/2022 02:22	WG1832227

Wet Chemistry by Method 9060A

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
TOC (Total Organic Carbon)	ND		1000	1	03/16/2022 03:01	WG1832860

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Acetone	ND		50.0	1	03/14/2022 03:54	WG1831711
Benzene	ND		1.00	1	03/14/2022 03:54	WG1831711
Carbon tetrachloride	1.55		1.00	1	03/14/2022 03:54	WG1831711
Chlorobenzene	ND		1.00	1	03/14/2022 03:54	WG1831711
Chloroethane	ND		5.00	1	03/14/2022 03:54	WG1831711
Chloroform	10.9		5.00	1	03/14/2022 03:54	WG1831711
1,2-Dibromo-3-Chloropropane	ND		5.00	1	03/14/2022 03:54	WG1831711
1,2-Dichloroethane	ND		1.00	1	03/14/2022 03:54	WG1831711
1,1-Dichloroethene	ND		1.00	1	03/14/2022 03:54	WG1831711
cis-1,2-Dichloroethene	ND		1.00	1	03/14/2022 03:54	WG1831711
trans-1,2-Dichloroethene	ND		1.00	1	03/14/2022 03:54	WG1831711
1,2-Dichloropropane	ND		1.00	1	03/14/2022 03:54	WG1831711
Ethylbenzene	ND		1.00	1	03/14/2022 03:54	WG1831711
Methylene Chloride	ND		5.00	1	03/14/2022 03:54	WG1831711
1,1,2,2-Tetrachloroethane	ND		1.00	1	03/14/2022 03:54	WG1831711
Tetrachloroethene	ND		1.00	1	03/14/2022 03:54	WG1831711
Toluene	ND		1.00	1	03/14/2022 03:54	WG1831711
Trichloroethene	ND		1.00	1	03/14/2022 03:54	WG1831711
Vinyl chloride	ND		1.00	1	03/14/2022 03:54	WG1831711
o-Xylene	ND		1.00	1	03/14/2022 03:54	WG1831711
m&p-Xylene	ND		2.00	1	03/14/2022 03:54	WG1831711
(S) Toluene-d8	*105*		*80.0-120*		*03/14/2022 03:54*	WG1831711
(S) 4-Bromofluorobenzene	*100*		*77.0-126*		*03/14/2022 03:54*	WG1831711
(S) 1,2-Dichloroethane-d4	*108*		*70.0-130*		*03/14/2022 03:54*	WG1831711

Volatile Organic Compounds (GC/MS) by Method 8260B-SIM

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
1,4-Dioxane	ND		3.00	1	03/15/2022 16:30	WG1832540
(S) Toluene-d8	*88.4*		*77.0-127*		*03/15/2022 16:30*	WG1832540

Pesticides (GC) by Method 8081

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Alpha BHC	ND		0.0500	1	03/17/2022 03:21	WG1832674
Beta BHC	ND		0.0500	1	03/17/2022 03:21	WG1832674
Delta BHC	ND		0.0500	1	03/17/2022 03:21	WG1832674
Gamma BHC	ND		0.0500	1	03/17/2022 03:21	WG1832674
(S) Decachlorobiphenyl	*47.2*		*10.0-128*		*03/17/2022 03:21*	WG1832674
(S) Tetrachloro-m-xylene	*69.1*		*10.0-127*		*03/17/2022 03:21*	WG1832674

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

Wet Chemistry by Method 9056A

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Sulfate	32100		5000	1	03/15/2022 02:35	WG1832227

Wet Chemistry by Method 9060A

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
TOC (Total Organic Carbon)	ND		1000	1	03/16/2022 03:17	WG1832860

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Acetone	ND		50.0	1	03/14/2022 04:14	WG1831711
Benzene	ND		1.00	1	03/14/2022 04:14	WG1831711
Carbon tetrachloride	ND		1.00	1	03/14/2022 04:14	WG1831711
Chlorobenzene	ND		1.00	1	03/14/2022 04:14	WG1831711
Chloroethane	ND		5.00	1	03/14/2022 04:14	WG1831711
Chloroform	ND		5.00	1	03/14/2022 04:14	WG1831711
1,2-Dibromo-3-Chloropropane	ND		5.00	1	03/14/2022 04:14	WG1831711
1,2-Dichloroethane	3.68		1.00	1	03/14/2022 04:14	WG1831711
1,1-Dichloroethene	ND		1.00	1	03/14/2022 04:14	WG1831711
cis-1,2-Dichloroethene	ND		1.00	1	03/14/2022 04:14	WG1831711
trans-1,2-Dichloroethene	4.40		1.00	1	03/14/2022 04:14	WG1831711
1,2-Dichloropropane	ND		1.00	1	03/14/2022 04:14	WG1831711
Ethylbenzene	ND		1.00	1	03/14/2022 04:14	WG1831711
Methylene Chloride	ND		5.00	1	03/14/2022 04:14	WG1831711
1,1,2,2-Tetrachloroethane	25.9		1.00	1	03/14/2022 04:14	WG1831711
Tetrachloroethene	7.27		1.00	1	03/14/2022 04:14	WG1831711
Toluene	ND		1.00	1	03/14/2022 04:14	WG1831711
Trichloroethene	5.84		1.00	1	03/14/2022 04:14	WG1831711
Vinyl chloride	ND		1.00	1	03/14/2022 04:14	WG1831711
o-Xylene	ND		1.00	1	03/14/2022 04:14	WG1831711
m&p-Xylene	ND		2.00	1	03/14/2022 04:14	WG1831711
(S) Toluene-d8	*108*		*80.0-120*		*03/14/2022 04:14*	WG1831711
(S) 4-Bromofluorobenzene	*102*		*77.0-126*		*03/14/2022 04:14*	WG1831711
(S) 1,2-Dichloroethane-d4	*110*		*70.0-130*		*03/14/2022 04:14*	WG1831711

Volatile Organic Compounds (GC/MS) by Method 8260B-SIM

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
1,4-Dioxane	117		3.00	1	03/15/2022 16:50	WG1832540
(S) Toluene-d8	*94.6*		*77.0-127*		*03/15/2022 16:50*	WG1832540

Pesticides (GC) by Method 8081

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Alpha BHC	ND		0.0500	1	03/17/2022 03:34	WG1832674
Beta BHC	ND		0.0500	1	03/17/2022 03:34	WG1832674
Delta BHC	ND		0.0500	1	03/17/2022 03:34	WG1832674
Gamma BHC	ND		0.0500	1	03/17/2022 03:34	WG1832674
(S) Decachlorobiphenyl	*94.5*		*10.0-128*		*03/17/2022 03:34*	WG1832674
(S) Tetrachloro-m-xylene	*74.3*		*10.0-127*		*03/17/2022 03:34*	WG1832674

Wet Chemistry by Method 9056A

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Sulfate	961000		100000	20	03/16/2022 22:00	WG1833640

Wet Chemistry by Method 9060A

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
TOC (Total Organic Carbon)	1010	B	1000	1	03/16/2022 03:30	WG1832860

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Acetone	ND		50.0	1	03/14/2022 04:34	WG1831711
Benzene	ND		1.00	1	03/14/2022 04:34	WG1831711
Carbon tetrachloride	1.54		1.00	1	03/14/2022 04:34	WG1831711
Chlorobenzene	ND		1.00	1	03/14/2022 04:34	WG1831711
Chloroethane	ND		5.00	1	03/14/2022 04:34	WG1831711
Chloroform	25.2		5.00	1	03/14/2022 04:34	WG1831711
1,2-Dibromo-3-Chloropropane	ND		5.00	1	03/14/2022 04:34	WG1831711
1,2-Dichloroethane	ND		1.00	1	03/14/2022 04:34	WG1831711
1,1-Dichloroethene	ND		1.00	1	03/14/2022 04:34	WG1831711
cis-1,2-Dichloroethene	ND		1.00	1	03/14/2022 04:34	WG1831711
trans-1,2-Dichloroethene	ND		1.00	1	03/14/2022 04:34	WG1831711
1,2-Dichloropropane	ND		1.00	1	03/14/2022 04:34	WG1831711
Ethylbenzene	ND		1.00	1	03/14/2022 04:34	WG1831711
Methylene Chloride	ND		5.00	1	03/14/2022 04:34	WG1831711
1,1,2,2-Tetrachloroethane	ND		1.00	1	03/14/2022 04:34	WG1831711
Tetrachloroethene	ND		1.00	1	03/14/2022 04:34	WG1831711
Toluene	ND		1.00	1	03/14/2022 04:34	WG1831711
Trichloroethene	ND		1.00	1	03/14/2022 04:34	WG1831711
Vinyl chloride	ND		1.00	1	03/14/2022 04:34	WG1831711
o-Xylene	ND		1.00	1	03/14/2022 04:34	WG1831711
m&p-Xylene	ND		2.00	1	03/14/2022 04:34	WG1831711
(S) Toluene-d8	*108*		*80.0-120*		*03/14/2022 04:34*	WG1831711
(S) 4-Bromofluorobenzene	*101*		*77.0-126*		*03/14/2022 04:34*	WG1831711
(S) 1,2-Dichloroethane-d4	*107*		*70.0-130*		*03/14/2022 04:34*	WG1831711

Volatile Organic Compounds (GC/MS) by Method 8260B-SIM

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
1,4-Dioxane	ND		3.00	1	03/15/2022 17:10	WG1832540
(S) Toluene-d8	*91.6*		*77.0-127*		*03/15/2022 17:10*	WG1832540

Pesticides (GC) by Method 8081

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Alpha BHC	ND		0.0500	1	03/17/2022 03:47	WG1832674
Beta BHC	ND		0.0500	1	03/17/2022 03:47	WG1832674
Delta BHC	ND		0.0500	1	03/17/2022 03:47	WG1832674
Gamma BHC	ND		0.0500	1	03/17/2022 03:47	WG1832674
(S) Decachlorobiphenyl	*43.3*		*10.0-128*		*03/17/2022 03:47*	WG1832674
(S) Tetrachloro-m-xylene	*74.3*		*10.0-127*		*03/17/2022 03:47*	WG1832674

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

Wet Chemistry by Method 9056A

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Sulfate	6230000		500000	100	03/15/2022 03:26	WG1832227

Wet Chemistry by Method 9060A

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
TOC (Total Organic Carbon)	1500	B	1000	1	03/16/2022 03:47	WG1832860

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Acetone	92.1		50.0	1	03/14/2022 04:55	WG1831711
Benzene	ND		1.00	1	03/14/2022 04:55	WG1831711
Carbon tetrachloride	ND		1.00	1	03/14/2022 04:55	WG1831711
Chlorobenzene	ND		1.00	1	03/14/2022 04:55	WG1831711
Chloroethane	ND		5.00	1	03/14/2022 04:55	WG1831711
Chloroform	5.44		5.00	1	03/14/2022 04:55	WG1831711
1,2-Dibromo-3-Chloropropane	ND		5.00	1	03/14/2022 04:55	WG1831711
1,2-Dichloroethane	1.41		1.00	1	03/14/2022 04:55	WG1831711
1,1-Dichloroethene	ND		1.00	1	03/14/2022 04:55	WG1831711
cis-1,2-Dichloroethene	ND		1.00	1	03/14/2022 04:55	WG1831711
trans-1,2-Dichloroethene	ND		1.00	1	03/14/2022 04:55	WG1831711
1,2-Dichloropropane	ND		1.00	1	03/14/2022 04:55	WG1831711
Ethylbenzene	ND		1.00	1	03/14/2022 04:55	WG1831711
Methylene Chloride	ND		5.00	1	03/14/2022 04:55	WG1831711
1,1,2,2-Tetrachloroethane	16.2		1.00	1	03/14/2022 04:55	WG1831711
Tetrachloroethene	ND		1.00	1	03/14/2022 04:55	WG1831711
Toluene	ND		1.00	1	03/14/2022 04:55	WG1831711
Trichloroethene	ND		1.00	1	03/14/2022 04:55	WG1831711
Vinyl chloride	ND		1.00	1	03/14/2022 04:55	WG1831711
o-Xylene	ND		1.00	1	03/14/2022 04:55	WG1831711
m&p-Xylene	ND		2.00	1	03/14/2022 04:55	WG1831711
(S) Toluene-d8	*108*		*80.0-120*		*03/14/2022 04:55*	WG1831711
(S) 4-Bromofluorobenzene	*102*		*77.0-126*		*03/14/2022 04:55*	WG1831711
(S) 1,2-Dichloroethane-d4	*110*		*70.0-130*		*03/14/2022 04:55*	WG1831711

Volatile Organic Compounds (GC/MS) by Method 8260B-SIM

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
1,4-Dioxane	27.4		3.00	1	03/15/2022 17:30	WG1832540
(S) Toluene-d8	*94.6*		*77.0-127*		*03/15/2022 17:30*	WG1832540

Pesticides (GC) by Method 8081

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Alpha BHC	ND		0.0500	1	03/17/2022 04:00	WG1832674
Beta BHC	ND		0.0500	1	03/17/2022 04:00	WG1832674
Delta BHC	ND		0.0500	1	03/17/2022 04:00	WG1832674
Gamma BHC	ND		0.0500	1	03/17/2022 04:00	WG1832674
(S) Decachlorobiphenyl	*62.2*		*10.0-128*		*03/17/2022 04:00*	WG1832674
(S) Tetrachloro-m-xylene	*73.7*		*10.0-127*		*03/17/2022 04:00*	WG1832674

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

Wet Chemistry by Method 9056A

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Sulfate	147000		25000	5	03/15/2022 03:39	WG1832227

Wet Chemistry by Method 9060A

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
TOC (Total Organic Carbon)	ND		1000	1	03/16/2022 04:00	WG1832860

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Acetone	ND		50.0	1	03/14/2022 05:15	WG1831711
Benzene	ND		1.00	1	03/14/2022 05:15	WG1831711
Carbon tetrachloride	ND		1.00	1	03/14/2022 05:15	WG1831711
Chlorobenzene	ND		1.00	1	03/14/2022 05:15	WG1831711
Chloroethane	ND		5.00	1	03/14/2022 05:15	WG1831711
Chloroform	6.73		5.00	1	03/14/2022 05:15	WG1831711
1,2-Dibromo-3-Chloropropane	ND		5.00	1	03/14/2022 05:15	WG1831711
1,2-Dichloroethane	ND		1.00	1	03/14/2022 05:15	WG1831711
1,1-Dichloroethene	ND		1.00	1	03/14/2022 05:15	WG1831711
cis-1,2-Dichloroethene	ND		1.00	1	03/14/2022 05:15	WG1831711
trans-1,2-Dichloroethene	ND		1.00	1	03/14/2022 05:15	WG1831711
1,2-Dichloropropane	ND		1.00	1	03/14/2022 05:15	WG1831711
Ethylbenzene	ND		1.00	1	03/14/2022 05:15	WG1831711
Methylene Chloride	ND		5.00	1	03/14/2022 05:15	WG1831711
1,1,2,2-Tetrachloroethane	ND		1.00	1	03/14/2022 05:15	WG1831711
Tetrachloroethene	ND		1.00	1	03/14/2022 05:15	WG1831711
Toluene	ND		1.00	1	03/14/2022 05:15	WG1831711
Trichloroethene	ND		1.00	1	03/14/2022 05:15	WG1831711
Vinyl chloride	ND		1.00	1	03/14/2022 05:15	WG1831711
o-Xylene	ND		1.00	1	03/14/2022 05:15	WG1831711
m&p-Xylene	ND		2.00	1	03/14/2022 05:15	WG1831711
(S) Toluene-d8	*106*		*80.0-120*		*03/14/2022 05:15*	WG1831711
(S) 4-Bromofluorobenzene	*101*		*77.0-126*		*03/14/2022 05:15*	WG1831711
(S) 1,2-Dichloroethane-d4	*111*		*70.0-130*		*03/14/2022 05:15*	WG1831711

Volatile Organic Compounds (GC/MS) by Method 8260B-SIM

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
1,4-Dioxane	ND		3.00	1	03/15/2022 17:50	WG1832540
(S) Toluene-d8	*93.5*		*77.0-127*		*03/15/2022 17:50*	WG1832540

Pesticides (GC) by Method 8081

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Alpha BHC	ND		0.0500	1	03/17/2022 04:13	WG1832674
Beta BHC	ND		0.0500	1	03/17/2022 04:13	WG1832674
Delta BHC	ND		0.0500	1	03/17/2022 04:13	WG1832674
Gamma BHC	ND		0.0500	1	03/17/2022 04:13	WG1832674
(S) Decachlorobiphenyl	*95.9*		*10.0-128*		*03/17/2022 04:13*	WG1832674
(S) Tetrachloro-m-xylene	*80.7*		*10.0-127*		*03/17/2022 04:13*	WG1832674

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

Method Blank (MB)

(MB) R3769752-1 03/14/22 18:53

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Sulfate	U		594	5000

L1470707-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1470707-01 03/14/22 22:06 • (DUP) R3769752-3 03/14/22 22:19

Analyte	Original Result ug/l	DUP Result ug/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Sulfate	38000	37900	1	0.360		15

L1470735-04 Original Sample (OS) • Duplicate (DUP)

(OS) L1470735-04 03/15/22 02:35 • (DUP) R3769752-6 03/15/22 02:48

Analyte	Original Result ug/l	DUP Result ug/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Sulfate	32100	30700	1	4.44		15

Laboratory Control Sample (LCS)

(LCS) R3769752-2 03/14/22 19:06

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Sulfate	40000	38800	97.1	80.0-120	

L1470707-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1470707-01 03/14/22 22:06 • (MS) R3769752-4 03/14/22 22:31 • (MSD) R3769752-5 03/14/22 22:44

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MSD Result ug/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Sulfate	50000	38000	86800	88300	97.6	101	1	80.0-120			1.69	15

L1470735-04 Original Sample (OS) • Matrix Spike (MS)

(OS) L1470735-04 03/15/22 02:35 • (MS) R3769752-7 03/15/22 03:01

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Sulfate	50000	32100	78100	92.0	1	80.0-120	

Method Blank (MB)

(MB) R3770971-1 03/16/22 09:49

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Sulfate	U		594	5000

L1471848-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1471848-01 03/16/22 23:02 • (DUP) R3770971-3 03/16/22 23:17

Analyte	Original Result ug/l	DUP Result ug/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Sulfate	33400	33300	1	0.283		15

L1472056-06 Original Sample (OS) • Duplicate (DUP)

(OS) L1472056-06 03/17/22 13:23 • (DUP) R3770971-8 03/17/22 14:10

Analyte	Original Result ug/l	DUP Result ug/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Sulfate	ND	ND	1	0.663		15

Laboratory Control Sample (LCS)

(LCS) R3770971-2 03/16/22 10:04

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Sulfate	40000	39600	98.9	80.0-120	

L1471848-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1471848-01 03/16/22 23:02 • (MS) R3770971-4 03/16/22 23:33 • (MSD) R3770971-5 03/17/22 00:19

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MSD Result ug/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Sulfate	50000	33400	81000	80700	95.2	94.5	1	80.0-120			0.409	15

L1472056-06 Original Sample (OS) • Matrix Spike (MS)

(OS) L1472056-06 03/17/22 13:23 • (MS) R3770971-9 03/17/22 14:25

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Sulfate	50000	ND	54500	102	1	80.0-120	

Method Blank (MB)

(MB) R3770315-2 03/15/22 09:43

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
TOC (Total Organic Carbon)	346	J	102	1000

L1470489-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1470489-01 03/16/22 01:07 • (DUP) R3770315-8 03/16/22 01:21

Analyte	Original Result ug/l	DUP Result ug/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
TOC (Total Organic Carbon)	3690	3560	1	3.67		20

Laboratory Control Sample (LCS)

(LCS) R3770315-1 03/15/22 09:29

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
TOC (Total Organic Carbon)	75000	81300	108	85.0-115	

L1470201-06 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1470201-06 03/15/22 19:52 • (MS) R3770315-3 03/15/22 20:16 • (MSD) R3770315-4 03/15/22 20:39

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MSD Result ug/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
TOC (Total Organic Carbon)	50000	3580	57600	58800	108	111	1	80.0-120			2.10	20

L1470201-10 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1470201-10 03/15/22 22:47 • (MS) R3770315-6 03/15/22 23:13 • (MSD) R3770315-7 03/15/22 23:39

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MSD Result ug/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
TOC (Total Organic Carbon)	50000	7700	62500	62800	110	110	1	80.0-120			0.559	20

Method Blank (MB)

(MB) R3769436-2 03/13/22 22:21

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Acetone	U		11.3	50.0
Benzene	U		0.0941	1.00
Carbon tetrachloride	U		0.128	1.00
Chlorobenzene	U		0.116	1.00
Chloroethane	U		0.192	5.00
Chloroform	U		0.111	5.00
1,2-Dibromo-3-Chloropropane	U		0.276	5.00
1,2-Dichloroethane	U		0.0819	1.00
1,1-Dichloroethene	U		0.188	1.00
cis-1,2-Dichloroethene	U		0.126	1.00
trans-1,2-Dichloroethene	U		0.149	1.00
1,2-Dichloropropane	U		0.149	1.00
Ethylbenzene	U		0.137	1.00
Methylene Chloride	U		0.430	5.00
1,1,2,2-Tetrachloroethane	U		0.133	1.00
Tetrachloroethene	U		0.300	1.00
Toluene	U		0.278	1.00
Trichloroethene	U		0.190	1.00
Vinyl chloride	U		0.234	1.00
o-Xylene	U		0.174	1.00
m&p-Xylenes	U		0.430	2.00
(S) Toluene-d8	*111*			*80.0-120*
(S) 4-Bromofluorobenzene	*103*			*77.0-126*
(S) 1,2-Dichloroethane-d4	*105*			*70.0-130*

Laboratory Control Sample (LCS)

(LCS) R3769436-1 03/13/22 21:40

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Acetone	25.0	26.2	105	19.0-160	
Benzene	5.00	5.37	107	70.0-123	
Carbon tetrachloride	5.00	4.50	90.0	68.0-126	
Chlorobenzene	5.00	5.37	107	80.0-121	
Chloroethane	5.00	5.06	101	47.0-150	
Chloroform	5.00	5.27	105	73.0-120	
1,2-Dibromo-3-Chloropropane	5.00	4.42	88.4	58.0-134	
1,2-Dichloroethane	5.00	5.58	112	70.0-128	
1,1-Dichloroethene	5.00	4.68	93.6	71.0-124	

Laboratory Control Sample (LCS)

(LCS) R3769436-1 03/13/22 21:40

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
cis-1,2-Dichloroethene	5.00	5.13	103	73.0-120	
trans-1,2-Dichloroethene	5.00	5.20	104	73.0-120	
1,2-Dichloropropane	5.00	5.01	100	77.0-125	
Ethylbenzene	5.00	4.86	97.2	79.0-123	
Methylene Chloride	5.00	4.57	91.4	67.0-120	
1,1,2,2-Tetrachloroethane	5.00	4.41	88.2	65.0-130	
Tetrachloroethene	5.00	4.88	97.6	72.0-132	
Toluene	5.00	5.35	107	79.0-120	
Trichloroethene	5.00	4.84	96.8	78.0-124	
Vinyl chloride	5.00	5.00	100	67.0-131	
o-Xylene	5.00	5.04	101	80.0-122	
m&p-Xylenes	10.0	10.9	109	80.0-122	
(S) Toluene-d8			*107*	*80.0-120*	
(S) 4-Bromofluorobenzene			*104*	*77.0-126*	
(S) 1,2-Dichloroethane-d4			*110*	*70.0-130*	

Method Blank (MB)

(MB) R3770572-2 03/15/22 13:39

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	ug/l		ug/l	ug/l
1,4-Dioxane	U		0.597	3.00
(S) Toluene-d8	*96.2*			*77.0-127*

Laboratory Control Sample (LCS)

(LCS) R3770572-1 03/15/22 12:02

Analyte	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
	ug/l	ug/l	%	%	
1,4-Dioxane	50.0	31.6	63.2	55.0-138	
(S) Toluene-d8			*94.6*	*77.0-127*	

L1470735-07 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1470735-07 03/15/22 17:50 • (MS) R3770572-3 03/15/22 18:10 • (MSD) R3770572-4 03/15/22 18:29

Analyte	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
	ug/l	ug/l	ug/l	ug/l	%	%		%			%	%
1,4-Dioxane	50.0	ND	28.4	22.6	53.7	42.1	1	13.0-160			22.7	31
(S) Toluene-d8					*94.9*	*94.8*		*77.0-127*				

Method Blank (MB)

(MB) R3770701-1 03/16/22 22:26

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Alpha BHC	U		0.0172	0.0500
Beta BHC	U		0.0208	0.0500
Delta BHC	U		0.0150	0.0500
Gamma BHC	U		0.0209	0.0500
(S) Decachlorobiphenyl	*89.0*			*10.0-128*
(S) Tetrachloro-m-xylene	*74.8*			*10.0-127*

Laboratory Control Sample (LCS)

(LCS) R3770701-2 03/16/22 22:38

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Alpha BHC	1.00	0.908	90.8	54.0-130	
Beta BHC	1.00	0.992	99.2	53.0-136	
Delta BHC	1.00	0.869	86.9	54.0-133	
Gamma BHC	1.00	0.956	95.6	55.0-129	
(S) Decachlorobiphenyl			*68.8*	*10.0-128*	
(S) Tetrachloro-m-xylene			*71.4*	*10.0-127*	

L1467955-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1467955-01 03/17/22 00:09 • (MS) R3770701-3 03/17/22 00:21 • (MSD) R3770701-4 03/17/22 00:34

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MSD Result ug/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Alpha BHC	1.00	ND	0.755	0.615	75.5	61.5	1	10.0-145			20.4	40
Beta BHC	1.00	ND	0.835	0.592	83.5	59.2	1	14.0-146			34.1	35
Delta BHC	1.00	ND	0.751	0.577	75.1	57.7	1	17.0-143			26.2	38
Gamma BHC	1.00	ND	0.852	0.668	85.2	66.8	1	14.0-141			24.2	40
(S) Decachlorobiphenyl					*87.5*	*75.4*		*10.0-128*				
(S) Tetrachloro-m-xylene					*64.8*	*49.7*		*10.0-127*				

GLOSSARY OF TERMS

Guide to Reading and Understanding Your Laboratory Report

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

Results Disclaimer - Information that may be provided by the customer, and contained within this report, include Permit Limits, Project Name, Sample ID, Sample Matrix, Sample Preservation, Field Blanks, Field Spikes, Field Duplicates, On-Site Data, Sampling Collection Dates/Times, and Sampling Location. Results relate to the accuracy of this information provided, and as the samples are received.

Abbreviations and Definitions

MDL	Method Detection Limit.
ND	Not detected at the Reporting Limit (or MDL where applicable).
RDL	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
(S)	Surrogate (Surrogate Standard) - Analytes added to every blank, sample, Laboratory Control Sample/Duplicate and Matrix Spike/Duplicate; used to evaluate analytical efficiency by measuring recovery. Surrogates are not expected to be detected in all environmental media.
U	Not detected at the Reporting Limit (or MDL where applicable).
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state “ND” (Not Detected) or “BDL” (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Uncertainty (Radiochemistry)	Confidence level of 2 sigma.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

Qualifier	Description
B	The same analyte is found in the associated blank.
J	The identification of the analyte is acceptable; the reported value is an estimate.

ACCREDITATIONS & LOCATIONS

Pace Analytical National 12065 Lebanon Rd Mount Juliet, TN 37122

Alabama	40660	Nebraska	NE-OS-15-05
Alaska	17-026	Nevada	TN000032021-1
Arizona	AZ0612	New Hampshire	2975
Arkansas	88-0469	New Jersey–NELAP	TN002
California	2932	New Mexico [1]	TN00003
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina [1]	DW21704
Georgia	NELAP	North Carolina [3]	41
Georgia [1]	923	North Dakota	R-140
Idaho	TN00003	Ohio–VAP	CL0069
Illinois	200008	Oklahoma	9915
Indiana	C-TN-01	Oregon	TN200002
Iowa	364	Pennsylvania	68-02979
Kansas	E-10277	Rhode Island	LAO000356
Kentucky [1 6]	KY90010	South Carolina	84004002
Kentucky [2]	16	South Dakota	n/a
Louisiana	AI30792	Tennessee [1 4]	2006
Louisiana	LA018	Texas	T104704245-20-18
Maine	TN00003	Texas [5]	LAB0152
Maryland	324	Utah	TN000032021-11
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	110033
Minnesota	047-999-395	Washington	C847
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	998093910
Montana	CERT0086	Wyoming	A2LA
A2LA – ISO 17025	1461.01	AIHA-LAP,LLC EMLAP	100789
A2LA – ISO 17025 [5]	1461.02	DOD	1461.01
Canada	1461.01	USDA	P330-15-00234
EPA–Crypto	TN00003		

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

* Not all certifications held by the laboratory are applicable to the results reported in the attached report.

* Accreditation is only applicable to the test methods specified on each scope of accreditation held by Pace Analytical.

Company Name/Address:
Resolute Environmental & Water Resources

1003 Weatherstone Parkway

Billing Information:
Accounts Payable
1003 Weatherstone Pkwy., Ste. 320
Woodstock, GA 30188

Pres Chk

Report to:
Tommy Jordan

Email To: **tommy.jordan@resoluteenv.com**

Project Description: **3-month Post Injection**
UGA (Milledge Avenue Site)

City/State Collected: **Athens, GA**

Please Circle: PT MT CT (ET)

Phone: **404-358-8469**

Client Project #

Lab Project #
RESENVWGA-UGA MAS

Collected by (print):
Robert Mull

Site/Facility ID #

P.O. #

Collected by (signature):
Robert B Mull
Immediately Packed on Ice N ___ Y ✓

Rush? (Lab MUST Be Notified)
___ Same Day ___ Five Day
___ Next Day ___ 5 Day (Rad Only)
___ Two Day ___ 10 Day (Rad Only)
___ Three Day

Quote #

Date Results Needed

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	8081 100ml Amb-NoPres	SULFATE 125ml HDPE-NoPres	TOC 250ml HDPE-HCl	V8260LL14D 40ml Amb-HCl	V8260TCL 40ml Amb-HCl	Remarks	Sample # (lab only)
PW-UA	G	GW		3/10/22	1141	9	X	X	X	X	X		-01
PW-UB	G	GW		3/10/22	1323	9	X	X	X	X	X		-02
PW-PRBA	G	GW		3/10/22	1245	9	X	X	X	X	X		-03
PW-PRBB	G	GW		3/10/22	1408	9	X	X	X	X	X		-04
PW-DA	G	GW		3/10/22	1506	9	X	X	X	X	X		-05
PW-DB	G	GW		3/10/22	1525	9	X	X	X	X	X		-06
PW-DC	G	GW		3/10/22	1345	9	X	X	X	X	X		-07
		GW				9	X	X	X	X	X		

Analysis / Container / Preservative

Chain of Custody Page ___ of ___

Pace
PEOPLE ADVANCING SCIENCE

MT JULIET, TN
12065 Lebanon Rd Mount Juliet, TN 37122
Submitting a sample via this chain of custody constitutes acknowledgment and acceptance of the Pace Terms and Conditions found at: https://info.pacelabs.com/hubfs/pas-standard-terms.pdf

SDG # L470735
Ta B127
Acctnum: RESENVWGA
Template: T202182
Prelogin: P910080
PM: 526 - Chris McCord
PB: 3/24/22
Shipped Via: FedEX Ground

* Matrix:
SS - Soil AIR - Air F - Filter
GW - Groundwater B - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other_____

Remarks:

pH _____ Temp _____
Flow _____ Other _____

Samples returned via:
__ UPS __ FedEx __ Courier _____

Tracking # 5671 5377 2524

Sample Receipt Checklist
COC Seal Present/Intact: NP Y N
COC Signed/Accurate: Y N
Bottles arrive intact: Y N
Correct bottles used: Y N
Sufficient volume sent: Y N
If Applicable
VOA Zero Headspace: Y N
Preservation Correct/Checked: Y N
RAD Screen <0.5 mR/hr: Y N

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)
Robert B Mull	3/10/22	1615	
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)
			T. Robertson

Trip Blank Received: Yes / No HCL / MeoH TBR

Temp: 5.1+0=5.1 °C Bottles Received: 63

Date: 3/11/22 Time: 800

If preservation required by Login: Date/Time

Hold:

Condition: NCF / OK

ANALYTICAL REPORT

January 05, 2022

Resolute Environmental & Water Resources

Sample Delivery Group:	L1444885
Samples Received:	12/21/2021
Project Number:	
Description:	UGA (Milledge Avenue Site)

Report To:

Tommy Jordan
1003 Weatherstone Parkway
Suite 320
Woodstock, GA 30188

Entire Report Reviewed By:

Jason Romer
Project Manager

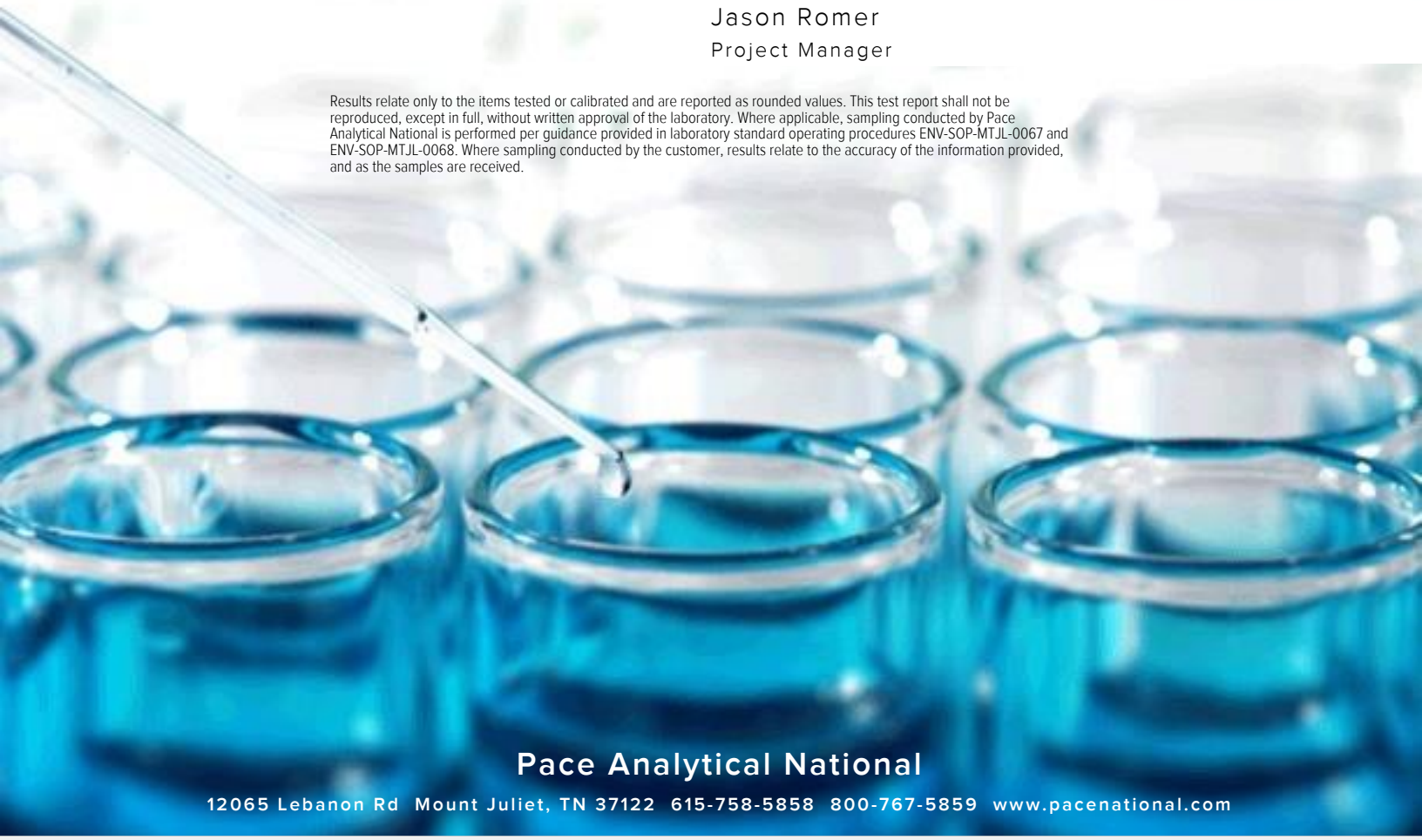


TABLE OF CONTENTS

SAMPLE SUMMARY

SW-D1 L1444885-01 GW

			Collected by	Collected date/time	Received date/time	
				12/20/21 15:20	12/21/21 10:15	
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 9056A	WG1796870	1	01/03/22 22:31	01/03/22 22:31	LBR	Mt. Juliet, TN
Wet Chemistry by Method 9060A	WG1795177	1	12/28/21 07:31	12/28/21 07:31	VRP	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1795041	1	12/27/21 13:27	12/27/21 13:27	JCP	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B-SIM	WG1793484	1	12/22/21 19:17	12/22/21 19:17	BMB	Mt. Juliet, TN
Pesticides (GC) by Method 8081	WG1794142	1	12/23/21 13:16	12/24/21 14:56	MTJ	Mt. Juliet, TN

CASE NARRATIVE

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

Jason Romer
Project Manager

Wet Chemistry by Method 9056A

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Sulfate	5800		5000	1	01/03/2022 22:31	WG1796870

Wet Chemistry by Method 9060A

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
TOC (Total Organic Carbon)	1770		1000	1	12/28/2021 07:31	WG1795177

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Acetone	ND		50.0	1	12/27/2021 13:27	WG1795041
Benzene	ND		1.00	1	12/27/2021 13:27	WG1795041
Carbon tetrachloride	ND		1.00	1	12/27/2021 13:27	WG1795041
Chlorobenzene	ND		1.00	1	12/27/2021 13:27	WG1795041
Chloroethane	ND		5.00	1	12/27/2021 13:27	WG1795041
Chloroform	ND		5.00	1	12/27/2021 13:27	WG1795041
1,2-Dibromo-3-Chloropropane	ND		5.00	1	12/27/2021 13:27	WG1795041
1,2-Dichloroethane	ND		1.00	1	12/27/2021 13:27	WG1795041
1,1-Dichloroethene	ND		1.00	1	12/27/2021 13:27	WG1795041
cis-1,2-Dichloroethene	ND		1.00	1	12/27/2021 13:27	WG1795041
trans-1,2-Dichloroethene	ND		1.00	1	12/27/2021 13:27	WG1795041
1,2-Dichloropropane	ND		1.00	1	12/27/2021 13:27	WG1795041
Ethylbenzene	ND		1.00	1	12/27/2021 13:27	WG1795041
Methylene Chloride	ND		5.00	1	12/27/2021 13:27	WG1795041
1,1,2,2-Tetrachloroethane	ND		1.00	1	12/27/2021 13:27	WG1795041
Tetrachloroethene	ND		1.00	1	12/27/2021 13:27	WG1795041
Toluene	ND		1.00	1	12/27/2021 13:27	WG1795041
Trichloroethene	ND		1.00	1	12/27/2021 13:27	WG1795041
Vinyl chloride	ND		1.00	1	12/27/2021 13:27	WG1795041
o-Xylene	ND		1.00	1	12/27/2021 13:27	WG1795041
m&p-Xylene	ND		2.00	1	12/27/2021 13:27	WG1795041
(S) Toluene-d8	*114*		*80.0-120*		*12/27/2021 13:27*	WG1795041
(S) 4-Bromofluorobenzene	*98.0*		*77.0-126*		*12/27/2021 13:27*	WG1795041
(S) 1,2-Dichloroethane-d4	*133*	J1	*70.0-130*		*12/27/2021 13:27*	WG1795041

Volatile Organic Compounds (GC/MS) by Method 8260B-SIM

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
1,4-Dioxane	4.07		3.00	1	12/22/2021 19:17	WG1793484
(S) Toluene-d8	*97.9*		*77.0-127*		*12/22/2021 19:17*	WG1793484

Pesticides (GC) by Method 8081

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Gamma BHC	ND		0.0500	1	12/24/2021 14:56	WG1794142
(S) Decachlorobiphenyl	*94.5*		*10.0-128*		*12/24/2021 14:56*	WG1794142
(S) Tetrachloro-m-xylene	*80.8*		*10.0-127*		*12/24/2021 14:56*	WG1794142

Method Blank (MB)

(MB) R3747422-1 01/03/22 13:29

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	ug/l		ug/l	ug/l
Sulfate	U		594	5000

L1444538-03 Original Sample (OS) • Duplicate (DUP)

(OS) L1444538-03 01/03/22 15:29 • (DUP) R3747422-3 01/03/22 15:53

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	ug/l	ug/l		%		%
Sulfate	52900	53100	1	0.430		15

Laboratory Control Sample (LCS)

(LCS) R3747422-2 01/03/22 13:41

Analyte	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
	ug/l	ug/l	%	%	
Sulfate	40000	41600	104	80.0-120	

L1444934-03 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1444934-03 01/03/22 23:06 • (MS) R3747422-7 01/03/22 23:41 • (MSD) R3747422-8 01/03/22 23:52

Analyte	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
	ug/l	ug/l	ug/l	ug/l	%	%		%			%	%
Sulfate	50000	ND	54500	54600	107	107	1	80.0-120			0.143	15

Method Blank (MB)

(MB) R3745418-2 12/27/21 18:39

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
TOC (Total Organic Carbon)	U		102	1000

L1444413-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1444413-01 12/28/21 02:53 • (DUP) R3745418-5 12/28/21 03:25

Analyte	Original Result ug/l	DUP Result ug/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
TOC	1620	1320	1	20.5	P1	20

L1444784-04 Original Sample (OS) • Duplicate (DUP)

(OS) L1444784-04 12/28/21 05:30 • (DUP) R3745418-6 12/28/21 05:57

Analyte	Original Result ug/l	DUP Result ug/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
TOC	1170	1140	1	2.18		20

Laboratory Control Sample (LCS)

(LCS) R3745418-1 12/27/21 18:12

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
TOC	75000	73000	97.4	85.0-115	

L1444256-11 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1444256-11 12/27/21 21:24 • (MS) R3745418-3 12/27/21 21:55 • (MSD) R3745418-4 12/27/21 22:36

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MSD Result ug/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
TOC	50000	4920	50800	55700	91.7	102	1	80.0-120			9.28	20

L1444886-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1444886-02 12/28/21 08:29 • (MS) R3745418-7 12/28/21 08:56 • (MSD) R3745418-8 12/28/21 09:23

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MSD Result ug/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
TOC	50000	ND	50800	51100	101	101	1	80.0-120			0.462	20

Method Blank (MB)

(MB) R3745666-3 12/27/21 08:02

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Acetone	U		11.3	50.0
Benzene	U		0.0941	1.00
Carbon tetrachloride	U		0.128	1.00
Chlorobenzene	U		0.116	1.00
Chloroethane	U		0.192	5.00
Chloroform	U		0.111	5.00
1,2-Dibromo-3-Chloropropane	U		0.276	5.00
1,2-Dichloroethane	U		0.0819	1.00
1,1-Dichloroethene	U		0.188	1.00
cis-1,2-Dichloroethene	U		0.126	1.00
trans-1,2-Dichloroethene	U		0.149	1.00
1,2-Dichloropropane	U		0.149	1.00
Ethylbenzene	U		0.137	1.00
Methylene Chloride	U		0.430	5.00
1,1,2,2-Tetrachloroethane	U		0.133	1.00
Tetrachloroethene	U		0.300	1.00
Toluene	U		0.278	1.00
Trichloroethene	U		0.190	1.00
Vinyl chloride	U		0.234	1.00
o-Xylene	U		0.174	1.00
m&p-Xylenes	U		0.430	2.00
(S) Toluene-d8	*118*			*80.0-120*
(S) 4-Bromofluorobenzene	*97.4*			*77.0-126*
(S) 1,2-Dichloroethane-d4	*128*			*70.0-130*

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

(LCS) R3745666-1 12/27/21 06:59 • (LCSD) R3745666-2 12/27/21 07:20

Analyte	Spike Amount ug/l	LCS Result ug/l	LCSD Result ug/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Acetone	25.0	25.5	29.7	102	119	19.0-160			15.2	27
Benzene	5.00	4.91	5.24	98.2	105	70.0-123			6.50	20
Carbon tetrachloride	5.00	4.76	5.17	95.2	103	68.0-126			8.26	20
Chlorobenzene	5.00	4.49	4.85	89.8	97.0	80.0-121			7.71	20
Chloroethane	5.00	6.32	7.21	126	144	47.0-150			13.2	20
Chloroform	5.00	5.01	5.44	100	109	73.0-120			8.23	20
1,2-Dibromo-3-Chloropropane	5.00	4.06	4.41	81.2	88.2	58.0-134			8.26	20
1,2-Dichloroethane	5.00	4.87	5.11	97.4	102	70.0-128			4.81	20
1,1-Dichloroethene	5.00	4.57	4.79	91.4	95.8	71.0-124			4.70	20

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

(LCS) R3745666-1 12/27/21 06:59 • (LCSD) R3745666-2 12/27/21 07:20

Analyte	Spike Amount ug/l	LCS Result ug/l	LCSD Result ug/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
cis-1,2-Dichloroethene	5.00	4.58	4.79	91.6	95.8	73.0-120			4.48	20
trans-1,2-Dichloroethene	5.00	4.83	5.11	96.6	102	73.0-120			5.63	20
1,2-Dichloropropane	5.00	4.98	5.10	99.6	102	77.0-125			2.38	20
Ethylbenzene	5.00	4.53	4.89	90.6	97.8	79.0-123			7.64	20
Methylene Chloride	5.00	4.93	5.08	98.6	102	67.0-120			3.00	20
1,1,2,2-Tetrachloroethane	5.00	4.55	4.90	91.0	98.0	65.0-130			7.41	20
Tetrachloroethene	5.00	4.73	4.93	94.6	98.6	72.0-132			4.14	20
Toluene	5.00	4.75	5.06	95.0	101	79.0-120			6.32	20
Trichloroethene	5.00	4.83	5.03	96.6	101	78.0-124			4.06	20
Vinyl chloride	5.00	5.10	5.60	102	112	67.0-131			9.35	20
o-Xylene	5.00	4.37	4.80	87.4	96.0	80.0-122			9.38	20
m&p-Xylenes	10.0	9.44	10.1	94.4	101	80.0-122			6.76	20
(S) Toluene-d8				*117*	*118*	*80.0-120*				
(S) 4-Bromofluorobenzene				*101*	*104*	*77.0-126*				
(S) 1,2-Dichloroethane-d4				*122*	*127*	*70.0-130*				

L1444854-05 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1444854-05 12/27/21 12:03 • (MS) R3745666-4 12/27/21 17:39 • (MSD) R3745666-5 12/27/21 18:00

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MSD Result ug/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Acetone	25.0	ND	ND	ND	133	129	1	10.0-160			2.75	35
Benzene	5.00	ND	6.27	6.43	125	129	1	17.0-158			2.52	27
Carbon tetrachloride	5.00	ND	7.31	7.30	146	146	1	23.0-159			0.137	28
Chlorobenzene	5.00	ND	5.98	5.81	120	116	1	33.0-152			2.88	27
Chloroethane	5.00	ND	9.31	9.35	186	187	1	10.0-160	J5	J5	0.429	30
Chloroform	5.00	8.85	16.2	15.4	147	131	1	29.0-154			5.06	28
1,2-Dibromo-3-Chloropropane	5.00	ND	5.07	ND	101	99.0	1	22.0-151			2.40	34
1,2-Dichloroethane	5.00	ND	6.33	6.50	127	130	1	29.0-151			2.65	27
1,1-Dichloroethene	5.00	ND	6.04	6.74	121	135	1	11.0-160			11.0	29
cis-1,2-Dichloroethene	5.00	ND	6.40	6.05	128	121	1	10.0-160			5.62	27
trans-1,2-Dichloroethene	5.00	ND	6.31	6.86	126	137	1	17.0-153			8.35	27
1,2-Dichloropropane	5.00	ND	6.03	6.36	121	127	1	30.0-156			5.33	27
Ethylbenzene	5.00	ND	5.68	6.05	114	121	1	30.0-155			6.31	27
Methylene Chloride	5.00	ND	6.39	6.14	128	123	1	23.0-144			3.99	28
1,1,2,2-Tetrachloroethane	5.00	ND	6.28	6.24	126	125	1	33.0-150			0.639	28
Tetrachloroethene	5.00	ND	6.08	6.09	122	122	1	10.0-160			0.164	27
Toluene	5.00	ND	6.16	6.21	123	124	1	26.0-154			0.808	28
Trichloroethene	5.00	ND	5.95	6.27	119	125	1	10.0-160			5.24	25

L1444854-05 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1444854-05 12/27/21 12:03 • (MS) R3745666-4 12/27/21 17:39 • (MSD) R3745666-5 12/27/21 18:00

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MSD Result ug/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Vinyl chloride	5.00	ND	7.27	7.59	145	152	1	10.0-160			4.31	27
o-Xylene	5.00	ND	5.24	5.67	105	113	1	45.0-144			7.88	26
m&p-Xylenes	10.0	ND	10.9	11.6	109	116	1	43.0-146			6.22	26
(S) Toluene-d8					*110*	*108*		*80.0-120*				
(S) 4-Bromofluorobenzene					*100*	*103*		*77.0-126*				
(S) 1,2-Dichloroethane-d4					*132*	*131*		*70.0-130*	J1	J1		

Method Blank (MB)

(MB) R3745230-3 12/22/21 11:42

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	ug/l		ug/l	ug/l
1,4-Dioxane	U		0.597	3.00
(S) Toluene-d8	*96.8*			*77.0-127*

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

(LCS) R3745230-1 12/22/21 10:43 • (LCSD) R3745230-2 12/22/21 11:02

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	ug/l	ug/l	ug/l	%	%	%			%	%
1,4-Dioxane	50.0	48.1	47.6	96.2	95.2	55.0-138			1.04	24
(S) Toluene-d8				*97.6*	*96.6*	*77.0-127*				

L1444231-05 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1444231-05 12/22/21 15:39 • (MS) R3745230-4 12/22/21 21:17 • (MSD) R3745230-5 12/22/21 21:37

Analyte	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
	ug/l	ug/l	ug/l	ug/l	%	%		%			%	%
1,4-Dioxane	50.0	ND	67.0	61.1	134	122	1	13.0-160			9.21	31
(S) Toluene-d8					*98.3*	*98.2*		*77.0-127*				

Method Blank (MB)

(MB) R3745013-1 12/24/21 11:00

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Gamma BHC	U		0.0209	0.0500
(S) Decachlorobiphenyl	*74.6*			*10.0-128*
(S) Tetrachloro-m-xylene	*77.9*			*10.0-127*

Laboratory Control Sample (LCS)

(LCS) R3745013-2 12/24/21 11:13

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Gamma BHC	1.00	1.12	112	55.0-129	
(S) Decachlorobiphenyl			*79.2*	*10.0-128*	
(S) Tetrachloro-m-xylene			*85.2*	*10.0-127*	

L1445022-07 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1445022-07 12/24/21 16:54 • (MS) R3745013-3 12/24/21 17:07 • (MSD) R3745013-4 12/24/21 17:20

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MSD Result ug/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Gamma BHC	1.00	ND	0.897	0.931	89.7	93.1	1	14.0-141			3.72	40
(S) Decachlorobiphenyl					*38.4*	*63.2*		*10.0-128*				
(S) Tetrachloro-m-xylene					*59.7*	*67.3*		*10.0-127*				

GLOSSARY OF TERMS

Guide to Reading and Understanding Your Laboratory Report

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

Results Disclaimer - Information that may be provided by the customer, and contained within this report, include Permit Limits, Project Name, Sample ID, Sample Matrix, Sample Preservation, Field Blanks, Field Spikes, Field Duplicates, On-Site Data, Sampling Collection Dates/Times, and Sampling Location. Results relate to the accuracy of this information provided, and as the samples are received.

Abbreviations and Definitions

MDL	Method Detection Limit.
ND	Not detected at the Reporting Limit (or MDL where applicable).
RDL	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
(S)	Surrogate (Surrogate Standard) - Analytes added to every blank, sample, Laboratory Control Sample/Duplicate and Matrix Spike/Duplicate; used to evaluate analytical efficiency by measuring recovery. Surrogates are not expected to be detected in all environmental media.
U	Not detected at the Reporting Limit (or MDL where applicable).
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state “ND” (Not Detected) or “BDL” (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Uncertainty (Radiochemistry)	Confidence level of 2 sigma.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

Qualifier	Description
J1	Surrogate recovery limits have been exceeded; values are outside upper control limits.
J5	The sample matrix interfered with the ability to make any accurate determination; spike value is high.
P1	RPD value not applicable for sample concentrations less than 5 times the reporting limit.

ACCREDITATIONS & LOCATIONS

Pace Analytical National 12065 Lebanon Rd Mount Juliet, TN 37122

Alabama	40660	Nebraska	NE-OS-15-05
Alaska	17-026	Nevada	TN000032021-1
Arizona	AZ0612	New Hampshire	2975
Arkansas	88-0469	New Jersey–NELAP	TN002
California	2932	New Mexico [1]	TN00003
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina [1]	DW21704
Georgia	NELAP	North Carolina [3]	41
Georgia [1]	923	North Dakota	R-140
Idaho	TN00003	Ohio–VAP	CL0069
Illinois	200008	Oklahoma	9915
Indiana	C-TN-01	Oregon	TN200002
Iowa	364	Pennsylvania	68-02979
Kansas	E-10277	Rhode Island	LAO000356
Kentucky [1 6]	KY90010	South Carolina	84004002
Kentucky [2]	16	South Dakota	n/a
Louisiana	AI30792	Tennessee [1 4]	2006
Louisiana	LA018	Texas	T104704245-20-18
Maine	TN00003	Texas [5]	LAB0152
Maryland	324	Utah	TN000032021-11
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	110033
Minnesota	047-999-395	Washington	C847
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	998093910
Montana	CERT0086	Wyoming	A2LA
A2LA – ISO 17025	1461.01	AIHA-LAP,LLC EMLAP	100789
A2LA – ISO 17025 [5]	1461.02	DOD	1461.01
Canada	1461.01	USDA	P330-15-00234
EPA–Crypto	TN00003		

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

* Not all certifications held by the laboratory are applicable to the results reported in the attached report.

* Accreditation is only applicable to the test methods specified on each scope of accreditation held by Pace Analytical.

J037

CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

Page : 1 Of 1

Section A — Required Client Information:

Company:	[redacted] Resduk Environmental
Address:	1003 Weatherstone Parkway, Woodstock, GA 30188
Email To:	
Phone: (678)548-9415	Fax:
Requested Due Date:	

Section B — Required Project Information:

Report To:	Tommy.Jordan@ResdukEnv.com
Copy To:	
Purchase Order #:	
Project Name:	
Project Number:	

Section C — Invoice Information:

Attention:	
Company Name:	
Address:	
Pace Quote:	
Pace Project Manager:	[redacted] Chris McCord
Pace Profile #:	10844

Regulatory Agency:

State / Location:

ITEM #	SAMPLE ID (One Character per box. (A-Z, 0-9 / , -) Sample Ids must be unique)	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED START DATE	COLLECTED START TIME	COLLECTED END DATE	COLLECTED END TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives: Unpreserved	H2SO4	HNO3	HCl	NaOH	Na2S2O3	Methanol	Other	Analyses Test Y/N	8021	Sulfate	TOC	V8260LL4D	V8260TCL	Residual Chlorine (Y/N)	
1	SW-D1	WT	G			12/20/21	1520		9	X			X					X	X	X	X	X	X		L1444885
2		WT	G																							-01
3		WT	G																							
4		WT	G																							
5		WT	G																							
6		WT	G																							
7																										
8																										
9																										
10																										
11																										
12																										

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS
	[signature]	12/20/21	1630	[signature]	12/21/21	1015	
							3.9

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Robert Mull, William Baker

SIGNATURE of SAMPLER: [signature] DATE Signed: 12/20/21

TEMP in C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)

Sample Receipt Checklist

COC Seal Present/Intact:	Y N	If Applicable	
COC Signed/Accurate:	Y N	VOA Zero Headspace:	Y N
Bottles arrive intact:	Y N	Pres.Correct/Check:	Y N
Correct bottles used:	Y N		
Sufficient volume sent:	Y N		
RAD Screen <0.5 mR/hr:	Y N		

K. BODY OF PLUME SP PILOT STUDY FIELD REPORT AND ANALYTICAL REPORTS

Injection Services Report

Prepared for:

Resolute
Environmental & Water Resources Consulting

1003 Weatherstone Parkway, Suite 320
Woodstock, GA 30188

Prepared by:

GEO LAB Drilling

800 Bill Rutledge Road
Winder, GA 30680
(770) 868-5407
www.geolabdrilling.com

June 2021

Project Summary

Project Name: UGA Landfill Pilot Injection – Athens, GA

Project Dates: June 30th, 2021

Geo Lab Personnel:

Name	Title/Role
Brendan Gerber	Remediation Manager
Randy Mason	Senior Driller
Ryan Bessetti	Drilling Technician

Equipment:

Item	Description
Injection Platform	Custom-built Injection Trailer
Pumping System	Stainless-Steel Centrifugal/Diaphragm Pumping System
Mixing System	Onboard 150 Gallon Tanks with High-Performance Stainless-Steel Mixers.
Injection Manifold	Onboard Stainless-Steel Multi-Point Manifold Equipped with Digital Flow Meters, Pressure Gauges, & Pressure Relief Devices
Safety Equipment	Onboard Safety Shower/Eye Wash Station, First Aid Kit, Fire Extinguisher, and Tank Overflow Protection
Injection Tooling	1.5” Bottom-up retractable injection tooling with horizontal ports.
Drill Rig	Geoprobe 7720 Series Track Mounted DPT Rig
Dilution Water	Water was obtained from a hose spigot located at the maintenance facility and transported to the work area.

Injection Summary

UGA Landfill – Athens, GA Injection Services:

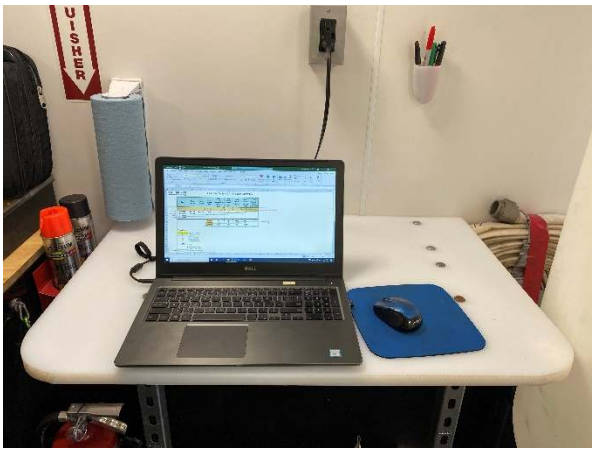
Date	Time On-Site	Time Off-Site	Lunch Break (hrs)	Total Klozur Injected (lbs)	Total Caustic Injected (gal)	Total Solution Injected (gal)	Total Injection Points Completed
6/30/2021	8:30 AM	3:30 PM	0.00	1045	220	600	2
			Design	1,045	220	600	2
			Injected	1,045	220	600	2
			Balance	0	0	0	0
			Daily Average	1,045	220.0	600	2

Project Photos

Geo Lab Custom Injection System

Injection System Setup

Stainless-steel Injection Manifold



Real-time Data Logging

Injection Mix Tanks

Monitoring Injection Flow and Pressure

Sodium Persulfate in 55 lb Bags

Sodium Hydroxide in 55 gal Drums

DPT Rig Injecting into the Subsurface

Injecting into the Subsurface

Dilution Water Transported in 250 gal Totes

Monitoring Nearby Wells

Onsite Monitoring Wells

Appendix – Injection Field Logs

Injection Point ID	Start Date	Start Time	End Date	End Time	Injection Interval (bgs)	Average Pressure (psi)	Average Flow Rate (gpm)	Klozur Injected (lbs)	Caustic Injected (gal)	Total Solution Injected (gal)	Notes
IP-1	6/30/21	11:58 AM	6/30/21	12:03 PM	28'-30'	50	6.0	52.2	11.0	30	
	6/30/21	12:03 PM	6/30/21	12:09 PM	26'-28'	55	5.0	52.2	11.0	30	
	6/30/21	12:13 PM	6/30/21	12:18 PM	24'-26'	47	6.0	52.2	11.0	30	
	6/30/21	12:18 PM	6/30/21	12:24 PM	22'-24'	35	5.0	52.2	11.0	30	
	6/30/21	12:24 PM	6/30/21	12:30 PM	20'-22'	30	5.0	52.2	11.0	30	
	6/30/21	12:33 PM	6/30/21	12:39 PM	18'-20'	30	5.0	52.2	11.0	30	
	6/30/21	12:39 PM	6/30/21	12:44 PM	16'-18'	30	6.0	52.2	11.0	30	
	6/30/21	12:44 PM	6/30/21	12:50 PM	14'-16'	35	5.0	52.2	11.0	30	
	6/30/21	12:52 PM	6/30/21	1:01 PM	12'-14'	30	4.0	52.2	11.0	30	
	6/30/21	1:01 PM	6/30/21	1:08 PM	10'-12'	55	4.0	52.2	11.0	30	Injection point successfully completed.
Total Klozur 522.5	Total Caustic 110.0	Total Solution 300		Additional Notes:							
IP-2	6/30/21	1:37 PM	6/30/21	1:43 PM	28'-30'	60	5.0	52.2	11.0	30	
	6/30/21	1:43 PM	6/30/21	1:49 PM	26'-28'	55	5.0	52.2	11.0	30	
	6/30/21	1:49 PM	6/30/21	1:56 PM	24'-26'	55	4.5	52.2	11.0	30	
	6/30/21	2:00 PM	6/30/21	2:05 PM	22'-24'	55	6.0	52.2	11.0	30	
	6/30/21	2:05 PM	6/30/21	2:12 PM	20'-22'	50	4.5	52.2	11.0	30	
	6/30/21	2:14 PM	6/30/21	2:18 PM	18'-20'	55	6.5	52.2	11.0	30	
	6/30/21	2:18 PM	6/30/21	2:24 PM	16'-18'	45	5.0	52.2	11.0	30	
	6/30/21	2:24 PM	6/30/21	2:30 PM	14'-16'	45	5.0	52.2	11.0	30	
	6/30/21	2:30 PM	6/30/21	2:35 PM	12'-14'	47	6.0	52.2	11.0	30	
	6/30/21	2:35 PM	6/30/21	2:41 PM	10'-12'	40	5.0	52.2	11.0	30	Injection point successfully completed.
Total Klozur 522.5	Total Caustic 110.0	Total Solution 300		Additional Notes:							

Avg. Pressure	Avg. Flow Rate	Total Klozur	Total Caustic	Total Solution	Injection Points Completed (based on 300 gal/point)
45 psi	5 gpm	1,045.0 lbs	220.0 gal	600 gal	2.0

Area Design Totals:	1,045	220	600	2
Remaining:	0.0	0.0	0.0	0.0

ANALYTICAL REPORT

July 13, 2021

Resolute Environmental & Water Resources

Sample Delivery Group:	L1371461
Samples Received:	06/26/2021
Project Number:	
Description:	Pre-injection sampling

Report To: Joe Booth
1003 Weatherstone Parkway
Suite 320
Woodstock, GA 30188

Entire Report Reviewed By:

Chris McCord
Project Manager

Pace Analytical National
12065 Lebanon Rd Mount Juliet, TN 37122 615-758-5858 800-767-5859 www.pacenational.com

TABLE OF CONTENTS

SAMPLE SUMMARY

MW-9A L1371461-01 GW

Collected by: Joe Booth
Collected date/time: 06/25/21 13:20
Received date/time: 06/26/21 09:30

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 7196A	WG1695775	1	06/26/21 15:04	06/26/21 15:04	BJD	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1703802	1	07/13/21 03:43	07/13/21 03:43	ELN	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1702482	1	07/09/21 09:19	07/09/21 17:27	JPD	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1697349	1	07/02/21 07:42	07/02/21 07:42	BMB	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1702219	1	07/08/21 20:26	07/08/21 20:26	BMB	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B-SIM	WG1696597	1	06/28/21 18:49	06/28/21 18:49	BMB	Mt. Juliet, TN
Pesticides (GC) by Method 8081	WG1698037	1	06/30/21 23:16	07/02/21 22:26	MTJ	Mt. Juliet, TN

MW-9B L1371461-02 GW

Collected by: Joe Booth
Collected date/time: 06/25/21 11:48
Received date/time: 06/26/21 09:30

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 9056A	WG1703802	1	07/13/21 03:56	07/13/21 03:56	ELN	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1702482	1	07/09/21 09:19	07/09/21 17:31	JPD	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1697349	1	07/02/21 08:02	07/02/21 08:02	BMB	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1702219	1	07/08/21 20:46	07/08/21 20:46	BMB	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B-SIM	WG1696597	1	06/28/21 19:08	06/28/21 19:08	BMB	Mt. Juliet, TN
Pesticides (GC) by Method 8081	WG1698037	1	06/30/21 23:16	07/02/21 22:38	MTJ	Mt. Juliet, TN

CASE NARRATIVE

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

Chris McCord
Project Manager

Wet Chemistry by Method 7196A

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Chromium,Hexavalent	ND	T8	10.0	1	06/26/2021 15:04	WG1695775

Wet Chemistry by Method 9056A

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Sulfate	ND		5000	1	07/13/2021 03:43	WG1703802

Metals (ICPMS) by Method 6020

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Arsenic,Dissolved	ND		2.00	1	07/09/2021 17:27	WG1702482
Barium,Dissolved	133		2.00	1	07/09/2021 17:27	WG1702482
Cadmium,Dissolved	ND		1.00	1	07/09/2021 17:27	WG1702482
Chromium,Dissolved	ND		2.00	1	07/09/2021 17:27	WG1702482
Copper,Dissolved	ND		5.00	1	07/09/2021 17:27	WG1702482
Lead,Dissolved	ND		2.00	1	07/09/2021 17:27	WG1702482
Selenium,Dissolved	ND		2.00	1	07/09/2021 17:27	WG1702482

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Acetone	ND		50.0	1	07/02/2021 07:42	WG1697349
Benzene	ND		1.00	1	07/02/2021 07:42	WG1697349
Carbon tetrachloride	ND		1.00	1	07/02/2021 07:42	WG1697349
Chlorobenzene	ND		1.00	1	07/02/2021 07:42	WG1697349
Chloroethane	ND		5.00	1	07/02/2021 07:42	WG1697349
Chloroform	32.0		5.00	1	07/02/2021 07:42	WG1697349
1,2-Dibromo-3-Chloropropane	ND		5.00	1	07/02/2021 07:42	WG1697349
1,2-Dichloroethane	ND		1.00	1	07/02/2021 07:42	WG1697349
1,1-Dichloroethene	ND		1.00	1	07/02/2021 07:42	WG1697349
cis-1,2-Dichloroethene	ND		1.00	1	07/08/2021 20:26	WG1702219
trans-1,2-Dichloroethene	ND		1.00	1	07/02/2021 07:42	WG1697349
1,2-Dichloropropane	ND		1.00	1	07/02/2021 07:42	WG1697349
Ethylbenzene	ND		1.00	1	07/02/2021 07:42	WG1697349
Methylene Chloride	ND		5.00	1	07/02/2021 07:42	WG1697349
1,1,2,2-Tetrachloroethane	ND		1.00	1	07/02/2021 07:42	WG1697349
Tetrachloroethene	1.17		1.00	1	07/08/2021 20:26	WG1702219
Toluene	ND		1.00	1	07/02/2021 07:42	WG1697349
Trichloroethene	1.17		1.00	1	07/08/2021 20:26	WG1702219
Vinyl chloride	ND		1.00	1	07/02/2021 07:42	WG1697349
o-Xylene	ND		1.00	1	07/02/2021 07:42	WG1697349
m&p-Xylene	ND		2.00	1	07/02/2021 07:42	WG1697349
(S) Toluene-d8	*108*		*80.0-120*		*07/02/2021 07:42*	WG1697349
(S) Toluene-d8	*99.1*		*80.0-120*		*07/08/2021 20:26*	WG1702219
(S) 4-Bromofluorobenzene	*95.8*		*77.0-126*		*07/02/2021 07:42*	WG1697349
(S) 4-Bromofluorobenzene	*93.0*		*77.0-126*		*07/08/2021 20:26*	WG1702219
(S) 1,2-Dichloroethane-d4	*88.7*		*70.0-130*		*07/02/2021 07:42*	WG1697349
(S) 1,2-Dichloroethane-d4	*104*		*70.0-130*		*07/08/2021 20:26*	WG1702219

Volatile Organic Compounds (GC/MS) by Method 8260B-SIM

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
1,4-Dioxane	28.4		3.00	1	06/28/2021 18:49	WG1696597
(S) Toluene-d8	*103*		*77.0-127*		*06/28/2021 18:49*	WG1696597

Pesticides (GC) by Method 8081

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Alpha BHC	ND		0.0500	1	07/02/2021 22:26	WG1698037
Beta BHC	ND		0.0500	1	07/02/2021 22:26	WG1698037
Delta BHC	ND		0.0500	1	07/02/2021 22:26	WG1698037
Gamma BHC	ND		0.0500	1	07/02/2021 22:26	WG1698037
(S) Decachlorobiphenyl	*50.7*		*10.0-128*		*07/02/2021 22:26*	WG1698037
(S) Tetrachloro-m-xylene	*67.2*		*10.0-127*		*07/02/2021 22:26*	WG1698037

Wet Chemistry by Method 9056A

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Sulfate	ND		5000	1	07/13/2021 03:56	WG1703802

Metals (ICPMS) by Method 6020

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Arsenic,Dissolved	ND		2.00	1	07/09/2021 17:31	WG1702482
Barium,Dissolved	100		2.00	1	07/09/2021 17:31	WG1702482
Cadmium,Dissolved	ND		1.00	1	07/09/2021 17:31	WG1702482
Chromium,Dissolved	ND		2.00	1	07/09/2021 17:31	WG1702482
Copper,Dissolved	ND		5.00	1	07/09/2021 17:31	WG1702482
Lead,Dissolved	ND		2.00	1	07/09/2021 17:31	WG1702482
Selenium,Dissolved	ND		2.00	1	07/09/2021 17:31	WG1702482

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Acetone	ND		50.0	1	07/02/2021 08:02	WG1697349
Benzene	ND		1.00	1	07/02/2021 08:02	WG1697349
Carbon tetrachloride	ND		1.00	1	07/02/2021 08:02	WG1697349
Chlorobenzene	ND		1.00	1	07/02/2021 08:02	WG1697349
Chloroethane	ND		5.00	1	07/02/2021 08:02	WG1697349
Chloroform	163		5.00	1	07/02/2021 08:02	WG1697349
1,2-Dibromo-3-Chloropropane	ND		5.00	1	07/02/2021 08:02	WG1697349
1,2-Dichloroethane	ND		1.00	1	07/02/2021 08:02	WG1697349
1,1-Dichloroethene	ND		1.00	1	07/02/2021 08:02	WG1697349
cis-1,2-Dichloroethene	ND		1.00	1	07/08/2021 20:46	WG1702219
trans-1,2-Dichloroethene	ND		1.00	1	07/02/2021 08:02	WG1697349
1,2-Dichloropropane	ND		1.00	1	07/02/2021 08:02	WG1697349
Ethylbenzene	ND		1.00	1	07/02/2021 08:02	WG1697349
Methylene Chloride	ND		5.00	1	07/02/2021 08:02	WG1697349
1,1,2,2-Tetrachloroethane	ND		1.00	1	07/02/2021 08:02	WG1697349
Tetrachloroethene	ND		1.00	1	07/08/2021 20:46	WG1702219
Toluene	ND		1.00	1	07/02/2021 08:02	WG1697349
Trichloroethene	1.23		1.00	1	07/08/2021 20:46	WG1702219
Vinyl chloride	ND		1.00	1	07/02/2021 08:02	WG1697349
o-Xylene	ND		1.00	1	07/02/2021 08:02	WG1697349
m&p-Xylene	ND		2.00	1	07/02/2021 08:02	WG1697349
(S) Toluene-d8	*104*		*80.0-120*		*07/02/2021 08:02*	WG1697349
(S) Toluene-d8	*99.6*		*80.0-120*		*07/08/2021 20:46*	WG1702219
(S) 4-Bromofluorobenzene	*99.9*		*77.0-126*		*07/02/2021 08:02*	WG1697349
(S) 4-Bromofluorobenzene	*94.1*		*77.0-126*		*07/08/2021 20:46*	WG1702219
(S) 1,2-Dichloroethane-d4	*95.4*		*70.0-130*		*07/02/2021 08:02*	WG1697349
(S) 1,2-Dichloroethane-d4	*106*		*70.0-130*		*07/08/2021 20:46*	WG1702219

Volatile Organic Compounds (GC/MS) by Method 8260B-SIM

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
1,4-Dioxane	49.0		3.00	1	06/28/2021 19:08	WG1696597
(S) Toluene-d8	*103*		*77.0-127*		*06/28/2021 19:08*	WG1696597

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

Pesticides (GC) by Method 8081

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Alpha BHC	ND		0.0500	1	07/02/2021 22:38	WG1698037
Beta BHC	ND		0.0500	1	07/02/2021 22:38	WG1698037
Delta BHC	ND		0.0500	1	07/02/2021 22:38	WG1698037
Gamma BHC	ND		0.0500	1	07/02/2021 22:38	WG1698037
(S) Decachlorobiphenyl	*45.7*		*10.0-128*		*07/02/2021 22:38*	WG1698037
(S) Tetrachloro-m-xylene	*69.5*		*10.0-127*		*07/02/2021 22:38*	WG1698037

Method Blank (MB)

(MB) R3672443-1 06/26/21 15:04

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	ug/l		ug/l	ug/l
Chromium,Hexavalent	U		3.00	10.0

L1371461-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1371461-01 06/26/21 15:04 • (DUP) R3672443-3 06/26/21 15:05

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	ug/l	ug/l		%		%
Chromium,Hexavalent	ND	ND	1	0.000		20

Laboratory Control Sample (LCS)

(LCS) R3672443-2 06/26/21 15:04

Analyte	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
	ug/l	ug/l	%	%	
Chromium,Hexavalent	500	489	97.8	80.0-120	

L1371461-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1371461-01 06/26/21 15:04 • (MS) R3672443-4 06/26/21 15:05 • (MSD) R3672443-5 06/26/21 15:05

Analyte	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
	ug/l	ug/l	ug/l	ug/l	%	%		%			%	%
Chromium,Hexavalent	500	ND	491	490	98.2	98.0	1	85.0-115			0.204	20

Method Blank (MB)

(MB) R3678627-1 07/12/21 22:46

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Sulfate	U		594	5000

L1372166-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1372166-01 07/13/21 00:03 • (DUP) R3678627-3 07/13/21 00:16

Analyte	Original Result ug/l	DUP Result ug/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Sulfate	92100	86500	1	6.26		15

L1371467-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1371467-01 07/13/21 04:08 • (DUP) R3678627-5 07/13/21 04:47

Analyte	Original Result ug/l	DUP Result ug/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Sulfate	15600	15200	1	2.82		15

Laboratory Control Sample (LCS)

(LCS) R3678627-2 07/12/21 22:59

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Sulfate	40000	41000	102	80.0-120	

L1372166-01 Original Sample (OS) • Matrix Spike (MS)

(OS) L1372166-01 07/13/21 00:03 • (MS) R3678627-4 07/13/21 00:29

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Sulfate	50000	92100	135000	85.6	1	80.0-120	E

L1371467-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1371467-01 07/13/21 04:08 • (MS) R3678627-6 07/13/21 05:00 • (MSD) R3678627-7 07/13/21 05:13

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MSD Result ug/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Sulfate	50000	15600	67900	65000	105	98.8	1	80.0-120			4.36	15

Method Blank (MB)

(MB) R3677731-1 07/09/21 16:18

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Arsenic,Dissolved	U		0.180	2.00
Barium,Dissolved	U		0.381	2.00
Cadmium,Dissolved	U		0.150	1.00
Chromium,Dissolved	U		1.24	2.00
Copper,Dissolved	U		1.51	5.00
Lead,Dissolved	U		0.849	2.00
Selenium,Dissolved	U		0.300	2.00

Laboratory Control Sample (LCS)

(LCS) R3677731-2 07/09/21 16:21

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Arsenic,Dissolved	50.0	49.3	98.6	80.0-120	
Barium,Dissolved	50.0	49.7	99.4	80.0-120	
Cadmium,Dissolved	50.0	52.7	105	80.0-120	
Chromium,Dissolved	50.0	51.7	103	80.0-120	
Copper,Dissolved	50.0	49.5	98.9	80.0-120	
Lead,Dissolved	50.0	48.0	96.0	80.0-120	
Selenium,Dissolved	50.0	53.3	107	80.0-120	

Method Blank (MB)

(MB) R3677099-3 07/02/21 01:19

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Acetone	U		11.3	50.0
Benzene	U		0.0941	1.00
Carbon tetrachloride	U		0.128	1.00
Chlorobenzene	U		0.116	1.00
Chloroethane	U		0.192	5.00
Chloroform	U		0.111	5.00
1,2-Dibromo-3-Chloropropane	U		0.276	5.00
1,2-Dichloroethane	U		0.0819	1.00
1,1-Dichloroethene	U		0.188	1.00
trans-1,2-Dichloroethene	U		0.149	1.00
1,2-Dichloropropane	U		0.149	1.00
Ethylbenzene	U		0.137	1.00
Methylene Chloride	U		0.430	5.00
1,1,2,2-Tetrachloroethane	U		0.133	1.00
Toluene	U		0.278	1.00
Vinyl chloride	U		0.234	1.00
o-Xylene	U		0.174	1.00
m&p-Xylenes	U		0.430	2.00
(S) Toluene-d8	*106*			*80.0-120*
(S) 4-Bromofluorobenzene	*97.2*			*77.0-126*
(S) 1,2-Dichloroethane-d4	*94.6*			*70.0-130*

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

(LCS) R3677099-1 07/02/21 00:19 • (LCSD) R3677099-2 07/02/21 00:39

Analyte	Spike Amount ug/l	LCS Result ug/l	LCSD Result ug/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Acetone	25.0	20.6	20.8	82.4	83.2	19.0-160			0.966	27
Benzene	5.00	5.04	5.05	101	101	70.0-123			0.198	20
Carbon tetrachloride	5.00	6.01	5.35	120	107	68.0-126			11.6	20
Chlorobenzene	5.00	5.04	5.23	101	105	80.0-121			3.70	20
Chloroethane	5.00	4.91	5.49	98.2	110	47.0-150			11.2	20
Chloroform	5.00	5.11	5.05	102	101	73.0-120			1.18	20
1,2-Dibromo-3-Chloropropane	5.00	4.47	4.45	89.4	89.0	58.0-134			0.448	20
1,2-Dichloroethane	5.00	4.79	4.43	95.8	88.6	70.0-128			7.81	20
1,1-Dichloroethene	5.00	5.23	5.33	105	107	71.0-124			1.89	20
trans-1,2-Dichloroethene	5.00	5.15	5.33	103	107	73.0-120			3.44	20
1,2-Dichloropropane	5.00	4.97	4.59	99.4	91.8	77.0-125			7.95	20
Ethylbenzene	5.00	4.99	5.11	99.8	102	79.0-123			2.38	20

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

(LCS) R3677099-1 07/02/21 00:19 • (LCSD) R3677099-2 07/02/21 00:39

Analyte	Spike Amount ug/l	LCS Result ug/l	LCSD Result ug/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Methylene Chloride	5.00	4.53	4.80	90.6	96.0	67.0-120			5.79	20
1,1,2,2-Tetrachloroethane	5.00	5.10	4.51	102	90.2	65.0-130			12.3	20
Toluene	5.00	5.19	5.59	104	112	79.0-120			7.42	20
Vinyl chloride	5.00	4.95	5.45	99.0	109	67.0-131			9.62	20
o-Xylene	5.00	5.35	5.71	107	114	80.0-122			6.51	20
m&p-Xylenes	10.0	9.35	10.1	93.5	101	80.0-122			7.71	20
(S) Toluene-d8				*99.9*	*101*	*80.0-120*				
(S) 4-Bromofluorobenzene				*96.0*	*94.9*	*77.0-126*				
(S) 1,2-Dichloroethane-d4				*100*	*95.1*	*70.0-130*				

Method Blank (MB)

(MB) R3677317-2 07/08/21 16:19

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
cis-1,2-Dichloroethene	U		0.126	1.00
Tetrachloroethene	U		0.300	1.00
Trichloroethene	U		0.190	1.00
(S) Toluene-d8	*98.8*			*80.0-120*
(S) 4-Bromofluorobenzene	*93.3*			*77.0-126*
(S) 1,2-Dichloroethane-d4	*101*			*70.0-130*

Laboratory Control Sample (LCS)

(LCS) R3677317-1 07/08/21 15:38

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
cis-1,2-Dichloroethene	5.00	5.95	119	73.0-120	
Tetrachloroethene	5.00	4.85	97.0	72.0-132	
Trichloroethene	5.00	5.26	105	78.0-124	
(S) Toluene-d8			*99.4*	*80.0-120*	
(S) 4-Bromofluorobenzene			*101*	*77.0-126*	
(S) 1,2-Dichloroethane-d4			*97.6*	*70.0-130*	

Method Blank (MB)

(MB) R3673126-3 06/28/21 15:20

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	ug/l		ug/l	ug/l
1,4-Dioxane	U		0.597	3.00
(S) Toluene-d8	*103*			*77.0-127*

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

(LCS) R3673126-1 06/28/21 14:21 • (LCSD) R3673126-2 06/28/21 14:40

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	ug/l	ug/l	ug/l	%	%	%			%	%
1,4-Dioxane	50.0	48.1	53.2	96.2	106	55.0-138			10.1	24
(S) Toluene-d8				*103*	*103*	*77.0-127*				

Method Blank (MB)

(MB) R3675147-1 07/02/21 14:57

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Alpha BHC	U		0.0172	0.0500
Beta BHC	U		0.0208	0.0500
Delta BHC	U		0.0150	0.0500
Gamma BHC	U		0.0209	0.0500
(S) Decachlorobiphenyl	*22.0*			*10.0-128*
(S) Tetrachloro-m-xylene	*70.5*			*10.0-127*

Laboratory Control Sample (LCS)

(LCS) R3675147-2 07/02/21 15:10

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Alpha BHC	1.00	0.910	91.0	54.0-130	
Beta BHC	1.00	0.949	94.9	53.0-136	P
Delta BHC	1.00	0.895	89.5	54.0-133	
Gamma BHC	1.00	0.974	97.4	55.0-129	
(S) Decachlorobiphenyl			*30.4*	*10.0-128*	
(S) Tetrachloro-m-xylene			*77.5*	*10.0-127*	

L1372548-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1372548-01 07/03/21 00:06 • (MS) R3675147-3 07/03/21 00:18 • (MSD) R3675147-4 07/03/21 00:31

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MSD Result ug/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Alpha BHC	0.952	ND	0.804	0.883	84.5	88.3	1	10.0-145			9.37	40
Beta BHC	0.952	ND	0.831	0.910	87.3	91.0	1	14.0-146	P	P	9.08	35
Delta BHC	0.952	ND	0.765	0.834	80.4	83.4	1	17.0-143			8.63	38
Gamma BHC	0.952	ND	0.839	0.922	88.1	92.2	1	14.0-141			9.43	40
(S) Decachlorobiphenyl					*68.1*	*80.6*		*10.0-128*				
(S) Tetrachloro-m-xylene					*78.3*	*86.8*		*10.0-127*				

GLOSSARY OF TERMS

Guide to Reading and Understanding Your Laboratory Report

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

Results Disclaimer - Information that may be provided by the customer, and contained within this report, include Permit Limits, Project Name, Sample ID, Sample Matrix, Sample Preservation, Field Blanks, Field Spikes, Field Duplicates, On-Site Data, Sampling Collection Dates/Times, and Sampling Location. Results relate to the accuracy of this information provided, and as the samples are received.

Abbreviations and Definitions

MDL	Method Detection Limit.
ND	Not detected at the Reporting Limit (or MDL where applicable).
RDL	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
(S)	Surrogate (Surrogate Standard) - Analytes added to every blank, sample, Laboratory Control Sample/Duplicate and Matrix Spike/Duplicate; used to evaluate analytical efficiency by measuring recovery. Surrogates are not expected to be detected in all environmental media.
U	Not detected at the Reporting Limit (or MDL where applicable).
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state “ND” (Not Detected) or “BDL” (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Uncertainty (Radiochemistry)	Confidence level of 2 sigma.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

Qualifier	Description
E	The analyte concentration exceeds the upper limit of the calibration range of the instrument established by the initial calibration (ICAL).
P	RPD between the primary and confirmatory analysis exceeded 40%.
T8	Sample(s) received past/too close to holding time expiration.

ACCREDITATIONS & LOCATIONS

Pace Analytical National 12065 Lebanon Rd Mount Juliet, TN 37122

Alabama	40660	Nebraska	NE-OS-15-05
Alaska	17-026	Nevada	TN000032021-1
Arizona	AZ0612	New Hampshire	2975
Arkansas	88-0469	New Jersey–NELAP	TN002
California	2932	New Mexico [1]	TN00003
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina [1]	DW21704
Georgia	NELAP	North Carolina [3]	41
Georgia [1]	923	North Dakota	R-140
Idaho	TN00003	Ohio–VAP	CL0069
Illinois	200008	Oklahoma	9915
Indiana	C-TN-01	Oregon	TN200002
Iowa	364	Pennsylvania	68-02979
Kansas	E-10277	Rhode Island	LAO000356
Kentucky [1 6]	KY90010	South Carolina	84004002
Kentucky [2]	16	South Dakota	n/a
Louisiana	AI30792	Tennessee [1 4]	2006
Louisiana	LA018	Texas	T104704245-20-18
Maine	TN00003	Texas [5]	LAB0152
Maryland	324	Utah	TN000032021-11
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	110033
Minnesota	047-999-395	Washington	C847
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	998093910
Montana	CERT0086	Wyoming	A2LA
A2LA – ISO 17025	1461.01	AIHA-LAP,LLC EMLAP	100789
A2LA – ISO 17025 [5]	1461.02	DOD	1461.01
Canada	1461.01	USDA	P330-15-00234
EPA–Crypto	TN00003		

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

* Not all certifications held by the laboratory are applicable to the results reported in the attached report.

* Accreditation is only applicable to the test methods specified on each scope of accreditation held by Pace Analytical.

Company Name/Address:
Resolute Environmental & Water Resources

1003 Weatherstone Parkway

Billing Information:
Accounts Payable
1003 Weatherstone Pkwy., Ste. 320
Woodstock, GA 30188

Pres Chk

Report to:
Joe Booth

Email To:
joe.booth@resoluteenv.com;ken.brooke@resol

Project Description:
Pre-injection sampling

City/State Collected:

Please Circle: PT MT CT ET

Phone: **404-358-8469**

Client Project #

Lab Project #
RESENVWGA-UGA MAS

Collected by (print):
Joe Booth

Site/Facility ID #

P.O. #

Collected by (signature):

Immediately Packed on Ice N ___ Y ✓

Rush? (Lab MUST Be Notified)
___ Same Day ___ Five Day
___ Next Day ___ 5 Day (Rad Only)
___ Two Day ___ 10 Day (Rad Only)
___ Three Day

Quote #

Date Results Needed

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	***CR6-24hr HT*** 250mlHDPE NoPres	8081 100ml Amb-NoPres	Dissolved Metals 250mlHDPE-NoPres	SULFATE 125mlHDPE-NoPres	V8260 40mlAmb-HCl	V8260LL14D 40mlAmb HCl					Remarks	Sample # (lab only)
MW-9A	Grab	GW		6/25/21	1320	10	X	X	X	X	X	X						-01
MW-9B	Grab	GW		6/25/21	1148	9	[redacted]	X	X	X	X	X						02
~~[illegible]~~		GW				10	X	X	X	X	X	X						
Trip Blank																		03

Analysis / Container / Preservative

Chain of Custody Page ___ of ___

Pace Analytical®

12065 Lebanon Rd Mount Juliet, TN 37122
Submitting a sample via this chain of custody constitutes acknowledgment and acceptance of the Pace Terms and Conditions found at: https://info.pacelabs.com/hubfs/pas-standard-terms.pdf

SDG # L1371461
H243

Tat

Acctnum: **RESENVWGA**
Template: **T189651**
Prelogin: **P855154**
PM: **526 - Chris McCord**
PB 6/16/21 tod
Shipped Via: **FedEX Ground**

* Matrix:
SS - Soil AIR - Air F - Filter
GW - Groundwater B - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other_____

Remarks:Dissolved Metals = As,Ba,Cd,Cr,Cu,Pb,Se 6020
Lab filter dissolved metals

pH _____ Temp _____
Flow _____ Other _____

Samples returned via:
__ UPS ✓ FedEx __ Courier _____

Tracking # 5163 7699 2365

Sample Receipt Checklist
COC Seal Present/Intact: __NP ✓Y __N
COC Signed/Accurate: ✓Y __N
Bottles arrive intact: ✓Y __N
Correct bottles used: ✓Y __N
Sufficient volume sent: ✓Y __N
If Applicable
VOA Zero Headspace: ✓Y __N
Preservation Correct/Checked: ✓Y __N
RAD Screen <0.5 mR/hr: ✓Y __N

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Trip Blank Received: (Yes) No HCL MeoH TBR
Joe Booth	6/25/21	1430		1
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Temp: 1.3 °C Bottles Received:
				2.8+1.3=3.1 19
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)	Date: Time:
			Jasmine Fuqua	6/26/21 930

If preservation required by Login: Date/Time

Hold:

Condition: NCF / OK

L1371461 RESENVWGA NCF

R5

Time estimate: oh **Time spent:** oh

Members

Jeremy Watkins (responsible) Christopher McCord

- [ ] Login Clarification needed
- [ ] Chain of custody is incomplete
- [ ] Please specify Metals requested
- [ ] Please specify TCLP requested
- [ ] Received additional samples not listed on COC
- [ ] Sample IDs on containers do not match IDs on COC
- [x] Client did not "X" analysis
- [ ] Chain of Custody is missing
- [ ] If no COC: Received by:_____
- [ ] If no COC: Date/Time:_____
- [ ] If no COC: Temp./Cont.Rec./pH:_____
- [ ] If no COC: Carrier:_____
- [ ] If no COC: Tracking #:_____
- [ ] Client informed by call
- [x] Client informed by Email
- [ ] Client informed by Voicemail
- [x] Date/Time: 6/28/21 15:18
- [x] PM initials: CM
- [x] Client Contact: Joe Booth

Comments

Jeremy Watkins *26 June 2021 11:02 AM*

Analysis not marked for Trip Blank

Christopher McCord *30 June 2021 1:44 PM*

Client notified. Keep on hold.

Jeremy Watkins *30 June 2021 5:42 PM*

Done

ANALYTICAL REPORT

July 26, 2021

Resolute Environmental & Water Resources

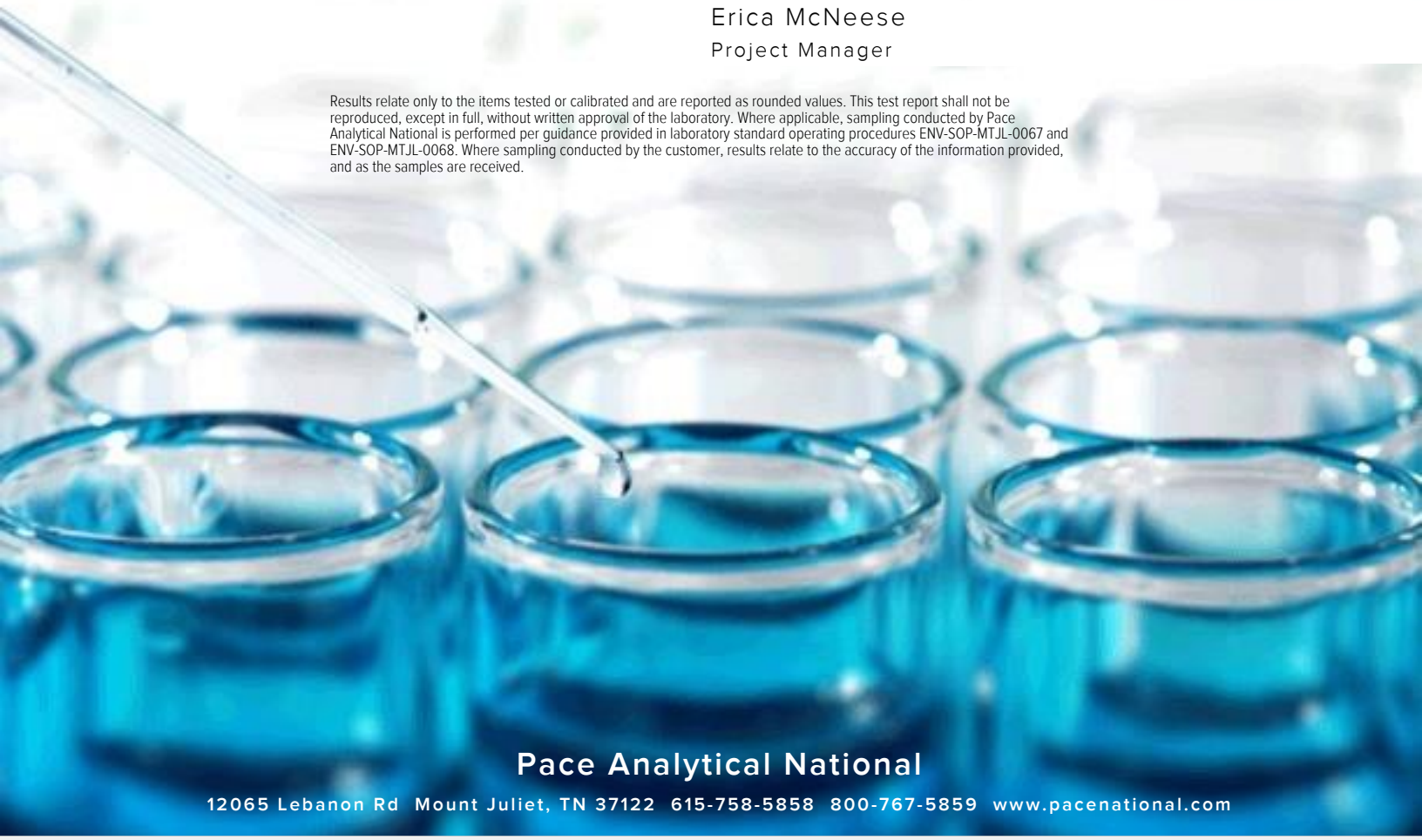
Sample Delivery Group:	L1378934
Samples Received:	07/15/2021
Project Number:	POST INJECTION SAMPL
Description:	

Report To:

Joe Booth
1003 Weatherstone Parkway
Suite 320
Woodstock, GA 30188

Entire Report Reviewed By:

Erica McNeese
Project Manager



Pace Analytical National
12065 Lebanon Rd Mount Juliet, TN 37122 615-758-5858 800-767-5859 www.pacenational.com

TABLE OF CONTENTS

TMW-2 L1378934-01 GW

Collected by	Collected date/time	Received date/time
William L	07/14/21 15:18	07/15/21 09:30

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Metals (ICPMS) by Method 6020	WG1709899	1	07/22/21 15:51	07/22/21 18:58	LD	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1707494	1	07/19/21 08:16	07/19/21 08:16	BMB	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B-SIM	WG1710805	1	07/23/21 16:13	07/23/21 16:13	BMB	Mt. Juliet, TN
Pesticides (GC) by Method 8081	WG1706664	1	07/18/21 08:34	07/19/21 14:13	MTJ	Mt. Juliet, TN

CASE NARRATIVE

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

Erica McNeese
Project Manager

Additional Information - Results for field analyses are not accredited to ISO 17025

Analyte	Result	Units
pH (On Site)	5.58	su

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	ug/l		ug/l		date / time	
Arsenic,Dissolved	ND		2.00	1	07/22/2021 18:58	WG1709899
Barium,Dissolved	37.4		2.00	1	07/22/2021 18:58	WG1709899
Cadmium,Dissolved	ND		1.00	1	07/22/2021 18:58	WG1709899
Chromium,Dissolved	ND		2.00	1	07/22/2021 18:58	WG1709899
Copper,Dissolved	ND		5.00	1	07/22/2021 18:58	WG1709899
Lead,Dissolved	ND		2.00	1	07/22/2021 18:58	WG1709899
Selenium,Dissolved	ND		2.00	1	07/22/2021 18:58	WG1709899

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	ug/l		ug/l		date / time	
Acetone	ND		50.0	1	07/19/2021 08:16	WG1707494
Benzene	5.15		1.00	1	07/19/2021 08:16	WG1707494
Carbon tetrachloride	ND		1.00	1	07/19/2021 08:16	WG1707494
Chlorobenzene	ND		1.00	1	07/19/2021 08:16	WG1707494
Chloroethane	ND		5.00	1	07/19/2021 08:16	WG1707494
Chloroform	81.1		5.00	1	07/19/2021 08:16	WG1707494
1,2-Dibromo-3-Chloropropane	ND		5.00	1	07/19/2021 08:16	WG1707494
1,2-Dichloroethane	ND		1.00	1	07/19/2021 08:16	WG1707494
1,1-Dichloroethene	ND		1.00	1	07/19/2021 08:16	WG1707494
cis-1,2-Dichloroethene	ND		1.00	1	07/19/2021 08:16	WG1707494
trans-1,2-Dichloroethene	ND		1.00	1	07/19/2021 08:16	WG1707494
1,2-Dichloropropane	2.00		1.00	1	07/19/2021 08:16	WG1707494
Ethylbenzene	ND		1.00	1	07/19/2021 08:16	WG1707494
Methylene Chloride	ND		5.00	1	07/19/2021 08:16	WG1707494
1,1,2,2-Tetrachloroethane	ND		1.00	1	07/19/2021 08:16	WG1707494
Tetrachloroethene	ND		1.00	1	07/19/2021 08:16	WG1707494
Toluene	ND		1.00	1	07/19/2021 08:16	WG1707494
Trichloroethene	1.47	B	1.00	1	07/19/2021 08:16	WG1707494
Vinyl chloride	ND		1.00	1	07/19/2021 08:16	WG1707494
o-Xylene	ND		1.00	1	07/19/2021 08:16	WG1707494
m&p-Xylene	ND		2.00	1	07/19/2021 08:16	WG1707494
(S) Toluene-d8	*107*		*80.0-120*		*07/19/2021 08:16*	WG1707494
(S) 4-Bromofluorobenzene	*91.0*		*77.0-126*		*07/19/2021 08:16*	WG1707494
(S) 1,2-Dichloroethane-d4	*98.5*		*70.0-130*		*07/19/2021 08:16*	WG1707494

Volatile Organic Compounds (GC/MS) by Method 8260B-SIM

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	ug/l		ug/l		date / time	
1,4-Dioxane	267		3.00	1	07/23/2021 16:13	WG1710805
(S) Toluene-d8	*102*		*77.0-127*		*07/23/2021 16:13*	WG1710805

Pesticides (GC) by Method 8081

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	ug/l		ug/l		date / time	
Alpha BHC	ND		0.0500	1	07/19/2021 14:13	WG1706664
Beta BHC	ND		0.0500	1	07/19/2021 14:13	WG1706664
Delta BHC	ND	P	0.0500	1	07/19/2021 14:13	WG1706664
Gamma BHC	ND		0.0500	1	07/19/2021 14:13	WG1706664

Pesticides (GC) by Method 8081

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	ug/l		ug/l		date / time	
(S) Decachlorobiphenyl	*90.3*		*10.0-128*		*07/19/2021 14:13*	WG1706664
(S) Tetrachloro-m-xylene	*64.5*		*10.0-127*		*07/19/2021 14:13*	WG1706664

Method Blank (MB)

(MB) R3682949-1 07/22/21 18:32

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Arsenic,Dissolved	U		0.180	2.00
Barium,Dissolved	U		0.381	2.00
Cadmium,Dissolved	U		0.150	1.00
Chromium,Dissolved	U		1.24	2.00
Copper,Dissolved	U		1.51	5.00
Lead,Dissolved	2.27		0.849	2.00
Selenium,Dissolved	U		0.300	2.00

Laboratory Control Sample (LCS)

(LCS) R3682949-2 07/22/21 18:35

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Arsenic,Dissolved	50.0	49.2	98.3	80.0-120	
Barium,Dissolved	50.0	47.8	95.6	80.0-120	
Cadmium,Dissolved	50.0	51.1	102	80.0-120	
Chromium,Dissolved	50.0	51.6	103	80.0-120	
Copper,Dissolved	50.0	49.1	98.2	80.0-120	
Lead,Dissolved	50.0	46.1	92.2	80.0-120	
Selenium,Dissolved	50.0	52.2	104	80.0-120	

L1379602-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1379602-01 07/22/21 18:38 • (MS) R3682949-4 07/22/21 18:45 • (MSD) R3682949-5 07/22/21 18:48

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MSD Result ug/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Arsenic,Dissolved	50.0	ND	50.4	49.6	99.7	98.3	1	75.0-125			1.48	20
Chromium,Dissolved	50.0	6.77	57.9	56.9	102	100	1	75.0-125			1.77	20

Method Blank (MB)

(MB) R3683555-2 07/19/21 02:09

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Acetone	U		11.3	50.0
Benzene	U		0.0941	1.00
Carbon tetrachloride	U		0.128	1.00
Chlorobenzene	U		0.116	1.00
Chloroethane	U		0.192	5.00
Chloroform	U		0.111	5.00
1,2-Dibromo-3-Chloropropane	U		0.276	5.00
1,2-Dichloroethane	U		0.0819	1.00
1,1-Dichloroethene	U		0.188	1.00
cis-1,2-Dichloroethene	U		0.126	1.00
trans-1,2-Dichloroethene	U		0.149	1.00
1,2-Dichloropropane	U		0.149	1.00
Ethylbenzene	U		0.137	1.00
Methylene Chloride	U		0.430	5.00
1,1,2,2-Tetrachloroethane	U		0.133	1.00
Tetrachloroethene	U		0.300	1.00
Toluene	U		0.278	1.00
Trichloroethene	0.223	J	0.190	1.00
Vinyl chloride	U		0.234	1.00
o-Xylene	U		0.174	1.00
m&p-Xylenes	U		0.430	2.00
(S) Toluene-d8	*108*			*80.0-120*
(S) 4-Bromofluorobenzene	*93.1*			*77.0-126*
(S) 1,2-Dichloroethane-d4	*99.3*			*70.0-130*

Laboratory Control Sample (LCS)

(LCS) R3683555-1 07/19/21 00:23

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Acetone	25.0	28.1	112	19.0-160	
Benzene	5.00	5.26	105	70.0-123	
Carbon tetrachloride	5.00	6.10	122	68.0-126	
Chlorobenzene	5.00	5.54	111	80.0-121	
Chloroethane	5.00	6.19	124	47.0-150	
Chloroform	5.00	5.16	103	73.0-120	
1,2-Dibromo-3-Chloropropane	5.00	4.54	90.8	58.0-134	
1,2-Dichloroethane	5.00	5.06	101	70.0-128	
1,1-Dichloroethene	5.00	5.40	108	71.0-124	

Laboratory Control Sample (LCS)

(LCS) R3683555-1 07/19/21 00:23

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
cis-1,2-Dichloroethene	5.00	5.56	111	73.0-120	
trans-1,2-Dichloroethene	5.00	5.22	104	73.0-120	
1,2-Dichloropropane	5.00	5.15	103	77.0-125	
Ethylbenzene	5.00	5.51	110	79.0-123	
Methylene Chloride	5.00	3.87	77.4	67.0-120	
1,1,2,2-Tetrachloroethane	5.00	4.88	97.6	65.0-130	
Tetrachloroethene	5.00	5.66	113	72.0-132	
Toluene	5.00	5.32	106	79.0-120	
Trichloroethene	5.00	6.07	121	78.0-124	
Vinyl chloride	5.00	5.70	114	67.0-131	
o-Xylene	5.00	5.38	108	80.0-122	
m&p-Xylenes	10.0	10.9	109	80.0-122	
(S) Toluene-d8			*102*	*80.0-120*	
(S) 4-Bromofluorobenzene			*92.6*	*77.0-126*	
(S) 1,2-Dichloroethane-d4			*103*	*70.0-130*	

Method Blank (MB)

(MB) R3683525-2 07/23/21 13:04

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
1,4-Dioxane	U		0.597	3.00
(S) Toluene-d8	*102*			*77.0-127*

Laboratory Control Sample (LCS)

(LCS) R3683525-1 07/23/21 12:15

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
1,4-Dioxane	50.0	64.9	130	55.0-138	
(S) Toluene-d8			*102*	*77.0-127*	

Method Blank (MB)

(MB) R3682351-1 07/19/21 10:05

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Alpha BHC	U		0.0172	0.0500
Beta BHC	U		0.0208	0.0500
Delta BHC	U		0.0150	0.0500
Gamma BHC	U		0.0209	0.0500
(S) Decachlorobiphenyl	*109*			*10.0-128*
(S) Tetrachloro-m-xylene	*138*	J1		*10.0-127*

Laboratory Control Sample (LCS)

(LCS) R3682351-2 07/19/21 10:17

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Alpha BHC	1.00	1.01	101	54.0-130	
Beta BHC	1.00	1.24	124	53.0-136	
Delta BHC	1.00	1.04	104	54.0-133	
Gamma BHC	1.00	1.07	107	55.0-129	
(S) Decachlorobiphenyl			*113*	*10.0-128*	
(S) Tetrachloro-m-xylene			*108*	*10.0-127*	

L1379162-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1379162-01 07/19/21 14:25 • (MS) R3682351-3 07/19/21 14:37 • (MSD) R3682351-4 07/19/21 14:50

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MSD Result ug/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Alpha BHC	1.00	ND	0.993	1.12	99.3	112	1	10.0-145			12.0	40
Beta BHC	1.00	ND	1.29	1.40	129	140	1	14.0-146			8.18	35
Delta BHC	1.00	ND	1.07	1.15	107	115	1	17.0-143			7.21	38
Gamma BHC	1.00	ND	1.06	1.18	106	118	1	14.0-141			10.7	40
(S) Decachlorobiphenyl					*107*	*114*		*10.0-128*				
(S) Tetrachloro-m-xylene					*96.2*	*106*		*10.0-127*				

GLOSSARY OF TERMS

Guide to Reading and Understanding Your Laboratory Report

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

Results Disclaimer - Information that may be provided by the customer, and contained within this report, include Permit Limits, Project Name, Sample ID, Sample Matrix, Sample Preservation, Field Blanks, Field Spikes, Field Duplicates, On-Site Data, Sampling Collection Dates/Times, and Sampling Location. Results relate to the accuracy of this information provided, and as the samples are received.

Abbreviations and Definitions

MDL	Method Detection Limit.
ND	Not detected at the Reporting Limit (or MDL where applicable).
RDL	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
(S)	Surrogate (Surrogate Standard) - Analytes added to every blank, sample, Laboratory Control Sample/Duplicate and Matrix Spike/Duplicate; used to evaluate analytical efficiency by measuring recovery. Surrogates are not expected to be detected in all environmental media.
U	Not detected at the Reporting Limit (or MDL where applicable).
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
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Uncertainty (Radiochemistry)	Confidence level of 2 sigma.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
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Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
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Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

Qualifier	Description
B	The same analyte is found in the associated blank.
J	The identification of the analyte is acceptable; the reported value is an estimate.
J1	Surrogate recovery limits have been exceeded; values are outside upper control limits.
P	RPD between the primary and confirmatory analysis exceeded 40%.

ACCREDITATIONS & LOCATIONS

Pace Analytical National 12065 Lebanon Rd Mount Juliet, TN 37122

Alabama	40660	Nebraska	NE-OS-15-05
Alaska	17-026	Nevada	TN000032021-1
Arizona	AZ0612	New Hampshire	2975
Arkansas	88-0469	New Jersey–NELAP	TN002
California	2932	New Mexico [1]	TN00003
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina [1]	DW21704
Georgia	NELAP	North Carolina [3]	41
Georgia [1]	923	North Dakota	R-140
Idaho	TN00003	Ohio–VAP	CL0069
Illinois	200008	Oklahoma	9915
Indiana	C-TN-01	Oregon	TN200002
Iowa	364	Pennsylvania	68-02979
Kansas	E-10277	Rhode Island	LAO000356
Kentucky [1 6]	KY90010	South Carolina	84004002
Kentucky [2]	16	South Dakota	n/a
Louisiana	AI30792	Tennessee [1 4]	2006
Louisiana	LA018	Texas	T104704245-20-18
Maine	TN00003	Texas [5]	LAB0152
Maryland	324	Utah	TN000032021-11
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	110033
Minnesota	047-999-395	Washington	C847
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	998093910
Montana	CERT0086	Wyoming	A2LA
A2LA – ISO 17025	1461.01	AIHA-LAP,LLC EMLAP	100789
A2LA – ISO 17025 [5]	1461.02	DOD	1461.01
Canada	1461.01	USDA	P330-15-00234
EPA–Crypto	TN00003		

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

* Not all certifications held by the laboratory are applicable to the results reported in the attached report.

* Accreditation is only applicable to the test methods specified on each scope of accreditation held by Pace Analytical.

Company Name/Address:
Resolute Environmental & Water Resources

1003 Weatherstone Parkway

Billing Information:
Accounts Payable
1003 Weatherstone Pkwy., Ste. 320
Woodstock, GA 30188

Pres Chk

Report to:
Joe Booth

Email To:
joe.booth@resoluteenv.com;ken.brooke@resol

Project Description:

City/State Collected: Athens, GA

Please Circle: PT MT CT ET

Phone: **404-358-8469**

Client Project # Post Injection Sample

Lab Project # **RESENVWGA-UGA MAS**

Collected by (print): William Lasker

Site/Facility ID #

P.O. #

Collected by (signature): [signature]

Immediately Packed on Ice N ___ Y ✓

Rush? (Lab MUST Be Notified)
___ Same Day ___ Five Day
___ Next Day ___ 5 Day (Rad Only)
___ Two Day ___ 10 Day (Rad Only)
___ Three Day

Quote #

Date Results Needed

No. of Cntrs

Analysis / Container / Preservative

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	**CR6 - 24hr HT** 250mlHDPE-NoPres WL 7/14	8081 100ml Amb-NoPres	Dissolved Metals 250mlHDPE-NoPres	V8260LL14D 40mlAmb-HCl	V8260TCL 40mlAmb-HCl	Remarks	Sample # (lab only)
TMW-2	G	GW		7/14/21	1518	~~9~~ 8 WL 7/14	X	X	X	X	X	pH: 5.58	-01

Chain of Custody Page ___ of ___

Pace Analytical®

12065 Lebanon Rd Mount Juliet, TN 37122
Submitting a sample via this chain of custody constitutes acknowledgment and acceptance of the Pace Terms and Conditions found at: https://info.pacelabs.com/hubfs/pas-standard-terms.pdf

SDG # L1378934
D081

Acctnum: **RESENVWGA**
Template: **T190949**
Prelogin: **P859631**
PM: **526 - Chris McCord**
PB: 7/7/21 tod
Shipped Via: **FedEX Ground**

* Matrix:
SS - Soil **AIR** - Air **F** - Filter
GW - Groundwater **B** - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other_____

Remarks:Dissolved Metals = As,Ba,Cd,Cr,Cu,Pb,Se 6020
Dissolved Metals need to be lab filtered

pH _____ Temp _____
Flow _____ Other _____

Samples returned via:
__ UPS ✓ FedEx __ Courier _____

Tracking # 5163 7706 1221

Sample Receipt Checklist
COC Seal Present/Intact: __NP __Y __N
COC Signed/Accurate: ✓Y __N
Bottles arrive intact: ✓Y __N
Correct bottles used: ✓Y __N
Sufficient volume sent: ✓Y __N
If Applicable
VOA Zero Headspace: __Y __N
Preservation Correct/Checked: __Y __N
RAD Screen <0.5 mR/hr: ✓Y __N

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Trip Blank Received: Yes / No HCl / MeoH TBR	If preservation required by Login: Date/Time
[signature]	7/14/21	1700		NA	
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Temp: 4.8 °C Bottles Received: 8	
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature) Patrick Michael	Date: 7-15-21 Time: 0930	Hold: Condition: NCF OK

ANALYTICAL REPORT

August 03, 2021

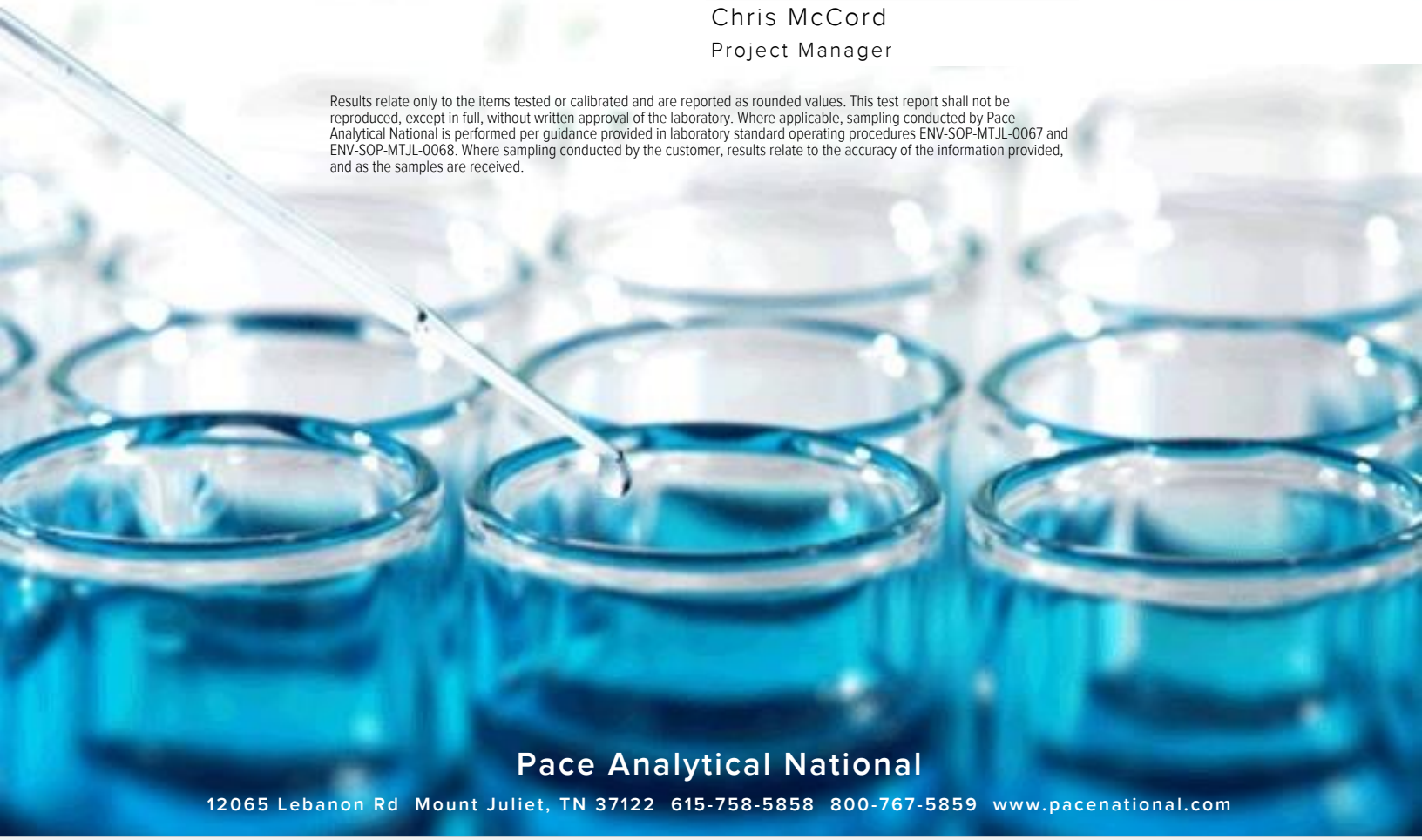
Resolute Environmental & Water Resources

Sample Delivery Group:	L1384747
Samples Received:	07/15/2021
Project Number:	UGA JULY 2021 SAE
Description:	

Report To: Joe Booth
1003 Weatherstone Parkway
Suite 320
Woodstock, GA 30188

Entire Report Reviewed By:

Chris McCord
Project Manager



Pace Analytical National
12065 Lebanon Rd Mount Juliet, TN 37122 615-758-5858 800-767-5859 www.pacenational.com

TABLE OF CONTENTS

SAMPLE SUMMARY

MW-7A L1384747-01 GW

Collected by	Collected date/time	Received date/time
Joe Booth	07/13/21 10:29	07/15/21 09:30

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 9056A	WG1714576	1	07/30/21 19:11	07/30/21 19:11	GB	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1715097	1	08/01/21 13:06	08/02/21 18:15	EL	Mt. Juliet, TN

CASE NARRATIVE

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

Chris McCord
Project Manager

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	ug/l		ug/l		date / time	
Sulfate	ND		5000	1	07/30/2021 19:11	WG1714576

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	ug/l		ug/l		date / time	
Sodium	3010		3000	1	08/02/2021 18:15	WG1715097

Method Blank (MB)

(MB) R3686212-1 07/30/21 11:49

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Sulfate	U		594	5000

L1384466-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1384466-01 07/30/21 13:43 • (DUP) R3686212-4 07/30/21 14:00

Analyte	Original Result ug/l	DUP Result ug/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Sulfate	ND	ND	1	0.844		15

Laboratory Control Sample (LCS)

(LCS) R3686212-2 07/30/21 12:06

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Sulfate	40000	39900	99.7	80.0-120	

L1384470-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1384470-01 07/30/21 12:55 • (MS) R3686212-3 07/30/21 13:11 • (MSD) R3686212-5 07/30/21 18:39

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MSD Result ug/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Sulfate	50000	ND	50900	50800	98.3	98.0	1	80.0-120			0.354	15

QUALITY CONTROL SUMMARY

L1384747-01

Method Blank (MB)

(MB) R3686886-1 08/02/21 17:08

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	ug/l		ug/l	ug/l
Sodium	U		504	3000

Laboratory Control Sample (LCS)

(LCS) R3686886-2 08/02/21 17:10

Analyte	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
	ug/l	ug/l	%	%	
Sodium	10000	9780	97.8	80.0-120	

L1384019-08 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1384019-08 08/02/21 17:13 • (MS) R3686886-4 08/02/21 17:18 • (MSD) R3686886-5 08/02/21 17:21

Analyte	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
	ug/l	ug/l	ug/l	ug/l	%	%		%			%	%
Sodium	10000	ND	9610	9720	96.1	97.2	1	75.0-125			1.08	20

GLOSSARY OF TERMS

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SDG	Sample Delivery Group.
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Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
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Qualifier | Description

The remainder of this page intentionally left blank, there are no qualifiers applied to this SDG.

ACCREDITATIONS & LOCATIONS

Pace Analytical National 12065 Lebanon Rd Mount Juliet, TN 37122

Alabama	40660	Nebraska	NE-OS-15-05
Alaska	17-026	Nevada	TN000032021-1
Arizona	AZ0612	New Hampshire	2975
Arkansas	88-0469	New Jersey–NELAP	TN002
California	2932	New Mexico [1]	TN00003
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina [1]	DW21704
Georgia	NELAP	North Carolina [3]	41
Georgia [1]	923	North Dakota	R-140
Idaho	TN00003	Ohio–VAP	CL0069
Illinois	200008	Oklahoma	9915
Indiana	C-TN-01	Oregon	TN200002
Iowa	364	Pennsylvania	68-02979
Kansas	E-10277	Rhode Island	LAO000356
Kentucky [1 6]	KY90010	South Carolina	84004002
Kentucky [2]	16	South Dakota	n/a
Louisiana	AI30792	Tennessee [1 4]	2006
Louisiana	LA018	Texas	T104704245-20-18
Maine	TN00003	Texas [5]	LAB0152
Maryland	324	Utah	TN000032021-11
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	110033
Minnesota	047-999-395	Washington	C847
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	998093910
Montana	CERT0086	Wyoming	A2LA
A2LA – ISO 17025	1461.01	AIHA-LAP,LLC EMLAP	100789
A2LA – ISO 17025 [5]	1461.02	DOD	1461.01
Canada	1461.01	USDA	P330-15-00234
EPA–Crypto	TN00003		

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

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* Accreditation is only applicable to the test methods specified on each scope of accreditation held by Pace Analytical.

Company Name/Address:
Resolute Environmental & Water Resources

1003 Weatherstone Parkway

Billing Information:
Accounts Payable
1003 Weatherstone Pkwy., Ste. 320
Woodstock, GA 30188

Pres Chk

Report to: Joe Booth

Email To: joe.booth@resoluteenv.com;ken.brooke@resol

Project Description:

City/State Collected: Athens, GA

Please Circle: PT MT CT ET

Phone: 404-358-8469

Client Project # UGA July 2021 SAE

Lab Project # RESENVWGA-UGA MAS

Collected by (print): Joe Booth

Site/Facility ID #

P.O. #

Collected by (signature):

Immediately Packed on Ice N ___ Y ✓

Rush? (Lab MUST Be Notified)
___ Same Day ___ Five Day
___ Next Day ___ 5 Day (Rad Only)
___ Two Day ___ 10 Day (Rad Only)
___ Three Day

Quote #

Date Results Needed

Analysis / Container / Preservative

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	8081 100ml Amb-NoPres	V8260LL14D 40mlAmb-HCl	V8260TCL 40mlAmb-HCl	Remarks	Sample # (lab only)
MW-2	G	GW		7/14/21	1522	7	X	X	X	pH: 4.74	-01
MW-3	G	GW		7/14/21	1442	7	X	X	X	pH: 4.75	-02
MW-4	G	GW		7/14/21	1129	7	X	X	X	pH: 5.46	-03
MW-5B	G	GW		7/14/21	1210	7	X	X	X	pH: 6.36	-04
MW-5C	G	GW		7/14/21	1248	7	X	X	X	pH: 6.18	-05
MW-6A	G	GW		7/14/21	1234	7	X	X	X	pH: 5.20	-06
MW-6B	G	GW		7/14/21	1130	7	X	X	X	pH: 5.27	-07
MW-7A	G	GW		7/13/21	1029	7	X	X	X	pH: 5.85	-08 -01
MW-7B	G	GW		7/13/21	1123	7	X	X	X	pH: 6.27	-09
~~MW-9A~~		GW				7	X	X	X		

Chain of Custody Page ___ of ___

Pace Analytical®

L1384747

12065 Lebanon Rd Mount Juliet, TN 37122

Submitting a sample via this chain of custody constitutes acknowledgment and acceptance of the Pace Terms and Conditions found at: https://info.pacelabs.com/hubfs/pas-standard-terms.pdf

SDG # 1378928 NV 7/30/21

A218

Acctnum: RESENVWGA

Template: T190948

Prelogin: P859630

PM: 526 - Chris McCord

PB: mn 21 tod

Shipped Via: FedEX Ground

* Matrix:
SS - Soil AIR - Air F - Filter
GW - Groundwater B - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other_____

Remarks:

pH _____ Temp _____

Flow _____ Other _____

Samples returned via:
__ UPS ✓ FedEx __ Courier _____

Tracking # 5163 7706 1130/1129

Sample Receipt Checklist

COC Seal Present/Intact:	NP	Y N
COC Signed/Accurate:		✓ N
Bottles arrive intact:		✓ N
Correct bottles used:		✓ N
Sufficient volume sent:		✓ N
If Applicable		
VOA Zero Headspace:		✓ N
Preservation Correct/Checked:		✓ N
RAD Screen <0.5 mR/hr:		✓ N

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Trip Blank Received: Yes / No HCl / MeoH TBR	If preservation required by Login: Date/Time
	7/14/21	1700		NA 2	
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Temp: 4.6 °C Bottles Received: 4.6 126	
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)	Date: 7/15/21 Time: 9:30	Hold: Condition: NCF / OK

L1378928 *RESENVWGA* RUSH relog

R3/R4/RX/EX

Please relog L1378928-08 for SULFATE, NAICP. Relog as R4 due 8/4.

Use remaining 100mlAmb-NoPres for 8081 to run these tests and qualify as needed for improper container. Pour off 25ml for WL and preserve the rest for Metals.

Thanks,

Chris

From: Joe Booth <Joe.Booth@resoluteenv.com>

Sent: Friday, July 30, 2021 1:59 PM

To: Chris McCord <Chris.McCord@pacelabs.com>

Subject: RE: MW-7a

CAUTION: This email originated from outside Pace Analytical. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Yes, and if possible can we get a 72 hour turn around if possible.

Thank you so much.

Joe Booth

Staff Hydrogeologist

470-895-0652

Time estimate: oh **Time spent:** oh

Members

Christopher McCord (responsible)

ANALYTICAL REPORT

August 09, 2021

Resolute Environmental & Water Resources

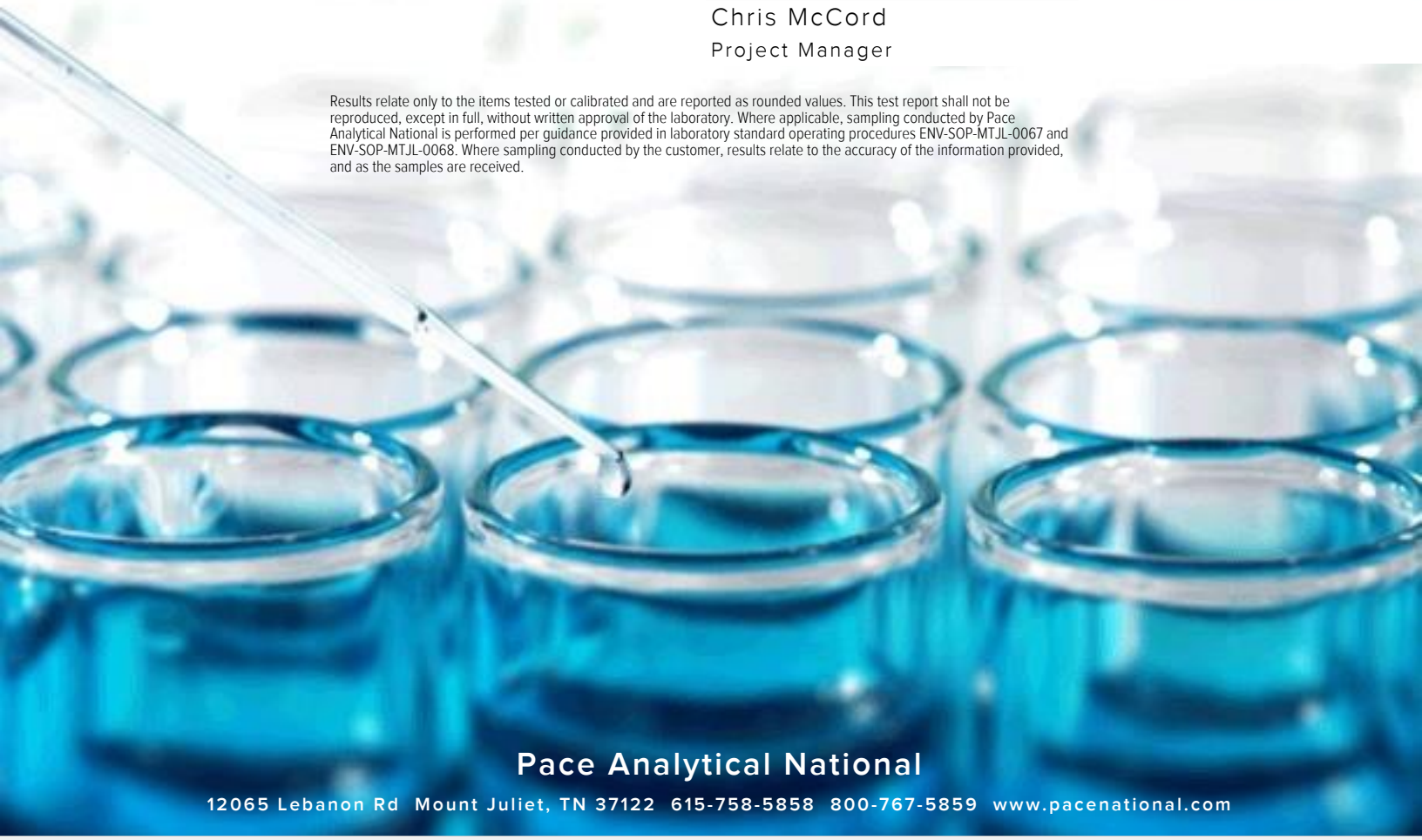
Sample Delivery Group:	L1386072
Samples Received:	08/04/2021
Project Number:	UGA - POST INJECTION
Description:	

Report To:

Joe Booth
1003 Weatherstone Parkway
Suite 320
Woodstock, GA 30188

Entire Report Reviewed By:

Chris McCord
Project Manager



Pace Analytical National
12065 Lebanon Rd Mount Juliet, TN 37122 615-758-5858 800-767-5859 www.pacenational.com

TABLE OF CONTENTS

SAMPLE SUMMARY

TMW-1 L1386072-01 GW

Collected by: Joe Booth
Collected date/time: 08/03/21 11:42
Received date/time: 08/04/21 09:15

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 9056A	WG1718467	1	08/06/21 02:49	08/06/21 02:49	GB	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1717764	1	08/05/21 10:58	08/06/21 03:16	CCE	Mt. Juliet, TN

TMW-2 L1386072-02 GW

Collected by: Joe Booth
Collected date/time: 08/03/21 11:59
Received date/time: 08/04/21 09:15

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 9056A	WG1718467	1	08/06/21 03:00	08/06/21 03:00	GB	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1717764	1	08/05/21 10:58	08/06/21 03:19	CCE	Mt. Juliet, TN

TMW-3 L1386072-03 GW

Collected by: Joe Booth
Collected date/time: 08/03/21 12:18
Received date/time: 08/04/21 09:15

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 9056A	WG1718467	1	08/06/21 04:09	08/06/21 04:09	GB	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1717764	1	08/05/21 10:58	08/06/21 03:28	CCE	Mt. Juliet, TN

MW-9B L1386072-04 GW

Collected by: Joe Booth
Collected date/time: 08/03/21 12:58
Received date/time: 08/04/21 09:15

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 9056A	WG1718467	1	08/06/21 04:20	08/06/21 04:20	GB	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1717764	1	08/05/21 10:58	08/06/21 03:31	CCE	Mt. Juliet, TN

MW-9A L1386072-05 GW

Collected by: Joe Booth
Collected date/time: 08/03/21 13:31
Received date/time: 08/04/21 09:15

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 9056A	WG1718467	1	08/06/21 04:32	08/06/21 04:32	GB	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1717764	1	08/05/21 10:58	08/06/21 03:34	CCE	Mt. Juliet, TN

CASE NARRATIVE

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

Chris McCord
Project Manager

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	ug/l		ug/l		date / time	
Sulfate	13700		5000	1	08/06/2021 02:49	WG1718467

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	ug/l		ug/l		date / time	
Sodium	18200		3000	1	08/06/2021 03:16	WG1717764

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	ug/l		ug/l		date / time	
Sulfate	ND		5000	1	08/06/2021 03:00	WG1718467

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	ug/l		ug/l		date / time	
Sodium	3540		3000	1	08/06/2021 03:19	WG1717764

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	ug/l		ug/l		date / time	
Sulfate	ND		5000	1	08/06/2021 04:09	WG1718467

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	ug/l		ug/l		date / time	
Sodium	3650		3000	1	08/06/2021 03:28	WG1717764

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	ug/l		ug/l		date / time	
Sulfate	ND		5000	1	08/06/2021 04:20	WG1718467

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	ug/l		ug/l		date / time	
Sodium	5950		3000	1	08/06/2021 03:31	WG1717764

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	ug/l		ug/l		date / time	
Sulfate	ND		5000	1	08/06/2021 04:32	WG1718467

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	ug/l		ug/l		date / time	
Sodium	4400		3000	1	08/06/2021 03:34	WG1717764

Method Blank (MB)

(MB) R3688940-1 08/06/21 01:40

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Sulfate	U		594	5000

L1386072-02 Original Sample (OS) • Duplicate (DUP)

(OS) L1386072-02 08/06/21 03:00 • (DUP) R3688940-3 08/06/21 03:11

Analyte	Original Result ug/l	DUP Result ug/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Sulfate	ND	ND	1	1.81		15

L1386544-05 Original Sample (OS) • Duplicate (DUP)

(OS) L1386544-05 08/06/21 16:53 • (DUP) R3688940-8 08/06/21 17:04

Analyte	Original Result ug/l	DUP Result ug/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Sulfate	138000	139000	5	0.272		15

Laboratory Control Sample (LCS)

(LCS) R3688940-2 08/06/21 01:51

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Sulfate	40000	41400	103	80.0-120	

L1386072-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1386072-02 08/06/21 03:00 • (MS) R3688940-4 08/06/21 03:23 • (MSD) R3688940-5 08/06/21 03:57

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MSD Result ug/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Sulfate	50000	ND	52400	52600	102	102	1	80.0-120			0.390	15

Method Blank (MB)

(MB) R3688658-1 08/06/21 02:16

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Sodium	U		504	3000

Laboratory Control Sample (LCS)

(LCS) R3688658-2 08/06/21 02:19

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Sodium	10000	9740	97.4	80.0-120	

L1384465-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1384465-02 08/06/21 02:22 • (MS) R3688658-4 08/06/21 02:28 • (MSD) R3688658-5 08/06/21 02:31

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MSD Result ug/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Sodium	10000	99000	106000	106000	69.6	71.6	1	75.0-125	V	V	0.184	20

GLOSSARY OF TERMS

Guide to Reading and Understanding Your Laboratory Report

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

Results Disclaimer - Information that may be provided by the customer, and contained within this report, include Permit Limits, Project Name, Sample ID, Sample Matrix, Sample Preservation, Field Blanks, Field Spikes, Field Duplicates, On-Site Data, Sampling Collection Dates/Times, and Sampling Location. Results relate to the accuracy of this information provided, and as the samples are received.

Abbreviations and Definitions

MDL	Method Detection Limit.
ND	Not detected at the Reporting Limit (or MDL where applicable).
RDL	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
U	Not detected at the Reporting Limit (or MDL where applicable).
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state “ND” (Not Detected) or “BDL” (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Uncertainty (Radiochemistry)	Confidence level of 2 sigma.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

Qualifier	Description
V	The sample concentration is too high to evaluate accurate spike recoveries.

ACCREDITATIONS & LOCATIONS

Pace Analytical National 12065 Lebanon Rd Mount Juliet, TN 37122

Alabama	40660	Nebraska	NE-OS-15-05
Alaska	17-026	Nevada	TN000032021-1
Arizona	AZ0612	New Hampshire	2975
Arkansas	88-0469	New Jersey–NELAP	TN002
California	2932	New Mexico [1]	TN00003
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina [1]	DW21704
Georgia	NELAP	North Carolina [3]	41
Georgia [1]	923	North Dakota	R-140
Idaho	TN00003	Ohio–VAP	CL0069
Illinois	200008	Oklahoma	9915
Indiana	C-TN-01	Oregon	TN200002
Iowa	364	Pennsylvania	68-02979
Kansas	E-10277	Rhode Island	LAO000356
Kentucky [1 6]	KY90010	South Carolina	84004002
Kentucky [2]	16	South Dakota	n/a
Louisiana	AI30792	Tennessee [1 4]	2006
Louisiana	LA018	Texas	T104704245-20-18
Maine	TN00003	Texas [5]	LAB0152
Maryland	324	Utah	TN000032021-11
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	110033
Minnesota	047-999-395	Washington	C847
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	998093910
Montana	CERT0086	Wyoming	A2LA
A2LA – ISO 17025	1461.01	AIHA-LAP,LLC EMLAP	100789
A2LA – ISO 17025 [5]	1461.02	DOD	1461.01
Canada	1461.01	USDA	P330-15-00234
EPA–Crypto	TN00003		

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

* Not all certifications held by the laboratory are applicable to the results reported in the attached report.

* Accreditation is only applicable to the test methods specified on each scope of accreditation held by Pace Analytical.

Company Name/Address:
Resolute Environmental & Water Resources

1003 Weatherstone Parkway

Billing Information:
Accounts Payable
1003 Weatherstone Pkwy., Ste. 320
Woodstock, GA 30188

Pres Chk

Report to:
Joe Booth

Email To:
joe.booth@resoluteenv.com;tommy.jordan@re

Project Description:

City/State Collected:

Please Circle: PT MT CT ET

Phone: **404-358-8469**

Client Project #
UGA - Post Injection

Lab Project #
RESENVWGA-UGA MAS

Collected by (print):
Joe Booth

Site/Facility ID #

P.O. #

Collected by (signature):

Immediately Packed on Ice N ___ Y ✓

Rush? (Lab MUST Be Notified)
___ Same Day ___ Five Day
✓ Next Day ___ 5 Day (Rad Only)
___ Two Day ___ 10 Day (Rad Only)
___ Three Day

Quote #

Date Results Needed
24 hour TAT

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	NAICP 250mlHDPE-HNO3	SULFATE 125mlHDPE-NoPres								Remarks	Sample # (lab only)
							2	1									
TMW-1	Grab	GW		8/3/21	1142	2	X	X									-01
TMW-2		GW			1159	2	X	X									-02
TMW-3		GW			1210	2	X	X									-03
MW-9B		GW			1258	2	X	X									-04
MW-9A		GW			1331	2	X	X									-05
		GW				2	X	X									
		GW				2	X	X									
		GW				2	X	X									
		GW				2	X	X									
		GW				2	X	X									

Analysis / Container / Preservative

Chain of Custody Page ___ of ___

Pace Analytical®

12065 Lebanon Rd Mount Juliet, TN 37122
Submitting a sample via this chain of custody constitutes acknowledgment and acceptance of the Pace Terms and Conditions found at: https://info.pacelabs.com/hubfs/pas-standard-terms.pdf

SDG # L1386072

Table E150

Acctnum: **RESENVWGA**

Template: **T192439**

Prelogin: **P864488**

PM: **526 - Chris McCord**

PB: CB 7/29/21

Shipped Via: **FedEX Priority**

* Matrix:
SS - Soil **AIR** - Air **F** - Filter
GW - Groundwater **B** - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other_____

Remarks:

pH _____ Temp _____

Flow _____ Other _____

Samples returned via:
__ UPS ✓ FedEx __ Courier _____

Tracking # 516377128512

Sample Receipt Checklist
COC Seal Present/Intact: __NP ✓Y __N
COC Signed/Accurate: ✓Y __N
Bottles arrive intact: ✓Y __N
Correct bottles used: ✓Y __N
Sufficient volume sent: ✓Y __N
If Applicable
VOA Zero Headspace: __Y __N
Preservation Correct/Checked: ✓Y __N
RAD Screen <0.5 mR/hr: ✓Y __N

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Trip Blank Received: Yes / No HCL / MeoH TBR	If preservation required by Login: Date/Time
Joe Booth	8/3/21	1500	Fed EX	0	
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Temp: 0.6 °C Bottles Received: 10	
				3.3 + 0.3 = 3.3	
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)	Date: 8-4-21 Time: 9:15	Hold: / Condition: NCF / OK

ANALYTICAL REPORT

August 17, 2021

Resolute Environmental & Water Resources

Sample Delivery Group:	L1389712
Samples Received:	08/12/2021
Project Number:	
Description:	Post Injection

Report To:

Joe Booth
1003 Weatherstone Parkway
Suite 320
Woodstock, GA 30188

Entire Report Reviewed By:

Chris McCord
Project Manager

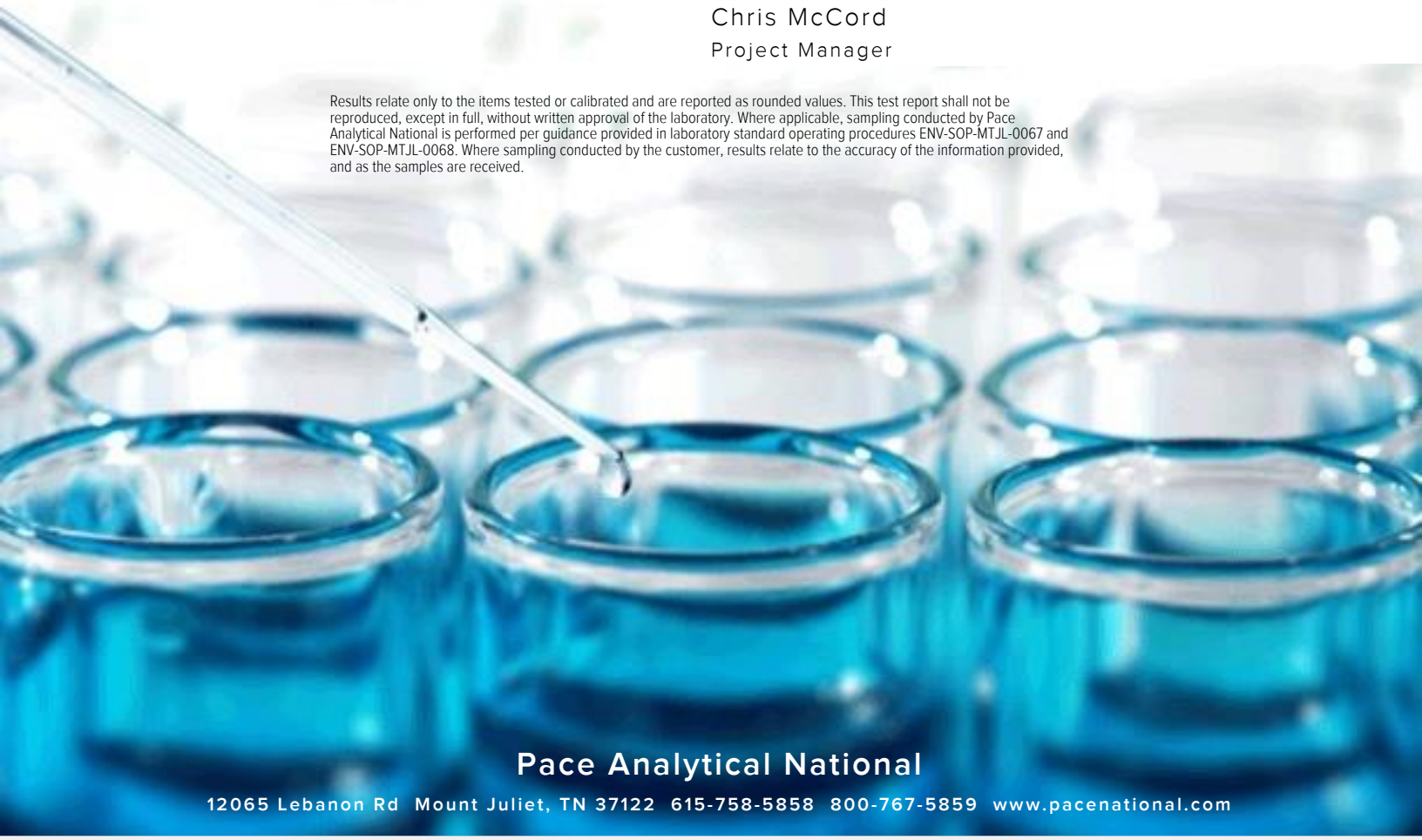


TABLE OF CONTENTS

SAMPLE SUMMARY

TMW-4 L1389712-01 GW

Collected by: Joe Booth
Collected date/time: 08/11/21 14:02
Received date/time: 08/12/21 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 9056A	WG1722893	100	08/14/21 01:08	08/14/21 01:08	MCG	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1722775	5	08/13/21 20:17	08/17/21 13:01	CCE	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1722709	5	08/13/21 11:38	08/17/21 16:20	JDG	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1722724	1	08/13/21 17:02	08/13/21 17:02	JHH	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B-SIM	WG1722766	1	08/13/21 17:46	08/13/21 17:46	JAH	Mt. Juliet, TN

TMW-6 L1389712-02 GW

Collected by: Joe Booth
Collected date/time: 08/11/21 15:24
Received date/time: 08/12/21 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 9056A	WG1722893	1	08/14/21 01:23	08/14/21 01:23	MCG	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1722775	1	08/13/21 20:17	08/14/21 13:48	EL	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1722709	1	08/13/21 11:38	08/13/21 23:28	JPD	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1722724	1	08/13/21 17:20	08/13/21 17:20	JHH	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B-SIM	WG1722766	1	08/13/21 18:06	08/13/21 18:06	JAH	Mt. Juliet, TN

CASE NARRATIVE

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

Chris McCord
Project Manager

Wet Chemistry by Method 9056A

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Sulfate	2210000		500000	100	08/14/2021 01:08	WG1722893

Metals (ICP) by Method 6010B

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Sodium	2880000		15000	5	08/17/2021 13:01	WG1722775

Metals (ICPMS) by Method 6020

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Arsenic,Dissolved	ND		10.0	5	08/17/2021 16:20	WG1722709
Barium,Dissolved	142		10.0	5	08/17/2021 16:20	WG1722709
Cadmium,Dissolved	ND		5.00	5	08/17/2021 16:20	WG1722709
Chromium,Dissolved	220		10.0	5	08/17/2021 16:20	WG1722709
Copper,Dissolved	ND		25.0	5	08/17/2021 16:20	WG1722709
Lead,Dissolved	ND		10.0	5	08/17/2021 16:20	WG1722709
Selenium,Dissolved	ND		10.0	5	08/17/2021 16:20	WG1722709

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Acetone	ND		50.0	1	08/13/2021 17:02	WG1722724
Benzene	ND		1.00	1	08/13/2021 17:02	WG1722724
Carbon tetrachloride	ND		1.00	1	08/13/2021 17:02	WG1722724
Chlorobenzene	ND		1.00	1	08/13/2021 17:02	WG1722724
Chloroethane	ND		5.00	1	08/13/2021 17:02	WG1722724
Chloroform	50.1		5.00	1	08/13/2021 17:02	WG1722724
1,2-Dibromo-3-Chloropropane	ND		5.00	1	08/13/2021 17:02	WG1722724
1,2-Dichloroethane	ND		1.00	1	08/13/2021 17:02	WG1722724
1,1-Dichloroethene	ND		1.00	1	08/13/2021 17:02	WG1722724
cis-1,2-Dichloroethene	ND		1.00	1	08/13/2021 17:02	WG1722724
trans-1,2-Dichloroethene	ND		1.00	1	08/13/2021 17:02	WG1722724
1,2-Dichloropropane	ND		1.00	1	08/13/2021 17:02	WG1722724
Ethylbenzene	ND		1.00	1	08/13/2021 17:02	WG1722724
Methylene Chloride	ND		5.00	1	08/13/2021 17:02	WG1722724
1,1,2,2-Tetrachloroethane	ND		1.00	1	08/13/2021 17:02	WG1722724
Tetrachloroethene	ND		1.00	1	08/13/2021 17:02	WG1722724
Toluene	ND		1.00	1	08/13/2021 17:02	WG1722724
Trichloroethene	ND		1.00	1	08/13/2021 17:02	WG1722724
Vinyl chloride	ND		1.00	1	08/13/2021 17:02	WG1722724
o-Xylene	ND		1.00	1	08/13/2021 17:02	WG1722724
m&p-Xylene	ND		2.00	1	08/13/2021 17:02	WG1722724
(S) Toluene-d8	*103*		*80.0-120*		*08/13/2021 17:02*	WG1722724
(S) 4-Bromofluorobenzene	*92.7*		*77.0-126*		*08/13/2021 17:02*	WG1722724
(S) 1,2-Dichloroethane-d4	*123*		*70.0-130*		*08/13/2021 17:02*	WG1722724

Volatile Organic Compounds (GC/MS) by Method 8260B-SIM

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
1,4-Dioxane	17.0		3.00	1	08/13/2021 17:46	WG1722766
(S) Toluene-d8	*98.0*		*77.0-127*		*08/13/2021 17:46*	WG1722766

Wet Chemistry by Method 9056A

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Sulfate	86600	J6	5000	1	08/14/2021 01:23	WG1722893

Metals (ICP) by Method 6010B

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Sodium	93700		3000	1	08/14/2021 13:48	WG1722775

Metals (ICPMS) by Method 6020

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Arsenic,Dissolved	ND		2.00	1	08/13/2021 23:28	WG1722709
Barium,Dissolved	1300		2.00	1	08/13/2021 23:28	WG1722709
Cadmium,Dissolved	ND		1.00	1	08/13/2021 23:28	WG1722709
Chromium,Dissolved	4.13		2.00	1	08/13/2021 23:28	WG1722709
Copper,Dissolved	ND		5.00	1	08/13/2021 23:28	WG1722709
Lead,Dissolved	ND		2.00	1	08/13/2021 23:28	WG1722709
Selenium,Dissolved	ND		2.00	1	08/13/2021 23:28	WG1722709

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Acetone	ND		50.0	1	08/13/2021 17:20	WG1722724
Benzene	ND		1.00	1	08/13/2021 17:20	WG1722724
Carbon tetrachloride	ND		1.00	1	08/13/2021 17:20	WG1722724
Chlorobenzene	ND		1.00	1	08/13/2021 17:20	WG1722724
Chloroethane	ND		5.00	1	08/13/2021 17:20	WG1722724
Chloroform	95.5		5.00	1	08/13/2021 17:20	WG1722724
1,2-Dibromo-3-Chloropropane	ND		5.00	1	08/13/2021 17:20	WG1722724
1,2-Dichloroethane	ND		1.00	1	08/13/2021 17:20	WG1722724
1,1-Dichloroethene	ND		1.00	1	08/13/2021 17:20	WG1722724
cis-1,2-Dichloroethene	ND		1.00	1	08/13/2021 17:20	WG1722724
trans-1,2-Dichloroethene	ND		1.00	1	08/13/2021 17:20	WG1722724
1,2-Dichloropropane	ND		1.00	1	08/13/2021 17:20	WG1722724
Ethylbenzene	ND		1.00	1	08/13/2021 17:20	WG1722724
Methylene Chloride	ND		5.00	1	08/13/2021 17:20	WG1722724
1,1,2,2-Tetrachloroethane	ND		1.00	1	08/13/2021 17:20	WG1722724
Tetrachloroethene	ND		1.00	1	08/13/2021 17:20	WG1722724
Toluene	ND		1.00	1	08/13/2021 17:20	WG1722724
Trichloroethene	ND		1.00	1	08/13/2021 17:20	WG1722724
Vinyl chloride	ND		1.00	1	08/13/2021 17:20	WG1722724
o-Xylene	ND		1.00	1	08/13/2021 17:20	WG1722724
m&p-Xylene	ND		2.00	1	08/13/2021 17:20	WG1722724
(S) Toluene-d8	*102*		*80.0-120*		*08/13/2021 17:20*	WG1722724
(S) 4-Bromofluorobenzene	*95.9*		*77.0-126*		*08/13/2021 17:20*	WG1722724
(S) 1,2-Dichloroethane-d4	*120*		*70.0-130*		*08/13/2021 17:20*	WG1722724

Volatile Organic Compounds (GC/MS) by Method 8260B-SIM

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
1,4-Dioxane	25.3		3.00	1	08/13/2021 18:06	WG1722766
(S) Toluene-d8	*97.7*		*77.0-127*		*08/13/2021 18:06*	WG1722766

Method Blank (MB)

(MB) R3692880-1 08/13/21 22:50

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Sulfate	739	J	594	5000

L1389712-02 Original Sample (OS) • Duplicate (DUP)

(OS) L1389712-02 08/14/21 01:23 • (DUP) R3692880-3 08/14/21 02:08

Analyte	Original Result ug/l	DUP Result ug/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Sulfate	86600	86400	1	0.172		15

L1389911-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1389911-01 08/14/21 05:22 • (DUP) R3692880-6 08/14/21 05:37

Analyte	Original Result ug/l	DUP Result ug/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Sulfate	63600	63500	1	0.148		15

Laboratory Control Sample (LCS)

(LCS) R3692880-2 08/13/21 23:05

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Sulfate	40000	39200	98.1	80.0-120	

L1389712-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1389712-02 08/14/21 01:23 • (MS) R3692880-4 08/14/21 02:23 • (MSD) R3692880-5 08/14/21 02:38

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MSD Result ug/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Sulfate	50000	86600	124000	124000	74.3	74.6	1	80.0-120	E J6	E J6	0.113	15

L1389911-01 Original Sample (OS) • Matrix Spike (MS)

(OS) L1389911-01 08/14/21 05:22 • (MS) R3692880-7 08/14/21 05:52

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Sulfate	50000	63600	110000	93.4	1	80.0-120	E

Method Blank (MB)

(MB) R3692301-1 08/14/21 12:34

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Sodium	U		504	3000

Laboratory Control Sample (LCS)

(LCS) R3692301-2 08/14/21 12:37

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Sodium	10000	9780	97.8	80.0-120	

L1389072-07 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1389072-07 08/14/21 12:39 • (MS) R3692301-4 08/14/21 12:45 • (MSD) R3692301-5 08/14/21 12:47

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MSD Result ug/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Sodium	10000	227000	233000	234000	58.4	62.2	1	75.0-125	V	V	0.163	20

QUALITY CONTROL SUMMARY

L1389712-01,02

Method Blank (MB)

(MB) R3691921-6 08/13/21 23:21

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Arsenic,Dissolved	U		0.180	2.00
Barium,Dissolved	U		0.381	2.00
Cadmium,Dissolved	U		0.150	1.00
Chromium,Dissolved	U		1.24	2.00
Copper,Dissolved	3.16	J	1.51	5.00
Lead,Dissolved	U		0.849	2.00
Selenium,Dissolved	U		0.300	2.00

Laboratory Control Sample (LCS)

(LCS) R3691921-2 08/13/21 22:40

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Arsenic,Dissolved	50.0	49.2	98.3	80.0-120	
Barium,Dissolved	50.0	48.2	96.3	80.0-120	
Cadmium,Dissolved	50.0	51.4	103	80.0-120	
Chromium,Dissolved	50.0	50.6	101	80.0-120	
Copper,Dissolved	50.0	49.5	99.1	80.0-120	
Lead,Dissolved	50.0	49.5	99.0	80.0-120	
Selenium,Dissolved	50.0	54.7	109	80.0-120	

L1388695-07 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1388695-07 08/13/21 22:44 • (MS) R3691921-4 08/13/21 22:50 • (MSD) R3691921-5 08/13/21 22:54

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MSD Result ug/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Arsenic,Dissolved	50.0	4.63	54.4	55.1	99.6	101	1	75.0-125			1.22	20
Barium,Dissolved	50.0	11.0	62.4	60.5	103	98.9	1	75.0-125			3.16	20
Cadmium,Dissolved	50.0	ND	50.7	50.6	101	101	1	75.0-125			0.193	20
Chromium,Dissolved	50.0	ND	49.8	50.1	99.6	100	1	75.0-125			0.535	20
Copper,Dissolved	50.0	ND	47.5	47.5	95.0	94.9	1	75.0-125			0.139	20
Lead,Dissolved	50.0	ND	47.8	48.4	95.7	96.9	1	75.0-125			1.23	20
Selenium,Dissolved	50.0	ND	57.7	56.0	112	109	1	75.0-125			3.02	20

Method Blank (MB)

(MB) R3692779-3 08/13/21 09:05

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Acetone	U		11.3	50.0
Benzene	U		0.0941	1.00
Carbon tetrachloride	U		0.128	1.00
Chlorobenzene	U		0.116	1.00
Chloroethane	U		0.192	5.00
Chloroform	U		0.111	5.00
1,2-Dibromo-3-Chloropropane	U		0.276	5.00
1,2-Dichloroethane	U		0.0819	1.00
1,1-Dichloroethene	U		0.188	1.00
cis-1,2-Dichloroethene	U		0.126	1.00
trans-1,2-Dichloroethene	U		0.149	1.00
1,2-Dichloropropane	U		0.149	1.00
Ethylbenzene	U		0.137	1.00
Methylene Chloride	U		0.430	5.00
1,1,2,2-Tetrachloroethane	U		0.133	1.00
Tetrachloroethene	U		0.300	1.00
Toluene	U		0.278	1.00
Trichloroethene	U		0.190	1.00
Vinyl chloride	U		0.234	1.00
o-Xylene	U		0.174	1.00
m&p-Xylenes	U		0.430	2.00
(S) Toluene-d8	*102*			*80.0-120*
(S) 4-Bromofluorobenzene	*96.8*			*77.0-126*
(S) 1,2-Dichloroethane-d4	*121*			*70.0-130*

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

(LCS) R3692779-1 08/13/21 08:08 • (LCSD) R3692779-2 08/13/21 08:27

Analyte	Spike Amount ug/l	LCS Result ug/l	LCSD Result ug/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Acetone	25.0	26.2	23.5	105	94.0	19.0-160			10.9	27
Benzene	5.00	4.63	4.82	92.6	96.4	70.0-123			4.02	20
Carbon tetrachloride	5.00	3.86	4.00	77.2	80.0	68.0-126			3.56	20
Chlorobenzene	5.00	4.49	4.76	89.8	95.2	80.0-121			5.84	20
Chloroethane	5.00	4.71	4.47	94.2	89.4	47.0-150			5.23	20
Chloroform	5.00	4.53	4.55	90.6	91.0	73.0-120			0.441	20
1,2-Dibromo-3-Chloropropane	5.00	3.98	4.38	79.6	87.6	58.0-134			9.57	20
1,2-Dichloroethane	5.00	5.82	5.98	116	120	70.0-128			2.71	20
1,1-Dichloroethene	5.00	4.82	4.99	96.4	99.8	71.0-124			3.47	20

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

(LCS) R3692779-1 08/13/21 08:08 • (LCSD) R3692779-2 08/13/21 08:27

Analyte	Spike Amount ug/l	LCS Result ug/l	LCSD Result ug/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
cis-1,2-Dichloroethene	5.00	4.55	4.80	91.0	96.0	73.0-120			5.35	20
trans-1,2-Dichloroethene	5.00	4.15	4.27	83.0	85.4	73.0-120			2.85	20
1,2-Dichloropropane	5.00	5.32	5.64	106	113	77.0-125			5.84	20
Ethylbenzene	5.00	4.07	4.31	81.4	86.2	79.0-123			5.73	20
Methylene Chloride	5.00	4.30	4.42	86.0	88.4	67.0-120			2.75	20
1,1,2,2-Tetrachloroethane	5.00	5.17	5.51	103	110	65.0-130			6.37	20
Tetrachloroethene	5.00	3.96	4.07	79.2	81.4	72.0-132			2.74	20
Toluene	5.00	4.67	4.81	93.4	96.2	79.0-120			2.95	20
Trichloroethene	5.00	4.26	4.31	85.2	86.2	78.0-124			1.17	20
Vinyl chloride	5.00	4.04	4.18	80.8	83.6	67.0-131			3.41	20
o-Xylene	5.00	4.28	4.47	85.6	89.4	80.0-122			4.34	20
m&p-Xylenes	10.0	8.60	8.78	86.0	87.8	80.0-122			2.07	20
(S) Toluene-d8				*103*	*102*	*80.0-120*				
(S) 4-Bromofluorobenzene				*101*	*101*	*77.0-126*				
(S) 1,2-Dichloroethane-d4				*122*	*121*	*70.0-130*				

Method Blank (MB)

(MB) R3692624-3 08/13/21 11:28

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	ug/l		ug/l	ug/l
1,4-Dioxane	U		0.597	3.00
(S) Toluene-d8	*99.1*			*77.0-127*

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

(LCS) R3692624-1 08/13/21 10:28 • (LCSD) R3692624-2 08/13/21 10:48

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	ug/l	ug/l	ug/l	%	%	%			%	%
1,4-Dioxane	50.0	44.2	43.6	88.4	87.2	55.0-138			1.37	24
(S) Toluene-d8				*99.8*	*99.5*	*77.0-127*				

L1388441-03 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1388441-03 08/13/21 13:48 • (MS) R3692624-4 08/13/21 18:25 • (MSD) R3692624-5 08/13/21 18:45

Analyte	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
	ug/l	ug/l	ug/l	ug/l	%	%		%			%	%
1,4-Dioxane	50.0	ND	46.0	41.5	92.0	83.0	1	13.0-160			10.3	31
(S) Toluene-d8					*99.0*	*99.1*		*77.0-127*				

GLOSSARY OF TERMS

Guide to Reading and Understanding Your Laboratory Report

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

Results Disclaimer - Information that may be provided by the customer, and contained within this report, include Permit Limits, Project Name, Sample ID, Sample Matrix, Sample Preservation, Field Blanks, Field Spikes, Field Duplicates, On-Site Data, Sampling Collection Dates/Times, and Sampling Location. Results relate to the accuracy of this information provided, and as the samples are received.

Abbreviations and Definitions

MDL	Method Detection Limit.
ND	Not detected at the Reporting Limit (or MDL where applicable).
RDL	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
(S)	Surrogate (Surrogate Standard) - Analytes added to every blank, sample, Laboratory Control Sample/Duplicate and Matrix Spike/Duplicate; used to evaluate analytical efficiency by measuring recovery. Surrogates are not expected to be detected in all environmental media.
U	Not detected at the Reporting Limit (or MDL where applicable).
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state “ND” (Not Detected) or “BDL” (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Uncertainty (Radiochemistry)	Confidence level of 2 sigma.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

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.
J6	The sample matrix interfered with the ability to make any accurate determination; spike value is low.
V	The sample concentration is too high to evaluate accurate spike recoveries.

ACCREDITATIONS & LOCATIONS

Pace Analytical National 12065 Lebanon Rd Mount Juliet, TN 37122

Alabama	40660	Nebraska	NE-OS-15-05
Alaska	17-026	Nevada	TN000032021-1
Arizona	AZ0612	New Hampshire	2975
Arkansas	88-0469	New Jersey–NELAP	TN002
California	2932	New Mexico [1]	TN00003
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina [1]	DW21704
Georgia	NELAP	North Carolina [3]	41
Georgia [1]	923	North Dakota	R-140
Idaho	TN00003	Ohio–VAP	CL0069
Illinois	200008	Oklahoma	9915
Indiana	C-TN-01	Oregon	TN200002
Iowa	364	Pennsylvania	68-02979
Kansas	E-10277	Rhode Island	LAO000356
Kentucky [1 6]	KY90010	South Carolina	84004002
Kentucky [2]	16	South Dakota	n/a
Louisiana	AI30792	Tennessee [1 4]	2006
Louisiana	LA018	Texas	T104704245-20-18
Maine	TN00003	Texas [5]	LAB0152
Maryland	324	Utah	TN000032021-11
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	110033
Minnesota	047-999-395	Washington	C847
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	998093910
Montana	CERT0086	Wyoming	A2LA
A2LA – ISO 17025	1461.01	AIHA-LAP,LLC EMLAP	100789
A2LA – ISO 17025 [5]	1461.02	DOD	1461.01
Canada	1461.01	USDA	P330-15-00234
EPA–Crypto	TN00003		

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

* Not all certifications held by the laboratory are applicable to the results reported in the attached report.

* Accreditation is only applicable to the test methods specified on each scope of accreditation held by Pace Analytical.

Company Name/Address:
Resolute Environmental & Water Resources

1003 Weatherstone Parkway

Billing Information:
Accounts Payable
1003 Weatherstone Pkwy., Ste. 320
Woodstock, GA 30188

Report to: **Joe Booth**

Email To: **joe.booth@resoluteenv.com;tommy.jordan@re**

Project Description: Post Injection

City/State Collected:

Please Circle: PT MT CT ET

Phone: **404-358-8469**

Client Project #

Lab Project # **RESENVWGA-UGA MAS**

Collected by (print): Joe Booth

Site/Facility ID #

P.O. #

Collected by (signature):

Immediately Packed on Ice N ___ Y ✓

Rush? (Lab MUST Be Notified)
___ Same Day ___ Five Day
___ Next Day ___ 5 Day (Rad Only)
___ Two Day ___ 10 Day (Rad Only)
✓ Three Day

Quote #

Date Results Needed

Analysis / Container / Preservative

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	Diss. Metals 250mlHDPE-NoPres	NAICP 250mlHDPE-HNO3	SULFATE 125mlHDPE-NoPres	V8260LL14D 40mlAmb-HCl	V8260TCL 40mlAmb-HCl	Remarks	Sample # (lab only)
TMW-4	Grab	GW		8/11/21	1402	8	X	X	X	X	X		01
TMW-6	Grab	GW		8/11/21	1524	8	X	X	X	X	X		02
		GW				8	X	X	X	X	X		
		GW				8	X	X	X	X	X		
		GW				8	X	X	X	X	X		
		GW				8	X	X	X	X	X		
		GW				8	X	X	X	X	X		

Chain of Custody Page ___ of ___

Pace Analytical®

12065 Lebanon Rd Mount Juliet, TN 37122
Submitting a sample via this chain of custody constitutes acknowledgment and acceptance of the Pace Terms and Conditions found at: https://info.pacelabs.com/hubfs/pas-standard-terms.pdf

SDG # L1389712

E198

Table #

Acctnum: **RESENVWGA**

Template: **T192960**

Prelogin: **P865934**

PM: **526 - Chris McCord**

PB: 8/6/21 MM

Shipped Via: **FedEX Ground**

* Matrix:
SS - Soil **AIR** - Air **F** - Filter
GW - Groundwater **B** - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other_____

Remarks:

pH _____ Temp _____

Flow _____ Other _____

Samples returned via: ___ UPS ✓ FedEx ___ Courier _____

Tracking # 5163 7715 4093

Sample Receipt Checklist

COC Seal Present/Intact:	NP	Y / N
COC Signed/Accurate:		Y / N
Bottles arrive intact:		Y / N
Correct bottles used:		Y / N
Sufficient volume sent:		Y / N
If Applicable		
VOA Zero Headspace:		Y / N
Preservation Correct/Checked:		Y / N
RAD Screen <0.5 mR/hr:		Y / N

	Date:	Time:		
Relinquished by: (Signature)	8/11/21	1730	Received by: (Signature) FedEx	Trip Blank Received: Yes / No HCL / MeoH TBR
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Temp: 2.0+0.2=2.0 °C Bottles Received: 16
Relinquished by: (Signature)	Date:	Time:	Received for lab by: (Signature)	Date: 8-12-21 Time: 9:00

If preservation required by Login: Date/Time

Hold:

Condition: NCF / OK